Program of the Sessions

Atlanta, Georgia, January 4–7, 2017

Monday, January 2

AMS Short Course on Random Growth Models, Part I

9:00 AM – 4:30 PM	M301, Marquis Level, Marriott Marquis

Organizers:	**Michael Damron**, Georgia Institute of Technology
	Firas Rassoul-Agha, University of Utah
	Timo Seppäläinen, University of Wisconsin at Madison

8:00AM	Registration
9:00AM (1)	*Introduction to random growth models, I.* **Michael Damron**, Georgia Institute of Technology (1125-60-3158)
10:15AM	Break
10:45AM (2)	*Introduction to random growth models, II.* **Michael Damron**, Georgia Institute of Technology
NOON	Break
1:30PM (3)	*Infinite geodesics, asymptotic directions, and Busemann functions.* **Jack Hanson**, The City College of New York (1125-60-3159)
3:15PM	Break

3:15PM (4)	*Concentration in first-passage percolation.* **Philippe Sosoe**, Harvard University (1125-60-3157)

NSF-EHR Grant Proposal Writing Workshop

3:00 PM – 6:00 PM	A707, Atrium Level, Marriott Marquis

AMS Short Course Reception

4:30 PM – 5:30 PM	M302, Marquis Level, Marriott Marquis

Tuesday, January 3

AMS Department Chairs Workshop

8:00 AM – 6:30 PM	M103, M104 & M105, Marquis Level, Marriott Marquis

Presenters:	**Malcolm Adams**, University of Georgia
	Matthew Ando, University of Illinois at Urbana-Champaign
	Krista Maxson, University of Science & Arts of Oklahoma
	Douglas Mupasiri, University of Northern Iowa

The time limit for each AMS contributed paper in the sessions is ten minutes. The time limit for each MAA contributed paper varies. In the Special Sessions the time limit varies from session to session and within sessions. To maintain the schedule, time limits will be strictly enforced.

For papers with more than one author, an asterisk follows the name of the author who plans to present the paper at the meeting.

Papers flagged with a solid triangle (▶) have been designated by the author as being of possible interest to undergraduate students.

Abstracts of papers presented in the sessions at this meeting will be found in Volume 38, Issue 1 of *Abstracts of papers presented to the American Mathematical Society*, ordered according to the numbers in parentheses following the listings. The middle two digits, e.g., 897-**20**-1136, refer to the Mathematical Reviews subject classification assigned by the individual author. Groups of papers for each subject are listed chronologically in the *Abstracts*. The last one to four digits, e.g., 897-20-**1136**, refer to the receipt number of the abstract; abstracts are further sorted by the receipt number within each classification. MAA abstracts are listed toward the back of the issue sorted by session name.

AMS Short Course on Random Growth Models, Part II

9:00 AM – 4:30 PM M301, Marquis Level, Marriott Marquis

Organizers: **Michael Damron**, Georgia Institute of Technology
Firas Rassoul-Agha, University of Utah
Timo Seppäläinen, University of Wisconsin at Madison

9:00AM (5) *Busemann functions, geodesics, and the competition interface for directed percolation.*
Firas Rassoul-Agha, University of Utah (1125-60-3130)

10:15AM Break

10:45AM (6) *Stationary versions and fluctuation exponents for the exactly solvable stochastic corner growth model.*
Timo Seppäläinen, University of Wisconsin-Madison (1125-60-3108)

NOON Break

2:00PM (7) *KPZ fluctuations in exactly solvable models, I.*
Ivan Z. Corwin, Columbia University (1125-60-3107)

2:45PM Break

3:15PM (8) *KPZ fluctuations in exactly solvable models, II.*
Ivan Z. Corwin, Columbia University (1125-60-3179)

MAA Board of Governors

9:00 AM – 5:00 PM Imperial Ballroom A, Marquis Level, Marriott Marquis

AMS Council

2:30 PM – 10:00 PM Imperial Ballroom B, Marquis Level, Marriott Marquis

Joint Meetings Registration

3:00 PM – 7:00 PM Grand Hall Lobby, Exhibit Level, Hyatt Regency

Advanced registration will remain open until 7:30 pm

Email Center

3:00 PM – 8:00 PM Exhibit Level Prefunction Area, Hyatt Regency

Wednesday, January 4

MAA Minority Chairs Meeting

7:00 AM – 8:45 AM University, Conference Level, Hyatt Regency

Joint Meetings Registration

7:30 AM – 6:00 PM Grand Hall Lobby, Exhibit Level, Hyatt Regency

Email Center

7:30 AM – 10:00 PM Exhibit Level Prefunction Area, Hyatt Regency

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, I

8:00 AM – 10:50 AM International 8, International Level, Marriott Marquis

Organizers: **Darren A. Narayan**, Rochester Institute of Technology

Tamas Forgacs, California State University, Fresno

Ugur Abdulla, Florida Institute of Technology

8:00AM ► (9) *Ballast Cleaning Scheduling Optimization.*
Meghan Stuart*, University of Tennessee, **Jorge Cisneros Paz**, The University of Texas Rio Grande Valley, **María José Pérez Pereda**, Instituto Tecnológico Autónomo de México, and **Navdha Malhotra**, Delhi Technological University (1125-00-618)

8:30AM ► (10) *Isoperimetry in Euclidean Space with Different Perimeter and Volume Densities.*
Leo Di Giosia, Lewis & Clark College, **Jahanger Habib**, Williams College, **Lea Kenigsberg***, Stony Brook University, **Weitao Zhu** and **Dylinger Pittman**, Williams College (1125-51-750)

9:00AM ► (11) *Second Minimal Orbits, Sharkovski Ordering, and Universality in Chaos.*
Ugur G. Abdulla, Florida Institute of Technology, **Rashad U Abdulla***, University of Pennsylvania, **Emily Ribando-Gros**, Louisiana State University, **Muhammad U Abdulla** and **Naveed Iqbal**, Florida Institute of Technology (1125-37-90)

9:30AM ► (12) *Qualitative Properties of Solutions to the Nonlinear Parabolic PDEs with Double-Degenerate Fast Diffusion.*
Ugur G. Abdulla, Florida Institute of Technology, **Montie Avery**, University of New Mexico, **Jian Du**, Florida Institute of Technology, **Naba Mukhtar***, Bucknell University, and **Adam Prinkey**, Florida Institute of Technology (1125-35-91)

10:00AM ► (13) *Evolution of Free Boundaries for the Nonlinear Fokker-Planck Equation with Reaction.*
Ugur G. Abdulla, **Lamees Alzaki**, Florida Institute of Technology, **Robert Balkin***, Colorado School of Mines, **Jian Du**, Florida Institute of Technology, and **Elizabeth Schloss**, Auburn University (1125-35-92)

10:30AM ► (14) *Fréchet Differentiability in Optimal Control of the Stefan Problem.*
Ugur G. Abdulla, Florida Institute of Technology, **R. Beekie***, University of Minnesota, Twin Cities, **V. Bukshtynov**, **E. Cosgrove**, **J. Jones**, **S. Seif**, Florida Institute of Technology, and **N. Wubshet**, Augustana University (1125-35-93)

AMS Special Session on Analysis of Fractional, Stochastic, and Hybrid Dynamic Systems and their Applications, I

8:00 AM – 10:50 AM   M301, Marquis Level, Marriott Marquis

Organizers: **Aghalaya S. Vatsala**, University of Louisiana at Lafayette

Gangaram S. Ladde, University of South Florida

John R. Graef, University of Tennessee at Chattanooga

8:00AM (15) *Monotone iterative tehniques for Riemann Liouville fractional integro–differential equations with initial condition.*
J. Diego Ramirez*, Savannah State University, and **Zachary Denton**, North Carolina A&T University (1125-34-530)

8:30AM (16) *Weak solutions for nonlinear Neumann boundary value problems with $p(x)$-Laplacian operators.*
Lingju Kong, University of Tennessee at Chattanooga (1125-35-753)

9:00AM (17) *The existence of positive solutions of a fractional boundary value problem.*
John R Graef, **Lingju Kong**, University of Tennessee at Chattanooga, **Qingkai Kong**, Northern Illinois University, and **Min Wang***, Rowan University (1125-34-832)

9:30AM ► (18) *Parameter Identification For The SEIRS Epidemic Model: Case Study Influenza.* Preliminary report.
Olusegun Michael Otunuga, Marshall University (1125-37-930)

10:00AM ► (19) *A Generalized Stochastic SEIRS Epidemic Dynamic Model for Vector-borne Diseases with three Distributed Delays and Nonlinear Incidence.*
D Wanduku, Georgia Southern University (1125-60-941)

10:30AM ► (20) *Mutli-Cultural Networks Under Internal and External Stochastic Perturbations.* Preliminary report.
Kristina B. Hilton* and **G. S. Ladde**, University of South Florida (1125-91-1038)

AMS Special Session on Analytical and Computational Studies in Mathematical Biology, I

8:00 AM – 10:50 AM   L405 & L406, Lobby Level, Marriott Marquis

Organizers: **Yanyu Xiao**, University of Cincinnati

Xiang-Sheng Wang, University of Louisiana at Lafayette

8:00AM (21) *Stabilization in a Chemostat with Sampled and Delayed Measurements.*
Michael Malisoff, Louisiana State University (1125-92-156)

8:30AM ► (22) *Modeling Multi-Epitope HIV/CTL Immune Response Dynamics and Evolution.*
Cameron J Browne, University of Louisiana at Lafayette (1125-92-793)

9:00AM ► (23) *Modeling environmental transmission of MAP infection.*
Suzanne Lenhart*, University of Tennessee and NIMBioS, **Kokum DeSilva**, University of Peradeniya, Sri Lanka, and **Shigetoshi Eda**, U of Tennessee, Forestry, Wildlife and Fisheries (1125-92-451)

9:30AM (24) *A Model for the Interaction of Phytoplankton Aggregates and the Environment: Approximation and Parameter Estimation.*
Azmy S. Ackleh*, University of Louisiana at Lafayette, and **Robert Miller**, C. H. Fenstermaker & Associates, L.L.C. (1125-92-1836)

10:00AM (25) *From Fibonacci to Alfred Lotka and beyond: Modeling the dynamics of population and age-structures.*
Arni S.R. Srinivasa Rao*, Augusta University, and **James R. Carey**, University of California, Davis (1125-92-160)

10:30AM (26) *Age-structure model with periodic mature probability.* Preliminary report.
Xiang-Sheng Wang, University of Louisiana at Lafayette (1125-92-2216)

AMS Special Session on Arithmetic Properties of Sequences from Number Theory and Combinatorics, I

8:00 AM – 10:50 AM   M101, Marquis Level, Marriott Marquis

Organizers: **Eric Rowland**, Hofstra University

Armin Straub, University of South Alabama

8:00AM ▶ (27) *4-Shadows in q-Series, the Kimberling Index, and Garden of Eden Partitions.* **George E. Andrews**, Pennsylvania State University (1125-05-1142)

8:30AM ▶ (28) *The Andrews spt-function mod 4.* Preliminary report. **Frank Garvan**, University of Florida (1125-11-1585)

9:00AM ▶ (29) *Using the "Freshman's Dream" to Prove Combinatorial Congruences.* **Moa Apagodu***, Virginia Commonwealth University, and **Doron Zeilberger**, Rutgers University (1125-11-666)

9:30AM ▶ (30) *Combinatorial Identities via Matrix Factorization.* **Marc Chamberland**, Grinnell College (1125-33-571)

10:00AM ▶ (31) *Weighted Partition Results Inspired by Nathan Fine's False Theta Identities.* **Ali Kemal Uncu**, University of Florida (1125-05-971)

10:30AM ▶ (32) *Companions and generalizations of Göllnitz's "big" partition theorem.* Preliminary report. **Terence Coelho**, **Jongwon Kim** and **Matthew C. Russell***, Rutgers, The State University of New Jersey (1125-11-2202)

AMS Special Session on Bases in Function Spaces: Sampling, Interpolation, Expansions and Approximations, I

8:00 AM – 10:50 AM   **Embassy D, International Tower, LL2, Hyatt Regency**

Organizers: **Shahaf Nitzan**, Georgia Institute of Technology

Christopher Heil, Georgia Institute of Technology

Alexander V. Powell, Vanderbilt University

8:00AM (33) *Lipschitz Properties for Deep Convolutional Networks.* **Radu Balan**, University of Maryland, **Maneesh Singh**, Verisk Analytics, and **Dongmian Zou***, University of Maryland (1125-41-912)

8:30AM ▶ (34) *A Learning Theory Approach to Compressive Sensing.* **Scott Spencer**, Georgia Tech (1125-60-767)

9:00AM (35) *Group frames and the theory of frame multiplication.* Preliminary report. **Travis D Andrews**, Department of Defense, **John J. Benedetto***, Norbert Wiener Center, Dept. of Mathematics, U. Maryland, College Park, and **Jeffrey J Donatelli**, Lawrence Livermore National Laboratory (1125-43-69)

9:30AM (36) *Optimal polynomial approximants in Dirichlet spaces.* **Catherine Beneteau**, University of South Florida (1125-30-1248)

10:00AM ▶ (37) *The discretization problem for continuous frames and coherent states.* **Daniel Freeman*** and **Darrin Speegle**, St Louis University (1125-46-835)

10:30AM ▶ (38) *On some recent developments related to the Fuglede conjecture.* **Alex Iosevich**, University of Rochester (1125-42-350)

AMS Special Session on Coding Theory for Modern Applications, I

8:00 AM – 10:50 AM   **M106 & M107, Marquis Level, Marriott Marquis**

Organizers: **Christine A. Kelley**, University of Nebraska-Lincoln

Iwan M. Duursma, University of Illinois Urbana-Champaign

Gretchen L. Matthews, Clemson University

8:00AM (39) *Repairing Reed-Solomon Codes.* **Venkatesan Guruswami**, Carnegie Mellon University, and **Mary Wootters***, Stanford (1125-68-975)

9:00AM (40) *Maximally recoverable codes.* **Parikshit Gopalan**, VMware Research, **Guangda Hu**, Google, **Swastik Kopparty**, **Shubhangi Saraf**, Rutgers University, **Carol Wang**, National University of Singapore, and **Sergey Yekhanin***, Microsoft Research (1125-68-2462)

9:30AM ▶ (41) *Locally-testable and locally-decodable codes.* **Noga Ron-Zewi**, Ben-Gurion University (1125-68-1242)

10:00AM (42) *Communication Efficient Secret Sharing.* **Wentao Huang**, California Institute of Technology, **Michael Langberg**, The State University of New York at Buffalo, **Joerg Kliewer***, New Jersey Institute of Technology, and **Jehoshua Bruck**, California Institute of Technology (1125-94-1508)

10:30AM ▶ (43) *Algorithms for Storage Capacity: An Information Theoretic Analogue of Vertex Cover.* **Arya Mazumdar**, University of Massachusetts Amherst (1125-94-1462)

AMS Special Session on Control and Long Time Behavior of Evolutionary PDEs, I

8:00 AM – 10:50 AM   **Embassy F, International Tower, LL2, Hyatt Regency**

Organizers: **Louis Tebou**, Florida International University

Luz de Teresa, Instituto de Matemáticas, UNAM

8:00AM (44) *Semigroup Wellposedness of a Compressible Fluid-Structure PDE Interactive Model.* **George Avalos**, University of Nebraska-Lincoln (1125-35-2294)

9:00AM (45) *The role of structural viscosity in poro-visco-elastic models.* **Lorena Bociu**, NC State University (1125-35-1917)

9:30AM (46) *Exponential Attractors for Fluttering Plate Models.* **Irena Lasiecka**, University of Memphis, and **Justin T Webster***, College of Charleston (1125-35-580)

10:00AM (47) *Global Wellposedness and Uniform Stability of a Quasilinear Thermo-elastic PDE system.* **Irena Lasiecka**, Distinguished University Professor and Chair, Department of Mathematical Sciences, University of Memphis, **Michael Pokojovy**, Postdoctoral researcher, Department of Mathematics, Karlsruhe Institute of Technology, Germany, and **Xiang Wan***, Graduate Student, Department of Mathematics, University of Virginia (1125-35-1206)

10:30AM (48) *Uniform stability near a non-trivial equilibrium of a nonlinear fluid-viscoelastic structure interaction.* Preliminary report. **Yongjin Lu**, Virginia State University (1125-35-2573)

AMS Special Session on Gaussian Graphical Models and Combinatorial Algebraic Geometry, I

8:00 AM – 10:50 AM — International 4, International Level, Marriott Marquis

Organizers: **Rainer Sinn**, Georgia Institute of Technology
Seth Sullivant, North Carolina State University
Josephine Yu, Georgia Institute of Technology

8:00AM (49) *Positive semidefinite matrix completion and algebraic geometry.* Preliminary report. **Grigoriy Blekherman**, **Rainer Sinn***, Georgia Institute of Technology, and **Mauricio Velasco**, Universidad de los Andes and Universidad de la Republica (1125-05-2360)

8:30AM (50) *The maximum likelihood threshold of a graph.* **Elizabeth Gross***, San Jose State University, and **Seth Sullivant**, North Carolina State University (1125-62-1991)

9:00AM (51) *Maximum Likelihood Threshold of Gaussian Graphical Models.* Preliminary report. **Grigoriy Blekherman*** and **Rainer Sinn**, Georgia Tech (1125-15-1341)

9:30AM ▶ (52) *Combinatorial Conditions for Generic Identification in Structural Equation Models.* Preliminary report. **Luca Weihs*** and **Mathias Drton**, University of Washington, Seattle (1125-14-1854)

10:00AM ▶ (53) *Critical exponents of graphs.* **Dominique Guillot***, **Mahya Ghandehari**, University of Delaware, and **Tina Torkaman**, Sharif University of Technology (1125-52-1814)

10:30AM ▶ (54) *Slow inconsistent statistics.* Preliminary report. **Jason Morton**, Penn State (1125-62-764)

AMS Special Session on Group Representations and Cohomology, I

8:00 AM – 10:50 AM — A705, Atrium Level, Marriott Marquis

Organizers: **Hung Nguyen**, The University of Akron
Nham Ngo, The University of Arizona
Andrei Pavelescu, University of South Alabama
Paul Sobaje, University of Georgia

8:00AM (55) *Update on the GLS project.* **Ronald Solomon**, The Ohio State University (1125-20-100)

8:30AM (56) *On a Conjecture Of Navarro and Self-Normalizing Sylow 2-Subgroups in Type A.* **Amanda A Schaeffer Fry***, Metropolitan State University of Denver, and **Jay Taylor**, University of Arizona (1125-20-919)

9:00AM (57) *New characteristic structure from filters.* **Joshua Maglione**, Colorado State University (1125-20-604)

9:30AM (58) *Support varieties for Lie superalgebras and supergroups in positive characteristic.* **Christopher M Drupieski**, DePaul University, and **Jonathan R Kujawa***, University of Oklahoma (1125-17-630)

10:00AM (59) *Rational Characters and Rational Conjugacy Classes in Finite Groups.* **Dan Rossi**, University of Arizona (1125-20-1857)

10:30AM (60) *Character triple isomorphisms and elements of the Brauer-Clifford group.* **Alexandre Turull**, University of Florida (1125-20-1182)

AMS Special Session on Harmonic Analysis (In Honor of Gestur Olafsson's 65th Birthday), I

8:00 AM – 10:50 AM   **Inman, Conference Level, Hyatt Regency**

Organizers: **Jens Christensen**, Colgate University

Susanna Dann, Technische Universität Wien-Vienna, Austria

Panelists: **Matthew Dawson**, Centro de Investigación en Matemáticas

8:00AM *On polytopes with congruent projections*
▶ (61) *or sections.*
Sergii Myroshnychenko* and **Dmitry Ryabogin**, Kent State University (1125-51-609)

8:30AM *Multiplicity-free restrictions of*
(62) *holomorphic discrete series and Toeplitz operators.*
Raul Quiroga-Barranco, Cimat Mexico (1125-47-1367)

9:00AM *Radial parts of differential operators*
(63) *and a one-parameter family of hypergeometric functions of type BC.*
E. K. Narayanan, Indian Institute of Science, Bangalore, and **Angela Pasquale***, Université de Lorraine (1125-43-1132)

9:30AM *Real spherical spaces and their*
(64) *classification.*
Henrik Schlichtkrull, Dept. of Math., U. of Copenhagen, Denmark (1125-22-1748)

10:00AM *Conformally Covariant Symmetry*
(65) *Breaking Operators on Differential Forms and Some Applications.*
Toshiyuki Kobayashi, Kavli IPMU and Graduate School of Mathematical Sciences, The University of Tokyo (1125-22-585)

10:30AM *Eisenstein Integrals and C functions.*
(66) **Sigurdur Helgason**, MIT (1125-43-601)

AMS Special Session on Hopf Algebras and their Actions, I

8:00 AM – 10:50 AM   **International 3, International Level, Marriott Marquis**

Organizers: **Henry Tucker**, University of California, San Diego

Susan Montgomery, University of Southern California - Los Angeles

Siu-Hung Ng, Louisiana State University

8:00AM *Hopf algebras of diagonal type.*
(67) **Agustín García Iglesias**, Universidad Nacional de Córdoba - CONICET (1125-16-526)

8:30AM *Invariant subrings of noetherian graded*
(68) *down-up algebras under group coactions.*
Ellen E. Kirkman*, Wake Forest University, **Jianmin Chen**, Xiamen University, Xiamen, Fujian, China, and **James J. Zhang**, University of Washington, Seattle (1125-16-2130)

9:00AM *McKay Correspondence for Hopf actions.*
(69) **Kenneth Chan**, University of Washington, **Ellen Kirkman**, Wake Forest University, **Chelsea Walton***, Temple University, and **James Zhang**, University of Washington (1125-16-906)

9:30AM *Quantum groups associated to a pair of*
(70) *preregular forms.* Preliminary report.
Alexandru Chirvasitu, University of Washington, **Chelsea Walton** and **Xingting Wang***, Temple University (1125-16-1386)

10:00AM *A Hopf-algebraic approach to the study*
(71) *of algebraic supergroups.*
Taiki Shibata, Department of Mathematical and Statistical Sciences, University of Alberta (1125-16-2158)

10:30AM *Certain families of Polynomials arising in*
(72) *the study of hyperelliptic Lie algebras.*
Ben Lewis Cox*, College of Charleston, and **Kaiming Zhao**, Wilfrid Laurier University and Hebei Normal (Teachers) University (1125-17-2575)

AMS Special Session on Nonlinear Systems and Applications, I

8:00 AM – 10:50 AM   **M103 & 104, Marquis Level, Marriott Marquis**

Organizer: **Wenrui Hao**, Ohio State University

8:00AM *Mathematical Models for Cells'*
▶ (73) *Interactions in Tumor Micro-enviroment.*
Leili Shahriyari, Mathematical Biosciences Institute (1125-92-1328)

8:30AM *Quantifying quasi-equilibrium and*
(74) *non-equilibrium properties of biomolecule systems.*
Huan Lei*, **Nathan Baker**, Pacific Northwest National Laboratory, and **Xiantao Li**, Department of Mathematics, The Pennsylvania State University (1125-00-1200)

9:00AM *Mathematical Models of Malaria Control*
▶ (75) *Using ITNs.*
Ruijun Zhao, Minnesota State University, Mankato (1125-92-1291)

9:30AM *Analysis of a dissipative hyperbolic*
(76) *system arising from biology.*
Kun Zhao, Tulane University (1125-35-652)

10:00AM *Asymptotic Dynamics of Two Species*
(77) *Competition Systems.* Preliminary report.
Liang Kong, University of Illinois at Springfield (1125-35-1162)

10:30ᴀᴍ *Multiscale modeling for epidermis layer*
► (78) *formation and homeostasis.*
Huijing Du, University of Nebraska,
Lincoln (1125-35-810)

AMS Special Session on Problems in Partial Differential Equations, I

8:00 ᴀᴍ – 10:50 ᴀᴍ   **Spring, Conference
Level, Hyatt Regency**

Organizers: **Alex Himonas**, University of
Notre Dame

Dionyssios Mantzavinos,
State University of New York
at Buffalo

8:00ᴀᴍ *The Heat Kernel for Systems of Linear*
(79) *Elasticity.*
Justin L Taylor*, Murray State University,
Russell M Brown, University of
Kentucky, and **Seick Kim**, Yonsei
University (1125-35-2031)

8:30ᴀᴍ *Numerical Bifurcation Analysis of a*
(80) *Coupled Elliptic System.*
James Dilts*, **Michael Holst**, **Tamara
Kozareva**, University of California,
San Diego, and **David Maxwell**, University of
Alaska, Fairbanks (1125-35-2499)

9:00ᴀᴍ *Regularity properties of the cubic NLS*
(81) *equation and the Zakharov system on the
half-line.*
M Burak Erdogan* and **Nikolaos
Tzirakis**, University of Illinois at Urbana
Champaign (1125-35-1668)

9:30ᴀᴍ *Spectral Stability for Classical Periodic*
(82) *Waves of the Ostrovsky and Short Pulse
Models.* Preliminary report.
Milena Stanislavova*, University of
Kansas, **Sevdzhan Hakkaev**, Istanbul
Aydin University, Istanbul, Turkey, and
Atanas Stefanov, University of Kansas
(1125-35-1539)

10:00ᴀᴍ *On solitary waves for the Whitham*
(83) *equation.*
Atanas Stefanov*, University of Kansas,
and **Mats Ehrnstroem**, Norwegian
Institute of Science and Technology
(1125-35-911)

10:30ᴀᴍ *On the analysis of integrable evolution*
(84) *equations.*
Dionyssios Mantzavinos*, University of
Massachusetts Amherst, and **Alex
Himonas**, University of Notre Dame
(1125-35-1105)

AMS Special Session on Random Matrices, Random Percolation and Random Sequence Alignments, I

8:00 ᴀᴍ – 10:20 ᴀᴍ   **The Learning Center,
Ballroom Level, Hyatt Regency**

Organizers: **Ruoting Gong**, Illinois
Institute of Technology

Michael Damron, Georgia
Institute of Technology

8:00ᴀᴍ *Asymptotics in Sequence Comparison.*
(85) **Christian Houdre**, Georgia Institute of
Technology (1125-60-397)

9:00ᴀᴍ *The Length of the Longest Common*
(86) *Subsequences of Two Independent
Mallows Permutations.* Preliminary
report.
Ke Jin, University of Delaware
(1125-40-698)

9:30ᴀᴍ *Concentration of Geodesics in Directed*
(87) *Bernoulli Percolation.* Preliminary report.
Chen Xu* and **Christian Houdre**,
Georgia Institute of Technology
(1125-60-569)

10:00ᴀᴍ *Connections between random matrices*
(88) *and pattern-avoiding permutations.*
Douglas Rizzolo, University of Delaware
(1125-60-2145)

AMS Special Session on Recent Advances in Mathematical Biology, I

8:00 ᴀᴍ – 10:50 ᴀᴍ   **International C,
International Level, Marriott Marquis**

Organizers: **Zhisheng Shuai**, University
of Central Florida

Guihong Fan, Columbus
State University

Andrew Nevai, University of
Central Florida

Eric Numfor, Augusta
University

8:00ᴀᴍ *Do fatal infectious diseases eradicate*
(89) *host species? Epidemic perspective.*
Preliminary report.
Alex Farrell, **James P. Collins**, Arizona
State University, **Amy L. Greer**, University
of Guelph, and **Horst R. Thieme***,
Arizona State University (1125-92-1102)

8:30ᴀᴍ *Discrete-time models for interactive wild*
(90) *and sterile mosquito populations and
impact of releases of sterile mosquitoes
on malaria transmission.* Preliminary
report.
Jia Li* and **Yang Li**, Department of
Mathematical Sciences, University of
Alabama in Huntsville (1125-92-2287)

9:00ᴀᴍ *Mathematical models of*
(91) *Ebola—Consequences of underlying
assumptions.*
Zhilan Feng*, **Yiqiang Zheng**, Purdue
University, **Nancy Hernandez-Ceron**,
University of Calgary, **Henry Zhao**,
Columbia University, **John W Glasser** and
Andrew N Hill, Centers for Disease
Control and Prevention (1125-92-1071)

9:30ᴀᴍ *Network-based modeling for*
► (92) *chikungunya spread in Dominica.*
Heidi E Brown*, University of Arizona,
College of Public Health, **Joceline Lega**,
Daoqin Tong and **Wangshu Mu**,
University of Arizona (1125-92-3084)

10:00AM *Mathematical models to evaluate*
► (93) *morphine–altered antibody responses on*
        HIV Dynamics.
        Naveen K. Vaidya, University of Missouri
        - Kansas City (1125-92-2029)

10:30AM *Management Strategies in a Malaria*
► (94) *Model Combining Human and*
        Transmission-blocking Vaccines.
        Jemal Mohammed-Awel, Valdosta State
        University, **Ruijun Zhao**, Minnesota State
        University, Mankato, **Eric Numfor***,
        Augusta University, and **Suzanne**
        Lenhart, University of Tennessee,
        Knoxville (1125-92-2896)

AMS Special Session on Sheaves in Topological Data Analysis, I

8:00 AM – 10:50 AM   International 10,
          International Level, Marriott Marquis

Organizers: **Mikael**
             Vejdemo-Johansson, CUNY
             College of Staten Island
             Elizabeth Munch, University
             at Albany, SUNY
             Martina Scolamiero, École
             polytechnique fédérale de
             Lausanne

8:00AM *Persistent homology and algebraic*
► (95) *foundations: a survey.*
        Mikael Vejdemo-Johansson, CUNY
        College of Staten Island (1125-55-210)

9:00AM *The Role of (Co)Sheaves in TDA.*
  (96) *Preliminary report.*
        Justin M Curry, Duke University
        (1125-55-1147)

9:30AM *The interleaving distance for posets.*
  (97) **Magnus Bakke Botnan**, Technische
        Universität München, **Justin Curry**,
        Duke University, and **Elizabeth**
        Munch*, University at Albany - SUNY
        (1125-55-1151)

10:00AM *Local topological analysis of complex*
► (98) *systems.*
        Michael Robinson, American University
        (1125-18-626)

10:30AM *Computations for Local and Pseudo*
  (99) *Sections in Real-world Sheaves.*
        Preliminary report.
        Cliff Joslyn, **Kathleen Nowak**, **Brenda**
        Praggastis, **Emilie Purvine***, Pacific
        Northwest National Laboratory, and
        Michael Robinson, American University
        (1125-55-1181)

AMS Special Session on Statistical Methods in Computational Topology and Applications, I

8:00 AM – 10:50 AM   International 9,
          International Level, Marriott Marquis

Organizers: **Yu-Min Chung**, College of
             William & Mary
             Sarah Day, College of
             William & Mary

8:00AM *Topological Roughness of the Human Red*
► (100) *Blood Cell.* Preliminary report.
        Yu-Min Chung*, College of William and
        Mary, **Madalena Costa**, Beth Israel
        Deaconess Medical Center, Harvard
        Medical School, and **Sarah Day**, College
        of William and Mary (1125-92-2022)

8:30AM *Topological Descriptors.* Preliminary
► (101) report.
        Brittany Terese Fasy, Montana State
        University (1125-55-2759)

9:00AM *Statistical Inference on Topological Data*
  (102) *Analysis.* Preliminary report.
        Jisu Kim, Carnegie Mellon University
        (1125-55-2901)

9:30AM *Constructing large-scale brain networks*
  (103) *with billions of connections via persistent*
        homology. Preliminary report.
        Moo K Chung, University of
        Wisconsin-Madison (1125-55-60)

10:00AM *Topological structures in human brain*
► (104) *networks.*
        Ann Sizemore, Broad Institute of MIT
        and Harvard, **Chad Giusti***, **Richard F**
        Betzel and **Danielle S Bassett**, University
        of Pennsylvania (1125-55-2329)

10:30AM *Modeling shapes and surfaces.*
  (105) **Sayan Mukherjee***, **Tingran**
        Gao, Duke University, **Katherine**
        Turner, EPFL, **Doug Boyer**, Duke
        University, **Washington Mio**, Florida
        State University, and **Jacek Brodzki**,
        Southampton University (1125-54-915)

AMS Special Session on Stochastic Matrices and Their Applications

8:00 AM – 10:50 AM   **Embassy E, International**
          Tower, LL2, Hyatt Regency

Organizers: **Selcuk Koyuncu**, University
             of North Georgia
             Lei Cao, Georgian Court
             University

8:00AM *Exploring a Class of Finite, Tridiagonal,*
► (106) *Stochastic Matrices.*
        Alan C. Krinik*, **Uyen Nguyen**, **Ali**
        Oudich, **Pedram Ostadhassanpanjehali**,
        California State Polytechnic University,
        Pomona, and **Ryan Kmet**, University Of
        Minnesota (1125-15-442)

8:30AM *The circular law for eigenvalues of*
  (107) *random stochastic matrices.*
        Hoi Huu Nguyen, The Ohio State
        University (1125-60-2446)

9:00AM *The Nonnegative Single Inverse*
  (108) *Eigenvalue Problem for Row Stochastic*
        and Doubly Stochastic Matrices.
        Charles Johnson, College of William and
        Mary (1125-15-3061)

9:30AM *A Minimal Completion of Doubly*
► (109) *Substochastic Matrix.*
        Lei Cao*, Georgian Court University,
        Selcuk Koyuncu and **Timmothy Ryan**
        Parmer, University of North Georgia
        (1125-15-1757)

10:00AM *On the number of vertices of the*
(110) *stochastic tensor polytope.*
Zhongshan Li*, Georgia State University,
Fuzhen Zhang, Nova Southeaster
University, and **Xiaodong Zhang**,
Shanghai Jiao Tong University
(1125-15-2133)

10:30AM *Sub-defect of Product of Doubly*
(111) *Substochastic Matrices.*
Selcuk Koyuncu*, University of North
Georgia, and **Lei Cao**, Georgian Court
University (1125-15-2402)

AMS Special Session on Topology, Representation Theory, and Operator Algebras (A Tribute to Paul Baum), I

8:00 AM – 10:50 AM   Dunwoody, Conference
                         Level, Hyatt Regency

Organizers: **Efton Park**, Texas Christian
University

Jose Carrion, Texas
Christian University

8:00AM *Extended affine Weyl groups, the*
(112) *Baum-Connes correspondence and*
Langlands duality.
Roger Plymen, Mathematical Sciences,
University of Southampton, SO17 1BJ,
England (1125-19-348)

8:30AM *The Baum-Connes Conjecture and*
(113) *matching of D-brane charges.*
Jonathan M. Rosenberg, University of
Maryland (1125-19-1146)

9:00AM *Exactness and the Baum-Connes*
(114) *conjecture.*
Paul Baum, Penn State University, **Erik
Guentner** and **Rufus Willett***, University
of Hawaii at Manoa (1125-19-711)

9:30AM *Toeplitz operators on uniformly*
(115) *rectifiable domains.*
Michael E. Taylor, Math. Dept., UNC,
Chapel Hill NC (1125-35-555)

10:00AM *Toeplitz operators on singular spaces.*
(116) Preliminary report.
Peter Haskell, Mathematics Department,
Virginia Tech (1125-19-1426)

10:30AM *Topological String Junctions.*
(117) **Julius L. Shaenson**, University of
Pennsylvania (1125-51-2060)

AMS-MAA-ICHM Special Session on History of Mathematics, I

8:00 AM – 10:50 AM   International 7,
          International Level, Marriott Marquis

Organizers: **Adrian Rice**,
Randolph-Macon College

Sloan Despeaux, Western
Carolina University

Daniel Otero, Xavier
University

8:00AM *From "Vir Celeberrime" to*
▶ (118) *"Hochedelgebohner Herr": From Euler to*
Goldbach. Preliminary report.
Jordan Bell, University of Toronto, and
V. Frederick Rickey*, West Point
(1125-01-2107)

8:30AM *John Playfair's Approach to "the Practical*
▶ (119) *Parts of the Mathematics".* Preliminary
report.
Amy Ackerberg-Hastings, Rockville, MD
(1125-01-253)

9:00AM *The Lay of the American Mathematical*
▶ (120) *Landscape in the 1920s.* Preliminary
report.
Karen V. H. Parshall, University of
Virginia (1125-01-1220)

9:30AM *Solomon Lefschetz: The Man, The*
▶ (121) *Mathematics.* Preliminary report.
Della Dumbaugh, University of
Richmond (1125-01-1032)

10:00AM *Scientific Diplomacy & Identity: Richard*
(122) *Courant in the 20th Century.*
Brittany Shields, University of
Pennsylvania (1125-01-1959)

10:30AM *The Krieger-Nelson Prize Lectureship.*
▶ (123) **Laura E Turner**, Monmouth University
(1125-01-1134)

AMS Contributed Paper Session on Number Theory, I

8:00 AM – 10:55 AM   International 1,
          International Level, Marriott Marquis

8:00AM *On a Frobenius problem for polynomials.*
▶ (124) **Ricardo Conceicao***, Gettysburg College,
Rodrigo Gondim, Universidade Federal
Rural de Pernambuco, and **Miguel
Rodriguez**, Private Sector (1125-11-54)

8:15AM *Unnatural Hecke operators: The local*
(125) *arithmetic of special cycles on Unitary*
Shimura Varieties.
Ernest Hunter Brooks, École
Polytechnique Fédérale de Lausanne
(1125-11-62)

8:30AM Break

8:45AM *On Consecutive Primitive nth Roots of*
▶ (126) *Unity Modulo q.*
Thomas Brazelton, The Johns Hopkins
University, **Joshua Harrington**, Cedar
Crest College, **Siddarth Kannan***,
Pomona College, and **Matthew Litman**,
The Pennsylvania State University
(1125-11-310)

9:00AM *The Combinatorics of the Divisibility of*
▶ (127) *spt-overpartition Functions.*
Dennis Eichhorn, University of
California, Irvine (1125-11-2877)

9:15AM *Multiple Dirichlet Series and Average*
(128) *Orders.*
Thomas A Hulse*, Colby College, **Chan
Ieong Kuan**, Macau, China, **David
Lowry-Duda** and **Alexander Walker**,
Brown University (1125-11-467)

9:30AM *Computing the Laplace Eigenvalue and*
(129) *Level of Maass Cusp Forms.*
Paul Savala, Whittier College
(1125-11-499)

9:45AM *The Stern diatomic sequence $a(n)$ as a*
▶ (130) *function of the gaps between 1's in the*
binary expansion of n.
Valerio De Angelis, Xavier University of
Louisiana (1125-11-660)

10:00AM *Monodromy, Fermat Curves and Modular*
(131) *Symbols.*
Ozlem Ejder, University of Southern
California (1125-11-705)

10:15AM *Arithmetic properties of signed Selmer*
(132) *groups at non-ordinary primes.*
Jeffrey Hatley*, Union College, and
Antonio Lei, Laval University
(1125-11-824)

10:30AM *Jacobi's triple product, mock theta*
▶ (133) *functions, and the q-bracket of*
Bloch-Okounkov.
Robert Schneider, Emory University
(1125-11-880)

10:45AM *A Short Proof of Fermat's Last Theorem,*
▶ (134) *$x < z$ and $y < z$.*
Martin Burke, Manchester, England
(1125-11-945)

AMS Contributed Paper Session on Numerical Analysis and Computer Science, I

8:00 AM – 10:40 AM   Greenbriar, Conference
Level, Hyatt Regency

8:00AM *Numerical Treatment of Ill-posed Linear*
▶ (135) *Systems.* Preliminary report.
Elaheh Gorgin, Minot State University
(1125-00-1595)

8:15AM *Heavy Ball Minimal Residual Method for*
(136) *Least-squares Problems.*
Mei Yang* and **Ren-cang Li**, University
of Texas at Arlington (1125-65-143)

8:30AM *A relaxed positive semi-definite and*
▶ (137) *skew-Hermitian splitting preconditioner*
for non-Hermitian generalized saddle
point problems. Preliminary report.
Zhu Xinyun*, University of Texas of the
Permian Basin, **Hongtao Fan** and
Bing Zheng, Lanzhou University
(1125-65-260)

8:45AM *Integrating oscillatory Hamiltonian*
(138) *systems via a block algorithm with an*
automatic error estimate based on a
trigonometrically-fitted second derivative
extended backward differentiation
formula.
Fidele F Ngwane*, University of South
Carolina, Salkehatchie, and **Samuel N
Jator**, Austin Peay State University
(1125-65-313)

9:00AM *Frame Scalings: A Condition Number*
(139) *Approach.*
Pete Casazza, University of Missouri,
Columbia, and **Xuemei Chen***, University
of San Francisco (1125-65-329)

9:15AM *Numerical methods for non-local*
(140) *diffusion equation.*
Siwei Duo* and **Yanzhi Zhang**, Missouri
University of Science and Technology
(1125-65-480)

9:30AM *Numerical Approximation of a*
(141) *Variational Problem on a Bounded*
Domain involving the Fractional
Laplacian.
Wenyu Lei*, **Joseph E. Pasciak** and
Andrea Bonito, Texas A&M University
(1125-65-855)

9:45AM *Electrical Impedance Tomography*
▶ (142) *Imaging of Experimental Data Using a*
D-bar Method with an Optimized Prior.
Melody Alsaker, Gonzaga University
(1125-65-948)

10:00AM *Construction Methodology of Weighted*
(143) *Upwind Compact Scheme.*
Yinlin Dong*, University of Texas at
Arlington, and **Zhengjie Wang**, Houston,
TX (1125-65-1279)

10:15AM *A Numerical study of the Navier Stokes-α*
(144) *Deconvolution Model with Pointwise Mass*
Conservation.
Sean Ryan Breckling, University of
Nevada - Las Vegas (1125-65-1460)

10:30AM *A high resolution finite difference*
(145) *method for a model of structured*
Susceptible-Infected populations coupled
with the environment.
Azmy S. Ackleh, University of Louisiana
at Lafayette, **Baoling Ma**, Millersville
University, and **Tingting Tang***,
University of Louisiana at Lafayette
(1125-65-1429)

AMS Contributed Paper Session on Operator Theory, I

8:00 AM – 10:55 AM   International B,
International Level, Marriott Marquis

8:00AM *The demiclosedness principle for mean*
(146) *nonexpansive mappings.*
Torrey M Gallagher, Bucknell University
(1125-47-95)

8:15AM *Fractional Self Adjoint Operator Poincaré*
(147) *and Sobolev type Inequalities.*
George A Anastassiou, University of
Memphis (1125-47-158)

8:30AM *On the the numerical range of finite*
(148) *order elliptic automorphism composition*
operators.
Abdolaziz Abdollahi, Shiraz University,
Shiraz, Iran (1125-47-200)

8:45AM *Notes on ergodic theorems in*
(149) *non-commutative symmetric spaces.*
Genady Ya. Grabarnik, St. Jonh's
University (1125-47-242)

9:00AM *Mixed Bram-Halmos and Agler-Embry*
(150) *conditions.* Preliminary report.
George R Exner, Bucknell University
(1125-47-413)

9:15AM *Difference of two weighted composition*
(151) *operators on Bergman spaces.*
Soumyadip Acharyya*, Embry - Riddle
Aeronautical University Worldwide,
Daytona Beach, FL, and **Zhijian Wu**,
University of Nevada, Las Vegas, NV
(1125-47-529)

9:30AM Break

9:45AM *Structural results for von Neumann*
(152) *algebras arising from poly-hyperbolic*
groups and Burger-Mozes groups.
Sujan Pant, University of Iowa
(1125-47-1018)

10:00AM *Coincidence and Common Fixed Point*
(153) *Results for Generalized Nonlinear*
Contractions in Partial Metric Spaces.
Muhammad Akram*, Department of
Mathematics, Lock Haven University of
Pennsylvania, USA,, and **Shamaila**
Waheed, Kinnaird College for Women,
Lahore, Pakistan (1125-47-1109)

10:15AM *A Gleason solution model for row*
(154) *contractions.*
Robert T.W. Martin, University of Cape
Town (1125-47-1167)

10:30AM *On The Numerical Ranges of Composition*
▶ (155) *Operators Induced By Mappings With The*
Denjoy-Wolff Point On The Boundary.
William M. Higdon, Butler University
(1125-47-1282)

10:45AM *Essential spectra of weighted composition*
(156) *operators induced by non-invertible*
transformations.
Arkady K. Kitover, Rider University
(1125-47-1611)

MAA Session on Cryptology for Undergraduates, I

8:00 AM – 10:55 AM   **L401 & L402, Lobby**
Level, Marriott Marquis

Organizers: **Chris Christensen**,
Northern Kentucky
University

Joshua Holden,
Rose-Hulman Institute of
Technology

Robert Lewand, Goucher
College

8:00AM *Computer Implementations of Certain*
▶ (157) *Cryptographic Methods.* Preliminary
report.
Manmohan Kaur, Benedictine University
(1125-B1-1416)

8:20AM *Teaching Cryptology to Increase Interest*
▶ (158) *in Mathematics for Students Majoring in*
Non-Technical Disciplines and High
School Students.
Neil P. Sigmon*, Radford University, and
Rick E. Klima, Appalachian State
University (1125-B1-431)

8:40AM *Using Cryptology to Motivate the Study of*
▶ (159) *Functions.* Preliminary report.
Eleanor Farrington, Massachusetts
Maritime Academy (1125-B1-1523)

9:00AM *Enigma: A Combinatorial Analysis and*
▶ (160) *Maple Simulator.*
Rick Klima*, Appalachian State
University, and **Neil Sigmon**, Radford
University (1125-B1-417)

9:20AM *The Simulation and Cryptanalysis of*
▶ (161) *Rotor Ciphers.*
N. Paul Schembari, East Stroudsburg
University of PA (1125-B1-245)

9:40AM *Alan Turing and his Contributions to*
▶ (162) *Cryptology.* Preliminary report.
Tamara B Veenstra, University of
Redlands (1125-B1-2584)

10:00AM *Don't Forget (Enciphered) Codes.*
▶ (163) Preliminary report.
Chris Christensen, Northern Kentucky
University (1125-B1-1785)

10:20AM *Attacking Even Falser Addition.*
▶ (164) **Nathan M Dasenbrock-Gammon**,
Northern Kentucky University
(1125-B1-436)

10:40AM *Cryptology for first year students.*
(165) **Jennifer M. Magee**, University of Mary
Washington (1125-B1-2376)

MAA Session on Innovative Teaching through Recreational Mathematics, I

8:00 AM – 10:55 AM   **Embassy C, International**
Tower, LL2, Hyatt Regency

Organizers: **Matthew Jura**, Manhattan
College

Oscar Levin, University of
Northern Colorado

Tyler Markkanen,
Springfield College

8:00AM *The "mathemagical" classroom.*
▶ (166) **Tyler J Markkanen**, Springfield College
(1125-F5-2876)

8:20AM *Using the Mathematics in the Simpsons in*
▶ (167) *a First Year Seminar.* Preliminary report.
Maura A. Murray, Salem State University
(1125-F5-139)

8:40AM *The Surprising Mathematics Hidden*
▶ (168) *Inside the Trihexaflexagon: Using hinged*
polygons to teach group theory.
Preliminary report.
Tanya Cofer, College of Coastal Georgia
(1125-F5-1658)

9:00AM *Permutation games with signed and*
▶ (169) *circular permutations.*
Jennifer F. Vasquez*, The University
of Scranton, **Michael P. Allocca**,
Muhlenberg College, and **Steven T.**
Dougherty, The University of Scranton
(1125-F5-2557)

9:20AM *Using a Kiowa Game to Increase Student*
▶ (170) *Understanding of Expected Value.*
Jay A Malmstrom, Oklahoma City
Community College (1125-F5-1064)

9:40AM *Deal or No Deal in the classroom.*
(171) **Michael A. Jones**, Mathematical Reviews, **Brittany Shelton***, Albright College, and **Jennifer M. Wilson**, Eugene Lang College The New School for Liberal Arts (1125-F5-2464)

10:00AM *Using Games and Puzzles to Motivate and*
► (172) *Introduce Students to Mathematical Concepts and Strategies Underlying Complex Societal Applications.* **M. Reba*** and **D. Shier**, Clemson University (1125-F5-2224)

10:20AM *Instant Insanity: Using Colored Blocks to*
► (173) *Teach Graph Theory.* Preliminary report. **Stephen M. Adams**, Cabrini University (1125-F5-1329)

10:40AM *A Magic Trick That is Full of Induction.*
► (174) **Robert W. Vallin**, Lamar University (1125-F5-995)

MAA Session on Mathematics and the Arts, I

8:00 AM – 10:55 AM **A706, Atrium Level, Marriott Marquis**

Organizer: **Douglas Norton**, Villanova University

8:00AM *Creating Symmetric Designs and*
► (175) *Animations.* **James Walker**, **Emily Gullerud*** and **Claire Arneson**, University of Wisconsin – Eau Claire (1125-I1-264)

8:20AM *Bitwise Artwork.*
► (176) **Susan A. McBurney**, Western Springs, Illinois (1125-I1-327)

8:40AM *Linear momentum in pairs figure skating:*
► (177) *Mathematics behind the art of lifts.* **Maura Twillman*** and **Diana Cheng**, Towson University (1125-I1-198)

9:00AM *Dichromatic Dances.*
► (178) **Karl H. Schaffer**, De Anza College / MoveSpeakSpin (1125-I1-1731)

9:20AM *Sheets, tubes, and capsules constructed*
► (179) *from corner connected rectangles.* **David A Reimann*** and **Liliya Chernysheva**, Albion College (1125-I1-97)

9:40AM *Math Through Crochet, Quilts, and*
► (180) *Temari: A Liberal Arts Math Course.* **Debra K. Borkovitz**, Wheelock College (1125-I1-2594)

10:00AM *Rotation and Symmetry in Mathematical*
► (181) *Quilt Design.* Preliminary report. **Simei Tong**, University of Wisconsin - Eau Claire (1125-I1-421)

10:20AM *Quilting Squares.*
► (182) **Beth Malmskog*** and **Katie Haymaker**, Villanova University (1125-I1-387)

10:40AM *Combinatorial Poppies.*
► (183) **Karl M Kattchee***, University of Wisconsin-La Crosse, and **Craig S Kaplan**, University of Waterloo (1125-I1-2100)

MAA Session on Teaching Abstract Algebra: Topics and Techniques, I

8:00 AM – 10:55 AM **M304, Marquis Level, Marriott Marquis**

Organizers: **Jessie Lenarz**, St. Catherine University

Kristi Meyer, Wisconsin Lutheran College

8:00AM *The probability that $ab = ba$ and other*
► (184) *adventures in commutativity in finite groups.* Preliminary report. **Tom Langley**, Rose-Hulman Institute of Technology (1125-P1-2750)

8:20AM *Concrete Algebra: Applying Knowledge*
► (185) *From Abstract Algebra.* **Melanie Pivarski*** and **Steve Cohen**, Roosevelt University (1125-P1-2711)

8:40AM *Read the masters! Learning abstract*
► (186) *algebra via Primary Source Projects.* **Janet Heine Barnett**, Colorado State University - Pueblo (1125-P1-1617)

9:00AM *The Four Cs of Investigative Projects in*
► (187) *Abstract Algebra.* **Stephen Lovett**, Wheaton College (IL) (1125-P1-418)

9:20AM *Matrix representations as a first topic in*
► (188) *abstract algebra?* **Paul E. Becker***, Penn State Behrend, and **Mark Medwid**, Bowling Green State University (1125-P1-71)

9:40AM *Adopt your own group.* Preliminary
► (189) report. **A E Francis**, Carroll College (1125-P1-3127)

10:00AM *Using Semester Projects in Abstract*
► (190) *Algebra.* Preliminary report. **Jolie Roat**, SUNY Cortland (1125-P1-3026)

10:20AM *Examples and Counterexamples in*
► (191) *Abstract Algebra.* Preliminary report. **Jacqueline A Jensen-Vallin**, Lamar University (1125-P1-322)

10:40AM *True/Sometimes True/False.* Preliminary
► (192) report. **Carolyn Yackel***, Mercer University, and **Julie Beier**, Earlham College (1125-P1-1964)

MAA Session on The Scholarship of Teaching and Learning in Collegiate Mathematics, I

8:00 AM – 10:55 AM **Embassy A, International Tower, LL2, Hyatt Regency**

Organizers: **Thomas Banchoff**, Brown University

Curtis Bennett, Loyola Marymount University

Pam Crawford, Jacksonville University

Jacqueline Dewar, Loyola Marymount University

Edwin Herman, University of Wisconsin-Stevens Point

8:00AM (193) *Piloting an active learning course by a novice lecturer in a large enrollment calculus class.* Preliminary report. **John H. Johnson**, The Ohio State University (1125-O1-2987)

8:20AM (194) *What one must know about students' concept formation.* **Girija Sarada Nair-Hart**, University of Cincinnati, Clermont College (1125-O1-1885)

8:40AM ► (195) *Curing the High DFW Rate in First Year Calculus.* Preliminary report. **Victoria Brown**, **Adam Childers**, **Jan Minton**, **Hannah Robbins***, **Kristin Emrich** and **David Taylor**, Roanoke College (1125-O1-402)

9:00AM (196) *The Effect of Required Office Hours on an Early Incentivized Remediation Program in Calculus I.* Preliminary report. **Jennifer Vandenbussche*** and **Lake Ritter**, Kennesaw State University (1125-O1-1276)

9:20AM (197) *Engineered Learning in Calculus at Colorado School of Mines.* Preliminary report. **Deb Carney*** and **Rebecca I Swanson**, Colorado School of Mines (1125-O1-2508)

9:40AM (198) *The Congruence between Instructor and Student Perceptions of Learner-Centered Teaching in Calculus I.* **Belinda Pickett Edwards*** and **B P Edwards**, Kennesaw State University (1125-O1-2743)

10:00AM ► (199) *Implementation and evaluation of active learning elements and innovative strategies for learning and teaching in Calculus classes.* **Mihhail Berezovski**, Embry-Riddle Aeronautical University (1125-O1-2657)

10:20AM ► (200) *Assessing Impacts on Student Learning in Mathematics from Inclusion of Biological, Real-World Examples.* Preliminary report. **Louis Gross***, **Suzanne Lenhart**, University of Tennessee and NIMBioS, **Pamela Bishop** and **Kelly Sturner**, National Institute for Mathematical and Biological Synthesis (1125-O1-1388)

10:40AM ► (201) *Effect of Belongingness Intervention on Student Performance.* Preliminary report. **Laura J Schmidt***, **Matt Corne** and **Todd Zimmerman**, University of Wisconsin - Stout (1125-O1-1954)

MAA General Contributed Paper Session on Graph Theory, I

8:00 AM – 10:55 AM **Baker, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

8:00AM (202) *On the uniqueness of some girth eight algebraically defined graphs.* **Brian G. Kronenthal***, Kutztown University of Pennsylvania, **Felix Lazebnik**, University of Delaware, and **Jason Williford**, University of Wyoming (1125-VF-192)

8:15AM ► (203) *The pharmaceutical Supply Chain.* Preliminary report. **P Ye***, University of North Georgia, and **M D Norton**, Quincy IL (1125-VF-311)

8:30AM ► (204) *Shortest Circuit Covers of Signed Graphs.* **Jian Cheng***, **Y. Lu**, **R. Luo** and **C.-Q. Zhang**, West Virginia University (1125-VF-523)

8:45AM (205) *Nordhaus-Gaddum bounds for the power domination number of a graph.* **Katherine F. Benson**, Westminster College, **Daniela Ferrero***, Texas State University, **Mary Flagg**, University of St. Thomas, Houston, **Veronika Furst**, Fort Lewis College, **Leslie Hogben**, Iowa State University, and **Violeta Vasilevska**, Utah Valley University (1125-VF-574)

9:00AM ► (206) *Maximal outerplanar graphs whose algebraic connectivity is at most one.* **Jason J Molitierno**, Sacred Heart University (1125-VF-597)

9:15AM (207) *An extremal problem in digraph connectivity.* **Murong Xu***, **Janet Anderson**, Department of Mathematics at West Virginia University, **Suohai Fan**, Department of Mathematics at Jinan University, **Hong-Jian Lai**, Department of Mathematics at West Virginia University, and **Xiaoxia Lin**, School of Sciences at Jimei University (1125-VF-842)

9:30AM ► (208) *When "Flow Free" is Played on a Torus.* **Wing Hong Tony Wong*** and **Brian Kronenthal**, Kutztown University of Pennsylvania (1125-VF-872)

9:45AM ► (209) *Excluded Minors for Families of Graphs.* Preliminary report. **Eammon J Hart*** and **Branden Stone**, Adelphi University (1125-VF-954)

10:00AM ► (210) *A graph theoretic analysis of co-branding in social networks.* **Darren Narayan***, Rochester Institute of Technology, **Rigoberto Florez**, The Citadel, **Ruth Lopez**, California State University, Long Beach, and **Jacob Worrell**, Indiana University (1125-VF-1023)

10:15AM ► (211) *Finding Minimal Spanning Forests in a Graph.* **Abdel-Rahman Amr Madkour*** and **Phillip Nadolny**, Saint Olaf College (1125-VF-1086)

10:30AM ▶ (212) *Counting cycles in the graphs of overlapping permutations.* **John Asplund***, Dalton State College, and **N. Bradley Fox**, Austin Peay State University (1125-VF-1095)

10:45AM ▶ (213) *Trees for Given Values of the Span and Icap for L(2,1)-Colorings.* **John Villalpando***, California Lutheran University, **Vesta Coufal**, Gonzaga University, **Karri Fogel**, California Lutheran University, **Aparna Higgins**, University of Dayton, **William Higgins**, Wittenberg University, **Rob Ray** and **Kathie Yerion**, Gonzaga University (1125-VF-1376)

MAA General Contributed Paper Session on Other Topics, I

8:00 AM – 10:40 AM   **Roswell, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

8:00AM ▶ (214) *Fight the Powers that Be: A Reflection on the Future of Our Professional Societies.* **Randall E. Cone**, Salisbury University (1125-VW-171)

8:15AM ▶ (215) *Career Contexts: How PD Can Prompt Connections in Secondary Classrooms.* **Caroline Maher Maher-Boulis***, Lee University, and **Lauren Jeneva Clark**, University of Tennessee at Knoxville (1125-VW-187)

8:30AM Break

8:45AM ▶ (216) *Undergraduate Research Projects in Discrete Dynamical Systems.* **Chris D. Lynd**, Bloomsburg University (1125-VW-271)

9:00AM ▶ (217) *Digital Storytelling in a History of Mathematics Class.* **Cynthia J. Huffman**, Pittsburg State University (1125-VW-422)

9:15AM ▶ (218) *Mickens Law of Cooling.* **'Kale Oyedeji***, Morehouse College, and **Ronald E. Mickens**, Clark Atlanta University (1125-VW-472)

9:30AM (219) *The Geometric Triangular Periodic Functions.* **Torina Lewis*** and **Ronald E. Mickens**, Clark Atlanta University (1125-VW-486)

9:45AM ▶ (220) *Extraordinary Subsets: A Generalization.* **Ralph P Grimaldi**, Rose-Hulman Institute of Technology (1125-VW-679)

10:00AM ▶ (221) *Sperm movement under the effect of a wall in Stokes flow.* **Jianjun Huang*** and **Sarah D. Olson**, Worcester Polytechnic Institute (1125-VW-821)

10:15AM ▶ (222) *Two Inequalities Involving AM, GM, and HM.* **John Tyler Risher**, University of South Carolina Salkehatchie (1125-VW-851)

10:30AM ▶ (223) *Factoring Quadratics: The Bijection That Lies Beneath.* **Ricardo E Rojas**, Northern State University (1125-VW-1190)

MAA General Contributed Paper Session on Topology, I

8:00 AM – 10:55 AM   **Kennesaw, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

8:00AM ▶ (224) *Generalized Erdos-Type Spaces.* Preliminary report. **R. M. Argus**, George Mason University (1125-VU-2947)

8:15AM ▶ (225) *Lattice-Valued Convergence Spaces.* Preliminary report. **Lyall Reid**, University of Central Florida, Department of Mathematics (1125-VU-595)

8:30AM (226) *Strongly Symmetric Compactifications.* Preliminary report. **Adu A Nathaniel**, University of Central Florida, Orlando Florida. (1125-VU-946)

8:45AM ▶ (227) *Topological Data Analysis of Students' Responses to MAA Surveys on College Calculus.* **Irma E. Stevens**, University of Georgia (1125-VU-1298)

9:00AM (228) *The proximal infinite game.* **Jocelyn R Bell**, Hobart and William Smith Colleges (1125-VU-1484)

9:15AM ▶ (229) *Knot Fertility and Lineage.* Preliminary report. **Allison Henrich**, **Elsa Magness**, Seattle University, **Kayla Perez***, The Evergreen State College, and **Briana Zimmer**, Green River College (1125-VU-1704)

9:30AM (230) *Topology of Non-k-Equal Configurations on Graphs.* **Safia Chettih**, Reed College (1125-VU-1726)

9:45AM (231) *Deformations in Dessin D'enfants of Trigonal Curves.* **Mehmet Emin Aktas**, Florida State University, Department of Mathematics (1125-VU-1797)

10:00AM (232) *Pseudo-Endpoints of a nondegenerate Chainable Continua.* Preliminary report. **Shiva Shankar Rai**, Texas Tech University, Lubbock, Tx (1125-VU-1877)

10:15AM Break

10:30AM *On an Algorithm in Data Homology.*
▶ (233) Preliminary report.
Marian Anton and **Landon Renzullo***, CCSU (1125-VU-2563)

10:45AM *Partial Metrics and Pathological*
▶ (234) *Topologies.*
E. T. Brown, James Madison University (1125-VU-2567)

SIAM Minisymposium on Recent Advances in Linear Algebra

8:00 AM – 10:50 AM   A703, Atrium Level, Marriott Marquis

Organizer: **James Nagy**, Emory University

8:25AM *Kronecker product approximations for*
(235) *image reconstruction problems.*
James G Nagy, Emory University (1125-65-1600)

8:50AM *Hybrid Clustering of Data with Contents*
(236) *and Links based on Nonnegative Matrix Factorization.*
Rundong Du* and **Haesun Park**, Georgia Institute of Technology (1125-65-1690)

9:15AM *Decentralized consensus optimization on*
(237) *networks with delayed and stochastic gradients.*
Xiaojing Ye, Georgia State University (1125-65-1604)

9:40AM *The regularization of the alternating*
(238) *least squares for low rank tensor approximation.*
Carmeliza Navasca, University of Alabama at Birmingham (1125-65-1606)

10:05AM *Classical iterative methods for the*
(239) *solution of Generalized Lyapunov Equations.*
Daniel Szyld*, Temple University, **Steven Shank**, Massachussetts Institute of Technology, and **Valeria Simoncini**, Universitá di Bologna (1125-65-1610)

10:30AM *Compact Representations of*
(240) *Quasi-Newton Matrices.*
Jennifer Erway, Wake Forest University (1125-65-1693)

Project NExT Workshop

8:00 AM – 6:00 PM   Regency Ballroom VI, Ballroom Level, Hyatt Regency

MAA Panel

8:00 AM – 9:20 AM   International 6, International Level, Marriott Marquis

Refocusing Your Career: Making Time and Space
Organizers: **Rachelle Bouchat**, Indiana University of Pennsylvania
     Brian P. Katz, Augustana College
Panelists: **Colin Adams**, Williams College

Gizem Karaali, Pomona College

Katherine Socha, Park School of Baltimore

Michael Starbird, University of Texas at Austin

Laura Taalman, James Madison University

Diana White, University of Colorado Denver

MAA Panel Discussion on NSF Funding Opportunities for the Learning and Teaching of the Mathematical Sciences, Part I

8:00 AM – 9:15 AM   International 5, International Level, Marriott Marquis

Undergraduate/Graduate Education, Department of Mathematics Infrastructure, and Human Resource Development (DUE/DGE/DMS/HRD)

Organizers: **Ron Buckmire**, Division of Undergraduate Education, NSF

     John Haddock, Division of Undergraduate Education, NSF

     Tasha Inniss, Division of Human Resource Development, NSF

     Karen King, Division of Research on Learning, NSF

     Teri Jo Murphy, Division of Undergraduate Education, NSF

     Sandra Richardson, Division of Undergraduate Education, NSF

     Jennifer Slimowitz Pearl, Division of Mathematical Sciences, NSF

     Tara Smith, Division of Graduate Education, NSF

     Lee Zia, Division of Undergraduate Education, NSF

Panelists: **Ron Buckmire**, Division of Undergraduate Education, NSF

     John Haddock, Division of Undergraduate Education, NSF

     Tasha Inniss, Division of Human Resource Development, NSF

     Karen King, Division of Research on Learning, NSF

     Teri Jo Murphy, Division of Undergraduate Education, NSF

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Sandra Richardson, Division of Undergraduate Education, NSF

Jennifer Slimowitz Pearl, Division of Mathematical Sciences, NSF

Tara Smith, Division of Graduate Education, NSF

Lee Zia, Division of Undergraduate Education, NSF

Employment Center

8:00 AM – 5:30 PM   Centennial Ballroom, Ballroom Level, Hyatt Regency

AMS Contributed Paper Session on Probability and Statistics, I

8:15 AM – 10:55 AM   International A, International Level, Marriott Marquis

8:15AM (241) ▶ *Transitions among States behind Interactive Agent Model.*
Po-Keng Cheng*, Department of Applied Mathematics and Statistics, SUNY-Stony Brook University, **Frank J. Fabozzi**, EDHEC Business School, and **Stoyan Stoyanov**, College of Business, SUNY-Stony Brook University (1125-60-1125)

8:30AM (242) ▶ *The Information Content of Volatility Demand.* Preliminary report.
Yihren Wu, Dept. of Math., Hofstra University, Hempstead, NY 11549 (1125-60-1209)

8:45AM (243) ▶ *Cloud regimes as phase transitions.*
Samuel N Stechmann, University of Wisconsin-Madison, and **Scott A Hottovy***, United States Naval Academy (1125-60-1321)

9:00AM (244) ▶ *Fast biased user-specified relative error estimates.*
Mark L Huber, Claremont McKenna College (1125-60-1504)

9:15AM (245) *A Bipartite Network Generation Using Joint Degree Distribution.* Preliminary report.
Asma Azizi*, Tulane University, **James Mac Hyman**, Tulane university, and **Jeremy Dewar**, Tulane University (1125-60-1609)

9:30AM (246) *An invariance principle for additive functionals of Semi-Markov processes.*
Adina Oprisan, Canisius College (1125-60-1852)

9:45AM (247) *A weak modified Euler-Maruyama method based on trapezoidal rule for a class of stochastic differential equations and mean square stability results.*
Ram Sharan Adhikari, Rogers State University (1125-60-1953)

10:00AM (248) ▶ *Mixing Times for the Generalized Rook's Walk.* Preliminary report.
Peter Otto, Willamette University, **Benjamin Savoie**, University of Michigan-Flint, **Ana Wright**, Willamette University, and **Renjun Zhu***, University of California-Berkeley (1125-60-2089)

10:15AM (249) *Stochastic methods for epidemic models: An application to the 2009 H1N1 Influenza outbreak in Korea.*
Hyojung Lee*, **Chang Hyeong Lee**, Mathematical Sciences/UNIST, and **Sunmi Lee**, Applied Mathematics/Kyung Hee University (1125-60-2237)

10:30AM (250) *Spectral statistics of random geometric graphs.*
Carl P Dettmann*, University of Bristol, UK, **Orestis Georgiou**, Toshiba Telecommunications Research Laboratory, Bristol, UK, and **Georgie Knight**, University of Bristol, UK (1125-60-2261)

10:45AM (251) ▶ *A hydrodynamic limit theorem for a minimal model of grain boundary evolution.*
Joe J Klobusicky*, Rensselaer Polytechnic Institute, and **Govind Menon**, Brown University (1125-60-2309)

MAA General Contributed Paper Session on Algebra, I

8:15 AM – 10:40 AM   Piedmont, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University
Melvin Royer, Indiana Wesleyan University

8:15AM (252) *Defining equations of the multi-Rees algebra.*
Babak Jabbar-Nezhad, University of Arkansas (1125-VA-1712)

8:30AM (253) *First l^p Cohomology of Some Infinite Groups.* Preliminary report.
Sam V Eastridge* and **Peter Linnell**, Virginia Tech (1125-VA-924)

8:45AM (254) *A Homological Approach to Factorization.*
J B Coykendall and **B G Goodell***, Clemson University (1125-VA-1065)

9:00AM (255) ▶ *Low-Dimensional Reality-Based Algebras.*
Rachel Victoria Barber, Mississippi State University (1125-VA-1155)

9:15AM (256) *Recognizing arbitrary rational functions amongst power series.* Preliminary report.
Erik O. Hieta-aho* and **Sergio Lopez-Permouth**, Ohio University (1125-VA-1513)

9:30AM Break

9:45AM (257) ▶ *When is a polynomial isomorphic to an even polynomial?*
Chad Awtrey*, **Jim Beuerle** and **Michael Keenan**, Elon University (1125-VA-1663)

10:00AM *An Algebraic Characterization of the*
(258) *Point-Pushing Subgroup.*
Victoria S Akin, University of Chicago
(1125-VA-426)

10:15AM *Extensions of the Congruence-based*
▶ (259) *Zero-divisor Graph.* Preliminary report.
Grace McClurkin, University of
Tennessee, Knoxville (1125-VA-1841)

10:30AM *The Space of Biorders for Solvable*
(260) *Groups of Finite Rank.* Preliminary report.
Kelli Marie Karcher, Virginia Tech
(1125-VA-1919)

MAA Invited Paper Session on Office Hours with a Geometric Group Theorist, I

9:00 AM – 10:50 AM **A602, Atrium Level, Marriott Marquis**

Organizers: **Dan Margalit**, Georgia Institute of Technology
Matthew Clay, University of Arkansas

9:00AM *Ping-Pong for Free Groups.*
▶ (261) **Johanna Mangahas**, University at Buffalo
(1125-AE-2099)

9:30AM *The Ends of a Group.*
▶ (262) **Nic Koban***, University of Maine Farmington, and **John Meier**, Lafayette College (1125-AE-1165)

10:00AM *Finite generation and subgroups of*
▶ (263) *infinite index.*
John Meier, Lafayette College
(1125-AE-491)

10:30AM *Asymptotic dimension of groups.*
▶ (264) **Greg Bell**, University of North Carolina at Greensboro (1125-AE-831)

MAA Minicourse #8: Part A

9:00 AM – 11:00 AM **L508, Lobby Level, Marriott Marquis**

(Re)Designing Your Own Mathematics Course using Backwards Course Design
Presenters: **Joel Kilty**, Centre College
Alex M. McAllister, Centre College

MAA Minicourse #4: Part A

9:00 AM – 11:00 AM **L504 & L505, Lobby Level, Marriott Marquis**

Incorporating Randomization Methods into Introductory Statistics
Presenters: **Patti Frazer Lock**, St. Lawrence University
Robin H. Lock, St. Lawrence University
Allan Rossman, California Polytechnic State University, San Luis Obispo
Beth Chance, California Polytechnic State University, San Luis Obispo

Soma Roy, California Polytechnic State University, San Luis Obispo

MAA Minicourse #12: Part A

9:00 AM – 11:00 AM **L506 & L507, Lobby Level, Marriott Marquis**

Teaching Introductory Statistics, GAISE 2016
Presenter: **Carolyn K. Cuff**, Westminster College

Hrabowski-Gates-Tapia-McBay Session

9:00 AM – 10:20 AM **A704, Atrium Level, Marriott Marquis**

Organizer: **Ricardo Cortez**, Tulane University

9:00AM *Packing, folding and simplifying DNA*
▶ (265) *topology.*
Mariel Vazquez, Dept of Mathematics, Dept of Microbiology and Molecular Genetics, University of California Davis
(1125-92-1378)

MAA Panel Discussion on NSF Funding Opportunities for the Learning and Teaching of the Mathematical Sciences, Part II

9:30 AM – 10:30 AM **International 5, International Level, Marriott Marquis**

The K-16 continuum-learning science and research and pre- and in-service teachers. (DUE/DRL)
Organizers: **Ron Buckmire**, Division of Undergraduate Education, NSF
John Haddock, Division of Undergraduate Education, NSF
Tasha Inniss, Division of Human Resource Development, NSF
Karen King, Division of Research on Learning, NSF
Teri Jo Murphy, Division of Undergraduate Education, NSF
Sandra Richardson, Division of Undergraduate Education, NSF
Jennifer Slimowitz Pearl, Division of Mathematical Sciences, NSF
Tara Smith, Division of Graduate Education, NSF
Lee Zia, Division of Undergraduate Education, NSF
Panelists: **Ron Buckmire**, Division of Undergraduate Education, NSF

John Haddock, Division of Undergraduate Education, NSF

Tasha Inniss, Division of Human Resource Development, NSF

Karen King, Division of Research on Learning, NSF

Teri Jo Murphy, Division of Undergraduate Education, NSF

Sandra Richardson, Division of Undergraduate Education, NSF

Jennifer Slimowitz Pearl, Division of Mathematical Sciences, NSF

Tara Smith, Division of Graduate Education, NSF

Lee Zia, Division of Undergraduate Education, NSF

MAA Panel

9:35 AM – 10:55 AM International 6, International Level, Marriott Marquis

What Belongs in a Twenty-First Century Geometry Course?

Organizer: **Stephen Kennedy**, MAA Press

Panelists: **Matthew Harvey**, University of Virginia College at Wise

Tom Sibley, St. John's University

Gerard Venema, Calvin College

Project NExT Panel

9:45 AM – 11:00 AM Regency Ballroom VI, Ballroom Level, Hyatt Regency

The Research and Teaching Pendulum: Finding a Stable Equilibrium

Organizers: **Benjamin Linowitz**, Oberlin College

Alicia Machuca, Texas Women's University

Chad Mangum, Niagra University

Suzanne O'Regan, North Carolina A & T State University

Panelists: **Cristina Villalobos**, University of Texas Rio Grande Valley

Presenters: **Judy Day**, University of Tennessee

Allison Henrich, Seattle University

Christine Stevens, American Mathematical Society

Radical Dash Kickoff Meeting

10:00 AM – 10:45 AM Courtland, Conference Level, Hyatt Regency

A daily scavenger hunt filled with math challenges and creativity for teams of undergraduates. Individuals are welcome and encouraged to participate;they will be formed into teams.

Organizer: **Stacey Muir**, University of Scranton

Moderator: **Janine Janoski**, Kings College

AMS Invited Address

10:05 AM – 10:55 AM Atrium Ballroom, Atrium Level, Marriott Marquis

(266) *Spectral Theory Sum Rules, Meromorphic Herglotz Functions and Large Deviations.* **Barry Simon**, Caltech (1125-46-794)

AMS-MAA Invited Address

11:10 AM – NOON Atrium Ballroom, Atrium Level, Marriott Marquis

▶ (267) *Through the Cryptographer's Looking-Glass, and what Alice found there.* **Alice Silverberg**, University of California, Irvine (1125-94-827)

Exhibits and Book Sales

12:15 PM – 5:30 PM Grand Hall, Exhibit Level, Hyatt Regency

AMS Colloquium Lectures: Lecture I

1:00 PM – 1:50 PM Atrium Ballroom, Atrium Level, Marriott Marquis

(268) *Overview: The focusing energy critical wave equation.* Preliminary report. **Carlos E. Kenig**, University of Chicago (1125-35-296)

MAA General Contributed Paper Session on Modeling and Applications, I

2:00 PM – 5:55 PM Piedmont, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

2:15PM ► (269) *Optimization of Down Syndrome Specialty Care Clinic Locations using Operations Research.* Preliminary report. **Heidi A. Berger***, **Emma C. Christensen**, **Nick J. Joslyn** and **Madeline M. Kersten**, Simpson College (1125-VM-153)

2:30PM (270) *Time-frequency methods for parameter estimation using gravitational waves.* Preliminary report. **L Patton**, Virginia Tech (1125-VM-270)

2:45PM (271) *A new model of the convective stability of geological carbon sequestration.* **Layachi Hadji*** and **C. Taber Wanstall**, The University of Alabama (1125-VM-332)

3:00PM ► (272) *Reverse Engineering Functional Brain Networks from fMRI Data Using Probabilistic Boolean Networks.* Preliminary report. **Tiffany Jann***, University of California, Berkeley, and **Erin Boggess**, Simpson College (1125-VM-347)

3:15PM ► (273) *n-Section Querying Methods for Target Estimation on an Interval.* Preliminary report. **Kasie G Farlow***, Dominican College, **Desmond Cummins**, Wells College, **Joseph Pedersen**, US Army, and **Brian M Sadler**, Army Research Laboratory (1125-VM-1548)

3:30PM Break

3:45PM ► (274) *Betting Better on Broadway: the Application of Statistical Matrix Theory to the Prediction of the Tony Awards for Best Play and Best Musical.* **Jack A. Ryan**, The University of Tennessee (1125-VM-654)

4:00PM ► (275) *Exact Recovery of Chaotic Systems from Highly Corrupted Data.* **Giang Tran*** and **Rachel Ward**, University of Texas at Austin (1125-VM-663)

4:15PM (276) *A refined Gaussian Network Model and Its Application to Biological Structures.* **Junkoo Park**, Georgia Gwinnett College (1125-VM-676)

4:30PM ► (277) *Modeling Tsunami Run-Up and Draw-Down on the Beach.* **William Patrick Noland***, North Central College, **Dylan Matthew Smith**, University of Connecticut, **Seth Selken**, Iowa State University, **Monica Swartz**, Smith College, **Marcus Battraw** and **Sergei Fomin**, California State University, Chico (1125-VM-789)

4:45PM (278) *A Continuous Time Stochastic Model to Optimize Blood Pressure Treatment Decisions.* **Anthony Bonifonte***, **Turgay Ayer**, **Benjamin Haaland**, Georgia Institute of Technology, and **Peter Wilson**, Emory University (1125-VM-1418)

5:00PM ► (279) *Obstacles and Boundaries in Flocking Behavior.* Preliminary report. **Kevin Winseck***, **Edward Martinez** and **Scott Mahan**, Arizona State University (1125-VM-1447)

5:15PM ► (280) *Optimized Control of Flocking Models.* Preliminary report. **Edward Martinez***, **Scott Mahan** and **Kevin Winseck**, Arizona State University (1125-VM-1470)

5:30PM ► (281) *Sparse Control and Disruptive Behavior in Biological Flocking Models.* **Scott Mahan***, **Edward Martinez** and **Kevin Winseck**, Arizona State University (1125-VM-1533)

5:45PM ► (282) *Securing FingerPrint Data By RSA algorithm.* **Shota Kurtanidze**, Ministry of Corrections of Georgia (1125-VM-482)

MAA Invited Address

2:15 PM – 3:05 PM   **Atrium Ballroom, Atrium Level, Marriott Marquis**

(283) *Math by design: 3D printing for the working mathematician.* **Laura Taalman**, James Madison University (1125-A0-17)

AMS Special Session on Analysis of Fractional, Stochastic, and Hybrid Dynamic Systems and their Applications, II

2:15 PM – 6:05 PM   **M301, Marquis Level, Marriott Marquis**

Organizers: **Aghalaya S. Vatsala**, University of Louisiana at Lafayette

Gangaram S. Ladde, University of South Florida

John R. Graef, University of Tennessee at Chattanooga

2:15PM ► (284) *Nonlinear Hybrid Dynamic Modeling for Time-to-Event Processes.* Preliminary report. **Emmanuel A Appiah***, University of South Floria, Tampa, and **G. S. Ladde**, University of South Florida, Tampa (1125-62-1044)

2:45PM (285) *Fundamental Properties of Solutions of Systems of Nonlinear Stochastic Differential Equations.* Preliminary report. **G. S. Ladde**, University of South Floria, Tampa (1125-60-1045)

3:15PM ► (286) *Numerical results for Sequential Caputo fractional boundary value problem.* Preliminary report. **Bhuvaneswari Sambandham***, Southern Utah University, Cedar City, and **Aghalaya S. Vatsala**, University of Louisiana at Lafayette (1125-34-1103)

3:45PM (287) *Hopf Bifurcation Analysis for a Predator-prey Model with Two Delays.* **Liancheng Wang**, Kennesaw State University (1125-34-1169)

4:15PM (288) *Analysis of Memory Effects for the Heat Conductivity of Random Suspensions of Spheres by Using the Method of Random-point Approximation.*
Abhinandan Chowdhury, Savannah State University (1125-35-1293)

4:45PM ▶ (289) *Riemann Liouville Versus Caputo Fractional Dynamic equations Via Laplace Transform Methods.* Preliminary report.
Aghalaya S. Vatsala, University of Louisiana at Lafayette (1125-34-1385)

5:15PM (290) *Analysis of Lethal and Sublethal Impacts of Environmental Disasters on Sperm Whales Using Stochastic Modeling.*
Ross A. Chiquet*, Univeriity of Louisiana at Lafayette, **A. S. Ackleh**, University of Louisiana at Lafayette, **B. A. Ma**, Millersville University, **T. Tang**, **A. Veprauskas**, University of Louisiana at Lafayette, **H. Caswell**, Woods Hole Oceanographic Institution, and **N. Sidorovskaia**, University of Louisiana at Lafayette (1125-39-2284)

5:45PM ▶ (291) *Upper and Lower Estimates for Positive Solutions of a Sixth Order Boundary Value Problem.* Preliminary report.
Bo Yang, Kennesaw State University (1125-34-2498)

AMS Special Session on Arithmetic Properties of Sequences from Number Theory and Combinatorics, II

2:15 PM – 6:05 PM **M101, Marquis Level, Marriott Marquis**

Organizers: **Eric Rowland**, Hofstra University
Armin Straub, University of South Alabama

2:15PM (292) *Arithmetic Properties of m–ary Partitions WIthout Gaps.*
James A Sellers, Penn State University (1125-11-716)

2:45PM (293) *On the polynomial part of a restricted partition function.*
Karl Dilcher*, Dalhousie University, and **Christophe Vignat**, Université Paris-Sud (1125-11-770)

3:15PM ▶ (294) *Debunking Richard Guy's Law of Small Numbers.*
Thotsaporn Aek Thanatipanonda, Mahidol University, Salaya Campus, Thailand, and **Doron Zeilberger***, Rutgers University (NB) (1125-11-527)

3:45PM ▶ (295) *Tree structures coming from valuations.* Preliminary report.
Victor Hugo Moll*, **Aashita Kesharwani** and **Xiao Guan**, Department of Mathematics, Tulane University (1125-11-1430)

4:15PM ▶ (296) *Exponential generating function mod p.* Preliminary report.
Ira M Gessel, Brandeis University (1125-11-531)

4:45PM ▶ (297) *Sporadic Apéry-like numbers modulo primes.*
Amita Malik*, University of Illinois at Urbana-Champaign, and **Armin Straub**, University of South Alabama (1125-11-1115)

5:15PM (298) *Algebraic independence of G-functions and Lucas congruences.*
Boris Adamczewski, Université de Lyon, **Jason P Bell***, University of Waterloo, and **Eric Delaygue**, Université de Lyon (1125-11-506)

5:45PM (299) *Modular p-midiation principles.*
Timothy J. Huber, University of Texas - Rio Grande Valley (1125-11-1940)

AMS Special Session on Bases in Function Spaces: Sampling, Interpolation, Expansions and Approximations, II

2:15 PM – 6:05 PM **Embassy D, International Tower, LL2, Hyatt Regency**

Organizers: **Shahaf Nitzan**, Georgia Institute of Technology
Christopher Heil, Georgia Institute of Technology
Alexander V. Powell, Vanderbilt University

2:15PM (300) *Tiling the line by affine shifts of a prototile.* Preliminary report.
Darrin Speegle*, Saint Louis University, and **Robert Steward**, National Geospatial-Intelligence Agency (1125-42-988)

2:45PM (301) *Interpolation for multipliers between spaces.* Preliminary report.
Alexandru Aleman, Lund University, **Michael Hartz**, **John E. McCarthy**, Washington University, and **Stefan Richter***, University of Tennessee (1125-47-629)

3:15PM (302) *Toeplitz Order.*
Alexei Poltoratski, Texas A&M University (1125-30-860)

3:45PM (303) *The HRT conjecture for real-valued functions.* Preliminary report.
Kasso A Okoudjou, Department of Mathematics, University of Maryland (1125-42-615)

4:15PM (304) *Fuglede Conjecture in finite vector spaces over prime fields.*
Azita Mayeli, City University of New York, The Graduate Center and Queensborough (1125-42-1004)

4:45PM (305) *Toeplitz operators and sampling sets.* Preliminary report.
Mishko Mitkovski, Clemson University (1125-43-1170)

5:15PM (306) *Detection of singularities by discrete multiscale representations.*
Demetrio Labate*, University of Houston, and **Kanghui Guo**, Missouri State University (1125-42-503)

5:45PM ▶ (307) *Balian-Low Type Theorems for Shift-Invariant Spaces.*
Michael C. Northington*, Georgia Institute of Technology, **Doug Hardin**, **Alexander Powell**, Vanderbilt University, and **Shahaf Nitzan**, Georgia Institute of Technology (1125-41-967)

AMS Special Session on Coding Theory for Modern Applications, II

2:15 PM – 6:05 PM   **M106 & M107, Marquis Level, Marriott Marquis**

Organizers: **Christine A. Kelley**, University of Nebraska-Lincoln

Iwan M. Duursma, University of Illinois Urbana-Champaign

Gretchen L. Matthews, Clemson University

2:15PM (308) *Coding-Theoretic Techniques for Modern Memories.*
Lara Dolecek, UCLA (1125-94-1014)

3:15PM (309) *Evaluation codes: codes using commutative algebra.*
Hiram Habid Lopez Valdez, Clemson University (1125-94-1793)

3:45PM (310) *Equidistant Subspace Codes.*
Alberto Ravagnani, University of Neuchâtel, Switzerland (1125-05-1131)

4:15PM (311) *Boolean Intersection Graphs.*
Hoang Dau and **Olgica Milenkovic***, University of Illinois, Urbana-Champaign (1125-05-1019)

4:45PM ▶ (312) *Fountain Codes on Partial Erasure Channels.* Preliminary report.
Carolyn Mayer* and **Christine A. Kelley**, University of Nebraska - Lincoln (1125-94-1037)

5:15PM (313) *Using Coding to Reduce Delay in Content Access.*
Gauri Joshi, IBM T. J. Watson Research Center (1125-68-692)

5:45PM ▶ (314) *2 error binary correcting codes through nonlinear algebra.*
José William Velázquez, Universidad de Puerto Rico en Cayey (1125-12-2181)

AMS Special Session on Control and Long Time Behavior of Evolutionary PDEs, II

2:15 PM – 6:05 PM   **Embassy F, International Tower, LL2, Hyatt Regency**

Organizers: **Louis Tebou**, Florida International University
Luz de Teresa, Instituto de Matemáticas, UNAM

2:15PM ▶ (315) *The Kalman condition for the boundary controllability of coupled 1-d wave equations.*
Sergei Avdonin, University of Alaska Fairbanks, and **Luz de Teresa***, Instituto de Matemáticas, UNAM (1125-35-1040)

3:15PM (316) *Exact Boundary Controllability as a Limit of Distributed Control Problems in Wave Systems.*
Scott Hansen*, Iowa State University, and **Marius Tucsnak**, Universite de Bordeaux (1125-93-2674)

3:45PM (317) *Controllability of the Kuramoto-Sivashinsky equation on star-shaped trees.*
Ademir Fernando Pazoto, Federal University of Rio de Janeiro (UFRJ) (1125-35-1782)

4:15PM (318) *A Risk-Sensitive Maximum Principle for Markov Regime-Switching Jump-Diffusion Systems and Applications.*
Isabelle Kemajou-Brown*, Morgan State University, **Olivier Menoukeu-Pamen**, Institute for Financial and Actuarial Mathematics, Department of Mathematics, University of Liverpool, and **Zhongyang Sun**, School of Mathematical Sciences, Nankai University (1125-49-2374)

4:45PM ▶ (319) *Uniform controllability of a 1-D transport equation with a fourth degree viscosity term.* Preliminary report.
Francisco Marcos Lopez-Garcia*, Institute of Mathematics, UNAM, Mexico, **Alberto Mercado**, Universidad Tecnica Federico Santa Sabina, Chile, and **Luz De Teresa**, Institute of Mathematics, UNAM, Mexico (1125-35-2153)

5:15PM ▶ (320) *Dynamic modeling of some smart composites and the lack of controllability/stabilizability.* Preliminary report.
Ozkan A Ozer, Department of Mathematics, Western Kentucky University (1125-93-1083)

5:45PM (321) *Stackelberg-Nash exact controllability for parabolic equations.*
Fagner D. Araruna, Federal University of Paraiba (1125-35-2854)

AMS Special Session on Gaussian Graphical Models and Combinatorial Algebraic Geometry, II

2:15 PM – 6:05 PM   **International 4, International Level, Marriott Marquis**

Organizers: **Rainer Sinn**, Georgia Institute of Technology

Seth Sullivant, North Carolina State University

Josephine Yu, Georgia Institute of Technology

2:15PM (322) *Combinatorial optimization in Markov equivalence of DAG models.*
Liam Solus, KTH Royal Institute of Technology (1125-05-1299)

2:45PM *Special positions of bar and joint*
► (323) *frameworks.* Preliminary report.
Dana Fry, University of Oregon, **Zvi Rosen**, University of Pennsylvania, **Jessica Sidman***, Mount Holyoke College, **Louis Theran**, St. Andrews University, and **Cynthia Vinzant**, North Carolina State University (1125-13-1474)

3:15PM *Schur polynomials and linear matrix*
(324) *inequalities for Hadamard powers.*
Alexander Belton, Lancaster University, Lancaster, UK, **Dominique Guillot**, University of Delaware, **Apoorva Khare***, Stanford University, and **Mihai Putinar**, University of California at Santa Barbara and Newcastle University, UK (1125-15-469)

3:45PM *Quantum Annealing for Combinatorial*
(325) *Algebraic Geometry.* Preliminary report.
Alexander Engström, Aalto University (1125-05-1744)

4:15PM *Polynomials as sums of few squares.*
(326) **Grigoriy Blekherman**, Georgia Tech, **Daniel Plaumann**, TU Dortmund, **Rainer Sinn**, Georgia Tech, and **Cynthia Vinzant***, NC State (1125-14-2114)

4:45PM *Polytopes and toric vector bundles.*
(327) **Sandra Di Rocco**, Royal Institute of Technology (KTH), **Kelly Jabbusch**, University of Michigan—Dearborn, and **Gregory G. Smith***, Queen's University (1125-14-1607)

5:15PM *Sums of powers of binary quadratic*
► (328) *forms.* Preliminary report.
Bruce Reznick, University of Illinois at Urbana-Champaign (1125-14-1584)

5:45PM *Local constructions of manifolds.*
► (329) Preliminary report.
Bruno Benedetti, University of Miami (1125-05-2585)

AMS Special Session on Group Representations and Cohomology, II

2:15 PM – 6:05 PM A705, Atrium Level, Marriott Marquis

Organizers: **Hung Nguyen**, The University of Akron
Nham Ngo, The University of Arizona
Andrei Pavelescu, University of South Alabama
Paul Sobaje, University of Georgia

2:15PM *On the existence of mock injective*
(330) *modules for algebraic groups.*
William Hardesty, Louisiana State University, **Daniel K. Nakano*** and **Paul Sobaje**, University of Georgia (1125-20-1036)

2:45PM *Generation problems for classical*
(331) *algebraic groups.*
Spencer J Gerhardt, University of Southern California (1125-20-1599)

3:15PM *Gelfand-Zetlin lattices in Specht modules*
► (332) *for symmetric groups.* Preliminary report.
David J. Hemmer*, University at Buffalo, SUNY, and **Harald Ellers**, Allegheny College (1125-20-2302)

3:45PM *Supercharacter Theories of*
(333) *Semiextraspecial p-Groups and Frobenius Groups.*
Casey W Wynn* and **Mark L Lewis**, Kent State University (1125-20-2359)

4:15PM *Geometric presentations of algebras.*
(334) **Jonathan I Hall**, Michigan State University (1125-17-2343)

5:15PM *Tensor Products and Filtrations.*
(335) Preliminary report.
Christopher P Bendel, University of Wisconsin-Stout, **Daniel K Nakano**, University of Georgia, and **Cornelius Pillen***, University of South Alabama (1125-20-1843)

5:45PM *Nilpotence and generation in the stable*
(336) *module category.*
David J. Benson, University of Aberdeen, and **Jon F. Carlson***, University of Georgia (1125-20-1128)

AMS Special Session on Harmonic Analysis (In Honor of Gestur Olafsson's 65th Birthday), II

2:15 PM – 6:05 PM Inman, Conference Level, Hyatt Regency

Organizers: **Jens Christensen**, Colgate University
Susanna Dann, Technische Universität Wien-Vienna, Austria
Panelists: **Matthew Dawson**, Centro de Investigación en Matemáticas

2:15PM *Macdonald hypergeometric functions.*
(337) **Siddhartha Sahi**, Rutgers University, New Brunswick, NJ 08903 (1125-33-138)

2:45PM *Surjectivity of Mean Value Operators on*
(338) *Noncompact Symmetric Spaces.*
Fulton B Gonzalez*, Tufts University, **Jens Christensen**, Colgate University, and **Tomoyuki Kakehi**, Okayama University (1125-43-694)

3:15PM *Vogan-Zuckerman Characters and*
(339) *Semisimple Coadjoint Orbits.*
Benjamin Harris*, Bard College at Simon's Rock, and **Yoshiki Oshima**, Kavli IPMU (1125-22-1681)

3:45PM *Geometric pictures of intertwining*
(340) *operators.*
Pierre Clare, Dartmouth College (1125-22-724)

4:15PM *Duality of geometries on flag manifolds*
► (341) *associated to maximal parabolic subgroups in split G_2.* Preliminary report.
Marcus J Slupinski, Université de Strasbourg, FRANCE, and **Robert J Stanton***, Columbus, OH (1125-22-2418)

4:45PM *Homomorphisms between Verma*
(342) *modules and small representations.*
Preliminary report.
Bent Ørsted, Aarhus University,
Denmark (1125-22-1034)

5:15PM *The Tricomi equation and*
(343) *complementary series representations of*
SL(2, ℝ). Preliminary report.
Jose A. Franco, University of North
Florida, and **Markus Hunziker***, Baylor
University (1125-22-1875)

5:45PM *New Inversion Formulas for the*
(344) *Horospherical Transform.*
Boris Rubin, Louisiana State University
(1125-44-108)

AMS Special Session on Hopf Algebras and their Actions, II

2:15 PM – 6:05 PM   **International 3, International
Level, Marriott Marquis**

Organizers: **Henry Tucker**, University of
California, San Diego

Susan Montgomery,
University of Southern
California - Los Angeles

Siu-Hung Ng, Louisiana
State University

2:15PM *Semisimple Hopf algebras of dimension*
(345) *32 with large abelian groups of*
grouplikes. Preliminary report.
Yevgenia Kashina, DePaul University
(1125-16-2375)

2:45PM *On Hopf orders and Kaplansky's sixth*
(346) *conjecture.*
Juan Cuadra, University of Almeria
(1125-16-1850)

3:15PM *Monoidal categories arising from*
(347) *representations of finite dimensional*
algebras, and their representation rings.
Kevin Gerstle, Oberlin College, **Miodrag
C Iovanov***, University of Iowa, and
Gerard Koffi, University of Nebraska,
Kearney (1125-16-2957)

3:45PM *Integral theory in finite tensor categories.*
(348) **Kenichi Shimizu**, Department of
Mathematics, Shibaura Institute of
Technology (1125-18-1736)

4:15PM *Gauge invariants from the antipode of a*
(349) *finite dimensional Hopf algebra.*
Cris Negron*, Massachusetts Institute of
Technology, and **Richard Ng**, Louisiana
State University (1125-16-1808)

4:45PM *Hopf algebras, Indicators and Twisted*
(350) *Extensions.*
Maria D. Vega, United States Military
Academy (1125-16-1871)

5:15PM *Yetter-Drinfel'd Hopf Algebras and Their*
(351) *Associated Algebras.*
Yorck Sommerhäuser, Memorial
University of Newfoundland
(1125-16-1564)

5:45PM *Automorphisms of Drinfeld Doubles and*
(352) *Bismash Products.* Preliminary report.
Joseph B Timmer, University of
Colorado at Boulder (1125-17-2527)

AMS Special Session on Nonlinear Systems and Applications, II

2:15 PM – 6:05 PM   **M103 & 104, Marquis
Level, Marriott Marquis**

Organizer: **Wenrui Hao**, Ohio State
University

2:15PM *Mathematical modeling of anti-PD-1 and*
▶ (353) *IL-27 synergy in cancer immunotherapy.*
Kang-Ling Liao*, Department of Biology
and Department of Pharmacology, The
University of North Carolina at Chapel
Hill, **Xue-Feng Bai**, Experimental
Pathology and Comprehensive Cancer
Center, The Ohio State University, and
Avner Friedman, Department of
Mathematics, The Ohio State University
(1125-92-1251)

2:45PM *Fast and robust computation of*
(354) *right-most eigenvalues of large matrices.*
Preliminary report.
Fei Xue*, Clemson University, and
Minghao Wu, Syracuse University
(1125-65-2935)

3:15PM *A simple bound-preserving sweeping*
▶ (355) *technique for conservative numerical*
approximations.
Yuan Liu*, Mississippi State University,
Yingda Cheng, Michigan State
University, and **Chi-Wang Shu**, Brown
University (1125-65-1275)

3:45PM *Two-level spectral methods for nonlinear*
▶ (356) *differential equations with multiple*
solutions. Preliminary report.
Yingwei Wang, Purdue University
(1125-65-592)

4:15PM *Central Schemes on Overlapping Cells for*
(357) *Solving MHD Equations on Triangular*
Meshes.
Yingjie Liu, Georgia Institute of
Technology (1125-65-1307)

4:45PM *An elastic sheet interacting with a 3D*
▶ (358) *non-Newtonian fluid flow.* Preliminary
report.
Luoding Zhu, Indiana University - Purdue
University Indianapolis (1125-76-366)

5:15PM *Multiphase Allen-Cahn and Cahn-Hilliard*
(359) *models and their discretizations with the*
effect of pairwise surface tensions.
Shuonan Wu* and **Jinchao Xu**,
Pennsylvania State University
(1125-65-1161)

5:45PM *Computing fluid-structure interaction.*
(360) **Jin Wang**, University of Tennessee at
Chattanooga (1125-65-1192)

AMS Special Session on Orthogonal Polynomials, I

2:15 PM – 6:05 PM   **Embassy E, International Tower, LL2, Hyatt Regency**

Organizers: **Doron Lubinsky**, Georgia Institute of Technology

Jeff Geronimo, Georgia Institute of Technology

2:15PM (361) *Chebyshev Polynomials on the Real Line.* **Barry Simon**, Caltech (1125-33-788)

2:45PM (362) *Relative Asymptotics of Orthogonal Polynomials for Perturbed Measures.* **Edward B Saff***, Vanderbilt University, and **Nikos Stylianopoulos**, Unviersity of Cyprus (1125-41-500)

3:15PM (363) *Nikishin systems on star-like sets and associated multi-orthogonal polynomials.* **Abey López-García***, University of South Alabama, **Guillermo López Lagomasino**, Universidad Carlos III de Madrid, and **Erwin Miña-Díaz**, The University of Mississippi (1125-41-484)

3:45PM (364) *Vector equilibrium problem with constraint and nth root asymptotics for some multiple orthogonal polynomials.* **Jorge Arvesú**, Charles III University of Madrid (1125-33-1714)

4:15PM (365) *On the Wall transformation and linear pencils of Jacobi matrices.* **Maksym Derevyagin**, University of Mississippi (1125-30-878)

4:45PM (366) *Some asymptotic results for multi-orthogonal polynomials on arcs of the unit circle.* Preliminary report. **Erwin Miña-Díaz**, University of Mississippi (1125-41-466)

5:15PM (367) *Szegő-type asymptotics for ray sequences of Frobenius-Padé approximants.* **Maxim L Yattselev***, Indiana University-Purdue University Indianapolis, **Alexander Aptekarev**, Keldysh Institute of Applied Mathematics, and **Alexander Bogolubsky**, Pirogov Russian National Research Medical University (1125-41-220)

5:45PM (368) *Bivariate Bernstein-Szego measures on the Square.* Preliminary report. **Jeff Geronimo**, Georgia Institute of Technology (1125-43-1832)

AMS Special Session on PDEs for Fluid flow: Analysis and Computation

2:15 PM – 6:05 PM   **L405 & L406, Lobby Level, Marriott Marquis**

Organizers: **Thinh Kieu**, University of North Georgia

Emine Celik, University of Nevada, Reno

Hashim Saber, University of North Georgia

2:15PM (369) *Analytical studies for a Data Assimilation Algorithm: Surface data, Higher-order synchronization, and Time-averaged measurements.* **Vincent R. Martinez***, Tulane University, **Animikh Biswas**, University of Maryland-Baltimore County, **Michael S. Jolly**, Indiana University-Bloomington, **Eric J. Olson**, University of Nevada-Reno, and **Edriss S. Titi**, Texas A&M University and Weizmann Institute of Science (1125-35-1089)

2:45PM (370) ▶ *Approximate solution to porous media flows.* Preliminary report. **Aleksey S. Telyakovskiy**, University of Nevada, Reno (1125-76-2732)

3:15PM (371) *A Robust Preconditioner for High-Contrast Problems.* **Yuliya Gorb**, University of Houston (1125-35-3156)

3:45PM (372) *Asymptotic expansion for solutions of Navier-Stokes equations with a non-potential body force.* Preliminary report. **Luan T Hoang***, Texas Tech University, and **Vincent R. Martinez**, Tulane University (1125-76-1889)

4:15PM (373) *Numerical computations of 2D Boussinesq equations with fractional dissipation.* Preliminary report. **Ramjee P Sharma***, University of North Georgia, and **Jiahong Wu**, Oklahoma State University (1125-35-495)

4:45PM (374) *Well-posedness and Continuity Properties of the Fornberg-Whitham Equation in Besov Spaces.* **Ryan C. Thompson***, University of North Georgia, and **John Holmes**, The Ohio State University (1125-35-1081)

5:15PM (375) *Weighted estimates of solutions to degenerate and singlular elliptic equations.* **Dat Cao***, Department of Mathematics and Statistics, Texas Tech University, **Tuoc Phan** and **Tadele Mengesha**, Department of Mathematics, University of Tennessee (1125-35-2234)

5:45PM (376) *A numerical study of immiscible two-phase multicomponent flows in highly heterogeneous porous media.* **Sourav Dutta*** and **Prabir Daripa**, Texas A&M University (1125-76-2696)

AMS Special Session on Problems in Partial Differential Equations, II

2:15 PM – 6:05 PM   **Spring, Conference Level, Hyatt Regency**

Organizers: **Alex Himonas**, University of Notre Dame

Dionyssios Mantzavinos, State University of New York at Buffalo

2:15PM *Birkhoff normal form for nonlinear wave*
(377) *equations.*
Walter Craig, McMaster University
(1125-35-1972)

2:45PM *Special properties of solutions to the IVP*
(378) *associated to the Camassa-Holm*
equation on the line.
Felipe Linares, IMPA-Rio De Janeiro,
Brazil, **Gustavo Ponce*** and **Thomas C.**
Sideris, University of California-Santa
Barbara (1125-35-1100)

3:15PM *Instabilities in fluid models.*
(379) **Dong Li**, University of British Columbia
(1125-35-2688)

3:45PM *Well-posedness of nonlinear dispersive*
(380) *PDEs via the unified transform method.*
Alex Himonas*, University of Notre
Dame, and **Dionyssios Mantzavinos**,
University of Massachusetts Amherst
(1125-35-1106)

4:15PM *The Cauchy problem for Euler-Poisson*
(381) *equation and nonuniform dependence.*
Preliminary report.
Feride Tiglay, Ohio State University
(1125-35-1837)

4:45PM *Norm-Inflation and nonuniqueness*
(382) *results for Novikov's equation.*
Preliminary report.
Curtis A Holliman*, The Catholic
University of America, **Alex Himonas**,
University of Notre Dame, and **Carlos**
Kenig, The University of Chicago
(1125-35-1631)

5:15PM *Mellin Transform Techniques for the*
(383) *Mixed Problem in Two Dimensions.*
Hussein Awala, Temple University
(1125-35-1517)

5:45PM *An admissibility condition for weak*
(384) *solutions of multidimensional nonlinear*
systems of conservation laws.
Michael Sever, The Hebrew University,
Jerusalem, Israel (1125-35-515)

AMS Special Session on Random Matrices, Random Percolation and Random Sequence Alignments, II

2:15 PM – 6:05 PM   **The Learning Center,**
Ballroom Level, Hyatt Regency

Organizers: **Ruoting Gong**, Illinois
Institute of Technology
Michael Damron, Georgia
Institute of Technology

2:15PM *Totally asymmetric simple exclusion*
(385) *process on a ring.*
Jinho Baik, University of Michigan
(1125-60-281)

3:15PM *The facilitated exclusion process and*
(386) *random growth in a half space.*
Guillaume Barraquand, Columbia
University (1125-60-752)

3:45PM *A drunk walk in a drunk world.*
(387) **Ivan Z Corwin**, Columbia University
(1125-60-1774)

4:45PM *Asymptotics for 2D critical first-passage*
(388) *percolation.*
Michael Damron, Georgia Institute of
Technology, **Wai-Kit Lam***, Indiana
University Bloomington, and **Xuan**
Wang, Georgia Institute of Technology
(1125-60-1510)

5:15PM *Bootstrap Percolation in Directed*
(389) *Inhomogeneous Random Graphs.*
Nils Detering*, University of California,
Santa Barbara, **Thilo Meyer-Brandis** and
Konstantinos Panagiotou, University of
Munich (1125-60-2208)

5:45PM *On a family of measures with finitely*
▶ (390) *many infinite geodesics in planar first*
passage percolation.
Gerandy Brito* and **Christopher**
Hoffman, University of Washington
(1125-60-2709)

AMS Special Session on Recent Advances in Mathematical Biology, II

2:15 PM – 6:05 PM   **International C, International**
Level, Marriott Marquis

Organizers: **Zhisheng Shuai**, University
of Central Florida

Guihong Fan, Columbus
State University

Andrew Nevai, University of
Central Florida

Eric Numfor, Augusta
University

2:15PM *Analysis of a simplified model of*
(391) *anaerobic digestion.*
Tyler Meadows, McMaster University,
Marion Weedermann, Dominican
University, and **Gail S. K. Wolkowicz***,
McMaster University (1125-92-2486)

2:45PM *Noise induced mixed-mode oscillations*
(392) *and distribution of outbreaks in a*
bi-trophic ecosystem.
Susmita Sadhu, Georgia College & State
University (1125-34-1656)

3:15PM *Dynamics and pattern formation in*
(393) *diffusive predator-prey system with*
prey-taxis or predator-taxis.
Sainan Wu, Harbin Institute of
Technology, **Junping Shi***, College of
William and Mary, **Boying Wu**, Harbin
Institute of Technology, China, and
Jinfeng Wang, Harbin Normal University
(1125-92-1572)

3:45PM *Mathematical Models for Prostate Cancer*
▶ (394) *with Androgen Resistance under*
Intermittent Androgen Suppression
Therapy.
Tin Phan*, **Javier Baez** and **Yang Kuang**,
Department of Mathematical and
Statistical Sciences, Arizona State
University (1125-00-2587)

4:15PM **Connecting Local and Global Sensitivities**
(395) *in a Mathematical Model for Wound Healing.*
Richard Schugart*, Western Kentucky University, **Nitin Krishna**, The University of Chicago, **Hannah Pennington**, The University of Illinois at Chicago, **Ayush Prasad**, Western Kentucky University, **Marisa Eisenberg**, University of Michigan, Ann Arbor, and **Canaan Coppola**, University at Buffalo, The State University of New York (1125-92-2549)

4:45PM *Mathematical exploration of virtuous*
▶ (396) *versus vicious cycles of human health and economic development.*
Calistus N Ngonghala*, University of Florida, and **Matthew H Bonds**, Harvard medical School (1125-92-2412)

5:15PM *Student Life Tables: Case Study for a*
▶ (397) *Regional University.* Preliminary report.
Ariel Cintron-Arias, East Tennessee State University (1125-92-3141)

5:45PM *A calcium time course based*
(398) *computational model for acute stress related cortisol dynamics and synaptic plasticity.* Preliminary report.
Pengcheng Xiao*, University of Evansville, and **Jianzhong Su**, The University of Texas at Arlington (1125-92-544)

AMS Special Session on Sheaves in Topological Data Analysis, II

2:15 PM – 5:35 PM   International 10, International Level, Marriott Marquis

Organizers: **Mikael Vejdemo-Johansson**, CUNY College of Staten Island

Elizabeth Munch, University at Albany, SUNY

Martina Scolamiero, École polytechnique fédérale de Lausanne

2:15PM *Directed sheaf co/homology for*
(399) *pursuit-evasion games.*
Robert Ghrist*, University of Pennsylvania, and **Sanjeevi Krishnan**, Ohio State University (1125-91-1157)

3:15PM *Matroids, Morse Theory, and Fast*
(400) *Persistent Homology Computations.* Preliminary report.
Gregory Henselman, University of Pennsylvania (1125-55-1225)

3:45PM *Classification of Constructible Cosheaves.*
▶ (401) **Amit Patel**, Colorado State University (1125-55-1241)

4:15PM *Theory of interleavings on categories*
(402) *with lax* $[0, \infty)$*-action and the hom tree functor.*
Vin de Silva, Pomona College, **Elizabeth Munch**, University at Albany - SUNY, and **Anastasios Stefanou***, University at Albany (1125-55-1540)

4:45PM *Multidimensional persistence vs diagram*
(403) *and Hochschild cohomology.* Preliminary report.
Francesco Vaccarino, Politecnico di Torino / ISI Foundation (1125-55-1265)

5:15PM *Invariants of Simplicial Complexes from*
(404) *Configuration Spaces.* Preliminary report.
Radmila Sazdanovic*, **Andrew Cooper**, North Carolina State University, and **Vin de Silva**, Pomona College (1125-57-1459)

AMS Special Session on Statistical Methods in Computational Topology and Applications, II

2:15 PM – 6:05 PM   International 9, International Level, Marriott Marquis

Organizers: **Yu-Min Chung**, College of William & Mary

Sarah Day, College of William & Mary

2:15PM *Universality of the Homotopy Interleaving*
(405) *Distance.*
Michael Lesnick*, Princeton University, and **Andrew Blumberg**, University of Texas-Austin (1125-55-1597)

2:45PM *A comparison framework for interleaved*
(406) *persistence modules.*
Shaun Harker, Rutgers University, **Miroslav Kramar**, Tohoku University, **Rachel Levanger*** and **Konstantin Mischaikow**, Rutgers University (1125-55-1614)

3:15PM *Discovering Geometry using Topological*
▶ (407) *Data Analysis.* Preliminary report.
Peter Bubenik, University of Florida (1125-55-1287)

3:45PM *Pseudo-Multidimensional Persistent*
▶ (408) *Homology for Landmark-Free Analysis of Point-Cloud Datasets for Medical Imaging and the Determination of Manual Segmentation Reliability.*
Matthew Pietrosanu* and **Giseon Heo**, University of Alberta (1125-62-1596)

4:15PM *Multidimensional Persistence: A Practical*
(409) *Approach.*
Matthew L Wright*, St. Olaf College, and **Michael Lesnick**, Princeton Neuroscience Institute (1125-55-1154)

4:45PM *Topological Microstructure Analysis*
(410) *Using Persistence Landscapes.*
Thomas Wanner, George Mason University (1125-55-958)

5:15PM *Kernel method for persistence diagrams.*
(411) **Genki Kusano***, Tohoku University, **Kenji Fukumizu**, The Institute of Statistical Mathematics, and **Yasuaki Hiraoka**, Tohoku University (1125-62-443)

5:45PM *Maximally persistent cycles in random*
(412) *geometric complexes.*
Omer Bobrowski, Duke University, **Matthew Kahle***, The Ohio State University, and **Primoz Skraba**, Jozef Stefan Institute, A.I. Laboratory (1125-55-325)

AMS Special Session on Topology, Representation Theory, and Operator Algebras (A Tribute to Paul Baum), II

2:15 PM – 5:35 PM **Dunwoody, Conference Level, Hyatt Regency**

Organizers: **Efton Park**, Texas Christian University

Jose Carrion, Texas Christian University

2:15PM *Index Equals Coarsening Equals Heat
(413) Flow Equals Loss of Control.*
John Roe, Penn State (1125-19-505)

2:45PM *Analytic Grothendieck-Riemann-Roch
(414) Theorem.*
Ronald G Douglas* and **Yi Wang**, Texas A&M University (1125-46-359)

3:15PM *Primary and secondary invariants of
(415) algebras of pseudodifferential symbols.*
Preliminary report.
Alexander Gorokhovsky*, University of Colorado, Boulder, and **Henri Moscovici**, The Ohio State University (1125-47-1135)

3:45PM *Noncommutative Borsuk-Ulam-type
(416) conjecture revisited.* Preliminary report.
Piotr M. Hajac*, IMPAN, and **Ludwik Dabrowski**, SISSA (1125-46-2039)

4:15PM *L-classes: Is there a computable local
(417) combinatorial formula?* Preliminary
report.
Jeff Cheeger, Courant Institute, NYU (1125-57-1186)

4:45PM *On the isomorphism between topological
(418) and geometric K-homology.* Preliminary
report.
Jody Trout, Dartmouth College (1125-55-1936)

5:15PM *Beyond Ellipticity.*
(419) **Paul Frank Baum**, Penn State (1125-58-1317)

MAA Invited Paper Session on Office Hours with a Geometric Group Theorist, II

2:15 PM – 4:35 PM **A602, Atrium Level, Marriott Marquis**

Organizers: **Dan Margalit**, Georgia Institute of Technology

Matthew Clay, University of Arkansas

2:15PM *Pitching Coxeter Groups to a Curious
▶ (420) Undergraduate.*
Adam Piggott, Bucknell University (1125-AE-424)

2:45PM *Growth in Groups.*
▶ (421) **Eric M Freden**, Southern Utah University (1125-AE-81)

3:15PM *An exploration of right-angled Artin
▶ (422) groups.*
Robert W Bell, Michigan State University (1125-AE-2346)

3:45PM *Mapping class groups: a pictorial
▶ (423) introduction.*
Leah Childers*, Pittsburg State University, **Tara Brendle**, University of Glasgow, and **Dan Margalit**, Georgia Institute of Technology (1125-AE-689)

4:15PM *An Introduction to Lamplighter Groups.*
▶ (424) **Jennifer Taback**, Bowdoin College (1125-AE-991)

MAA Invited Paper Session on Role of Modeling & Understanding Environmental Risks

2:15 PM – 5:35 PM **International 7, International Level, Marriott Marquis**

Organizer: **Ben Fusaro**, Florida State University

2:15PM *Commonalities and differences among
▶ (425) environmental calamities.*
Charles R. Hadlock, Bentley University (1125-AC-1171)

2:45PM *Modeling the Energy Future.*
▶ (426) **James Case**, Baltimore MD (1125-AC-617)

3:15PM *Humanistic Conceit, Unintended
▶ (427) Consequences and Collapse.* Preliminary
report.
Ben Fusaro, Florida State University (1125-AC-3050)

3:45PM *Climate Change and Tipping Points in
▶ (428) Seabird Colonies.*
Shandelle M Henson, Andrews University (1125-AC-1091)

4:15PM *The Interaction Term in Population
▶ (429) Models.*
Michael Olinick, Middlebury College (1125-AC-785)

4:45PM *A hysteresis effect in a simple sea-ice
▶ (430) model.* Preliminary report.
William Dean Stone, New Mexico Tech (1125-AC-1521)

5:15PM *Current Civilization Plus Climate Change
▶ (431) Equals Collapse.* Preliminary report.
Martin E. Walter, University of Colorado, Boulder (1125-AC-498)

AMS-MAA-ICHM Special Session on History of Mathematics, II

2:15 PM – 6:05 PM **International 8, International Level, Marriott Marquis**

Organizers: **Adrian Rice**, Randolph-Macon College

Sloan Despeaux, Western Carolina University

Daniel Otero, Xavier University

2:15PM *From L'Hôpital to Lagrange: Analysis
▶ (432) Textbooks in the 18th Century.*
Robert E Bradley, Adelphi University (1125-01-1476)

2:45ᴘᴍ *Jean le Rond d'Alembert: l'enfant terrible*
► (433) *of the French Enlightenment.* Preliminary report.
Lawrence A. D'Antonio, Ramapo College of New Jersey (1125-01-1417)

3:15ᴘᴍ *Did Euler Scoop Möbius?*
► (434) **William Dunham**, Research Associate in Mathematics, Bryn Mawr College (1125-01-254)

3:45ᴘᴍ *The Power of Power Series: Hensel and*
(435) *Analogy.* Preliminary report.
Fernando Q Gouvea, Colby College (1125-01-538)

4:15ᴘᴍ *A Tour of Group Generalisations of the*
► (436) *1920s and 1930s.*
Christopher D. Hollings, University of Oxford (1125-01-308)

4:45ᴘᴍ Discussion

5:15ᴘᴍ *An incompleat chronology of the* $(7, 3, 1)$
► (437) *block design.* Preliminary report.
Ezra Brown, Virginia Tech (1125-01-607)

5:45ᴘᴍ *How did Leibniz solve the catenary*
► (438) *problem?* Preliminary report.
Michael R. Raugh, Los Angeles, California (1125-01-776)

MAA Minicourse #2: Part A

2:15 ᴘᴍ – 4:15 ᴘᴍ   **L508, Lobby Level, Marriott Marquis**

Directing Undergraduate Research
Presenter: **Aparna Higgins**, University of Dayton

MAA Minicourse #3: Part A

2:15 ᴘᴍ – 4:15 ᴘᴍ   **L504 & L505, Lobby Level, Marriott Marquis**

Flipping your Linear Algebra Course using Open Educational Resources
Presenters: **Sarah Eichhorn**, University of California, Irvine

David Farmer, American Institute of Mathematics

Jim Fowler, The Ohio State University

Petra Bonfert-Taylor, Dartmouth College

MAA Minicourse #5: Part A

2:15 ᴘᴍ – 4:15 ᴘᴍ   **Vinings, Conference Level, Hyatt Regency**

Introductory Proposal Writing for Grant Applications to the National Science Foundation EHR Division of Undergraduate Education
Presenters: **Ron Buckmire**, Division of Undergraduate Education, National Science Foundation

John Haddock, Division of Undergraduate Education, National Science Foundation

Teri Jo Murphy, Division of Undergraduate Education, National Science Foundation

Sandra Richardson, Division of Undergraduate Education, National Science Foundation

Lee Zia, Division of Undergraduate Education, National Science Foundation

MAA Minicourse #14: Part A

2:15 ᴘᴍ – 4:15 ᴘᴍ   **L506 & L507, Lobby Level, Marriott Marquis**

Teaching Quantitative Reasoning with Common Sense and Common Knowledge
Presenters: **Ethan D. Bolker**, University of Massachusetts, Boston

Maura B. Mast, Fordham University

AMS Contributed Paper Session on Combinatorics and Graph Theory, I

2:15 ᴘᴍ – 5:55 ᴘᴍ   **Greenbriar, Conference Level, Hyatt Regency**

2:15ᴘᴍ *Minimum Degrees of Minimal Ramsey*
► (439) *Graphs for Almost-Cliques.*
Raj Raina*, Novi, **Andrey Grinshpun** and **Rik Sengupta**, Massachusetts Institute of Technology (1125-05-8)

2:30ᴘᴍ *Total domination polynomials of graphs.*
► (440) Preliminary report.
J. Hu, University of Mississippi, **E. Shan**, Shanghai University, **C. Wang**, Central China Normal University, **Shaohui Wang*** and **B. Wei**, University of Mississippi (1125-05-74)

2:45ᴘᴍ *A Ramsey class for Steiner systems.*
(441) **Vindya Bhat***, Courant Institute of Mathematical Sciences/New York University, **Jaroslav Nešetřil**, Charles University, **Christian Reiher**, Universität Hamburg, and **Vojtěch Rödl**, Emory University (1125-05-2972)

3:00ᴘᴍ *The Warden's Game - Greedy and*
(442) *Necklace Constructions of Universal Cycles.* Preliminary report.
Joseph M DiMuro, Biola University (1125-05-217)

3:15ᴘᴍ *Algebraic Digraphs.*
(443) **Aleksandr Kodess**, University of Rhode Island (1125-05-238)

3:30ᴘᴍ *Symmetry and Turan Sums of Squares.*
(444) **Annie Raymond***, University of Washington, **James Saunderson**, Monash University, **Mohit Singh**, Microsoft Research, and **Rekha R Thomas**, University of Washington (1125-05-261)

3:45PM
▶ (445)
Neighbor sum distinguishing total coloring of d-degenerate graphs.
Preliminary report.
Miaomiao Han*, West Virginia University, **You Lu**, Northwestern Polytechnical University, and **Rong Luo**, West Virginia University (1125-05-283)

4:00PM
(446)
A Ramsey-Type theorem on Modulo Orientations.
Miaomiao Han, West Virginia University, **Xinmin Hou**, University of Science and Technology of China, **Hong-Jian Lai** and **Jiaao Li***, West Virginia University (1125-05-300)

4:15PM
(447)
Induced Turán numbers.
Po-Shen Loh, **Michael Tait**, Carnegie Mellon, and **Craig Timmons***, California State University Sacramento (1125-05-319)

4:30PM
▶ (448)
Anti-Power Prefixes of the Thue-Morse Word.
Colin R. Defant, University of Florida (1125-05-481)

4:45PM
▶ (449)
On the Minimum Number of Monochromatic Generalized Schur Triples.
Thotsaporn Thanatipanonda, Mahidol University International College (1125-05-674)

5:00PM
(450)
Permutations that Destroy Arithmetic Progressions in Elementary p-groups.
Ashvin Anand Swaminathan* and **Noam D Elkies**, Harvard University (1125-05-726)

5:15PM
▶ (451)
The 26 Wilf-equivalence classes of length five quasi-consecutive patterns.
Shyam S Narayanan*, Harvard University, and **Evan Chen**, Massachusetts Institute of Technology (1125-05-791)

5:30PM
▶ (452)
Counting kings and a connection with Catalan numbers. Preliminary report.
Shih-Wei Chao*, University of North Georgia, **Neil Calkin**, Clemson University, **Catherine Davison**, Trinity College, **Krista Kelly**, Western New England University, and **Ana Andreea Stoica**, Princeton (1125-05-815)

5:45PM
(453)
Strongly Regular Graphs from Arcs in Non-Desarguesian Planes. Preliminary report.
Liz Lane-Harvard, University of Central Oklahoma (1125-05-818)

AMS Contributed Paper Session on Dynamical Systems, Ergodic Theory, Difference and Functional Equations, I

2:15 PM – 5:55 PM **International B, International Level, Marriott Marquis**

2:15PM
(454)
An Experiment of the Malkus-Lorenz Waterwheel and Its Measurement by Image Processing.
Heewon Kim*, **Jiwon Seo**, **Bora Jeong** and **Chohong Min**, Department of mathematics, Ewha womans university, Seoul, Korea (1125-37-52)

2:30PM
▶ (455)
The concept of the dividing surface in collinear Hydrogen exchange reaction.
Ali Allahem, Maths Department, Sciences College, Qassim University, Saudi Arabia. (1125-37-59)

2:45PM
▶ (456)
Adiabatic Chaos and Transport in Mesoscale Vortices and Vortex Rings.
Maleafisha Joseph Pekwa Stephen Tladi, University of Limpopo (1125-37-65)

3:00PM
▶ (457)
The Chaotic Ballet of Walking Droplets.
Aminur Rahman, New Jersey Institute of Technology (1125-37-161)

3:15PM Break

3:30PM
(458)
Discrete dynamical modeling and experimental investigation of chaotic NOR gates and set/reset flip-flops.
Aminur Rahman and **Ian Jordan***, New Jersey Institute of Technology (1125-37-184)

3:45PM
▶ (459)
Idealized Models of Insect Olfaction.
Pamela B. Pyzza*, Ohio Wesleyan University, **Gregor Kovacic**, Rensselaer Polytechnic Institute, and **David Cai**, Courant Institute, NYU & Shanghai Jiao Tong University (1125-37-275)

4:00PM
(460)
Competition between a nonallelopathic phytoplankton and an allelopathic phytoplankton species under predation.
Jean-Jacques Kengwoung-Keumo, Cameron University, Lawton, Oklahoma (1125-37-1256)

4:15PM
(461)
Finite orbits in random subshifts of finite type.
Ryan Broderick, University of California, Irvine (1125-37-1439)

4:30PM
(462)
Packing measure of super separated iterated function systems.
James E Reid, University of North Texas (1125-37-1541)

4:45PM Break

5:00PM
(463)
Parameter space structures for complex rational maps.
Daniel Cuzzocreo, Northwestern University (1125-37-1834)

5:15PM
(464)
Pressure Type Metrics on Spaces of Metric Graphs.
Lien-Yung Kao, University of Notre Dame (1125-37-1984)

5:30PM *Fundamental Cupolets of Chaotic*
(465) *Systems.*
Matthew A Morena*, Young Harris
College, and **Kevin M Short**, University of
New Hampshire (1125-37-2000)

5:45PM *On the fine classification of Second*
▶ (466) *Minimal Odd Periodic Orbits of the*
Continuous Endomorphisms on the Real
Line.
Ugur G. Abdulla, Florida Institute Of
Technology, **Naveed H Iqbal***, Florida
Institute of Technology, **Rashad U.**
Abdulla, University of Pennsylvania, and
Muhammad U. Abdulla, Florida Institute
Of Technology (1125-37-2007)

AMS Contributed Paper Session on Functional Analysis

2:15 PM – 5:25 PM   Techwood, Conference
                          Level, Hyatt Regency

2:15PM *Spectral theory on Banach spaces.*
▶ (467) **Jan Lang**, The Ohio State University
(1125-46-570)

2:30PM *Hilbert C^*-modules over Σ^*-algebras.*
(468) **Clifford A Bearden**, University of
Houston (1125-46-682)

2:45PM *Iterative actions of operators on a system*
(469) *of vectors.*
Armenak Petrosyan, Vanderbilt
University (1125-46-977)

3:00PM *Cover topologies and algebraic structures*
(470) *for some spaces of vector-valued*
functions. Preliminary report.
Terje Hõim*, Wilkes Honors College,
Florida Atlantic Univ., Jupiter, FL 33458,
and Univ. of Tartu, Tartu, Estonia, and **D.**
A. Robbins, Trinity College, Hartford, CT
06106 (1125-46-1085)

3:15PM *Boundary behavior of analytic functions*
(471) *on the bidisk via Hilbert spaces.*
Ryan K Tully-Doyle, Hampton University
(1125-46-1197)

3:30PM *On the Smoothness of Weak Solutions of*
(472) *an Abstract Evolution Equation with*
a Scalar Type Spectral Operator.
Preliminary report.
Marat V. Markin, Department of
Mathematics, California State University,
Fresno (1125-46-1445)

3:45PM *On bounded homomorphisms of real*
(473) *C*-algebras into essentially real Banach*
algebras.
Alexander A Katz, St. John's University,
NY (1125-46-1507)

4:00PM *A Finiteness Result for Circulant Core*
▶ (474) *Hadamard Matrices.* Preliminary report.
Chase T Worley, University of
Tennessee, Knoxville (1125-46-1798)

4:15PM Break

4:30PM *On defining real locally C*-algebras.*
(475) **Oleg Friedman***, Touro College / Lander
College for Men, NY, USA, and **Alexander**
A. Katz, St. John's University, NY, USA
(1125-46-2808)

4:45PM *Positive cones and positive linear*
▶ (476) *functionals on algebras of operators on*
Pontryagin space Π_1 with indefinite
metrics: non-degenerated cases.
Preliminary report.
Sofya S Masharipova*, Southern
Arkansas University, and **Shukhrat M**
Usmanov, Waldorf University
(1125-46-2085)

5:00PM *On Measurable Bundles of real*
(477) *C*-algebras.*
Alexander A Katz, St. John's University,
NY, and **Roman Kushnir***, University
of South Africa, Pretoria, RSA
(1125-46-2436)

5:15PM *Twisted Duality for the Clifford von*
(478) *Neumann Algebra.*
Jeramiah A Hocutt* and **Paul L**
Robinson, University of Florida
(1125-46-2728)

AMS Contributed Paper Session on Mathematics Education

2:15 PM – 5:40 PM   Fairlie, Conference
                          Level, Hyatt Regency

2:15PM *Fostering concept modification through*
▶ (479) *Light Board technology.*
Girija Sarada Nair-Hart, University of
Cincinnati, Clermont College
(1125-00-1951)

2:30PM *A Twist on an Old Mathematical Puzzle.*
▶ (480) **Arsalan Wares**, Valdosta State University
(1125-97-1)

2:45PM *An Experiment with Module Based*
▶ (481) *Instruction in Linear Algebra.*
Tanvir Prince and **Nieves Angulo***,
Hostos Community College, City
University of New York (1125-97-6)

3:00PM *A Moore Method Apprenticeship Program.*
▶ (482) **Jacqueline A Jensen-Vallin*** and **W.**
Ted Mahavier, Lamar University
(1125-97-882)

3:15PM *Mathematical Puzzle Programs:*
▶ (483) *Connecting with Students Using Puzzles*
and Games.
PJ Couch*, Lamar University, **Braxton**
Carrigan, Southern Connecticut State
University, **Steven Clontz**, University of
South Alabama, and **Zachary Sarver**,
Auburn University (1125-97-1335)

3:30PM *A Five-Year Update on the Academic*
▶ (484) *Transition Program.*
Peter Olszewski, Penn State Behrend
(1125-97-1364)

3:45PM *Supporting Teachers and Engaging*
▶ (485) *Students: The College of Coastal Georgia*
Math Department's partnership with
Glynn County Public Schools.
Laura R Lynch*, **Tanya Cofer** and
German Vargas, College of Coastal
Georgia (1125-97-1756)

4:00PM *Changing past perceptions and fostering*
▶ (486) *future STEM ambitions through secondary and higher education partnerships.*
Catherine Paolucci*, State University of New York at New Paltz, and **Evan Smith**, Frank McCourt High School (1125-97-2211)

4:15PM *Success for Calculus: Is It a Success?*
(487) Preliminary report.
Paul N. Runnion* and **Barbara Wilkins**, Missouri University of Science and Technology (1125-97-2398)

4:30PM *Developing Mathematical Identity in*
▶ (488) *Post-Secondary Students in a Student Math Seminar.*
Joni J Schneider, Texas State University (1125-97-2413)

4:45PM *3D Printing in Middle School Mathematics*
▶ (489) *and Preservice Teachers.* Preliminary report.
Matthew J Haines, Augsburg College, **Nora Helf**, Sanford Middle School, and **Lewis Istok***, Augsburg College (1125-97-2739)

5:00PM *Connecting Multiplication, Fractions, and*
▶ (490) *Equations.* Preliminary report.
Eun Jung, University of Georgia (1125-97-2926)

5:15PM *Sustainable Mathematics Partnerships*
▶ (491) *between Public School Districts and Institution of Higher Education: The COMPLETE Center.* Preliminary report.
Padmanabhan Seshaiyer* and **Jennifer Suh**, George Mason University (1125-97-3054)

5:30PM *Partnering for Success: Developing a*
▶ (492) *high school discrete mathematics curriculum connecting a university course with a local high school course using the standards for mathematical practice.* Preliminary report.
Osvaldo Daniel Soto, University of California San Diego (1125-97-3111)

AMS Contributed Paper Session on Number Theory, II

2:15 PM – 5:55 PM   International 1, International Level, Marriott Marquis

2:15PM *Bound for preperiodic points for maps*
(493) *with good reduction.*
Sebastian I Troncoso, Michigan State University (1125-11-1055)

2:30PM *Arithmetic Progressions of Polygonal*
▶ (494) *Numbers with Polygonal Common Difference.* Preliminary report.
Lenny Jones, Shippensburg University, and **Tristan Phillips***, Shippensburg Univeristy (1125-11-1309)

2:45PM ρ-*Minimal Transitive Permutation Groups*
(495) *and Ranks of CM Types in Degree* 24.
Alexander Borselli, Lehigh University (1125-11-1391)

3:00PM *Gaps Between Elements of the Same*
▶ (496) *Order in* $\mathbb{F}_p$. Preliminary report.
Joshua Harrington, Cedar Crest College, and **Lenny Jones***, Shippensburg University (1125-11-1395)

3:15PM *Sums of Polynomial Residues.*
▶ (497) **Samuel Gross**, Noblis Inc., **Joshua Harrington*** and **Laurel Minott**, Cedar Crest College (1125-11-1489)

3:30PM *Heuristic and improvement on the least*
(498) *prime in an arithmetic progression.*
Junxian Li*, **Kyle Pratt** and **George Shakan**, University of Illinois at Urbana-Champaign (1125-11-1514)

3:45PM *Ramanujan-Sato Series for* $\frac{1}{\pi}$ *Arising*
(499) *from the Monster Group.*
Daniel Schultz*, Penn State, **Timothy Huber**, The University of Texas-Pan American, and **Donxi Ye**, The University of Wisconsin–Madison (1125-11-1518)

4:00PM *Capitulation, unit groups, and the*
(500) *cohomology of* S-*idèle classes.*
Preliminary report.
Saikat Biswas, Arizona State University (1125-11-1535)

4:15PM *Unrestricted Congruence Properties of*
▶ (501) *the Restricted Partition Function.*
Preliminary report.
Jonathan D. Rehmert*, College of the Ozarks, and **Brandt Kronholm**, University of Texas - Rio Grande Valley (1125-11-1542)

4:30PM *Constructing Galois 2-extensions of the*
(502) *2-adic numbers.*
Chad Awtrey*, **Jim Beuerle** and **Jade Schrader**, Elon University (1125-11-1662)

4:45PM *Generalized Zeckendorf Decompositions*
▶ (503) *and Monovariants.* Preliminary report.
Dawn C. Nelson, Saint Peter's University (1125-11-1702)

5:00PM *GCD properties of Generalized Fibonacci*
▶ (504) *Polynomials.* Preliminary report.
Antara Mukherjee, The Citadel, The Military College of South Carolina (1125-11-1772)

5:15PM *Characterizations of Quadratic, Cubic,*
▶ (505) *and Quartic Residue Matrices.*
Evan P. Dummit*, University of Rochester, **David S. Dummit**, University of Vermont, and **Hershy Kisilevsky**, Concordia University (1125-11-1783)

5:30PM *Quadratic forms representing all*
(506) *integers coprime to 3.*
Justin DeBenedetto, University of Notre Dame, and **Jeremy Rouse***, Wake Forest University (1125-11-1965)

5:45PM *A Generalization of Identities from*
▶ (507) *Fibonacci Numbers to the Generalized Fibonacci Polynomial.*
Nathan S McAnally, The Citadel (1125-11-2081)

AMS Contributed Paper Session on Undergraduate Research, I

2:15 PM – 5:55 PM   International A, International Level, Marriott Marquis

2:15PM
► (508)
Optimizing the Quality-Cost Trade-off of Human Annotation for labeling web-pages to train web page classifiers.
Sameeksha Khillan*, **Edgar Sucar**, **Xiran Liu** and **Zichao Li**, Institute of Pure and Applied Mathematics, University of California, Los Angeles (1125-00-1872)

2:30PM
(509)
Extreme Precipitation: Changes in Rain Frequency from 1895-2015 in Central Texas.
Victorie Gore, Southwestern University (1125-00-2018)

2:45PM
► (510)
An Infinitude of Proofs for the Infinitude of Primes.
Matthew D Bradley, Wentworth Institute of Technology (1125-00-2622)

3:00PM
► (511)
Topological data analysis of ballistic deposition models.
Kate Heenan L Heenan* and **David B Damiano**, College of the Holy Cross (1125-00-3044)

3:15PM
► (512)
Euler characteristic of Hilbert schemes via colored Young diagrams.
Shelby P. Cox*, University of Massachusetts, and **Amal Mattoo**, Sidwell Friends School (1125-05-205)

3:30PM
► (513)
Generalized splines on infinite graphs.
Portia Anderson*, **Mariel Jones**, **Minjun Li**, **Caitlin O'Neill**, **Cleophelia Roberts**, **Carolyn Stephen** and **Claudia He Yun**, Smith College (1125-05-1914)

3:45PM
► (514)
Further results on a generalization of Lie(k).
Sarah D Brauner*, **Marissa E Miller**, **Leslie K Nordstrom** and **Jamie A Oliva**, Smith College (1125-05-2324)

4:00PM
► (515)
Pruning techniques for Subgraph Isomorphism using matchings and vertex cuts. Preliminary report.
Andrew Meier*, **Austin Mohr** and **Thomas Schuler**, Nebraska Wesleyan University (1125-05-2452)

4:15PM   Break

4:30PM
► (516)
Strategies for Weak Cop Number on Tilings of the Plane. Preliminary report.
Arthur F Diep-Nguyen*, Boston College, and **Dylan King**, University of Nebraska at Omaha (1125-05-2924)

4:45PM
► (517)
Games on Graphs: Seepage! Preliminary report.
Julie Anne Bowman, Southwest Baptist University, and **Nicholas Lindell***, University of Georgia (1125-05-2986)

5:00PM
► (518)
Triangular Ramsey Numbers. Preliminary report.
Conner Mattes* and **Zachary Chaney**, Colorado School of Mines (1125-05-3006)

5:15PM
► (519)
Routing Permutations on Hypercube Graphs. Preliminary report.
Gexin Yu and **C. Santana Afton***, The College of William & Mary (1125-05-3030)

5:30PM
(520)
Logarithms over a Real Associative Algebra.
Nathan A. BeDell, Liberty University (1125-13-277)

5:45PM
(521)
Clifford Algebras as Hopf Algebras and the Connection Between Cocycles and Walsh Functions.
Hannah Elizabeth Downs, Tennessee Technological University (1125-16-2769)

MAA Session on Cryptology for Undergraduates, II

2:15 PM – 4:50 PM   L401 & L402, Lobby Level, Marriott Marquis

Organizers: **Chris Christensen**, Northern Kentucky University

Joshua Holden, Rose-Hulman Institute of Technology

Robert Lewand, Goucher College

2:15PM
► (522)
Secure Hands-on Cryptosystems in an Undergraduate Cryptology Course. Preliminary report.
Eric J Landquist, Kutztown University (1125-B1-1401)

2:35PM
► (523)
Cryptology as a Post-Linear Algebra Gateway to Advanced Mathematics.
Joseph H Silverman, Brown University (1125-B1-39)

2:55PM
► (524)
Unlocking Ideas: Using escape room puzzles in a cryptology classroom. Preliminary report.
Anne M. Ho, Coastal Carolina University (1125-B1-1700)

3:15PM
► (525)
Using Declassified Intelligence Documents in a Cryptology Course.
David A Brown, Ithaca College (1125-B1-96)

3:35PM
► (526)
Teaching Information Security to First-Year Students.
Darren B Glass, Gettysburg College (1125-B1-944)

3:55PM
► (527)
The Suitability of Lattices for Project-based Introductions to Cryptology.
Scott C. Batson*, SPAWAR Systems Center Atlantic, **Hemant Pendharkar**, Worcester State University, **Tuwaner Hudson Lamar**, Morehouse College, **Georgianna L.T. Campbell**, University of Georgia, and **Kayla A. Capitan**, Palmetto Scholars Academy (1125-B1-213)

4:15PM
► (528)
Cryptology Examples for a Variety of Course Levels. Preliminary report.
Joy L. Becker, Wartburg College (1125-B1-2225)

4:35PM *Broken one-time pads and other projects.*
▶ (529) **Paul Jenkins**, Brigham Young University
(1125-B1-1252)

MAA Session on Humanistic Mathematics, I

2:15 PM – 4:50 PM   **Courtland, Conference
                              Level, Hyatt Regency**

Organizers: **Gizem Karaali**, Pomona
College
Eric S. Marland,
Appalachian State University

2:15PM *Using Math to Improve Cultural*
(530) *Understanding.*
Julie C. Beier, Earlham College
(1125-D1-1320)

2:35PM *Mathematics, Writing and Rhetoric:*
▶ (531) *Deep Thinking in First-Year Learning
Communities.*
Christine von Renesse* and **Jennifer
DiGrazia**, Westfield State University, MA
(1125-D1-1456)

2:55PM *The Geometry and Spirituality of Islamic*
▶ (532) *Tiling.* Preliminary report.
Carol E. Gibbons* and **Jayme Hennessy**,
Salve Regina University (1125-D1-86)

3:15PM *From Menstruation to Triathlons:*
▶ (533) *Ethnomathematics for the College
Classroom.*
John Kellermeier, Vancouver, WA
(1125-D1-2394)

3:35PM *Using History as a Vehicle for*
(534) *Humanizing Mathematics.*
Aaron Trocki, Elon University
(1125-D1-1677)

3:55PM *Team Teaching the Math and History of*
▶ (535) *Global Pandemics.* Preliminary report.
Maura Chhun, Metropolitan State
University, and **Matthew Moynihan***, The
College of Wooster (1125-D1-2908)

4:15PM *Playing Nice in the Math Sandbox:*
▶ (536) *Mathematics in Support of Digital
Humanities.*
Cindy Traub, Washington University in
St. Louis (1125-D1-3071)

4:35PM *Big, Small, and Nowhere at All: The*
(537) *Nature of Numbers - A Denison Seminar.*
Sam Cowling, Department of Philosophy,
Denison University, and **May Mei***,
Department of Mathematics and
Computer Science, Denison University
(1125-D1-1172)

MAA Session on Innovative Teaching through Recreational Mathematics, II

2:15 PM – 4:50 PM   **Embassy C, International
                              Tower, LL2, Hyatt Regency**

Organizers: **Matthew Jura**, Manhattan
College
Oscar Levin, University of
Northern Colorado
Tyler Markkanen,
Springfield College

2:15PM *Frogs + Puzzles = Algorithmic Thinking.*
▶ (538) **Edmund A Lamagna**, University of
Rhode Island (1125-F5-1420)

2:35PM *How many push-ups did they do?*
▶ (539) Preliminary report.
Michael A. Brilleslyper, U. S. Air Force
Academy (1125-F5-1912)

2:55PM *Using a Mathematical Excursion in*
▶ (540) *Calculus to Challenge and Expand
Student Understanding of Continuous
Functions.* Preliminary report.
Lee G. Windsperger, Winona State
University (1125-F5-2638)

3:15PM *Multivariable calculus: A Play-Doh*
▶ (541) *adventure.* Preliminary report.
Anthony Rizzie*, Visiting Assistant
Professor/University of Connecticut,
Myron Min-Thu-Aye, Assistant Professor
in Residence/University of Connecticut,
and **Amit A Savkar**, Associate Professor
in Residence/University of Connecticut
(1125-F5-2001)

3:35PM *Music composition utilizing probabilistic*
(542) *methods as an applied project in an
upper level mathematical statistics
course.*
Jennifer L Sinclair, Georgia Gwinnett
College (1125-F5-1346)

3:55PM *Does Monte Hall know Bayes' Rule?*
▶ (543) **Paul R Coe**, Dominican University
(1125-F5-2981)

4:15PM *Linear Algebra Properties of Magic*
▶ (544) *Squares.*
Hossein Behforooz, Utica College
(1125-F5-1830)

4:35PM *Exemplifying Mathematical Concepts*
▶ (545) *through Magic Tricks.*
Ricardo V Teixeira, University of
Houston - Victoria (1125-F5-1956)

MAA Session on Mathematics and Sports, I

2:15 PM – 5:30 PM   **Regency Ballroom V,
                              Ballroom Level, Hyatt Regency**

Organizers: **John David**, Virginia Military
Institute
Drew Pasteur, College of
Wooster

2:15PM *Tennis Anyone? Mathematical Modeling*
▶ (546) *and Markov Processes.*
Paul R. Bouthellier, University of
Pittsburgh-Titusville (1125-I5-48)

2:35PM *Physics and Mathematics within Pairs*
▶ (547) *Figure Skating Jumps.* Preliminary report.
Diana S Cheng* and **Kyle P Hurley**,
Towson University (1125-I5-2151)

2:55PM *Mathematics with Apparatus:*
▶ (548) *explorations into rhythmic gymnastics.*
Preliminary report.
Tetyana Berezovski, Associate Professor
of Mathematics, Saint Joseph's University,
Philadelphia (1125-I5-1068)

3:15PM ► (549) *Tracking Athlete Wellness.* Preliminary report.
John Kersch Mayberry, University of the Pacific (1125-I5-940)

3:35PM ► (550) *What is the relative value of gold, silver, and bronze Olympic medals?* Preliminary report.
Charles Bergeron, Albany College of Pharmacy and Health Sciences (1125-I5-2682)

3:55PM ► (551) *Using the Oracle method to rank pitchers and batters.* Preliminary report.
Tom Tegtmeyer, The University of Texas at Austin (1125-I5-2415)

4:15PM ► (552) *The convex hull of a ballplayer.*
Gerry Myerson, Mathematics, Macquarie University (1125-I5-88)

4:35PM ► (553) *A Student Stat Crew at Roanoke College.*
David Moreau, Roanoke College (1125-I5-983)

4:55PM ► (554) *Thinking Outside the Box-Score in Lacrosse.*
Adam F Childers, Roanoke College (1125-I5-1384)

5:15PM ► (555) *A Search for Champion Boxers.*
Tien Chih*, Newberry College, and **Demitri Plessas**, Northeastern State University (1125-I5-1612)

MAA Session on Mathematics and the Arts, II

2:15 PM – 6:10 PM A706, Atrium Level, Marriott Marquis

Organizer: **Douglas Norton**, Villanova University

2:15PM ► (556) *Squares that Look Round: Transforming Spherical Images.*
Saul Schleimer, University of Warwick, and **Henry Segerman***, Oklahoma State University (1125-I1-447)

2:35PM ► (557) *Curve constraints in ruler-and-compass perspective drawings.* Preliminary report.
Annalisa Crannell, Franklin & Marshall College (1125-I1-519)

2:55PM ► (558) *The Mathematics and Art of the Wunderlich Cube.*
Betty Love* and **Victor Winter**, University of Nebraska - Omaha (1125-I1-664)

3:15PM ► (559) *The Art of Geometric Dissections.* Preliminary report.
Margaret Kepner, Washington, DC (1125-I1-1849)

3:35PM ► (560) *Turning the Corner: Symmetry, Botanical Art, and Metalpoint Drawing.*
Elizabeth Whiteley, Washington DC (1125-I1-1858)

3:55PM ► (561) *Hidden Beauty in Penrose Tiling: Weavings and Lace.* Preliminary report.
Douglas G Burkholder, Lenoir-Rhyne University (1125-I1-1856)

4:15PM ► (562) *Self-Similar Polygon Spirals.*
Nick C Mendler, University of San Francisco (1125-I1-956)

4:35PM ► (563) *Creating Wallpaper Patterns that are Locally Random Fractals.* Preliminary report.
Douglas Dunham*, University of Minnesota, Duluth, and **John Shier**, Apple Valley, MN (1125-I1-881)

4:55PM ► (564) *Mathematics in Literature and Cinema.*
Mark Kozek, Whittier College (1125-I1-2221)

5:15PM ► (565) *A Novel Idea: Teaching Mathematics using Apostolos Doxiadis's Uncle Petros and Goldbach's Conjecture.* Preliminary report.
Bill Linderman, King University (1125-I1-3041)

5:35PM ► (566) *The mathematical problems of Sol LeWitt.*
Jennifer Wilson, Eugene Lang College, The New School (1125-I1-2918)

5:55PM ► (567) *Criterion of Yielding is a group of drawings with elements from the mathematics of plasticity superimposed on vintage stereoscopic images exploring paths of stress and strain visually and emotionally.*
Sarah Katherine Stengle*, Stengle Studio, Saint Paul, Minnesota, and **Genevieve Gaiser Tremblay**, Cornish College, Seattle, Washington (1125-I1-1860)

MAA Session on Teaching Abstract Algebra: Topics and Techniques, II

2:15 PM – 5:50 PM M304, Marquis Level, Marriott Marquis

Organizers: **Jessie Lenarz**, St. Catherine University

Kristi Meyer, Wisconsin Lutheran College

2:15PM ► (568) *Confessions of an Abstract Algebra Noob.* Preliminary report.
Erica L Johnson, St. John Fisher College (1125-P1-1791)

2:35PM ► (569) *Strengthening the Narrative of an Abstract Algebra Course via Tutored Oral Exams and Other Techniques.* Preliminary report.
Bradford J. Schleben, Belmont University (1125-P1-2771)

2:55PM ► (570) *Re-write and Re-submit: Multiple Attempts at Homework Problems in Abstract Algebra.* Preliminary report.
Katie Anders, University of Texas at Tyler (1125-P1-2450)

3:15PM ► (571) *Reading, Writing, and 'Rithmetic in the Abstract Algebra Classroom.*
Kristi Meyer, Wisconsin Lutheran College (1125-P1-2612)

3:35PM (572) *Specifications Grading in a First Course in Abstract Algebra.*
Mike Janssen, Dordt College (1125-P1-177)

3:55PM *Specifications Grading in Abstract*
► (573) *Algebra.*
Melissa Lindsey, Indiana Wesleyan
University (1125-P1-2853)

4:15PM *Symmetry and IBL in Abstract Algebra.*
(574) **Matt Koetz**, Nazareth College
(1125-P1-2331)

4:35PM *A Visual and Intuitive Approach to the*
► (575) *Teaching of the Always Even or Always*
Odd Theorem for Permutations.
Tanya Cofer, College of Coastal Georgia
(1125-P1-1638)

4:55PM *Group theory for middle schoolers and*
► (576) *inservice teachers: close encounters with*
the abstract.
Ben Blum-Smith, Courant Institute of
Mathematical Sciences (1125-P1-1554)

5:15PM *Teaching introductory group theory with*
► (577) *the Rubik's cube.* Preliminary report.
Scott Zinzer, West Virginia Wesleyan
College (1125-P1-2578)

5:35PM *A Commutative but non-Associative*
► (578) *Operation in the Game of SET.*
Preliminary report.
Michael D Smith, Lycoming College
(1125-P1-1433)

MAA Session on The Scholarship of Teaching and Learning in Collegiate Mathematics, II

2:15 PM – 5:50 PM   **Embassy A, International
Tower, LL2, Hyatt Regency**

Organizers: **Thomas Banchoff**, Brown
University

Curtis Bennett, Loyola
Marymount University

Pam Crawford, Jacksonville
University

Jacqueline Dewar, Loyola
Marymount University

Edwin Herman, University
of Wisconsin-Stevens Point

2:15PM *Increasing Student Knowledge Transfer*
► (579) *from College Algebra Curriculum to*
Partner Disciplines. Preliminary report.
Lorraine F Dame*, **Aminul Huq**, **Bijaya
Aryal** and **Xavier Prat-Resina**, University
of Minnesota Rochester (1125-O1-2654)

2:35PM *Teaching Pre-Calculus through Gaming.*
► (580) Preliminary report.
Brett C Smith* and **James S Rolf**, Yale
University (1125-O1-2894)

2:55PM *Long-term Learning Gains from an Online*
► (581) *Bridge Program.* Preliminary report.
James S Rolf* and **John Hall**, Yale
University (1125-O1-2810)

3:15PM *Understanding Gender Bias on Large*
► (582) *Scale Precalculus Exams.*
Ashley Klahr* and **Guadalupe Lozano**,
University of Arizona (1125-O1-2835)

3:35PM *Anticipatory Sets as a Method of*
► (583) *Engagement in College Mathematics*
Classes.
Carrie J. Timmerman, Siena Heights
University (1125-O1-2605)

3:55PM *Flipping the liberal arts math classroom:*
► (584) *improving learning, increasing verbal*
discourse.
Michael Weingart* and **Alice W Seneres**,
Rutgers University (1125-O1-1352)

4:15PM *How I Flipped My Classroom and Why I*
► (585) *am Sticking With It.*
Adam T Heck, Southern Adventist
University (1125-O1-346)

4:35PM *Writing to Learn Intervention in an*
► (586) *Algebra Course for K-8 Pre-service*
Teachers. Preliminary report.
Maria G Fung* and **Pamela
Hollander**, Worcester State University
(1125-O1-2280)

4:55PM *Teaching Set Theory and Venn Diagrams*
(587) *with Embodied Cognition.*
Sarah E. Hanusch, SUNY Oswego
(1125-O1-2161)

5:15PM *College teachers' beliefs: Teaching*
► (588) *mathematics to students with learning*
disabilities. Preliminary report.
Lisa J. Carnell, High Point University
(1125-O1-1311)

5:35PM *Impact of Course Policy Changes on*
► (589) *Calculus I DFW Rates.* Preliminary report.
Paran Rebekah Norton*, **Karen High**
and **William Bridges**, Clemson University
(1125-O1-1661)

MAA General Contributed Paper Session on Number Theory, I

2:15 PM – 5:55 PM   **Roswell, Conference
Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena
College

Kimberly Presser,
Shippensburg University

Melvin Royer, Indiana
Wesleyan University

2:15PM *Variations on The Harmonic Series.*
► (590) Preliminary report.
Jay Lawrence Schiffman, Rowan
University (1125-VN-34)

2:30PM *Advances in the Goldbach and Twin*
► (591) *Primes conjectures.* Preliminary report.
Juan Orozco, Austin, TX (1125-VN-321)

2:45PM *Iterative limit of numbers with digit*
► (592) *reversals.* Preliminary report.
M Affouf, Kean University (1125-VN-541)

3:00PM *Cyclic Patterns in Digital Root Series.*
► (593) Preliminary report.
Jeremiah Bartz, University of North
Dakota (1125-VN-686)

3:15PM *Fibonacci Numbers in PTPMs.* Preliminary
► (594) report.
Jathan W. Austin, Salisbury University
(1125-VN-690)

3:30PM ▶ (595) *Binomial Sums That Generate Doubly-Recursive Sequences.* **Steven R Edwards***, Kennesaw State Univeristy, and **William Griffiths**, Kennesaw State University (1125-VN-703)

3:45PM Break

4:00PM ▶ (596) *Parametrization of Four-Periodic Points of Rational Quadratic Functions.* **Chatchawan Panraksa**, Mahidol University International College (1125-VN-1301)

4:15PM (597) *Level compatibility in the passage from modular symbols to cup products.* **R. Scott Williams**, University of Central Oklahoma (1125-VN-1412)

4:30PM ▶ (598) *Exploring the characteristics of modulo one sequences.* Preliminary report. **Yasanthi Kottegoda**, University of New Haven (1125-VN-1487)

4:45PM ▶ (599) *A random walk and the Riemann hypothesis for children.* Preliminary report. **Thomas J. Osler**, Rowan University (1125-VN-1509)

5:00PM Break

5:15PM ▶ (600) *Scaling of Spectra of Cantor-Type Measures and Some Number Theoretic Considerations.* **Dorin Ervin Dutkay** and **Isabelle Kraus***, University of Central Florida (1125-VN-1882)

5:30PM ▶ (601) *A Formula for the Number of Solutions of an Arbitrary Quadratic Congruence.* **J. Larry Lehman**, University of Mary Washington (1125-VN-1925)

5:45PM ▶ (602) *Gelfand's Question in Different Bases.* **Vadim Ponomarenko*** and **Jason Thoma**, San Diego State University (1125-VN-1945)

MAA General Contributed Paper Session on Teaching and Learning Introductory Mathematics, I

2:15 PM – 5:40 PM   **Kennesaw, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

2:15PM ▶ (603) *Do Our Calculations Matter if Our Assumptions are Flawed?* **Lisa A Lister***, Bloomsburg University, and **Lynne Ipiña**, University of Wyoming (1125-VQ-241)

2:30PM (604) *Building a Community of Practice to Develop and Integrate Innovative Instructional Strategies in College Algebra Classes at the University of Houston-Downtown.* Preliminary report. **Judith Quander*** and **Timothy Redl**, University of Houston-Downtown (1125-VQ-643)

2:45PM (605) *Corequisite Remediation in a College Algebra Course: Embracing Complete College America.* **Alison Reddy**, University of Illinois (1125-VQ-699)

3:00PM ▶ (606) *Formula vs. Concept: A Dual Process for Solving Problems in Beginning Algebra.* Preliminary report. **Shumei C Richman**, Midlands Technical College (1125-VQ-1061)

3:15PM ▶ (607) *Using Clickers to Gauge Understanding.* **Christy Sue Langley**, University of Louisiana at Lafayette (1125-VQ-1152)

3:30PM Break

3:45PM ▶ (608) *Web-based games to master core skills in introductory college mathematics.* **Frank Vahid**, **Joe Allen***, Univ. of California, Riverside, and **Alex Edgcomb**, Univ. of California, Riverside / zyBooks (1125-VQ-1454)

4:00PM ▶ (609) *Adapting the Singapore Problem Framework to College Level – Performance Report Presenters: Drs. Umesh Nagarkatte, Joshua Berenbom.* **Umesh P. Nagarkatte***, Medgar Evers College (CUNY), and **Joshua Berenbom**, Medgar Evers College, CUNY (1125-VQ-489)

4:15PM ▶ (610) *Reading vs. Doing: A Comparison of Methods of Teaching Problem-Solving in Introductory Statistics.* **Abra Brisbin*** and **Erica Maranhao do Nascimento**, University of Wisconsin-Eau Claire (1125-VQ-2051)

4:30PM ▶ (611) *Testing a Learning Lab Model in First Year Mathematics Courses.* **Emma Smith Zbarsky*** and **Joan Giblin**, Wentworth Institute of Technology (1125-VQ-2219)

4:45PM ▶ (612) *Ways Secondary Mathematics Teachers Order Algebra Problems Based on Both Mathematical and Linguistic Complexity: A Case Study.* Preliminary report. **Bill Zahner**, **Hayley Milbourne*** and **Lynda Wynn**, San Diego State University (1125-VQ-1966)

5:00PM ▶ (613) *Learning Assistants' Roles in Flipping Large Classrooms.* **Sheeva Doshireh***, George Mason University, and **Stephen Liddle**, George Mason Univeristy (1125-VQ-1719)

5:15PM ▶ (614) *Preparing Students for Trigonometry with a Primary Source Project.* **Daniel E. Otero**, Xavier University (Cincinnati, OH) (1125-VQ-1906)

5:30PM ► (615) *Using TPR in the pre-calculus class: Math instruction inspired by second-language learning.*
Daniel S. Helman, Prescott College (1125-VQ-2254)

SIAM Minisymposium on Recent Developments in Computational Inverse Problems and Imaging

2:15 PM – 5:40 PM   A703, Atrium Level, Marriott Marquis

Organizers: **Fernando Guevara Vasquez**, University of Utah
Alexander V. Mamonov, University of Houston
Kui Ren, University of Texas at Austin

2:15PM (616) *Unique Continuation, Uniqueness and Optimization for Viscoelastic Models.* Preliminary report.
Joyce R. McLaughlin, Rensselaer Polytechnic Institute (1125-35-1939)

2:45PM (617) *Solution of inverse hyperbolic problems via data-driven discrete-time reduced order models.*
Vladimir Druskin*, Schlumberger, **Alexander Mamonov**, University of Houston, **Andrew Thaler**, MathWorks, and **Mikhail Zaslavsky**, Schlumberger (1125-65-1985)

3:15PM (618) *Imaging with intensity cross correlations and application to ghost imaging.*
Josselin Garnier, Ecole Polytechnique (1125-35-899)

3:45PM (619) *Phase Retrieval and Ptychography with Coded Diffraction Patterns.*
Albert Fannjiang*, UC Davis, **Pengwen Chen**, National Chung Hsing University, Taiwan, and **Gi-Ren Liu**, National Cheng-Kung University, Taiwan (1125-65-287)

4:15PM (620) *An Inverse Problem in Quantum Optics.*
John C Schotland, Department of Mathematics, University of Michigan (1125-81-1583)

4:45PM (621) *Incorporating Sparsity Information in Inverse Problems.*
Ilker Kocyigit, University of Michigan (1125-00-1723)

5:15PM (622) *Phase tracking for model reduction of high-frequency waves.*
Laurent Demanet, MIT (1125-65-2061)

MAA Panel

2:15 PM – 3:35 PM   International 5, International Level, Marriott Marquis

Preparing for the Data Deluge: Mathematics Programs and the Future of Undergraduate Statistics Education
Organizers: **Patti Frazer Lock**, St. Lawrence University

Stacey Hancock, Montana State University
Sue Schou, Idaho State University
Panelists: **K. Scott Alberts**, Truman State University
Roger Hoerl, Centers for Disease Control and Prevention
Robin Lock, St. Lawrence University

MAA Panel

2:15 PM – 3:35 PM   International 6, International Level, Marriott Marquis

What Every Student Should Know about the JMM
Organizer: **Violeta Vasilevska**, Utah Valley University
Panelists: **Joyati Debnath**, Winona State University
Michael Dorff, Brigham Young University
Matt DeLong, Taylor University

Association for Women in Mathematics Panel Discussion

2:15 PM – 3:40 PM   A707, Atrium Level, Marriott Marquis

Mentoring Women in Mathematics.
Organizer: **Michelle Manes**, University of Hawaii at Manoa
Moderator: **Michelle Manes**, University of Hawaii at Manoa
Panelists: **Helen Grundman**, Bryn Mawr College
Suzanne Weekes, Worcester Polytechnic Institute
Deanna Haunsperger, Carleton College
Kristin Lauter, Microsoft Research
Emina Soljanin, Rutgers University

MAA General Contributed Paper Session on Probability and Statistics, I

2:30 PM – 5:55 PM   Baker, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University
Melvin Royer, Indiana Wesleyan University

2:30PM ▶ (623) *The beta- fisher snedecor distribution with applications to cancer remission data.*
Kazeem Adesola Adepoju, University of Ibadan (1125-VP-35)

2:45PM ▶ (624) *Bootstrapping Analogs of the Two Sample Hotelling's T^2 Test.*
Hasthika S Rupasinghe Arachchige Don* and **Lasanthi CR Pelawa Watagoda**, Southern Illinois University (1125-VP-164)

3:00PM ▶ (625) *Inference After Variable Selection.*
Lasanthi C.R. Pelawa Watagoda* and **David J Olive**, Southern Illinois University (1125-VP-165)

3:15PM ▶ (626) *A Statistical Approach of Multivariate Data Analysis to Study Effects of Video Games and Online Chat on Mathematics Performance.* Preliminary report.
Lina Wu, Borough of Manhattan Community College-The City University of New York (1125-VP-341)

3:30PM (627) *The Beta Transmuted Pareto Distribution: Theory and Application.* Preliminary report.
Sher B. Chhetri*, **Hongwei Long**, Florida Atlantic University, Boca Raton, and **Gokarna Raj Aryal**, Purdue University, Calumet (1125-VP-1107)

3:45PM ▶ (628) *How to Win at Tenzi!*
Steve Bacinski, Davenport University (1125-VP-647)

4:00PM ▶ (629) *On the Limitations of Financial Models.* Preliminary report.
Ben Duklewski, Harvest Investment Consultants, Timonium, MD 21093, **Veera Holdai** and **Barbara Wainwright***, Salisbury University, Salisbury, MD 21801 (1125-VP-685)

4:15PM (630) *Optimal quantization for infinite nonhomogeneous distributions.*
Lakshmi Roychowdhury* and **Mrinal K Roychowdhury**, University of Texas Rio Grande Valley (1125-VP-771)

4:30PM (631) *Bond percolation threshold bounds for Archimedean lattices.* Preliminary report.
John C. Wierman, John Hopkins University (1125-VP-823)

4:45PM (632) *Nonparametric Estimation of Prior Distribution for a Linear Degradation Signal Model.*
Geoffrey H Schuette, The University of Texas at Arlington (1125-VP-862)

5:00PM ▶ (633) *Best Linear Unbiased Estimators Using Both Double Ranked Set Sampling and Modified Double Ranked Set Sampling Procedures.*
Qasim M Al-Shboul*, Zayed University - Dubai - UAE, and **Elies Kouider**, Ferris State University (1125-VP-1072)

5:15PM (634) *Study of Autocorrelation of Regression Residuals using Crop Residue Yield Potential.* Preliminary report.
Mitra L Devkota*, Shawnee State University, and **Gary D Hatfield**, South Dakota State University (1125-VP-1097)

5:30PM (635) *Risk Measures for the Mixture of the Popular Models.*
Min Deng, Mathematics Department, Towson University, Towson, MD (1125-VP-455)

5:45PM (636) *Bayesian Inference on $P(X < Y)$ Based on Progressive First Failure Censored Samples from Burr Type XII Distributions.* Preliminary report.
Jessie M Byrnes, University of South Dakota, Department of Mathematical Sciences (1125-VP-1219)

Project NExT Panel

3:15 PM – 4:30 PM   **Regency Ballroom VI, Ballroom Level, Hyatt Regency**

How to Successfully Enhance Cultural Diversity in the Mathematics Classroom and Beyond

Organizers: **Ben Gaines**, Iona College

Rosemary Guzman, University of Illinois at Urbana

Terrance Pendleton, Drake University

Margaret Rahmoeller, Roanoke College

Presenters: **Rick Laugesen**, University of Illinois at Urbana-Champaign

Adriana Salerno, Bates College

Darryl Yong, Harvey Mudd College

MAA Invited Address

3:20 PM – 4:10 PM   **Atrium Ballroom, Atrium Level, Marriott Marquis**

(637) *Random polygons, Grassmannians, and a problem of Lewis Carroll.*
Jason Cantarella, University of Georgia (1125-A0-16)

AWM Business Meeting

3:45 PM – 4:15 PM   **A707, Atrium Level, Marriott Marquis**

MAA Panel Discussion

3:50 PM – 5:10 PM   International 5, International
                         Level, Marriott Marquis

Professional Development at the Section Level: Section NExT, Opportunities for Graduate Students, and More

Organizers: **Julie Barnes**, Western
            Carolina University

**Benjamin V.C.
Collins**, University of
Wisconsin-Platteville

Jessica Deshler, West
Virginia University

Eric Eager, University of
Wisconsin La Crosse

David Torain, Hampton
University

Panelists: **Brian Birgen**, Wartburg
            College

Eric Eager

Jon Ernstberger, LaGrange
College

Sarah Frick, Furman
University

MAA Panel

3:50 PM – 5:10 PM   International 6, International
                         Level, Marriott Marquis

Research Support Networks

Moderator: **Louis Deaett**, Quinnipiac
            University

Panelists: **Jason Callahan**, St.
            Edward's University

Margaret Cozzens, Rutgers
University

Joyati Debnath, Winona
State University

T. Christine Stevens,
American Mathematical
Society

Ulrica Wilson, Morehouse
College/ICERM

MAA Section Officers

4:00 PM – 5:00 PM   Imperial Ballroom A,
                         Marquis Level, Marriott Marquis

Chair: **Betty Mayfield**, Hood
            College

AMS Committee on the Profession Panel Discussion

4:30 PM – 6:00 PM   A601, Atrium
                         Level, Marriott Marquis

Diversity and Inclusion in the Mathematical Sciences

Organizers: **Pamela Gorkin**, Bucknell
            University

Monica Jackson, American
University

John McCleary, Vassar
College

Moderator: **Helen G. Grundman**,
            American Mathematical
            Society

Panelists: **Carlos Castillo-Chavez**,
            Arizona State University

Duane Cooper, Morehouse
College

Kristin Lauter, Microsoft
Corporation

Talithia Williams, Harvey
Mudd College

MAA Minicourse #1: Part A

4:45 PM – 6:45 PM   L508, Lobby Level,
                         Marriott Marquis

Complex Analysis and Geometry/Topology as Introductions to Proofs Courses

Presenters: **Neelesh Tiruviluamala**,
            University of Southern
            California

David Crombecque,
University of Southern
California

MAA Minicourse #6: Part A

4:45 PM – 6:45 PM   L504 & L505, Lobby
                         Level, Marriott Marquis

Linear Algebra in Computer Graphics and Data Mining

Presenter: **Tim Chartier**, Davidson
            College

MAA Minicourse #16: Part A

4:45 PM – 6:45 PM   L506 & L507, Lobby
                         Level, Marriott Marquis

Using and Making Integrated Online Textbooks with MathBook XML.

Presenter: **Karl-Dieter Crisman**,
            Gordon College

Reception for Graduate Students and First-Time Participants

5:30 PM – 6:30 PM   Imperial Ballroom B,
                         Marquis Level, Marriott Marquis

SIGMAA on the History of Mathematics (HOM SIGMAA) Business Meeting

6:00 PM – 6:30 PM   International 6, International
                         Level, Marriott Marquis

SIGMAA on the History of Mathematics (HOM SIGMAA) Reception

6:30 PM – 7:00 PM   **International 6, International Level, Marriott Marquis**

Special Panel Presentation

6:30 PM – 8:00 PM   **A704, Atrium Level, Marriott Marquis**

The Mathematics and Mathematicians Behind Hidden Figures.

SIGMAA on the History of Mathematics (HOM SIGMAA) Guest Lecture

7:00 PM – 7:50 PM   **International 6, International Level, Marriott Marquis**

     Organizer: **Toke Knudsen**, State University of New York at Oneonta

7:00PM (638)   *Trigonometry and the Challenge of the History of Mathematics.* **Glen Van Brummelen**, Quest University (1125-A0-202)

AMS Josiah Willard Gibbs Lecture

8:30 PM – 9:20 PM   **Atrium Ballroom, Atrium Level, Marriott Marquis**

(639)   *Quantum computing and the entanglement frontier.* **John Preskill**, California Institute of Technology (1125-00-22)

Thursday, January 5

Joint Meetings Registration

7:30 AM – 4:00 PM   **Grand Hall Lobby, Exhibit Level, Hyatt Regency**

Email Center

7:30 AM – 10:00 PM   **Exhibit Level Prefunction Area, Hyatt Regency**

AMS-MAA Special Session on Mathematics of Cryptography, I

8:00 AM – 11:50 AM   **International C, International Level, Marriott Marquis**

     Organizers: **Nathan Kaplan**, University of California, Irvine
                         Alice Silverberg, University of California, Irvine

8:00AM ▶ (640)   *Counting lattices by cotype.* **Nathan Kaplan***, University of California, Irvine, **Gautam Chinta**, CCNY, and **Shaked Koplewitz**, Yale University (1125-11-2249)

8:30AM (641)   *Security and attacks on Ring-Learning-with-Errors.* **Hao Chen**, **Kristin E Lauter**, Microsoft Research, and **Katherine E Stange***, University of Colorado Boulder (1125-11-748)

9:00AM (642)   *Using lattice reduction to improve isogeny evaluation.* **Jean-Francois Biasse***, University of South Florida, **Claus Fieker**, University of Kaiserslautern, and **Michael John Jacobson**, University of Calgary (1125-11-2005)

9:30AM (643)   *Cryptographic constructions via secret finite field isomorphisms.* Preliminary report. **Joseph H Silverman**, Brown University (1125-94-389)

10:00AM (644)   *Cryptographic constructions via secret finite field isomorphisms.* **Jill Pipher***, **Jeffrey Hoffstein** and **Joseph Silverman**, Brown University (1125-94-546)

10:30AM (645)   *Capacity Theory and Optimality of Coppersmith's Theorem.* **Ted Chinburg**, **Brett Hemenway**, **Nadia Heninger**, University of Pennsylvania, and **Zachary Scherr***, Bucknell University (1125-11-841)

11:00AM ▶ (646)   *Capacity theory and Coppersmith's algorithm for integral points.* Preliminary report. **Ted Chinburg***, **Brett Hemenway**, **Nadia Heninger**, University of Pennsylvania, and **Zachary Scherr**, Bucknell University (1125-11-965)

11:30AM ▶ (647)   *Computing L-series of genus 3 curves.* Preliminary report. **Andrew V Sutherland**, Massachusetts Institute of Technology (1125-11-577)

AMS-NAM Joint Special Session on The Mathematics of the Atlanta University Center, I

8:00 AM – 11:50 AM   **M101, Marquis Level, Marriott Marquis**

     Organizers: **Talitha M. Washington**, Howard University
                         Monica Jackson, American University
                         Colm Mulcahy, Spelman College

8:00AM ▶ (648)   *Applied Mathematics Research at Atlanta University/Clark Atlanta University: 1980-2015.* **Ronald E. Mickens**, Clark Atlanta University (1125-01-1043)

8:30AM ▶ (649)   *Generalizing Parabolic Subsets from Involutorial Automorphisms.* **Samuel J Ivy**, United States Military Academy (1125-20-2819)

9:00AM ▶ (650) *Race matters: analyzing the relationship between colorectal cancer mortality rates and various factors within respective racial groups.*
Monica Christine Jackson*, American University, **Kimberly Sellers**, Georgetown University, **Calandra Moore**, Washington, DC, **Jada Johnson**, University of Texas, **Jessica Lyle**, Maryville College, **Israel Almodovar**, Iowa State University, **Emma Veach**, Indiana University, and **Ismael Xique**, University of Michigan (1125-62-2459)

9:30AM ▶ (651) *Community Data Analytics: Localized Data Analysis and Decision Modeling in the Era of 'Big Data' and 'Smart Cities'.* Preliminary report.
Michael P. Johnson, University of Massachusetts Boston (1125-62-3147)

10:00AM ▶ (652) *Mathematical Model of Temperature Effects on Human Sleep Regulation.*
Shelby Nicole Wilson, Morehouse College (1125-92-3035)

10:30AM ▶ (653) *Why a mathematics degree? Implications of a Mathematics Major for Secondary Teachers.*
Karen D King, National Science Foundation (1125-97-3138)

11:00AM ▶ (654) *AI and Communities of Color: What Questions Should We Be Asking?* Preliminary report.
Charles C Earl, Automattic (1125-68-2096)

11:30AM (655) *Non-uniqueness of the dual of a Banach space and its application.*
Tepper L. Gill, Howard University (1125-46-3)

AMS Special Session on Advances in Numerical Analysis for Partial Differential Equations, I

8:00 AM – 11:45 AM   M103 & 104, Marquis Level, Marriott Marquis

Organizers: **Thomas Lewis**, University of North Carolina at Greensboro

Amanda Diegel, Louisiana State University

8:00AM ▶ (656) *Müntz-Galerkin methods and applications to mixed Dirichlet-Neumann boundary value problems.*
Yingwei Wang, Purdue University (1125-65-1191)

8:30AM (657) *A domain decomposition method for a partition of unity method applied to fourth order problems.* Preliminary report.
Susanne C. Brenner, Louisiana State University, **Christopher B. Davis***, Tennessee Technological University, and **Li-yeng Sung**, Louisiana State University (1125-65-1879)

9:00AM (658) *Finite element and discontinuous Galerkin methods for linear elliptic PDEs in non-divergence form.*
Xiaobing Feng*, **Stefan Schnake**, The University of Tennessee, and **Michael Neilan**, University of Pittsburgh (1125-65-1389)

10:00AM (659) *A saddle point least squares method for mixed variational formulations.*
Constantin Bacuta* and **Klajdi Qirko**, University of Delaware (1125-65-1322)

10:30AM (660) *Pseudo-time adaptive regularization for quasilinear elliptic PDE.*
Sara Pollock, Wright State University (1125-65-1909)

11:00AM (661) *Exotic transmission problems for wave equations and how they really are semidiscrete integral equations.*
Francisco Javier Sayas, University of Delaware (1125-65-352)

AMS Special Session on Algebraic Statistics (a Mathematics Research Communities Session), I

8:00 AM – 11:50 AM   Inman, Conference Level, Hyatt Regency

Organizers: **Mateja Raic**, University of Illinois at Chicago

Nathaniel Bushnek, University of Alaska, Anchorage

Daniel Irving Bernstein, North Carolina State University

8:00AM ▶ (662) *Introduction to Algebraic Statistics.*
Seth Sullivant, North Carolina State University (1125-62-1027)

9:00AM (663) *Exact goodness-of-fit tests for Stochastic Block Models.*
Nikita Alexeev, The George Washington University, **Vishesh Karwa***, Harvard University, **Debdeep Pati**, Florida State University, **Sonja Petrović**, Illinois Institute of Technology, Chicago, **Mateja Raič**, University of Illinois, Chicago, **Liam Solus**, Institute of Science and Technology Austria and MIT, **Dane Wilburne**, Illinois Institute of Technology, Chicago, **Robert Williams**, Texas A & M University, and **Bowei Yan**, The University of Texas at Austin (1125-62-1717)

9:30AM (664) *On consistency guarantees for DAG model selection.*
Liam Solus, KTH Royal Institute of Technology (1125-05-1300)

10:00AM (665) *Means and a Central Limit Theorem in tree space.*
Megan Owen, Lehman College, CUNY (1125-62-1915)

10:30AM *Finite phylogenetic complexity and*
(666) *combinatorics of tables.*
Emanuele Ventura, Department of
Mathematics and Systems Analysis, Aalto
University (1125-62-477)

11:00AM *When is it surprising that all gene trees*
(667) *are unique? An application of the*
generalized birthday problem.
Ruth Davidson*, University of Illinois
Urbana-Champaign, and **James H.
Degnan**, University of New Mexico
(1125-92-1348)

11:30AM *Chordal networks of polynomial ideals.*
(668) **Diego Cifuentes*** and **Pablo A Parrilo**,
Massachusetts Institute of Technology
(1125-68-396)

AMS Special Session on An Amicable Combination of Algebra and Number Theory (Dedicated to Dr. Helen G. Grundman), I

8:00 AM – 11:50 AM International 10,
International Level, Marriott Marquis

Organizers: **Eva Goedhart**, Lebanon
Valley College

Pamela E. Harris, Williams
College

Daniel P. Wisniewski,
DeSales University

Alejandra Alvarado,
Eastern Illinois University

8:00AM *Hyperbolic Euler Numbers and*
(669) *Polynomials.* Preliminary report.
Abdul Hassen* and **Christopher Ernest**,
Rowan University (1125-11-587)

8:30AM *Number of solutions to $a^x + b^y = c^z$.*
(670) **Robert Styer***, Villanova University, and
Reese Scott, Boston, MA (1125-11-1457)

9:00AM *Simple Proof of the Partition Function*
(671) *Formula.*
Wladimir Pribitkin, College of Staten
Island and the Graduate Center, City
University of New York (1125-11-1130)

9:30AM *Applications of Hyperbolic Fourier*
▶ (672) *Coefficients.* Preliminary report.
Karen Taylor, Bronx Community College
(1125-11-1461)

10:00AM *Analysis and arithmetic in moments of*
(673) *twisted L-functions.*
Djordje Milićević*, Bryn Mawr College,
Valentin Blomer, Mathematisches
Institut, Universität Göttingen, **Étienne
Fouvry**, Université Paris-Sud, CNRS,
Université Paris-Saclay, **Emmanuel
Kowalski**, ETH Zürich, **Philippe Michel**,
École Polytechnique Fédérale de
Lausanne, and **William F. Sawin**, ETH
Zürich (1125-11-1466)

10:30AM *Coefficients of Logarithmic Vector-Valued*
(674) *Poincaré Series.*
Austin Daughton, Franklin and Marshall
College (1125-11-1467)

11:00AM *Using closure operations to study*
(675) *singularities.*
Rebecca R.G., Syracuse University
(1125-13-1198)

11:30AM $\mathbb{F}_q$-*Local Systems on Abelian Varieties of*
(676) *Low p-rank.*
Brett Frankel, Northwestern University
(1125-14-1374)

AMS Special Session on Character Varieties (a Mathematics Research Communities Session), I

8:00 AM – 11:45 AM Embassy D, International
Tower, LL2, Hyatt Regency

Organizers: **Nathan Druivenga**,
University of Kentucky

Brett Frankel, Northwestern
University

Ian Le, Perimeter Institute
for Theoretical Physics

8:00AM *Representations of the Kauffman bracket*
(677) *skein algebra at roots of unity.*
Charles Frohman*, The University of
Iowa, **Joanna Kania-Bartoszynska**,
National Science Foundation, and **Thang
Le**, Georgia Tech (1125-57-731)

9:00AM *Riemannian metrics on character*
(678) *varieties of closed surface groups.*
Andrew Michael Sanders, University of
Heidelberg (1125-53-558)

10:00AM *Spaces of flat connections.*
(679) **Daniel Ramras**, Indiana
University-Purdue University Indianapolis
(1125-55-437)

11:00AM *(unmarked) Length spectrum rigidity of*
(680) *representations.*
Andrew Zimmer, University of Chicago
(1125-22-1581)

AMS Special Session on Combinatorial and Cohomological Invariants of Flag Manifolds and Related Varieties, I

8:00 AM – 11:50 AM A705, Atrium
Level, Marriott Marquis

Organizers: **Martha Precup**,
Northwestern University

Rebecca Goldin, George
Mason University

8:00AM *Equivariant cohomology and counting*
(681) *tableaux.*
Linda Chen, Swarthmore College
(1125-14-2714)

8:30AM *GKM theory for non-GKM spaces.*
(682) **Elizabeth Drellich**, Swarthmore College
(1125-05-1318)

9:00AM *On the equivariant K-theory of type A*
(683) *Peterson varieties.*
Brent Gorbutt, George Mason University
(1125-05-2506)

9:30AM *Singularities of Hessenberg Varieties.*
(684) Preliminary report.
Erik A Insko*, Florida Gulf Coast
University, and **Martha Precup**,
Northwestern University (1125-14-2035)

10:00AM *Equivariant cohomology of certain affine*
(685) *Springer fibers.*
Julianna Tymoczko, Smith College
(1125-55-1943)

10:30AM *Flat families of Hessenberg varieties with*
(686) *an application to Newton-Okounkov*
bodies. Preliminary report.
Hiraku Abe*, Osaka City University
Advanced Mathematical Institute, **Lauren
DeDieu**, The University of Minnesota,
Federico Galetto and **Megumi Harada**,
McMaster University (1125-51-2735)

11:00AM *Puzzles for 3-step flag varieties.*
(687) Preliminary report.
Anders S. Buch, Rutgers University
(1125-05-1615)

11:30AM *Parabolic Kazhdan-Lusztig basis,*
(688) *Schubert classes, and equivariant*
oriented cohomology.
Cristian Lenart*, State University of New
York at Albany, **Kirill Zainoulline**,
University of Ottawa, and **Changlong
Zhong**, State University of New York at
Albany (1125-14-863)

AMS Special Session on Discrete Structures in Number Theory, I

8:00 AM – 11:50 AM **International 9,
International Level, Marriott Marquis**

Organizers: **Anna Haensch**, Duquesne
University

Adriana Salerno, Bates
College

8:00AM *Torsion Points on CM Elliptic Curves.*
(689) **Abbey Bourdon*** and **Pete L. Clark**,
University of Georgia (1125-11-2603)

8:30AM *Arithmetic Progressions on Conic*
▶ (690) *Sections.*
Edray H Goins, Purdue University, and
Alejandra Alvarado*, Eastern Illinois
University (1125-11-1114)

9:00AM *Strictly k-regular quadratic forms.*
(691) Preliminary report.
Alicia Marino* and **Wai Kiu Chan**,
Wesleyan University (1125-11-273)

9:30AM *Graded modules of vector-valued*
(692) *modular forms and directed graphs.*
Luca Candelori*, Louisiana State
University, and **Cameron Franc**,
University of Saskatchewan
(1125-11-1425)

10:00AM *Lattice point visibility on straight and*
▶ (693) *curved lines of sight.*
aBa Mbirika, University of Wisconsin-Eau
Claire (1125-05-745)

10:30AM *Abel-Jacobi maps and Riemann points*
(694) *on hyperelliptic Riemann surfaces.*
Preliminary report.
Christelle Vincent, University of
Vermont (1125-11-1665)

11:00AM *Dynamical modular curves for quadratic*
(695) *polynomial maps.* Preliminary report.
John R. Doyle, University of Rochester
(1125-11-1193)

11:30AM *Finiteness results for regular binary*
(696) *quadratic polynomials.* Preliminary
report.
James Ricci, Daemen College
(1125-11-2013)

AMS Special Session on Dynamical Systems, I

8:00 AM – 11:50 AM **M301, Marquis
Level, Marriott Marquis**

Organizers: **Jim Wiseman**, Agnes Scott
College

Aimee Johnson,
Swarthmore College

8:00AM *Continuum Fibonacci Schrödinger*
(697) *Operators.*
Mark Embree, Department of
Mathematics and Computational
Modeling and Data Analytics Division,
Virginia Tech, **Jake Fillman**, Department
of Mathematics, Virginia Tech, and **May
Mei***, Department of Mathematics and
Computer Science, Denison University
(1125-37-981)

8:30AM *On conditions implied by ergodic*
(698) *cartesian square for nonsingular ergodic*
actions.
Isaac Loh, Northwestern University, and
Cesar E Silva*, Williams College
(1125-37-2187)

9:00AM *Structure of Rigidity Sequences for*
(699) *Substitution Dynamical Systems.*
Preliminary report.
Jon Fickenscher, Princeton University,
and **Kelly B. Yancey***, Institute for
Defense Analyses - Center for Computing
Sciences (1125-37-693)

9:30AM *New developments in directional*
(700) *dynamics.* Preliminary report.
E. Arthur Robinson, George Washington
University, **Joseph Rosenblatt**, Indiana
University Purdue University Indianapolis,
and **Ayşe A. Şahin***, Wright State
University (1125-37-2275)

10:00AM *Towards spectral analysis of self-similar*
(701) *tilings via a renormalization approach.*
Preliminary report.
Natalie Priebe Frank*, Vassar College,
E. Arthur Robinson, Jr., George
Washington University, **Michael Baake**,
Universitat Bielefeld, and **Uwe Grimm**,
The Open University (1125-37-1025)

10:30AM *Elliptic functions with disconnected Julia*
(702) *sets.*
Lorelei Koss, Dickinson College
(1125-37-809)

11:00AM *Sofic shifts via Conley index theory:*
(703) *computing lower bounds on recurrent dynamics for maps.*
Sarah Day*, College of William and Mary, and **Rafael Frongillo**, CU Boulder
(1125-37-913)

11:30AM *Generalized Shift Spaces and Shear.*
(704) Preliminary report.
Steve Kass, Drew University, and **Kathleen Madden***, California State University, Bakersfield (1125-37-1876)

AMS Special Session on Fusion Categories and Quantum Symmetries, I

8:00 AM – 11:50 AM International 3, International Level, Marriott Marquis

Organizers: **Julia Plavnik**, Texas A&M University
Paul Bruillard, Pacific Northwest National Laboratory
Eric Rowell, Texas A&M University

8:00AM *Gauge invariants from the powers of*
(705) *antipodes.*
Siu-Hung Ng, Louisiana State University
(1125-20-2328)

8:30AM *Rank 5 Premodular Categories.*
(706) Preliminary report.
Carlos M Ortiz Marrero* and **Paul Bruillard**, Pacific Northwest National Laboratory (1125-18-2004)

9:00AM *A Computational Approach to Classifying*
▶ (707) *Rank 6 Modular Tensor Categories.*
Preliminary report.
Daniel Creamer, Texas A&M University
(1125-18-1812)

9:30AM *Finiteness of quantum subgroups of*
(708) $SU(n)$. Preliminary report.
Andrew Schopieray, University of Oregon (1125-18-2063)

10:00AM *Skein algebra and quantum Teichmuller*
(709) *space of surfaces.*
Thang Le* and **Jon Paprocki**, Georgia Institute of Technology (1125-57-2090)

10:30AM *Topological Quantum Computation with*
▶ (710) *Gapped Boundaries.*
Iris Cong*, University of California, Los Angeles, **Meng Cheng**, Yale University, and **Zhenghan Wang**, Microsoft Station Q (1125-81-651)

11:00AM *VOAs as thermodynamical limit of*
(711) *Anyonic chains.* Preliminary report.
Zhenghan Wang, Microsoft Station Q and University of California, Santa Barbara, and **Modjtaba Shokrian Zini***, University of California, Santa Barbara (1125-81-1546)

11:30AM *On classification of vertex operator*
(712) *algebras by their representation categories.* Preliminary report.
James E Tener, UC Santa Barbara
(1125-81-1689)

AMS Special Session on Lie Group Representations, Discretization, and Gelfand Pairs (a Mathematics Research Communities Session), I

8:00 AM – 11:50 AM Spring, Conference Level, Hyatt Regency

Organizers: **Matthew Dawson**, CIMAT
Holley Friedlander, Dickenson College
John Hutchens, Winston-Salem State University
Wayne Johnson, Truman State University

8:00AM *Generalized Symmetric k-Varieties*
(713) *Corresponding to Finite Order Automorphisms.* Preliminary report.
Mark C Hunnell, Winston-Salem State University (1125-20-1160)

8:30AM *Orbit decomposition of the generalized*
(714) *symmetric spaces of* $SL_2(F_q)$. Preliminary report.
Catherine A. Buell*, Fitchburg State University, **Aloysius Helminck**, University of Hawaií at Manoa, **Vicky Kilma**, Appalachian State University, **Jennifer Schaefer**, Dickinson College, **Carmen Wright**, Jackson State University, and **Ellen Ziliak**, Benedictine University (1125-20-2038)

9:00AM *On the k-Involutions of* G_2 *over fields of*
(715) *Characteristic 2.* Preliminary report.
Nathaniel Schwartz*, Washington College, and **John Hutchens**, Winston-Salem State University (1125-17-1255)

9:30AM *Antiholomorphic involutions and*
(716) *multiplicity free representations.*
Chal Benson, East Carolina University
(1125-22-708)

10:00AM *Syzygies and covariant differential*
(717) *operators.*
Markus Hunziker, **John A. Miller*** and **Mark R. Sepanski**, Baylor University
(1125-22-1795)

10:30AM *The Gelfand-Zeitlin integrable system on*
(718) *complex orthogonal Lie algebras.*
Preliminary report.
Mark Colarusso, University of Wisconsin-Milwaukee (1125-22-1046)

11:00AM *Weight modules for current algebras.*
(719) **Michael K. Lau**, Université Laval
(1125-17-1676)

11:30AM *The q-analog of Kostant's partition*
(720) *function and the highest root of the simple Lie algebras.*
Pamela E Harris*, Williams College, **Erik Insko**, Florida Gulf Coast University, and **Mohamed Omar**, Harvey Mudd College
(1125-17-635)

AMS Special Session on Mathematics in Physiology and Medicine (a Mathematics Research Communities Session), I

8:00 AM – 11:50 AM   **Dunwoody, Conference Level, Hyatt Regency**

Organizers: **Kamila Larripa**, Humboldt State University

Charles Puelz, Rice University

Laura Strube, University of Utah

Longhua Zhao, Case Western Reserve University

8:00AM *Modeling control of cardiovascular*
▶ (721) *dynamics during Head-up tilt.* Preliminary report.
Mette S Olufsen, North Carolina State University (1125-92-2003)

8:30AM *Mathematical modeling of blood pressure*
▶ (722) *and heart rate in response to the Valsalva Maneuver.*
Eric Benjamin Randall*, North Carolina State University, **Jesper Mehlsen**, Coordinating Research Centre at Frederiksberg Hospital, and **Mette Olufsen**, North Carolina State University (1125-92-1208)

9:00AM *Modeling Actin Regulations in Motility*
▶ (723) *Structures of Cancer Cells.* Preliminary report.
Nessy Tania, Smith College (1125-92-866)

9:30AM *Modeling Cell-ECM Interactions in Cancer*
(724) *Invasion.*
Yi Jiang, Georgia State University (1125-92-1369)

10:00AM *Mechanical-Energetic Coupling in Cardiac*
▶ (725) *Contraction and Heart Failure.*
Daniel A Beard, University of Michigan (1125-92-2333)

10:30AM *The interaction between inflammation*
▶ (726) *and cardiovascular dynamics.*
Ivan Ramirez-Zuniga*, University of Pittsburgh, **Renee Brady**, North Carolina State University, **Charles Puelz**, Rice University, **Kamila Larripa**, Humboldt State University, **Elisabeth Bangsgaard**, Global Development Graduate Programme, Novo Nordisk, Bagsvaerd, Denmark, and **Mette S. Olufsen**, North Caroina State University (1125-92-917)

11:00AM *Mathematical Modeling of Cardiac*
▶ (727) *Tissue: Theoretical, Numerical, and Experimental Study of Ephaptic Effects.*
J T Lin*, California Polytechnic State University, **J P Keener**, University of Utah, **S Poelzing**, **R Veeraraghavan**, **S A George**, **R G Gourdie**, Virginia Tech, **M E Salama**, University of Utah and ARUP Reference Lab Institute of Research, **K J Sciuto**, University of Utah, and **G S Hoeker**, Virginia Tech (1125-92-1863)

11:30AM *Modeling volume transmission and*
▶ (728) *neurotransmitter homeostasis.*
Janet A. Best*, The Ohio State University, **Michael C. Reed**, Duke University, **Sean D. Lawley**, University of Utah, and **H. Fred Nijhout**, Duke University (1125-92-2793)

AMS Special Session on Orthogonal Polynomials, II

8:00 AM – 11:50 AM   **Embassy F, International Tower, LL2, Hyatt Regency**

Organizers: **Doron Lubinsky**, Georgia Institute of Technology

Jeff Geronimo, Georgia Institute of Technology

8:00AM *A Transfer Matrix Approach to Scaled*
(729) *Limits of Christoffel-Darboux Kernels.*
Jonathan Breuer, The Hebrew University of Jerusalem (1125-28-1721)

9:00AM *Higher-order Szegő theorems.*
(730) **Milivoje Lukic**, Rice University (1125-47-494)

9:30AM *Solution to Steklov's problem and related*
▶ (731) *questions.*
Sergey Denisov, UW-Madison (1125-41-172)

10:00AM *Orthogonal polynomials and the*
(732) *six-vertex model.*
Karl E. Liechty*, DePaul University, and **P. M. Bleher**, Indiana University-Purdue University Indianapolis (1125-82-594)

10:30AM *New Universality Results for Polynomial*
(733) *Reproducing Kernels.*
Brian Simanek, Baylor University (1125-42-547)

11:00AM *Majorization results for zeros of*
▶ (734) *orthogonal polynomials.*
Walter Van Assche, KU Leuven (1125-33-1473)

11:30AM *Some sufficient conditions of convergence*
(735) *in interpolatory quadrature rules.*
Ulises Fidalgo, Case Western Reserve University (1125-41-473)

AMS Special Session on Recent Progress on Nonlinear Dispersive and Wave Equations, I

8:00 AM – 11:50 AM   **L405 & L406, Lobby Level, Marriott Marquis**

Organizers: **Dana Mendelson**, University of Chicago

Carlos Kenig, University of Chicago

Hao Jia, University of Chicago

Andrew Lawrie, University of California, Berkeley

Gigliola Staffilani, Massachusetts Institute of Technology

Magdalena Czubak, University of Colorado Boulder

8:00AM *On global regularity and scattering for*
(736) *geometric wave equations.*
Sung-Jin Oh*, Korea Institute for Advanced Study, and **Daniel Tataru**, UC Berkeley (1125-35-2201)

8:30AM *Conditional scattering for the*
(737) *mass-subcritical NLS.*
Rowan Killip, UCLA, **Satoshi Masaki**, Osaka University, **Jason Murphy***, UC Berkeley, and **Monica Visan**, UCLA (1125-35-1715)

9:00AM *Finite depth gravity water waves in*
(738) *holomorphic coordinates.*
Benjamin Harrop-Griffiths*, New York University, **Mihaela Ifrim** and **Daniel Tataru**, University of California, Berkeley (1125-35-1761)

9:30AM *Onsager's conjecture and*
(739) *non-uniqueness in fluid equations.*
Tristan Buckmaster, New York University (1125-35-3036)

10:00AM Break

10:30AM *On global solutions of some fluids*
(740) *equations.*
Fabio Pusateri, Princeton University (1125-35-2180)

11:00AM *Long time dynamics for several water*
(741) *waves related models.*
Mihaela Ifrim* and **Daniel I. Tatarutataru**, UC Berkeley (1125-35-775)

11:30AM *Level sets of ground state eigenfunctions.*
(742) **Thomas Beck**, Massachusetts Institute of Technology (1125-35-2982)

AMS Special Session on Spin Glasses and Disordered Media, I

8:00 AM – 10:50 AM **The Learning Center, Ballroom Level, Hyatt Regency**

Organizers: **Antonio Auffinger**, Northwestern University

Aukosh Jagannath, New York University

Dmitry Panchenko, University of Toronto

8:00AM *SO(N) Lattice Gauge Theory, under*
(743) *strong coupling.*
Riddhipratim Basu, Stanford University, and **Shirshendu Ganguly***, UC Berkeley (1125-60-1955)

8:30AM *Relaxation to equilibrium in spherical*
(744) *spin glasses.*
Reza Gheissari*, Courant Institute, NYU, and **Aukosh Jagannath**, University of Toronto (1125-60-935)

9:00AM *The energy landscape of the*
(745) *Sherrington-Kirkpatrick model.*
Wei-Kuo Chen*, University of Minnesota, **Antonio Auffinger**, Northwestern University, **Madeline Handschy** and **Gilad Lerman**, University of Minnesota (1125-60-2473)

10:00AM *On the time constant of high dimensional*
▶ (746) *first passage percolation.*
Antonio Auffinger, Northwestern University, and **Si Tang***, University of Chicago (1125-60-994)

10:30AM *The size of the boundary in the Eden*
(747) *model.*
Michael Damron, Georgia Institute of Technology, **Jack Hanson**, City College of New York, and **Wai-Kit Lam***, Indiana University Bloomington (1125-60-1511)

AMS Special Session on Theory and Applications of Numerical Algebraic Geometry, I

8:00 AM – 11:50 AM **International 4, International Level, Marriott Marquis**

Organizers: **Daniel Brake**, University of Notre Dame

Robert Krone, Queen's University

Jose Israel Rodriguez, University of Chicago

8:00AM *Tuning of tolerances in polynomial*
▶ (748) *homotopy continuation.* Preliminary report.
Dan Bates, Colorado State University (1125-65-1845)

8:30AM *Regularizing closed cells of numerical*
(749) *real decompositions.*
Daniel Brake*, **Jonathan Hauenstein**, University of Notre Dame, **Lloyd N Trefethen**, Oxford University, and **Charles Wampler**, General Motors (1125-14-1666)

9:00AM *Improving solutions to fully nonlinear*
(750) *second order elliptic PDEs with numerical algebraic geometry endgame techniques.* Preliminary report.
Jeb B. Collins*, West Texas A&M University, and **Jonathan Hauenstein**, University of Notre Dame (1125-65-376)

9:30AM *Topological data analysis of real*
(751) *algebraic varieties.*
Emilie Dufresne, University of Oxford, **Parker Edwards**, University of Florida, **Heather A Harrington***, University of Oxford, and **Jonathan D Hauenstein**, University of Notre Dame (1125-14-1623)

10:00AM Break

10:30AM *Computing the real equilibrium points*
► (752) *of the standard Kuramoto model.*
Preliminary report.
Jonathan D Hauenstein*, University of
Notre Dame, **Owen Coss**, **Hoon Hong**,
North Carolina State University, and
Daniel K Molzahn, Argonne National
Laboratory (1125-65-1479)

11:00AM *The degree of the special orthogonal*
► (753) *group.*
Madeline Brandt, University of
California, Berkeley, **David J. Bruce**,
University of Wisconsin, **Taylor
Brysiewicz**, Texas A&M University,
Robert Krone*, Queen's University, and
Elina Robeva, University of California,
Berkeley (1125-14-2910)

11:30AM *Solving polynomial systems via homotopy*
(754) *continuation and monodromy.*
Timothy Duff, **Cvetelina Hill**, Georgia
Tech, **Anders Jensen**, Aarhus Universitet,
Kisun Lee, **Anton Leykin***, Georgia
Tech, and **Jeffrey Sommars**, University
of Illinois at Chicago (1125-14-2417)

AMS-MAA-ICHM Special Session on History of Mathematics, III

8:00 AM – 11:50 AM **International 8,
International Level, Marriott Marquis**

Organizers: **Adrian Rice**,
Randolph-Macon College
Sloan Despeaux, Western
Carolina University
Daniel Otero, Xavier
University

8:00AM *The Jullien Models of Descriptive*
► (755) *Geometry.*
Amy Shell-Gellasch, Montgomery
College (1125-01-380)

8:30AM *The Mathematical Department of the*
► (756) *Educational Times and Journal of the
College of Preceptors.*
J. J. Tattersall, Providence College
(1125-01-1492)

9:00AM *Almanack and Almanaque: the*
► (757) *Calendrical Periodical in Seventeenth
Century North America.*
Bruce S. Burdick, Roger Williams
University (1125-01-2767)

9:30AM *The Early Teaching of Descriptive*
(758) *Geometry in the United States
(1817-1915).*
Thomas Preveraud, LML Université
d'Artois/ESPE Lille Nord-de-France
(1125-01-307)

10:00AM *Publishing mathematics in 18C Geneva*
► (759) *and Lausanne.*
Niccolo' Guicciardini, University of
Bergamo (1125-01-804)

10:30AM *An Indian version of al-Kāshī's method of*
► (760) *iterative approximation of* $\sin 1°$*.*
Kim Plofker, Union College (NY)
(1125-01-2437)

11:00AM *Rationales for Mathematics and its*
► (761) *Significance in Recently-Excavated
Bamboo Texts from Ancient China.*
Preliminary report.
Joseph W. Dauben, City University of
New York (1125-01-3109)

11:30AM Discussion

AMS Contributed Paper Session on Dynamical Systems, Ergodic Theory, Difference and Functional Equations, II

8:00 AM – 11:55 AM **International B,
International Level, Marriott Marquis**

8:00AM *Using Morse Theory in the Planar*
(762) *N-Vortex Problem.* Preliminary report.
Gareth E Roberts, College of the Holy
Cross (1125-37-2016)

8:15AM *Joint impacts of the cell-free and*
(763) *cell-to-cell infection modes on viral
dynamics.*
Hongying Shu*, Tongji University,
Yuming Chen, Wilfrid Laurier University,
and **Lin Wang**, University of New
Brunswick (1125-37-2205)

8:30AM Break

8:45AM *Periodic forcing of a first-order delay*
► (764) *limit cycle oscillator.*
Lauren Lazarus*, Harvey Mudd College,
Matthew Davidow and **Richard Rand**,
Cornell University (1125-37-2875)

9:00AM *A family of discrete dynamical systems in*
► (765) *real projective geometry.*
Quang-Nhat Le, Brown University,
Providence, RI (1125-37-2903)

9:15AM Break

9:30AM *Thermodynamics and Thermophoresis in*
(766) *Random Billiard Dynamical Systems.*
Scott Cook, Tarleton State University
(1125-37-2944)

9:45AM *Nonstandard Finite Difference Schemes:*
► (767) *the Mathematics of Ronald Mickens.*
Preliminary report.
Talitha M. Washington, Howard
University (1125-37-3150)

10:00AM *Two types of KAM-nondegenerate nearly*
(768) *integrable systems with positive metric
entropy.*
Dong Chen, Pennsylvania State
University (1125-37-3151)

10:15AM *Unique Solutions to Nonlinear Boundary*
(769) *Value Problems with a Fractional
Self-Adjoint Difference Equation.*
Preliminary report.
Kevin Ahrendt, University of
Nebraska-Lincoln (1125-39-768)

10:30AM *Monotone Discrete Dynamical systems.*
► (770) **S N Elaydi***, **E C Balreira**, Trinity
University, and **R Luis**, Lisbon
(1125-39-1075)

10:45AM *A Monotonicity Theorem for the Quantum*
► (771) *Calculus.*
Allan C Peterson, University of
Nebraska-Lincoln (1125-39-1360)

105

11:00AM *A new weighted Ostrowski type inequality*
(772) *on arbitrary time scale.*
Eze R Nwaeze, Tuskegee University
(1125-39-2056)

11:15AM *An Almost Sharp Monotonicity Result for*
(773) *Discrete Sequential Fractional Delta*
Differences.
Rajendra B Dahal*, Coastal Carolina
University, Conway, SC 29526, USA, and
Christopher S Goodrich, Creighton
Preparatory School, Omaha, NE 68114,
USA (1125-39-2357)

11:30AM *On the Kunz-Souillard approach*
(774) *to localization for the discrete one*
dimensional generalized Anderson
model.
Valmir Bucaj, Rice University
(1125-39-2387)

11:45AM *Projectively integrable linear difference*
(775) *equations and their Galois groups.*
Carlos E. Arreche, North Carolina State
University (1125-39-2608)

AMS Contributed Paper Session on Numerical Analysis and Computer Science, II

8:00 AM – 11:55 AM   **Greenbriar, Conference Level, Hyatt Regency**

8:00AM *On the Numerical Integration of*
(776) *Initial-Boundary Value Problem to One*
Nonlinear Parabolic Equation.
Mikheil Tutberidze*, Associated
Professor at Ilia State University, and
Akaki Gvalia, Director at LLC G.M.
(1125-65-1649)

8:15AM *A new multi-grid method for the obstacle*
(777) *problem.* Preliminary report.
Joseph A Eichholz, Rose-Hulman
Institute of Technology (1125-65-1947)

8:30AM *(Un)Stable Manifold Computation via*
▶ (778) *Forward-Backward Iteration.*
Dmitriy Zhigunov* and **Yu-Min Chung**,
The College of William & Mary
(1125-65-2023)

8:45AM *An Unsteady Two-Dimensional Complex*
▶ (779) *Variable Boundary Element Method for*
Modeling Heat Transport Problems.
Bryce D. Wilkins* and **Randy Boucher**,
United States Military Academy
(1125-65-2229)

9:00AM *An enhanced finite element method for a*
(780) *class of variational problems exhibiting*
the Lavrentiev gap phenomenon.
Xiaobing Feng and **Stefan Schnake***,
University of Tennessee, Knoxville
(1125-65-2392)

9:15AM *An approach to the numerical solution of*
(781) *multidimensional stochastic Kawarada*
equations via adaptive operator splitting.
Joshua Lee Padgett, Baylor University
(1125-65-2397)

9:30AM *Automated Computation for Symbolic*
▶ (782) *and Graphical Representations of*
Separatrices for N-Dimensional
Dynamical Systems.
Sarah Ryan Black* and **Emily Kim**
Miller, New Mexico Tech – ICASA
(1125-65-2491)

9:45AM *Numerical Simulation of Hydraulic*
(783) *Fracking and Induced Earthquakes.*
A. Bass Bagayogo, University of
Saint-Boniface (1125-65-2510)

10:00AM *Mathematical modeling of fungal growth.*
(784) Preliminary report.
Weiwei Zhang, King's College,
Wilkes-Barre, PA, 18711 (1125-65-2636)

10:15AM *The Trio Identity for Cubature Error.*
▶ (785) **Fred J Hickernell**, Department of
Applied Mathematics, Illinois Institute of
Technology (1125-65-2713)

10:30AM *Maximum Energy Concentration Inside*
(786) *Composite Structures.*
Robert Lipton, Center for Computation
and Technology, Department of
Mathematics, Louisiana State University,
Paul Sinz*, Department of Mathematics,
Louisiana State University, and **Michael**
Stuebner, University of Dayton Research
Institute (1125-65-2751)

10:45AM *Invariant Densities of Frobenius-Perron*
▶ (787) *Operator Related to Random Maps.*
Tulsi Upadhyay, The University of
Southern Mississippi (1125-65-2796)

11:00AM *The answer to the P/NP problem is P≠NP*
(788) *— proof via logical analysis.*
Bangyan Wen*, University of Electronic
Science and Technology of China,
and **Yi Lin**, Slippery Rock University
(1125-68-997)

11:15AM *Computing Hypergeometric Solutions of*
(789) *Second Order Linear Differential*
Equations using Quotients of Formal
Solutions and Integral Bases.
Erdal Imamoglu* and **Mark van Hoeij**,
Florida State University (1125-68-1087)

11:30AM *A Block Chain Mathematical Algorithm*
(790) *for Secure Data Authentication, Storage,*
Transmission, Reception and
Distribution.
Robert S Owor* and **Zephyrinus C**
Okonkwo, Albany State University
(1125-68-2969)

11:45AM *An Optimization Based Domain*
(791) *Decomposition Method for Stochastic*
Optimal Control Problems.
Jangwoon Lee*, University of Mary
Washington, **Lee** and **Hwang**, Yonsei
University (1125-65-1403)

AMS Contributed Paper Session on Ordinary Differential Equations

8:00 AM – 11:55 AM   **Fairlie, Conference Level, Hyatt Regency**

8:00AM *Coercive Nonlocal Elements in Fractional*
▶ (792) *Differential Equations.*
Christopher S. Goodrich, Creighton Preparatory School (1125-34-150)

8:15AM *Fractional boundary value problems*
(793) *and Lyapunov-type inequalities with fractional integral boundary conditions.*
Sougata Dhar*, **Qingkai Kong** and **Michael McCabe**, Northern Illinois University (1125-34-330)

8:30AM *Adaptive Polynomial Expansion Method*
▶ (794) *for the Numerical Solution of the Landau Equation.* Preliminary report.
Bilyana Tzolova*, Johns Hopkins University, **Abigail Hickok**, Princeton University, **Justyna Tafoya**, University of New Mexico, **Robert Loek Van Heyningen**, University of California, Berkeley, **Omer Tekin**, University of California, Los Angeles, **Frank Graziani** and **Chris Scullard**, Lawrence Livermore National Laboratory (1125-34-502)

8:45AM *Generalized Sturm-Picone Comparison*
(795) *Theorems.*
Ahmed Ghatasheh* and **Rudi Weikard**, University of Alabama at Birmingham (1125-34-836)

9:00AM *Continuous Dependence and*
(796) *Differentiating Solutions of an nth Order Boundary Value Problem with Integral Conditions.*
Jeffrey W. Lyons* and **Samantha A. Major**, Nova Southeastern University (1125-34-859)

9:15AM *Positive Solutions of first order boundary*
(797) *value problems with nonlinear nonlocal boundary conditions.* Preliminary report.
Seshadev Padhi, Birla Institute of Technology, and **Jaffar Ali***, Florida Gulf Coast University (1125-34-1280)

9:30AM *Mathematical Modeling of Glucose*
▶ (798) *Dependent Renin-Angiotensin System in Podocytes in Diabetic Kidney Disease.* Preliminary report.
Minu Pilvankar*, **Ashlee N Ford-Versypt** and **Michele A. Higgins**, Oklahoma State University (1125-34-1893)

9:45AM *Uniqueness implies existence of solutions*
(799) *for three-point boundary value problems for fractional differential equations.*
Paul Eloe and **Tyler Masthay***, University of Dayton (1125-34-1911)

10:00AM *Uniqueness implies existence of solutions*
(800) *for two-point boundary value problems for fractional differential equations.*
Paul Eloe* and **Tyler Masthay**, University of Dayton (1125-34-1924)

10:15AM *Extremal points for a fractional*
(801) *boundary value problem with a fractional boundary condition.*
Jeffrey Thomas Neugebauer, Eastern Kentucky University (1125-34-2075)

10:30AM *Taylor Methods in Nonlinear Differential*
▶ (802) *Equations.* Preliminary report.
Roger J Thelwell, James Madison University (1125-34-2157)

10:45AM *Prey cannibalism alters the dynamics of*
▶ (803) *Holling–Tanner-type predator–prey models.*
Aladeen Al Basheer*, **Rana D Parshad**, **Emmanuel Quansah** and **Suman Bhowmick**, Clarkson University (1125-34-2342)

11:00AM *Solving Second Order Linear Differential*
(804) *Equations with Five Regular Singularities.*
Vijay Jung Kunwar*, Albany State University, and **Mark van Hoeij**, Florida State University (1125-34-2620)

11:15AM *Modeling the interplay between Varroa*
(805) *destructor-Acute Bee Paralysis Virus infestation and division of labour in a honeybee colony.*
Vardayani Ratti*, Dartmouth College, **Peter G Kevan**, University of Guelph, Canada, and **Hermann J Eberl**, University of Guelph (1125-34-2790)

11:30AM *Modeling Harmful Agal Blooms in the*
▶ (806) *Western Basin of Lake Erie and their Economic Impact.*
Hem Raj Joshi* and **Mark Miller**, Xavier University, Cincinnati (1125-34-2818)

11:45AM *Mathematical modeling, analysis*
▶ (807) *and computation of the influence of preventive measures on the spread of the Zika Virus.* Preliminary report.
Padmanabhan Seshaiyer, George Mason University, and **Pradyuta Padmanabhan***, The Forcroft School (1125-34-3079)

AMS Contributed Paper Session on Topics in Analysis, I

8:00 AM – 11:55 AM   **Techwood, Conference Level, Hyatt Regency**

8:00AM *Can we generalize the limit-definition of*
▶ (808) *the derivative? II.* Preliminary report.
Udita N. Katugampola, Department of Mathematical sciences, University of Delaware (1125-26-2897)

8:15AM *Weighted Korn inequality and solutions of*
(809) *the divergence on John domains.*
Fernando Lopez Garcia, University of California Riverside (1125-26-2920)

8:30AM *Scale transforms of unbounded functions*
(810) *on an analogue of Wiener space.*
Dong Hyun Cho, Kyonggi University (1125-28-1732)

8:45AM *Towards the classification of Legendre*
(811) *multiplier sequences.* Preliminary report. **Matthew Chasse**, Brockport, NY, **Tamas Forgacs***, California State University, Fresno, and **Andrzej Piotrowski**, University of Alaska Southeast (1125-30-549)

9:00AM Break

9:15AM *Zeros of optimal polynomial*
(812) *approximants and Jacobi matrices.* **C Bénéteau**, **D Khavinson**, University of South Florida, **C Liaw**, Baylor University, **D Seco***, Universitat de Barcelona, and **B Simanek**, Baylor University (1125-30-1133)

9:30AM *Convolutions Of Univalent Harmonic*
(813) *Mappings.* Preliminary report. **Michael Dorff**, **Samaneh G. Hamidi***, Brigham Young University, **Jay M. Jahangiri**, Kent State University, and **Elif Yasar**, Uludag University (1125-30-1183)

9:45AM *Zeros of polynomials generated by*
(814) *rational functions with a hyperbolic polynomial type denominator.* **Khang D Tran*** and **Tamas Forgacs**, California State University, Fresno (1125-30-1701)

10:00AM *Integral characterization and growth*
(815) *properties of analytic functions defined by a differential inequality.* Preliminary report. **See Keong Lee**, Universiti Sains Malaysia (1125-30-1728)

10:15AM *Dirichlet's problem with entire data on*
(816) *ellipsoidal cylinder.* **Dima Khavinson***, University of South Florida, **Erik Lundberg**, Florida Atlantic university, and **Hermann Render**, University College Dublin (1125-31-734)

10:30AM *The problem of p-Laplacian and*
(817) *its Surjectivity on Infinite Graphs.* Preliminary report. **Lucio M-G Prado**, Department of Mathematics, BMCC, The City University of New York, New York,NY 10007 (1125-31-2849)

10:45AM *Unilateral and bilateral identities of*
(818) *Rogers-Ramanujan type.* **Ahmad El-Guindy***, Texas A&M University at Qatar, and **Mourad E.H. Ismail**, University of Central Florida (1125-33-2777)

11:00AM *Special Functions arising from*
(819) *Sturm-Liouville Equations.* Preliminary report. **Charles T Fulton***, Florida Institute of Technology, and **Heinz Langer**, Vienna University of Technology (1125-33-2873)

11:15AM *Chebyshev-like maps in several and*
(820) *infinite variables.* Preliminary report. **Joshua P. Bowman**, Pepperdine University (1125-33-2933)

11:30AM *Three dimensional Krawtchouk*
▶ (821) *descriptors for local comparison of protein surfaces.* **Atilla Sit***, Eastern Kentucky University, and **Daisuke Kihara**, Purdue University (1125-33-3002)

11:45AM *Moment Representations of Exceptional*
(822) X_1 *Orthogonal Polynomials.* **Constanze Liaw**, Baylor University, **Jessica S. Kelly**, Christopher Newport University, and **John M. Osborn***, Baylor University (1125-33-3076)

AMS Contributed Paper Session on Topology and Manifolds, I

8:00 AM – 11:55 AM   **International 1, International Level, Marriott Marquis**

8:00AM *A Colored Khovanov Homotopy Type.*
(823) **Michael Willis**, University of Virginia (1125-54-1490)

8:15AM *Hexagonal Mosaic Knots.*
▶ (824) **Malachi Alexander**, California State University Monterey Bay, **Selina Foster***, Westminster College, **Gianni Krakoff**, University of Washington, and **Jennifer McLoud-Mann**, University of Washington Bothell (1125-54-1624)

8:30AM *Zero-Dimensional Spaces Homeomorphic*
(825) *to Their Cartesian Squares.* **Włodzimierz J. Charatonik** and **Sahika Şahan***, Missouri University of Science and Technology (1125-54-1820)

8:45AM *Descriptive Set Theory and Borel*
(826) *Probabilities.* **C Caruvana*** and **R Kallman**, University of North Texas (1125-54-2152)

9:00AM *A Discussion on the Tangle Model: An*
▶ (827) *Application of Topology.* **Candice Renee Price**, University of San Diego (1125-54-2753)

9:15AM *A Note on the Construction of Complex*
(828) *and Quaternionic Vector Fields on Spheres.* **Mohammad A Obiedat**, Department of Science, Technology, and Mathematics, Gallaudet University (1125-55-37)

9:30AM Break

9:45AM *A neural network approach to computing*
▶ (829) *knot invariants.* **Mark C Hughes**, Brigham Young University (1125-55-1112)

10:00AM *Interactive software for topological data*
▶ (830) *analysis.* **Luke Wolcott**, University of Southern California (1125-55-1272)

10:15AM *Higher Big Homotopy Groups.*
(831) **Keith Penrod**, Morehouse College (1125-55-1941)

10:30AM *Algebraic ν_n self maps of spectra at the*
(832) *prime 2.* **Leanne Elizabeth Merrill**, University of Oregon (1125-55-2517)

10:45AM *Combinatorial Hodge Theory for*
▶ (833) *Equitable Kidney Paired Donation.*
Preliminary report.
Joshua Lee Mike* and **Vasileios Maroulas**, University of Tennessee, Knoxville (1125-55-2595)

11:00AM *Constructing a finite spectrum with a ν_2*
(834) *self map at $p = 3$.*
Ben Reid, University of Oregon (1125-55-2764)

11:15AM *Equivariant dendroidal sets and the*
(835) *homotopy theory of equivariant operads.*
Peter J. Bonventre* and **Luis Pereira**, University of Virginia (1125-55-3042)

11:30AM *Stabilizing Spectral Functors of Exact*
(836) *Categories.* Preliminary report.
Juan S. Villeta-Garcia, University of Illinois at Urbana-Champaign (1125-55-3101)

11:45AM *Exact Lagrangian fillings of Legendrian*
(837) *$(2, n)$ torus knots.*
Yu Pan, Duke University (1125-55-189)

AMS Contributed Paper Session on Undergraduate Research, II

8:00 AM – 11:55 AM **International A, International Level, Marriott Marquis**

8:00AM *On the subgroup generated by solutions*
▶ (838) *of Pell's equation.*
Elena C Covill, Siena College (1125-11-889)

8:15AM *On Summand Minimality of Generalized*
▶ (839) *Zeckendorf Decompositions.*
Chi Huynh, Georgia Institute of Technology/SMALL 2016, **Carsten Peterson**, Yale University/SMALL 2016, and **Yen Nhi Truong Vu***, Amherst College/SMALL 2016 (1125-11-1815)

8:30AM *Factorizations, elasticity, and Frobenius*
▶ (840) *numbers of numerical monoids generated by a double arithmetic sequence.*
Vanessa Arcelia Aguirre* and **Seneca Cox**, University of Hawaii at Hilo (1125-11-2265)

8:45AM *Symmetries of the Hypercube.*
▶ (841) **Lindsey Heiberger***, **Heather Palmer**, **Daniel Viaud** and **Meghan De Witt**, St. Thomas Aquinas College (1125-20-1771)

9:00AM *Monomial Galois Groups of Homogeneous*
▶ (842) *Linear Differential Equations of Arbitrary Order.*
Jack Wagner* and **Sabrina Hessinger**, Armstrong State University (1125-20-2592)

9:15AM *Anallagmatic Curves and Inversion About*
▶ (843) *the Unit Hyperbola.*
Stephanie P Neas, University of Wisconsin-Stout (1125-30-2460)

9:30AM *Modeling the Zika Virus and Mitigating*
▶ (844) *Microcephaly Outcomes.*
Travis M. Metzger, Morningside College (1125-34-1406)

9:45AM *A Mathematical Model of Chronic Myeloid*
▶ (845) *Leukemia with Treatment.* Preliminary report.
Lindsay K Bradley*, **Kristen Abernathy** and **Zachary Abernathy**, Winthrop University (1125-34-2126)

10:00AM *Incorporating the Cancer Stem Cell*
▶ (846) *Hypothesis into a Treatment Model of Glioblastoma Multiforme.* Preliminary report.
Stephen M Steward* and **Joshua B Dasburg**, Winthrop University (1125-34-3114)

10:15AM *PDEs and hypercomplex differentiable*
▶ (847) *functions.*
David Michael Harper, Florida International University (1125-35-1641)

10:30AM *Parameter Estimation in a Mathematical*
▶ (848) *Model of Tumor Growth.* Preliminary report.
Yaxin Zhang* and **Baasansuren Jadamba**, Rochester Institute of Technology (1125-35-2266)

10:45AM *Using Partial Differential Equations to*
▶ (849) *Model Tumor Growth.*
C. MaLyn Lawhorn*, **Zachary Abernathy** and **Kristen Abernathy**, Winthrop University (1125-35-2509)

11:00AM *Further results on KAM tori appearing in*
▶ (850) *the Charged Isosceles three-body Problem.* Preliminary report.
Yvonne Niyonzima*, **Angelica M Rosario-Santos** and **Marisa Bloom**, Smith College (1125-37-1896)

11:15AM *Classification of numerical sequences*
▶ (851) *originating from recursive polynomial sequences.* Preliminary report.
Kathleen Lee*, Whittier College, **Michelle Haver**, Ohio Northern University, **William McDermott**, Virginia Tech, and **Alex Wilson**, Michigan State University (1125-40-2461)

11:30AM *Collineation Maps Between Tori.*
▶ (852) **Jacob Shulkin**, The University of Michigan (1125-51-589)

11:45AM *Existence, Uniqueness, and*
▶ (853) *Cost-Optimizing Results of Mathematical Trusses.*
William Soller and **Kristen McCrary***, Southwestern University (1125-51-2532)

MAA Session on Inquiry-Based Teaching and Learning, I

8:00 AM – 11:55 AM **Regency Ballroom V, Ballroom Level, Hyatt Regency**

Organizers: **Judith Covington**, Louisiana State University in Shreveport

Theron Hitchman, University of Northern Iowa

Angie Hodge, University of Nebraska Omaha

Brian P. Katz, Augustana College

Alison Marr, Southwestern University

Victor Piercey, Ferris State University

8:00AM *Creating Independent Readers: Ideas for*
(854) *Effective Student Reading of Textbooks.*
Nicholas Long, Stephen F. Austin State University (1125-G1-704)

8:20AM *Lessons Learned from a First Attempt at*
► (855) *IBL.*
Jessie Hamm, Winthrop University (1125-G1-2317)

8:40AM *First steps in IBL with students who have*
(856) *never proved a mathematical result before.*
Meghan De Witt, St. Thomas Aquinas College (1125-G1-1781)

9:00AM *Learning real analysis through discussion*
► (857) *and presentation.* Preliminary report.
Joshua P. Bowman, Pepperdine University (1125-G1-2953)

9:20AM *Discovering Geometry.*
(858) **Kassie Archer**, University of Texas at Tyler (1125-G1-2590)

9:40AM *Inquiry-Based Teaching and Learning in*
► (859) *the Mathematics Classroom.*
Stephen F Bismarck, University of South Carolina Upstate (1125-G1-2676)

10:00AM *Do Math Long and Prosper: An*
(860) *Experiment in "Gamifying" an Active Learning Classroom.* Preliminary report.
Kayla Bradley Dwelle, Ouachita Baptist University (1125-G1-2659)

10:20AM *Leveraging Context to Make Old Ideas*
(861) *New Again.*
Elizabeth Thoren, Pepperdine University (1125-G1-3089)

10:40AM *Making Discrete Inquiries: Effective IBL*
► (862) *Structures for a Multi-Audience Discrete Mathematics Course.* Preliminary report.
Suzanne Ingrid Dorée, Augsburg College (1125-G1-984)

11:00AM *Effect of Classroom Setup on Student*
► (863) *Learning.* Preliminary report.
James B Collins, West Texas A&M University (1125-G1-1944)

11:20AM *IBL in very small classes.*
(864) **Xiao Xiao**, Utica College (1125-G1-2434)

11:40AM *Writing IBL Notes for a Textbook-Free*
► (865) *Class.* Preliminary report.
Heather A Lewis, Nazareth College (1125-G1-2041)

MAA Session on Mathematical Technology in the Calculus Classroom, I

8:00 AM – 11:35 AM **Courtland, Conference Level, Hyatt Regency**

Organizers: **Joel Kilty**, Centre College
Alex M. McAllister

8:00AM *MYMathApps Calculus - Building on*
► (866) *Maplets for Calculus.* Preliminary report.
Philip B. Yasskin*, Texas A&M University, **Douglas B. Meade**, University of South Carolina, and **Andrew Crenwelge**, Texas A&M University (1125-H5-2669)

8:20AM *Teaching Calculus with Ximera.*
(867) **Bart Snapp**, The Ohio State University (1125-H5-2623)

8:40AM *A Basic Approach to Creating Interactive*
(868) *Calculus Lessons in Mathematica.*
Kristen Mazur, Elon University (1125-H5-112)

9:00AM *Empowering Calculus Students through*
► (869) *Mathematica.*
Laura R Lynch, College of Coastal Georgia (1125-H5-404)

9:20AM *Utilizing Mathematica for Higher Level*
► (870) *Thinking in Multivariable Calculus.*
Preliminary report.
Grace McClurkin* and **Joshua Mike**, University of Tennessee, Knoxville (1125-H5-1185)

9:40AM *3D visualizations in multivariable*
(871) *calculus: A pedagogy through technology.* Preliminary report.
Amit A Savkar*, Associate Professor in Residence/University of Connecticut, and **David Nichols**, Graduate Assistant/University of Connecticut (1125-H5-2791)

10:00AM *Maple Software Technology as a*
► (872) *Stimulant Tool for Dynamic Interactive Calculus Teaching and Learning.*
Preliminary report.
Lina Wu, Borough of Manhattan Community College-The City University of New York (1125-H5-339)

10:20AM *Exploring Sequences through Technology*
► (873) *to Expand Students' Example Space.*
Christine A. Herrera*, California State University, Chico, California, and **Alexander White**, Texas State University (1125-H5-173)

10:40AM *Computation and cloud collaboration in a*
► (874) *Calculus class.* Preliminary report.
Nikolay Brodskiy, University of Tennessee (1125-H5-2405)

11:00AM *Web-based apps for practice, scaffolding*
(875) *and conceptualization in calculus.*
D Brian Walton, James Madison University (1125-H5-2372)

11:20AM *Three Ways of Using CalcPlot3D in the*
► (876) *Multivariable Calculus Classroom.*
Preliminary report.
Monica M VanDieren, Robert Morris University (1125-H5-2330)

MAA Session on Mathematics and the Arts, III

8:00 AM – 11:55 AM **International 7, International Level, Marriott Marquis**

Organizer: **Douglas Norton**, Villanova University

8:00AM ▶ (877) *Art as a Pedagogical Innovation That Can Provide a Multicultural Dimension to the K-12 Classroom.*
Elizabeth C Rogers, Piedmont College (1125-I1-3143)

8:20AM ▶ (878) *Mathematics and Science in Rangolee Art from India.* Preliminary report.
Madhuri Bapat, Eastern Arizona College (1125-I1-2065)

8:40AM ▶ (879) *Math and Persian Art.* Preliminary report.
Samaneh Gholizadeh Hamidi, Brigham Young University (1125-I1-1444)

9:00AM Break

9:20AM ▶ (880) *The Art that is Mathematics.* Preliminary report.
James M Henle, Smith College (1125-I1-3125)

9:40AM ▶ (881) *Mathematics in a Dramatic Warm-up Exercise.*
John H Wilson, Centre College (1125-I1-2720)

10:00AM ▶ (882) *Recurrence Relations for Melodies and Tilings.* Preliminary report.
Kurt E. Ludwick, Salisbury University (1125-I1-2745)

10:20AM ▶ (883) *Identifying Dihedral Groups of Inversions in Music.*
Craig M. Johnson, Marywood University (1125-I1-2596)

10:40AM ▶ (884) *We Got The Beat: Using Rhythm to Teach and Motivate Mathematics.*
Gareth E Roberts, College of the Holy Cross (1125-I1-2046)

11:00AM ▶ (885) *Pythagoras to Secor: Improving the Miracle Temperament.*
Anil Venkatesh, Ferris State University (1125-I1-2295)

11:20AM ▶ (886) *Polyphonic Piano Transcription with an Infinite Training Dataset.* Preliminary report.
Samuel Jinglian Li, Seminole High School (1125-I1-2945)

11:40AM (887) *Myia married Milo. And mathematics, music and athletic melted in beautiful harmony in Crotone's Pythagorean School.*
Rosanna Iembo*, University of Calabria, Italy, and **Irene Iaccarino**, High School of Music, Crotone, Italy (1125-I1-1740)

MAA Session on Meaningful Modeling in the First Two Years of College

8:00 AM – 11:55 AM   **Embassy A, International Tower, LL2, Hyatt Regency**

Organizers: **Stuart Boersma**, Central Washington University
Jason Douma, University of Sioux Falls

8:00AM ▶ (888) *Environmental Applications: Introduction to Mathematical Modeling.*
Suzanne Sumner, University of Mary Washington (1125-J5-1632)

8:20AM (889) *On Implementing Meaningful Model Selection Criteria.*
Aden Ahmed*, Texas A&M University-Kingville, and **Khairul Islam**, Eastern Michigan University (1125-J5-207)

8:40AM ▶ (890) *Mathematics for Modeling.* Preliminary report.
Mary Parker*, Austin Community College, **Hunter Ellinger**, Austin, Texas, and **Lindsay Orlando**, Austin Community College (1125-J5-2591)

9:00AM (891) *Statistical Modeling as a Thought-Revealing Activity.*
Catherine Case*, University of Georgia, and **Tim Jacobbe**, University of Florida (1125-J5-2846)

9:20AM ▶ (892) *Less is More: Mathematical Modeling Experiences for non-STEM Majors.*
Teresa D Magnus, Rivier University (1125-J5-1777)

9:40AM ▶ (893) *Modeling with Mathematics: A Second Course in a Quantitative Reasoning Pathway.* Preliminary report.
Gregory D Foley, Ohio University (1125-J5-2435)

10:00AM ▶ (894) *A Discrete Approach to Continuous Logistic Growth.*
Dan Kalman, American University (1125-J5-1500)

10:20AM ▶ (895) *Integrating First Year Mathematics and Physics through a Problem-Based Modeling Course.*
Nathan Pennington, Creighton University (1125-J5-2755)

10:40AM ▶ (896) *COMPASS - Combining Mathematics and Physics to Raise Mathematical Achievement.* Preliminary report.
Kelly Black*, University of Georgia, **Guangming Yao**, Clarkson University, **Craig Wiegert**, University of Georgia, and **Michael Ramsdell**, Clarkson University (1125-J5-2468)

11:00AM ▶ (897) *An Alternative First Year Calculus Course: Modeling Calculus.*
Brian J Birgen, Wartburg College (1125-J5-1049)

11:20AM ▶ (898) *Calculus in Clinical Medicine: Using the Simulation Center to Model and Motivate Calculus and Differential Equations.* Preliminary report.
Melissa A Stoner, Salisbury University (1125-J5-1807)

11:40AM ▶ (899) *Course "Mathematical Modeling in Life Sciences" at Xavier University of Louisiana.* Preliminary report.
Vlajko L Kocic, Xavier University of Louisiana (1125-J5-671)

MAA Session on Research in Undergraduate Mathematics Education (RUME), I

8:00 AM – 11:55 AM   **A706, Atrium Level, Marriott Marquis**

Organizers: **Karen Keene**, North Carolina State University

            Megan Wawro, Virginia Tech

8:00AM ▶ (900)   *Graphing and Fostering Operative Thought.*
Kevin Charles Moore, University of Georgia (1125-N1-1398)

8:20AM ▶ (901)   *Math Anxiety in an Interactive Mathematics Classroom.*
Daniel Visscher*, University of Mihigan, and **Nina White**, University of Michigan (1125-N1-939)

8:40AM ▶ (902)   *Generality-construction processes of undergraduate students.*
Duane Graysay, Syracuse University (1125-N1-2995)

9:00AM ▶ (903)   *Examining Students' Procedural and Conceptual Understanding of Eigenvectors and Eigenvalues in the Context of Inquiry-Oriented Instruction.* Preliminary report.
Khalid Bouhjar*, **Muhammad Haider** and **Christine Andrews Larson**, Florida State University (1125-N1-1158)

9:20AM ▶ (904)   *Student support resources in first-year mathematics: Are they helping?*
Rachel Elizabeth Keller* and **Estrella Johnson**, Virginia Polytechnic Institute & State University (1125-N1-2310)

9:40AM ▶ (905)   *Is it a Function? Generalising from the Single- to Multivariable Setting.*
Allison Dorko, Oregon State University (1125-N1-1359)

10:00AM ▶ (906)   *Examining the Role of Experiential Time in Students' Covariational Reasoning.*
Kristin M Frank, Arizona State University (1125-N1-2722)

10:20AM (907)   *Mathematical Problem Solving Practices: A comparison of a student in College Algebra to a student in Calculus.*
R. Cavender Campbell, The University of Texas at Arlington (1125-N1-2444)

10:40AM ▶ (908)   *A first lesson on proof by contradiction: Developing proof comprehension in a transition-to-proof course.* Preliminary report.
Darryl Chamberlain Jr.* and **Draga Vidakovic**, Georgia State University (1125-N1-1475)

11:00AM ▶ (909)   *An Ongoing Assessment of the Effectiveness of the Hillyer College Bridge Program in Improving At-Risk First-Year Student Performance.* Preliminary report.
Elena A. Cheser, University of Hartford, West Hartford, CT (1125-N1-1594)

11:20AM ▶ (910)   *The Lead TA Influence: A Case Study on How the Lead TA Influences the Teaching Practices of Other GTAs.* Preliminary report.
Hayley Milbourne, San Diego State University (1125-N1-1969)

11:40AM (911)   *Student Generalizations from Finite to Infinite Dimensional Normed Spaces.* Preliminary report.
Zackery Kevin Reed, Oregon State University (1125-N1-3098)

MAA General Contributed Paper Session on Applied Mathematics, I

8:00 AM – 11:40 AM   **Piedmont, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

            Kimberly Presser, Shippensburg University

            Melvin Royer, Indiana Wesleyan University

8:00AM (912)   *Exact solutions to a generalized (3+1)-dimensional nonlinear partial differential equations.*
Alrazi M Abdeljabbar, The Petroleum Institute (1125-VC-40)

8:15AM ▶ (913)   *Porous Medium Equation and Its one parameter family of solutions with degenerate interface.* Preliminary report.
Laxmi P. Paudel*, Albany State University, Albany, GA, and **Joseph Iaia**, University of North Texas, Denton (1125-VC-190)

8:30AM ▶ (914)   *The Role of Electrotonic Junctions between Excitatory Neurons in the Cortex.* Preliminary report.
Jennifer A. Crodelle (Kile)*, **Gregor Kovacic**, Rensselaer Polytechnic Institute, and **David Cai**, NYU Courant Institute (1125-VC-152)

8:45AM ▶ (915)   *Magnetic constant determined; diffuses uncertainty and integrates scales of measure.*
Michael A Norton, Reston, Virginia (1125-VC-44)

9:00AM (916)   *Optimal control applied to a differential equation model for an anthrax epizootic.*
Buddhi R. Pantha*, Abraham Baldwin Agricultural College, **Suzanne Lenhart**, University of Tennessee and NIMBioS, and **Judy Day**, University of Tennessee, Knoxville (1125-VC-267)

9:15AM (917)   *Stable Operator Splitting Method for Free Energy Calculation of One Atom Model.* Preliminary report.
Tania Hazra, University of Alabama, Tuscaloosa (1125-VC-337)

9:30AM ▶ (918)   *Comparison of Numerical Solutions of Advection-Reaction-Dispersion Model.*
Jashmon Rana*, **Gokul R Kadel** and **Narayan Thapa**, Cameron University (1125-VC-677)

9:45AM (919) ▶ *Convergence of Iterative Methods under Weak Conditions.*
Nirjal Shrestha* and **Ioannis K. Argyros**, Cameron University (1125-VC-678)

10:00AM (920) *FMM Preconditioner for Radiative Transport Equation with isotropic coefficients.*
Yimin Zhong*, **Rongting Zhang** and **Kui Ren**, University of Texas at Austin (1125-VC-688)

10:15AM (921) *Fast solvers for poroelastic models.*
Mingchao Cai, Morgan State University (1125-VC-713)

10:30AM (922) *Stresses in Micropolar thermoelastic Elastic Solid due to Ramp-type increase in Thermal and Normal Loading.*
Kulwinder Singh*, Lovely Professional University, Phagwara, and **Rajneesh Kumar**, Kurukshetra University (1125-VC-763)

10:45AM (923) ▶ *Diffie-Hellman key exchange protocol and its software implementation.* Preliminary report.
Samundra Regmi* and **Parshuram Budhathoki**, Cameron University (1125-VC-801)

11:15AM (924) ▶ *Recurrent Viral Infection May Need No Exogenous Trigger.*
Wenjing Zhang*, Texas Tech University, **Lindi Wahl** and **Pei Yu**, University of Western Ontario (1125-VC-1269)

11:30AM (925) ▶ *Solving Poisson's Equations Using Buffered Fourier Spectral Method.* Preliminary report.
Yinlin Dong* and **Chaoqun Liu**, University of Texas at Arlington (1125-VC-1281)

MAA General Contributed Paper Session on Assessment

8:00 AM – 9:40 AM   Roswell, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University
Melvin Royer, Indiana Wesleyan University

8:00AM (926) ▶ *Does Grading Homework Improve Student Performance?*
Kevin G Brown, Southern Adventist University (1125-VD-539)

8:15AM (927) ▶ *A case study of major assessment at a small liberal arts college.* Preliminary report.
Jeff Barton, **Bernadette Mullins**, **Doug Riley** and **Maria Stadnik***, Birmingham-Southern College (1125-VD-1788)

8:30AM (928) ▶ *Who is on the other end?*
Girija Sarada Nair-Hart, University of Cincinnati, Clermont College (1125-VD-1865)

8:45AM (929) ▶ *Using mastery-based assessment in a precalculus course.*
Jason R Elsinger, Spring Hill College (1125-VD-1913)

9:00AM (930) ▶ *A hybrid approach to standards based grading.* Preliminary report.
Peri A Shereen, Carleton College (1125-VD-2189)

9:15AM (931) ▶ *Results From The On-Going Flip-IBL Study – Comparison of Traditional and F/IBL (Flipped and Inquiry-Based Learning) for 'Large' College Algebra – Classroom Settings Reboot.* Preliminary report.
Perry Y.C. Lee* and **Padraig M McLoughlin**, Kutztown University of Pennsylvania (1125-VD-2281)

9:30AM (932) ▶ *Using collaborative pedagogy and assessment instruments to enhance student achievement in College Algebra at Albany State University.*
Zephyrinus C Okonkwo*, **Anilkumar Devarapu** and **Robert S owor**, Albany State University (1125-VD-2588)

MAA General Contributed Paper Session on Interdisciplinary Topics in Mathematics

8:00 AM – 11:10 AM   Baker, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University
Melvin Royer, Indiana Wesleyan University

8:00AM (933) ▶ *Optimizing the Search Space for New Biological Riboswitches – An Applied Combinatorics Problem.*
Jeff Poet*, Missouri Western State University, and **Laurie Heyer**, Davidson College (1125-VH-2667)

8:15AM (934) ▶ *Disparities in Cutaneous Melanoma Hazard Rates between Whites and Black/African Americans in the U.S.A. from 1973 through 2014.* Preliminary report.
Mariama J. Abramson*, Cameron.edu, and **Jean-Jacques Kengwoung-Keumo**, Cameron University (1125-VH-1217)

8:30AM (935) ▶ *The Regression Analysis for the Influence of Religion upon Several Economic Indicators.*
Marat R Mamedbakov* and **Alexander N. Nepp**, Ural Federal University (1125-VH-1591)

8:45AM (936) ▶ *π: Billiards, Physics, and Mathematics.* Preliminary report.
Aramayis Orkusyan, **Adnan H. Sabuwala*** and **David Wu**, California State University, Fresno (1125-VH-1593)

9:00AM (937) *Wavelet Regularization for Numerical Solution of Laplace equation in an arbitrary shaped domain.*
Vani Cheruvu, The University of Toledo (1125-VH-2948)

9:15AM ▶ (938) *Modeling the role of inhibitors in blood clot degradation.*
Brittany Bannish, University of Central Oklahoma (1125-VH-2362)

9:30AM ▶ (939) *Modeling Protein Adsorption in Multimodal Membranes.*
Anastasia B Wilson, Augusta University (1125-VH-2662)

9:45AM ▶ (940) *The Reflection Principle and Bertrand's Ballot Theorem on Three Alternatives.*
Mark A. Krines, Ripon College (1125-VH-751)

10:00AM (941) *Testing and Refining Dynamic Statistical Penetration Testing Security Indices.*
Manjuladevi Gottapu* and **Robert S Owor**, Albany State University (1125-VH-2960)

10:15AM ▶ (942) *Teasing climate signals from one hundred year-old seasonal data of Nova Scotia.* Preliminary report.
Andrew E Long*, **Steven Wilkinson**, **Madison Culbertson** and **Laura Farro**, Northern Kentucky University (1125-VH-2895)

10:30AM (943) *Similarity Solutions For a Class of Mixed Convection Heat Transfer Problems.*
Anilkumar Devarapu*, **Zephyrinus C Okonkwo** and **Manjuladevi Gottapu**, Albany State University (1125-VH-2936)

10:45AM ▶ (944) *Interdisciplinary Team Teaching: The Good, the Bad, and the Beautiful.*
Lisa Driskell, Colorado Mesa University (1125-VH-2964)

11:00AM ▶ (945) *Using computer programming to improve mathematical thinking.* Preliminary report.
Cynthia L Stenger* and **James A Jerkins**, University of North Alabama (1125-VH-2730)

MAA General Contributed Paper Session on Outreach

8:00 AM – 10:10 AM **Kennesaw, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University
Melvin Royer, Indiana Wesleyan University

8:00AM ▶ (946) *Quilts, Constructions, and Kids.*
M. Carol Williams* and **G. Brock Williams**, Texas Tech University (1125-VO-891)

8:15AM ▶ (947) *Mentoring Mathematical Science Fair Projects.*
Jennifer Nordstrom, Linfield College (1125-VO-1687)

8:30AM ▶ (948) *Community Outreach: Annual Mathematics Competitions Bootcamp at Morehouse College.* Preliminary report.
Tuwaner Hudson Lamar, Morehouse College (1125-VO-1840)

8:45AM ▶ (949) *A Study of University Mathematics Outreach Programs in the United States.* Preliminary report.
Gangadhar Acharya, Texas Tech University, Lubbock, TX (1125-VO-1866)

9:00AM ▶ (950) *Creating Career Pathways in Mathematics through the Recruitment and Retention of Talented Community College Students.* Preliminary report.
A Morgulis*, **A Han**, **M Dean** and **F Prioleau**, Department of Mathematics, BMCC, The City University of New York (1125-VO-1986)

9:15AM ▶ (951) *Mathematicians in the Community: Enriching Middle School Mathematics Education.*
Katelynn D Kochalski, University of Virginia (1125-VO-2607)

9:30AM ▶ (952) *Outreach Through Fabrication of College-Level Lab Activities for High-school Students.* Preliminary report.
A. R. Wilzman*, **Brent Lunsford**, **Jeff Pullen** and **Chamaree de Silva**, Mercer University (1125-VO-2870)

9:45AM ▶ (953) *Summer Illinois Math Camp.*
Melinda Lanius, **Claire Merriman***, **Vanessa Rivera Quiñones** and **Simone Sisneros-Thiry**, University of Illinois at Urbana-Champaign (1125-VO-2975)

10:00AM (954) *Disseminating Mathematical Activities for Outreach Programs.* Preliminary report.
Lisa Rezac, University of St. Thomas, St. Paul, MN (1125-VO-3058)

SIAM Minisymposium on The GAIMME Report on Mathematical Modeling in K-16

8:00 AM – 10:50 AM **A703, Atrium Level, Marriott Marquis**

Organizer: **Kathleen Fowler**, Clarkson University

8:00AM (955) *The GAIMME Report on Mathematical Modeling in K-16.*
Jessica M. Libertini, Virginia Military Institute (1125-97-3160)

8:40AM (956) *Mathematical Modeling in High School Mathematics.*
Dan Teague, NC School of Science and Mathematics (1125-97-1357)

9:25AM (957) *Mathematic Modeling at the Undergraduate Level.*
Karen Bliss, North Carolina State University (1125-97-3161)

9:30AM *Discussion*

10:10AM (958) *Assessing Mathematical Modeling.*
Ben Galluzzo, Shippensburg University (1125-97-2240)

Project NExT Workshop

8:00 AM – 6:00 PM **Regency Ballroom VI, Ballroom Level, Hyatt Regency**

Bylaws for a New Century: Q&A Forum on Proposed Changes in MAA Governance

8:00 AM – 8:50 AM   **International 6, International Level, Marriott Marquis**

Come learn and ask questions about the revised MAA bylaws which will be voted on at the Saturday MAA Business Meeting.

Moderators: **Jim Daniel**, MAA

Matt Boelkins, MAA

PME Council Meeting

8:00 AM – 11:00 AM   **Auburn, Conference Level, Hyatt Regency**

Employment Center

8:00 AM – 5:30 PM   **Centennial Ballroom, Ballroom Level, Hyatt Regency**

AMS Special Session on RE(UF)search on Graphs and Matrices, I

8:30 AM – 11:50 AM   **Embassy E, International Tower, LL2, Hyatt Regency**

Organizers: **Cheryl Grood**, Swarthmore College

Daniela Ferrero, Texas State University

Mary Flagg, University of St. Thomas

8:30AM   *Comparing the large scale structure of*
▶ (959)   *Cayley graphs of the group of integers.* **Violeta Vasilevska**, Utah Valley University (1125-20-720)

9:00AM   *Numerical secondary terms for a*
▶ (960)   *conjecture of Cohen and Lenstra.* Preliminary report. **Cassie Williams**, James Madison University (1125-11-951)

9:30AM   *Topological symmetry groups of Möbius*
(961)   *ladders.* **E Flapan**, Pomona College, and **E Davie Lawrence***, University of San Francisco (1125-57-934)

10:00AM   *Peak Sets of Graphs.*
▶ (962)   **Alexander Diaz-Lopez**, Swarthmore College, **Lucas Everham**, Florida Gulf Coast University, **Pamela E Harris***, Williams College, **Erik Insko**, **Vincent Marcantonio**, Florida Gulf Coast University, and **Mohamed Omar**, Harvey Mudd College (1125-05-632)

10:30AM   *Faster computation of zero forcing*
▶ (963)   *parameters.* Preliminary report. **Louis Deaett*** and **Alexander Hutman**, Quinnipiac University (1125-05-2963)

11:00AM   *Nordhaus-Gaddum problems for the*
(964)   *power domination number of a simple graph.* **Mary Flagg***, University of St. Thomas, Houston, **Daniela Ferrero**, Texas State University, **Katherine F. Benson**, Westminster College, **Veronika Furst**, Fort Lewis College, **Leslie Hogben**, Iowa State University and AIM, and **Violeta Vasilevska**, Utah Valley University (1125-05-578)

11:30AM   *The relationship between k-forcing and*
(965)   *k-power domination.* **Daniela Ferrero***, Texas State University, **Leslie Hogben**, Iowa State University, **Franklin H. J. Kenter**, United States Naval Academy, and **Michael Young**, Iowa State University (1125-05-2671)

AMS Special Session on Stochastic Processes and Modelling, I

8:30 AM – 11:50 AM   **M106 & M107, Marquis Level, Marriott Marquis**

Organizers: **Erkan Nane**, Auburn University

Jebessa B. Mijena, Georgia College and State University

8:30AM   *Some isomorphism identities for*
(966)   *Poissonian infinitely divisible processes.* **Jan Rosinski**, University of Tennessee (1125-60-1179)

9:00AM   *Invariant Markov processes under Lie*
(967)   *group actions.* **Ming Liao**, Auburn University (1125-60-740)

9:30AM   *Operators on discrete random chaos*
(968)   *modeling quantum phenomena.* **Jerzy Szulga**, Department of Mathematics and Statistics, Auburn University (1125-60-1887)

10:00AM   *Phase Uniqueness for the Mallows Model.*
(969)   **Shannon Starr***, University of Alabama at Birmingham, and **Meg Walters**, University of Rochester (1125-60-1153)

10:30AM   *Small deviations for time-changed*
(970)   *Brownian motions and applications to second-order chaos.* **Daniel Dobbs**, Trine University (1125-60-755)

11:00AM   *Sample Paths of the Solution to the*
(971)   *Fractional Stochastic Heat Equation Driven by a Fractional-Colored Noise.* Preliminary report. **Randall Herrell**, Department of Mathematical Sciences, University of Alabama in Huntsville, **Renming Song**, Department of Mathematics, University of Illinois at Urbana Champaign, **Dongsheng Wu***, Department of Mathematical Sciences, University of Alabama in Huntsville, and **Yimin Xiao**, Department of Statistics and Probability, Michigan State University (1125-60-391)

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11:30AM *Stability of the solution of stochastic*
(972) *differential equation driven by*
time-changed Lévy noise.
Erkan Nane and **Yinan Ni***, Auburn
University (1125-37-395)

MAA Invited Paper Session on Random Polygons and Knots

8:30 AM – 11:50 AM   **A602, Atrium**
Level, Marriott Marquis

Organizer: **Jason Cantarella**, University
of Georgia

8:30AM *Generating random knots and links from*
(973) *random permutations.*
Joel Hass, UC Davis (1125-AF-1405)

9:00AM *Slipknotting in the Knot Diagram Model.*
(974) **Harrison Chapman**, University of
Georgia (1125-AF-423)

9:30AM *TesseLace: An interesting family of*
▶ (975) *doubly-periodic alternating braids.*
Veronika Irvine, University of Waterloo
(1125-AF-354)

10:00AM *Entanglement complexity in lattice*
▶ (976) *polygon models of polymers under*
confinement. Preliminary report.
Christine Soteros, Department of
Mathematics and Statistics, University of
Saskatchewan (1125-AF-2068)

10:30AM *Knotting and Size in Ergodically*
▶ (977) *Generated Off-Lattice Walks with*
Excluded Volume.
Laura K. Plunkett*, Holy Names
University, and **Kyle Chapman**,
University of Georgia (1125-AF-2072)

11:00AM *Knot Fertility and Heredity.* Preliminary
▶ (978) report.
Allison Henrich, Seattle University
(1125-AF-616)

11:30AM *Entanglement of Confined Random*
▶ (979) *Polygonal Chains.*
Kenneth C Millett, University of
California, Santa Barbara (1125-AF-902)

MAA Invited Address

9:00 AM – 9:50 AM   **Atrium Ballroom,**
Atrium Level, Marriott Marquis

(980) *From Gauss to today: class numbers and*
p-torsion in class groups of number
fields.
Lillian Pierce, Duke University
(1125-A0-18)

MAA Minicourse #5: Part B

9:00 AM – 11:00 AM   **Vinings, Conference**
Level, Hyatt Regency

Introductory Proposal Writing for
Grant Applications to the National
Science Foundation EHR Division of
Undergraduate Education

Presenters: **Ron Buckmire**, Division of
Undergraduate Education,
National Science Foundation

John Haddock, Division of
Undergraduate Education,
National Science Foundation

Teri Jo Murphy, Division of
Undergraduate Education,
National Science Foundation

Sandra Richardson,
Division of Undergraduate
Education, National Science
Foundation

Lee Zia, Division of
Undergraduate Education,
National Science Foundation

MAA Minicourse #9: Part A

9:00 AM – 11:00 AM   **L504 & L505, Lobby**
Level, Marriott Marquis

Statistical Education of Teachers

Presenters: **Anna E. Bargagliotti**, Loyola
Marymount University

Christine Franklin,
University of Georgia

Denise Spangler, University
of Georgia

MAA Minicourse #10: Part A

9:00 AM – 11:00 AM   **L508, Lobby**
Level, Marriott Marquis

Teaching an Applied Topology Course

Presenters: **Colin Adams**, Williams
College

Robert Franzosa, University
of Maine

MAA Minicourse #11: Part A

9:00 AM – 11:00 AM   **L506 & L507, Lobby**
Level, Marriott Marquis

Teaching an Introduction to the
Mathematics of Computer Graphics

Presenter: **Nathan C. Carter**, Bentley
University

MAA Session on Integrating Research into the Undergraduate Classroom

9:00 AM – 11:55 AM   **L401 & L402, Lobby Level, Marriott Marquis**

Organizers: **Timothy B. Flowers**, Indiana University of Pennsylvania
Shannon R. Lockard, Bridgewater State University

9:00AM ▶ (981)
Great Pedagogical Gains from Mentoring Undergraduate Research in Calculus I.
Abe Edwards, Michigan State University (1125-G5-1980)

9:20AM ▶ (982)
Aspects of Calculus 3 in flexible solar panels and other renewable sources of energy.
Malgorzata Aneta Marciniak*, **Marina Nechayeva** and **Vladimir Przhebelskiy**, CUNY (1125-G5-2352)

9:40AM ▶ (983)
Using classroom as a venue for undergraduate research.
Tanweer J. Shapla and **Khairul Islam***, Eastern Michigan University (1125-G5-522)

10:00AM ▶ (984)
The irresistible attraction of big mathematical ideas - Creating an interest in undergraduate research.
George E Cazacu, Georgia College (1125-G5-2628)

10:20AM ▶ (985)
Image and Data in the Classroom: Research and Research-like Experiences.
Tom Asaki*, Washington State University, **Marie Snipes**, Kenyon College, **Heather Moon**, Lewis-Clark State College, and **Chris Camfield**, Hendrix Collge (1125-G5-2643)

10:40AM ▶ (986)
Creating and Investigating Classes of Graphs. Preliminary report.
Shannon R Lockard, Bridgewater State University (1125-G5-2828)

11:00AM ▶ (987)
Final Projects that Give a Taste of Research. Preliminary report.
Caroline Haddad, SUNY Geneseo (1125-G5-1603)

11:20AM ▶ (988)
Mickey Mouse, Kevin Bacon, and How Undergraduate Research Opened a Whole New World For Me.
Jeffrey S. Powell, Samford University (1125-G5-2377)

11:40AM ▶ (989)
Development and Implementation of a Research Methods Course. Preliminary report.
Carolyn A Otto* and **Manda R Riehl**, University of Wisconsin-Eau Claire (1125-G5-2120)

MAA Session on Proofs and Mathematical Reasoning in the First Two Years of College, I

9:00 AM – 11:15 AM   **A702, Atrium Level, Marriott Marquis**

Organizers: **Dean Gooch**, Santa Rosa Junior College
Chris Oehrlein

Joanne Peeples

9:20AM ▶ (990)
Use of Templates in Teaching Proof Writing.
Brandilyn Stigler, Southern Methodist University (1125-M5-3055)

9:40AM (991)
The Role of Operable Interpretations of Definitions in Writing Proof Frameworks.
Ahmed Benkhalti*, **John Selden** and **Annie Selden**, New Mexico State University (1125-M5-743)

10:00AM ▶ (992)
Why Courses in Proofs and Mathematical Reasoning need to be Taught at Two-Year Colleges.
Dean Gooch, Santa Rosa Junior College (1125-M5-1528)

10:20AM (993)
Introducing proof through argumentation: An analysis of K-12 tasks.
Steven R LeMay* and **Fabiana A. Cardetti**, University of Connecticut (1125-M5-2487)

10:40AM ▶ (994)
Proofs: An Introduction to Reading, Analyzing and Writing Mathematics. Preliminary report.
David Burns, Western Connecticut State University (1125-M5-1648)

11:00AM ▶ (995)
Contraposition, Complements, Counterexamples, and Counting: Enumerative Combinatorics as an Introduction to Proof Course.
Erin E Bancroft, Grove City College (1125-M5-1819)

MAA Session for Chairs

9:00 AM – 10:35 AM   **International 5, International Level, Marriott Marquis**

Data, Information, Knowledge using Annual Survey of Math Science /& CBMS Survey

Organizers: **Daniel Maki**, Indiana University
Catherine Murphy, Purdue University Northwest

Panelists: **Thomas Barr**, American Mathematical Society
Ellen Kirkman, Wake Forest University

MAA Panel

9:00 AM – 10:20 AM   **International 6, International Level, Marriott Marquis**

Pushing for change: the MAA and advocacy

Organizers: **Karen Saxe**, Macalester College
David Manderscheid, The Ohio State University

Panelists: **Daniel Goroff**, Alfred P. Sloan Foundation
David Manderscheid, The Ohio State University

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Michael Pearson, MAA

Project NExT Panel

9:30 AM – 10:45 AM   **Regency Ballroom VI, Ballroom Level, Hyatt Regency**

Activities for Contextualizing Mathematics in Undergraduate Courses

Organizers: **Eric Hanson**, Texas Christian University

Sarah Nelson, Lenoir-Rhyne University

Hwayeon Ryu, University of Hartford

Ivan Ventura, California State Polytechnic University, Pomona

Presenters: **Dawn Archey**, University of Detroit Mercy

Chad Topaz, Macalester College

Exhibits and Book Sales

9:30 AM – 5:30 PM   **Grand Hall, Exhibit Level, Hyatt Regency**

MAA General Contributed Paper Session on History or Philosophy of Mathematics

10:00 AM – 11:10 AM   **Roswell, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

10:00AM *Chain Rule - A Wonderful Mind Imaging.*
▶ (996) Preliminary report.
Ram U. Verma, University of North Texas (1125-VG-27)

10:15AM *Extrapolating Plimpton 322—the most*
▶ (997) *famous ancient mathematical artefact.*
Andrew J Simoson, King University (1125-VG-545)

10:30AM *The Algebra of Marriage: An Episode in*
▶ (998) *the History of Applied Group Theory.*
James V Rauff, Millikin University (1125-VG-649)

10:45AM *A First Attempt at a History of*
▶ (999) *Mathematics Course: Mathematics and General Education.*
Eric B Kahn, Bloomsburg University (1125-VG-873)

11:00AM *Euler and the Problem of Surface Area.*
▶ (1000) **Daniel J. Curtin**, Northern Kentucky University (1125-VG-1760)

MAA Poster Session

10:00 AM – NOON   **Marquis Ballroom, Marquis Level, Marriott Marquis**

Mathematical outreach programs.
Organizer: **Betsy Yanik**, Emporia State University

AWM-AMS Noether Lecture

10:05 AM – 10:55 AM   **Atrium Ballroom, Atrium Level, Marriott Marquis**

(1001) *Real loci in symplectic manifolds.*
Lisa Jeffrey, University of Toronto (1125-58-1619)

AMS Special Presentation

10:30 AM – NOON   **A704, Atrium Level, Marriott Marquis**

AMS Conversation on Non-Academic Employment

SIGMAA Officers Meeting

10:30 AM – NOON   **Imperial Ballroom A, Marquis Level, Marriott Marquis**

Organizer: **Andrew Miller**, Belmont University

MAA-AMS Joint Panel

10:35 AM – 11:55 AM   **International 6, International Level, Marriott Marquis**

Design (or improve) Preparation of Your Graduate Students to Teach: Using MAA's CoMInDS Resource Suite

Organizer: **Jessica Deshler**, West Virginia University

Panelists: **Jack Bookman**, Duke University

Natasha Speer, University of Maine

Jessica Deshler, West Virginia University

Sarah Schott, Duke University

MAA Panel

10:35 AM – 11:55 AM   **International 5, International Level, Marriott Marquis**

Models for Mathematicians Working with K-12 Mathematics Teachers

Organizers: **Ben Ford**, Sonoma State University

Debbie Gochenaur, Shippensburg University

Panelists: **James A.M. Epperson**, The University of Texas at Arlington

Davida Fischman, California State University, San Bernardino

Robert M. Klein, Ohio University

MAA General Contributed Paper Session on Mathematics and Technology

10:45 AM – 11:55 AM   Kennesaw, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

10:45AM ▶ (1002)   *R is not only for Data Science: Visualizing Art Patterns Coded in R.* **Boyan Kostadinov**, City Tech, CUNY (1125-VK-1570)

11:00AM ▶ (1003)   *Mathematical Education and 3D Printing in the GMU Math Maker Lab.* Preliminary report. **Ratna Khatri*** and **Evelyn Sander**, George Mason University (1125-VK-1979)

11:15AM (1004)   *"Active" vs "Looking Active" in a Fully Online Mathematics Class: Word of Caution.* Preliminary report. **Nermin Bayazit***, Fitchburg State University, **Draga Vidakovic** and **Pier Junor Clarke**, Georgia State University (1125-VK-2321)

11:30AM ▶ (1005)   *High-Performance Computing for Undergraduate and Graduate Mathematics Students.* **Eric J Kostelich**, Arizona State University (1125-VK-2496)

11:45AM ▶ (1006)   *Pairs of close cycle-points in a logistic map: 5-periodicity or 10?* **Mojtaba Moniri**, Western Illinois University (1125-VK-3023)

Project NExT Lecture on Teaching

11:10 AM – NOON   Regency Ballroom VII, Ballroom Level, Hyatt Regency

SIAM Invited Address

11:10 AM – NOON   Atrium Ballroom, Atrium Level, Marriott Marquis

(1007)   *The Dynamics of Particle Systems by Boltzmann Type Models.* **Irene M. Gamba**, The University of Texas at Austin (1125-45-2366)

AMS Colloquium Lectures: Lecture II

1:00 PM – 1:50 PM   Atrium Ballroom, Atrium Level, Marriott Marquis

(1008)   *The focusing energy critical wave equation: the radial case in 3 space dimensions.* Preliminary report. **Carlos E. Kenig**, University of Chicago (1125-35-297)

AMS-MAA Special Session on Mathematics of Cryptography, II

1:00 PM – 3:50 PM   International C, International Level, Marriott Marquis

Organizers: **Nathan Kaplan**, University of California, Irvine
Alice Silverberg, University of California, Irvine

1:00PM (1009)   *Some remarks on Coppersmith's method and small-exponent RSA.* Preliminary report. **Bhargav Narayanan**, Cambridge University, **Stephen D. Miller***, Rutgers University, and **Ramarathnam Venkatesan**, Microsoft Research India (1125-11-1047)

1:30PM (1010)   *Post-quantum public-key cryptography based on isogenies between supersingular elliptic curves.* **David Jao**, University of Waterloo (1125-11-903)

2:00PM (1011)   *Isogeny Graphs of Ordinary Abelian Varieties.* **Ernest Hunter Brooks***, **Dimitar P. Jetchev** and **Benjamin Pierre Charles Wesolowski**, École Polytechnique Fédérale de Lausanne (1125-11-900)

2:30PM (1012)   *Isogenies of Edwards Curves.* **Dustin Moody***, National Institute of Standards and Technology (NIST), and **Daniel Shumow**, Microsoft (1125-14-596)

3:00PM (1013)   *Supersingular Isogeny Graphs and Quantum Arithmetic.* **Kristin Estella Lauter**, Microsoft Research (1125-11-1129)

3:30PM ▶ (1014)   *Machine Learning on Encrypted Data.* **Kim Laine**, Microsoft Research, USA (1125-68-1556)

AMS-NAM Joint Special Session on The Mathematics of the Atlanta University Center, II

1:00 PM – 3:50 PM   M101, Marquis Level, Marriott Marquis

Organizers: **Talitha M. Washington**, Howard University
Monica Jackson, American University
Colm Mulcahy, Spelman College

1:00PM *The Culture and History of Mathematics*
▶ (1015) *In The Atlanta University Center (AUC).*
Johnny L. Houston, Elizabeth City State
University (1125-01-1926)

2:00PM *A Historical Perspective of Mathematics*
(1016) *at Morris Brown College.*
Sandra Rucker, Clark Atlanta University
(1125-00-1438)

2:30PM *A century of mathematical excellence at*
▶ (1017) *Spelman College.* Preliminary report.
Colm Mulcahy, Spelman College
(1125-01-2433)

3:00PM *Mathematics at Spelman College: Mission*
▶ (1018) *Possible.*
Sylvia T Bozeman*, **Yewande
Olubummo** and **Joycelyn Wilson**,
Spelman College (1125-97-1806)

3:30PM *Morehouse Mathematics: Making a*
▶ (1019) *Difference from "Pop" through "Doc" to
the Present.*
Duane Cooper, Morehouse College
(1125-01-2821)

AMS Special Session on Advances in Numerical Analysis for Partial Differential Equations, II

1:00 PM – 3:50 PM   M103 & 104, Marquis
                          Level, Marriott Marquis

Organizers: **Thomas Lewis**, University
             of North Carolina at
             Greensboro

             Amanda Diegel, Louisiana
             State University

1:00PM *An Energy Stable Finite-Difference*
(1020) *Scheme for Functionalized Cahn-Hilliard
Equation and its Convergence Analysis.*
Preliminary report.
Wenqiang Feng*, The University of
Tennessee, **Cheng Wang**, The University
of Massachusetts, North Dartmouth, and
Steven Matthew Wise, The University of
Tennessee (1125-35-107)

1:30PM *Exponential Time Differencing Gauge*
(1021) *Method for Incompressible Viscous Flows.*
Zhu Wang and **Lili Ju***, University of
South Carolina (1125-65-1653)

2:00PM *Uniquely solvable and energy*
(1022) *stable decoupled schemes for
Cahn-Hilliard-Stokes-Darcy system.*
Wenbin Chen, Fudan University,
Daozhi Han, Indiana University, and
Xiaoming Wang*, Florida State University
(1125-65-1455)

2:30PM *Improved accuracy in algebraic splitting*
(1023) *methods for Navier-Stokes equations.*
Leo Rebholz* and **Mengying Xiao**,
Clemson University (1125-65-393)

3:00PM *A new optimally convergent HDG method*
(1024) *for Korteweg-de Vries type equations.*
Preliminary report.
Bo Dong, University of Massachusetts
Dartmouth (1125-65-1922)

3:30PM *Superconvergence of Immersed Finite*
▶ (1025) *Element Methods.*
Xu Zhang, Mississippi State University
(1125-65-943)

AMS Special Session on Algebraic Statistics (a Mathematics Research Communities Session), II

1:00 PM – 3:50 PM   Inman, Conference
                          Level, Hyatt Regency

Organizers: **Mateja Raic**, University of
             Illinois at Chicago

             Nathaniel Bushnek,
             University of Alaska,
             Anchorage

             Daniel Irving Bernstein,
             North Carolina State
             University

1:00PM *Identifiability of species trees from gene*
▶ (1026) *tree clades and splits.*
Elizabeth S. Allman, University of
Alaska Fairbanks, **James H. Degnan**,
University of New Mexico, and **John A.
Rhodes***, University of Alaska Fairbanks
(1125-62-1343)

1:30PM *Maximum likelihood geometry for*
(1027) *group-based phylogenetic models.*
Preliminary report.
Kaie Kubjas*, Aalto University, and
Dimitra Kosta, University of Edinburgh
(1125-62-1765)

2:00PM *Maximum Likelihood Degree of Toric*
▶ (1028) *Varieties and Discriminants.*
Serkan Hosten*, San Francisco State
University Mathematics Department,
Carlos Amendola, Technische
Universitaet, Berlin, **Nathan Bliss**,
University of Illinois at Chicago, **Isaac
Burke**, National University of Ireland,
Galway, **Courtney Gibbons**, Hamilton
College, **Martin Helmer**, University
of California, Berkeley, **Evan
Nash**, Ohio State University, **Jose
Rodriguez**, University of Chicago, and
Daniel Smolkin, University of Utah
(1125-14-2238)

2:30PM *Topological Invariants and the Maximum*
(1029) *Likelihood Degree of a Toric Variety.*
Preliminary report.
Martin Helmer*, University of California,
Berkeley, **Jose Israel Rodriguez**,
University of Chicago, and **Serkan
Hosten**, San Francisco State University
(1125-14-2021)

3:00PM *Maximum Likelihood Estimate Homotopy*
▶ (1030) *Tracking for Twisted Toric Models.*
Preliminary report.
Carlos Amendola, Technical University,
Berlin (1125-62-1739)

3:30PM *Convexity in treespaces.*
(1031) **Bo Lin**, **Bernd Sturmfels**, University of California, Berkeley, **Xiaoxian Tang**, University of Bremen, and **Ruriko Yoshida***, University of Kentucky (1125-05-58)

AMS Special Session on An Amicable Combination of Algebra and Number Theory (Dedicated to Dr. Helen G. Grundman), II

1:00 PM – 3:50 PM   International 10, International Level, Marriott Marquis

Organizers: **Eva Goedhart**, Lebanon Valley College

Pamela E. Harris, Williams College

Daniel P. Wisniewski, DeSales University

Alejandra Alvarado, Eastern Illinois University

1:00PM *Modularity for Schreieder's varieties.*
(1032) Preliminary report.
Laure Flapan, University of California, Los Angeles, and **Jaclyn Ann Lang***, Université Paris 13 (1125-11-536)

1:30PM *Exponents of Class Groups in Towers of*
(1033) *Number Fields.*
Farshid Hajir*, University of Massachusetts Amherst, and **Christian Maire**, University of Franche-Comte (1125-11-3112)

2:00PM *Fake Real Quadratic Orders.*
(1034) **Renate Scheidler**, University of Calgary (1125-11-2837)

2:30PM *A history of studies of a certain pair of*
▶ (1035) *Diophantine equations.*
Laura Hall-Seelig, Merrimack College (1125-11-1465)

3:00PM *Zeros and irreducibility of*
(1036) *gcd-polynomials.*
Karl Dilcher*, Dalhousie University, and **Sinai Robins**, University of Sao Paulo, Brazil (1125-11-756)

3:30PM *Progress and Challenges Regarding*
▶ (1037) *Tetranomial Thue Equations.*
Daniel P. Wisniewski, DeSales University (1125-11-2758)

AMS Special Session on Analytical and Computational Studies in Mathematical Biology, II

1:00 PM – 3:50 PM   L405 & L406, Lobby Level, Marriott Marquis

Organizers: **Yanyu Xiao**, University of Cincinnati

Xiang-Sheng Wang, University of Louisiana at Lafayette

1:00PM *Fitness based prey dispersal and prey*
(1038) *persistence in intraguild predation systems.*
Robert Stephen Cantrell*, The University of Miami, **King-Yeung Lam**, The Ohio State University, **Xinru Cao** and **Tian Xiang**, Renmin University of China (1125-92-237)

1:30PM *Extinction and uniform strong*
(1039) *persistence of a size-structured population model.*
Keng Deng*, Department of Mathematics, University of Louisiana at Lafayette, and **Yixiang Wu**, Department of Mathematics, Vanderbilt University (1125-35-1344)

2:00PM *A Final Size Relation for Epidemic*
▶ (1040) *Models of Vector-Transmitted Diseases.* Preliminary report.
Fred Brauer, Department of mathematics, University of British Columbia (1125-92-1598)

2:30PM *Mathematical modeling and dynamics of*
(1041) *interactive wild and sterile mosquito populations and release strategies.*
Jia Li, Department of Mathematical Sciences, University of Alabama in Huntsville (1125-92-2131)

3:00PM *Malaria and vector dynamics in the*
(1042) *Kenyan highlands.*
D. I. Wallace, Dartmouth College (1125-92-1063)

3:30PM *A computational model to evaluate*
▶ (1043) *outcomes of various vaccine strategies.*
Yanyu Xiao, University of Cincinnati (1125-92-2220)

AMS Special Session on Character Varieties (a Mathematics Research Communities Session), II

1:00 PM – 3:50 PM   Embassy D, International Tower, LL2, Hyatt Regency

Organizers: **Nathan Druivenga**, University of Kentucky

Brett Frankel, Northwestern University

Ian Le, Perimeter Institute for Theoretical Physics

1:00PM *Circle Packings on Surfaces with Complex*
(1044) *Projective Structures.*
Ellie Dannenberg, University of Illinois at Chicago (1125-51-2385)

2:00PM *Positively ratioed representations.*
(1045) **Giuseppe Martone***, University of Southern California, and **Tengren Zhang**, California Institute of Technology (1125-51-1536)

2:30PM *Symmetries of Link Complements and*
(1046) *Their Character Varieties.* Preliminary report.
Leona Sparaco, Florida State University (1125-55-2277)

3:00PM *Newton-Okounkov cones of free group*
▶ (1047) *character varieties.*
Christopher Allen Manon, George
Mason University (1125-14-868)

3:30PM *Character Varieties of Free Groups are*
(1048) *Gorenstein but not always Factorial.*
Sean D Lawton* and **Christopher
Manon**, George Mason University
(1125-14-1015)

AMS Special Session on Combinatorial and Cohomological Invariants of Flag Manifolds and Related Varieties, II

1:00 PM – 3:50 PM   A705, Atrium
Level, Marriott Marquis

Organizers: **Martha Precup**,
Northwestern University

Rebecca Goldin, George
Mason University

1:00PM *The cyclic Bruhat decomposition of flag*
(1049) *manifolds.*
Allen Knutson, Cornell University
(1125-14-1263)

1:30PM *Lusztig's Generalized Springer*
(1050) *Correspondence and Graham's Variety in
Type A.* Preliminary report.
William Graham, University of Georgia,
Martha Precup, Northwestern University,
and **Amber Russell***, Butler University
(1125-17-2782)

2:00PM *Bruhat orders on wonderful embeddings*
▶ (1051) *of symmetric varieties of type A.*
Preliminary report.
Mahir Bilen Can, Tulane University
(1125-14-2273)

2:30PM *Diagrams and essential sets for signed*
(1052) *permutations.*
David Anderson, The Ohio State
University (1125-05-665)

3:00PM *The Peterson Isomorphism: Moduli of*
(1053) *Curves and Alcove Walks.*
Elizabeth Milićević*, Haverford College,
and **Arun Ram**, University of Melbourne
(1125-14-1903)

3:30PM *Cominuscule points in Schubert varieties.*
(1054) **William Graham***, University of Georgia,
and **Victor Kreiman**, University of
Wisconsin – Parkside (1125-22-2312)

AMS Special Session on Discrete Structures in Number Theory, II

1:00 PM – 3:50 PM   International 9, International
Level, Marriott Marquis

Organizers: **Anna Haensch**, Duquesne
University

Adriana Salerno, Bates
College

1:00PM *Lower bounds on the canonical heights*
(1055) *associated to some rational maps.*
Preliminary report.
Bianca A Thompson, Harvey Mudd
College (1125-11-1273)

1:30PM *Index divisibility in dynamical sequences*
▶ (1056) *and cyclic orbits modulo p.*
Annie Chen, Boulder High School,
T. Alden Gassert*, Western New
England University, and **Katherine E.
Stange**, University of Colorado Boulder
(1125-11-2425)

2:00PM *Counting quaternion algebras.*
(1057) **Benjamin Linowitz**, Oberlin College, **D.
B. McReynolds**, Purdue University, **Paul
Pollack**, University of Georgia, and
Lola Thompson*, Oberlin College
(1125-11-551)

2:30PM *Lower bounds for Hilbert class*
(1058) *polynomials.*
Reinier Broker* and **Allan Keeton**, CCR
Princeton (1125-11-388)

3:00PM *Toroidal Belyĭ Pairs, Toroidal Graphs,*
(1059) *and their Monodromy Groups.*
Edray Herber Goins, Purdue University
(1125-11-475)

3:30PM *Torsion subgroups of CM elliptic curves.*
(1060) **Paul Pollack**, University of Georgia
(1125-11-2334)

AMS Special Session on Dynamical Systems, II

1:00 PM – 3:50 PM   M301, Marquis
Level, Marriott Marquis

Organizers: **Jim Wiseman**, Agnes Scott
College

Aimee Johnson,
Swarthmore College

1:00PM *Intrinsic Stability of Dynamical Networks.*
▶ (1061) **Benjamin Z Webb**, Brigham Young
University (1125-37-972)

1:30PM *Bounded Topological Speedups.*
(1062) **Lori Alvin**, Bradley University, **Drew D
Ash***, Davidson College, and **Nic Ormes**,
University of Denver (1125-37-1608)

2:00PM *Self-induced systems.*
(1063) **Fabien Durand**, Université de Picardie
Jules Verne, Amiens, France, **Nicholas
Ormes***, University of Denver, and
Samuel Petite, Université de Picardie
Jules Verne, Amiens, France
(1125-37-1203)

2:30PM *A condition for topological conjugacy to*
(1064) *an odometer.*
Sarah Bailey Frick*, Furman University,
Karl Petersen, University of North
Carolina, and **Sandra Shields**, College of
Charleston (1125-37-942)

3:00PM *Entropy of C^1 diffeomorphisms without a*
(1065) *dominated splitting.*
Jerome Buzzi, **Sylvain Crovisier**,
Universite Paris-Sud, and **Todd Fisher***,
Brigham Young University (1125-37-406)

3:30PM *The spacetime of a shift automorphism.*
(1066) Preliminary report.
John Franks*, **Bryna Kra**, Northwestern
University, and **Van Cyr**, Bucknell
University (1125-37-909)

AMS Special Session on Fusion Categories and Quantum Symmetries, II

1:00 PM – 3:50 PM　　International 3, International Level, Marriott Marquis

Organizers: **Julia Plavnik**, Texas A&M University

Paul Bruillard, Pacific Northwest National Laboratory

Eric Rowell, Texas A&M University

1:00PM　*On Classification of Super-modular*
(1067)　*Categories by Rank.* Preliminary report. **Zhenghan Wang**, Microsoft Research Station Q and Dept. of Math., UCSB. (1125-18-553)

2:00PM　*Super Modular Categories from Quantum*
(1068)　*Groups.* **Qing Zhang**, TEXAS A&M UNIVERSITY (1125-18-1506)

2:30PM　*Tensor categories enriched in braided*
(1069)　*tensor categories.* **Scott Morrison**, The Australian National University, and **David Penneys***, The Ohio State University (1125-18-950)

3:00PM　*Diagrammatic categorification of the*
(1070)　*polynomial ring $Z[x]$.* Preliminary report. **Radmila Sazdanovic***, North Carolina State University, and **Mikhail Khovanov**, Columbia University (1125-18-1525)

3:30PM　*On Brauer-Picard groups of fusion*
(1071)　*p-categories.* **Ian Swenson Marshall**, University of New Hampshire (1125-81-3078)

AMS Special Session on Lie Group Representations, Discretization, and Gelfand Pairs (a Mathematics Research Communities Session), II

1:00 PM – 3:50 PM　　Spring, Conference Level, Hyatt Regency

Organizers: **Matthew Dawson**, CIMAT

Holley Friedlander, Dickenson College

John Hutchens, Winston-Salem State University

Wayne Johnson, Truman State University

1:00PM　*Real forms of finitary Lie algebras.*
(1072)　Preliminary report. **J Hennig**, University of Alberta (1125-17-2762)

1:30PM　*Equiangular tight frames from*
(1073)　*association schemes.* **Joseph W Iverson**, University of Maryland, **John D Jasper***, University of Cincinnati, and **Dustin G Mixon**, Air Force Institute of Technology (1125-43-2576)

2:00PM　*Discrete frames arising from irreducible*
(1074)　*solvable actions.* Preliminary report. **Vignon S Oussa**, Bridgewater State University (1125-22-278)

2:30PM　*Structure of cyclic shift-invariant spaces*
(1075)　*on the Heisenberg group.* **Azita Mayeli**, City University of New York, The Graduate Center and Queensborough (1125-43-542)

3:00PM　*A structure theorem for the class of*
(1076)　*Parseval frame MRA wavelets for $L^2(\mathbb{R})$.* **Peter M Luthy**, College of Mount Saint Vincent (1125-41-2633)

3:30PM　*Quantum dimensions and fusion*
(1077)　*products for irreducible modules of orbifold lattice vertex algebras under an isometry of order two: a step toward the general case.* **Jason R Elsinger**, Spring Hill College (1125-06-1575)

AMS Special Session on Mathematics in Physiology and Medicine (a Mathematics Research Communities Session), II

1:00 PM – 3:50 PM　　Dunwoody, Conference Level, Hyatt Regency

Organizers: **Kamila Larripa**, Humboldt State University

Charles Puelz, Rice University

Laura Strube, University of Utah

Longhua Zhao, Case Western Reserve University

1:00PM　*A Combined Experimental and*
(1078)　*Computational Approach to Characterize Differential Response to Hemorrhagic Shock.* **Brian E. Carlson***, University of Michigan, Ann Arbor, **Daniel A. Beard**, University of Michigan, Ann Arbor, **Brendan M. McCracken**, **Kevin R. Ward**, **M. Hakam Tiba**, University of Michigan, Ann Arbor, and **Jae Hyuk Lee**, Seoul National University (1125-92-2562)

1:30PM　*Influence of Non-Physiological Blood*
(1079)　*Pressure Artifacts on Cerebral Autoregulation.* Preliminary report. **Erica M Rutter***, North Carolina State University, Raleigh, NC, USA, and **Adam Mahdi**, University of Oxford, Oxford, England, UK (1125-92-782)

2:00PM　*Modeling Host-Pathogen Interactions*
▶ (1080)　*During Influenza-Pneumococcal Coinfection.* **Amber M Smith**, Department of Infectious Diseases, St. Jude Children's Research Hospital (1125-92-457)

2:30PM　*Getting to the target on time.*
▶ (1081)　**Ami Radunskaya**, Pomona College (1125-35-888)

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3:00PM *A mathematical model for generating*
(1082) *synthetic blood pressure.*
Adam Mahdi, University of Oxford, UK
(1125-92-2443)

3:30PM *Interaction between blood flow and*
(1083) *multi-layered structure of arterial walls.*
Suncica Canic*, Department of
Mathematics, University of Houston,
Josip Tambaca, Department of
Mathematics, University of Zagreb,
Martina Bukac, University of Notre
Dame, **Yifan Wang**, University of
Houston, and **Boris Muha**, University of
Zagreb (1125-76-2916)

AMS Special Session on RE(UF)search on Graphs and Matrices, II

1:00 PM – 3:50 PM   **Embassy E, International
Tower, LL2, Hyatt Regency**

Organizers: **Cheryl Grood**, Swarthmore
College

Daniela Ferrero, Texas
State University

Mary Flagg, University of St.
Thomas

1:00PM *Coprime and prime labelings of ladder*
▶ (1084) *graphs and complete bipartite graphs.*
Adam Berliner, St. Olaf College,
Nate Dean, Texas State University,
Jonelle Hook, Mount St. Mary's
University, **Alison Marr**, Southwestern
University, **aBa Mbirika***, University of
Wisconsin-Eau Claire, and **Cayla McBee**,
Providence College (1125-05-744)

1:30PM *Prime Labelings of Hypercube Graphs.*
▶ (1085) Preliminary report.
Cayla D. McBee, Providence College
(1125-05-955)

2:00PM *On matrices subordinate to a tree.*
▶ (1086) **Charles R Johnson**, The College
of William and Mary, and **Ilya M
Spitkovsky***, New York University Abu
Dhabi (1125-15-897)

2:30PM *A tale of two matrices.*
▶ (1087) **Stephan Ramon Garcia**, Pomona College
(1125-15-252)

3:00PM *Random Matrix Ensembles with Split*
▶ (1088) *Limiting Behavior.*
Steven J Miller, Williams College
(1125-15-428)

3:30PM *Chutes, Ladders, and Markov Chains.*
▶ (1089) **Jason Callahan**, St. Edward's University
(1125-91-856)

AMS Special Session on Spectral Calculus and Quasilinear Partial Differential Equations, I

1:00 PM – 3:20 PM   **Embassy F, International
Tower, LL2, Hyatt Regency**

Organizers: **Shijun Zheng**, Georgia
Southern University

Marius Beceanu, State
University of New York -
Albany

Tuoc Van Phan, University
of Tennessee, Knoxville

1:00PM *Long time behavior of solutions to the*
(1090) *mKdV.*
Benjamin Harrop-Griffiths, New York
University (1125-35-1900)

1:30PM *Instability of Cauchy horizon under*
(1091) *spherically symmetric perturbations.*
Jonathan Luk, Stanford University, and
Sung-Jin Oh*, Korea Institute for
Advanced Study (1125-35-2824)

2:00PM *Propagation of water waves.* Preliminary
(1092) report.
Jerry Bona, University of Illinois at
Chicago (1125-35-3045)

2:30PM *The focusing nonlinear Schrödinger*
(1093) *equation with inverse square potential.*
Rowan Killip, UCLA, **Jason Murphy***, UC
Berkeley, **Monica Visan**, UCLA, and
Jiqiang Zheng, University of Nice Sophia
Antipolis (1125-35-1709)

3:00PM *Nonlinear modulatioal instability of*
(1094) *dispersive wave models.*
Zhiwu Lin*, Georgia Institute of
Technology, **Jiayin Jin**, Georgia Institue
of Technology, and **Shasha Liao**, Nankai
University (1125-35-2052)

AMS Special Session on Spin Glasses and Disordered Media, II

1:00 PM – 3:45 PM   **The Learning Center,
Ballroom Level, Hyatt Regency**

Organizers: **Antonio Auffinger**,
Northwestern University

Aukosh Jagannath, New
York University

Dmitry Panchenko,
University of Toronto

1:00PM *The ant in a labyrinth.*
▶ (1095) **Gérard Ben Arous**, NYU, **Manuel
Cabezas**, PUC, and **Alexander
Fribergh***, Université de Montréal
(1125-60-918)

2:00PM *Optimization on Sparse Random Graphs*
(1096) *and its Applications.*
Subhabrata Sen, Stanford University
(1125-60-938)

2:30PM *Diffusion processes on branching*
(1097) *Brownian motion.*
Lisa B Hartung, Courant Institute of
Mathematical Sciences, NYU
(1125-60-923)

3:00PM *The local extrema of the Riemann zeta*
(1098) *function on the critical line.*
Louis-Pierre Arguin, City University of
New York (1125-60-936)

AMS Special Session on Stochastic Processes and Modelling, II

1:00 PM – 3:50 PM   **M106 & M107, Marquis Level, Marriott Marquis**

Organizers: **Erkan Nane**, Auburn University

Jebessa B. Mijena, Georgia College and State University

1:00PM
(1099)
Invariance principle for tempered fractionally integrated time series.
Farzad Sabzikar*, Iowa State University, and **Donatas Surgailis**, Institute of Mathematics and Informatics (1125-60-852)

1:30PM
(1100)
Intermittency fronts for space-time fractional stochastic partial differential equations in $(d + 1)$ *dimensions.*
Preliminary report.
Sunday A Asogwa* and **Erkan Nane**, Auburn University (1125-60-1122)

2:00PM
► (1101)
Mean square power series solutions and its applications in solving linear second order random differential equations.
Laura Villafuerte Altuzar*, Universidad Autonoma de Chiapas, and **Juan Carlos Cortes**, Universidad Politecnica de Valencia (1125-60-1431)

2:30PM
(1102)
Large time behavior for the solution of the fractional stochastic heat equation in bounded domains.
Mohammud Foondun, Loughborough University, Leicestershire, UK, **Ngartelbaye Guerngar***, Auburn University, Auburn, AL, USA, and **Erkan Nane**, Auburn, Auburn, AL, USA (1125-60-1057)

3:00PM
(1103)
Simulating Option Pricing Models with Hereditary Structure.
Flavia C Sancier-Barbosa, Antioch College (1125-60-3072)

3:30PM
(1104)
Dyson type formula for pure jump Lévy processes and applications. Preliminary report.
Jin Sixian*, Claremont Graduate University, Institute of Mathematical Sicences, **Schellhorn Henry**, Claremont Graduate University, and **Vives Josep**, Universitat de Barcelona (1125-60-169)

AMS Special Session on Theory and Applications of Numerical Algebraic Geometry, II

1:00 PM – 3:50 PM   **International 4, International Level, Marriott Marquis**

Organizers: **Daniel Brake**, University of Notre Dame

Robert Krone, Queen's University

Jose Israel Rodriguez, University of Chicago

1:00PM
(1105)
Sampling Algebraic Varieties for Sum of Squares Programs.
Diego Cifuentes* and **Pablo A Parrilo**, Massachusetts Institute of Technology (1125-90-394)

1:30PM
(1106)
SVDquartets and Numerical Algebraic Geometry.
Ruth Davidson, University of Illinois Urbana-Champaign (1125-92-1559)

2:00PM
(1107)
Numerical algebraic geometry in econometrics and the GMM degree.
Lek-Heng Lim and **Jose Israel Rodriguez***, University of Chicago (1125-14-2339)

2:30PM
(1108)
Numerical algebraic geometry for identifying the number of components in Gaussian Mixture Models.
Sara Shirinkam*, Department of Mathematics, University of Texas at San Antonio, **Adel Alaeddini**, Department of Mechanical Engineering, University of Texas at San Antonio, and **Elizabeth Gross**, Department of Mathematics, San Jose State University (1125-14-619)

3:00PM
(1109)
Trace Test.
Frank Sottile*, Texas A&M University, **Anton Leykin**, Georgia Institute of Technology, and **Jose Israel Rodriguez**, University of Chicago (1125-14-1383)

3:30PM
(1110)
Geometric measure of entanglement of symmetric d-qubits is polynomial-time computable.
Shmuel Friedland and **Li Wang***, University of Illinois at Chicago, Department of Mathematics, Statistics and Computer Science (1125-14-870)

MAA Invited Paper Session on Technical Tools for Mathematical 3D Printing

1:00 PM – 4:20 PM   **A602, Atrium Level, Marriott Marquis**

Organizers: **Elizabeth Denne**, Washington and Lee University

Laura Taalman, James Madison University

1:00PM
► (1111)
Using Cinema 4D to create Calculus models.
Elizabeth Denne, Washington and Lee University (1125-AH-67)

1:30PM
► (1112)
Design by transformation.
Henry Segerman, Oklahoma State University (1125-AH-73)

2:00PM
► (1113)
Using Grasshopper to design 3D-printable models.
David Bachman, Pitzer College (1125-AH-849)

2:30PM
► (1114)
Visualizing Homotopies with 3D Printing.
Preliminary report.
Jonathan M. Gerhard* and **Laura Taalman**, James Madison University (1125-AH-365)

3:00PM *Orientable Mesh Modeling.*
▶ (1115) **Ergun Akleman**, Texas A&M University (1125-AH-70)

3:30PM *Cyclic Woven Object Modeling and*
▶ (1116) *Topological Constructions.*
Ergun Akleman, Texas A&M University (1125-AH-72)

4:00PM Discussion

AMS-MAA-ICHM Special Session on History of Mathematics, IV

1:00 PM – 3:50 PM   International 8, International Level, Marriott Marquis

Organizers: **Adrian Rice**, Randolph-Macon College
Sloan Despeaux, Western Carolina University
Daniel Otero, Xavier University

1:00PM *Mathematicians as Consultants in*
▶ (1117) *Eighteenth-Century England.*
David R Bellhouse, University of Western Ontario (1125-01-240)

1:30PM *Mathematical Induction and Nature of*
▶ (1118) *British Miracles.*
Daniel S Silver, University of South Alabama (1125-01-375)

2:00PM *Writing the mathematical biography of*
▶ (1119) *Ada Lovelace.*
Ursula Martin, University of Oxford (1125-01-1766)

2:30PM *"Knowledge gained by experience": Olaus*
▶ (1120) *Henrici – engineer, geometer and maker of mathematical models.*
June Barrow-Green, The Open University, UK (1125-01-444)

3:00PM *The Perilous Practice of 'Flying and*
▶ (1121) *Applying'.*
Tony Royle, The Open University, UK (1125-01-318)

3:30PM Discussion

MAA Minicourse #7: Part A

1:00 PM – 3:00 PM   L504 & L505, Lobby Level, Marriott Marquis

Mathematical Modeling Contest Papers: Insights for Instructors and Students
Presenters: **Gregory Rhoads**, Appalachian State University
William Bauldry, Appalachian State University

MAA Minicourse #13: Part A

1:00 PM – 3:00 PM   L506 & L507, Lobby Level, Marriott Marquis

Teaching Modeling-First Differential Equations–Technology and Complete End Game Efforts.
Presenters: **Rosemary Farley**, Manhattan College

Jon Paynter, US Military Academy

Therese Shelton, Southwestern College

Patrice Tiffany, Manhattan College

Brian Winkel, SIMIODE

MAA Minicourse #15: Part A

1:00 PM – 3:00 PM   L508, Lobby Level, Marriott Marquis

Unraveling Four Interesting Ciphers
Presenters: **Chris Christensen**, Northern Kentucky University
Jeffrey Ehme, Spelman College

AMS Contributed Paper Session on Mathematical Logic, Order Theory, Algebraic Systems

1:00 PM – 3:40 PM   Greenbriar, Conference Level, Hyatt Regency

1:00PM *Classifying Material Implications over*
▶ (1122) *Minimal Logic.*
Maarten McKubre-Jordens*, **Hannes Diener** and **Louis Warren**, University of Canterbury (1125-03-42)

1:15PM *Uniformly metastable convergence in*
(1123) *metric structures.*
Eduardo Dueñez* and **José N Iovino**, University of Texas, San Antonio (1125-03-1048)

1:30PM *Modal logic axioms valid in quotient*
(1124) *spaces of finite CW-complexes and other families of topological spaces.*
Maria Nogin* and **Bing Xu**, California State University, Fresno (1125-03-1259)

1:45PM *On a variant of continuous logic.*
(1125) **Simon Cho**, University of Pennsylvania (1125-03-1537)

2:00PM *Partition Properties for Non-Ordinal Sets*
(1126) *Under the Axiom of Determinacy.*
Preliminary report.
Jared Holshouser, University of North Texas (1125-03-1968)

2:15PM *Strongly nontrivial minimal Turing*
(1127) *degrees.* Preliminary report.
William C. Calhoun, Bloomsburg University of Pennsylvania (1125-03-2232)

2:30PM *Symmetry and Superstability in Abstract*
(1128) *Elementary Classes.*
Monica M VanDieren, Robert Morris University (1125-03-2344)

2:45PM *On the Computational Complexity and*
▶ (1129) *Randomness of Derivatives of Online Functions.* Preliminary report.
Douglas Cenzer and **Diego A. Rojas***, University of Florida (1125-03-2766)

3:00PM *Graphical Properties of the Partially*
► (1130) *Ordered Set Derived from Spec(Z[x]) 0.*
Christina Eubanks Turner, Loyola
Marymount University, and **Aihua
Li***, Montclair State University
(1125-06-2738)

3:15PM *The Surreal Exponential and*
(1131) *Order-Reversing Maps between
Well-Ordered Set.* Preliminary report.
Harry Altman, University of Michigan
(1125-06-2973)

3:30PM *Constructing Demazure Flags and the*
(1132) *Combinatorics Involved.*
Jeffrey O Wand, Gonzaga University
(1125-08-1634)

AMS Contributed Paper Session on Operator Theory, II

1:00 PM – 3:55 PM   **International B, International
Level, Marriott Marquis**

1:00PM *Invariant subspaces for triangular*
(1133) *algebras in Schatten p-classes.*
Lauren Sager, University of New
Hampshire (1125-47-1910)

1:15PM *Essential Norm of Weighted Composition*
(1134) *Operators on Bargmann-Fock Spaces.*
Waleed K. Al-Rawashdeh, Montana Tech
(1125-47-2024)

1:30PM *Ergodic Properties of Markov operator*
(1135) *sequences on KB-spaces.* Preliminary
report.
Nazife Erkursun Ozcan, Hacettepe
University (1125-47-2318)

1:45PM *Numerical Range of Partial Isometries.*
(1136) **Jaedeok Kim*** and **Youngmi
Kim**, Jacksonville State University
(1125-47-2408)

2:00PM *On the Uniqueness of Topological*
(1137) *Degrees for Densely Defined Mappings
Involving Variants of (S_+) Operators.*
Preliminary report.
Dhruba R. Adhikari, Kennesaw State
University (1125-47-2451)

2:15PM *Inequalities of Hardy-Littlewood-Polya*
► (1138) *type for functions of operators and their
applications.*
Yuliya Babenko*, Kennesaw State
University, Marietta, Georgia, **Vladyslav
Babenko** and **Nadiia Kriachko**,
Dnepropetrovsk National University,
Ukraine (1125-47-2453)

2:30PM *Boundary Conditions associated with the*
(1139) *Left–Definite Theory for Differential
Operators.* Preliminary report.
Dale Frymark* and **Constanze Liaw**,
Baylor University (1125-47-2455)

2:45PM *Spectrum of hypercyclic operators.*
► (1140) **Gokul R Kadel**, Cameron University
(1125-47-2520)

3:00PM *Permanence Properties of Exact*
(1141) *Groupoids.* Preliminary report.
Scott M LaLonde, The University of
Texas at Tyler (1125-47-2697)

3:15PM *Core C^*-algebras of an operator space.*
(1142) **Masayoshi Kaneda**, American University
of Kuwait (1125-47-2734)

3:30PM *Estimates for the Corona Theorem on*
(1143) $H_{\mathbb{I}}^{\infty}(\mathbb{D})..$
Debendra P Banjade, Coastal Carolina
University (1125-47-2860)

3:45PM *On The Numerical Range of the $C_\phi C_\psi^*$.*
► (1144) Preliminary report.
Michael G Dabkowski*, Lawrence
Technological University, and **John H.
Clifford**, University of Michigan-
Dearborn (1125-47-3015)

AMS Contributed Paper Session on Topology and Manifolds, II

1:00 PM – 3:55 PM   **International 1, International
Level, Marriott Marquis**

1:00PM *4-dimensional analogues of Dehn's*
(1145) *lemma.*
Arunima Ray* and **Daniel Ruberman**,
Brandeis University (1125-57-445)

1:15PM *Virtual Knots and the Multi-variable*
(1146) *Alexander Polynomial of Boundary Links
in the 3-Sphere.* Preliminary report.
Micah Chrisman*, Monmouth University,
and **Robert Todd**, Mount Mercy
University (1125-57-448)

1:30PM *Computing the Turaev genus of a link.*
(1147) **Adam Lowrance**, Vassar College
(1125-57-784)

1:45PM *Seiberg-Witten Invariants, Alexander*
(1148) *Polynomials, and Fibred Classes.*
Oliver J Thistlethwaite, University of
Tennessee (1125-57-1003)

2:00PM *When is a sphere quotient a sphere? And*
(1149) *an application to invariant theory.*
Ben Blum-Smith, Courant Institute of
Mathematical Sciences (1125-57-1491)

2:15PM *Constructions of new Lefschetz fibrations*
(1150) *using cyclic group actions.* Preliminary
report.
Anar Akhmedov and **Nur Saglam***,
University of Minnesota (1125-57-1557)

2:30PM *To what extent does the knotting*
► (1151) *of open subarcs of a closed knot
configuration predict the knot type of the
configuration?* Preliminary report.
Emily K. Vecchia, University of St.
Thomas (1125-57-1994)

2:45PM *Knotting Transitions in Tight Knots.*
► (1152) Preliminary report.
Oliver J O'Keefe, University of St.
Thomas (1125-57-1995)

3:00PM *An alternative notion of symplectic*
(1153) *4-manifolds of general type.* Preliminary
report.
Kin Hei A. Mak, University of Virginia
(1125-57-2070)

3:15PM *Patterns and Stability in the Colored*
(1154) *Jones Polynomial.*
Katherine Walsh, University of Arizona
(1125-57-2200)

3:30PM ► (1155) *Extending a result of Nazir and Yoshinaga to distinguish more interesting hyperplane arrangements.* Preliminary report.
Moshe Cohen*, Vassar College, and **Elía Saini**, University of Fribourg (1125-57-2336)

3:45PM (1156) *The prism manifold realization problem.* **William Ballinger**, **Ching-Yun Hsu**, California Institute of Technology, **Wyatt Mackey**, Harvard University, **Yi Ni**, **Tynan Ochse** and **Faramarz Vafaee***, California Institute of Technology (1125-57-3070)

AMS Contributed Paper Session on Undergraduate Research, III

1:00 PM – 4:10 PM   International A, International Level, Marriott Marquis

1:00PM ► (1157) *Symmetries of Graphs in Homology Spheres.* **Song Yu**, Pomona College (1125-54-234)

1:15PM ► (1158) *Topological Modeling of Force Networks in Granular Media.* Preliminary report. **David B Damiano** and **Emily T Winn***, College of the Holy Cross (1125-54-1333)

1:30PM ► (1159) *A Topological Analysis of Retinal Vasculature.* Preliminary report. **Sarah J. Tymochko*** and **David B. Damiano**, College of the Holy Cross (1125-54-2550)

1:45PM ► (1160) *Computational Topology in Texture Classification.* **Victoria R. Gerardi***, **Sarah Day** and **Yu-Min Chung**, College of William and Mary (1125-55-2307)

2:00PM ► (1161) *Random Unit Bar and Unit Square Visibility.* Preliminary report. **Jiarui Chu*** and **Laurie Heyer**, Davidson College (1125-60-2351)

2:15PM ► (1162) *Sovereign Adaptive Risk Modeling.* **Morgan G Escalera**, Rose-Hulman Institute of Technology (1125-62-1214)

2:30PM ► (1163) *De-identification through re-identification: using high-dimensional distance to mitigate statistical disclosure.* **John P Higgins**, Virginia Tech (1125-62-2054)

2:45PM ► (1164) *How do characteristics of police departments impact crime?* Preliminary report. **Alexandra Dwyer*** and **Rachel Strow**, Muhlenberg College (1125-62-2127)

3:00PM ► (1165) *Green Math: Models of Greenhouse Gasses.* **Morgan E Engle*** and **Penny Phan**, Southwestern University (1125-62-2289)

3:15PM ► (1166) *A Bayesian Approach to Predicting the Outcome of Endovenous Laser Ablation.* **Steve Chung**, California State University, Fresno, **Aaron Pinkerton**, Sterling College, **Hunter Rehm**, University of Wisconsin - La Crosse, and **Michelle Yu***, College of the Holy Cross (1125-62-2323)

3:30PM ► (1167) *An Examination of the Relationship between Financial Characteristics and Portfolio Performance.* Preliminary report. **Eva Gjekmarkaj*** and **Jessica Lynn Perry**, Smith College (1125-62-2502)

3:45PM (1168) *Nonparametric Multiple Comparisons Using Log Odds of the Relative Effects.* Preliminary report. **Riley S Abel*** and **Kimihiro Noguchi**, Western Washington University (1125-62-2637)

4:00PM ► (1169) *Studying the Traveling Salesman Problem.* **Clarissa Tahnise McMillar**, The University of Texas of the Permian Basin (1125-90-1555)

MAA Session on Humanistic Mathematics, II

1:00 PM – 3:35 PM   Embassy C, International Tower, LL2, Hyatt Regency

Organizers: **Gizem Karaali**, Pomona College

Eric S. Marland, Appalachian State University

1:00PM ► (1170) *The Mathematical Art: A course for beginning artists.* Preliminary report. **James M Henle**, Smith College (1125-D1-3124)

1:20PM ► (1171) *Mathematical Computer Doodles.* **Albert W Schueller**, Whitman College (1125-D1-1351)

1:40PM ► (1172) *Very Special Functions: Perspectives of Generalized Trigonometry.* **William Wood**, University of Northern Iowa (1125-D1-1088)

2:00PM ► (1173) *Math Teaching Stories from the Kingdom of the Sick.* **Debra K. Borkovitz**, Wheelock College (1125-D1-2581)

2:20PM (1174) *Facilitating Student Self-Direction in Learning Mathematics.* **Diana B. McGinnis**, Georgia State University, Perimeter College (1125-D1-1483)

2:40PM ► (1175) *Mathematics Intersecting with Other Modern World Ideas: 1850-1950.* Preliminary report. **Mike Pinter**, Belmont University (1125-D1-461)

3:00PM ► (1176) *Mathematics beyond Mathematics: Uses and Abuses.* Preliminary report. **Kira Hylton Hamman**, Penn State Mont Alto (1125-D1-2839)

3:20PM ► (1177) *Mathematics beyond Mathematics: Uses and Abuses (Part II).* Preliminary report. **David L Neel**, Seattle University (1125-D1-3104)

MAA Session on Innovative Strategies to Inspire & Prepare Potential STEM Majors Who are Not Yet Ready for Calculus, I

1:00 PM – 3:55 PM   **Embassy A, International Tower, LL2, Hyatt Regency**

Organizers: **Suzanne I Doree**, Augsburg College

Rebecca Hartzler, Seattle Central College

Michael Oehrtman, Oklahoma State University

Frank Savina, University of Texas at Austin

1:00PM *STEM Women Majors: A Path to Success.*
▶ (1178) **Junalyn P. Navarra-Madsen**, Texas Woman's University (1125-F1-3113)

1:20PM *Prepare Potential STEM Majors Who Are Not Yet Ready for Calculus Sequence.*
▶ (1179) Preliminary report.
Margaret H. Dean, **Yi Han** and **Fatima Prioleau***, Department of Mathematics, BMCC, The City University of New York (1125-F1-1967)

1:40PM *Hit the Ground Running: A Summer Bridge to Success at Missouri S&T.*
(1180) **Paul N Runnion*** and **Barbara Wilkins**, Missouri University of Science and Technology (1125-F1-453)

2:00PM *Calculus with Integrated Precalculus for Underprepared STEM Majors.* Preliminary report.
▶ (1181) **Ellen J Goldstein**, Boston College (1125-F1-932)

2:20PM *Two Approaches to Precalculus.*
▶ (1182) Preliminary report.
Cathy W Grilli* and **Andrew Diener**, Christian Brothers University (1125-F1-2806)

2:40PM *Building and Sustaining Success in Pre-calculus Through a Multi-Pronged Approach.*
▶ (1183) **Sharon Lanaghan*** and **Matthew G Jones**, California State University Dominguez Hills (1125-F1-385)

3:00PM *Preparing students to succeed in Calculus through adaptive instructional approach.*
(1184) **Rachid Ait Maalem Lahcen*** and **R. N. Mohapatra**, University of Central Florida (1125-F1-3057)

3:20PM *Impact of an Online Bridge Program for Preparedness for Quantitative Reasoning.* Preliminary report.
▶ (1185) **James S Rolf*** and **John Hall**, Yale University (1125-F1-2989)

3:40PM *To Work or Not To Work: Understanding How Natural Work Habits Can Help or Hurt Students in Self-Paced Courses.*
(1186) **Khushikumari Patel-Desai***, Clemson Univeristy, **Eliza Dargan Gallagher**, **Claire L.A. Dancz**, **Jeffery M. Plumblee II** and **Charity N. Watson**, Clemson University (1125-F1-1786)

MAA Session on Mathematical Technology in the Calculus Classroom, II

1:00 PM – 3:55 PM   **Courtland, Conference Level, Hyatt Regency**

Organizers: **Joel Kilty**, Centre College
Alex M. McAllister

1:00PM *Building and Using GeoGebra Books in Calculus.* Preliminary report.
▶ (1187) **Mike May**, Saint Louis University (1125-H5-181)

1:20PM *Learning Calculus Concepts with Desmos – In and Out of the Classroom.*
▶ (1188) **Mel Henriksen**, Wentworth Institute of Technology (1125-H5-2111)

1:40PM *A Surprising Use of Technology to Find Leaf Area.*
▶ (1189) **Jody Sorensen**, Augsburg College (1125-H5-2727)

2:00PM *Desmos Calculator and SageMath Cell Server in Calculus.*
▶ (1190) **D Scott Dillery**, Lindsey Wilson College (1125-H5-2139)

2:20PM *Teaching and learning mathematics in the AR/VR environment.*
▶ (1191) **Alexander Y Vaninsky**, City University of New York / Hostos Community College (1125-H5-167)

2:40PM *Using Videos to Augment In-Class Instruction.* Preliminary report.
(1192) **Darrin Weber**, The University of Tennessee, Knoxville (1125-H5-1990)

3:00PM *Analyzing Student Usage of Online Video Lectures in a Flipped Calculus Course.* Preliminary report.
▶ (1193) **Ross Sweet**, Northwestern University (1125-H5-1692)

3:20PM *Flip-mastery learning in applied calculus.* Preliminary report.
(1194) **Neal Coleman**, Allstate Insurance, **Christopher Judge**, **Deniz Kutluay**, Indiana University, **Ranjan Rohatgi***, Saint Mary's College, **David Sprunger**, **Zhixu Su** and **Tristan Tager**, Indiana University (1125-H5-2314)

3:40PM *Promoting Mathematical Proficiency with Technology and Structured Inquiry in Calculus I.* Preliminary report.
▶ (1195) **Nicole R Juersivich**, Nazareth College (1125-H5-1390)

MAA Session on Mathematics and Sports, II

1:00 PM – 3:55 PM   **Regency Ballroom V, Ballroom Level, Hyatt Regency**

Organizers: **John David**, Virginia Military Institute
Drew Pasteur, College of Wooster

1:00PM *Poor Man's Total Quarterback Rating.*
▶ (1196) **John David**, Virginia Military Institute (1125-I5-1402)

1:20PM ▸ (1197) *Markov Chain Models of NFL Overtime Rules.*
Megan Olivia Powell, University of St. Francis (1125-I5-969)

1:40PM ▸ (1198) *Quantifying the causal effects of conservative fourth down decision making in the National Football League.* Preliminary report.
Derrick R. Yam* and **Michael J. Lopez**, Skidmore College (1125-I5-3004)

2:00PM ▸ (1199) *Statistics of a Proposed Mercy Rule in College Football to Reduce Major Injuries.* Preliminary report.
Reza O Abbasian*, **Kareem K Christmas** and **John T Sieben**, Texas Lutheran University (1125-I5-405)

2:20PM ▸ (1200) *The Newest Football Statistics and Football Analytics Research.*
Andrew B Perry, Springfield College (MA) (1125-I5-1565)

2:40PM ▸ (1201) *Expected Points in Appalachian State Football.*
Mark C Ginn*, **Madison Combs**, **Amanda Lake Heath** and **Zachary Snipes**, Appalachian State University (1125-I5-2378)

3:00PM ▸ (1202) *Skill and Randomness on the PGA Tour.*
Roland Minton, Roanoke College (1125-I5-980)

3:20PM ▸ (1203) *An Analysis of 3 point shooting in the NBA, NCAA, and Olympics.* Preliminary report.
Michael A. Furuto, University of Hawai'i - West O'ahu (1125-I5-3048)

3:40PM ▸ (1204) *A theoretical approach for generating linear theorems to predict winning percentages for the teams in the mlb, nfl, nba and nhl at any point in a season.*
Stanley Rothman* and **Alexander Everett**, Quinnipiac University (1125-I5-84)

MAA Session on Mathematics and the Arts, IV

1:00 PM – 2:55 PM   International 7, International Level, Marriott Marquis

Organizer: **Douglas Norton**, Villanova University

1:00PM ▸ (1205) *Bragdon and Trautmann's Math at the MAG.* Preliminary report.
Cheri L Boyd, Nazareth College (1125-I1-3056)

1:20PM ▸ (1206) *Barcelona Through the Looking Glass: A travel seminar on Mathematics, Architecture, and Detective Fiction.*
Michael Sebastian Gagliardo* and **Rafaela Fiore-Urizar**, California Lutheran University (1125-I1-2523)

1:40PM (1207) *Incorporating the Arts in a Mathematics Classroom.*
Felicia Y. Tabing, Rose-Hulman Institute of Technology (1125-I1-3043)

2:00PM ▸ (1208) *The effects of altitude sickness on mathematical cognition.*
Luke Wolcott, University of Southern California (1125-I1-1270)

2:20PM ▸ (1209) *Teaching a Mathematics and Digital Art Course.*
Vincent J. Matsko, University of San Francisco (1125-I1-931)

2:40PM ▸ (1210) *Digital Graphic Calculus Art Design in Maple Software.* Preliminary report.
Lina Wu, Borough of Manhattan Community College-The City University of New York (1125-I1-368)

MAA Session on Methods of Engaging Math Learners with Physical Impairments

1:00 PM – 3:35 PM   A701, Atrium Level, Marriott Marquis

Organizers: **Rebekah Gilbert**, George Mason University

Steven Schluchter, George Mason University

1:00PM ▸ (1211) *Resources for teaching math students with physical impairments.* Preliminary report.
Rebekah Ann Gilbert, George Mason University (1125-K1-1497)

1:20PM ▸ (1212) *"Teaching Mathematics to Deaf and Hard of Hearing Students in a Mainstream Setting: Tips, Tricks, and Strategies for Success".*
Gary C Blatto-Vallee, Rochester Institute of Technology/National Technical Institute for the Deaf (1125-K1-2970)

1:40PM (1213) *Improving Math Accessibility with MyMathLab.*
Heijung Kim, Pearson (1125-K1-3077)

2:00PM ▸ (1214) *Communicating Mathematics Independent of Vision.* Preliminary report.
Robert O. Shelton, NASA Johnson Space Center (1125-K1-1977)

2:20PM ▸ (1215) *Making Real Analysis Accessible to the Visually Impaired - One Example.*
Kathryn J Montovan, Bennington College (1125-K1-2410)

2:40PM ▸ (1216) *On being a scribe for a blind math student.* Preliminary report.
Stephen Liddle, George Mason University (1125-K1-2074)

3:00PM ▸ (1217) *3D Mathematical Models For the Blind.*
Julia R Sykora* and **Allison K Young**, Southwestern University, '16 (1125-K1-2110)

3:20PM ▸ (1218) *3D-technological methods for teaching 2D-graphing to a blind student: a case study.* Preliminary report.
Evelyn Sander, George Mason University (1125-K1-696)

MAA Session on Proofs and Mathematical Reasoning in the First Two Years of College, II

1:00 PM – 3:15 PM   A702, Atrium Level, Marriott Marquis

Organizers: **Dean Gooch**, Santa Rosa Junior College

Chris Oehrlein, Oklahoma City Community College

Joanne Peeples, El Paso Community College

1:00PM   *Tackling Intro to Proofs at CU Boulder.*
(1219)   **T. Alden Gassert**, Western New England University (1125-M5-2515)

1:20PM   *Integrating "Introduction to Proofs" into*
▶ (1220)   *Linear Algebra.* Preliminary report. **Jacquelyn L Rische**, Hamilton College (1125-M5-1149)

1:40PM   *Standards-based grading and other*
(1221)   *experiences in a first proofs course.* **Katherine E Stange**, University of Colorado Boulder (1125-M5-749)

2:00PM   *On the denesting of nested square roots.*
▶ (1222)   **Eleftherios Gkioulekas**, University of Texas Rio Grande Valley (1125-M5-147)

2:20PM   *A student-friendly proof of the density of*
(1223)   *rationals.* **Livinus U Uko**, Georgia Gwinnett College (1125-M5-2642)

2:40PM   *An online smart, interactive,*
▶ (1224)   *collaborative, multilingual database of mathematical theorems and proofs.* **Luis Valero-Elizondo*** and **Karina Mariela Figueroa-Mora**, Universidad Michoacana, Mexico (1125-M5-586)

3:00PM   *Intriguing Problems for Students in a*
▶ (1225)   *Proofs Class.* **Igor Vladimirovich Minevich**, Boston College (1125-M5-769)

MAA Session on Research in Undergraduate Mathematics Education (RUME), II

1:00 PM – 3:50 PM   A706, Atrium Level, Marriott Marquis

Organizers: **Karen Keene**, North Carolina State University

Megan Wawro, Virginia Tech

1:00PM   *Supporting Instructional Change: The*
(1226)   *TIMES Project.* **Christine Andrews-Larson***, Florida State University, **Karen Keene**, North Carolina State University, and **Estrella Johnson**, Virginia Tech (1125-N1-1708)

1:20PM   *Supporting Instructional Change: The*
▶ (1227)   *"Discovering the Art of Mathematics" Project.* **Christine von Renesse*** and **Phil Hotchkiss**, Westfield State University, MA (1125-N1-1775)

1:40PM   *Supporting Instructional Change: The*
▶ (1228)   *Raising Calculus to the Surface Project.* **Aaron D Wangberg***, Winona State University, **Brian Fisher**, Lubbock Christian University, **Jason Samuels**, City University of New York - BMCC, **Tisha Hooks**, Winona State University, and **Elizabeth Gire**, Oregon State University (1125-N1-2483)

2:00PM   *Optimization: Assessing Student*
▶ (1229)   *Understanding in an Inquiry Calculus Course.* **Mairead Greene**, Rockhurst University (1125-N1-1891)

2:20PM   *Exploring Experts' Thinking in Graphing*
(1230)   *Dynamic Situations.* **Natalie LF Hobson***, University of Georgia, and **Kevin C Moore**, University or Georgia (1125-N1-1314)

2:40PM   *One College Student's Decision-Making in*
▶ (1231)   *Selecting Proof Methods in Proof Construction.* Preliminary report. **Hyejin Park**, University of Georgia (1125-N1-2658)

3:00PM   *Teacher questioning in advanced*
▶ (1232)   *mathematics lectures.* **Keith Weber***, Rutgers University, **Teo Paoletti**, Montclair State University, **Dimitri Papadopoulos**, Drexel University, **Victoria Krupnik**, **Joe Olsen**, Rutgers University, and **Timothy Fukawa-Connelly**, Temple University (1125-N1-2047)

3:20PM   *Invited Talk: Students' Meanings of a*
▶ (1233)   *(Potentially) Powerful Generalized Representation in a Combinatorial Setting.* **Elise Lockwood*** and **Zackery Reed**, Oregon State University (1125-N1-1274)

MAA Session on Successful Implementation of Innovative Models for Developmental and General Education Mathematics, I

1:00 PM – 3:55 PM   International 2, International Level, Marriott Marquis

Organizers: **Tom Hagedorn**, The College of New Jersey

Christina H. Lee, Oxford College of Emory University

Phil Mahler, Middlesex Community College

Christopher Oehrlein, Oklahoma City Community College

1:00PM   *Developmental Math Students'*
▶ (1234)   *Dispositions Towards Mathematics.* **Wes Maciejewski**, San Jose State University (1125-O5-2414)

1:20PM *Bridging Developmental Mathematics*
▶ (1235) *with College Algebra: A Study Using ALEKS and Homework Time Requirement.* **Alfred Dahma**, **Timothy B. Flowers*** and **Yuliya Melnikova**, Indiana University of Pennsylvania (1125-O5-2699)

1:40PM *Curriculum Innovations for*
(1236) *Developmental Mathematics: Introductory Statistics with Algebra Workshops.* **Jean W. Richard***, **Daniela Bardac-Vlada**, **Susan Licwinko**, **Lucio M-G Prado** and **Bettina Hansel**, BMCC, The City University of New York (1125-O5-2729)

2:00PM *Design and Implementation of*
(1237) *Corequisite Model in a Freshman Level Quantitative Reasoning Course.* **Upasana Kashyap*** and **Santhosh Mathew**, Regis College (1125-O5-667)

2:20PM *EdReady: A Low Stakes Alternative to*
▶ (1238) *Placement Testing.* **Jan Orton Case**, Jacksonville State University (1125-O5-1257)

2:40PM *Quantitative Literacy for Non-Math*
▶ (1239) *Faculty: Challenges and Solutions.* Preliminary report. **McKenzie Lamb**, Ripon College (1125-O5-2634)

3:00PM *The Redesign of Precalculus at Clemson*
▶ (1240) *University.* **Charity Watson*** and **Eliza Gallagher**, Clemson University (1125-O5-2842)

3:20PM *Survivor Math - Incorporating a*
▶ (1241) *Semester-Long Research Project in Environmental Sustainability into an Introduction to Mathematics General Education Course.* **Peter G Hardy**, University of Maine at Farmington (1125-O5-1938)

3:40PM *Projects in geometry for design students.*
▶ (1242) **Rachel Maitra**, Wentworth Institute of Technology (1125-O5-2927)

MAA General Contributed Paper Session on Applied Mathematics, II

1:00 PM – 4:10 PM   Piedmont, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

1:00PM *An undergraduate uses O.R. to improve*
▶ (1243) *her university's final exam schedules.* **Danielle Sienko**, **Paul Ache**, **Yun Lu***, **Francis Vasko** and **Ted Witryk**, Kutztown University (1125-VC-1942)

1:15PM *Using continued fractions with*
▶ (1244) *logarithmic basis functions to overcome singular points via a nonlinear one-step method.* Preliminary report. **Ramanjit K. Sahi***, **Chenchutta D. Jackson** and **Samuel N. Jator**, Austin Peay State University (1125-VC-1827)

1:30PM *Hybrid Optimization for Mixed-Integer*
(1245) *Nonlinear Problems via a Genetic Algorithm and Implicit Filtering.* **Benjamin D Ritz**, Clarkson University Department of Mathematics (1125-VC-1847)

1:45PM *Accelerating stochastic collocation*
(1246) *methods for PDEs with random coefficients.* **Peter Jantsch**, University of Tennessee, Knoxville (1125-VC-1932)

2:00PM *Coexistence conditions for nonlinear*
▶ (1247) *reaction-diffusion population models.* **Timothy Robertson*** and **Joon Hyuk Kang**, Andrews University (1125-VC-2558)

2:15PM *High-Order Adaptive Extended Stencil*
(1248) *Finite Element Method (AES-FEM) on Tangled Meshes.* Preliminary report. **Rebecca C Conley***, Saint Peter's University, **Tristan J Delaney** and **Xiangmin Jiao**, Stony Brook University (1125-VC-1992)

2:30PM *Existence of Solutions for semilinear*
(1249) *problems with prescribed number of zeros on exterior domains.* **Janak R. Joshi*** and **Joseph Iaia**, University of North Texas (1125-VC-2017)

2:45PM *War-Gaming Applications for Achieving*
▶ (1250) *Optimum Acquisition of Future Space Systems.* **Karel Marshall**, Andrews University, **Paul Vienhage***, Emory University, **Heather Barcomb**, SUNY Geneseo, and **William A. Black**, Lehigh University (1125-VC-2043)

3:00PM *Cleaner Air Through Parallelized*
▶ (1251) *Simulations of Novel Mathematical Models of Gas-Surface Interactions.* **Mary Barker**, Tarleton State University (1125-VC-2084)

3:15PM *Neural codes, undecidability, and a new*
▶ (1252) *class of local obstructions.* **Aaron H Chen**, Cornell University (1125-VC-2154)

3:30PM *Pricing of boundary-linked assets by*
(1253) *stochastic boundary value problems by using a new adaptive multiple shooting methods.* **Davood Damircheli**, Mississippi State University (1125-VC-2178)

3:45PM *Spectral Singularities of the Impulsive*
(1254) *Difference Equations.* Preliminary report. **Serifenur Cebesoy**, Ankara University/ TURKEY (1125-VC-2264)

4:00PM *The Effectively Linear Behavior of the*
(1255) *Nonlinear Schrödinger Equation.*
Katelyn Leisman*, **Gregor Kovacic**,
Rensselaer Polytechnic Institute,
and **David Cai**, Courant Institute of
Mathematical Sciences, NYU;
Shanghai Jiao Tong University, China
(1125-VC-1971)

MAA General Contributed Paper Session on Linear Algebra

1:00 PM – 3:25 PM   **Roswell, Conference**
                                        Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena
College

Kimberly Presser,
Shippensburg University

Melvin Royer, Indiana
Wesleyan University

▶ **1:00PM** *Factorization Properties of Graph*
(1256) *Correspondences.*
Rene Ardila, University of Iowa
(1125-VI-154)

1:15PM *Combined Matrices of sign regular*
(1257) *matrices.*
Máximo De Jesús Santana*, Full time
professor/ Universidad Autónoma de
Santo Domingo, **Rafael Bru**, **María
Teresa Gassó** and **Isabel Giménez**,
València, Spain (1125-VI-470)

1:30PM *Zero-Sum Coefficient Derivations in Three*
(1258) *Variables of Triangular Algebras.*
Youngsoo Kim* and **Byunghoon Lee**,
Tuskegee University, Tuskegee, AL
(1125-VI-937)

1:45PM *Envelopes that bound the spectrum of a*
(1259) *matrix.*
Göran Bergqvist, Linköping University
(1125-VI-1138)

2:00PM *Tangent Bundle Algorithms for*
(1260) *Averaging Point Clouds on Grassmann*
and Stiefel Manifolds.
Justin D Marks, Gonzaga University
(1125-VI-3136)

▶ **2:15PM** *Wow Them: Achieve the Maximum Error*
(1261) *in Ill-Conditioned Systems.*
J Donato Fortin, Johnson & Wales
University - Charlotte (1125-VI-2335)

2:30PM *Implementation of Nested Dissection*
(1262) *Method Using Block Elimination.*
Hashim A Saber, University of North
Georgia (1125-VI-2961)

2:45PM *A Criterion for Normality.* Preliminary
(1263) report.
Cara D. Brooks* and **Alberto A.
Condori**, Florida Gulf Coast University
(1125-VI-2955)

▶ **3:00PM** *Generalized Cyclotomic Polynomials and*
(1264) *Projective Order.* Preliminary report.
Joshua Boone, Lincoln Memorial
University (1125-VI-2512)

▶ **3:15PM** *Mathematical Rankings of an FBI Drug*
(1265) *Ring.*
Laurie Zack, High Point University
(1125-VI-1844)

MAA General Contributed Paper Session on Probability and Statistics, II

1:00 PM – 4:10 PM   **Baker, Conference**
                                        Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena
College

Kimberly Presser,
Shippensburg University

Melvin Royer, Indiana
Wesleyan University

▶ **1:00PM** *Racial and Gender Disparities in*
(1266) *Incidence of Lung and Bronchus Cancer*
in the United States: A Longitudinal
Analysis.
Jean-Jacques Kengwoung-Keumo,
Cameron University, Lawton, Oklahoma
(1125-VP-1260)

▶ **1:15PM** *Predicting Internet Domain Popularity.*
(1267) **Erica Maciejewski**, Arlington, VA
(1125-VP-1332)

▶ **1:30PM** *Stable Quasi-Birth-Death Processes with*
(1268) *Time-varying Periodic Transition*
Rates are Asymptotically Geometric.
Preliminary report.
Barbara Margolius, Cleveland State
University (1125-VP-1408)

1:45PM *n-digit Benford converges to Benford.*
(1269) **Azar Khosravani*** and **Constantin
Rasinariu**, Columbia College Chicago
(1125-VP-1413)

▶ **2:00PM** *Pseudo-Likelihood Estimates and*
(1270) *Bootstrap Confidence Intervals for the*
Mean of Zero-Inflated Population.
Khyam Paneru* and **Robert N Padgett**,
Department of Mathematics, University of
Wisconsin-Whitewater (1125-VP-1630)

▶ **2:15PM** *Differential Equation model for carbon*
(1271) *dioxide emission.* Preliminary report.
Netra P Khanal, The University of Tampa
(1125-VP-1707)

▶ **2:30PM** *Mathematics and Disparate Discipline*
(1272) *Cases in the Office for Civil Rights.*
Shandy Hauk, WestEd (1125-VP-1646)

2:45PM *Using Curriculum Infusion to Impact a*
(1273) *Probability and Statistics Course.*
Andrew Lazowski, Sacred Heart
University (1125-VP-1867)

3:00PM *Smoothing Splines on Unit Ball Domains*
(1274) *with Application to Corneal Topography.*
Farzana Nasrin*, **Ram Iyer**, **Eltonzsee
See**, Department of Mathematics and
Statistics, Texas Tech University, and
Steven Mathews, West Texas Eye
Associates (1125-VP-1982)

▶ **3:15PM** *A New family of continuous distributions.*
(1275) **Ahmad Alzaghal**, State University of New
York at Oswego (1125-VP-2174)

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3:30PM ▶ (1276) *Modeling Hurricanes using Exploratory Factor Analysis in conjunction with Non-Response Analysis and Logistic Regression.*
Joy M D'Andrea, University of South Florida Sarasota-Manatee (1125-VP-2271)

3:45PM (1277) *The Use of Non-Canonical Link Functions in Generalized Linear Models.*
Mehdi Razzaghi, Bloomsburg University (1125-VP-2420)

4:00PM (1278) *Bayesian Method for Histogram Smoothing.*
Bhikhari P Tharu, Spelman College, Atlanta, GA (1125-VP-1651)

MAA General Contributed Paper Session on Teaching and Learning Advanced Mathematics

1:00 PM – 4:10 PM **Kennesaw, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University
Melvin Royer, Indiana Wesleyan University

1:00PM Break

1:15PM ▶ (1279) *A Writing Assignment in a Complex Analysis Course.*
Samer S. Habre, Lebanese American University (1125-VS-797)

1:30PM ▶ (1280) *Essential statistics for mathematics majors.* Preliminary report.
Javad Namazi, Fairleigh Dickinson University (1125-VS-884)

1:45PM Break

2:00PM ▶ (1281) *Cryptography: Decoding Student Learning.*
Blain Anthony Patterson, North Carolina State University (1125-VS-2160)

2:15PM ▶ (1282) *Medieval India's Solution to the Pell Equation as a Classroom Project.*
Toke L Knudsen* and **Keith M Jones**, State University of New York at Oneonta (1125-VS-2167)

2:30PM (1283) *Teaching research skills in undergraduate mathematics courses.*
Elizabeth Niese, Marshall University (1125-VS-2519)

2:45PM ▶ (1284) *Point Reward System (PRS) - A New (R)evolutionary Learning Assessment Method.* Preliminary report.
Josip Derado* and **Mary L Garner**, Kennesaw State University (1125-VS-2438)

3:00PM ▶ (1285) *Promoting Metacognition in an Over-easy Geometry Classroom.*
Tessa F Weinstein, Morningside College (1125-VS-2466)

3:15PM ▶ (1286) *Inverting the Advanced Calculus and Abstract Algebra Classrooms.*
Randy Combs, West Texas A and M University (1125-VS-2760)

3:30PM Break

3:45PM (1287) *Foregrounding the Background: Two Uses of Coordinate Systems.*
Hwa Young Lee* and **Hamilton Lee Hardison**, University of Georgia (1125-VS-2248)

4:00PM ▶ (1288) *Closing a cycle by helping develop the next generation of African problem solvers.*
Michael Obiero Oyengo*, University of Illinois at Urbana Champaign, and **David A. Stern**, University of Reading (1125-VS-3087)

SIAM Minisymposium on Topics in Analysis and Numerical Methods for Collisional Kinetic Equations

1:00 PM – 3:55 PM **A703, Atrium Level, Marriott Marquis**

Organizers: **Ricardo Alonso**, Pontifical Catholic University of Rio de Janeiro
Irene M. Gamba, The University of Texas at Austin
Robert Strain, University of Pennsylvania

1:00PM (1289) *A fast spectral method for the Boltzmann collision operator with general collision kernels.*
Jingwei Hu, Purdue University (1125-35-1907)

1:30PM (1290) *Quantum kinetic problems.*
Minh-Binh Tran, University of Wisconsin at Madison (1125-45-1901)

2:00PM (1291) *Measure Valued Solutions to the Boltzmann Equation.*
Tong Yang, City University of Hong Kong, China (1125-82-1868)

2:30PM (1292) *On the Musket problem.*
Robert Strain, University of Pennsylvania (1125-35-3146)

3:00PM (1293) *One dimensional dissipative Boltzmann equation.*
Ricardo J Alonso, PUC-Rio, Rio de Janeiro, Brazil (1125-45-1888)

3:30PM (1294) *Global Classical Solutions of the Vlasov-Maxwell-Fokker-Planck System.*
Stephen Pankavich, Colorado School of Mines (1125-35-2146)

MAA Workshop

1:00 PM – 2:20 PM **M304, Marquis Level, Marriott Marquis**

Implementing and Orchestrating Active Learning Strategies in Calculus

Organizers: **Debbie Gochenaur**, Shippensburg University
Larissa B. Schroeder, University of Hartford

MAA Panel

1:00 PM – 2:20 PM **International 5, International Level, Marriott Marquis**

Perspectives on Inquiry Based Learning: Novice, Experienced, and Master

Organizers: **Judith Covington**, Louisiana State University in Shreveport

Theron J. Hitchman, University of Northern Iowa

Angie Hodge, University of Nebraska Omaha

Brian Katz, Augustana College

Alison Marr, Southwestern University

Victor Piercey, Southwestern University

Panelists: **Susan Crook**, Loras College

Theron J. Hitchman, University of Northern Iowa

Carol Schumacher, Kenyon College

Joint Committee on Women Panel Discussion

1:00 PM – 2:30 PM **A704, Atrium Level, Marriott Marquis**

From Calculus to a Bachelor's Degree: Encouraging and Developing Undergraduate Mathematics Majors

Organizer: **Jenna P. Carpenter**, Campbell University

Panelists: **Alison Henrich**, Seattle University

Sylvia Bozeman, Spelman, Infinite Possibilities

Federico Ardila, San Francisco State University

Christine Kelley, University of Nebraska-Lincoln

AMS and SIAM Committees on Education Joint Panel Discussion

1:00 PM – 2:30 PM **A601, Atrium Level, Marriott Marquis**

Broadening Research Experiences for Doctoral Students in the Mathematical Sciences

Organizers: **Loek Helminck**, North Carolina State University

Rachel Levy, Harvey Mudd College

Douglas Mupasiri, University of Northern Iowa

Suzanne L. Weekes, Worcester Polytechnic Institute

Moderator: **Suzanne L. Weekes**, Worcester Polytechnic Institute

Panelists: **Richard Laugesen**, University of Illinois at Urbana-Champaign

Stephen Pankavich, Colorado School of Mines

Dan Spirn, Institute for Mathematics and its Applications

John Zweck, University of Texas-Dallas

Summer Program for Women in Mathematics (SPWM) Reunion

1:00 PM – 3:00 PM **A707, Atrium Level, Marriott Marquis**

MAA Poster Session on Projects Supported by the NSF Division of Undergraduate Education

2:00 PM – 4:00 PM **Marquis Ballroom, Marquis Level, Marriott Marquis**

Organizer: **Jon Scott**, Montgomery College

2:00PM (1295) *COMPASS: CoOrdinated Math-Physics Assessment for Student Success.* **Guangming Yao***, **Michael Ramsdell**, **Joseph Skufca**, Clarkson University, and **Kelly Black**, University of Georgia

2:00PM (1296) *Passion-Driven Statistics: A multidisciplinary, project-based, supportive model for statistical reasoning and application.* **Kristin Woods***, Southwestern Oklahoma State University, **Lisa Dierker** and **David Beveridge**, Wesleyan University

2:00PM (1297) *Collaborative Research: Maplets for Calculus.* **Philip B. Yasskin***, Texas A&M University, **Douglas B. Meade**, University of South Carolina, **Andrew Crenwelge**, **Joseph Martinsen**, **Don Van Huyck**, **Matthew Weihing**, Texas A&M University, **Shiva Saravanan**, **Parth Sarin** and **Michael Sprintson**, A&M Consolidated High School

2:00PM (1298) *Project SMILES: Student-Made Interactive Learning with Educational Songs for Introductory Statistics.* **John J. Weber III***, Perimeter College at Georgia State University, **Lawrence M. Lesser**, University of Texas at El Paso, and **Dennis K. Pearl**, Pennsylvania State University

2:00PM (1299) *MATH:EAGER: Improving Algebra Web-Native Learning Material via Real-Life Applications and Games.* **Frank Vahid**, University of California, Riverside

2:00PM *Modeling Across the Curriculum.*
(1300) **Peter Turner***, Clarkson University, **James Crowley**, SIAM, and **Ben Galluzzo**, Shippensburg University

2:00PM *Broadening the impact and evaluating*
(1301) *the effectiveness of randomization-based curricula for introductory statistics.*
Nathan Tintle*, Dordt College, **Beth Chance**, **Soma Roy**, California Polytechnic State University, San Luis Obispo, **Todd Swanson** and **Jill VanderStoep**, Hope College

2:00PM *Transforming Developmental*
(1302) *Mathematics Education in Partnership with Teacher Preparation.*
Pavel Sikorskii*, **Kristen Bieda**, **Raven McCrory**, **Beth Herbel-Eisenmann** and **Kenneth Bradfield**, Michigan State University

2:00PM *RUME with a View: Cultivating New*
(1303) *Researchers on the Frontier of Research in Undergraduate Mathematics Education.*
Milos Savic*, University of Oklahoma, and **Gulden Karakok**, University of Northern Colorado

2:00PM *Recruiting and Preparing Mathematics*
(1304) *Majors for Houston-Area Classrooms: The University of Houston-Downtown Noyce Mathematics Teacher Scholarship Program.*
Rebecca J. Quander*, **Timothy A. Redl**, **Nancy A. Leveille**, **Jacqueline J. Sack** and **Michael L. Connell**, University of Houston-Downtown

2:00PM *Promoting Reasoning in Undergraduate*
(1305) *Mathematics (PRIUM).*
William Martin*, **Josef Dorfmeister**, **Benton Duncan**, **Friedrich Littman**, North Dakota State University, **Draga Vidakovic**, **Guantao Chen** and **Valerie Mille**, Georgia State University

2:00PM *Broadening the Net: Promoting Success in*
(1306) *the Sciences for All Students.*
Alison Marr*, **Emily D. Niemeyer**, **Mark Bottorff**, **Barbara Anthony** and **Willis A. Weigand**, Southwestern University

2:00PM *Lexical Ambiguity in Statistics: The*
(1307) *Development of High Impact, Little Time Activities to Help Students Better Understand the Meaning of Parameter.*
Jennifer J. Kaplan*, University of Georgia, **Neal Rogness**, Grand Valley State University, and **Diane Fisher**, University of Louisiana at Lafayette

2:00PM *Initial Findings about Graduate Teaching*
(1308) *Assistants' Teaching Needs to Foster Active Learning in Statistics.*
Jennifer J. Kaplan* and **Kristen E. Roland**, University of Georgia

2:00PM *The Tuskegee Partnership for Personal*
(1309) *Authenticity in College Mathematics.*
Lauretta Garrett*, **Mohammed Qazi**, **Youngsoo Kim** and **Li Huang**, Tuskegee University

2:00PM *WeBWorK: Improving Student Success in*
(1310) *Mathematics.*
Michael Gage*, **Arnold Pizer**, **Vicki Roth**, University of Rochester, **John Travis**, Mississippi College, and **Douglas Ensley**, MAA

2:00PM *Collaborative Research: Teaching*
(1311) *Inquiry-oriented Mathematics: Establishing Supports (TIMES).*
Nicholas Fortune*, **Karen Keene**, North Carolina State University, **Muhammad Haider**, **Christine Andrews-Larson**, Florida State University, **Rachel Keller** and **Estrella Johnson**, Virginia Tech

2:00PM *MPWR 2016 and Beyond: Fostering*
(1312) *sustainable networks for women in RUME.*
Jess Ellis*, Colorado State University, **Stacy Musgrave**, California Polytechnic State University, Pomona, **Megan Wawro**, Virginia Tech, **Eva Thanheiser**, Portland State University, and **Kate Melhuish**, Texas State University

2:00PM *Transforming Students' Mathematical*
(1313) *Experiences: Advancing Quality Teaching with Reliability at Scale.*
Dan Ray*, **Ann Edwards**, **Anthony Bryk**, **Alicia Grunow**, Carnegie Foundation for the Advancement of Teaching, and **James Stigler**, UCLA

2:00PM *Active Learning Approaches in*
(1314) *Mathematics Instruction: Practice and Assessment Workshop.*
Ronald Douglas, Texas A&M University

2:00PM *Assessing the Impact of the Emporium*
(1315) *Model on Student Persistence and Dispositional Learning by Transforming Faculty Culture.*
Kathy Cousins-Cooper* and **Katrina Staley**, North Carolina A&T State University

2:00PM *Motivating First-Year Calculus with*
(1316) *Robotics.*
Jason Cantarella, University of Georgia

2:00PM *STEP: Using Early Introduction to*
(1317) *Undergraduate Research to Recruit, Retain, and Graduate More STEM Majors.*
M. Lynn Breyfogle* and **DeeAnn Casteel**, Bucknell University

2:00PM *The Role of Calculus in the Transition*
(1318) *from High School to College Mathematics.*
David Bressoud, Macalester College

2:00PM *Progress through Calculus.*
(1319) **David Bressoud***, Macalester College, **Jess Ellis**, Colorado State University, **Sean Larsen**, Portland State University, **Chris Rasmussen**, San Diego State University, and **Doug Ensley**, MAA

2:00PM *Improving the Preparation of Graduate*
(1320) *Students to Teach Undergraduate Mathematics.*
Jack Bookman*, Duke University, and **Robin Gottlieb**, Harvard University

2:00PM *Collaborative Research: Data-Driven*
(1321) *Applications Inspiring Upper-Division*
Mathematics.
Thomas Asaki, Washington State
University, **Chris Camfield***, Hendrix
College, **Heather Moon**, Lewis-Clark
State College, and **Marie Snipes**, Kenyon
College

2:00PM *Transforming Instruction in*
(1322) *Undergraduate Mathematics via Primary*
Historical Sources (TRIUMPHS).
Jerry Lodder*, New Mexico State
University, **Kathleen Clark**, Florida State
University, **Janet Barnett**, Colorado State
University-Pueblo, **Dominic Klyve**,
Central Washington University, **Nicholas**
Scoville, Ursinus College, **Daniel Otero**,
Xavier University, and **Diana White**,
University of Colorado Denver-Downtown

2:00PM *The Elmhurst College Keystone Project.*
(1323) **Jon L. Johnson***, **Merrilee Guenther** and
Thomas Sawyer, Elmhurst College

2:00PM *A Common Vision for the Undergraduate*
(1324) *Mathematics Program in 2025.*
Linda Braddy*, Tarrant County College,
Karen Saxe, Macalester College, **Doug**
Ensley, MAA, and **Doug Ensley**,
Mathematical Association of America

2:00PM *MATH: EAGER: Developing a Learning*
(1325) *Map for Introductory Statistics.*
Angela Broaddus*, Benedictine College,
Jennifer Kaplan, University of Georgia,
and **Jonathan Templin**, University of
Kansas

2:00PM *EAGER: Understanding and Improving*
(1326) *Collegiate Persistence and STEM*
Opportunities for Developmental
Mathematics Students.
Xiangming Wu*, **Edgar Fuller**, **Jessica**
Deshler and **Marcela Mera Trujillo**,
West Virginia University

2:00PM *Using Evidence to Understand and*
(1327) *Support an Educational Reform*
Movement: The Case of Inquiry-based
Learning (IBL) in College Mathematics.
Sandra Laursen*, **Charles N. Hayward**
and **Zachary Haberler**, University of
Colorado Boulder

2:00PM *Preparing to Teach Mathematics and*
(1328) *Statistics with Technology-A Decade of*
Development and Impact on Preservice
Secondary Mathematics Teachers.
Hollylynne Lee*, **Karen Hollebrands**,
Allison McCulloch, North Carolina State
University, **William Finzer**, Concord
Consortium, **Stephanie Casey**, Eastern
Michigan University, and **Rick Hudson**,
Southern Indiana University

2:00PM *2+1 STEM Scholars Program at Solano*
(1329) *Community College.*
Genele G. Rhoads*, **Jan Tracy Camacho**
and **Audrey Rose de Leon**, Solano
Community College

2:00PM *Collaborative Research: Improving*
(1330) *Conceptual Understanding of*
Multivariable Calculus Through
Visualization Using CalcPlot3D.
Paul Seeburger*, Monroe Community
College, **Monica VanDieren**, Robert
Morris University, and **Deborah**
Moore-Russo, State University of New
York at Buffalo

2:00PM *Scots Science Scholars (S3).*
(1331) **Maria Siopsis***, **Angelia Gibson** and
Karen Beale, Maryville College

2:00PM *Heartland: The Carver Bridge to STEM*
(1332) *Success Program.*
Heidi Berger*, **Mark Brodie**, **Derek**
Lyons and **Rick Spellerberg**, Simpson
College

2:00PM *Raising Calculus to the Surface.*
(1333) **Aaron Wangberg***, Winona State
University, **Jason Samuels**, City
University of New York – BMCC, **Brian**
Fisher, Lubbock Christian University,
Elizabeth Gire, Oregon State University,
and **Tisha Hooks**, Winona State
University

2:00PM *Collaborative Research: Maplets for*
(1334) *Calculus.*
Douglas B. Meade*, University of South
Carolina, **Philip B. Yasskin**, Texas A&M
University,, and **Robert Petrulis**, EPRE
Consulting LLC

2:00PM *Open resources for the mathematics*
(1335) *curriculum.*
Jim Fowler*, The Ohio State University,
Petra Bonfert-Taylor, Dartmouth
College, **David Farmer**, American
Institute of Mathematics, and **Sarah**
Eichorn, University of California, Irvine

2:00PM *UTMOST: Undergraduate Teaching in*
(1336) *Mathematics with Open Software and*
Textbooks.
Robert Beezer*, University of Puget
Sound, **David Farmer**, American Institute
of Mathematics, **Tom Judson**, Stephen F.
Austin State University, **Kent Morrison**,
American Institute of Mathematics, and
Vilma Mesa, University of Michigan

2:00PM *Engaging Mathematics: Creating a*
(1337) *National Community of Practice.*
Frank Wattenberg*, United States
Military Academy, **Victor Padron**,
Normandale Community College, **Cathy**
Evins, Roosevelt University, **John Nardo**,
Oglethorpe University, **Lynn Gieger**,
Oglethorpe University,
Barbara Gonzalez, Hofstra University,
Rikki Wagstrom, **Cindy Kaus** and
Mangala Kothari, Metropolitan State
University

2:00PM *An Interdisciplinary Study of Learning:*
(1338) *Student Understanding of Linear Algebra*
in Physics.
Megan Wawro and **Kevin Watson***,
Virginia Tech

2:00ᴘᴍ (1339) *NSF Scholarship Program in Science and Mathematics at Kennesaw State University.* Preliminary report.
► **Ana-Maria Croicu**, Kennesaw State University

2:00ᴘᴍ (1340) *The AugSTEM Program: Informing Institutional Collaboration and Change to Prepare Juniors and Seniors for Careers in STEM.*
Rebekah Dupont, Augsburg College

2:00ᴘᴍ (1341) *Undergraduate Sustainability Experiences in Mathematics (USE Math).*
Benjamin Galluzzo*, Shippensburg University, and **Corrine Taylor**, Wellesley College

2:00ᴘᴍ (1342) *Ensuring Early Mathematics Success for STEM Majors.*
Amanda Hattaway*, **Fred Driscoll**, **Emma Smith Zbarsky** and **Joan Giblin**, Wentworth Institute of Technology

2:00ᴘᴍ (1343) *Transforming Undergraduate Statistics Education at Primarily Undergraduate Institutions through Experiential Learning.*
Tracy Morris, **Cynthia Murray** and **Tyler Cook***, University of Central Oklahoma

2:00ᴘᴍ (1344) *Examining Student Understanding of Cross Product through a Visualization Activity.*
Monica VanDieren*, Robert Morris University,, **Deborah Moore-Russo**, State University of New York at Buffalo, and **Paul Seeburger**, Monroe Community College

2:00ᴘᴍ (1345) *Holyoke Community College STEM Scholars Program (2015-2020).*
Ileana Vasu*, **Diane Stengle** and **Steve Winters**, Holyoke Community College

2:00ᴘᴍ (1346) *MATH: EAGER: Mathematical Problem Solving Item Development Project.*
R. Cavender Campbell*, **James A. Mendoza Epperson** and **Kathryn Rhoads**, The University of Texas at Arlington

2:00ᴘᴍ (1347) *Enhancing Explorations in Functions for Preservice Secondary Mathematics Teachers.*
Theresa Jorgensen*, **James A. Mendoza Epperson** and **Kathryn Rhoads**, The University of Texas at Arlington

2:00ᴘᴍ (1348) *Using Research to Shape Instruction and Placement in Algebra and Precalculus.*
Marilyn Carlson*, Arizona State University, **Doug Ensley**, Mathematical Association of America, **Bernie Madison**, University of Arkansas, and **Michael Tallman**, Oklahoma State University

2:00ᴘᴍ (1349) *Undergraduate Curriculum Guide for the Mathematical Sciences.*
Martha Siegel*, Towson University, **Carol Schumacher**, Kenyon College, **Doug Ensley** and **J. Michael Pearson**, Mathematical Association of America

2:00ᴘᴍ (1350) *Guide to Evidenced-Based Instructional Practices in Undergraduate Mathematics.*
Martha Abell*, Georgia Southern University, **Linda Braddy**, Tarrant County College, **Doug Ensley**, Mathematical Association of America, **Lew Ludwig**, Denison University, and **Hortensia Soto-Johnson**, University of Northern Colorado

2:00ᴘᴍ (1351) *Talented Teachers in Training for Texas: Maintaining Contact and Support for Noyce Graduates.*
Lesa Beverly*, **Keith Hubbard**, **Dennis Gravatt** and **Chrissy Cross**, Stephen F. Austin State University

2:00ᴘᴍ (1352) *SMART Texas: Establishing Longitudinal Paired Comparison Groups to Document Project Impacts.*
Keith Hubbard* and **Nola Schmidt**, Stephen F. Austin State University

2:00ᴘᴍ (1353) *POGIL Math: Guided Inquiry Materials for Gatekeeper Courses in Mathematics.*
Jill E. Guerra*, University of Arkansas Fort Smith, **Catherine Bénéteau**, University of South Florida, **Zdeňka Guadarrama**, Rockhurst University, **Laurie Lenz**, Marymount University, **Andrei Straumanis**, **Rick Moog**, POGIL Project, **Jennifer Noll**, Portland State University, and **Jennifer E. Lewis**, University of South Florida

2:00ᴘᴍ (1354) *USA Noyce Pathway to Mathematics.*
Madhuri S. Mulekar*, **Andre Green** and **Susan Martin**, University of South Alabama

2:00ᴘᴍ (1355) *PRODUCT: Professional Development and Uptake through Collaborative Teams NSF DUE 1525058.*
Stan Yoshinobu*, California Polytechnic State University, San Luis Obispo, **Matthew Jones**, California State University, Dominguez Hills, **Brian Katz**, Augustana College, **Xiao Xiao**, Utica College, **Angie Hodge**, University of Nebraska Omaha, **Sandra Laursen**, University of Colorado Boulder, **Christine von Renesse**, Westfield State University, and **Yousuf George**, Nazareth College

2:00ᴘᴍ (1356) *Transforming Linear Algebra Education with GeoGebra Applets.*
James D. Factor* and **Susan Pustejovsky**, Alverno College

2:00ᴘᴍ (1357) *SSTEM: Using Computational Science to Enhance Learning and Commitment to STEM.*
Maria Zack*, **Katherine Maloney**, **Lori Carter**, **Paul Schmelzenbach** and **Dawne Page**, Point Loma Nazarene University

2:00ᴘᴍ (1358) *Native American-based Mathematics Materials for Integration into Undergraduate Courses.*
Charles Funkhouser*, **Harriet C. Edwards**, California State University Fullerton, and **Miles Pfahl**, Turtle Mountain Community College

2:00PM *STEM Real World Applications of*
(1359) *Mathematics.*
Darren A. Narayan*, Rochester Institute of Technology, and **Joy Lind**, University of Sioux Falls

2:00PM *SUMMIT-P at SLU: Math for Business*
(1360) *Students in the Spirit of CRAFTY.*
Mike May*, **Michael Alderson** and **Anneke Bart**, Saint Louis University

AMS Invited Address

2:15 PM – 3:05 PM Atrium Ballroom, Atrium Level, Marriott Marquis

(1361) *The many faces of dispersive and wave equations.*
Gigliola Staffilani, Massachusetts Institute of Technology (1125-35-11)

MAA Workshop

2:35 PM – 3:55 PM M304, Marquis Level, Marriott Marquis

Course Design with Active Learning.

Organizers: **Victor Piercey**, Ferris State University

Luke Tunstall, Michigan State University

MAA Panel

2:35 PM – 3:55 PM International 6, International Level, Marriott Marquis

the Dolciani Award: Mathematicians in K-16 Education

Organizers: **Will Abram**, Hillsdale College

Judith Grabiner, Pitzer College

Bill Hawkins, University of the District of Columbia

Betty Mayfield, Hood College

Glenn Stevens, Boston University

David Stone, Georgia Southern University

Susan Wildstrom, Walt Whitman High School

Panelists: **Hyman Bass**, University of Michigan

Sybilla Beckman, University of Georgia

Bill McCallum, University of Arizona

MAA-AMS-SIAM Panel

2:35 PM – 3:55 PM International 5, International Level, Marriott Marquis

Multiple Paths to Mathematics Careers in Business, Industry and Government (BIG)

Organizers: **Rachel Levy**, Harvey Mudd College

Allen Butler, Daniel H. Wagner Associates, Inc.

Douglas Mupasiri, University of Northern Iowa

Moderator: **Rachel Levy**, Harvey Mudd College

Panelists: **Carla Cotwright-Williams**, U.S. Social Security Administration

Frank Cullen, Emeritus Principal with Blackstone & Cullen, Inc.

Mary Morley, State of New Jersey

Dan Sanders, Columbia University

Prasad Tetali, Georgia Tech

AMS Invited Address

3:20 PM – 4:10 PM Atrium Ballroom, Atrium Level, Marriott Marquis

(1362) *Galois groups and locally symmetric spaces.*
Richard Taylor, Institute for Advanced Study (1125-11-12)

MAA Session on Incorporating Big Data Ideas in the Mathematics and Statistics Classroom

3:20 PM – 3:55 PM International 7, International Level, Marriott Marquis

Organizers: **Patti Frazer Lock**, St. Lawrence University

Stacey Hancock, Montana State University

Sue Schou, Idaho State University

3:20PM *Big Data Visualization in Intro Stats (in*
▶ (1363) *15 minutes!).*
Patti Frazer Lock*, **Robin H. Lock**, St. Lawrence University, **Kari Lock Morgan**, Pennsylvania State University, **Eric F. Lock**, University of Minnesota, and **Dennis F. Lock**, Miami Dolphins NFL Franchise (1125-E1-2757)

3:40PM *Using Big Data in the Sciences:*
▶ (1364) *Integrating Mathematics and Plant Ecology.*
Robin L Angotti, University of Washington Bothell (1125-E1-867)

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MAA Session on Modern Data Sets for the Intro Statistics Classroom and Beyond, I

4:00 PM – 4:55 PM   International 7, International Level, Marriott Marquis

Organizers: **Patti Frazer Lock**, St. Lawrence University

Stacey Hancock, Montana State University

Sue Schou, Idaho State University

4:00PM ▶ (1365) *Applications of Statistical R Package to Undergraduate Teaching and Research.* **Leon Kaganovskiy**, Touro College (1125-K5-1124)

4:20PM ▶ (1366) *On Using SEER Data for Teaching and Research.* **Khairul Islam**, Eastern Michigan University (1125-K5-487)

4:40PM ▶ (1367) *Measuring Life: Data for introductory biostatistics.* Preliminary report. **Elizabeth Wilcox**, State University of New York at Oswego (1125-K5-2580)

Joint Prize Session

4:25 PM – 5:25 PM   Atrium Ballroom, Atrium Level, Marriott Marquis

SIGMAA on Statistics Education Reception

5:30 PM – 6:00 PM   International 7, International Level, Marriott Marquis

MAA Special Presentation: Poetry+Math.

5:30 PM – 7:00 PM   Regency Ballroom VII, Ballroom Level, Hyatt Regency

Organizers: **Gizem Karaali**, Pomona College

Lawrence M. Lesser, University of Texas at El Paso

Douglas Norton, Villanova University

Joint Prize Session Reception

5:30 PM – 6:30 PM   Atrium Ballroom, Atrium Level, Marriott Marquis

MAA Two-Year College Reception

5:30 PM – 7:00 PM   International Ballroom South, Int Tower LL1, Hyatt Regency

SIGMAA on Statistics Education Business Meeting

6:00 PM – 6:45 PM   International 7, International Level, Marriott Marquis

SIGMAA on Mathematical and Computational Biology Reception and Business Meeting

6:00 PM – 7:00 PM   International 5, International Level, Marriott Marquis

Organizer: **Maeve McCarthy**, Murray State University

SIGMAA On Statistics Education Guest Lecture

6:50 PM – 7:40 PM   International 7, International Level, Marriott Marquis

Organizer: **Sue Schou**, Idaho State University

6:50PM (1368) *Applied Mathematics and Statistics at the CDC - 2017 and Beyond.* **Brian M. Gurbaxani**, Centers for Disease Control and Prevention (1125-A0-805)

SIGMAA on Mathematical and Computational Biology Guest Lecture

7:00 PM – 7:50 PM   International 5, International Level, Marriott Marquis

Organizer: **Brian Walton**, James Madison University

7:00PM ▶ (1369) *Simple mathematical models for public health decision making during a response.* **Martin I Meltzer**, Centers for Disease Control and Prevention (CDC) (1125-A0-301)

AMS-MAA Panel, sponsored by the U.S. National Committee for Mathematics

7:00 PM – 7:30 PM   Atrium Ballroom, Atrium Level, Marriott Marquis

International Mathematics Efforts and the IMU

Moderator: **Eric M. Friedlander**, University of Southern California

Panelists: **Ingrid Daubechies**, Duke University

Wilfrid Gangbo, University of California Los Angeles

Ken Ono, Emory University

AMS-MAA Special Film Presentation

7:30 PM – 9:30 PM   Atrium Ballroom, Atrium Level, Marriott Marquis

The Man Who Knew Infinity, presented by the US National Committee for Mathematics

Friday, January 6

Joint Meetings Registration

7:30 AM – 4:00 PM   Grand Hall Lobby,
Exhibit Level, Hyatt Regency

Email Center

7:30 AM – 9:00 PM   Exhibit Level Prefunction
Area, Hyatt Regency

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, II

8:00 AM – 10:50 AM   International 8,
International Level, Marriott Marquis

Organizers: **Darren A. Narayan**,
Rochester Institute of
Technology

Tamas Forgacs, California
State University, Fresno

Ugur Abdulla, Florida
Institute of Technology

▶ 8:00AM *Sufficient Conditions for a Linear*
(1370) *Operator on $\mathbb{R}[x]$ to be Monotone.*
Preliminary report.
Leah Buck, Muskingum University, **Kelly
Emmrich***, University of Wisconsin, La
Crosse, and **Tamas Forgacs**, California
State University, Fresno (1125-32-306)

▶ 8:30AM *Change-point Detection Methods for*
(1371) *Body-Worn Video.*
Stephanie Ann Allen*, State University
of New York at Geneseo, **Ye Ye**,
University of California, Los Angeles,
David Madras, University of Toronto,
and **Greg Anthony Zanotti**, DePaul
University (1125-62-259)

▶ 9:00AM *Faltings heights of CM elliptic curves and*
(1372) *special gamma values.*
Adrian Barquero-Sanchez, Universidad
de Costa Rica, **Lindsay Cadwallader**,
University of Connecticut, **Olivia
Cannon**, Bowdoin College, **Tyler
Genao***, Florida Atlantic University, and
Riad Masri, Texas A&M University
(1125-11-284)

▶ 9:30AM *Topological Properties of Classical*
(1373) *Multiplier Sequences, n-sequences, and
Extensions.*
Christian Hokaj, University of Notre
Dame, and **Kenneth Plante***, University
of Rochester (1125-30-386)

▶ 10:00AM *Association with Interpolation.*
(1374) **Aaron Landesman***, Stanford University,
and **Anand Patel**, Harvard University
(1125-14-533)

▶ 10:30AM *Rational Curves on Hypersurfaces.*
(1375) **David Yang**, Massachusetts Institute of
Technology (1125-14-3122)

AMS-AWM Special Session on Symplectic Geometry, Moment Maps and Morse Theory, I

8:00 AM – 10:50 AM   International C,
International Level, Marriott Marquis

Organizers: **Lisa Jeffrey**, University of
Toronto

Tara Holm, Cornell
University

8:00AM *Contraction of a Hamiltonian K-space.*
(1376) **Christopher Allen Manon**, George
Mason University (1125-51-840)

8:30AM *Invariants of pairs in SL(4,C) and SU(3,1).*
(1377) **Sean D Lawton***, George Mason
University, and **Krishnendu
Gongopadhyay**, Indian Institute of
Science Education & Research, Mohali
(1125-14-1016)

9:00AM *Vanishing theorems in the cohomology*
(1378) *ring of the moduli space of parabolic
bundles.*
Elisheva Adina Gamse, University of
Toronto (1125-51-2305)

9:30AM *Positivity in Schubert Calculus, with*
(1379) *Symplectic Analogs.*
R Goldin, George Mason University
(1125-51-2040)

10:00AM *The quiver at the bottom of the twisted*
(1380) *nilpotent cone on $\mathbf{P}^1$.*
Steven Rayan, University of
Saskatchewan (1125-14-3137)

10:30AM *On geometric quantization of*
(1381) *b-symplectic manifolds.*
Victor Guillemin, Massachusetts
Institute of Technology, **Eva Miranda**,
Universitat Politecnica de Catalunya, and
Jonathan Weitsman*, Northeastern
University (1125-58-1001)

AMS Special Session on Advances in Mathematics of Ecology, Epidemiology and Immunology of Infectious Diseases, I

8:00 AM – 10:50 AM   M101, Marquis
Level, Marriott Marquis

Organizer: **Abba Gumel**, Arizona State
University

8:00AM *Prey-predator-parasite: an ecosystem*
(1382) *model with fragile persistence.*
Preliminary report.
Alex Farrell, **James P. Collins** and **Horst
R. Thieme***, Arizona State University
(1125-92-1104)

▶ 8:30AM *Permanence and Stability of a Kill the*
(1383) *Winner Model in Marine Ecology.*
Daniel Allin Korytowski* and **Hal Smith**,
Arizona State University (1125-34-3097)

9:00AM (1384) *Realistic mixing functions for meta-population modeling to support public health policymaking.* **Zhilan Feng**, Purdue University, **Andrew N Hill**, **Aaron T Curns** and **John W Glasser***, Centers for Disease Control and Prevention (1125-92-1041)

9:30AM (1385) *Using the partial derivatives of effective reproduction numbers to guide public health policy.* **Zhilan Feng***, Purdue University, **Andrew N Hill**, **Aaron T Curns** and **John W Glasser**, Centers for Disease Control and Prevention (1125-92-1039)

10:00AM ▶ (1386) *Duration of an Epidemic Near the Critical Threshold of $\mathcal{R}_0$ = 1.* Preliminary report. **Linda J. S. Allen*** and **William Tritch**, Texas Tech University (1125-92-1415)

10:30AM (1387) *Recovery rates in epidemiological models.* **Scott W Greenhalgh*** and **Troy Day**, Department of Mathematics and Statistics, Queen's University (1125-92-1870)

AMS Special Session on Advances in Operator Algebras, I

8:00 AM – 10:50 AM International 9, International Level, Marriott Marquis

Organizers: **Michael Hartglass**, University of California, Riverside

David Penneys, University of California, Los Angeles

Elizabeth Gillaspy, University of Colorado, Boulder

8:00AM (1388) *Bi-free probability: a new characterisation and consequences.* Preliminary report. **Ian L Charlesworth**, University of California, Los Angeles (1125-47-1831)

8:30AM (1389) *Product Rigidity for the von Neumann algebras of hyperbolic groups.* **Rolando de Santiago***, **Ionut Chifan**, **Sujan Pant**, The University of Iowa, and **Thomas Sinclair**, Purdue University (1125-47-2783)

9:00AM (1390) *Hulanicki's theorem fails for groupoids.* **Rufus Willett**, University of Hawaii at Manoa (1125-47-709)

9:30AM (1391) *A comparison of Nevanlinna-Pick theorems.* **Rachael M. Norton**, University of Iowa (1125-47-2037)

10:00AM ▶ (1392) *Recent advances in combinatorially-defined C*-algebras.* Preliminary report. **Sarah A Reznikoff**, Kansas State University (1125-46-2774)

10:30AM (1393) *1-bounded entropy with applications to von Neuman algebras.* **Ben Hayes**, Vanderbilt University (1125-47-989)

AMS Special Session on Automorphic Forms and Arithmetic, I

8:00 AM – 10:45 AM Embassy E, International Tower, LL2, Hyatt Regency

Organizers: **Frank Calegari**, University of Chicago

Ana Caraiani, Princeton University

Richard Taylor, Institute for Advanced Study

8:00AM (1394) *Intersection numbers and higher derivatives of L-functions for function fields.* **Zhiwei Yun***, Yale University, and **Wei Zhang**, Columbia University (1125-11-377)

9:00AM (1395) *Geometry and cohomology of local Shimura varieties.* **David Hansen**, Columbia University (1125-11-163)

10:00AM (1396) *Cycles in the de Rham cohomology of abelian varieties over number fields.* **Yunqing Tang**, Institute of Advanced Study (1125-11-258)

AMS Special Session on Complex Analysis and Special Functions, I

8:00 AM – 10:50 AM M103 & 104, Marquis Level, Marriott Marquis

Organizers: **Brock Williams**, Texas Tech University

Kendall Richards, Southwestern University

Alex Solynin, Texas Tech University

8:00AM (1397) *Convolutions of univalent harmonic strip mappings.* **Michael Dorff***, **Samaneh Hamidi**, Brigham Young University, **Jay Jahangiri**, Kent State University, and **Elif Yasar**, Uludag University (1125-30-590)

8:30AM (1398) *The 3-dimensional incidence geometry of circle space with applications to the geometry of circle frameworks in the Riemann sphere.* Preliminary report. **John C. Bowers**, James Madison University, and **Philip L. Bowers***, The Florida State University (1125-52-1978)

9:00AM (1399) *Cauchy Rigidity of Convex c-Polyhedra.* **John C. Bowers***, James Madison University, **Philip L. Bowers**, The Florida State University, and **Kevin Pratt**, University of Connecticut (1125-52-2370)

9:30AM (1400) *Loewner deformations driven by the Weierstrass function.* **Joan Lind*** and **Jessica Robins**, University of Tennessee (1125-30-2106)

10:00AM ▶ (1401) *Bohr inequality in hyperbolic geometry.* **Rosihan M Ali*** and **Zhen Chuan Ng**, Universiti Sains Malaysia (1125-30-185)

10:30AM Discussion

AMS Special Session on Discrete Geometry and Convexity (Dedicated to András Bezdek on the occasion of his 60th birthday), I

8:00 AM – 10:50 AM   International 3, International Level, Marriott Marquis

Organizers: **Krystyna Kuperberg**, Auburn University

Gergely Ambrus, Renyi Institute of Mathematics

Braxton Carrigan, Southern Connecticut State University

Ferenc Fodor, University of Szeged

8:00AM *Discs held in cages.*
(1402) **Tudor I. Zamfirescu**, Mathematical Institute, Bucharest, Roumania (1125-52-800)

8:30AM *Extensive parallelograms and*
▶ (1403) *double-lattice packings.* Preliminary report.
Wlodzimierz Kuperberg, Auburn University (1125-52-1202)

9:00AM *Skewers.*
▶ (1404) **Serge Tabachnikov**, Pennsylvania State University (1125-51-754)

9:30AM *Pessimal packing shapes.*
▶ (1405) **Yoav Kallus**, Santa Fe Institute (1125-52-657)

10:00AM *Some problems in Geometry and its*
(1406) *presentation.* Preliminary report.
Michael N. Bleicher, Prof, (emeritus) U of Wisconsin - Madison (1125-52-612)

10:30AM *On triangulations of simple polygons.*
▶ (1407) Preliminary report.
T. Bisztriczky, University of Calgary/York University (1125-52-250)

AMS Special Session on Ergodic Theory and Dynamical Systems, I

8:00 AM – 10:50 AM   M106 & M107, Marquis Level, Marriott Marquis

Organizers: **Mrinal Kanti Roychowdhury**, University of Texas Rio Grande Valley

Tamara Kucherenko, City College of New York

8:00AM *Dynamical Degrees and the Projective*
▶ (1408) *Heat Map Acting on Pentagons.*
Scott R. Kaschner*, Butler University, and **Roland K. W. Roeder**, Indiana University Purdue University Indianapolis (1125-37-588)

9:00AM *On the absence of an ergodic multiplier*
▶ (1409) *property in infinite measure.*
Madeleine Elyze, **Alexander S Kastner***, Williams College, **Juan Ortiz Rhoton**, MIT, **Vadim Semenov**, Courant Institute, New York University, and **Cesar E. Silva**, Williams College (1125-37-2213)

9:30AM *Tower constructions in smooth and*
(1410) *symbolic dynamics.*
Vaughn Climenhaga, University of Houston (1125-37-2341)

10:00AM *Thermodynamic formalism for geodesic*
(1411) *flow on locally CAT(-1) spaces.*
David Constantine, Wesleyan, **Jean-Francois Lafont** and **Daniel J. Thompson***, Ohio State University (1125-37-1846)

10:30AM *Are rotation sets and localized entropies*
(1412) *computable?* Preliminary report.
Christian P Wolf, Department of Mathematics, The City College of New York (1125-37-1076)

AMS Special Session on Inverse Problems and Applications, I

8:00 AM – 10:50 AM   Inman, Conference Level, Hyatt Regency

Organizers: **Vu Kim Tuan**, University of West Georgia

Amin Boumenir, University of West Georgia

8:00AM *Globally convergent numerical methods*
(1413) *for coefficient and phaseless inverse problems.*
Michael Victor Klibanov*, **Dinh Liem Nguyen**, **Loc Hoang Nguyen** and **Aleksandr Egor Kolesov**, University of North Carolina at Charlotte, Charlotte, NC 28223 (1125-35-38)

8:30AM *Gradient and Extragradient methods*
(1414) *for the inverse problem of tumor identification.*
Aviv Gibali, ORT Braude College, Karmiel, Israel (1125-35-140)

9:00AM *Recent Advances on Inverse Parabolic*
(1415) *Free Boundary Problems.*
Ugur G. Abdulla, Department of Mathematical Sciences/Florida Institute of Technology (1125-35-1823)

9:30AM *Frechet Differentiability in Besov Spaces*
(1416) *in the Optimal Control of Parabolic Free Boundary Problems.*
U. G. Abdulla and **J. G. Goldfarb***, Florida Institute of Technology (1125-35-2626)

10:00AM *Study of some inverse problems raised*
(1417) *from a free boundary model of ductal carcinoma in situ.*
Yongzhi Steve Xu, University of Louisville (1125-35-204)

10:30AM *Recovering a time-dependent diffusion*
(1418) *coefficient in a parabolic PDE with applications in geochronology.*
Sedar Ngoma*, **Dmitry Glotov**, Auburn University, **A. J. Meir**, Southern Methodist University, and **Willis E. Hames**, Auburn University (1125-35-2915)

AMS Special Session on Mapping Class Groups and their Subgroups, I

8:00 AM – 10:50 AM   **Dunwoody, Conference Level, Hyatt Regency**

Organizers: **James W. Anderson**, University of Southampton, UK

Aaron Wootton, University of Portland

8:00AM *Subgroups of the Mapping Class Group*
(1419) *Corresponding to 1-dimensional Strata in the Branch Locus of Moduli Space.* Preliminary report.
S. Allen Broughton*, Rose-Hulman Institute of Technology, **Antonio F. Costa**, Universidad Nacional de Educación A Distancia, and **Milagros Izquierda**, Linköping University (1125-14-493)

8:30AM *Uniparametric families of compact*
(1420) *Riemann surfaces with large symmetry.*
Emilio Bujalance, **Antonio F. Costa**, UNED, Spain, and **Milagros Izquierdo***, Linköping University, Sweden (1125-30-288)

9:00AM *Orientation-Reversing Euclidean*
(1421) *Symmetry of Closed Surfaces Immersed in 3-Space.* Preliminary report.
Thomas W. Tucker*, Colgate University, and **Undine Leopold**, Technische Univerität of Chemnitz (1125-57-1862)

9:30AM *Maximal Group Actions on Compact*
(1422) *Oriented Surfaces.*
Valerie Peterson, University of Portland, **Jacob Russell***, CUNY Gradaute Center, and **Aaron Wootton**, University of Portland (1125-20-554)

10:00AM *A combinatorial approach to the*
(1423) *conjugacy class count for elementary abelian subgroups of the mapping class group.*
Anthony Weaver, Bronx Community College of the City University of New York (1125-14-1327)

10:30AM *The symmetric genus of metabelian*
(1424) *groups.* Preliminary report.
Stephen Lo, University of Auckland (1125-57-1126)

AMS Special Session on Mathematics and Music, I

8:00 AM – 10:50 AM   **M301, Marquis Level, Marriott Marquis**

Organizers: **Mariana Montiel**, Georgia State University

Robert Peck, Louisiana State University

8:00AM *Self-Similarity, Continuous Processes,*
▶ (1425) *and New Compositional Resources.*
Clifton Callender, Florida State University (1125-00-3080)

8:30AM *Voicing Transformations and a Linear*
▶ (1426) *Representation of Uniform Triadic Transformations.*
Thomas M. Fiore*, University of Michigan-Dearborn, and **Thomas Noll**, Escola Superior de Musica de Catalunya (1125-20-1350)

9:00AM *Rhythmic and Melodic L-Canons.*
▶ (1427) Preliminary report.
Jeremy Kastine, Georgia Highlands College (1125-00-1407)

9:30AM *Quantifying functional accent.*
▶ (1428) Preliminary report.
Richard J Plotkin, University at Buffalo, The State University of New York (1125-00-2493)

10:00AM *Theoretical Physics and Category*
▶ (1429) *Theory as Tools for Analysis of Musical Performance and Composition.*
Maria Mannone, School of Music, University of Minnesota (1125-00-328)

10:30AM *Associahedra, combinatorial block*
(1430) *designs and related structures.*
Franck Jedrzejewski, University of Paris Saclay (1125-06-1302)

AMS Special Session on Operator Theory, Function Theory, and Models, I

8:00 AM – 10:50 AM   **International 4, International Level, Marriott Marquis**

Organizers: **William Ross**, University of Richmond

Alberto Condori, Florida Golf Coast University

8:00AM *Spectral area of Toeplitz operators.*
(1431) **Cheng Chu**, Vanderbilt, and **Dima Khavinson***, University of South Florida (1125-47-733)

8:30AM *Commutators and BMO Associated to the*
(1432) *Bessel Operator.*
Brett D. Wick, Washington University - St. Louis (1125-42-1221)

9:00AM *Weighted Inequalities for Little BMO.*
(1433) Preliminary report.
Irina Holmes*, **Brett D. Wick**, Washington University in St. Louis, and **Stefanie Petermichl**, University of Toulouse Paul Sabatier (1125-43-1297)

9:30AM *Characterization of binormal matrices.*
▶ (1434) **Eungil Ko**, Ewha Womans University, **Hyun Kwon***, The University of Alabama, and **Ji Eun Lee**, Sejong University (1125-47-1469)

10:00AM *Approximation of Invariant Subspaces in*
(1435) *Some Dirichlet-type Spaces.*
Faruk Yilmaz, University of Tennessee, Knoxville (1125-47-963)

10:30AM *The Range and Valence of Real Smirnov*
(1436) *Functions.*
Tim Ferguson*, University of Alabama, and **William T Ross**, University of Richmond (1125-30-1380)

AMS Special Session on Partition Theory and Related Topics, I

8:00 AM – 10:50 AM   **Embassy D, International Tower, LL2, Hyatt Regency**

Organizers: **Amita Malik**, University of Illinois at Urbana-Champaign

Dennis Eichhorn, University of California, Irvine

Tim Huber, University of Texas-Rio Grande Valley

8:00AM *Sequences in partitions.* Preliminary
(1437) report.
George E. Andrews, Pennsylvania State University (1125-11-1140)

8:30AM *New representations for $\sigma(q)$ via*
▶ (1438) *reciprocity theorems.*
Atul Dixit*, Indian Institute of Technology Gandhinagar, and **Koustav Banerjee**, Ramkrishna Mission Vivekananda University (1125-11-1010)

9:00AM *Remarks on cubic partitions.*
(1439) **Byungchan Kim**, Seoul National University of Science and Technology (1125-11-1419)

9:30AM *Rogers–Ramanujan type partition*
▶ (1440) *identities.* Preliminary report.
Andrew V. Sills, Georgia Southern University (1125-11-1035)

10:00AM *Bressoud's Conjecture.*
▶ (1441) **Sun Kim**, University of Illinois at Urbana-Champaign (1125-05-1664)

10:30AM *New Weighted Partition Identities, the*
(1442) *Smallest Part of Partition and all that.*
Alexander Berkovich, University of Florida (1125-05-1493)

AMS Special Session on Quantum Groups, I

8:00 AM – 10:50 AM   **International 10, International Level, Marriott Marquis**

Organizers: **Shuzhou Wang**, University of Georgia

Angshuman Bhattacharya, University of Georgia

8:00AM *Integrability of Homomorphisms of*
(1443) *Locally Compact Qauntum Groups.*
Piotr M. Sołtan, Department of Mathematical Methods in Physics, Faculty of Physics, University of Warsaw (1125-46-796)

9:00AM *Lattices of subgroups for locally compact*
(1444) *quantum groups.*
Alexandru Chirvasitu*, University of Washington, **Souleiman Omar Hoche**, Universite de Franche-Comte, Besancon, France, and **Pawel Kasprzak**, University of Warsaw, Poland (1125-20-710)

9:30AM *Open quantum subgroups of locally*
(1445) *compact quantum groups, and induced*
representation.
Mehrdad Kalantar*, University of Houston, **Pawel Kasprzak**, University of Warsaw, **Adam Skalski**, IMPAN, and **Piotr Soltan**, University of Warsaw (1125-46-1519)

10:00AM *Mean ergodic theorem for discrete*
(1446) *amenable quantum groups.*
Huichi Huang, College of mathematics and statistics, Chongqing University, Chongqing, China (1125-46-336)

10:30AM *The dual Temperley-Lieb basis and*
(1447) *quantum group integrals.*
Michael Brannan*, Texas A&M University, and **Benoit Collins**, Kyoto University (1125-46-1021)

AMS Special Session on Recent Progress on Nonlinear Dispersive and Wave Equations, II

8:00 AM – 10:50 AM   **L405 & L406, Lobby Level, Marriott Marquis**

Organizers: **Dana Mendelson**, University of Chicago

Carlos Kenig, University of Chicago

Hao Jia, University of Chicago

Andrew Lawrie, University of California, Berkeley

Gigliola Staffilani, Massachusetts Institute of Technology

Magdalena Czubak, University of Colorado Boulder

8:00AM *On pure two-bubbles for focusing*
(1448) *energy-critical dispersive equations.*
Jacek Jendrej, University of Chicago (1125-35-2034)

8:30AM *The L^2 weak sequential convergence of*
(1449) *radial mass critical NLS solutions with*
mass above the ground state.
Chenjie Fan, MIT (1125-35-1289)

9:00AM *Exponential moments for the*
(1450) *homogeneous Kac equation.*
Milana Pavic-Colic, University of Novi Sad, Serbia, and **Maja Taskovic***, University of Pennsylvania (1125-35-2822)

9:30AM *Bilinear estimates in quasilinear*
(1451) *evolution problems.*
Alexandru Ionescu, Princeton University (1125-35-3133)

10:00AM *Almost sure wellposedness for 2D wave*
(1452) *equations with null forms. Part I.*
Magdalena Czubak, University of Colorado Boulder (1125-35-2485)

10:30AM *Almost sure wellposedness for 2D wave*
(1453) *equations with null forms (Part II).*
Dana Mendelson, University of Chicago (1125-35-2675)

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AMS Special Session on Representations and Related Geometry in Lie Theory, I

8:00 AM – 10:50 AM   **A705, Atrium Level, Marriott Marquis**

Organizers: **Laura Rider**, Massachusetts Institute of Technology

Amber Russell, Butler University

8:00AM *Frobenius and embedded*
(1454) *Grassmannians.* Preliminary report.
Gus Lonergan, Massachusetts Institute of Technology (1125-16-2797)

8:30AM *Modular Koszul duality for Kac–Moody*
(1455) *groups, part I.*
Pramod N. Achar, Louisiana State University, **Shotaro Makisumi***, Stanford University, **Simon Riche**, Université Blaise Pascal, Clermont-Ferrand, and **Geordie Williamson**, RIMS (Kyoto) / University of Sydney (1125-20-2203)

9:00AM *Modular Koszul duality for Kac–Moody*
(1456) *groups, part II.*
Pramod N. Achar*, Louisiana State University, **Shotaro Makisumi**, Stanford University, **Simon Riche**, Université Blaise Pascal, Clermont-Ferrand, and **Geordie Williamson**, RIMS (Kyoto) / University of Sydney (1125-20-2163)

9:30AM *A combinatorial Fourier transform for*
(1457) *quiver representation varieties in type A.* Preliminary report.
Pramod N. Achar, **Maitreyee Kulkarni**, Louisiana State University, Department of Mathematics, and **Jacob P. Matherne***, University of Massachusetts–Amherst, Department of Mathematics and Statistics (1125-20-2538)

10:00AM *Perverse sheaves arising from cyclically*
(1458) *graded Lie algebras and DAHA.*
George Lusztig, Massachusetts Institute of Technology, and **Zhiwei Yun***, Yale University (1125-22-378)

10:30AM *A sufficient condition for a category of*
(1459) *perverse sheaves to be highest weight.* Preliminary report.
Tom Braden, University of Massachusetts, Amherst (1125-18-2086)

AMS Special Session on Spectral Calculus and Quasilinear Partial Differential Equations, II

8:00 AM – 10:50 AM   **Embassy F, International Tower, LL2, Hyatt Regency**

Organizers: **Shijun Zheng**, Georgia Southern University

Marius Beceanu, State University of New York - Albany

Tuoc Van Phan, University of Tennessee, Knoxville

8:00AM *Energy subcritical nonlinear wave*
(1460) *equations.* Preliminary report.
Andrew Lawrie, MIT (1125-35-3148)

8:30AM *Dynamics of nonlinear wave equations.*
(1461) **Hao Jia**, Institute for advanced study (1125-35-1729)

9:00AM *The benefits of randomizing initial data*
(1462) *when proving well-posedness for certain dispersive equations.*
Gigliola Staffilani, Massachusetts Institute of Technology (1125-35-1754)

9:30AM *Some new results on Kato-Ponce type*
(1463) *inequalities.*
Dong Li, University of British Columbia (1125-35-2693)

10:00AM *Blow up solutions in the semilinear*
(1464) *Schroedinger equation.*
Svetlana Roudenko, The George Washington University (1125-35-2784)

10:30AM *Microlocal dispersive estimates and the*
(1465) *energy-critical NLS on perturbations of* $\mathbf{R}^3$.
Casey Jao, UC Berkeley (1125-35-2171)

AMS Special Session on Symmetries, Integrability, and Beyond, I

8:00 AM – 10:50 AM   **The Learning Center, Ballroom Level, Hyatt Regency**

Organizers: **Maria Clara Nucci**, Università di Perugia, ITALY

Sarah Post, University of Hawaií at Manoa

8:00AM *Quantizing with Noether symmetries;*
(1466) *linearity and superintegrability; unusual Lagrangian systems: an overview.*
Maria Clara Nucci, University of Perugia, Italy (1125-81-1647)

8:30AM *N-dimensional superintegrable systems*
(1467) *and higher rank quadratic algebras.*
Ian Marquette*, **Fazlul Hoque** and **Yao-Zhong Zhang**, The University of Queensland (1125-81-798)

9:00AM *2D 2nd order Laplace superintegrable*
(1468) *systems, Heun equations, QES and Böcher contractions.*
M. A. Escobar-Ruiz, Instituto de Ciencias Nucleares, UNAM, Mexico City, **E. G. Kalnins**, Department of Mathematics, University of Waikato, Hamilton, New Zealand, and **W. Miller, Jr.***, School of Mathematics, University of Minnesota, Minneapolis, Minnesota, 55455, (1125-20-550)

9:30AM *Conformal Laplace superintegrable*
(1469) *systems in 2D: polynomial invariant subspaces.*
Willard Miller Jr and **Adrian Mauricio Escobar Ruiz***, University of Minnesota (1125-33-979)

10:00AM *The Heun operator as a Hamiltonian.*
(1470) Preliminary report.
Alexander Turbiner, ICN-UNAM, Mexico-City (1125-81-591)

10:30AM *An Algebraic Geometric Approach to the*
► (1471) *Classification of Superintegrable Systems and Hypergeometric Orthogonal Polynomials.*
Konrad Schöbel, Jena, Germany
(1125-37-714)

AMS Special Session on Topics in Graph Theory, I

8:00 AM – 10:50 AM   **Spring, Conference Level, Hyatt Regency**

Organizers: **Songling Shan**, Vanderbilt University

Xiaofeng Gu, University of West Georgia

8:00AM *Coloring graphs with forbidden minors.*
► (1472) **Martin Rolek*** and **Zi-Xia Song**, University of Central Florida
(1125-05-1809)

8:30AM *Minors in 3-connected planar*
(1473) *non-Hamiltonian graphs.* Preliminary report.
Emily Marshall* and **Guoli Ding**, Louisiana State University
(1125-05-1196)

9:00AM *Toughness condition for k-trees in*
(1474) K_4-*minor-free graphs.*
M. N. Ellingham, **Songling Shan***, Vanderbilt University, **Dong Ye** and **Xiaoya Zha**, Middle Tennessee State University (1125-05-2170)

9:30AM *On fullerene graphs.*
(1475) **Shoichi Tsuchiya**, Senshu University
(1125-05-1472)

10:00AM *Rainbow matchings in graphs.*
(1476) **Guanghui Wang**, Shandong University
(1125-05-2353)

10:30AM *On almost perfect matchings in k-partite*
(1477) k-*graphs.*
Hongliang Lu, Xi'an Jiaotong University, **Yan Wang** and **Xingxing Yu***, Georgia Institute of Technology (1125-05-2048)

MAA Invited Paper Session on L-Functions and Other Animals, I

8:00 AM – 10:50 AM   **A706, Atrium Level, Marriott Marquis**

Organizers: **Caroline Turnage-Butterbaugh**, Duke University

Maria Nastasescu, Cal Tech

8:00AM *Higher Eisenstein Congruences.*
(1478) **Catherine M Hsu**, University of Oregon
(1125-AB-672)

8:30AM L-*functions of automorphic forms on*
(1479) *non-split tori.*
Ian Petrow, Ecole Polytechnique Fédérale de Lausanne (1125-AB-802)

9:00AM *Numerical Computations with the Selberg*
(1480) *trace formula.*
Min Lee*, **Andrew R Booker**, University of Bristol, and **Andreas Strömbergsson**, Uppsala University (1125-AB-2319)

9:30AM *Central L-values and functorial transfer.*
(1481) **Kimball Martin**, University of Oklahoma
(1125-AB-640)

10:00AM *How many L-functions are there?*
(1482) **Djordje Milićević**, Bryn Mawr College
(1125-AB-2943)

10:30AM *Arithmetic statics over function fields.*
(1483) **Edva Roditty-Gershon**, Bristol University
(1125-AB-2602)

MAA Invited Paper Session on Research in Improving Undergraduate Mathematical Sciences Education: Examples Supported by the National Science Foundation's IUSE: EHR Program

8:00 AM – 10:50 AM   **A602, Atrium Level, Marriott Marquis**

Organizers: **Ron Buckmire**, National Science Foundation

John Haddock, National Science Foundation

Teri Murphy, National Science Foundation

Sandra Richardson, National Science Foundation

Lee Zia, National Science Foundation

8:00AM *Teaching Inquiry-oriented mathematics:*
(1484) *Establishing Support.*
Estrella Johnson*, Virginia Tech, **Christine Andrews-Larson**, Florida State University, and **Karen Keene**, North Carolina State University (1125-AG-1899)

8:30AM *Collaborative Research: Improving*
► (1485) *Conceptual Understanding of Multivariable Calculus Through Visualization Using CalcPlot3D.* Preliminary report.
Paul E Seeburger*, Monroe Community College, **Monica VanDieren**, Robert Morris University, and **Deborah Moore-Russo**, University at Buffalo
(1125-AG-1716)

9:00AM *Promoting Success In Early College*
(1486) *Mathematics Through Graduate Teacher Training.*
Michael S Jacobson*, **Michael Ferrara**, **RaKissa Manzanares** and **Gary Olson**, University of Colorado Denver
(1125-AG-1561)

9:30AM *Fostering Active Learning in Statistics:*
► (1487) *Research on Students and Graduate Teaching Assistant.* Preliminary report.
Jennifer J Kaplan* and **Kristen E Roland**, University of Georgia
(1125-AG-1250)

10:00AM ▶ (1488) *Collaborative Research: Transforming Instruction in Undergraduate Mathematics via Primary Historical Sources (TRIUMPHS). Preliminary report.*
Nicholas A Scoville*, Ursinus College, **Jerry Lodder**, New Mexico State University, **Diana White**, University of Colorado Denver, **Dominic Klyve**, Central Washington University, **Danny Otero**, Xavier University, **Janet Barnett**, Colorado State University – Pueblo, and **Kathy Clark**, Florida State University (1125-AG-566)

10:30AM (1489) *Collaborative Research: Data-Driven Applications Inspiring Upper-Division Mathematics.*
Heather A Moon*, Lewis-Clark State College, **Thomas J Asaki**, Washington State University, **Marie Snipes**, Kenyon College, and **Chris Camfield**, Hendrix College (1125-AG-1813)

AMS Contributed Paper Session on History of Mathematics, and Miscellaneous Topics

8:00 AM – 10:40 AM   International 1, International Level, Marriott Marquis

8:00AM ▶ (1490) *The Future of the AMS Notices.*
Frank Morgan, Williams College (1125-00-263)

8:15AM ▶ (1491) *zbMATH – Challenges and Perspectives.*
Klaus Hulek, FIZ Karlsruhe/zbMATH; Leibniz Universität Hannover (1125-00-2546)

8:30AM ▶ (1492) *Status of the Global Digital Mathematics Library Initiative. Preliminary report.*
Olaf Teschke, FIZ Karlsruhe/zbMATH (1125-00-2593)

8:45AM ▶ (1493) *The Affinity of Mathematics and Music is Cultural not Technical.*
James M Henle, Smith College (1125-00-3123)

9:00AM ▶ (1494) *Fusion Mathematics.*
Shirley B. Gray, Dept. of Mathematics, California State University Los Angeles (1125-01-64)

9:15AM ▶ (1495) *Plimpton 322: The Rosetta Stone of the Integer (Pythagorean) Triple.*
Donald A. Sokol, Burr Ridge, Illinois. (1125-01-80)

9:30AM (1496) *Mathematics Contributions of ʻAbd al-ʻAlī al-Bīrjandī [Bīrjandī].*
Mohammad K. Azarian, University of Evansville (1125-01-110)

9:45AM (1497) *The Motion Equations and Theories of Heat by Fourier and Poisson. Preliminary report.*
Shigeru Masuda, Ex. Long-Term Researcher of RIMS, Kyoto University (1125-01-196)

10:00AM ▶ (1498) *Riemann, Siegel, and a Translation of Siegel's 1932 paper "Uber Riemanns Nachlass zur analytischen Zahlentheorie". Preliminary report.*
Eric Barkan, Novato, CA, and **David Sklar***, San Francisco State University (1125-01-861)

10:15AM ▶ (1499) *Thousand-year-old geometry: al-Karaji's Treatise on the Extraction of Hidden Waters. Preliminary report.*
Erik R. Tou, University of Washington, Tacoma (1125-01-1410)

10:30AM ▶ (1500) *Classifying Seven Dimensional Lie Algebras With Niradical Isomorphic to $A_{5,2} \oplus \mathbb{R}$. Preliminary report.*
Firas Hindeleh* and **Anthony Pecoraro**, Grand Valley State University (1125-22-1792)

AMS Contributed Paper Session on Probability and Statistics, II

8:00 AM – 10:40 AM   International A, International Level, Marriott Marquis

8:00AM (1501) *Probability distribution for a particle's position in the inhomogeneous totally asymmetric zero range process.*
Eunghyun Lee*, Nazarbayev University, and **Dong Wang**, National University of Singapore (1125-60-2449)

8:15AM ▶ (1502) *Random walks on infinitely generated dense groups. Preliminary report.*
Abbas M Alhakim*, American University of Beirut, and **S Molchanov**, University of North Carolina at Charlotte (1125-60-2609)

8:30AM (1503) *Fluid Limit for a Batched Processor Sharing Queue. Preliminary report.*
Katelynn D Kochalski, University of Virginia (1125-60-2610)

8:45AM (1504) *Levy Processes in a Step 3 Nilpotent Lie Group.*
John E Haga, Wentworth Institute of Technology (1125-60-2630)

9:00AM ▶ (1505) *Estimating the Fraction in Fractional Differential Equations using a Bayesian Approach.*
Joshua M. Whitlinger*, **Edward L. Boone**, Virginia Commonwealth University, and **Ryad Ghanam**, Virginia Commonwealth University Qatar (1125-62-299)

9:15AM ▶ (1506) *Functional Data Analysis of Copy Number Alterations in Bladder Cancer Tumors.*
Sarah Robinson*, University of Georgia, and **David Burton**, East Tennessee State University (1125-62-582)

9:30AM ▶ (1507) *Mahalanobis Baseed k-Nearest Neighbor Forecasting versus Time Series Forecasting Methods. Preliminary report.*
Vindya Kumari Pathirana*, University of Connecticut, and **Kandethody M. Ramachandran**, University of South Florida (1125-62-2269)

9:45AM *Solving inverse problems in econometrics*
(1508) *using a mollification approach.*
Marechal, Paul Sabatier University,
Toulouse France, and **Vanhems***,
University of Toulouse, TBS and TSE
(1125-62-2290)

10:00AM *Bootstrapping Time Series Models.*
(1509) **Mosisa G. Aga**, Auburn University
Montgomery (1125-62-2386)

10:15AM *Nonlinear filtering for periodic*
(1510) *time-varying parameter estimation in an*
epidemic model.
Andrea Arnold* and **Alun L. Lloyd**,
North Carolina State University
(1125-62-2399)

10:30AM *Coherent Itemset Mining.* Preliminary
▶ (1511) report.
Kelly Bodwin*, **Kai Zhang** and **Andrew**
Nobel, University of North Carolina -
Chapel Hill (1125-62-3066)

MAA Session on Humor and Mathematics

8:00 AM – 10:35 AM   **Embassy C, International**
Tower, LL2, Hyatt Regency

Organizers: **Debra K. Borkovitz**,
Wheelock College

Gizem Karaali, Pomona
College

Semra Kilic-Bahi,
Colby-Sawyer College

Cesar Martinez-Garza,
Pennsylvania State
University, Berks

8:00AM *A Funny Thing Happened on the Way to*
▶ (1512) *Foundations.* Preliminary report.
Thomas Drucker, University of
Wisconsin–Whitewater (1125-D5-2534)

8:20AM *Using recent advanced in humor theory*
▶ (1513) *to understand how we do mathematics*
and why we enjoy it.
Keith Weber, Rutgers University,
Graduate School of Education
(1125-D5-2027)

8:40AM *Improvisation in a Senior Capstone*
▶ (1514) *Course.*
Andrea Young, Ripon College
(1125-D5-1805)

9:00AM *The pun of introducing students to*
▶ (1515) *Calculus: Why was the parent function*
upset with its child?
Elizabeth A Peitz, University of Central
Florida (1125-D5-1336)

9:20AM *Brace Yourself, Calculus Memes are*
▶ (1516) *Coming.* Preliminary report.
Janine E. Janoski, King's College
(1125-D5-2014)

9:40AM *Through the Looking Glass: a collage*
▶ (1517) *of images that adds character to*
mathematical concepts in Calculus
courses.
Cesar Martínez-Garza, The Pennsylvania
State University at Berks (1125-D5-3052)

10:00AM *And Behind Door #3...*
▶ (1518) **James P. Howard, II**, University
of Maryland University College
(1125-D5-2844)

10:20AM *Using Interactive Songs to Engage*
(1519) *Students in Learning Introductory*
Statistics: Overview of NSF-Funded
Project.
John J Weber*, Perimeter College at
Georgia State University, **Larry Lesser**,
The University of Texas at El Paso, and
Dennis K Pearl, Pennsylvania State
University (1125-D5-3014)

MAA Session on Innovative and Effective Ways to Teach Linear Algebra, I

8:00 AM – 10:15 AM   **Courtland, Conference**
Level, Hyatt Regency

Organizers: **Gil Strang**, Massachusetts
Institute of Technology

David Strong, Pepperdine
University

Megan Wawro, Virginia
Tech

8:00AM *Exploiting Recent Developments in*
▶ (1520) *MATLAB.*
Nicholas J. Higham, The University of
Manchester (1125-E5-247)

8:20AM *WeBWorK, linear algebra and the simplex*
▶ (1521) *method.* Preliminary report.
Michael E. Gage, University of Rochester
(1125-E5-2338)

8:40AM *WeBWorK, Reading Quizzes, and Proof*
▶ (1522) *Portfolio in Linear Algebra Course.*
Preliminary report.
Risto Atanasov, Western Carolina
University (1125-E5-2770)

9:00AM *Undergraduate Spectral Theory with*
(1523) *Computer Labs.*
Emily J Evans, Brigham Young University
(1125-E5-729)

9:20AM *Implementing a partially flipped*
▶ (1524) *team-based approach to linear algebra.*
Timothy O Trujillo and **Kelley**
Tatangelo*, Colorado School of Mines
(1125-E5-2977)

9:40AM *Active Learning in Linear Algebra.*
▶ (1525) **Steven Schlicker*** and **Feryal Alayont**,
Grand Valley State University
(1125-E5-2345)

10:00AM *Helping non-math majors see the power*
(1526) *in linear algebra theory through proofs.*
Martha Lee H Kilpack, Brigham Young
University (1125-E5-1098)

MAA Session on Inquiry-Based Teaching and Learning, II

8:00 AM – 10:55 AM   **International 6,**
International Level, Marriott Marquis

Organizers: **Judith Covington**, Louisiana
State University in
Shreveport

Theron Hitchman, University of Northern Iowa

Angie Hodge, University of Nebraska Omaha

Brian P. Katz, Augustana College

Alison Marr, Southwestern University

Victor Piercey, Ferris State University

8:00AM *Using Guided-Inquiry Activities to*
(1527) *Promote Stronger Foundations in Introductory Statistics.* Preliminary report.
Amanda Sutherland*, Shenandoah Universtiy, and **Beth Dodson**, Shenandoah University (1125-G1-625)

8:20AM *"Rethink, Revise, Research" Encouraging*
▶ (1528) *Critical and Scientific Thinking.*
Galit Eizman, Harvard University (1125-G1-2726)

8:40AM *Reflective Journaling in Quantitative*
▶ (1529) *Reasoning.*
Joanna G. Jauchen, George Mason University (1125-G1-2971)

9:00AM *Liberal Arts Mathematics and Guided*
▶ (1530) *Learning Worksheets – IBL for non-majors.* Preliminary report.
Mariah Birgen, Wartburg College (1125-G1-2613)

9:20AM *Incorporating Inquiry Based Learning*
▶ (1531) *into a Mathematics Foundation Course at Florida SouthWestern State College.*
Elizabeth W Schott* and **Laurice Garrett**, Florida SouthWestern State College (1125-G1-2313)

9:40AM *Autonomous Learning in College Algebra.*
▶ (1532) Preliminary report.
James Carter, Butler University (1125-G1-2619)

10:00AM *Teaching Honors College Algebra*
▶ (1533) *with Inquiry-Based Instruction at the University of Houston-Downtown.* Preliminary report.
Timothy Redl, University of Houston-Downtown (1125-G1-655)

10:20AM *College Algebra TACTivities and the TA*
▶ (1534) *Coach Experiment.*
Gary A. Olson, University of Colorado Denver (1125-G1-2898)

10:40AM *Managing tensions within a coordinated*
▶ (1535) *inquiry-based learning algebra course: The role of worksheets.*
Vilma Mesa, **Mollee Huisinga** and **Ashley N. Jackson***, University of Michigan (1125-G1-53)

MAA Session on Mathematics Experiences and Projects in Business, Industry, and Government

8:00 AM – 9:55 AM International 7, International Level, Marriott Marquis

Organizer: **Allen Butler**, Daniel H. Wagner Associates, Inc.

8:00AM *Mathematical Modeling of a Decision*
▶ (1536) *Planning Tool.* Preliminary report.
William P Fox, Naval Postgraduate School (1125-J1-608)

8:20AM *Modeling of Gastrointestinal Stent*
▶ (1537) *Behavior.* Preliminary report.
Abraham Levitan, Franklin W. Olin College of Engineering, **Jessica Oehrlein***, Columbia University, **Laura Christakis** and **Shawn Ryan**, Boston Scientific Corporation (1125-J1-999)

8:40AM *Automated Scoring of Extended Text*
▶ (1538) *Responses to Mathematics Test Items.*
James H Fife, Educational Testing Service (1125-J1-1886)

9:00AM *Exposure: A Decision Metric for Selecting*
▶ (1539) *Effective Sets of Security Upgrades at Dams.*
Kevin E. Burns*, Mississippi College, **James D. Morgeson**, **Jason A. Dechant**, Institute for Defense Analyses, and **Yazmin Seda-Sanabria**, United States Army Corps of Engineers (1125-J1-1970)

9:20AM *From the Classroom to the Corporate*
▶ (1540) *World: Sharing Internship Experiences.* Preliminary report.
Robert Chaney and **Chanda Hughes***, Lee University (1125-J1-2528)

9:40AM *Heat transfer analysis of road pavement*
▶ (1541) *system with phase change materials.*
Bhagya Athukorallage* and **Darryl James**, Texas Tech University (1125-J1-3024)

MAA Session on Preserving and Writing the History of Mathematics Departments, I

8:00 AM – 10:50 AM Embassy A, International Tower, LL2, Hyatt Regency

Organizers: **Lawrence D'Antonio**, Ramapo College

Toke Knudsen, State University of New York at Oneonta

8:00AM *What's your angle? Exploring the history*
(1542) *of your department one facet at a time.*
Janet L. Beery, University of Redlands (1125-M1-3091)

8:30AM *William Fogg Osgood and the*
(1543) *Transformation of the Harvard Mathematics Department.* Preliminary report.
Lawrence A. D'Antonio, Ramapo College of New Jersey (1125-M1-483)

9:00AM *Bertrand Russell at Bryn Mawr.*
▶ (1544) **William Dunham**, Research Associate in Mathematics, Bryn Mawr College (1125-M1-1937)

9:30AM *Writing for Vassar College's*
(1545) *Sesquicentennial.* Preliminary report. **John McCleary**, Vassar College (1125-M1-45)

10:00AM *Preserving and Writing the History of*
▶ (1546) *Mathematics Departments – A Note on Museum Resources.* Preliminary report. **Peggy Aldrich Kidwell**, Curator of Mathematics, NMAH, Smithsonian Institution (1125-M1-434)

10:30AM *Discovering Questions as Well as Answers*
▶ (1547) *When Writing a Departmental History.* **Jacqueline M Dewar***, **W. Scott Wright** and **Dennis G. Zill**, Loyola Marymount University (1125-M1-409)

MAA Session on Research in Undergraduate Mathematics Education (RUME), III

8:00 AM – 10:55 AM **Regency Ballroom V, Ballroom Level, Hyatt Regency**

Organizers: **Karen Keene**, North Carolina State University

Megan Wawro, Virginia Tech

8:00AM *The Role of Justifying in Entry-Level*
▶ (1548) *Undergraduates' Mathematical Problem Solving.* Preliminary report. **Kathryn Rhoads***, **James A. Mendoza Epperson** and **R. Cavender Campbell**, The University of Texas at Arlington (1125-N1-2695)

8:20AM *Could a variable parts perspective on*
(1549) *proportional relationships be useful in trigonometry, calculus, and probability?* Preliminary report. **Sybilla Beckmann**, University of Georgia (1125-N1-2166)

8:40AM *Using Analytics to Better Understand*
(1550) *Calculus Students' Weaknesses and Learning Behaviors.* **Mary E Pilgrim*** and **Ben D Sencindiver**, Colorado State University (1125-N1-361)

9:00AM *Do They Know What They Know or Do Not*
▶ (1551) *Know? A Report on Undergraduate Mathematics Students' Self-assessment Behaviors.* Preliminary report. **Kedar Nepal***, Mercer University, **Kailash Ghimire**, Georgia Southwestern State University, **Ramjee Sharma**, University of North Georgia-Gainsville, and **Manoj Thapa**, Georgia Southwestern State University (1125-N1-871)

9:20AM *Developing Students' Reasoning about*
▶ (1552) *the Derivative of Complex-Valued Functions with the Aid of Geometer's Sketchpad (GSP).* **Jonathan D Troup**, University of Oklahoma (1125-N1-2746)

9:40AM *Any correlations among students' ways*
▶ (1553) *of thinking about the derivative and their abilities to solve the applied derivative problems.* **Shawn Firouzian**, University of California San Diego (1125-N1-2689)

10:00AM *Rate of Change as a Feature of*
▶ (1554) *Partitioning Activity: The Case of Lydia.* **Biyao Liang*** and **Kevin C. Moore**, University of Georgia (1125-N1-1363)

10:20AM *Mathematically Talented Black Women of*
▶ (1555) *Spelman, 1960s-2010s.* **Morgin Jones Williams**, Georgia State University (1125-N1-304)

10:40AM *How proficient learners of mathematics*
▶ (1556) *read proofs: An exploratory study.* **Eyob S Demeke**, California State University, Los Angeles (1125-N1-702)

MAA Session on The Creation and Implementation of Effective Homework Assignments, I

8:00 AM – 10:55 AM **L401 & L402, Lobby Level, Marriott Marquis**

Organizers: **Sarah Greenwald**, Appalachian State University

Judy Holdener, Kenyon College

8:00AM *Incorporating Reflection into Calculus*
▶ (1557) *Assignments.* Preliminary report. **Vicky Williams Klima**, Appalachian State University (1125-A5-1759)

8:20AM *Reflections on Assigning Both Online and*
▶ (1558) *Written Homework in Calculus.* **Kevin Gerstle**, Oberlin College (1125-A5-2624)

8:40AM *Grading more than just the final answer*
▶ (1559) *with an automated grading system: Benefits and pitfalls.* **Matt Zaremsky**, Cornell University (1125-A5-1629)

9:00AM *Turning Problems into Projects.*
▶ (1560) **Susan Jane Colley**, Oberlin College (1125-A5-808)

9:20AM *Mathematics Assignments — a Storied*
▶ (1561) *Approach.* **Judy A. Holdener** and **Brian D. Jones***, Kenyon College (1125-A5-1881)

9:40AM *Do the homework, then go to the lecture.*
▶ (1562) **Shahriar Shahriari**, Pomona College (1125-A5-1733)

10:00AM *Peer-Assisted Reflection and Online*
▶ (1563) *Homework in a Flipped Calculus Course.* Preliminary report. **Ross Sweet**, Northwestern University (1125-A5-1691)

10:20AM *Making Learning Visible with*
▶ (1564) *Student-Generated Video Content.* Preliminary report. **Shelly Smith*** and **Robert Talbert**, Grand Valley State University (1125-A5-1586)

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10:40AM *Nuances of online calculus homework:*
► (1565) *Insights from the student perspective.*
Andrew J Krause* and **Ralph Putnam**,
Michigan State University (1125-A5-2291)

MAA Session on The Teaching and Learning of Undergraduate Ordinary Differential Equations, I

8:00 AM – 10:55 AM   A702, Atrium
Level, Marriott Marquis

Organizers: **Christopher S. Goodrich**,
Creighton Preparatory
School

Beverly H. West, Cornell
University

8:00AM *Teaching Modeling Through Poster*
(1566) *Projects in Differential Equations.*
Courtney L Davis* and **Timothy A
Lucas**, Pepperdine University
(1125-P5-2817)

8:20AM *The Tautochrone: Times are the Same,*
► (1567) *Times are Different.*
Itai Seggev, Wolfram Research, Inc.
(1125-P5-1699)

8:40AM *Real time modeling illuminates mixing*
(1568) *problems.*
Audrey Malagon, **Lydia Kennedy*** and
Kristin Burney, Virginia Wesleyan
College (1125-P5-1824)

9:00AM *ODE Reviews: A Repository of Reviews of*
► (1569) *Articles Related to the Teaching and
Learning of ODEs.*
Thomas W. Judson, Stephen F. Austin
State University (1125-P5-2073)

9:20AM *Student-Centered Teaching Strategies in*
(1570) *Ordinary Differential Equations.*
Baoling Ma, Millersville University of
Pennsylvania (1125-P5-2101)

9:40AM *Engaged Learning in Large-enrollment*
► (1571) *Differential Equations through Computer
Laboratory Materials.*
P. Gavin LaRose, University of Michigan
(1125-P5-2156)

10:00AM *Reflections on Teaching a Combined*
► (1572) *Differential Equations/Linear Algebra
Class.*
Christopher S. Goodrich, Creighton
Preparatory School (1125-P5-2196)

10:20AM *Stay Tuned – Modeling in Differential*
(1573) *Equations Courses.*
Brian Winkel, Emeritus, US Military
Academy, West Point and Director
SIMIODE (1125-P5-2297)

10:40AM *A modeling first approach to differential*
► (1574) *equations using SIMIODE.*
Patrice G Tiffany* and **Rosemary
C. Farley**, Manhattan College
(1125-P5-2299)

MAA Session on Unexpected Topics for a Math Circle, I

8:00 AM – 10:35 AM   A701, Atrium
Level, Marriott Marquis

Organizers: **Robert M. Klein**, Ohio
University

Philip Yasskin, Texas A&M
University

8:00AM *What's in a Logo?* Preliminary report.
► (1575) **Christopher Goff**, University of the
Pacific (1125-Q5-622)

8:20AM *Finite Projective Planes and Applications.*
► (1576) Preliminary report.
Martin J Strauss, University of Michigan
(1125-Q5-567)

8:40AM *Complex behavior from simple rules -*
► (1577) *cellular automata for Math Circles.*
Mark C Hughes, Brigham Young
University (1125-Q5-1011)

9:00AM *The magical way to learn mathematics.*
► (1578) **Maria S. Nogin*** and **Adnan H.
Sabuwala**, California State University,
Fresno (1125-Q5-1371)

9:20AM *Math Circles for Integrated STEM*
► (1579) *Learning Communities.*
Celil Ekici, **Christopher Plyley***, **Cigdem
Alagoz** and **Angie Estien**, University of
the Virgin Islands (1125-Q5-1404)

9:40AM *The Missing 'M' in STEM: A Math Circles &*
► (1580) *Modeling Approach.*
James C Taylor* and **Nicholas Bennett**,
Math Teachers' Circle of Santa Fe
(1125-Q5-1532)

10:00AM *Different Angle.*
► (1581) **Tatiana Dezbah Shubin**, San Jose State
University (1125-Q5-3088)

10:20AM Discussion

MAA General Contributed Paper Session on Algebra, II

8:00 AM – 10:25 AM   Piedmont, Conference
Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena
College

Kimberly Presser,
Shippensburg University

Melvin Royer, Indiana
Wesleyan University

8:00AM *Truncated Path Algebras and Betti*
► (1582) *Numbers with Polynomial Growth.*
Preliminary report.
Ryan Coopergard*, University of
Minnesota - Twin Cities, and **Marju
Purin**, St. Olaf College (1125-VA-2207)

8:15AM *On the periodicity of irreducible elements*
► (1583) *in arithmetical congruence monoids.*
Christopher ONeill*, University of
California Davis, and **Jacob Hartzer**,
Texas A&M University (1125-VA-2230)

8:30AM
(1584) *Model theoretic limits of categories and representations of diagram algebras.* **Nate Harman**, Massachusetts Institute of Technology (1125-VA-2476)

8:45AM
(1585) *Tensor product multiplicities and descent of line bundles to GIT quotients.* **Nathaniel Bushek**, University of Alaska, Anchorage (1125-VA-2547)

9:00AM
(1586) *The Index of a Family of Gorenstein Numerical Semigroups in Four Generators.* Preliminary report. **Bernadette Boyle**, Sacred Heart University (1125-VA-2548)

9:15AM
(1587) *Maximal subgroup growth of some groups.* **Andrew J. Kelley**, Binghamton University (1125-VA-2611)

9:30AM
▶ (1588) *Zero divisor graphs of commutative graded rings.* **Brian P. Johnson***, Florida Gulf Coast University, and **Katherine Cooper**, University of Kentucky (1125-VA-2795)

9:45AM
(1589) *The algebraic approach to spinor representation theory.* **Jonathan Brown**, SUNY Oneonta (1125-VA-2939)

10:00AM
▶ (1590) *Connecting the Algebraic Theory of Lie Algebra Spinor Representations to Applications in Physics.* Preliminary report. **Kimmy Cushman**, SUNY College at Oneonta (1125-VA-2931)

10:15AM
▶ (1591) *Counting Elements of Particular Orders in the Symmetric Group.* **Tucker L. Dowell*** and **Brad Schleben**, Belmont University (1125-VA-2992)

MAA *General Contributed Paper Session on Graph Theory, II*

8:00 AM – 10:55 AM   Baker, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

8:00AM
(1592) *Uniqueness in labelings of tree-depth-critical graphs.* **Michael D. Barrus***, University of Rhode Island, and **John Sinkovic**, University of Waterloo (1125-VF-1377)

8:15AM
▶ (1593) *Dragon placement problems.* Preliminary report. **Doug Chatham**, Morehead State University (1125-VF-1543)

8:30AM
Break

8:45AM
▶ (1594) *Coloring graphs and their complements.* **Peter Maceli**, Canisius College (1125-VF-1745)

9:00AM
(1595) *A Categorical Reformulation of the Reconstruction Conjectures.* **Demitri Plessas***, Northeastern State University, and **Tien Chih**, Newberry College (1125-VF-1842)

9:15AM
▶ (1596) *Rainbow Hamiltonian-Connected Graphs.* **Zhenming Bi**, Western Michigan University (1125-VF-1946)

9:30AM
(1597) *Chorded Pancyclicity.* **Megan Cream**, Spelman College (1125-VF-1989)

9:45AM
(1598) *An informative invariant: the neighborhood degree list.* **Elizabeth Donovan**, Murray State University (1125-VF-2300)

10:00AM
(1599) *Color-blind index, computational complexity, and hypergraphs.* **Jennifer Diemunsch**, St. Vincent College, **Nathan Graber**, University of Colorado, Denver, **Lucas Kramer**, Bethel College, **Victor Larsen***, Kennesaw State University, **Lauren Nelsen**, University of Denver, **Luke Nelsen**, **Devon Sigler**, University of Colorado, Denver, **Derrick Stolee**, Microsoft, and **Charlie Suer**, Centre College (1125-VF-2368)

10:15AM
(1600) *Set-Sized Packing on Graphs.* Preliminary report. **Miranda Bowie***, University of North Alabama, **Louis Sewell**, Northrop Grumman / University of Alabama in Huntsville, and **Anne Sinko**, College of St. Benedict and St. John's University (1125-VF-2627)

10:30AM
▶ (1601) *Computer-aided investigation of coloring graphs under rainbow connection.* Preliminary report. **Janet Fierson*** and **Eric Frazier III**, La Salle University (1125-VF-3021)

10:45AM
▶ (1602) *The Critical Group of KG(n,2).* Preliminary report. **Ian M Hill*** and **Josh E Ducey**, James Madison University (1125-VF-362)

MAA *General Contributed Paper Session on Other Topics, II*

8:00 AM – 10:55 AM   Roswell, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

8:00AM
▶ (1603) *Enhanced Student Learning with Bi-weekly MINITAB Labs in Statistics.* Preliminary report. **Dan L. Seth**, West Texas A&M University, Department of Mathematics, Canyon, TX (1125-VW-2241)

8:15AM *Behavior of Residuated Maps with respect*
(1604) *to the Way-Below Relation.* Preliminary
report.
Ryan Luke, University of Louisville
(1125-VW-2525)

8:30AM *Connecting the Math and Science*
▶ (1605) *Practices.* Preliminary report.
Kimberly Muller, Lake Superior State
University (1125-VW-2629)

8:45AM *How to Choose a Graduate School in*
▶ (1606) *Mathematics.*
Paul R. Bialek, Trinity International
University (1125-VW-3140)

9:00AM *The Discrete Sheffer Sequences and*
(1607) *Schrodinger Form.*
Jennifer K Ulrich, Penn State Behrend
(1125-VW-2789)

9:15AM *"It Does Matter How You Slice It: The*
▶ (1608) *Combinatorics of Pizza-Slicing".*
John Robert Botzum, Kutztown
University (1125-VW-2799)

9:30AM *Stochastic Social Network Model for the*
▶ (1609) *Dissemination of Ideas.*
Tucker L. Dowell*, **Daniel Biles** and
Glenn Acree, Belmont University
(1125-VW-2827)

9:45AM *Supplemental Instruction Shaping*
▶ (1610) *Student Success.*
Brandon Samples*, Georgia College, and
Emily Baum, University of Georgia
(1125-VW-2880)

10:00AM *Measuring and Testing Central Symmetry*
▶ (1611) *in Bivariate Settings.* Preliminary report.
Sheida Riahi* and **Prakash Patil**,
Mississippi State University
(1125-VW-2914)

10:15AM *Categorization of all Newton maps of*
(1612) *rational functions conjugate to quadratic*
polynomials.
Erin E. Williams, University of Central
Oklahoma (1125-VW-3018)

10:30AM *New Directions for Developmental*
(1613) *Mathematics in Community Colleges.*
Susan Licwinko*, **Jean W. Richards**,
Daniela Bardac-Vlada and **Lucio M-G
Prado**, BMCC, The City University of New
York (1125-VW-2765)

10:45AM *Irish mathematicians in American*
▶ (1614) *mathematics–a historical perspective.*
Preliminary report.
Colm Mulcahy, Spelman College
(1125-VW-1763)

MAA General Contributed Paper Session on Topology, II

8:00 AM – 10:55 AM   **Kennesaw, Conference**
                            Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena
College
Kimberly Presser,
Shippensburg University
Melvin Royer, Indiana
Wesleyan University

8:00AM *Infinite Families of Non-Stein Rational*
(1615) *Balls.* Preliminary report.
Luke Morgan Williams, Kansas State
University (1125-VU-2616)

8:15AM *Localization of Coarse Structures.*
(1616) Preliminary report.
Ryan J Jensen, University of Tennessee
(1125-VU-2617)

8:30AM *In Search of Class Representatives for*
(1617) *SU-Cobordism.*
John E Mosley, Phillips Exeter Academy
(1125-VU-2640)

8:45AM *The Reidemeister trace in pictures.*
(1618) **Cary Malkiewich**, University of Illinois at
Urbana-Champaign (1125-VU-2660)

9:00AM *Realizing Incompressible 3-Manifolds in*
(1619) *Stable 4-Manifolds.* Preliminary report.
Qayum Khan and **Gerrit Smith***, Saint
Louis University (1125-VU-2776)

9:15AM *Alternating Minimum Braids and*
▶ (1620) *Caterpillar Graphs.* Preliminary report.
Ik Jae Lee* and **Hieu D Nguyen**, Rowan
University (1125-VU-2985)

9:30AM *Decompositions of multi-crossing link*
▶ (1621) *complements into bipyramids.*
Colin Adams, Williams College, and
Gregory Kehne*, Cambridge, MA
(1125-VU-3051)

9:45AM *Schema as a theoretical framework.*
▶ (1622) Preliminary report.
Ashley Berger* and **sepideh Stewart**,
University of Oklahoma (1125-VU-2958)

10:00AM *The Hungarian Horntail (THH) and Other*
▶ (1623) *Mathematical Beasts.* Preliminary report.
Juan S. Villeta-Garcia, University of
Illinois at Urbana-Champaign
(1125-VU-3099)

10:15AM *Classifying Tangles Using Invariants.*
▶ (1624) Preliminary report.
Christine Caples, University of Iowa
(1125-VU-3117)

10:30AM *Finite-type invariants for virtual knots.*
(1625) **Nicolas Petit**, Oberlin College
(1125-VU-323)

10:45AM *Widely-connected sets in the*
(1626) *bucket-handle continuum.*
David Sumner Lipham, Auburn
University (1125-VU-2227)

SIAM Minisymposium on Recent Advances in Uncertainty Quantification

8:00 AM – 10:55 AM   **A703, Atrium**
                            Level, Marriott Marquis

Organizers: **Noemi Petra**, University of
California, Merced
Juan C Meza, University of
California, Merced

8:00AM *Recent advances in probabilistic*
(1627) *modeling for multiscale and multiphysics*
problems.
Roger Ghanem, University of Southern
California (1125-65-3155)

8:30AM *Uncertainty Quantification with Model*
(1628) *Error.*
Habib Najm*, **Khachik Sargsyan**, **Xun Huan**, **Joseph Oefelein**, **Guilhem Lacaze** and **Zachary Vane**, Sandia National Laboratories (1125-62-1920)

9:00AM *Measure transport, variational inference,*
(1629) *and low-dimensional maps.*
Daniele Bigoni, Massachusetts Institute of Tehcnology, **Youssef Marzouk*** and **Alessio Spantini**, Massachusetts Institute of Technology (1125-62-3119)

9:30AM *Inverse problem of cerebral*
(1630) *hemodynamics with model uncertainty.*
Jamie Prezioso*, **Daniela Calvetti** and **Erkki Somersalo**, Case Western Reserve University (1125-92-1838)

10:00AM *Bayesian Inverse Problems Governed by*
▶ (1631) *Stochastic PDE Models.*
Umberto Villa*, **Peng Chen** and **Omar Ghattas**, Institute for Computational Engineering and Sciences, The University of Texas at Austin (1125-65-2390)

10:30AM *Scalable algorithms for D-optimal design*
(1632) *of experiments for large-scale Bayesian linear inverse problems.*
Alen Alexanderian* and **Arvind K Saibaba**, North Carolina State University (1125-62-2932)

Project NExT Workshop

8:00 AM – 6:00 PM   **Regency Ballroom VI, Ballroom Level, Hyatt Regency**

MAA Panel

8:00 AM – 9:20 AM   **International 5, International Level, Marriott Marquis**

Developing the MAA Instructional Practices Guide

Organizer: **Martha Abell**, Georgia Southern University

Moderator: **Linda Braddy**, Tarrant County Community College

Panelists: **Ben Braun**, University of Kentucky

Lew Ludwig, Denison University

Julie Phelps, Valencia College

Hortensia Soto, University of Northern Colorado

Employment Center

8:00 AM – 5:30 PM   **Centennial Ballroom, Ballroom Level, Hyatt Regency**

AMS Contributed Paper Session on Mathematical Biology, I

8:15 AM – 10:55 AM   **International B, International Level, Marriott Marquis**

8:15AM *An All-Encompassing Global Convergence*
▶ (1633) *Result for Processive Multisite Phosphorylation Systems.*
Mitchell J Eithun*, Ripon College, and **Anne Shiu**, Texas A&M University (1125-92-508)

8:30AM *Determining important Zika outbreak*
▶ (1634) *characteristics via Approximate Bayesian Computation for epidemics in South and Central America.* Preliminary report.
Deborah Shutt*, Colorado School of Mines, **Carrie Manore**, **Sara Y. Del Valle**, Los Alamos National Lab, **Aaron Porter** and **Stephen Pankavich**, Colorado School of Mines (1125-92-573)

8:45AM *Stochastic Modeling of*
(1635) *Phytoplankton-Zooplankton Interactions.*
T.MIhiri M. De Silva* and **Sophia R Jang**, Texas Tech University (1125-92-633)

9:00AM *PDE models for messenger RNA*
(1636) *localization in Xenopus (frog) oocytes.*
Maria-Veronica Ciocanel*, **Bjorn Sandstede** and **Kimberly Mowry**, Brown University (1125-92-737)

9:15AM *Modeling the Collective Behavior of Ants*
▶ (1637) *on Uneven Terrain.* Preliminary report.
Matthew A Moreno*, University of Puget Sound, **Jason M Graham**, University of Scranton, and **S Garnier**, New Jersey Institute of Technology (1125-92-970)

9:30AM *Transient Induced Global Response*
▶ (1638) *Synchronization: Dispositional Cellular Automata.*
William Sulis, McMaster University (1125-92-996)

9:45AM *Agent-based mathematical modeling as a*
(1639) *tool for estimating Trypanosoma cruzi vector–host contact rates.*
Kamuela E Yong, University of Hawaii - West Oahu (1125-92-1012)

10:00AM *Tear Film Dynamics: Modeling the*
▶ (1640) *Glycocalyx as a Poroelastic Region.*
Antonio Mastroberardino*, Penn State Erie, **Javed I Siddique**, Penn State York, **Richard J Braun**, University of Delaware, and **Daniel M Anderson**, George Mason University (1125-92-1030)

10:15AM *A nested model of tumor growth tuned*
(1641) *across multiple experiments.*
D. I. Wallace, Dartmouth College (1125-92-1059)

10:30AM *On the road to eliminating cART for HIV.*
(1642) Preliminary report.
Seema Nanda*, **Vardayani Ratti** and **Dorothy Wallace**, Dartmouth College (1125-92-1093)

10:45AM *A shadow detector for photosynthesis*
▶ (1643) *efficiency.*
Kang-Ling Liao*, Department of Biology
and Department of Pharmacology,
The University of North Carolina at
Chapel Hill, **Roger D. Jones**, Center for
Complex Systems and Enterprises,
Stevens Institute of Technology,
Patrick McCarter, Departments of
Pharmacology, University of North
Carolina at Chapel Hill, Chapel Hill,
Meral Tunc-Ozdemir, **James A.
Draper**, Departments of Biology,
University of North Carolina at Chapel
Hill, Chapel Hill, **Timothy C. Elston**,
Departments of Pharmacology, University
of North Carolina at Chapel Hill, Chapel
Hill, **David Kramer**, Plant Research
Laboratory Michigan State University,
East Lansing, Michigan, and **Alan M.
Jones**, Departments of 1Biology and
2Pharmacology, University of North
Carolina at Chapel Hill, Chapel Hill
(1125-92-1249)

AMS Contributed Paper Session on Topics in Analysis, II

8:15 AM – 10:25 AM   **Techwood, Conference
Level, Hyatt Regency**

8:15AM *The Maximum Length of k-bounded,*
▶ (1644) *t-avoiding Zero-sum Sequences over $\mathbb{Z}$.*
Aaron Berger, Yale University
(1125-40-430)

8:30AM *Approximation of functions with values*
▶ (1645) *in general and specific L-spaces.*
Vira Babenko, Ithaca College
(1125-41-257)

8:45AM *Scalable frames generated by actions of*
(1646) *iterative operators.*
Roza Aceska*, Ball State University, and
Yeon Hyang Kim, Central Michigan
University (1125-41-292)

9:00AM *Solution of fractional differential*
(1647) *equations by polynomial series.*
Mohsen Razzaghi, Mississippi State
University (1125-41-723)

9:15AM *Interpolation in Shifted Function Spaces.*
(1648) **Keaton Hamm**, Department of
Mathematics, Vanderbilt University
(1125-41-1050)

9:30AM *An extension of Lagrange-Burman*
▶ (1649) *Inversion with Application to Positioning*
via Delayed Signals.
Erik I Verriest, Georgia Institute
of Technology, School of ECE
(1125-41-1710)

9:45AM *A Mesh-free Approach to Estimating the*
(1650) *Fractional Laplacian via Radial Basis*
Functions.
Joel A Rosenfeld*, **Spencer A Rosenfeld**
and **Warren E Dixon**, University of
Florida (1125-41-2748)

10:00AM *Some complexity results in the theory of*
▶ (1651) *normal numbers.*
Dylan Airey*, University of Texas at
Austin, **Steve Jackson**, University of
North Texas, and **Bill Mance**, Polish
Academy of Sciences (1125-41-2904)

10:15AM *The Reconstruction of The Band-limited*
(1652) *Functions of Polynomial Growth with*
minimal Oversampling.
Hussain Y. Al-Hammali, Oregon State
University (1125-41-3095)

MAA Session on Revitalizing Complex Analysis

8:20 AM – 10:55 AM   **M304, Marquis
Level, Marriott Marquis**

Organizers: **Russell W. Howell**,
Westmont College

Paul Zorn, St. Olaf College

8:20AM *If you believe in real numbers and*
▶ (1653) *matrices, then you believe in complex*
arithmetic!
Stephan Ramon Garcia, Pomona College
(1125-N5-251)

8:40AM *Complex Analysis in the Transition*
▶ (1654) *(Proofs) Course.*
William W Johnston, Butler University
(1125-N5-1948)

9:00AM *Harnessing student interest to present*
(1655) *applications of Complex Analysis.*
Preliminary report.
Kristin A. Camenga, Juniata College
(1125-N5-1547)

9:20AM *The Domain-Coloring Algorithm and the*
▶ (1656) *Argument Principle.*
Frank A. Farris, Santa Clara University
(1125-N5-2424)

9:40AM *Complex analysis in action: Introducing*
▶ (1657) *the novel Fokas' transform method to*
our undergraduates. Preliminary report.
Zhengqing Chen* and **Scott Fulton**,
Math Department, Clarkson University
(1125-N5-2228)

10:00AM *Using applications to understand*
▶ (1658) *complex analysis concepts.*
Beth Schaubroeck, U.S. Air Force
Academy (1125-N5-2033)

10:20AM *Unimodular Roots of Trinomials and*
▶ (1659) *Connections to Cyclotomic Polynomials.*
Preliminary report.
Michael A. Brilleslyper, U. S. Air Force
Academy (1125-N5-2055)

10:40AM *The Count of Monte Disco.* Preliminary
▶ (1660) report.
Russell W. Howell and **David N Kyle***,
Westmont College (1125-N5-1379)

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AMS-MAA Grad School Fair

8:30 AM – 10:30 AM **Marquis Ballroom, Marquis Level, Marriott Marquis**

Undergrads! Take this opportunity to meet representatives from mathematical science graduate programs.

MAA Retiring Presidential Address

9:00 AM – 9:50 AM **Atrium Ballroom, Atrium Level, Marriott Marquis**

▶ (1661) *Mathematics For Human Flourishing.* **Francis Edward Su**, Harvey Mudd College (1125-A0-2731)

ASL Invited Address

9:00 AM – 9:50 AM **A707, Atrium Level, Marriott Marquis**

(1662) *Hypergraph Regularity, Ultraproducts, and a Game Semantics.* **Henry P. Towsner**, University of Pennsylvania (1125-03-127)

MAA Minicourse #8: Part B

9:00 AM – 11:00 AM **L508, Lobby Level, Marriott Marquis**

(Re)Designing Your Own Mathematics Course using Backwards Course Design

Presenters: **Joel Kilty**, Centre College

Alex M. McAllister, Centre College

MAA Minicourse #4: Part B

9:00 AM – 11:00 AM **L504 & L505, Lobby Level, Marriott Marquis**

Incorporating Randomization Methods into Introductory Statistics

Presenters: **Patti Frazer Lock**, St. Lawrence University

Robin H. Lock, St. Lawrence University

Allan Rossman, California Polytechnic State University, San Luis Obispo

Beth Chance, California Polytechnic State University, San Luis Obispo

Soma Roy, California Polytechnic State University, San Luis Obispo

MAA Minicourse #12: Part B

9:00 AM – 11:00 AM **L506 & L507, Lobby Level, Marriott Marquis**

Teaching Introductory Statistics, GAISE 2016

Presenter: **Carolyn K. Cuff**, Westminster College

Exhibits and Book Sales

9:30 AM – 5:30 PM **Grand Hall, Exhibit Level, Hyatt Regency**

MAA Panel

9:35 AM – 10:55 AM **International 5, International Level, Marriott Marquis**

Insights from MAA studies of College Algebra, Precalculus, and Calculus

Organizers: **David Bressoud**, Macalester College

Marilyn Carlson, Arizona State University

Panelists: **Jess Ellis**, Colorado State University

Bernie Madison, University of Arkansas

Chris Rasmussen, San Diego State University

Michael Tallman, Oklahoma State University

Project NExT Workshop

9:55 AM – 11:10 AM **Regency Ballroom VI, Ballroom Level, Hyatt Regency**

Technology for Teaching: GeoGebra Implementation for the Calculus Sequence

Organizers: **Ibukun Amusan**, Kentucky State University

Shihwei Chao, University of North Georgia

Nicole Panza, Francis Marion University

Na Lu, Lawrence Technological University

Presenters: **Gabriela Dumitrascu**, Eastern Michigan University

Constantin Dumitrascu, Adrian College

ASL Invited Address

10:00 AM – 10:50 AM **A707, Atrium Level, Marriott Marquis**

(1663) *Measurable chromatic numbers.* **Clinton Conley**, Carnegie Mellon University (1125-03-120)

AMS Invited Address

10:05 AM – 10:55 AM   **Atrium Ballroom, Atrium Level, Marriott Marquis**

(1664)   *A tale of rigidity and flexibility - discrete subgroups of higher rank Lie groups.* **Anna Wienhard**, Ruprecht-Karls-Universität Heidelberg (1125-22-2556)

Radical Dash Prize Session

10:30 AM – 11:00 AM   **International 7, International Level, Marriott Marquis**

Organizers: **Stacey Muir**, University of Scranton

       Janine Janoski, Kings College

AMS-MAA Invited Address

11:10 AM – NOON   **Atrium Ballroom, Atrium Level, Marriott Marquis**

▶ (1665)   *Distance Correlation: A New Tool for Detecting Association and Measuring Correlation Between Data Sets.* **Donald Richards**, Penn State University (1125-62-777)

AMS Colloquium Lectures: Lecture III

1:00 PM – 1:50 PM   **Atrium Ballroom, Atrium Level, Marriott Marquis**

(1666)   *The focusing energy critical wave equation: the non-radial case.* **Carlos E. Kenig**, University of Chicago (1125-35-298)

ASL Invited Address

1:00 PM – 1:50 PM   **A707, Atrium Level, Marriott Marquis**

(1667)   *On existential definability of C.E. sets over function rings of characteristic 0.* Preliminary report. **Alexandra Shlapentokh**, East Carolina University (1125-03-124)

MAA Lecture for Students

1:00 PM – 1:50 PM   **Regency Ballroom VII, Ballroom Level, Hyatt Regency**

▶ (1668)   *Take what you have gathered from coincidence: understanding and using randomness.* **Matthew Richey**, St. Olaf College (1125-A0-602)

Current Events Bulletin

1:00 PM – 4:45 PM   **Imperial Ballroom A, Marquis Level, Marriott Marquis**

Organizer: **David Eisenbud**, MSRI and UC Berkeley

1:00PM (1669)   *Black hole formation and stability: a mathematical investigation.* **Lydia R. Bieri**, University of Michigan (1125-35-976)

2:00PM (1670)   *Hodge Theory in Combinatorics.* **Matt Baker**, Georgia Tech (1125-05-1150)

3:00PM ▶ (1671)   *Tao's work on the Erdos discrepancy problem.* **Kannan Soundararajan**, Stanford University (1125-11-1156)

4:00PM ▶ (1672)   *Statistical proof and the problem of irreproducibility.* **Susan Holmes**, Stanford University (1125-62-1304)

AMS-AWM Special Session on Symplectic Geometry, Moment Maps and Morse Theory, II

1:00 PM – 5:50 PM   **International C, International Level, Marriott Marquis**

Organizers: **Lisa Jeffrey**, University of Toronto

       Tara Holm, Cornell University

1:00PM (1673)   *Beyond toric blow-ups.* **Sonja Hohloch**, University of Antwerp, **Silvia Sabatini**, University of Cologne, **Daniele Sepe**, Federal Fluminense University, and **Margaret Symington***, Mercer University (1125-53-2941)

1:30PM (1674)   *GKM graphs for odd dimensional manifolds with torus actions.* **Chen He**, Northeastern University (1125-53-844)

2:00PM (1675)   *Convexity property of Hamiltonian transversely symplectic manifolds.* **Yi Lin**, Georgia Southern University (1125-53-762)

2:30PM (1676)   *Norm-square localization for Hamiltonian LG-spaces.* Preliminary report. **Yiannis Loizides*** and **Eckhard Meinrenken**, University of Toronto (1125-53-1577)

3:00PM (1677)   *Dirac geometry of folded symplectic and b-symplectic structures.* **Geoffrey Scott**, University of Toronto (1125-53-2984)

3:30PM (1678) C^0-*characterization of symplectic embeddings via Lagrangian embeddings.* **Stefan Müller**, Georgia Southern University (1125-53-101)

4:00PM *Product Structures for Generating Family*
(1679) *Cohomology of Legendrian Submanifolds.*
Preliminary report.
Ziva Myer, Bryn Mawr College
(1125-53-1053)

4:30PM *On Fillability of Higher Dimensional*
(1680) *Contact Manifolds Supporting Iterated*
Planar Open Books.
Bahar Acu, University of Southern
California and University of California,
Los Angeles (1125-53-176)

5:00PM *Symplectic and Contact Imprimitivity.*
(1681) **François Ziegler**, Georgia Southern
University (1125-53-3063)

5:30PM Discussion

AMS Special Session on Advances in Operator Algebras, II

1:00 PM – 5:50 PM **International 9, International
Level, Marriott Marquis**

Organizers: **Michael Hartglass**,
University of California,
Riverside
David Penneys, University
of California, Los Angeles
Elizabeth Gillaspy,
University of Colorado,
Boulder

1:00PM *Actions of amenable groups on the*
(1682) *Cantor set and their crossed products.*
David Kerr, Texas A&M University
(1125-46-1616)

1:30PM *Free Stein kernels and an improvement of*
(1683) *the free logarithmic Sobolev inequality.*
Brent Nelson* and **Max Fathi**, University
of California, Berkeley (1125-46-1918)

2:00PM *Wavelets associated to representations of*
(1684) *higher-rank graph algebras.* Preliminary
report.
Judith A. Packer, University of Colorado,
Boulder (1125-46-2978)

2:30PM *Centrally Large Subalgebras and Tracial*
(1685) $\mathcal{Z}$-*Absorption.*
Dawn E. Archey*, University of Detroit
Mercy, **Julian Buck**, Francis Marion
University, and **N. Christopher Phillips**,
University of Oregon (1125-46-2911)

3:00PM *Convergence of Quotients of AF Algebras*
(1686) *in Quantum Propinquity by Convergence*
of Ideals.
Konrad Aguilar, University of Denver
(1125-46-488)

3:30PM *Minimal faces and Schur's Lemma for*
(1687) *embeddings into R^u.*
Scott A. Atkinson, Vanderbilt University
(1125-46-2185)

4:00PM *Trivalent categories.*
(1688) **Noah Snyder**, Indiana University
(1125-46-363)

4:30PM *Generalized fixed points of conformal*
(1689) *nets.*
Marcel Bischoff, Vanderbilt University
(1125-81-966)

5:00PM *Weak*-rigged modules over dual*
(1690) *operator algebras and the Picard group.*
Upasana Kashyap, Regis College
(1125-46-669)

5:30PM *From skein theory to presentation for*
(1691) *Thompson group.*
Yunxiang Ren, Vanderbilt University
(1125-46-1090)

AMS Special Session on ApREUF: Applied Research Experience for Undergraduate Faculty

1:00 PM – 5:50 PM **M106 & M107, Marquis
Level, Marriott Marquis**

Organizers: **Shenglan Yuan**, LaGuardia
Community College, CUNY
Jason Callahan, St. Edwards
University
Eva Strawbridge, James
Madison University
Ami Radunskaya, Pomona
College

1:00PM *Analysis of a Coupled, n-Patch Population*
▶ (1692) *Model with Ceiling Density Dependence.*
Jason Callahan, St. Edward's University
(1125-91-858)

1:30PM *The growth of coefficients in certain PLFT*
▶ (1693) *(u, v)-Calkin-Wilf trees.* Preliminary
report.
**Sandie Han, Ariane M Masuda,
Satyanand Singh** and **Johann Thiel***,
New York City College of Technology
(1125-11-953)

2:00PM *Blocking the immune blockers: helping*
▶ (1694) *the immune system fight cancer.*
Ami Radunskaya, Pomona College
(1125-92-886)

3:00PM *The Enumeration of 132-Pattern*
▶ (1695) *Occurrences in Dumont Permutations of*
Length Four.
Chinenye Ofodile, Albany State
University (1125-05-908)

3:30PM *The Experience of Mentoring*
▶ (1696) *Undergraduate Researchers.* Preliminary
report.
Shenglan Yuan, LaGuardia Community
College, CUNY (1125-00-929)

4:00PM *Modeling the Sub-Saharan African*
▶ (1697) *Disease Onchocerciasis, a Commutative*
Algebraist's Perspective. Preliminary
report.
Rachelle Bouchat*, Indiana University of
Pennsylvania, **G. Ledder**, University
of Nebraska, **D. Sylvester**, Seattle
University, and **J. Thiel**, New York City
College of Technology (1125-92-874)

4:30PM *Modeling the Progression of Alzheimer's*
▶ (1698) *Disease.*
Adrienne Kinney, Abby Quirk-Royal
and **Ellen Swanson***, Centre College
(1125-92-642)

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5:00PM *The Proper Diameter of a Graph.*
► (1699) Preliminary report.
Vincent Coll, Lehigh University, **Jonelle Hook**, Mount St. Mary's University, **Colton Magnant**, Georgia Southern University, **Karen McCready***, King's College, PA, and **Kathleen Ryan**, DeSales University (1125-05-742)

5:30PM *Development and Analysis of a Worm-like*
► (1700) *Model.*
Eva Marie Strawbridge, James Madison University (1125-92-828)

AMS Special Session on Automorphic Forms and Arithmetic, II

1:00 PM – 4:45 PM   **Embassy E, International Tower, LL2, Hyatt Regency**

Organizers: **Frank Calegari**, University of Chicago
Ana Caraiani, Princeton University
Richard Taylor, Institute for Advanced Study

1:00PM *Special subvarieties of Shimura varieties.*
(1701) Preliminary report.
Keerthi Madapusi Pera, University of Chicago (1125-11-374)

2:00PM *On the Serre weights of certain* GSp_4
(1702) *valued Galois representations.*
George A Boxer, University of Chicago (1125-11-411)

3:00PM *Reciprocity maps with restricted*
(1703) *ramification.*
Romyar T. Sharifi, University of California, Los Angeles (1125-11-384)

4:00PM *On torsion in the cohomology of unitary*
(1704) *Shimura varieties.*
Ana Caraiani* and **Peter Scholze**, University of Bonn (1125-11-349)

AMS Special Session on Commutative Algebra: Research for Undergraduate and Early Graduate Students

1:00 PM – 5:45 PM   **M103 & 104, Marquis Level, Marriott Marquis**

Organizers: **Nicholas Baeth**, University of Central Missouri
Courtney Gibbons, Hamilton College

1:00PM *Examples of Undergraduate Research in*
► (1705) *Commutative Algebra.* Preliminary report.
Branden Stone, Adelphi University (1125-13-1222)

2:00PM *Rational Combinations of Betti Diagrams*
► (1706) *of Complete Intersection Modules.*
Michael T. Annunziata, Willamette Mathematics Consortium REU 2015, **Courtney R. Gibbons**, Hamilton College, **Cole Hawkins*** and **Alexander J. Sutherland**, Willamette Mathematics Consortium REU 2015 (1125-13-779)

2:30PM *Matroids on Commutative Rings.*
► (1707) Preliminary report.
Patrick M Phelps* and **Branden Stone**, Adelphi University (1125-13-1187)

3:00PM *Understanding the Relationship Between*
► (1708) *Local Rings and Their Completions: Contributions by Undergraduates.*
Preliminary report.
Susan Loepp, Williams College (1125-13-351)

4:00PM *Strange Formal Fibers: A*
► (1709) *Counterexample.*
Sarah M. Fleming, Williams College, **Lena Ji***, Princeton University, **S. Loepp**, **Peter M. McDonald**, **Nina Pande**, Williams College, and **David Schwein**, University of Michigan (1125-13-974)

4:30PM *Strange Formal Fibers: An Excellent*
► (1710) *Counterexample.*
Sarah M. Fleming, Williams College, **Lena Ji**, Princeton University, **S. Loepp**, Williams College, **Peter M. McDonald**, Boston, MA, **Nina Pande***, Williams College, and **David Schwein**, University of Michigan (1125-13-1174)

5:00PM *REU projects involving non-unique*
► (1711) *factorization in integral domains and monoids: Past, Present, and Future.*
Preliminary report.
Scott T Chapman, Sam Houston State University (1125-13-600)

AMS Special Session on Discrete Geometry and Convexity (Dedicated to András Bezdek on the occasion of his 60th birthday), II

1:00 PM – 5:50 PM   **International 3, International Level, Marriott Marquis**

Organizers: **Krystyna Kuperberg**, Auburn University
Gergely Ambrus, Renyi Institute of Mathematics
Braxton Carrigan, Southern Connecticut State University
Ferenc Fodor, University of Szeged

1:00PM *Packings of Regular Pentagons in the*
► (1712) *Plane.*
Thomas Hales*, University of Pittsburgh, and **Wöden Kusner**, Graz University of Technology (1125-52-928)

1:30PM *Critical packings, rigidity, and the radius*
► (1713) *function.* Preliminary report.
Woden Kusner, Graz University of Technology (1125-52-904)

2:00PM *Minimal spherical representation of*
► (1714) *graphs.*
Oleg R Musin, University of Texas Rio Grande Valley (1125-52-468)

2:30PM *Contact graphs of ball packings.*
► (1715) **Alexey Glazyrin**, University of Texas Rio Grande Valley (1125-52-460)

▶ 3:00PM (1716) *Helly numbers for crystals and cut-and-project sets.*
Alexey Garber, The University of Texas Rio Grande Valley (1125-52-459)

▶ 3:30PM (1717) *Variants on Helly's Theorems over Algebraic Subsets of $\mathbb{R}^d$.* Preliminary report.
Déborah Oliveros, Instituto de Matemáticas, Universidad Nacional Autónoma de México, UNAM (1125-52-340)

▶ 4:00PM (1718) *Rotors in triangles and tetrahedra.* Preliminary report.
Luis Montejano, National University at Queretaro (1125-05-1042)

▶ 4:30PM (1719) *On the Bounds of a Golden Triangulation Refinements.*
Braxton A Carrigan*, Southern Connecticut State University, and **Bruce W Atkinson**, Samford University (1125-52-1750)

5:00PM (1720) *A discrete version of Koldobsky's slicing inequality.*
Matthew Alexander*, Kent State University, **Martin Henk**, Technische Universität Berlin, and **Artem Zvavitch**, Kent State University (1125-52-829)

5:30PM (1721) *Aspects of soft ball packings.*
Karoly Bezdek*, University of Calgary, and **Zsolt Langi**, University of Technology, Inst. of Math., Budapest, Hungary (1125-52-2245)

AMS Special Session on Dynamics of Fluids and Nonlinear Waves

1:00 PM – 5:50 PM   **Embassy F, International Tower, LL2, Hyatt Regency**

Organizers: **Zhiwu Lin**, Georgia Institute of Technology

Jiayin Jin, Georgia Institute of Technology

Chongchun Zeng, Georgia Institute of Technology

1:00PM (1722) *Analyzing the stability spectrum for elliptic solutions of the focusing NLS equation.*
Bernard Deconinck* and **Benjamin L Segal**, Applied Mathematics, University of Washington (1125-33-1387)

1:30PM (1723) *Transverse instability in Kadomtsev-Petviashvili (KP), rotation-modified KP and full-dispersion KP equations.*
Vera Mikyoung Hur, University of Illinois at Urbana-Champaign, **Mathew A. Johnson**, University of Kansas, Lawrence, and **Ashish Kumar Pandey***, University of Illinois at Urbana-Champaign (1125-35-1331)

2:00PM (1724) *Orbital Stability of Standing Waves for Dispersive Models with Nonlocal Nonlinearity.* Preliminary report.
Shijun Zheng, Georgia Southern University (1125-35-2479)

2:30PM (1725) *The Maslov index, spectral flow, Hadamard formula: recent advances.*
Yuri Latushkin, University of Missouri, and **Alim Sukhtayev***, Indiana University (1125-35-471)

3:00PM (1726) *Long-time dynamics of solutions to the focusing energy-critical heat equation.*
Dimitrios Roxanas, University of British Columbia (1125-35-333)

3:30PM (1727) *Stability of quasiperiodic solutions to nonlinear Schrödinger type equations.*
Jared C Bronski, University of Illinois (1125-35-2956)

4:00PM (1728) *Dynamical Structures near the solitary waves of the supercritical gKDV equation.*
Jiayin Jin*, **Zhiwu Lin** and **Chongchun Zeng**, Georgia Institute of Technology (1125-35-2112)

4:30PM (1729) *On the ground states for the generalized Hartree problem.*
Atanas Stefanov, University of Kansas (1125-35-927)

5:00PM (1730) *Multilocality and fusion rules on the generalized structure functions in two-dimensional and three-dimensional Navier-Stokes turbulence.*
Eleftherios Gkioulekas, University of Texas Rio Grande Valley (1125-76-146)

5:30PM (1731) *Dynamics of energy critical wave equations.*
Hao Jia, Institute for Advanced Study (1125-35-1727)

AMS Special Session on Inverse Problems and Applications, II

1:00 PM – 5:50 PM   **Inman, Conference Level, Hyatt Regency**

Organizers: **Vu Kim Tuan**, University of West Georgia

Amin Boumenir, University of West Georgia

1:00PM (1732) *An inverse problem for the zeta function and the Cramer prime gap conjecture.* Preliminary report.
Ian W. Knowles, University of Alabama at Birmingham (1125-34-208)

▶ 1:30PM (1733) *Inverse Problems for Krein's String.*
Sergei Avdonin*, University of Alaska Fairbanks, and **Fadhed Al-Musallam**, Kuwait University (1125-35-1031)

2:00PM (1734) *An Inverse Spectrum Problem for Infinite Graphs and Applications.*
Keivan Hassani Monfared, University of Calgary, and **Ehssan Khanmohammadi***, Franklin and Marshall College (1125-46-3028)

2:30PM (1735) *Stability for the inverse resonance problem for the CMV operator.*
Rudi Weikard, University of Alabama at Birmingham (1125-39-715)

3:00PM (1736) *Uniqueness for an Inverse problem in electromagnetism with partial data.*
B Malcolm Brown*, Cardiff University, UK, **Marco Marletta**, Cardiff University UK, and **Juan Reves**, Madrid Spain (1125-34-450)

3:30PM (1737) *Groeger-Meyers's estimate and justification of the enclosure method for the Maxwell system.*
Mourad Sini, Radon Institute, Austrian Academy of Sciences (1125-35-186)

4:00PM (1738) *Image Reconstruction from Compton Camera Data.*
Fatma Terzioglu* and **Peter Kuchment**, Texas A&M University (1125-44-141)

4:30PM (1739) *Seafloor identification in sonar imagery via simulations of Helmholtz equations.* Preliminary report.
Christina A Frederick*, Georgia Institute of Technology, **Quyeh Hyunh**, **Bjorn Engquist**, University of Texas at Austin, and **Haomin Zhou**, Georgia Institute of Technology (1125-86-819)

▶ 5:00PM (1740) *Optical detection and heat generation for plasmonic nanoparticles.* Preliminary report.
Habib Ammari, **Francisco Romero**, ETH Zurich, and **Matias Ruiz***, ENS Paris (1125-31-1747)

5:30PM (1741) *Approximate Cloaking for Maxwell equations via Transformation Optics: Non-resonant and Resonant Phenomena.*
Loc Xuan Tran*, Ecole Polytechnique Federale de Lausanne (EPFL), and **Minh Hoai Nguyen**, EPFL (1125-44-1013)

AMS Special Session on Mapping Class Groups and their Subgroups, II

1:00 PM – 5:50 PM   **Dunwoody, Conference Level, Hyatt Regency**

Organizers: **James W. Anderson**, University of Southampton, UK

Aaron Wootton, University of Portland

1:00PM (1742) *Lifting Homeomorphisms and Cyclic Branched Covers of the Sphere.*
Tyrone Ghaswala, University of Waterloo, and **Rebecca Winarski***, University of Wisconsin-Milwaukee (1125-57-145)

1:30PM (1743) *Fox calculus in Galois theory.*
Rachel Davis, University of Wisconsin-Madison (1125-20-1411)

2:00PM (1744) *Adjoining Roots and Rational Powers of Generators in $PSL(2,\mathbb{R})$ and Discreteness.*
Jane Gilman, Rutgers-Newark (1125-20-446)

2:30PM (1745) *Models for Mapping Class Groups.*
Tara Brendle, University of Glasgow, and **Dan Margalit***, Georgia Institute of Technology (1125-20-1330)

3:00PM (1746) *Ivanov's Metaconjecture: Automorphism Groups of Sufficiently Rich Complexes of Regions for Surfaces with Punctures.*
Alan McLeay, University of Glasgow (1125-22-1768)

3:30PM (1747) *The high-dimensional cohomology of congruence subgroups of the mapping class group.*
Neil Fullarton, Rice University, and **Andrew Putman***, University of Notre Dame (1125-55-514)

4:00PM (1748) *Convex cocompactness and stability in mapping class groups.*
Samuel J Taylor, Yale University (1125-57-463)

4:30PM (1749) *Holomorphic families of isomorphisms of Möbius groups.* Preliminary report.
Clifford J. Earle, Department of Mathematics, Cornell University, and **Sudeb Mitra***, Department of Mathematics, Queens College, CUNY and The Graduate Center, CUNY (1125-32-869)

5:00PM (1750) *Weierstrass Semigroups.*
Emma Previato, Boston University (1125-14-392)

5:30PM (1751) *Computational complexity and 3-manifolds and zombies.*
Eric G Samperton, UC Davis (1125-57-2239)

AMS Special Session on Operator Theory, Function Theory, and Models, I

1:00 PM – 5:50 PM   **International 4, International Level, Marriott Marquis**

Organizers: **William Ross**, University of Richmond

Alberto Condori, Florida Golf Coast University

1:00PM (1752) *Cyclic vectors in the Drury-Arveson space.* Preliminary report.
Stefan Richter, University of Tennessee (1125-47-780)

1:30PM (1753) *Trace class bounds for Schur multipliers.* Preliminary report.
Anna Skripka, University of New Mexico (1125-47-883)

2:00PM (1754) *Jentzsch-type theorems for optimal polynomial approximants.*
Catherine Beneteau*, **Dmitry Khavinson**, University of South Florida, **Constanze Liaw**, Baylor University, **Daniel Seco**, Universitat de Barcelona, and **Brian Simanek**, Baylor University (1125-30-1312)

2:30PM (1755) *Finite rank unitary perturbations.*
Constanze Liaw*, Baylor University, and **Sergei Treil**, Brown University (1125-47-621)

3:00PM *Operators and lattices.*
(1756) **Stephan Ramon Garcia**, Pomona College
(1125-47-255)

3:30PM *Applications of model-realization theory*
(1757) *to inverse problems in free probability.*
James Eldred Pascoe, Washington
University in St. Louis (1125-47-949)

4:00PM *Hardy Smirnov spaces of pseudo-analytic*
(1758) *functions.*
Elodie Pozzi, University of Bordeaux
(1125-35-1268)

4:30PM *Localized frames and their applications*
(1759) *to operator theory.* Preliminary report.
Mishko Mitkovski, Clemson University
(1125-47-1164)

5:00PM *Weighted Dirichlet integrals in the bidisk.*
(1760) Preliminary report.
Kelly Bickel, Bucknell University, and
Alan A. Sola*, Stockholm University
(1125-32-799)

5:30PM *Extreme points and saturated*
(1761) *polynomials.* Preliminary report.
Greg Knese, Washington University in St.
Louis (1125-32-1284)

AMS Special Session on Partition Theory and Related Topics, II

1:00 PM – 5:50 PM   **Embassy D, International Tower, LL2, Hyatt Regency**

Organizers: **Amita Malik**, University of Illinois at Urbana-Champaign

Dennis Eichhorn, University of California, Irvine

Tim Huber, University of Texas-Rio Grande Valley

1:00PM *The local distribution of the number of*
(1762) *small prime factors - variations of the classical theme.* Preliminary report.
Krishnaswami Alladi, University of Florida (1125-11-1796)

1:30PM *Parity similarity formulas for partitions*
(1763) *and multipartitions.*
William J Keith, Michigan Technological University (1125-05-1414)

2:00PM *Weighted partition identities and divisor*
▶ (1764) *sums.*
Frank Garvan, University of Florida
(1125-11-1576)

2:30PM *Infinite Families of Congruences for the*
▶ (1765) *Coefficients of Gaussian Polynomials.*
Brandt Kronholm, University of Texas Rio Grande Valley (1125-11-833)

3:00PM *Asymptotics and Congruences For*
(1766) *Partition Functions which Arise from Finitary Permutation Groups.*
Tessa Cotron*, **Robert Dicks**, Emory University, and **Sarah Fleming**, Williams College (1125-11-707)

3:30PM *The mock theta conjectures.*
(1767) **Nickolas Andersen**, UCLA
(1125-11-1118)

4:00PM *Some Hecke-Rogers type identities.*
(1768) **Liuquan Wang**, National University of Singapore, and **Ae Ja Yee***, Penn State (1125-11-2155)

4:30PM *t-Core Words and Their Use in Proving*
▶ (1769) *t-Core Identities.*
Hiram Golze, University of Illinois at Urbana-Champaign (1125-11-2482)

5:00PM *Core partitions into distinct parts and an*
▶ (1770) *analog of Euler's theorem.*
Armin Straub, University of South Alabama (1125-11-728)

5:30PM *A Combinatorial Proof of a Relationship*
(1771) *Between Maximal $(2k-1, 2k+1)$-cores and $(2k-1, 2k, 2k+1)$-cores.*
James A Sellers, Penn State University (1125-05-718)

AMS Special Session on Public School Districts and Higher Education Mathematics Partnerships, I

1:00 PM – 5:50 PM   **M301, Marquis Level, Marriott Marquis**

Organizers: **Virgil U. Pierce**, University of Texas Rio Grande Valley

Aaron Wilson, University of Texas Rio Grande Valley

1:00PM *School and University Collaboration:*
(1772) *Working Together to Provide Quality Support for Teachers.*
Fabiana Cardetti*, **Mary Truxaw** and **Megan Staples**, University of Connecticut (1125-97-2421)

1:30PM *Mathematical knowledge for teaching*
(1773) *and mathematical habits of mind in the NebraskaNOYCE program.* Preliminary report.
Wendy M Smith, **Yvonne Lai*** and **Lorraine Males**, University of Nebraska-Lincoln (1125-97-2186)

2:00PM *Partnerships to build algebraic thinking*
(1774) *for teaching: professional development across geographic and grade-level boundaries.*
Cody L Patterson*, The University of Texas at San Antonio, and **William McCallum**, The University of Arizona (1125-97-2681)

2:30PM *Math Circles: Circles for Students and*
▶ (1775) *Circles for Teachers. Circles Galore across the Nation!*
James S Tanton, Mathematical Association of America (1125-97-1526)

3:00PM *Writing the PK-12 Eureka/EngageNY*
▶ (1776) *Math Curriculum.*
Scott Baldridge, Louisiana State University (1125-97-1463)

3:30PM *Building a Graduate Certificate Program*
(1777) *for Dual-Credit Mathematics Teaching For High School Mathematics Teachers.* Preliminary report.
Judith Quander, University of Houston-Downtown (1125-97-639)

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4:00PM ▶ (1778) *WebWork for High School College Preparatory Mathematics Courses in Texas.*
Virgil U Pierce, University of Texas Rio Grande Valley (1125-97-416)

4:30PM (1779) *University and Public School Partnerships: Camps, curriculum, and teacher training.*
Hiroko Kawaguchi Warshauer*, **Max Leon Warshauer** and **Terence William McCabe**, Texas State University (1125-97-560)

5:00PM ▶ (1780) *Examples of Outreach Activities.* Preliminary report.
Sean D Lawton* and **Jack Love**, George Mason University (1125-97-1022)

5:30PM ▶ (1781) *A near-peer mathematical mentoring pipe-line from the secondary mathematics classroom to graduate studies in mathematics.*
Aaron T Wilson, University of Texas Rio Grande Valley (1125-97-2214)

AMS Special Session on Quantum Groups, II

1:00 PM – 3:50 PM   International 10, International Level, Marriott Marquis

Organizers: **Shuzhou Wang**, University of Georgia
Angshuman Bhattacharya, University of Georgia

1:00PM (1782) *Quantum symmetry of of classical spaces.*
Debashish Goswami, Indian Statistical Institute, Kolkata, India (1125-46-624)

2:00PM (1783) *No Quantum Symmetry from an algebraic point of view.*
Juan Cuadra, University of Almeria, **Pavel Etingof**, Massachusetts Institute of Technology, and **Chelsea Walton***, Temple University (1125-81-907)

2:30PM (1784) *Torsion-freeness of free quantum groups.*
Kenny De Commer, Vrije Universiteit Brussel (1125-81-623)

3:00PM (1785) *Vector Bundles over Multi-pullback Quantum Projective Spaces.* Preliminary report.
Albert Jeu-Liang Sheu, University of Kansas (1125-46-414)

3:30PM (1786) *Kirchberg's factorisation property for discrete quantum groups.*
Angshuman Bhattacharya* and **Shuzhou Wang**, University of Georgia (1125-46-817)

AMS Special Session on Quaternions

1:00 PM – 5:50 PM   International 8, International Level, Marriott Marquis

Organizers: **Johannes Familton**, Borough of Manhattan Community College
Terrence Blackman, Medgar Evers College

Chris McCarthy, Borough of Manhattan Community College

1:00PM ▶ (1787) *The eigenvalue problem for quaternionic and octonionic matrices.*
Tevian Dray* and **Corinne A. Manogue**, Oregon State University (1125-17-219)

1:30PM ▶ (1788) *Division algebra descriptions of rotation groups, with applications to physics.*
Corinne A. Manogue* and **Tevian Dray**, Oregon State University (1125-17-218)

2:00PM ▶ (1789) *The Joining of Quaternions with Grassmann algebras: William Kingdon Clifford.*
Johannes C. Familton, Borough of Manhattan Community College (1125-01-279)

2:30PM ▶ (1790) *Split quaternions and carcinogenesis.*
Garri Davydyan, Ottawa Hospital, Ottawa, Canada (1125-92-410)

3:00PM ▶ (1791) *Visualizing Gimbal Lock and Quaternions with the HTML5 Canvas.*
Paul R. Bouthellier, University of Pittsburgh-Titusville (1125-15-49)

3:30PM ▶ (1792) *Navigating the three-sphere via quaternions.*
Henry Segerman, Oklahoma State University (1125-68-77)

4:00PM ▶ (1793) *A categorical approach to the Cayley-Dickson construction.* Preliminary report.
Noson S. Yanofsky, Brooklyn College, CUNY (1125-18-83)

4:30PM ▶ (1794) *$\mathcal{A}$-Calculus on a Real Associative Algebra.*
James S Cook, Liberty University (1125-16-290)

5:00PM (1795) *Poisson Structures on Twistor Spaces of Hyperkähler and HKT Manifolds.*
Lisandra Hernandez-Vazquez*, Stony Brook University, and **Gueo Grantcharov**, Florida International University (1125-53-398)

5:30PM (1796) *Spectral correspondences for Maass waveforms on quaternion groups.*
Terrence Richard Blackman, Medgar Evers College, CUNY (1125-11-2105)

AMS Special Session on Real Discrete Dynamical Systems with Applications

1:00 PM – 5:50 PM   M101, Marquis Level, Marriott Marquis

Organizers: **M. R. S. Kulenovic**, University of Rhode Island
Abdul-Aziz Yakubu, Howard University

1:00PM (1797) *Difference equation models in population dynamics whose coefficients are subject to Darwinian evolution.*
J. M. Cushing, Department of Mathematics and Interdisciplinary Program in Applied Mathematics, University of Arizona (1125-39-1246)

1:30PM ► (1798) *Non-Standard Discretization of Models with the Allee Effect.* Preliminary report. **Eddy A Kwessi***, **Saber N Elaydi**, Trinity University, **Brian Dennis**, University of Idaho, and **George Livadiodis**, Southwest Research Institute (1125-39-1084)

2:00PM ► (1799) *Models of Reproductive Synchrony in Colonial Seabirds.* Preliminary report. **Shandelle M Henson**, Andrews University (1125-92-1096)

2:30PM ► (1800) *A Discrete-Time Nutrients-Phytoplankton-Oysters Model of a Bay Ecosystem.* Preliminary report. **Najat Ziyadi***, Morgan State University, and **Abdul-Aziz Yakubu**, Howard University (1125-39-1671)

3:00PM (1801) *Implications of inter-stage interactions for extinction and the Allee region in an age-structured population model.* **H Sedaghat***, Virginia Commonwealth Universtiy, and **N Lazaryan**, Richmond, Virginia (1125-39-1636)

3:30PM (1802) *A Proposal for an Application for a Max-Type Difference Equation.* Preliminary report. **Candace M. Kent***, Virginia Commonwealth University, and **Stevo Stevic**, Mathematical Institute of the Serbian Academy of Science (1125-39-496)

4:00PM ► (1803) *Dynamics of certain classes of nonlinear discontinuous difference equations.* Preliminary report. **Vlajko L Kocic**, Xavier University of Louisiana (1125-39-656)

4:30PM ► (1804) *Susceptible-Infected-Susceptible Model on Time Scales.* **Sabrina Heike Streipert***, Department of Wisconsin, Madison, and **Martin Bohner**, Missouri University of Science and Technology (1125-39-513)

5:00PM (1805) *Most General Fractional Self Adjoint Operator Representation formulae and Operator Poincare and Sobolev type and other basic Inequalities.* Preliminary report. **George A Anastassiou**, University of Memphis (1125-26-765)

5:30PM ► (1806) *Invariant Curves for Planar Competitive and Cooperative Maps.* Preliminary report. **Mustafa R. S. Kulenovic**, University of Rhode Island (1125-39-1024)

AMS Special Session on Representations and Related Geometry in Lie Theory, II

1:00 PM – 5:50 PM **A705, Atrium Level, Marriott Marquis**

Organizers: **Laura Rider**, Massachusetts Institute of Technology
Amber Russell, Butler University

1:00PM (1807) *A monodromy action on crystals and the cactus group.* Preliminary report. **Iva Halacheva***, Lancaster University, **Joel Kamnitzer**, University of Toronto, **Leonid Rybnikov**, Higher School of Economics, and **Alex Weekes**, Perimeter Institute (1125-16-1749)

1:30PM (1808) *The discreet charm of the Coulomb branch.* **Ben Webster**, University of Virginia (1125-16-1368)

2:00PM (1809) *On the geometry of filtered representations of quivers and connections to isospectral Hilbert schemes.* **Mee Seong Im***, United States Military Academy, West Point, and **Lisa M Jones**, University of Cambridge (1125-14-113)

2:30PM (1810) *Annihilators and associated varieties of Harish-Chandra modules for Sp(p,q).* **William M. McGovern**, University of Washington (1125-22-408)

3:00PM (1811) *A decomposition of the group algebra of a hyperoctahedral group.* **Drew Tomlin*** and **J. Matthew Douglass**, University of North Texas (1125-20-2552)

3:30PM (1812) *The Betti numbers of regular Hessenberg varieties and the dot action.* **Martha Precup**, Northwestern University (1125-14-993)

4:00PM (1813) *On Springer Isomorphisms For Algebraic Groups.* Preliminary report. **Paul Sobaje**, University of Georgia (1125-20-1494)

4:30PM (1814) *Action of Automorphisms on Irreducible Characters of Symplectic Groups.* **Jay Taylor**, University of Arizona (1125-20-1099)

5:00PM (1815) *Functions on nilpotent orbit covers.* **Eric N Sommers**, University of Massachusetts Amherst (1125-17-2478)

5:30PM (1816) *Generically free representations and essential dimension.* **Skip Garibaldi***, Center for Communications Research, and **Robert M. Guralnick**, University of Southern California (1125-20-875)

AMS Special Session on Symmetries, Integrability, and Beyond, II

1:00 PM – 5:50 PM **The Learning Center, Ballroom Level, Hyatt Regency**

Organizers: **Maria Clara Nucci**, Università di Perugia, ITALY
Sarah Post, University of Hawaií at Manoa

1:00PM (1817) *Integrable multi-component peakon equations from a modified AKNS scheme.* **Stephen Anco**, Brock University (1125-35-1880)

1:30PM *Analytic Lie symmetric solutions of*
(1818) *nonlinear partial differential equations.*
Preliminary report.
Barbara Abraham-Shrauner,
Department of Electrical and Systems
Engineering, Washington University
(1125-35-548)

2:00PM *Integrable Hamiltonian equations from*
▶ (1819) *matrix loop algebras.*
Wen-Xiu Ma, University of South Florida
(1125-35-280)

2:30PM *Jacobians with prescribed eignvectors.*
(1820) **Michael R Benfield**, North Carolina State
University, **Helge Kristian Jenssen**,
Pennsylvania State University, and **Irina A
Kogan***, North Carolina State University
(1125-53-534)

3:00PM *Lie group classification of delay ordinary*
(1821) *differential equations.*
Pavel Winternitz, Centre de recherches
mathematiques, Universite de Montreal
(1125-34-1354)

3:30PM *Cluster algebraic interpretation of*
▶ (1822) *infinite friezes.* Preliminary report.
Emily Gunawan*, Gustavus Adolphus
College, **Gregg Musiker**, University
of Minnesota, and **Hannah Vogel**,
University of Graz (1125-05-661)

4:00PM *Supersymmetry and Superintegrability of*
(1823) *the B_n Calogero Model.*
Vincent X Genest, Department of
Mathematics, MIT, and **Luc Vinet***, CRM,
Université de Montréal (1125-81-926)

4:30PM *The Z_n^2 Dirac-Dunkl operator and a*
(1824) *higher rank Bannai-Ito algebra.*
De Bie, Ghent University, **Genest***, MIT,
and **Vinet**, University of Montreal
(1125-81-1199)

5:00PM *Towards the classification of Exceptional*
(1825) *Orthogonal Polynomials.*
Maria Angeles Garcia-Ferrero, **David
Gomez-Ullate**, U. Complutense, and
Robert Milson*, Dalhousie University
(1125-33-634)

5:30PM *Generalizations of the Askey-Wilson*
(1826) *Algebra.*
Sarah Post, University of Hawai'i
(1125-33-1290)

AMS Special Session on Topics in Graph Theory, II

1:00 PM – 5:50 PM   **Spring, Conference
                            Level, Hyatt Regency**

Organizers: **Songling Shan**, Vanderbilt
              University

              Xiaofeng Gu, University of
              West Georgia

1:00PM *Matching extension in prism graphs.*
(1827) **Robert Aldred**, Otago University,
Dunedin, New Zealand, and **Michael D.
Plummer***, Vanderbilt University
(1125-05-504)

1:30PM *Partition graphs with non-negative Euler*
(1828) *characteristics.* Preliminary report.
Baogang Xu, Nanjing Normal
University (China), and **Xiaoya Zha***,
Middle Tennessee State University
(1125-05-1787)

2:00PM *Circuit Covers of Cubic Signed Graphs.*
(1829) **Yezhou Wu**, Zhejiang University, and
Dong Ye*, Middle Tennessee State
University (1125-05-1029)

2:30PM *A combinatorial condition for nets of*
▶ (1830) *triangular polyhedra.*
Mark Ellingham, Vanderbilt University
(1125-05-1245)

3:00PM *Forbidden subgraphs in edge-colored*
(1831) *graphs.*
Akira Saito*, Nihon University, Japan,
and **Colton Magnant**, Georgia Southern
University (1125-05-1458)

3:30PM *Small theta subgraphs in sparse graphs.*
(1832) **Katsuhiro Ota**, Department of
Mathematics, Keio University
(1125-05-1007)

4:00PM *On Saturation Spectrum.*
(1833) **Ronald J. Gould**, Emory University,
Atlanta, GA 30322 (1125-05-420)

4:30PM *Cycles in critical edge coloring graphs*
▶ (1834) *with large maximum degrees.* Preliminary
report.
Guantao Chen, Georgia State University
(1125-05-1895)

5:00PM *Decomposing 2-cycles.*
(1835) **Hein van der Holst***, Georgia State
University, **Robin Thomas**, Georgia
Institute of Technology, and **Sergey
Norin**, McGill University (1125-55-2457)

5:30PM *Degree version of the Erdős-Ko-Rado*
(1836) *Theorem.*
Hao Huang, Emory University, and
Yi Zhao*, Georgia State University
(1125-05-843)

AMS Special Session on Women in Topology

1:00 PM – 5:50 PM   **L405 & L406, Lobby
                            Level, Marriott Marquis**

Organizers: **Jocelyn Bell**, Hobart and
              William Smith Colleges

              Eleanor Ollhoff, University
              of Tennessee

              Candice Price, University of
              San Diego

              Arunima Ray, Brandeis
              University

1:00PM *The Stable Concordance Genus of Knots.*
(1837) **M Kate Kearney**, Gonzaga University
(1125-57-1974)

1:30PM *Converting d-invariants into lattice*
(1838) *points: A visualization technique to aid in
knot slicing.*
Kathryn Bryant, Colorado College
(1125-55-532)

2:00PM (1839) *Stability and asymptotics of almost-adequate links.*
Christine Ruey Shan Lee, University of Texas at Austin (1125-57-439)

2:30PM (1840) *Invariants of Legendrian Links.*
Caitlin Leverson, Georgia Institute of Technology (1125-57-509)

▶ 3:00PM (1841) *On Classification of Virtual Rational Tangles.*
Noureen Khan, University of North Texas at Dallas (1125-55-75)

3:30PM (1842) *Strategies in the Banach-Mazur game, pi-Noetherian type, and cellularity.* Preliminary report.
Lynne Yengulalp, University of Dayton (1125-54-556)

▶ 4:00PM (1843) *Geodesics on surfaces.*
Jenya Sapir, University of Illinois at Urbana-Champaign (1125-57-1471)

4:30PM (1844) *Derivatives in Goodwillie Calculus.*
Sarah Yeakel, University of Maryland (1125-55-2149)

5:00PM (1845) *Blowing up Atomic Functors.*
Amelia Tebbe, University of Illinois at Urbana-Champaign (1125-55-1725)

5:30PM (1846) *On Fillability of Higher Dimensional Contact Manifolds and Their Symplectic Mapping Class Group Relations.*
Bahar Acu, University of Southern California and University of California, Los Angeles (1125-53-175)

MAA Invited Paper Session on L-Functions and Other Animals, II

1:00 PM – 2:50 PM
A706, Atrium Level, Marriott Marquis

Organizers: **Caroline Turnage-Butterbaugh**, Duke University

Maria Nastasescu, Cal Tech

▶ 1:00PM (1847) *The Porpoise and Relephants of Moments of L-functions and their Assymptotics.* Preliminary report.
Jennifer Beineke, Western New England University (1125-AB-1713)

1:30PM (1848) *The mean value of quadratic Dirichlet L–functions over function fields.*
Alexandra M Florea, Stanford University (1125-AB-1370)

▶ 2:00PM (1849) *Simple zeros of L-functions and related problems.* Preliminary report.
Micah B. Milinovich, University of Mississippi (1125-AB-2272)

▶ 2:30PM (1850) *New explicit zero density result for the Riemann Zeta Function and consequences for the primes.*
Habiba Kadiri*, University of Lethbridge, **Allysa Lumley**, York University, and **Nathan Ng**, University of Lethbridge (1125-AB-1802)

MAA Minicourse #2: Part B

1:00 PM – 3:00 PM
L508, Lobby Level, Marriott Marquis

Directing Undergraduate Research

Presenter: **Aparna Higgins**, University of Dayton

MAA Minicourse #3: Part B

1:00 PM – 3:00 PM
L504 & L505, Lobby Level, Marriott Marquis

Flipping your Linear Algebra Course using Open Educational Resources

Presenters: **Sarah Eichhorn**, University of California, Irvine

David Farmer, American Institute of Mathematics

Jim Fowler, The Ohio State University

Petra Bonfert-Taylor, Dartmouth College

MAA Minicourse #14: Part B

1:00 PM – 3:00 PM
L506 & L507, Lobby Level, Marriott Marquis

Teaching Quantitative Reasoning with Common Sense and Common Knowledge

Presenters: **Ethan D. Bolker**, University of Massachusetts, Boston

Maura B. Mast, Fordham University

AMS Contributed Paper Session on Algebraic Geometry

1:00 PM – 4:40 PM
Fairlie, Conference Level, Hyatt Regency

1:00PM (1851) *Generic forms of low Chow rank.*
Douglas A Torrance, Piedmont College (1125-14-230)

▶ 1:15PM (1852) *Locally Recoverable Trace Codes.* Preliminary report.
Sean F Ballentine, **Rebecca Black***, **Ariella Kirsch**, **Adam Lizzi** and **Robert Maschal**, University of Maryland (1125-14-646)

1:30PM (1853) *Identities between first Chern classes of vector bundles of Conformal blocks.*
Natalie Hobson, University of Georgia (1125-14-1056)

1:45PM (1854) *Faithful tropicalization of hypertoric varieties.*
Max B. Kutler, University of Oregon (1125-14-1267)

2:00PM *Good and bad reduction of dynatomic*
(1855) *modular curves.*
Andrew Obus*, University of Virginia,
Holly Krieger, University of Cambridge,
John Doyle, University of Rochester,
Lloyd West, University of Virginia,
Rachel Pries, Colorado State University,
and **Simon Rubinstein-Salzedo**, Euler
Circle (1125-14-1271)

2:15PM *Classical invariant theory and birational*
(1856) *geometry of moduli spaces of parabolic*
bundles.
Han-Bom Moon*, Fordham University,
and **Sang-Bum Yoo**, Postech
(1125-14-1553)

2:30PM *Tropical curves of genus 2.*
▶ (1857) **Maria Angelica Cueto**, Ohio State
University, **Hannah Markwig**, University
of the Saarland, and **Ralph Morrison***,
Williams College (1125-14-1590)

2:45PM *Special divisors on general k-gonal*
(1858) *curves.*
Nathan Pflueger, Brown University
(1125-14-1962)

3:00PM *The KSBA compactification of the moduli*
(1859) *space of $D_{1,6}$-polarized Enriques*
surfaces.
Luca Schaffler, The University of Georgia
(1125-14-2210)

3:15PM *Holomorphic Lagrangian fibrations.*
(1860) **Justin Sawon**, University of North
Carolina-Chapel Hill (1125-14-2292)

3:30PM *Are hard questions in algebraic geometry*
(1861) *approximately easy?* Preliminary report.
James S Wolper, Idaho State University
(1125-14-2423)

3:45PM *Maximal linear sections of 2-step flag*
(1862) *varieties and quadratic Veronese of*
Grassmannians over finite fields.
Preliminary report.
Sudhir R Ghorpade, Indian Institute of
Technology Bombay, **Fernando Piñero**,
University of Puerto Rico - Ponce, and
Prasant Singh*, Indian Institute of
Technology Bombay (1125-14-2543)

4:00PM *Moduli spaces of flat* GSp-*connections.*
(1863) Preliminary report.
Neal Livesay, Louisiana State University
(1125-14-2780)

4:15PM *Relative Ranks of Binary Forms.*
▶ (1864) **Neriman Tokcan**, University of Illinois at
Urbana- Champaign (1125-14-2803)

4:30PM *Precise Dimensions That Guarantee a*
▶ (1865) *Transformation Preserving the Euclidean*
Distance.
Fiona Knoll*, **Shuhong Gao** and **Michael
Burr**, Clemson University (1125-14-2998)

AMS Contributed Paper Session on Combinatorics and Graph Theory, II

1:00 PM – 5:55 PM   Greenbriar, Conference
                                         Level, Hyatt Regency

1:00PM *Central-Peripheral Appendage Numbers*
(1866) *of Uniform Central Graphs.*
S-Y Choi and **Jonathan Needleman***, Le
Moyne College (1125-05-839)

1:15PM *Dimension and edge dimension: random*
▶ (1867) *graphs and counterexamples.*
Nina V Zubrilina, Stanford University
(1125-05-854)

1:30PM *Rainbow Spanning Trees in Edge-Colored*
(1868) *Complete Graphs.*
Katherine Perry*, **Chris Rodger**, Auburn
University, **Hung-Lin Fu**, National Chiao
Tung University, and **Yuan-Hsun Lo**,
Xiamen University (1125-05-1113)

1:45PM *Sigma-Adequate Link Diagrams and the*
(1869) *Tutte Polynomial.* Preliminary report.
Adam Giambrone, University of
Connecticut (1125-05-1117)

2:00PM *Net Regular Signed Trees.*
▶ (1870) **Isaac Benjamin Michael*** and
Mark Sepanski, Baylor University
(1125-05-1579)

2:15PM *The Almost Intersection Property for*
(1871) *Pairs of Matroids on Common Groundset.*
Nathan Bowler, University of Hamburg,
Johannes Carmesin, Cambridge
University, **Shadisadat Ghaderi*** and
Jerzy Wojciechowski, West Virginia
University (1125-05-1353)

2:30PM *Ramsey Numbers of Odd Cycles Versus*
▶ (1872) *Larger Even Wheels.*
Ryan N Alweiss, Massachusetts Institute
of Technology (1125-05-1365)

2:45PM *Recent results on extending Hall*
▶ (1873) *precolorings of graphs.*
Jennifer Vandenbussche*, **Victor
Larsen** and **Erik Westlund**, Kennesaw
State University (1125-05-1366)

3:00PM *The packing chromatic number of*
▶ (1874) *subdivisions of subcubic graphs.*
Kirsti Wash, Trinity College
(1125-05-1375)

3:15PM *Short Zero-Sum Sequences Over Abelian*
▶ (1875) *p-Groups of Large Exponent.*
Sammy Y. Luo, Massachusetts Institute
of Technology (1125-05-1434)

3:30PM *Families of Strongly Regular Graphs*
▶ (1876) *and Two-Weight Codes from Partial*
Difference Sets. Preliminary report.
John Polhill, Bloomsburg University of
Pennsylvania (1125-05-1522)

3:45PM *Interlace Polynomials of Paths Attached*
▶ (1877) *to a Star Head.*
Xiangfei Ni*, Zhejiang Normal
University/Montclair State University, and
Aihua Li, Montclair State University
(1125-05-1538)

▶ 4:00PM *Polynomial Chebyshev Quotients,*
(1878) *Combinatorially.* Preliminary report.
Eric Stucky*, University of Minnesota –
Twin Cities, **Garner Cochran**, University
of South Carolina, **Andrew W. Herring**,
University of Wyoming, **Ranjan
Rohatgi**, Saint Mary's College, and
Corbin Groothuis, University of
Nebraska-Lincoln (1125-05-1672)

4:15PM *Properties of almost all matroids.*
(1879) **Lisa Warshauer Lowrance***, Skidmore
College, **James Oxley**, Louisiana State
University, **Charles Semple**, University of
Canterbury, and **Dominic Welsh**, Oxford
University (1125-05-1679)

▶ 4:30PM *Linear chord diagrams with long chords.*
(1880) **Everett Sullivan**, Dartmouth college
(1125-05-1762)

▶ 4:45PM *A Lower Bound on the Hadwiger Number*
(1881) *of a Random Subgraph of the Kneser
Graph.*
Arran Hamm and **Kristen Melton***,
Winthrop University (1125-05-1780)

▶ 5:00PM *Counting colorful tilings of rectangular*
(1882) *arrays.* Preliminary report.
Katie Haymaker* and **Sally Robertson**,
Villanova University (1125-05-1790)

5:15PM *A Leray model for the Orlik-Solomon*
(1883) *algebra.*
Christin Bibby*, **Graham Denham**,
University of Western Ontario, and **Eva
Maria Feichtner**, University of Bremen
(1125-05-1878)

▶ 5:30PM *A Graph Theoretical Analysis of the*
(1884) *Number of Edges in k-Dense Graphs.*
Linda Eroh, University of
Wisconsin-Oshkosh, **Henry Escuadro***,
Juniata College, **Ralucca Gera**, Naval
Postgraduate School, **Samuel Prahlow**
and **Karl Schmitt**, Valparaiso University
(1125-05-1930)

5:45PM *Matching and Independence Complexes*
(1885) *Related to Small Grids.*
Benjamin J. Braun and **Wesley K.
Hough***, University of Kentucky
(1125-05-1996)

AMS Contributed Paper Session on Mathematical Biology, II

1:00 PM – 5:55 PM **International B, International
Level, Marriott Marquis**

1:00PM *Dynamical analysis of malaria*
(1886) *transmission model includes both
extrinsic incubation period and intrinsic
incubation period.*
Fan Bai, Department of Mathematics and
Statistics, Texas Tech University
(1125-92-1258)

▶ 1:15PM *Incorporating Antibiotic Resistance in the*
(1887) *Modeling of TB in the US.* Preliminary
report.
Ellie Mainou, Smith College
(1125-92-1288)

1:30PM *Optimal Control in a Discrete Model for*
(1888) *Invasive Species Integrating Surveillance
and Removal.*
Rebecca Pettit*, University of Tennessee,
and **Suzanne Lenhart**, University of
Tennessee and NIMBioS (1125-92-1316)

1:45PM *Dynamics of tumor-$CD4^+$-cytokine-host*
(1889) *cells interactions with treatments.*
Xiaochuan Hu* and **Sophia R.-J. Jang**,
Texas Tech University, Department
of Mathematics and Statistics
(1125-92-1423)

▶ 2:00PM *Undergraduate Research in Mathematical*
(1890) *Biology at the University of Wisconsin - La
Crosse.*
Eric Alan Eager*, **James P Peirce**,
Gregory J Sandland, University of
Wisconsin - La Crosse, **Richard A
Erickson**, United States Geological
Survey, and **Barbara Bennie**, University
of Wisconsin - La Crosse (1125-92-1435)

2:15PM *Analyzing Sleep-Wake Transitions.*
(1891) **Linh Huynh**, The Ohio State University
(1125-92-1453)

▶ 2:30PM *Modeling the transmission dynamics of*
(1892) *Congo Virus Disease with Control
Strategies.*
Adnan A Khan*, Lahore University of
Management Sciences, and **Mudassar
Imran**, Gulf University of Science and
Technology (1125-92-1567)

▶ 2:45PM *UP Phase Characterization.* Preliminary
(1893) report.
Suzannah R Tebon*, **Kiefer Green**,
Richard Noriega and **Erin Munro**, Beloit
College (1125-92-1655)

▶ 3:00PM *Modeling the mechanisms by which*
(1894) *HIV-associated immunosuppression
influences HPV persistence at the oral
mucosa.*
Samantha Erwin*, **Meghan Verma**, **Vida
Abedi**, **Raquel Hontecillas**, **Stefan
Hoops**, **Josep Bassaganya-Riera**
and **Stanca Ciupe**, Virginia Tech
(1125-92-1696)

▶ 3:15PM *Mathematical Modeling for*
(1895) *understanding the the Impact of eCD4-Ig
molecule within an HIV Infected Host.*
Preliminary report.
Tae Jin Lee* and **Arni S. R. Srinivasa
Rao**, Augusta University (1125-92-1804)

3:30PM *Modeling the effects of varying treatment*
(1896) *regimes on the control of an emerging
disease in the Midwest of the United
States.*
James Peirce*, **Greg Sandland**,
University of Wisconsin - La Crosse, **Kelly
Buch**, Southern Illinois University
Edwardsville, and **Rob Hendrickson**,
University of Minnesota Twin Cities
(1125-92-1826)

3:45PM *Wave propagation in a noisy system near*
(1897) *saddle node on limit cycle bifurcation.*
Preliminary report.
Mahbubur Rahman, University of North
Florida (1125-92-1873)

4:00PM *Resource-Driven Encounters and the*
(1898) *Induction of Disease Among Consumers.*
Preliminary report.
Rebecca K. Borchering*, University of
Florida, **Steve E. Bellan**, University of
Georgia, **Jason M. Flynn**, Gainesville,
Florida, **Juliet R.C. Pulliam**, Stellenbosch
University, and **Scott A. McKinley**,
Tulane University (1125-92-1905)

4:15PM *On the Dynamics of Evolutionary*
(1899) *Competition Models.*
Paul L Salceanu*, **Azmy A Ackleh**,
University of Louisiana at Lafayette, and
Jim M Cushing, The University of
Arizona (1125-92-1921)

4:30PM *Mathematical Model for ZIKA virus*
(1900) *transmission dynamics.*
Munsur Rahman* and **Naveen K Vaidya**,
University of Missouri-Kansas City
(1125-92-1998)

4:45PM *Transmission dynamics of bluetongue*
▶ (1901) *and epizootic hemorrhagic diseases in a*
patchy environment. Preliminary report.
Gerald W Baygents, University of
Missouri Kansas City (1125-92-2011)

5:00PM *Operators of diagonal evolution.*
▶ (1902) **Irina N Trofimova**, McMaster University,
Canada (1125-92-2093)

5:15PM *Vector-host epidemic model with direct*
(1903) *transmission in random environment.*
Preliminary report.
Dawit Denu, Auburn University
(1125-92-2147)

5:30PM *Finite Difference Approximations for a*
(1904) *General Nonlinear Model for the*
Interaction of Structured Populations and
the Environment.
Azmy S. Ackleh, University of Louisiana
at Lafayette, **Baoling Ma***, Millersville
University of Pennsylvania, and **Robert
Miller**, C. H. Fenstermaker and
Associates, LLC (1125-92-2150)

5:45PM *The Interaction of Calcium and Metabolic*
▶ (1905) *Oscillations in Pancreatic β-cells.*
Mary Aronne, University of Maryland,
Baltimore County, **Samantha Clapp**,
Georgia College and State University,
Soohwan Jung*, University of California,
Los Angeles, **Abigail Kramer**, Kent State
University, **William Wang**, Vanderbilt
University, **Janita Patwardhan** and
Bradford Peercy, University of Maryland,
Baltimore County (1125-92-2176)

AMS Contributed Paper Session on Number Theory, III

1:00 PM – 4:55 PM   **International 1, International
Level, Marriott Marquis**

1:00PM *Average Twin Prime Conjecture for*
(1906) *Elliptic Curves over Abelian Number*
Fields.
Luke Giberson, Clemson University
(1125-11-2125)

1:15PM *Counting Arithmetical Structures on*
▶ (1907) *Graphs.*
Darren B Glass, Gettysburg College
(1125-11-2172)

1:30PM *Fiboquadratic Sequences Raised From*
▶ (1908) *Rithmomachia.*
Tomas E Guardia*, Gonzaga University,
and **Douglas A Jimenez**, Universidad
Nacional ExperimentalPolitecnica
(1125-11-2190)

1:45PM *Looking for Sum-Freedom: The Maximum*
▶ (1909) *Size of (k, l)-sum-free Sets.* Preliminary
report.
Ryan William Matzke, University of
Minnesota (1125-11-2197)

2:00PM *The Riemann zeta function for integer*
(1910) *values and evaluation of some multiple*
zeta values. Preliminary report.
Cezar Lupu, University of Pittsburgh
(1125-11-2255)

2:15PM *Reduction of ETRU to NTRU.* Preliminary
▶ (1911) report.
Floyd B Johnson* and **Jie Sun**, Michigan
Technological University (1125-00-2380)

2:30PM *Sturmian words and Cantor sets arising*
(1912) *from unique expansions over ternary*
alphabets.
DoYong Kwon, Chonnam National
University (1125-11-2395)

2:45PM Break

3:00PM *Covering Subsets of the Integers.*
(1913) **Wilson Harvey*** and **Michael Filaseta**,
University of South Carolina
(1125-11-2832)

3:15PM *Non-vanishing of central L-values for*
(1914) *Rankin-Selberg convolutions.*
Alia Hamieh, University of Lethbridge,
and **Naomi Tanabe***, Dartmouth College
(1125-11-2852)

3:30PM *An exact product formula for abelian*
▶ (1915) *threefolds.* Preliminary report.
Jonathan M. Gerhard, James Madison
University (1125-11-268)

3:45PM *Hypergeometric Functions and Relations*
(1916) *to Arithmetic and Analytic Properties of*
Curves.
Heidi E Goodson, Haverford College
(1125-11-2881)

4:00PM *On the zeros of Riemann's zeta-function*
(1917) *on the critical line.*
Siegfred Baluyot, University of Rochester
(1125-11-2959)

4:15PM *Exact covering systems, Quadratic*
(1918) *forms, and product identities for theta*
functions.
Zhu Cao*, Kennesaw State University,
and **Yong Hu**, Huazhong University of
Science & Technology, P. R. China
(1125-11-3001)

4:30PM *Equidistribution of shapes of cubic fields*
(1919) *of fixed quadratic resolvent.*
Robert Harron, University of Hawaii at
Manoa (1125-11-3060)

4:45PM *Diophantine questions on a familiar limit.*
► (1920) **Mojtaba Moniri**, Western Illinois University (1125-11-3154)

AMS Contributed Paper Session on Topics in Analysis, III

1:00 PM – 5:25 PM   Techwood, Conference Level, Hyatt Regency

1:00PM *de Branges-Rovnyak Spaces and the*
(1921) *Kaczmarz Algorithm.*
John E Herr, Butler University (1125-42-1235)

1:15PM *Fourier Bases on the "Skewed Sierpinski*
(1922) *Gasket".*
Calvin Hotchkiss* and **Eric S Weber**, Iowa State University (1125-42-1326)

1:30PM *Endpoint estimates for one-dimensional*
(1923) *oscillator integral operators.*
Lechao Xiao, University of Pennsylvania (1125-42-2763)

1:45PM *The character and wave front set*
(1924) *correspondence in the stable range.*
Tomasz Przebinda, University of Oklahoma (1125-43-736)

2:00PM *Partitions of Equiangular Tight Frames.*
► (1925) **James Rosado***, **Hieu Nguyen**, Rowan University, and **Lei Cao**, Georgian Court University (1125-43-1340)

2:15PM *Weighted estimates for multilinear*
(1926) *dyadic operators and their commutators.*
Ishwari J Kunwar, Georgia Institute of Technology, Atlanta, GA (1125-43-2694)

2:30PM *Stability results for the n-order hold*
► (1927) *models.* Preliminary report.
Laura De carli*, Florida International University, and **Pierluigi Vellucci**, Univ. of Roma "la sapienza" (Italy) (1125-46-1890)

2:45PM *Combining Continuous and Discrete*
(1928) *Phenomena in Feynman's Operational Calculus in the Presence of a* (C_0) *Semigroup: Feynman-Kac Formulas with Lebesgue-Stieltjes Measures.* Preliminary report.
Lance Nielsen, Creighton University (1125-44-1851)

3:00PM *ρ-Laplace and ρ-Fourier Transforms of*
► (1929) *Katugampola fractional operators and their Applications.*
Hua Chen* and **Udita N. Katugampola**, Department of Mathematical Sciences, University of Delaware (1125-44-2358)

3:15PM *Statistical near-optimal filtering method*
(1930) *with application to underwater acoustics.* Preliminary report.
Viktoria Taroudaki*, University of Washington, **Costas Smaragdakis** and **Michael Taroudakis**, University of Crete & FORTH (1125-49-1481)

3:30PM *Tax Policy to Minimize the Gini Index.*
(1931) Preliminary report.
Michael McAsey* and **Libin Mou**, Bradley University (1125-49-1486)

3:45PM *Optimal Control of the Coefficients in*
(1932) *Second Order Parabolic Free Boundary Problems.*
Evan Cosgrove*, **Ugur G. Abdulla** and **Jonathan Goldfarb**, Florida Institute of Technology (1125-49-2349)

4:00PM *Constraint Handling for Wireless Energy*
(1933) *Transfer Application with filter Particle Swarm Optimization.*
Ahmad R Almomani, Clarkson University (1125-49-2794)

4:15PM *Hybrid Classes of Duality Models*
(1934) *for Discrete Minmax Fractional Programming Problems.*
Ram N. Mohapatra*, University of Central Florida, Orlando, FL. 32816, and **Ram U. Verma**, University of North Texas (1125-49-2928)

4:30PM Break

4:45PM *Global Dynamics of a Cancer Stem Cell*
► (1935) *Treatment Model.* Preliminary report.
Caleb Mayer*, Haverford College, **Robert Dougherty-Bliss**, Oglethorpe University, and **Heidi Whiteside**, Winston-Salem State University (1125-58-1751)

5:00PM *Global Dynamics of a Colorectal Cancer*
► (1936) *Treatment Model with Cancer Stem Cells.* Preliminary report.
Rebecca Blaire Hoehne*, Saint Mary's College, **Zachary Abernathy**, **Kristen Abernathy**, Winthrop University, **Claire Burgess**, Sewanee: The University of the South, and **Kelsey Brown**, High Point University (1125-58-2188)

5:15PM *Analytic torsion, the eta invariant, and*
(1937) *closed differential forms on spaces of metrics.*
Phillip Andreae, Meredith College (1125-58-2826)

AMS Contributed Paper Session on Undergraduate Research, IV

1:00 PM – 5:10 PM   International A, International Level, Marriott Marquis

1:00PM *Funding and Mentoring Projects at*
► (1938) *Boston University.*
Emma Previato, Boston University (1125-97-584)

1:15PM *Center Manifolds via Lyapunov-Perron.*
► (1939) **Emily E Schaal*** and **Yu-Min Chung**, College of William and Mary (1125-65-2664)

1:30PM *Using Data Analytics to Teach Computers*
► (1940) *the Difference between Rembrandt and Monet.* Preliminary report.
Kolten C Pearson and **Megan Searles***, Brigham Young University (1125-68-2677)

1:45PM *Mathematical Model of the Motion of a*
(1941) *Contact Lens.*
Rachael Thormann, Rochester Institute of Technology (1125-76-1503)

2:00PM **(1942)** *Determination of Director angle for flow aligning Nematic Liquid Crystals under Couette geometry.*
Bagisa Mukherjee, Penn State University, Worthington Scranton Campus (1125-76-2132)

2:15PM ► **(1943)** *The Deformation of an Eye Caused by a Contact Lens.*
Joshua Chasen*, **Roland Sanford**, **Kara Maki** and **David Ross**, Rochester Institute of Technology (1125-76-2427)

2:30PM ► **(1944)** *Calculating Lift and Drag Force for Airfoils.* Preliminary report.
Paul DeVries* and **Michael Wiley**, LaGuardia Community College (1125-76-2615)

2:45PM Break

3:00PM ► **(1945)** *A Discrete Stage-Structured Model of Newt Population Declines Due to Severe Drought.*
Marjorie T Jones, Pepperdine University (1125-92-1062)

3:15PM ► **(1946)** *Understanding Zika Dynamics: Sex, Mosquitoes, and Gender.*
Emma J Talis*, Marist College, **Ondrej Maxian**, Case Western Reserve University, and **Anna Neufeld**, Williams College (1125-92-2059)

3:30PM ► **(1947)** *Global Dynamics of a Breast Cancer Competition System.* Preliminary report.
Meghan Stevens*, Drake University, Des Moines, IA 50311, **Arden Baxter**, Rollins College, Winter Park, FL 32789, **Kristen Abernathy** and **Zachary Abernathy**, Winthrop University, Rock Hill, SC 29733 (1125-92-2138)

3:45PM ► **(1948)** *Modeling Coral Reef Ecosystems: The Need for Models of Intermediate Complexity.* Preliminary report.
Andre Archer, Macalester College, **Eliza Matt***, Williams College, and **Colin Okasaki**, Harvey Mudd College (1125-92-2165)

4:00PM ► **(1949)** *Solving a Tear Film Model with a Spectral Method.* Preliminary report.
Tim Reid* and **Daniel Anderson**, George Mason University (1125-92-2274)

4:15PM ► **(1950)** *Predicting the Effects of Manual Crayfish Removal on California Newt Persistence in Santa Monica Mountain Streams.*
William Milligan*, Emory University, **Marjorie Jones**, **Timothy Lucas** and **Courtney Davis**, Pepperdine University (1125-92-2285)

4:30PM ► **(1951)** *Finding Theta Oscillations Using Independent component analysis.* Preliminary report.
Kiefer Hart Green, Beloit College (1125-92-2494)

4:45PM ► **(1952)** *Investigation of Central Texas Surface Ozone Concentrations 1980-2015.* Preliminary report.
Oliver Matthew Sale, Southwestern University (1125-92-2868)

5:00PM ► **(1953)** *Accelerating Thermoacoustic Tomography.* Preliminary report.
Parisa Florence Samareh, Virginia Polytechnic Institute and State University (1125-92-2749)

MAA Session on Innovative Strategies to Inspire & Prepare Potential STEM Majors Who are Not Yet Ready for Calculus, II

1:00 PM – 5:55 PM   **Embassy C, International Tower, LL2, Hyatt Regency**

Organizers: **Suzanne I Doree**, Augsburg College
Rebecca Hartzler, Seattle Central College
Michael Oehrtman, Oklahoma State University
Frank Savina, University of Texas at Austin

1:00PM ► **(1954)** *Planets, Earthquakes, and Airbags: The Challenge of Incorporating Significant Mathematics Content in STEM Activities.*
Brian J Lindaman, California State University, Chico (1125-F1-2786)

1:20PM **(1955)** *Mathematical Modeling and Applied Calculus: An Integrated Approach for Less Prepared Students.*
Joel Kilty* and **Alex M McAllister**, Centre College (1125-F1-2582)

1:40PM ► **(1956)** *Four Faculty, Twenty Students, and the University's Squirrel Population: Reconceptualizing Undergraduate Research for Non-Calculus Ready Science Majors.* Preliminary report.
Jeff Pullen*, **Katherine Northcutt**, **Jarred Jenkins** and **Chamaree de Silva**, Mercer University (1125-F1-2863)

2:00PM **(1957)** *Science Math and Research Training (SMART) Calculus at University of Richmond.*
Harry F Hoke* and **Kathy W Hoke**, University of Richmond (1125-F1-94)

2:20PM ► **(1958)** *A Watershed Year: Modeling and Data Interpretation as Pathways to Building Mathematical Confidence in First-Year Students.* Preliminary report.
Martha Shott, Sonoma State University (1125-F1-3086)

2:40PM **(1959)** *Engaging and Retaining Underprepared Engineering Majors With Math-Heavy Applications.*
Jenna P. Carpenter, Campbell University (1125-F1-1933)

3:00PM ► **(1960)** *Enhancing quantitative reasoning and skills through exploring scientific applications.*
Marie P. Sheckels, University of Mary Washington (1125-F1-2136)

3:20PM ► **(1961)** *Reasoning with Functions: A STEM prep pathway.* Preliminary report.
Stuart Boersma, Central Washington University (1125-F1-1601)

3:40PM ► (1962) *Helping Students "Function in the Real World".* **Martha J. Siegel**, Towson University (1125-F1-1232)

4:00PM (1963) *Math Success for STEM Majors at Tennessee Tech University.* **Allan D. Mills***, **Michael Allen** and **Anna Litchford**, Tennessee Tech University (1125-F1-1767)

4:20PM ► (1964) *Engaging and retaining pre-college STEM students in Calculus through innovative pedagogical practices.* Preliminary report. **Padmanabhan Seshaiyer*** and **Mary Nelson**, George Mason University (1125-F1-2684)

4:40PM ► (1965) *A Peer-Mentoring Program for STEM-Intending Developmental Mathematics Students.* Preliminary report. **Xiangming Wu***, **Jessica Deshler**, West Virginia University, and **Edgar Fuller**, West Virginia Univesity (1125-F1-2204)

5:00PM ► (1966) *Effects of Active Learning Techniques on Precalculus Students' Beliefs.* Preliminary report. **Jessica L Williams**, Converse College (1125-F1-2012)

5:20PM ► (1967) *Improving Student Success through Deepening GTAs' Meanings.* **Stacy M Musgrave***, California State Polytechnic University, Pomona, and **Marilyn P Carlson**, Arizona State University (1125-F1-3082)

5:40PM ► (1968) *A year long Calculus course versus the traditional Pre-calculus/ Calculus I sequence.* Preliminary report. **Branden Stone*** and **Salvatore J. Petrilli, Jr.**, Adelphi University (1125-F1-2078)

MAA Session on Inquiry-Based Teaching and Learning, III

1:00 PM – 4:55 PM International 6, International Level, Marriott Marquis

Organizers: **Judith Covington**, Louisiana State University in Shreveport

Theron Hitchman, University of Northern Iowa

Angie Hodge, University of Nebraska Omaha

Brian P. Katz, Augustana College

Alison Marr, Southwestern University

Victor Piercey, Ferris State University

1:00PM ► (1969) *Constructing Inquiry Lessons in High School Geometry.* **Joel T. Patterson**, Cambridge Rindge and Latin School (1125-G1-2820)

1:20PM ► (1970) *Shared Presentations: Encouraging Clear Communication through Divided Roles.* Preliminary report. **Tim Whittemore*** and **Aviva Halani**, Phillips Exeter Academy (1125-G1-2599)

1:40PM (1971) *Practicing Peer Review: Making Sense of Other Peoples' Mathematical Perspectives.* **Aviva Halani*** and **Tim Whittemore**, Phillips Exeter Academy (1125-G1-2885)

2:00PM ► (1972) *Inquiry-Based Learning and the History of Mathematics: Discovering the Geometric Procedure for Completing the Square through an Ancient Mesopotamian Text.* Preliminary report. **Zoë Misiewicz**, SUNY Oneonta and the Institute for the Study of the Ancient World, New York University (1125-G1-256)

2:20PM ► (1973) *A Graduate IBL Course in the History of Mathematics Education.* **Patricia Baggett***, Dept. of Mathematical Sciences, New Mexico State University, and **Andrzej Ehrenfeucht**, Computer Science Dept. University of Colorado Boulder CO (1125-G1-645)

2:40PM ► (1974) *Unintended Consequences: How IBL experiences influence future teachers.* Preliminary report. **Cassie Williams**, James Madison University (1125-G1-952)

3:00PM ► (1975) *Productive Failure in Proving – Perspectives of a Student and Instructor.* Preliminary report. **Milos Savic** and **Emily L. Curtis***, University of Oklahoma (1125-G1-848)

3:20PM ► (1976) *Students' Social Adaptation to Mathematical Tasks.* Preliminary report. **Jeffrey J King***, University of Northern Colorado, **Gulden Karakok**, University of Nothern Colorado, and **Nathaniel Miller**, University of Northern Colorado (1125-G1-3129)

3:40PM ► (1977) *Inquiry as an Access Point to Equity.* **Gail Tang**, University of La Verne, **El Turkey Houssein**, University of New Haven, **Cilli-Turner Emily***, University of Washington Tacoma, **Milos Savic**, University of Oklahoma, **Gulden Karakok**, University of Northern Colorado, and **David Plaxco**, University of Oklahoma (1125-G1-2843)

4:00PM ► (1978) *Messaging for a movement: Names, ideas, and inclusion in the movement for inquiry-based learning in mathematics.* **Sandra L. Laursen***, **Zachary Haberler** and **Charles N. Hayward**, University of Colorado Boulder (1125-G1-2564)

4:20PM ► (1979) *SIGMAA IBL: Making our Future Proactively Inclusive.* **Brian Katz***, Augustana College, and **Victor Piercey**, Ferris State University (1125-G1-2568)

4:40PM *The IBL SIGMAA: Chair's farewell and*
(1980) *Business Meeting.*
Theron J Hitchman, University of
Northern Iowa (1125-G1-2834)

MAA Session on Mathematics and Sports, III

1:00 PM – 4:55 PM　　　　**Regency Ballroom V,
Ballroom Level, Hyatt Regency**

Organizers: **John David**, Virginia Military
Institute

Drew Pasteur, College of
Wooster

1:00PM *The New NFL Overtime Rule: A Logistic*
▶ (1981) *Regression Analysis.*
Nicholas Gorgievski, Nichols College
(1125-I5-2199)

1:20PM *A Bayesian Analysis of Draft Pick Value*
▶ (1982) *in Major League Soccer.*
Howard H Hamilton, Soccermetrics
Research (1125-I5-1685)

1:40PM *Seeds of Victory: Big Ideas with Small*
▶ (1983) *Data in March Madness.*
Sheldon H Jacobson*, **Arash Khatibi**
and **Douglas King**, University of Illinois
at Urbana-Champaign (1125-I5-427)

2:00PM *How To Win Your March Madness Pool*
▶ (1984) *with Jensen's Inequality and The Law of
Large Numbers.*
Franklin H. J. Kenter, United States Naval
Academy (1125-I5-2025)

2:20PM *Basketball and Football Win Probabilities*
▶ (1985) *and the Point Spread.*
Jeffrey W Heath*, **Eric Murrell** and
Trevor Brewer, Centre College
(1125-I5-2979)

2:40PM *A Data Science Approach to Picking*
▶ (1986) *National Football League Games.*
Preliminary report.
Eric Alan Eager, University of Wisconsin -
La Crosse (1125-I5-1436)

3:00PM *Evolving Monkeys into Hawks: Analyzing*
▶ (1987) *Optimal Drafting Techniques Used
for Daily Fantasy Football using
Mathematical Modeling and Machine
Learning.* Preliminary report.
Conor Maley, The College of Wooster
(1125-I5-2891)

3:20PM *Using Machine Learning to Predict the*
▶ (1988) *Next Major League Pitch.* Preliminary
report.
Glenn D Sidle* and **Hien Tran**, North
Carolina State University (1125-I5-309)

3:40PM *Bean Bags and Basketball - Simple,*
▶ (1989) *Complete Experiments for the
Introductory Statistics Classroom.*
Jeffrey C Kallenbach* and **Timothy H
Husband**, Siena Heights University
(1125-I5-2162)

4:00PM *The Existence and Uniqueness of Metrics*
▶ (1990) *in Sports.*
Jacqueline Brannon Giles, Central
College - Houston CC (1125-I5-961)

4:20PM *Maximizing Utility of Challenges in*
▶ (1991) *Professional Tennis.*
James R Henderson, Penn State Behrend
(1125-I5-249)

4:40PM *Modeling learning in youth archery.*
▶ (1992) **Tyler Skorczewski**, Cornell College
(1125-I5-2949)

MAA Session on Modern Data Sets for the Intro Statistics Classroom and Beyond, II

1:00 PM – 4:15 PM　　　　**International 7, International
Level, Marriott Marquis**

Organizers: **Patti Frazer Lock**, St.
Lawrence University

Stacey Hancock, Montana
State University

Sue Schou, Idaho State
University

1:00PM *Examples for Implementing the Revised*
▶ (1993) *GAISE Guidelines.*
Allan J. Rossman, Cal Poly - San Luis
Obispo (1125-K5-1981)

1:20PM *Portable Populations for Collecting Real*
▶ (1994) *Time Data Sets in the Classroom.*
Preliminary report.
Bob Guest, University of Tennessee
(1125-K5-2809)

1:40PM *Utilizing World Bank Data to Enrich the*
▶ (1995) *Learning of Students in all Levels of
Statistics.* Preliminary report.
Joseph McCollum*, Siena College, and
Nichole McCollum, Questar III Boces
(1125-K5-2909)

2:00PM *Web Tools to Help Students Get*
▶ (1996) *Individualized Datasets on a Common
Theme.* Preliminary report.
Robin H Lock*, St. Lawrence Uinversity,
Ivan Ramler and **Choong-Soo Lee**, St.
Lawrence University (1125-K5-2524)

2:20PM *Real Data is Messy…and Manageable.*
▶ (1997) **Beverly L. Wood***, Embry-Riddle
Aeronautical University, and **Carl
Clark**, Indian River State College
(1125-K5-1382)

2:40PM *Analyzing the lead content in drinking*
▶ (1998) *water during the Flint water crisis.*
Gina F Reed, University of North Georgia
(1125-VP-33)

3:00PM *Real Data: Collect Your Own Data and*
▶ (1999) *Use It!* Preliminary report.
Michael D. Miner, American Public
University System (1125-K5-1652)

3:20PM *Enhanced Student Learning in*
▶ (2000) *Elementary Statistics With Fresh Real
Estate Data.* Preliminary report.
Dan Seth, West Texas A&M University,
Department of Mathematics, Canyon, TX
(1125-K5-2244)

3:40PM ► (2001) *Increasing Engagement by Using Modern Data Sets for Contexts in Introductory Statistics: Fostering Productive Struggle in Statway Lessons.*
Scott Strother, Carnegie Foundation for the Advancement of Teaching (1125-K5-1422)

4:00PM ► (2002) *State-by-State Corralation Between Religious Attitudes and Math ACT/SAT Scores.* Preliminary report.
Jason T Shaw, Washburn University (1125-K5-126)

MAA Session on Preparing Pre-service and In-service Teachers to Support the Common Core State Standards Assessments

1:00 PM – 3:15 PM   **A602, Atrium Level, Marriott Marquis**

Organizers: **Bonnie Gold**, Monmouth University

Gulden Karakok, University of Northern Colorado

Karen Morgan, New Jersey City University

1:00PM (2003) *An Undergraduate Research Project that Investigated the Impact of Activities in a Mathematics Methods Course to Prepare Preservice Teachers for the CCSS.*
Cathy S Liebars, The College of New Jersey (1125-L5-1515)

1:20PM (2004) *Learning to Teach the Common Core through Undergraduate Research.*
Jennifer Bergner, Salisbury University (1125-L5-2614)

1:40PM ► (2005) *Professional Development in Mathematical Modeling to Support the Common Core.*
Gregory D Foley, Ohio University (1125-L5-2441)

2:00PM ► (2006) *Mathematical Modeling in the Middle Grades (M^3): A Professional Development Project for Grades 5-8 Teachers in Rural School Districts near the Southern US Border.*
Cynthia O. Anhalt*, The University of Arizona, and **Ricardo Cortez**, Tulane University (1125-L5-2976)

2:20PM (2007) *A Tool for Exploring Understanding of Rational Numbers.*
Brian J Lindaman, California State University, Chico (1125-L5-3064)

2:40PM ► (2008) *Understanding the Impact of the Mathematics Advancement in Teaching through Professional Development (MAT-PD2) Program.*
Jana Talley* and **Lecretia A. Buckley**, Jackson State University (1125-L5-3094)

3:00PM (2009) *Assessing Secondary Teachers' Algebraic Habits of Mind.*
Ryota Matsuura*, St. Olaf College, **Sarah Sword**, **Al Cuoco**, Education Development Center, Inc., and **Glenn Stevens**, Boston University (1125-L5-2194)

MAA Session on Preserving and Writing the History of Mathematics Departments, II

1:00 PM – 3:50 PM   **Embassy A, International Tower, LL2, Hyatt Regency**

Organizers: **Lawrence D'Antonio**, Ramapo College

Toke Knudsen, State University of New York at Oneonta

1:00PM (2010) *The Calculus Curriculum at West Point in the Twentieth-Century.* Preliminary report.
Tina R. Hartley and **V. Frederick Rickey***, West Point (1125-M1-2119)

1:30PM ► (2011) *Stanford and Applied Mathematics: Getting Its Groove.*
Walter J. Meyer, Adelphi U. (1125-M1-563)

2:00PM ► (2012) *Compiling a History of the Youngstown State Department of Mathematics and Statistics.*
Thomas Philip Wakefield, Youngstown State University (1125-M1-111)

2:30PM ► (2013) *Millersville University Department of Mathematics: Preparing Mathematicians and Educators for More Than 150 Years.* Preliminary report.
Noel F. Heitmann and **Michael G. Wismer***, Millersville University of Pennsylvania (1125-M1-2859)

3:00PM ► (2014) *The bicentennial history of the Athens State University Department of Mathematics: Its structure, curriculum and influence.*
Ronald L Merritt, Athens State University (1125-M1-43)

3:30PM ► (2015) *Merits of the History of Mathematics Projects.*
Satish C. Bhatnagar, University of Nevada Las Vegas (1125-M1-433)

MAA Session on Research in Undergraduate Mathematics Education (RUME), IV

1:00 PM – 3:15 PM   **Courtland, Conference Level, Hyatt Regency**

Organizers: **Karen Keene**, North Carolina State University

Megan Wawro, Virginia Tech

1:00PM ▶ (2016) *Active Learning Usage in Precalculus to Calculus 2.*
Naneh Apkarian*, San Diego State University, **Dana Kirin**, **Kristen Vroom**, Portland State University, and **Progress through Calculus team**, Mathematical Association of America (1125-N1-1393)

1:20PM ▶ (2017) *Uses of neurocognitive measures to evaluate cognitive load during the mathematical proving process.* Preliminary report.
Shiv Smith Karunakaran*, **James Whitbread, Jr.** and **Abigail Higgins**, Washington State University (1125-N1-2673)

1:40PM ▶ (2018) *Pre-service Secondary Teachers' Understandings of Central Angle and Inscribed Angle.*
Biyao Liang, University of Georgia, and **Carlos Castillo-Garsow***, Eastern Washington University (1125-N1-2058)

2:00PM ▶ (2019) *Mathematical Maturity: How can it inform teaching and learning of mathematics?* Preliminary report.
Maarten McKubre-Jordens*, **Erik Brogt** and **Annie Horton**, University of Canterbury (1125-N1-41)

2:20PM ▶ (2020) *What Were They Thinking? Students in College Algebra Confront Misconceptions by Analyzing Errors in Examples of Student Work.* Preliminary report.
Nicholas Kirby and **Jennifer Yantz***, Austin Peay State University (1125-N1-1588)

2:40PM ▶ (2021) *Choices Made by Students when Enacting Procedures.* Preliminary report.
Wes Maciejewski, San Jose State University (1125-N1-2426)

3:00PM ▶ (2022) *A Case Study: When Graphs Contain Everything.*
Irma E. Stevens* and **Kevin C. Moore**, University of Georgia (1125-N1-1294)

MAA Session on Successful Implementation of Innovative Models for Developmental and General Education Mathematics, II

1:00 PM – 4:35 PM   **International 2, International Level, Marriott Marquis**

Organizers: **Tom Hagedorn**, The College of New Jersey

          Christina H. Lee, Oxford College of Emory University

          Phil Mahler, Middlesex Community College

          Christopher Oehrlein, Oklahoma City Community College

1:00PM ▶ (2023) *"REACT" to Improve Student Success Rates and Classroom Effectiveness–Reaching Excellence through Active Coordinated Teaching.* Preliminary report.
Malissa M Peery, University of Tennessee, Knoxville (1125-O5-2678)

1:20PM ▶ (2024) *An Effective Pathway for Implementation of an Active Coordinated Course.* Preliminary report.
April E Conner, University of Tennessee, Knoxville (1125-O5-2679)

1:40PM ▶ (2025) *A GTA's Perspective on Active Coordinated Teaching in a Mentorship Program.* Preliminary report.
Cara J Sulyok, University of Tennessee, Knoxville (1125-O5-2680)

2:00PM ▶ (2026) *Math Camp: Preparing Students for College Level Math.* Preliminary report.
Kevin P Sukanek* and **Tracy L Cook**, University of Tennessee (1125-O5-1358)

2:20PM ▶ (2027) *The Carnegie Math Pathways: Structural, Curricular, and Pedagogical Innovation in Developmental Mathematics at Scale.*
Dan L Ray, Carnegie Foundation for the Advancement of Teaching (1125-O5-738)

2:40PM ▶ (2028) *A New Angle on Assessing Quantitative Literacy Pathways.*
Abe Edwards, Michigan State University (1125-O5-1902)

3:00PM ▶ (2029) *Incorporating the Computer Lab in the Developmental Mathematics Classroom.* Preliminary report.
Kimberly J Presser, Shippensburg University (1125-O5-628)

3:20PM ▶ (2030) *Learning For or Through Problems?: Exploring Differentiating Experiences in a Problem-centered Developmental Math Class.* Preliminary report.
Martha Makowski, University of Illinois at Urbana-Champaign (1125-O5-2647)

3:40PM ▶ (2031) *Active Learning in Developmental and General Education Mathematics Courses.* Preliminary report.
Vesna Kilibarda*, **Yuanying Guan** and **Xiaofeng Wang**, Indiana University Northwest (1125-O5-1571)

4:00PM (2032) *The ingredients for a successful liberal arts course in quantitative reasoning.* Preliminary report.
Keith E Mellinger, University of Mary Washington (1125-O5-1230)

4:20PM ▶ (2033) *Building Middle School Mathematics Foundational Skills Using the Environment as a Culturally Responsive Setting.* Preliminary report.
Veronica Ocampo, University of Wisconsin Milwaukee (1125-O5-2554)

MAA Session on The Creation and Implementation of Effective Homework Assignments, II

1:00 PM – 4:55 PM   **L401 & L402, Lobby Level, Marriott Marquis**

Organizers: **Sarah Greenwald**, Appalachian State University

Judy Holdener, Kenyon College

1:00PM *The Three Horsemen of Homework.*
▶ (2034) **Emma Smith Zbarsky**, Wentworth Institute of Technology (1125-A5-2231)

1:20PM *Recognizing Calculus Outside of*
▶ (2035) *Mathematical Settings.* **Leann Ferguson***, United States Air Force Academy, and **D Scott Dillery**, Lindsey Wilson College (1125-A5-2492)

1:40PM *Emphasizing Integral Existalia in*
▶ (2036) *Calculus and beyond.* Preliminary report. **Robert A Peacock**, Young Harris College (1125-A5-3090)

2:00PM *Promoting students' deep learning in*
▶ (2037) *calculus through challenging problem sets.* Preliminary report. **Silvia Saccon**, Case Western Reserve University (1125-A5-2858)

2:20PM *Justification and proof-writing in Calculus*
▶ (2038) *I through group homework assignments.* **Taylor E Martin**, Sam Houston State University (1125-A5-2715)

2:40PM *Are final projects in math classes worth*
▶ (2039) *the effort?* Preliminary report. **A E Francis**, Carroll College (1125-A5-3128)

3:00PM *Frequent Feedback through Google*
(2040) *Forms.* Preliminary report. **Jacqueline Anderson**, Bridgewater State University (1125-A5-700)

3:20PM *So Little (Written) Homework, So Much*
▶ (2041) *Accomplished.* Preliminary report. **Pangyen Ben Weng**, Metropolitan State University (1125-A5-520)

3:40PM *Putting It Together: An Effective*
▶ (2042) *Assignment Model for Upper-division Mathematics Students.* Preliminary report. **Linda McGuire**, Muhlenberg College (1125-A5-243)

4:00PM Break

4:20PM *Self-Assessment Homework in an Online*
(2043) *Linear Algebra Class.* **Przemyslaw Bogacki**, Old Dominion University (1125-A5-1175)

4:40PM *How to Implement Effective Homework*
▶ (2044) *Assignment in Lower Level Undergraduate Course: Personal Observations.* **Lakshmi Roychowdhury**, University of Texas Rio Grande Valley (1125-A5-1637)

MAA Session on The Teaching and Learning of Undergraduate Ordinary Differential Equations, II

1:00 PM – 5:30 PM   **A702, Atrium Level, Marriott Marquis**

Organizers: **Christopher S. Goodrich**, Creighton Preparatory School

Beverly H. West, Cornell University

1:00PM *Wave Propagation Inspiring Techniques*
(2045) *in Differential Equations.* **Heather A Moon***, Lewis-Clark State College, **Thomas J Asaki**, Washington State University, **Marie Snipes**, Kenyon College, and **Chris Camfield**, Hendrix College (1125-P5-2555)

1:20PM *Exposure to Laplace Transforms Early in*
▶ (2046) *the Intro to ODE Course.* **Chris Oehrlein**, Oklahoma City Community College (1125-P5-2836)

1:40PM *An Analysis Of Various Effects*
▶ (2047) *Disaggregated By Gender Of Different Pedagogical Practices In An Introductory Differential Equations Course.* Preliminary report. **Ron Buckmire*** and **Treena Basu**, Occidental College (1125-P5-2668)

2:00PM *Standards-based grading: An evaluation*
▶ (2048) *system that fosters meaningful knowledge acquisition and skills development.* Preliminary report. **Charles Bergeron**, Albany College of Pharmacy and Health Sciences (1125-P5-2742)

2:20PM *" Laplace Transforms or the Method of*
▶ (2049) *Undetermined Coefficients : which should be introduced first ? ".* Preliminary report. **Paul D. Olson**, Penn State Erie , the Behrend College (1125-P5-2752)

2:40PM *Construction and (some) classification of*
▶ (2050) *integer matrices with integer eigenvalues.* Preliminary report. **Christopher Towse***, Scripps College, and **Eric Campbell**, Pomona College (1125-P5-2756)

3:00PM *Slopes: A Differential Equations Graphing*
▶ (2051) *Environment.* **Timothy A Lucas**, Pepperdine University (1125-P5-1094)

3:20PM *What does it mean to find a solution to a*
▶ (2052) *system of differential equations? Hands-on and technology helps with the conceptualization.* Preliminary report. **Karen Allen Keene*** and **Nicholas Fortune**, North Carolina State University (1125-P5-2598)

3:40PM *Exploring the Solar System through*
▶ (2053) *Differential Equations and Vector Calculus.* Preliminary report. **Michelle L Ghrist**, U.S. Air Force Academy (1125-P5-2879)

4:00PM
▶ (2054) *Find, Process, and Share: How an ODE Project led to Student Engagement in the Vidale-Wolfe Marketing Model.*
Michael C. Barg, Niagara University (1125-P5-3033)

4:20PM Discussion - CODEE invites all who teach ODEs to join us for a meet-and-greet hour, to highlight the new CODEE Journal website and to discuss future activities.

MAA Session on Trends in Undergraduate Mathematical Biology Education

1:00 PM – 4:35 PM   M304, Marquis Level, Marriott Marquis

Organizers: **Timothy D. Comar**, Benedictine University

Daniel Hrozencik

1:00PM
▶ (2055) *CORaL: Diving into Calculus.* Preliminary report.
Carrie Diaz Eaton* and **Emma Perry**, Unity College (1125-Q1-403)

1:20PM
(2056) *Getting Biocalculus Students to Apply Mathematics to Biology Through Active Learning.*
Timothy D. Comar, Benedictine University (1125-Q1-415)

1:40PM
▶ (2057) *The attitudes of students in calculus for life science toward Mathematics in their careers and some calculus applications in real life.* Preliminary report.
Yanping Ma, Loyola Marymount University (1125-Q1-3092)

2:00PM
▶ (2058) *The Perceived vs. Actual Use of Mathematics in Medicine According to Pre-Medicine students and Practicing Physicians.*
Paxton Martin* and **Milos Savic**, University of Oklahoma (1125-Q1-644)

2:20PM
(2059) *Turning an REU Investigation into Calculus II Projects.*
James P Peirce, University of Wisconsin - La Crosse (1125-Q1-1373)

2:40PM
▶ (2060) *An Introduction to Mathematical Biology through Discrete Mathematics and Abstract Algebra.*
Raina S Robeva, Sweet Briar College (1125-Q1-3008)

3:00PM
▶ (2061) *A Modeling Course for Majors in the Life Sciences.*
Douglas Norton, Villanova University (1125-Q1-3011)

3:20PM
▶ (2062) *Senior Biomathematics Projects at Chicago State University.*
Dan Hrozencik, Chicago State University (1125-Q1-2129)

3:40PM
(2063) *Changing tracks: More Applied Courses Make a Med-Ready Major.*
Rebecca E Gasper, Creighton University (1125-Q1-2991)

4:00PM
▶ (2064) *Picking and Choosing: Ten Lectures in Support of Planarian Tissue Regeneration.*
Michael Kerckhove, University of Richmond (1125-Q1-2311)

4:20PM
(2065) *An Integrated Sciences First Year Program at Hampshire College.*
Sarah Hews* and **Christina Cianfrani**, Hampshire College (1125-Q1-2379)

MAA Session on Unexpected Topics for a Math Circle, II

1:00 PM – 3:35 PM   A701, Atrium Level, Marriott Marquis

Organizers: **Robert M. Klein**, Ohio University

Philip Yasskin, Texas A&M University

1:00PM
▶ (2066) *Fold, cut, and problem solve: A Math Teachers' Circle sampling.*
Angie Hodge* and **Dylan Sorrell**, University of Nebraska Omaha (1125-Q5-2811)

1:20PM
▶ (2067) *Pancakes, Music, and Games in MTC Dubuque.*
Amanda H Matson*, Clarke University, and **Jonas Meyer**, Loras College (1125-Q5-2355)

1:40PM
▶ (2068) *Math Circle Artifacts at the Bard Math Circle.*
Japheth Wood, Bard College (1125-Q5-2262)

2:00PM
(2069) *Dancing in Math Circles.*
Mary L. Garner*, **Virginia Watson** and **Beth Rogers**, Kennesaw State University (1125-Q5-2179)

2:20PM
▶ (2070) *A grid of liars.*
Ryan W. Morrill, University of Alberta (1125-Q5-2067)

2:40PM
▶ (2071) *Triangles, Squares, and Segregation: Introducing social issues through math.* Preliminary report.
Anne M. Ho* and **Tara T. Craig**, Coastal Carolina University (1125-Q5-1923)

3:00PM
▶ (2072) *CryptoClue.* Preliminary report.
Sharon K. Robbert, Trinity Christian College (1125-Q5-830)

3:20PM
▶ (2073) *Impact of the Southwest Chicago Math Teachers' Circle on the Disposition of Teachers Toward Mathematics and Toward the Teaching and Learning of Mathematics.* Preliminary report.
Angela Antonou*, University of St. Francis, **Rita Patel**, College of DuPage, **Amanda Harsy**, Lewis University, **Dave Klanderman**, Trinity Christian College, **Kristen Schreck**, Saint Xavier University, and **Amanda Snooks**, St. Bede School (1125-Q5-2122)

MAA *General Contributed Paper Session on Analysis*

1:00 PM – 5:55 PM   **Baker, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

▶ 1:00PM (2074) *A Trace Operator for the Laplacian on the Sierpinski Gasket.*
Prem M. Talwai, Cornell University (1125-VB-3073)

1:15PM (2075) *Higher integrability of iterated operators on differential forms.*
Shusen Ding, Dept. of Math, Seattle University, **Guannan Shi*** and **Yuming Xing**, Harbin Institute of Technology (1125-VB-302)

▶ 1:30PM (2076) *Resolving the Unsolvable and Graphing the Infinite.* Preliminary report.
Chandra Kethi-Reddy, University of Central Florida (1125-VB-516)

1:45PM (2077) *Discontinuous Local Minimizers to a Class of Semilinear Integral Equations.*
Jeremy Trageser* and **Xiaofeng Ren**, The George Washington University (1125-VB-787)

2:00PM (2078) *A random measure algebra under convolution.*
Jason Hong Jae Park, San Bernardino Valley College (1125-VB-2779)

▶ 2:15PM (2079) *A New Extension of the Riemann Integral.*
Bryan Dawson, Union University (1125-VB-1315)

2:30PM (2080) *Hartogs Domain and the Diederich-Fornaess Index.*
Muhenned A Abdulsahib, University of Arkansas, fayetteville, Arkansas (1125-VB-1441)

2:45PM Break

▶ 3:00PM (2081) *On the Convergence of the Positive Roots of Recursively Defined Polynomials.*
Gregory AE Vaughan, Purdue University (1125-VB-1613)

3:15PM (2082) *Modified Energy Functionals and the NLS Approximation.*
Patrick Cummings* and **C. E. Wayne**, Boston University (1125-VB-1753)

3:30PM (2083) *Schatten Class Weighted Composition Operators on Generalized Fock Spaces $\mathcal{F}^2_\phi(\mathbb{C}^n)$.*
Waleed K. Al-Rawashdeh, Montana Tech (1125-VB-2036)

4:00PM (2084) *Lebesgue Integration on a Banach Space with a Schauder Basis.*
Timothy I Myers, Howard University (1125-VB-2045)

4:15PM (2085) *A Constructive Approach to the Universality Criterion for Semigroups.*
Kit C. Chan and **David Walmsley***, Bowling Green State University (1125-VB-2057)

4:30PM Break

4:45PM (2086) *An extension of "Positive $H^{1/2}$ Functions are Constants".* Preliminary report.
Lisa De Castro, Florida Southern College (1125-VB-2542)

5:00PM (2087) *Mean Value Theorem for general divergence form elliptic operators.*
Ashok Aryal, Kansas State University (1125-VB-2569)

5:15PM (2088) *Chaotic Extensions of General Operators in Hilbert Spaces.*
Leonardo Pinheiro*, Rhode Island College, and **Kit Chan**, Bowling Green State University (1125-VB-820)

▶ 5:30PM (2089) *Almost α-type f-weak contractive mappings in partial metric space and fixed points.*
Mr Deepak Kumar*, Lovely Professional University, Phagwara, Punjab-144411, India., and **Dr Sumit Chandok**, Thapar University, Patiala-147004, Punjab, India. (1125-VB-79)

▶ 5:45PM (2090) *Calculations with Generating Functions.* Preliminary report.
Tom McNamara, SWOSU (1125-VB-2716)

MAA *General Contributed Paper Session on Modeling and Applications, II*

1:00 PM – 5:25 PM   **Piedmont, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

▶ 1:00PM (2091) *Quantifying Communication Effects in Disaster Response Logistics: A Multiple Network System Dynamics Model.*
Danilo R. Diedrichs*, **Kaile Phelps** and **Paul A. Isihara**, Wheaton College (1125-VM-1773)

▶ 1:15PM (2092) *Modeling the evolution of female sexual signaling.*
Kelly Rooker*, University of Tennessee, Knoxville, and **Sergey Gavrilets**, University of Tennessee, Knoxville; NIMBioS (1125-VM-1810)

▶ 1:30PM (2093) *A Mathematical Model for the Human Papillomavirus (HPV) with a Case Study in Japan.* Preliminary report.
Arielle Gaudiello* and **Zhisheng Shuai**, University of Central Florida (1125-VM-1883)

1:45PM **Stability and Time-scale Analysis**
▶ (2094) *of Malaria Transmission in Human-Mosquito Population.*
Kodwo Annan, Georgia Gwinnett College (1125-VM-2020)

2:00PM *Shortfall risk in long term hedging*
▶ (2095) *with short-term futures contracts on multi-commodity case.*
Carynne Litcher and **Chunhui Yu***, Farmingdale State College, SUNY (1125-VM-2184)

2:15PM *The effects of parasitoid migration on*
▶ (2096) *stability of discrete-time host-parasitoid population dynamic models.* Preliminary report.
Brooks K Emerick, Trinity College (1125-VM-2369)

2:30PM *Modeling habitat fragmentation at the*
▶ (2097) *landscape level via reaction diffusion equations.*
Jerome Goddard II*, Auburn University Montgomery, **A. Barnett**, University of Alabama, **D. Harrell**, University of Alabama Birmingham, and **R. Shivaji**, University of North Carolina Greensboro (1125-VM-2416)

2:45PM *Analytical model for assessing the*
(2098) *knowledge of statistical procedures amongst postgraduate students.*
Germaine Kamleu Ndouma*, **Lorna Holtman**, University of the Western Cape, and **Bingwen Yan**, Cape Technology University of Technology (1125-VM-2474)

3:00PM *Modeling Three-Wave Follicle Dynamics in*
(2099) *the Menstrual Cycle.* Preliminary report.
Nicole M Panza, Francis Marion University (1125-VM-2535)

3:15PM *Using Individual Patient Data to Quantify*
▶ (2100) *a Mathematical Model for the Interactions of Matrix Metalloproteinases and Their Inhibitors in a Wound.* Preliminary report.
Ayush Prasad, Western Kentucky University (1125-VM-1580)

3:30PM *Probabilities in a Sensor Network.*
▶ (2101) **Lidia Smith**, Blinn College (1125-VM-2692)

3:45PM *Assessing the Economic Tradeoffs*
▶ (2102) *Between Prevention and Suppression of Forest Fires.* Preliminary report.
Betsy Heines, University of Tennessee, Knoxville (1125-VM-2871)

4:00PM *A Mathematical Model of Biomechanical*
(2103) *and Chemical Influences on Hypertension.* Preliminary report.
Zahava C Wilstein*, **Daniel Alligood**, **Valerie McLure**, Berry College, and **Austinn Miller**, Mercer University (1125-VM-2921)

4:15PM *Modelling the Spread of Parasitoid Wasps*
(2104) *from Point Release.*
Christopher Strickland*, University of North Carolina, Chapel Hill, **Nadiah Kristensen**, National University of Singapore, and **Laura Miller**, University of North Carolina, Chapel Hill (1125-VM-2937)

4:30PM *Multi-armed Bandit Problem in Digital*
▶ (2105) *Forensics.*
Tugba Karabiyik* and **Umit Karabiyik**, Sam Houston State University (1125-VM-2954)

4:45PM *Mathematical models of condensation,*
▶ (2106) *adsorption, and filters.*
Chris McCarthy, Borough of Manhattan Community College, CUNY (1125-VM-2980)

5:00PM *Artificial Neural Network Model for*
(2107) *Predicting Lung Cancer Survival.*
Hansapani Sarasepa Rodrigo* and **Chris P Tsokos**, University of South Florida (1125-VM-2983)

5:15PM *Spider Monkeys in Fragmented*
▶ (2108) *Landscapes: A Discrete Mathematical Model.*
Matthew Joshua Buhr and **Jose Flores***, University of South Dakota (1125-VM-3139)

MAA *General Contributed Paper Session on Number Theory, II*

1:00 PM – 5:10 PM　　　　　**Roswell, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

1:00PM *Integer Complexity and P-Adic*
▶ (2109) *Expansions of Rational Numbers.*
Joshua Zelinsky, Birmingham Southern College (1125-VN-1983)

1:15PM *Generalizing the convergent to a simple*
(2110) *continued fraction.*
Nicholas Heiner and **Duff Campbell***, Hendrix College (1125-VN-2044)

1:30PM *Generalization of Pythagorean Triples.*
▶ (2111) **Sungkon Chang**, Armstrong State University (1125-VN-2079)

1:45PM *Monotonically Increasing Digits.*
▶ (2112) Preliminary report.
Ji Young Choi, Shippensburg University of PA (1125-VN-2128)

2:00PM *A note on the products*
(2113) $((m+1)^2+1)((m+2)^2+1)\ldots(n^2+1)$ *and* $((m+1)^3+1)((m+2)^3+1)\ldots(n^3+1)$.
Erhan Gürel, Middle East Technical University, Northern Cyprus Campus (1125-VN-2260)

2:15PM *Local Arboreal Galois Representations.*
(2114) **Jacqueline Anderson***, Bridgewater State University, **Spencer Hamblen**, McDaniel College, **Bjorn Poonen**, MIT, and **Laura Walton**, Brown University (1125-VN-2296)

2:30PM *Rotation Symmetric Bent Boolean*
▶ (2115) *Functions in $n = 2p$ Variables.* Preliminary report. **E. M. Sanger*** and **T. W. Cusick**, SUNY at Buffalo (1125-VN-2322)

2:45PM *On the arithmetic of a family of*
(2116) *degree-two diagonal K3 surfaces.* **Florian Bouyer**, University of Bristol, **Edgar Costa**, Dartmouth College, **Dino Festi**, Johannes Gutenberg-Universität Mainz, **Christopher Nicholls**, University of Oxford, and **Mckenzie West***, Reed College (1125-VN-2393)

3:00PM *Affine equivalence classes of 2-rotation*
(2117) *symmetric cubic Boolean functions.* **Elizabeth M. Reid***, SUNY at Buffalo, and **Thomas Cusick**, Math. Dept. at UB (1125-VN-2440)

3:15PM *New ideas for tabulating Baillie-PSW*
▶ (2118) *pseudoprimes.* Preliminary report. **Jonathan Webster***, Butler University, and **Andrew Shallue**, Illinois Wesleyan University (1125-VN-2465)

3:30PM *Growth of torsion points on elliptic*
(2119) *curves from $\mathbb{Q}$ to the maximal abelian extension of $\mathbb{Q}$.* **Michael Chou**, University of Connecticut (1125-VN-2665)

3:45PM *Comparing the Restricted Critical*
▶ (2120) *Number and Size of Weakly Zero Sum-Free Sets.* **Samuel N Edwards**, Gettysburg College (1125-VN-2686)

4:00PM *On the x-coordinates of Pell equations*
▶ (2121) *which are Fibonacci numbers.* Preliminary report. **Bir Kafle***, Purdue University Northwest, **Florian Luca**, University of the Witwatersrand, South Africa, and **Alain Togbe**, Purdue University Northwest (1125-VN-2687)

4:15PM *Zero distribution of a sequence of*
▶ (2122) *polynomials with a recurrence of degree three.* **Andres Israel Zumba Quezada***, California State University Fresno, and **Khang D Tran**, California State University, Fresno (1125-VN-2705)

4:30PM *On some applications of a generalized*
(2123) *Dwork trace formula to the L-function associated with exponential sums over Galois rings.* Preliminary report. **Harris Ahmed Mohammed Ismail*** and **Steven Sperber**, University of Minnesota (1125-VN-2718)

4:45PM *Counting low degree extensions of*
(2124) *function fields.* **Joseph Gunther***, City University of New York, **Daniel Hast** and **Vlad Matei**, University of Wisconsin-Madison (1125-VN-2923)

5:00PM *Torsion of CM-Elliptic Curves over*
(2125) *Abelian Number Fields.* **Marko Milosevic***, **Pete L. Clark**, University of Georgia, and **Michael Chou**, University of Connecticut (1125-VN-3017)

MAA General Contributed Paper Session on Teaching and Learning Calculus

1:00 PM – 5:25 PM   **Kennesaw, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

           Kimberly Presser, Shippensburg University

           Melvin Royer, Indiana Wesleyan University

1:00PM *Optimization Problems: Understanding*
▶ (2126) *Students' Struggles.* **Mary E Pilgrim** and **Jessica R Gehrtz***, Colorado State University (1125-VR-209)

1:15PM *Revitalizing Calculus to Connect the Dots.*
(2127) **N Bradley Fox*** and **Ramanjit Sahi**, Austin Peay State University (1125-VR-383)

1:30PM *The Joys of Teaching Infinitesimal*
▶ (2128) *Calculus.* Preliminary report. **William Freed**, Concordia University of Edmonton (1125-VR-1529)

1:45PM *A Canned Flipped Calculus Experience.*
▶ (2129) Preliminary report. **J.C. Price**, Georgia Gwinnett College (1125-VR-1916)

2:00PM *Fostering Comprehensive Learning*
(2130) *Through Concept Worksheets and Mastery-Based Testing.* Preliminary report. **Amanda J Mangum**, Niagara University (1125-VR-2222)

2:15PM *Calculus Applied! An Online Resource for*
▶ (2131) *Students and Teachers of Calculus to Explore Calculus' Connections to Other Fields Through the Lens of Practitioners.* **Juliana V. Belding***, Boston College, and **Peter M. Garfield**, UC Santa Barbara (1125-VR-2268)

2:30PM *Teaching Contour Diagrams using 3D*
(2132) *Models.* **Jonathan P Keiter**, East Stroudsburg University (1125-VR-2356)

2:45PM *Side-by-side comparison of a single*
▶ (2133) *instructor's flipped and traditional sections.* Preliminary report. **Matthew Leingang***, **Selin Kalaycioglu** and **Drew Youngren**, New York University (1125-VR-2384)

3:00PM *Improving Student Success in Calculus*
(2134) *Using an Algebra Supplement Course.*
Ellen R. Swanson and **Lesley W.
Wiglesworth***, Centre College
(1125-VR-2409)

3:15PM *Using Points-Free Grading to Promote*
▶ (2135) *Perseverance in Calculus.*
Austin Mohr, Nebraska Wesleyan
University (1125-VR-2574)

3:30PM *Introducing Picard's Theorem in Integral*
(2136) *Calculus: an Interesting Example.*
Steven M. Hetzler, Salisbury University
(1125-VR-2597)

3:45PM *Cooperative Curve Sketching: An Activity*
▶ (2137) *for Classes.*
Martha H Byrne, Sonoma State University
(1125-VR-2651)

4:00PM *A Guide for Understanding and*
▶ (2138) *Achievement: Using Developmental
Counseling as a Tool to Provide Effective
Communication for Calculus Students
Learning in a Hybrid Format.*
Terry L. Barron, Georgia Gwinnett
College (1125-VR-2704)

4:15PM *Implementation of Pre and Post Class*
▶ (2139) *Readings in Calculus.* Preliminary report.
Houssein El Turkey, University of New
Haven, and **Salam Turki***, Rhode Island
College (1125-VR-2712)

4:30PM *How Do First Year Calculus Students'*
▶ (2140) *Proof Schemes Change Over the Course
of a Semester?*
Amanda M. Akin* and **Allison B.
Bernhard**, Lee University (1125-VR-2723)

4:45PM *Using Low-Stakes Writing to Promote*
▶ (2141) *Engaged Learning.* Preliminary report.
Allison M. Wolf, University of Tennessee
- Knoxville/Perimeter College at Georgia
State University (1125-VR-2724)

5:00PM *Challenges and Benefits of Tight*
(2142) *Coordination of Calculus 1 at OSU.*
Nela Lakos, Ohio State University
(1125-VR-2999)

5:15PM *An Oral Final Exam in a Distance Applied*
(2143) *Calculus Course.*
Mary Vlastnik Armon, Knox College
(1125-VR-2672)

SIAM Minisymposium on Applications of Algebra, Geometry, and Topology

1:00 PM – 6:10 PM   A703, Atrium
                                 Level, Marriott Marquis

Organizer: **Frank Sottile**, Texas A&M
             University

1:00PM *An Introduction to Topological Data*
▶ (2144) *Analysis.*
Peter Bubenik, University of Florida
(1125-55-1266)

1:30PM *Topological Complexity in Protein*
▶ (2145) *Structures.* Preliminary report.
Erica Flapan, Pomona College
(1125-57-521)

2:00PM *Toric Differential Inclusions and a Proof*
(2146) *of the Global Attractor Conjecture.*
Gheorghe Craciun, University of
Wisconsin-Madison (1125-37-1734)

2:30PM *Volume-based comparison for some*
(2147) *polytopes arising in optimization.*
Jon Lee, University of Michigan
(1125-52-525)

3:00PM *Connectivity and Irreducibility of Finite*
(2148) *Unit-Norm Tight Frame Varieties.*
Nate Strawn*, Georgetown University,
Jameson Cahill, New Mexico State
University, and **Dustin Mixon**, Air Force
Institute for Technology (1125-14-535)

3:30PM *Solving polynomial systems via*
(2149) *monodromy and trace test.*
Anton Leykin, Georgia Tech
(1125-14-1755)

4:10PM *Convex algebraic geometry.*
(2150) **Cynthia Vinzant**, NC State
(1125-52-2124)

4:40PM *Periodic auxetics.*
▶ (2151) **Ciprian S. Borcea**, Rider University, NJ,
and **Ileana Streinu***, Smith College, MA
(1125-52-2445)

5:10PM *Product-Mix Auctions and Tropical*
▶ (2152) *Geometry.*
Ngoc Mai Tran, UT Austin and University
of Bonn, and **Josephine Yu***, Georgia
Institute of Technology (1125-91-492)

5:40PM *The Future of Curves in Cryptography (?).*
▶ (2153) **Kristin E. Lauter**, Microsoft Research
(1125-14-1127)

NAM Granville-Brown-Haynes Session of Presentations by Recent Doctoral Recipients in the Mathematical Sciences

1:00 PM – 3:50 PM   A708, Atrium
                                 Level, Marriott Marquis

Organizer: **Talitha M Washington,Dr.**,
             Howard University

1:00PM *Equidistribution of Shapes of Number*
(2154) *Fields of degree 3, 4, and 5.*
Piper Harron*, University of Hawaii at
Manoa, and **Manjul Bhargava**, Princeton
University (1125-11-2246)

1:30PM *Granuloma Formation in Leishmaniasis:*
▶ (2155) *A Mathematical Model.*
Nourridine Siewe*, NIMBioS, **Abdul-Aziz
Yakubu**, Howard University, **Abhay R
Satoskar**, Ohio State Univerisity, and
Avner Friedman, MBI, Ohio State
University (1125-65-1987)

2:00PM *A Bayesian False Discovery Approach to*
(2156) *Syndromic Surveillance.*
Deidra Andrea Coleman*, Philander
Smith College, **Brian J Reich** and **Donald
E. K. Martin**, North Carolina State
University (1125-62-3032)

2:30PM *Hopf algebras, tensor categories, and*
▶ (2157) *gauge invariants.*
Cris Negron, Massachusetts Institute of
Technology (1125-16-1794)

3:00PM *Finiteness of Associated Primes of*
(2158) *Local Cohomology Modules over*
Stanley-Reisner Rings.
Roberto Barrera, Texas A&M University,
Jeffrey Madsen, Purdue University, and
Ashley K. Wheeler*, University of
Arkansas (1125-13-2570)

3:30PM *Existence Results for Some Higher-Order*
(2159) *Abstract Differential Equations with*
Applications to PDEs.
Valerie N. Nelson, Howard
University/Department of Defense
(1125-46-2193)

MAA Panel

1:00 PM – 2:20 PM   **International 5, International**
Level, Marriott Marquis

Women and Scholarly Publishing

Organizers: **Jenna P. Carpenter**,
Campbell University

Semra Kilic-Bahi,
Colby-Sawyer College

Kim Roth, Juniata College

Panelists: **Jackie Jensen-Vallin**, Lamar
University

Susan Colley, Oberlin
College

Gizem Karaali, Pomona
College

Marjorie Senechal, Smith
College

Cathy Kessel, Illustrative
Mathematics

Dorothy Wallace,
Dartmouth College

Project NExT Session

1:00 PM – 2:15 PM   **Regency Ballroom VI,**
Ballroom Level, Hyatt Regency

Alternative Assessment Techniques for
the Active Classroom

Organizers: **Gabriel Sosa Castillo**,
Amherst College

James Hammer, Cedar
Crest College

Katherine Vance, Simpson
College

Mami Wentworth,
Wentworth Institute of
Technology

Presenters: **David Bressoud**, Macalester
College

Kathleen Heid, Pennsylvania
State University

Alan Knoerr, Occidental
College

Sandra Trowell, Valdosta
State University

ASL Invited Address

2:00 PM – 2:50 PM   **A707, Atrium**
Level, Marriott Marquis

(2160) *Applications of descriptive set theory to*
the classification of measure preserving
diffeomorphisms of the torus.
Matthew Foreman, University of
California, Irvine (1125-37-119)

Rocky Mountain Mathematics Consortium Board of Directors Meeting

2:15 PM – 4:00 PM   **Embassy G, International**
Tower, LL2, Hyatt Regency

Presentations by MAA Teaching Award Recipients

2:30 PM – 3:50 PM   **Regency Ballroom VII,**
Ballroom Level, Hyatt Regency

Organizers: **Barbara Faires**, Westminster
College

Francis Su, Harvey Mudd
College

▶ (2161) *The geometry of calculus.*
Tevian Dray, Oregon State University
(1125-A0-2209)

▶ (2162) *Do Your Students Believe that*
Mathematics is Exciting? Preliminary
report.
Caren L. Diefenderfer, Hollins University
(1125-A0-2030)

(2163) *Drinking straight from the source:*
Learning today's mathematics through
its historical roots.
Janet Heine Barnett, Colorado State
University - Pueblo (1125-A0-1618)

AMS Committee on Science Policy Panel Discussion

2:30 PM – 4:00 PM   **A704, Atrium**
Level, Marriott Marquis

Grassroots Advocacy for Mathematics
and Science Policy.

Organizers: **Jeffrey Hakim**, American
University

Douglas Mupasiri,
University of Northern Iowa

Scott Wolpert, University of
Maryland

*MAA Committee on the Mathematical
Education of Teachers (COMET) and AWM
Committee on Education Panel Discussion*

2:35 PM – 3:55 PM   International 5, International
                                    Level, Marriott Marquis

*Highlighting Contributions to
Mathematics Education from Members of
Departments of Mathematical Sciences*

Organizers: **Beth Burroughs**, Montana
State University

Jacqueline Dewar, Loyola
Marymount University

Pao-sheng Hsu, unaffiliated

Moderator: **Robert Klein**, Ohio
University

Panelists: **Viveka Borum**, Spelman
College

LouAnn Lovin, James
Madison University

Megan Wawro, Virginia
Polytechnic and State
University

Nina White, University of
Michigan

ASL Contributed Paper Session, I

3:00 PM – 5:50 PM   A707, Atrium
                                    Level, Marriott Marquis

3:00PM *Parametrizing by the Ellentuck space.*
(2164) **Timothy Trujillo**, Colorado School of
Mines (1125-00-3170)

3:30PM *Madness in vector spaces.*
(2165) **Iian Smythe**, Cornell University
(1125-00-3168)

4:00PM *Ideals of Compact Anticliques in Borel*
(2166) *Graphs.*
Francis Adams, University of Florida
(1125-03-1839)

4:30PM *Multisets, a ternary relation and*
(2167) *decidability.*
Katalin Bimbó, University of
Alberta, Department of Philosophy
(1125-03-1667)

5:00PM *Amalgamating many Boolean algebras.*
(2168) **David Milovich**, Texas A&M International
University (1125-03-1361)

5:30PM *A proof-theoretic solution to the*
(2169) *set-theoretic paradoxes.*
Maarten McKubre-Jordens* and
Erik Istre, University of Canterbury
(1125-03-1673)

MAA Minicourse #1: Part B

3:30 PM – 5:30 PM   L508, Lobby Level,
                                    Marriott Marquis

*Complex Analysis and
Geometry/Topology as Introductions to
Proofs Courses*

Presenters: **Neelesh Tiruviluamala**,
University of Southern
California

David Crombecque,
University of Southern
California

MAA Minicourse #6: Part B

3:30 PM – 5:30 PM   L504 & L505, Lobby
                                    Level, Marriott Marquis

*Linear Algebra in Computer Graphics
and Data Mining*

Presenter: **Tim Chartier**, Davidson
College

MAA Minicourse #16: Part B

3:30 PM – 5:30 PM   L506 & L507, Lobby
                                    Level, Marriott Marquis

*Using and Making Integrated Online
Textbooks with MathBook XML.*

Presenter: **Karl-Dieter Crisman**,
Gordon College

MAA Student Poster Session

4:30 PM – 6:00 PM   Marquis Ballroom,
                        Marquis Level, Marriott Marquis

Organizers: **Chasen Smith**, Georgia
Southern University

Eric Ruggieri, College of the
Holy Cross

AMS Congressional Fellowship Session

4:30 PM – 6:30 PM   A601, Atrium
                                    Level, Marriott Marquis

Speakers: **Catherine Paolucci**, AMS
Congressional Fellow
2016-17

*SIGMAA on Inquiry Based Learning (IBL)
Business Meeting*

5:00 PM – 6:00 PM   International 6, International
                                    Level, Marriott Marquis

MAA Panel Discussion:

5:00 PM – 7:00 PM   **International 5, International Level, Marriott Marquis**

Actuarial Science at the JMM: 25 Years and Counting

Organizers: **Bettye Anne Case**, Florida State University

Patrick Brewer, Lebanon Valley College

Robert Buck, Slippery Rock University

Kevin Charlwood, Washburn University

Michelle Guan, Indiana University Northwest

Steve Paris, Florida State University

Sue Staples, Texas Christian University

Panelists: **James Daniel**, University of Texas

Stuart Klugman, Society of Actuaries

Rick Gorvett, Casualty Actuarial Society

Dwayne Husbands, Ernst and Young, representing the International Association of Black Actuaries

Jonathan Applewhite, Ernst and Young, representing the International Association of Black Actuaries

SIGMAA on the Philosophy of Mathematics (POM SIGMAA) Business Meeting

5:15 PM – 5:30 PM   **A706, Atrium Level, Marriott Marquis**

SIGMAA on Business, Industry, and Government (BIG SIGMAA)Guest Lecture

5:30 PM – 6:20 PM   **L401 & L402, Lobby Level, Marriott Marquis**

5:30PM *Optimization-Based Machine Learning*
(2170) *Approach for Predicting Vaccine = Immunity.*
Eva K Lee, Georgia Institute of Technology (1125-A0-3176)

SIGMAA on Mathematics Instruction Using the WEB (WEB SIGMAA)Reception

5:30 PM – 6:00 PM   **International 2, International Level, Marriott Marquis**

SIGMAA on the Philosophy of Mathematics (POM SIGMAA) Reception

5:30 PM – 6:00 PM   **A706, Atrium Level, Marriott Marquis**

SIGMAA on Mathematics Instruction Using the WEB (WEB SIGMAA) Guest Lecture

6:00 PM – 6:50 PM   **International 2, International Level, Marriott Marquis**

Organizer: **Paul Seeburger**, Monroe Community College

6:00PM *Textbooks for the Web from MathBook*
▶ (2171) *XML.*
Robert A Beezer, University of Puget Sound (1125-A0-1675)

SIGMAA on the Philosophy of Mathematics (POM SIGMAA) Guest Lecture

6:00 PM – 6:50 PM   **A706, Atrium Level, Marriott Marquis**

Organizer: **Tom Drucker**, University of Wisconsin Whitewater

6:00PM *Computers, mathematical proof, and the*
▶ (2172) *nature of the human mind: a surprising connection.* Preliminary report.
Jeff Buechner, Rutgers University Newark and the Saul Kripke Center, CUNY Graduate Center (1125-A0-1082)

AWM Workshop Poster Presentations and Reception

6:00 PM – 7:15 PM   **Marquis Ballroom Prefunction, Marquis Level, Marriott Marquis**

Organizers: **Rosa Orellana**, Dartmouth College

Anne Shepler, University of North Texas

6:00PM *Effects of recurrent excitation in*
(2173) *neuronal network models.*
R. Melody Takeuchi* and **Christoph Borgers**, Tufts University

6:00PM *On the ramification of étale cohomology*
(2174) *groups.*
Isabel Leal, University of Chicago

6:00PM *Higher Congruences between Newforms*
(2175) *and Eisenstein Series.*
Catherine M Hsu, University of Oregon

6:00PM *The Weinstein Conjecture for Iterated*
(2176) *Planar Open Books.*
Bahar Acu, University of Southern California and University of California, Los Angeles

6:00PM *Graph Algebras with Amalgamated Free*
(2177) *Products.*
Erin Brownlee, North Dakota State University

6:00PM *Regularity conditions for quadratic forms*
(2178) *and Hermitian forms.* Preliminary report.
Alicia Marino* and **Wai Kiu Chan**, Wesleyan University

6:00PM *Deterministic and Stochastic Dynamics of*
(2179) *Phytoplankton-Zooplankton Interactions with a Toxin Producing Phytoplankton.*
T.Mihiri M. De Silva* and **Sophia Jang**, Texas Tech University

6:00PM (2180) *A lower bound for the least prime in an arithmetic progression.*
Junxian Li*, **Kyle Pratt** and **George Shakan**, University of Illinois at Urbana-Champaign

6:00PM (2181) *The augmentation category map induced by exact Lagrangian cobordisms.*
Yu Pan, Duke University

▶ 6:00PM (2182) *Handicap principle implies emergence of dimorphic ornaments.*
Sara M. Clifton*, **Rosemary I. Braun** and **Daniel M. Abrams**, Northwestern University

6:00PM (2183) *Exploding trousers and computing the intractable: An introduction to scattering-symplectic geometry.*
Melinda Lanius, University of Illinois at Urbana-Champaign

▶ 6:00PM (2184) *The Maximum Number of Triangles in a Graph with a Fixed Number of Edges and Maximum Degree.* Preliminary report.
Rachel Kirsch* and **Jamie Radcliffe**, University of Nebraska-Lincoln

6:00PM (2185) *Vector bundles of conformal blocks- rank One and finite generation.*
Natalie Hobson, University of Georgia

6:00PM (2186) *Fractional Separation Dimension.*
Sarah Loeb*, University of Illinois, Urbana-Champaign, and **Douglas B. West**, University of Illinois, Urbana-Champaign and Zhejiang Normal University

▶ 6:00PM (2187) *Characterizations of hysteresis in conceptual Arctic sea ice models.* Preliminary report.
Kaitlin Hill*, Northwestern University, and **Mary Silber**, University of Chicago

6:00PM (2188) *Geodesic Language Complexity and Group Structure.* Preliminary report.
Maranda Franke, University of Nebraska - Lincoln

6:00PM (2189) *Nonassociative numbers and the infinite tree of valency four.*
Stefanie Wang, Iowa State University

6:00PM (2190) *Partitions into kth powers of terms in an arithmetic progression.*
Bruce C. Berndt, **Amita Malik*** and **Alexandru Zaharescu**, University of Illinois at Urbana-Champaign

6:00PM (2191) *Spacing Problems and the Pair Correlation Statistics.*
Sneha Chaubey, University of Illinois at Urbana-Champaign

6:00PM (2192) *A New Northcott Property for Faltings' Heights.*
Lucia Mocz, Princeton University

Mathematically Bent Theater

6:00 PM – 7:00 PM   Regency Ballroom VII, Ballroom Level, Hyatt Regency

Performed by Colin Adams and the Mobiusbandaid Players.

AMS Mathematical Reviews Reception

6:00 PM – 7:00 PM   Hanover Hall AB, Exhibit Level, Hyatt Regency

SIGMAA on Business, Industry, and Government (BIG SIGMAA)Reception

6:20 PM – 7:00 PM   L401 & L402, Lobby Level, Marriott Marquis

SIGMAA on Business, Industry, and Government (BIG SIGMAA) Business Meeting

7:00 PM – 7:30 PM   L401 & L402, Lobby Level, Marriott Marquis

NAM Cox-Talbot Address

7:45 PM – 8:35 PM   Imperial Ballroom B, Marquis Level, Marriott Marquis

▶ (2193) *The Changing Higher Education Landscape: One Mathematician Turned Administrator's View.*
Garikai Campbell, Morehouse College (1125-00-3145)

Project NExT Reception

8:00 PM – 10:00 PM   International Ballroom South, Int Tower LL1, Hyatt Regency

All Project NExT Fellows, consultants, and other friends of Project NExT are invited.

Organizers: **Julia Barnes**, West Carolina University

Alissa Crans, Loyola Marymount University

Matt DeLong, Taylor University

David Kung, St Mary's College of Maryland

MAA Special Presentation:

8:00 PM – 9:00 PM   Regency Ballroom VII, Ballroom Level, Hyatt Regency

Relatively Prime - Live Podcast

Presenter: **Samuel Hansen**

Backgammon!

8:00 PM – 10:00 PM   International Ballroom North, Int Tower LL1, Hyatt Regency

Organizer: **Arther Benjamin**, Harvey Mudd College

Saturday, January 7

Joint Meetings Registration

7:30 AM – 2:00 PM
Grand Hall Lobby, Exhibit Level, Hyatt Regency

Email Center

7:30 AM – 2:00 PM
Exhibit Level Prefunction Area, Hyatt Regency

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, III

8:00 AM – 11:50 AM
International 8, International Level, Marriott Marquis

Organizers: **Darren A. Narayan**, Rochester Institute of Technology

Tamas Forgacs, California State University, Fresno

Ugur Abdulla, Florida Institute of Technology

8:00AM ▶ (2194) *When is $a^n + 1$ the sum of two squares?* Preliminary report.
Kylie Hess, Rose-Hulman Institute of Technology, **Jeremy Rouse**, Wake Forest University, **Emily Stamm***, Vassar College, and **Terrin Warren**, University of Georgia (1125-11-118)

8:30AM ▶ (2195) *Classification of All Crescent Configurations on Four and Five Points.*
Rebecca F. Durst, Williams College/SMALL 2016, **Max Hlavacek***, Harvey Mudd College/SMALL 2016, and **Chi Huynh**, Georgia Institute of Technology/SMALL 2016 (1125-52-1569)

9:00AM ▶ (2196) *Index Divisibility in Dynamical Sequences and Cyclic Orbits Modulo p.* Preliminary report.
Annie S. Chen*, Boulder High School, **T. Alden Gassert**, Western New England University, and **Katherine E. Stange**, University of Colorado Boulder (1125-11-235)

9:30AM ▶ (2197) *Towards a Characterization of Graphs with Distinct Betweenness Centralities.*
Ruth Lopez*, California State University, Long Beach, and **Jacob Worrell**, Indiana University - Bloomington (1125-05-134)

10:00AM ▶ (2198) *On Some Edge Folkman Numbers, Large and Small.*
Jenny Kaufmann*, Princeton University, and **Henry Wickus**, DeSales University (1125-05-135)

10:30AM ▶ (2199) *Control of Cardiac Tissue Using Feedback-Based Synchronization.*
Nirja Dave*, University of Pittsburgh, and **Andre Lesartre**, Colorado School of Mines (1125-37-136)

11:00AM ▶ (2200) *Using Delay Differential Equations to Study Calcium Alternans in a Model of Intracellular Calcium Cycling.*
Jamshaid Shahir*, University of Maryland, Baltimore County, and **Kimberly Truong**, Brown University (1125-37-137)

11:30AM ▶ (2201) *Average saturation numbers of double stars.*
Kristofer Siy*, Tufts University, and **Heather Weaver**, Case Western Reserve University (1125-05-188)

AMS Special Session on Advances in Mathematics of Ecology, Epidemiology and Immunology of Infectious Diseases, II

8:00 AM – 11:50 AM
M101, Marquis Level, Marriott Marquis

Organizer: **Abba Gumel**, Arizona State University

8:00AM (2202) *Analysis of an SIR Model with Population Dynamics.*
Ronald E. Mickens, Clark Atlanta University (1125-92-464)

8:30AM ▶ (2203) *Modeling Hantavirus Among Rodents in Paraguay.* Preliminary report.
Suzanne Lenhart, University of Tennessee and NIMBioS (1125-92-331)

9:00AM ▶ (2204) *Target reproduction numbers with applications in ecology and epidemiology.* Preliminary report.
Zhisheng Shuai, University of Central Florida (1125-92-2698)

9:30AM (2205) *Transmission Dynamics of Two Dengue Serotypes with vaccination scenarios.* Preliminary report.
Jorge X Velasco-Hernandez, Instituto de Matematicas UNAM-Juriquilla (1125-92-1779)

10:00AM ▶ (2206) *The Transmission Dynamics of a Within-and Between-Hosts Malaria Model.* Preliminary report.
F. B. Agusto, University of Kansas (1125-92-790)

10:30AM ▶ (2207) *A Multi-Scale Model of Vector-Host Infection Dynamics and Evolution.* Preliminary report.
Hayriye Gulbudak*, Arizona State University, School of Mathematical and Statistical Sciences, **Vincent Cannataro**, Yale University, **Necibe Tuncer**, Florida Atlantic University, and **Maia Martcheva**, University of Florida (1125-92-1119)

11:00AM (2208) *An Immuno-Eco-Epidemiological Model of Competition.* Preliminary report.
Michael Barfield, **Maia Martcheva***, University of Florida, **Necibe Tuncer**, Florida Atlantic University, **Robert Holt** and **Yena Kim**, University of Florida (1125-92-761)

11:30AM *Optimal control with multiple human*
(2209) *papillomavirus vaccines.*
Tufail M Malik*, Khalifa University, Abu
Dhabi, **M Imran**, Gulf University for
Science and Technology, Kuwait, and **R
Jayaraman**, Khalifa University, Abu Dhabi
(1125-92-78)

AMS Special Session on Analytic Number Theory and Arithmetic, I

8:00 AM – 11:50 AM   **Inman, Conference
Level, Hyatt Regency**

Organizers: **Robert Lemke Oliver**, Tufts
University

Paul Pollack, University of
Georgia

Frank Thorne, University of
South Carolina

8:00AM *Random multiplicative walks on the*
(2210) *residues modulo n.*
Nathan G McNew, Towson University
(1125-11-1111)

8:30AM *New results on arithmetic equivalence*
(2211) *using a Galois representation analog of*
Tate's isogeny theorem. Preliminary
report.
Guillermo Mantilla-Soler, Universidad de
los Andes (1125-11-670)

9:00AM *Brun-Titchmarsh, Chebotarev, and*
(2212) *Lang-Trotter.*
Jesse Thorner, Stanford University, and
Asif Zaman*, University of Toronto
(1125-11-925)

9:30AM *Partitions into values of a polynomial.*
(2213) Preliminary report.
Ayla R. Gafni, University of Rochester
(1125-11-845)

10:00AM *Differencing methods for Korobov-type*
(2214) *exponential sums.*
Joseph A Vandehey, The Ohio State
University (1125-11-438)

10:30AM *Poisson spacings between sums of two*
▶ (2215) *squares and spectral correlations for the*
square billiard.
Tristan Freiberg*, University of
Waterloo, **Pär Kurlberg** and **Lior
Rosenzweig**, KTH Royal Institute of
Technology (1125-11-847)

11:00AM *Small scale equidistribution of*
(2216) *eigenfunctions on the torus.*
Steve Lester*, University of Montreal,
and **Zeev Rudnick**, Tel Aviv University
(1125-11-454)

11:30AM *Local to global principles in integral*
(2217) *circle packings.*
Elena Fuchs, UC Davis (1125-11-968)

AMS Special Session on Applications of Partially Ordered Sets in Algebraic, Topological, and Enumerative Combinatorics, I

8:00 AM – 11:45 AM   **Spring, Conference
Level, Hyatt Regency**

Organizers: **Rafael S. González D'León**,
University of Kentucky

Joshua Hallam, Wake Forest
University

8:00AM *Progress on the $1/3 - 2/3$ Conjecture.*
(2218) Preliminary report.
Emily J Olson* and **Bruce Sagan**,
Michigan State University (1125-05-2276)

8:30AM *Wilf-equivalences of non-overlapping*
(2219) *permutations, the cluster method, and*
linear extensions of posets. Preliminary
report.
J Tim Dwyer, Dartmouth College
(1125-05-1502)

9:00AM *The structure of the consecutive pattern*
(2220) *poset.*
Sergi Elizalde, Dartmouth College, and
Peter R. W. McNamara*, Bucknell
University (1125-05-1212)

9:30AM *Pattern-avoiding polytopes and Bruhat*
(2221) *orders I.*
Robert Davis and **Bruce E Sagan***,
Michigan State University (1125-05-381)

10:00AM *Pattern-avoiding polytopes and Bruhat*
(2222) *orders II.*
Robert Davis* and **Bruce E. Sagan**,
Michigan State University (1125-05-382)

10:30AM *A poset of reduced words for the longest*
(2223) *element.*
Thomas McConville, Massachusetts
Institute of Technology (1125-05-478)

11:00AM *Homology of Partition Posets.* Preliminary
(2224) report.
Michelle L. Wachs, University of Miami
(1125-05-3027)

AMS Special Session on Complex Analysis and Special Functions, II

8:00 AM – 11:50 AM   **M103 & 104, Marquis
Level, Marriott Marquis**

Organizers: **Brock Williams**, Texas Tech
University

Kendall Richards,
Southwestern University

Alex Solynin, Texas Tech
University

8:00AM *Asymptotic Properties of Finite Perimeter*
(2225) *Sets in Metric Spaces.* Preliminary report.
James T. Gill*, Saint Louis University,
Panu Lahti and **Nageswari
Shanmugalingam**, University of
Cincinnati (1125-28-2504)

8:30AM   *Distortion of dimension by Sobolev and*
(2226)   *quasiconformal mappings.*
         Jeremy T. Tyson, University of Illinois at
         Urbana-Champaign (1125-30-1695)

9:00AM   *Jump decomposition on quasicircles.*
(2227)   **Eric D. Schippers***, University of
         Manitoba, and **Wolfgang Staubach**,
         Uppsala Universitet (1125-30-3049)

9:30AM   *Sewing homeomorphisms and conformal*
▶ (2228) *invariants.* Preliminary report.
         Tao Cheng, East China Normal
         University, Shanghai, China, **Huiqiang
         Shi**, Emory University, Atlanta, GA and
         Hunan University of Commerce, Hunan,
         China, and **Shanshuang Yang***, Emory
         University, Atlanta, GA (1125-30-806)

10:00AM *A Möbius invariant Cassinian metric.*
(2229)   **Zair Ibragimov**, California State
         University, Fullerton (1125-30-599)

10:30AM *An Extremal Problem Approach to*
(2230)   *Korenblum's Maximum Principle in*
         Bergman Spaces.
         Pritha Chakraborty*, Texas A&M
         University Corpus-Christi, and **Alexander
         Solynin**, Texas Tech University
         (1125-30-1392)

11:00AM *Quasi-Hyperbolic Geodesics are*
(2231)   *Hyperbolic Quasi-Geodesics.* Preliminary
         report.
         David A Herron*, University of
         Cincinnati, and **Stephen M Buckley**,
         National University of Ireland
         (1125-51-1958)

11:30AM *Quotients of hyperbolic metrics.*
(2232)   Preliminary report.
         C. David Minda, University of Cincinnati
         (1125-30-1148)

AMS Special Session on Continued Fractions, I

8:00 AM – 11:50 AM   **Dunwoody, Conference
                             Level, Hyatt Regency**

         Organizers: **James McLaughlin**, West
                      Chester University

                      Geremías Polanco,
                      Hampshire College

                      Nancy J. Wyshinski, Trinity
                      College

8:00AM   *Classical Convergence of Random*
(2233)   *Continued Fractions.*
         Lisa Lorentzen, Norwegian University of
         Science and Technology (1125-30-2326)

9:00AM   *A Continued Fraction Algorithm for*
▶ (2234) *Quadratic Numbers, Forms, and Ideals.*
         Preliminary report.
         J. Larry Lehman, University of Mary
         Washington (1125-11-1778)

9:30AM   *Constructing exact Hermite matrices*
▶ (2235) *using approximate roots.* Preliminary
         report.
         Tulay Ayyildiz Akoglu, North Carolina
         State University (1125-15-2428)

10:00AM *Minkowski Question Mark Type Functions*
(2236)   *for a Family of Multi-dimensional*
         Continued Fractions. Preliminary report.
         Thomas Garrity* and **Peter McDonald**,
         Williams (1125-11-2439)

10:30AM *Invertible substitutions and continued*
(2237)   *fractions.* Preliminary report.
         Bernd Sing*, University of the West
         Indies, Barbados, and **Dirk Frettlöh**,
         Universität Bielefeld, Germany
         (1125-37-2618)

11:00AM *On the Stolt Fundamental Solutions of*
▶ (2238) $x^2 - dy^2 = 4n$. Preliminary report.
         Keith R Matthews, University of
         Queensland and Australian National
         University, Australia, and **John P
         Robertson***, National Council on
         Compensation Insurance, Boca Raton,
         USA (1125-11-3153)

11:30AM *Applications of the Heine and Bauer-Muir*
(2239)   *transformations to Rogers-Ramanujan*
         type continued fractions.
         Jongsil Lee, Yonsei University, Seoul,
         Korea, **James Mc Laughlin***, West
         Chester University, and **Jaebum Sohn**,
         Yonsei University, Seoul, Korea
         (1125-33-2195)

AMS Special Session on Ergodic Theory and Dynamical Systems, II

8:00 AM – 11:50 AM   **M106 & M107,
                             Marquis Level, Marriott Marquis**

         Organizers: **Mrinal Kanti
                      Roychowdhury**, University
                      of Texas Rio Grande Valley

                      Tamara Kucherenko, City
                      College of New York

8:00AM   *Periodicity and ergodicity in the*
▶ (2240) *trihexagonal tiling.*
         Diana Davis, Williams College, and **W.
         Patrick Hooper***, City College of New
         York and CUNY Graduate Center
         (1125-37-425)

9:00AM   *Periodic billiard paths on the pentagon.*
▶ (2241) **Diana Davis**, Williams College
         (1125-37-465)

9:30AM   *A multifractal analysis for cuspidal*
(2242)   *windings on hyperbolic surfaces.*
         Johannes Jaerisch*, Department of
         Mathematics, Shimane University, Japan,
         Marc Kesseböhmer, University Bremen,
         Germany, and **Sara Munday**, University
         of Bologna, Italy (1125-37-898)

10:00AM *Finding Roots of Any Polynomials by*
▶ (2243) *Random Relaxed Newton's Methods.*
         Preliminary report.
         Hiroki Sumi, Department of
         Mathematics, Graduate School of Science,
         Osaka University (1125-37-317)

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10:30AM *Hereditarily Non Uniformly Perfect Sets*
(2244) *of Full Dimension.*
Rich Stankewitz*, Ball State University,
Toshiyuki Sugawa, Tohoku University,
and **Hiroki Sumi**, Osaka University
(1125-37-1211)

11:00AM *Dynamics of neutral dissipative*
(2245) *holomorphic germs of* $(\mathbb{C}^2, 0)$.
Remus Radu, Stony Brook University
(1125-37-2223)

11:30AM *Random geometric graphs on*
▶ (2246) *nonuniform and fractal measures.*
Preliminary report.
Carl P Dettmann, University of Bristol,
UK (1125-60-2259)

AMS Special Session on Graphs and Matrices, I

8:00 AM – 11:50 AM   **Embassy D, International**
Tower, LL2, Hyatt Regency

Organizers: **Sudipta Mallik**, Northern
Arizona University

Keivan Hassani Monfared,
University of Calgary

Bryan Shader, University of
Wyoming

8:00AM *Combinatorial Matrix Theory modulo* k.
(2247) Preliminary report.
Richard A Brualdi, University of
Wisconsin - Madison (1125-15-947)

9:00AM *Graphs for which inertia bounds are not*
▶ (2248) *tight.*
John Sinkovic, University of Waterloo
(1125-05-2198)

9:30AM *On the Characteristic Set, Centroid, and*
(2249) *Centre for a Tree.* Preliminary report.
Steve Kirkland, University of Manitoba
(1125-05-1080)

10:00AM *Spectral Approaches to Graph Coloring*
(2250) *And Its Variations.*
Franklin H. J. Kenter, United States Naval
Academy (1125-05-1864)

10:30AM *On the addressing problem for triangular*
▶ (2251) *graphs.*
S. Cioaba, University of Delaware, **R.
Elzinga**, Info-Tech Research Group, **M.
Markiewitz**, University of Delaware, **K.
Vander Meulen*** and **T. Vanderwoerd**,
Redeemer University College
(1125-15-1482)

11:00AM *Distance Laplacian eigenvalues and*
(2252) *forbidden subgraphs.*
Maria A. A. Freitas*, Universidade
Federal do Rio de Janeiro, **Celso M. Silva
Jr**, CEFET-RJ, and **Renata R. Del-Vecchio**,
Universidade Federal Fluminense
(1125-15-1544)

11:30AM *Constructions for distance cospectral*
(2253) *graphs.*
Kristin Heysse, Iowa State University
(1125-05-1861)

AMS Special Session on Group Actions and Geometric Structures, I

8:00 AM – 11:50 AM   **International C,**
International Level, Marriott Marquis

Organizers: **Anna Wienhard**, Universität
Heidelberg

Jeffrey Danciger, University
of Texas at Austin

8:00AM *Simple length spectrum rigidity.*
(2254) **Martin Bridgeman**, Boston College,
Richard Canary*, University of Michigan,
and **François Labourie**, Universite de
Nice (1125-57-1627)

9:00AM *N–chain groups of homeomorphisms of*
(2255) *one-manifolds.*
Sang-hyun Kim, Seoul National
University, **Thomas Koberda***, University
of Virginia, and **Yash Lodha**, EPFL
(1125-20-735)

9:30AM *Rigidity of divisible domains in flag*
(2256) *manifolds.*
Andrew Zimmer, University of Chicago
(1125-53-1530)

10:00AM *Spaces of nonnegatively curved surfaces.*
(2257) **Igor Belegradek**, Georgia Tech
(1125-53-419)

11:00AM *The geometry of quasi-Hitchin symplectic*
(2258) *Anosov representations.*
Daniele Alessandrini, University of
Heidelberg, **Sara Maloni***, University
of Virginia, and **Anna Wienhard**,
Ruprecht-Karls-Universität Heidelberg
(1125-57-636)

11:30AM *Spectral networks craft hour.* Preliminary
▶ (2259) report.
Aaron Fenyes, University of Toronto
(1125-57-1874)

AMS Special Session on Inverse Problems and Multivariate Signal Analysis, I

8:00 AM – 11:50 AM   **International 9,**
International Level, Marriott Marquis

Organizers: **M. Zuhair Nashed**,
University of Central Florida

Willi Freeden, University of
Kaiserslautern

Otmar Scherzer, University
of Vienna

8:00AM *Multivariate Sampling in Signal*
(2260) *Processing: A Tutorial Review with Brief*
Analysis and Applications.
Abdul J. Jerri, Emeritus
member:Clarkson Univesity,Potsdam,New
York 13676 (1125-94-1711)

8:30AM *Some new results on Lavrentiev*
(2261) *regularization for linear accretive*
ill-posed problems.
Robert Plato, Department of
Mathematics, University of Siegen
(1125-65-838)

9:00AM *Sampling for multi-spectral theory of*
▶ (2262) *Sturm-Liouville systems.*
Amin Boumenir, University of West
Georgia (1125-42-540)

9:30AM *Orthonormal basis systems on the ball*
(2263) *and their role in inverse problems.*
Volker Michel* and **Sarah Orzlowski**,
Geomathematics Group, Department of
Mathematics, University of Siegen
(1125-45-1026)

10:00AM *A general mollifier approach to the*
(2264) *regularization of linear ill-posed*
problems.
Pierre R. Marechal, Mathematical
Institute of Toulouse, Paul Sabatier
University, France (1125-49-2288)

10:30AM *Parameter Estimation in Optical*
(2265) *Coherence Tomography.* Preliminary
report.
Otmar Scherzer, Computational Science
Center, University Vienna (1125-44-1008)

11:00AM *Reconstruction of signals from phaseless*
(2266) *samples of evolutionary systems.*
Akram Aldroubi*, Vanderbilt, **Ilya**
Krishtal, Northern Illinois University, and
Sui Tang, John Hopkins (1125-42-1060)

11:30AM *Bayesian statistics in variational inverse*
(2267) *problems.* Preliminary report.
Mila Nikolova, CMLA, CNRS, ENS Cachan,
Universite Paris Saclay (1125-49-2503)

AMS Special Session on Mathematics and Music, II

8:00 AM – 11:50 AM M301, Marquis
Level, Marriott Marquis

Organizers: **Mariana Montiel**, Georgia
State University

Robert Peck, Louisiana
State University

8:00AM *Measuring Distances of Musical*
▶ (2268) *Schemata.*
David John Baker, Louisiana State
University (1125-00-3081)

8:30AM *A Diachronic Approach to Musical*
▶ (2269) *Prototypicality with Dynamic Time*
Warping. Preliminary report.
Daniel T Shanahan, Louisiana State
University (1125-62-2866)

9:00AM *Christoffel Words, Rich Words, and*
(2270) *Perfect Balance.*
Norman Carey, The City University of
New York (1125-00-3059)

9:30AM *The Fibonacci sequence as metric*
▶ (2271) *suspension in Luigi Nono's "Il canto*
sospeso". Preliminary report.
Jon Kochavi, Swarthmore College
(1125-00-1635)

10:00AM *Difference sets in mathematical music*
▶ (2272) *theory.* Preliminary report.
Robert W. Peck, Louisiana State
University (1125-05-1574)

10:30AM $\sqrt{2}$, *a musical exploration.*
▶ (2273) **Gerry Myerson**, Mathematics, Macquarie
University (1125-11-87)

11:00AM *Geometrical Realizations of Two- and*
▶ (2274) *Three-Dimensional Generalized Tonnetze.*
Jason D Yust, Boston University
(1125-00-1997)

11:30AM *Voice Leading and Composition.*
▶ (2275) **Dmitri Tymoczko**, Princeton University
(1125-51-605)

AMS Special Session on Mathematics of Signal Processing and Information, I

8:00 AM – 11:50 AM International 10,
International Level, Marriott Marquis

Organizers: **Rayan Saab**, University of
California, San Diego

Mark Iwen, Michigan State
University

8:00AM *Super-resolution by means of Beurling*
(2276) *minimal extrapolation.* Preliminary
report.
John J. Benedetto* and **Weilin Li**,
Norbert Wiener Center, Dept. of
Mathematics, U. Maryland, College Park
(1125-42-66)

8:30AM *Frequency extrapolation from*
(2277) *band-limited data.*
Rongrong Wang, University of British
Columbia (1125-42-894)

9:00AM *Phase retrieval on infinite dimensions.*
(2278) **Ingrid Daubechies**, Duke University
(1125-94-269)

9:30AM *Robust and Fast Phase Retrieval from*
(2279) *Local Correlation Measurements.*
Brian Preskitt, University of California,
San Diego, **Aditya Viswanathan***, **Mark**
Iwen, Michigan State University, and
Rayan Saab, University of California, San
Diego (1125-42-214)

10:00AM *Fixed Point Algorithms for Phase*
(2280) *Retrieval.*
Albert Fannjiang*, UC Davis, and
Pengwen Chen, National Chung Hsing
University, Taiwan (1125-42-286)

10:30AM *Statistics of the Stability Bounds in the*
(2281) *Phase Retrieval Problem.* Preliminary
report.
Radu Balan, University of Maryland
(1125-60-227)

11:00AM *Computational microscopy for phase*
▶ (2282) *retrieval.*
Laura Waller, UC Berkeley (1125-92-183)

11:30AM *Lens design for X-ray imaging.*
(2283) Preliminary report.
Huibin Cang, Stefano Marchesini*,
Lawrence Berkeley National Laboratory,
and **Anne Sakdinawat**, Stanford
(1125-41-3034)

AMS Special Session on Minimal Integral Models of Algebraic Curves, I

8:00 AM – 11:45 AM   **The Learning Center, Ballroom Level, Hyatt Regency**

Organizer: **Tony Shaska**, Oakland University

▶ 8:00AM (2284) *Brauer Manin Obstruction for a family of surfaces.*
Jennifer Berg, Rice University (1125-11-2733)

8:30AM (2285) *A universal pair of genus-two curves.*
Tony Shaska*, Oakland University, and **Andreas Malmendier**, Utah State University (1125-14-1705)

9:00AM (2286) *Tropical geometry and uniformity of rational points.*
David Zureick-Brown*, Emory University, **Eric Katz**, The Ohio State University, and **Joe Rabinoff**, Georgia Tech (1125-11-55)

10:00AM (2287) *The number of binary forms of bounded moduli height.* Preliminary report.
Lubjana Beshaj*, The University of Texas at Austin, and **Tony Shaska**, Oakland University (1125-11-265)

11:00AM (2288) *Integrality of the Kleinian sigma function and Rankin-Cohen brackets on modular forms.*
Emma Previato, Boston University (1125-11-367)

AMS Special Session on New Developments in Noncommutative Algebra & Representation Theory, I

8:00 AM – 11:50 AM   **A705, Atrium Level, Marriott Marquis**

Organizers: **Ellen Kirkman**, Wake Forest University

            Chelsea Walton, Temple University

8:00AM (2289) *Tilting Modules and the centralizer of a regular nilpotent.* Preliminary report.
Laura Rider, University of Georgia (1125-22-2381)

8:30AM (2290) *Deformations of the skew group algebras of truncated quantum polynomial rings.* Preliminary report.
Lauren Grimley*, Spring Hill College, and **Christine Uhl**, St. Bonaventure University (1125-16-1621)

9:00AM (2291) *Discriminants of Polynomial Identity Quantized Weyl Algebras.*
Jesse S. F. Levitt*, University of Southern California, and **Milen Yakimov**, Louisiana State University (1125-16-2965)

9:30AM (2292) *Mutation of A_n friezes.* Preliminary report.
Karin Baur, University of Graz, **Eleonore Faber***, University of Michigan, **Sira Gratz**, University of Oxford, **Khrystyna Serhiyenko**, University of California at Berkeley, and **Gordana Todorov**, Northeastern University (1125-16-1501)

10:00AM (2293) *From prime ideals to physics, via total nonnegativity.*
Siân Fryer, UC Santa Barbara (1125-16-1934)

10:30AM (2294) *Adelic grassmannians for finite dimensional algebras.*
Emil Horozov, University of Sofia, Bulgaria, and **Milen Yakimov***, Louisiana State University (1125-16-1355)

11:00AM (2295) *Auslander's Theorem for permutation actions on (−1)-skew polynomial rings.* Preliminary report.
Jason Gaddis*, **Ellen Kirkman**, **W. Frank Moore** and **Robert Won**, Wake Forest University (1125-16-1319)

11:30AM (2296) *Noncommutative Auslander Theorem and McKay correspondence.*
James Zhang, University of Washington (1125-16-722)

AMS Special Session on Open & Accessible Problems for Undergraduate Research, I

8:00 AM – 11:50 AM   **International 4, International Level, Marriott Marquis**

Organizers: **Allison Henrich**, Seattle University

            Michael Dorff, Brigham Young University

            Nicholas Scoville, Ursinus College

▶ 8:00AM (2297) *Past, Current, and Potential Interdisciplinary Undergraduate Research Problems in Math Biology.*
Eva Marie Strawbridge, James Madison University (1125-92-684)

▶ 8:30AM (2298) *Examples of Research by Undergraduates at the Summer Undergraduate Research Institute in Experimental Mathematics (SURIEM).*
Aklilu Zeleke, Michigan State University (1125-00-105)

▶ 9:00AM (2299) *New Problems in Graph Theory from Self-Assembly.*
Joanna A. Ellis-Monaghan, Saint Michael's College (1125-05-846)

9:30AM (2300) *Modeling Shapes of Objects with Undergraduates.*
Kathryn Leonard, CSU Channel Islands (1125-51-2484)

10:00AM (2301) *Non-Euclidean Photography: The World of Mirrors.*
Casey Douglas, St. Mary's College of Maryland (1125-35-2071)

▶ 10:30AM (2302) *Summer research projects for First Year students.*
Enrique Treviño, Lake Forest College (1125-11-3022)

▶ 11:00AM (2303) *They Really Can Do Research in Pure Math: Group-theoretic Problems Accessible to Underprepared Students.*
Meghan De Witt, St. Thomas Aquinas College (1125-97-1776)

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11:30AM *Least-perimeter Tiles of the Hyperbolic*
▶ (2304) *Plane.*
Frank Morgan, Williams College and
Notices (1125-49-807)

AMS Special Session on PDE Analysis on Fluid Flows, I

8:00 AM – 11:50 AM **Embassy F, International
Tower, LL2, Hyatt Regency**

Organizers: **Xiang Xu**, Old Dominion
University

Geng Chen, Georgia
Institute of Technology

Ronghua Pan, Georgia
Institute of Technology

8:00AM *Nonuniqueness of weak solutions to the*
(2305) *nematic liquid crystal flows.*
Huajun Gong, College of Mathematics
and Statistics, Shenzhen University,
Tao Huang*, NYU-ECNU Institute
of Mathematical Sciences at NYU
Shanghai, and **Jinkai Li**, Department of
Mathematics, The Chinese University of
Hong Kong (1125-35-390)

8:30AM *Harmonic map flow in 2 dimension under*
(2306) *weak anchoring boundary condition.*
Preliminary report.
Tao Huang, New York University
at Shanghai, **Yuanzhen Shao** and
Changyou Wang*, Purdue University
(1125-35-1110)

9:00AM *Finite element methods for nematic*
(2307) *liquid crystals with variable degree of*
orientation.
Wujun Zhang*, Department of
Mathematics, Rutgers University,
and **Shawn Walker**, Department of
Mathematics and Center for Computation
& Technology (CCT) Louisiana State
University (1125-65-2123)

9:30AM *Analysis of a one-dimensional Landau-de*
(2308) *Gennes model for bent-core liquid*
crystals.
Tiziana Giorgi, New Mexico State
University (1125-49-1345)

10:00AM Break

10:30AM *Bifurcation study of smectic A liquid*
(2309) *crystals in three dimensions.*
S Joo*, Old Dominion University, **A
Contreras**, New Mexico State University,
C Garcia-Azpeitia, Facultad de Ciencias,
and **C Garcia-Cervera**, University of
California, Santa Barbara (1125-82-1908)

11:00AM *Uniaxiality vs Biaxiality in the Q-tensor*
(2310) *model.*
Andres Contreras, New Mexico State
University (1125-35-2095)

11:30AM *Global well-posedness for nonlinear wave*
(2311) *equations with applications in nematic*
liquid crystals.
Geng Chen, University of Kansas
(1125-35-1694)

AMS Special Session on Recent Progress on Nonlinear Dispersive and Wave Equations, III

8:00 AM – 11:50 AM **L405 & L406, Lobby
Level, Marriott Marquis**

Organizers: **Dana Mendelson**, University
of Chicago

Carlos Kenig, University of
Chicago

Hao Jia, University of
Chicago

Andrew Lawrie, University
of California, Berkeley

Gigliola Staffilani,
Massachusetts Institute of
Technology

Magdalena Czubak,
University of Colorado
Boulder

8:00AM *Instability of solitary waves in the*
(2312) *KdV-type equations.* Preliminary report.
Svetlana Roudenko, The George
Washington University (1125-35-2778)

8:30AM *The rigorous derivation of the 2D cubic*
(2313) *focusing NLS from quantum many-body*
evolution.
Xuwen Chen, University of Rochester,
and **Justin Holmer***, Brown University
(1125-35-2816)

9:00AM *The symplectic non-squeezing for*
(2314) *nonlinear Schrodinger equations.*
Xiaoyi Zhang, University of Iowa
(1125-35-1818)

9:30AM *Solitons and scattering for a semi–linear*
▶ (2315) *Skyrme equation.*
Casey P Rodriguez*, University of
Chicago, and **Andrew Lawrie**, MIT
(1125-35-2098)

10:00AM Break

10:30AM *New methods for the study of*
(2316) *supercritical semilinear wave equations.*
Marius Beceanu*, State University of
New York - Albany, and **Avy Soffer**,
Rutgers (1125-34-1626)

11:00AM *Minimal mass-energy dynamics for*
(2317) *rotating BEC.*
Shijun Zheng, Georgia Southern
University (1125-35-2091)

11:30AM *Scattering for the 3D Gross-Pitaevskii*
(2318) *equation.*
Zihua Guo, School of Mathematical
Sciences, Monash University, **Zaher
Hani***, Georgia Institute of Technology,
and **Kenji Nakanishi**, Osaka University
(1125-35-1935)

AMS Special Session on Teaching Assistant Development Programs: Why and How?, I

8:00 AM – 11:50 AM **International 3,
International Level, Marriott Marquis**

Organizers: **Solomon Friedberg**, Boston
College

Jessica Deshler, West Virginia University

Jeffrey Remmel, University of California, San Diego

Lisa Townsley, University of Georgia

8:00AM *Preparing graduate students for 40*
(2319) *years of teaching.*
D. I. Wallace, Dartmouth College
(1125-97-1054)

8:30AM *Arizona Mathematics GTA Training: A*
(2320) *Gentle Crash Course in Teaching.*
Tina Deemer, The University of Arizona
(1125-97-1005)

9:00AM *Career-long and Timely Training for TAs:*
(2321) *An overview of the various components
of the Math TA Training at the University
of Washington, how the program
evolved, and lessons learned.*
Judith M Arms* and **Alexandra Nichifor**,
University of Washington (1125-97-1123)

9:30AM *Mathematics GTA PD: Where we are and*
▶ (2322) *where we are going.*
Jess Ellis*, Colorado State University,
Daniel Bragdon, Fort Collins, CO, and
Jessica Gehrtz, Colorado State University
(1125-97-2539)

10:00AM *The Evolution of TA Training at Texas*
▶ (2323) *A&M.* Preliminary report.
David Manuel, Texas A&M University,
and **Tracy Weyand***, Baylor University
(1125-97-814)

10:30AM *The College Fellow Program at the*
(2324) *University of Chicago.*
John Boller, University of Chicago
(1125-97-1409)

11:00AM *Thirteen Hours: Graduate Student*
(2325) *Teacher Training Under Time
Constraints.*
Daniel J Katz, Brown University
(1125-97-638)

11:30AM *Current Teaching Assistant Professional*
(2326) *Development Program Structures:
Findings from a National Survey.*
Jessica M Deshler, West Virginia
University (1125-97-2053)

AMS Special Session on The Modeling First Approach to Teaching Differential Equations

8:00 AM – 12:20 PM A601, Atrium
Level, Marriott Marquis

Organizers: **Chris McCarthy**, City
University of New York

Brian Winkel, US Military
Academy, West Point

8:00AM *Remodel Your Differential Equations*
(2327) *Course.*
Jon Paynter, United States Military
Academy (1125-34-1308)

8:30AM *Bringing the Differential Course into the*
▶ (2328) *Twenty-First Century With a Computer
Algebra System and a Modeling First
Approach.*
Patrice G Tiffany* and **Rosemary C
Farley**, Manhattan College (1125-34-371)

9:00AM *Creating and using videos in support of*
▶ (2329) *modeling in differential equations course
work.*
John T. Sieben, Texas Lutheran
University (1125-34-324)

9:30AM *Modeling Improvisation: Taking*
▶ (2330) *Classroom Materials & Making Them
Your Own.*
Jessica Libertini* and **Karen Bliss**,
Virginia Military Institute (1125-97-372)

10:00AM *Baby steps for introducing Modeling First*
(2331) *with teaching Differential Equations.*
Dina M. Yagodich, Frederick Community
College (1125-34-441)

10:30AM *Modeling in an Engineering Mathematics*
▶ (2332) *Class – Tuned Mass Dampers.*
Keith A Landry*, Georgia Southern
University, and **Brian Winkel**, SIMIODE
(1125-34-293)

11:00AM *Successful modeling motivation for beam*
▶ (2333) *equations.*
Tiernan R. Fogarty, Oregon Institute of
Technology (1125-34-28)

11:30AM *Modeling Feral Cat Control.*
(2334) **Rachel Louise Bayless**, Agnes Scott
College (1125-34-228)

NOON *SIMIODE–a supportive community for*
▶ (2335) *teaching and learning differential
equations using the "modeling first"
approach: from the classroom to
preparing students for research.*
Chris McCarthy*, Borough of Manhattan
Community College, CUNY, and **Brian J.
Winkel**, SIMIODE (1125-34-314)

MAA Invited Paper Session on Current Trends in Mathematical and Computational Biology

8:00 AM – 11:50 AM A602, Atrium
Level, Marriott Marquis

Organizers: **Raina Robeva**, Sweet Briar
College

Erin Bodine, Rhodes College

Brian Walton, James
Madison University

8:00AM *Entangled Proteins: Knotting and Linking.*
▶ (2336) **Kenneth C Millett**, University of
California, Santa Barbara (1125-AA-901)

8:30AM *The Combinatorics of RNA Branching.*
(2337) **Christine Heitsch**, School of
Mathematics, Georgia Institute of
Technology (1125-AA-2103)

9:00AM *Combinatorial and Computational Models*
▶ (2338) *in Synthetic Biology.*
Laurie J Heyer*, Davidson College, and
Jeffrey L Poet, Missouri Western State
University (1125-AA-2350)

9:30AM *The role of the autologous immune*
(2339) *response in chronic myelogenous*
leukemia.
Doron Levy, University of Maryland
(1125-AA-1904)

11:00AM *A mathematical framework to*
▶ (2340) *personalize gastric carcinogenesis*
screening.
Rachel Walker, H. Lee Moffitt Cancer
Center & Research Institute, **Jaime
Mejia**, Instituto de Patología Mejía
Jiménez, **Domenico Coppola** and **Heiko
Enderling***, H. Lee Moffitt Cancer Center
& Research Institute (1125-AA-1079)

11:30AM *Determining Near-Optimal Treatment*
▶ (2341) *Protocols via Nonlinear Cancer Models.*
Shelby Nicole Wilson, Morehouse
College (1125-AA-2685)

AMS Contributed Paper Session on Combinatorics and Graph Theory, III

8:00 AM – 11:55 AM   **Greenbriar, Conference
Level, Hyatt Regency**

8:00AM *Circular Separation Dimension.*
▶ (2342) **Sarah Loeb***, University of Illinois,
Urbana-Champaign, and **Douglas
B. West**, University of Illinois,
Urbana-Champaign and Zhejiang Normal
University (1125-05-1999)

8:15AM *Spherical configurations over finite fields.*
(2343) **Neil Lyall**, **Ákos Magyar** and **Hans
Parshall***, University of Georgia
(1125-05-2069)

8:30AM *On graphs representable by*
▶ (2344) *pattern-avoiding words.*
Yelena Mandelshtam, Stanford
University (1125-05-2087)

8:45AM *Grünbaum colorings extended to*
(2345) *non-facial 3-cycles.* Preliminary report.
sarah-marie belcastro*, MathILy / Smith
College, and **Ruth Haas**, Smith College
(1125-05-2094)

9:00AM *4-Cycle Decompositions of Complete*
(2346) *3-Uniform Hypergraphs.* Preliminary
report.
Heather D Jordon*, Albion College, and
Genevieve Newkirk, Illinois State
University (1125-05-2113)

9:15AM *The 3×3 Rook's graph is the unique*
▶ (2347) *smallest graph with lazy cop number 3.*
Brendan W Sullivan*, **Nikolas
Townsend** and **Mikayla Werzanski**,
Emmanuel College (1125-05-2175)

9:30AM *Graphs whose only odd cycles are small.*
▶ (2348) **Kristen Wetzler**, Louisiana State
University (1125-05-2212)

9:45AM *A Sharp Upper Bound on the k-Color*
▶ (2349) *Connection Number of a Graph.*
Preliminary report.
Alexander Halperin and **Adam Jump***,
Salisbury University (1125-05-2279)

10:00AM *Two q-countings related to q-multinomial*
(2350) *coefficients.* Preliminary report.
Mark Bly, University of
Tennessee-Knoxville (1125-05-2301)

10:15AM *On Different Topological Indices and*
(2351) *polynomials of the Boron Zigzag*
nanotube $BNT[p,q]$.
Sarfraz Ahmad, COMSATS Institute
of Information Technology, Lahore
(1125-05-2304)

10:30AM *Structure constants for K-theory of*
(2352) *Grassmannians, revisited.*
Huilan Li, Shandong Normal University,
Jennifer Morse, University of Virginia,
and **Patrick Shields***, Drexel University
(1125-05-2361)

10:45AM *On Orbits of Toggling Actions on*
▶ (2353) *Independent Sets of a Path Graph and the*
Homomesy Phenomenon. Preliminary
report.
Michael J. Joseph, University of
Connecticut (1125-05-2364)

11:00AM *The upper and lower*
(2354) *independence-partition number on*
bipartite graphs.
Anne C Sinko, College of St. Benedict/St.
John's University (1125-05-2371)

11:15AM *An algorithm toward finding solutions to*
▶ (2355) *the general multi-constraint cable-trench*
problem.
Jonathan Bloom and **Carl
Hammarsten***, Lafayette College
(1125-05-2396)

11:30AM *Chain decompositions for q,t-Catalan*
▶ (2356) *numbers.*
Kyungyong Lee, Univ. of Nebraska
Lincoln and Korea Institute for Advanced
Study, **Li Li**, Oakland University Dept. of
Mathematics and Statistics, and **Nicholas
A. Loehr***, Virginia Tech Department of
Mathematics (1125-05-2400)

11:45AM *Gamification of combinatorial research*
▶ (2357) *via Nim on graphs.*
Lindsay A Erickson, Augustana
University (1125-05-2419)

AMS Contributed Paper Session on Convex and Discrete Geometry

8:00 AM – 11:25 AM   **International B,
International Level, Marriott Marquis**

8:00AM *Hyperbolicity and Congestion.*
(2358) **Matthew Yancey**, Institute of Defense
Analyses / Center for Computing
Sciences (1125-05-1073)

8:15AM *Counting lattice points with solid-angle*
▶ (2359) *weights in irrational polytopes.*
Ricardo Diaz, University of Northern
Colorado, **Quang-Nhat Le***, Brown
University, Providence, RI, and **Sinai
Robins**, University of Sao Paulo, Brasil
(1125-05-2855)

8:30AM (2360) *Generating point configurations via hypersingular Riesz energy with an external field.*
Douglas P. Hardin, **Edward B. Saff** and **Oleksandr V. Vlasiuk***, Vanderbilt University (1125-31-2028)

8:45AM (2361) *Approximating continuous maps by isometries.*
Barry Minemyer, Ohio State University (1125-51-178)

9:00AM (2362) *On a functional equation related to a pair of hedgehogs with congruent projections.*
Sergii Myroshnychenko, Kent State University (1125-51-610)

9:15AM ▶ (2363) *On the Principle of Planimeters.*
Osman Yardimci, Auburn University (1125-51-2537)

9:30AM (2364) *Hypersurfaces with central convex cross-sections.*
Metin Alper Gur, Indiana University (1125-52-61)

9:45AM (2365) *On the average volume of sections of convex bodies.*
S Brazitikos, University of Athens, **S Dann***, University of Technology Vienna, **A Giannopoulos**, University of Athens, and **A Koldobsky**, University of Missouri (1125-52-537)

10:00AM ▶ (2366) *Variations of Toeplitz' Conjecture.*
Doyon Kim, Auburn University, Auburn, Alabama (1125-52-1296)

10:15AM ▶ (2367) *On Convex and Higher Dimensional Extensions of Conway's Thrackle Theorem.*
David Walter Stoner*, Harvard University, **Zoe Wellner**, Cornell University, **Ryan Chen**, Princeton University, **Frederick Huang**, Cornell University, and **Maxwell Polevy**, Northeastern University (1125-52-1550)

10:30AM (2368) *Alexandrov curvature of convex hypersurfaces in Hilbert space forms.*
Jonathan Dahl, Lafayette College (1125-52-2116)

10:45AM (2369) *On L-structures and other related convexity structures.* Preliminary report.
Andrzej Szymanski, Slippery Rock University of PA (1125-52-2447)

11:00AM ▶ (2370) *Using Rotations, If You Can Hide Behind It, Can You Hide Inside It?*
Michelle R. Cordier, Wheeling Jesuit University (1125-52-2814)

11:15AM (2371) *Lorentzian Ricci Solitons on Solvable Lie groups.* Preliminary report.
T. H. Wears, Longwood University (1125-52-2952)

AMS Contributed Paper Session on Game Theory, Systems, Control

8:00 AM – 11:40 AM International 1, International Level, Marriott Marquis

8:00AM ▶ (2372) *A fast relaxed normal two split method and an effective weighted TV approach for Euler's elastica image inpainting.*
Maryam Yashtini* and **Sung Ha Kang**, Georgia Institute of Technology (1125-90-144)

8:15AM ▶ (2373) *Multi-commodity flow applied to tracking multiple targets.*
Thy M. Tran, **James P. Ferry**, **John D. Foley*** and **Gregory A. Godfrey**, Metron, Inc. (1125-90-2700)

8:30AM ▶ (2374) *Modeling Portfolios using Big Data: Histories and Weight Presentation.*
Rodrigue M Djikeuchi* and **Isabelle Kemajou-Brown**, Morgan State University (1125-90-2848)

8:45AM ▶ (2375) *Territorial movement game.*
Jan Rychtar, University of North Carolina at Greensboro (1125-91-452)

9:00AM ▶ (2376) *Asset Pricing Models with Heterogeneous Behavioral Investors.* Preliminary report.
Yuanying Guan, Indiana University Northwest (1125-91-650)

9:15AM ▶ (2377) *A genetic algorithm approach to finding an optimal strategy for a folk dice game.* Preliminary report.
David P Ebert, Tarleton State University (1125-91-2560)

9:30AM ▶ (2378) *Optimal Control of Quadrotor Unmanned Aerial Vehicles on Time Scales.* Preliminary report.
Ozkan Ozturk* and **Haci Mehmet Guzey**, Missouri University of Science and Technology (1125-93-568)

9:45AM (2379) *Controllability of fractional neutral impulsive integro-differential equations in Banach spaces.*
Dimplekumar N Chalishajar*, Virginia Military Institute (VMI), **C Ravichandran**, KPR Institute of Engineering and Technology, and **S Dhanalakshmi**, Kongunadu Arts and Science College, (1125-93-837)

10:00AM (2380) *A Causal Impact Modeling in Impulsive Systems using Non-standard Analysis.*
Nak-seung Patrick Hyun* and **Erik I Verriest**, Georgia Institute of Technology (1125-93-1552)

10:15AM (2381) *On the inverse problems for the nonlinear dynamical systems arising in mathematical biology.* Preliminary report.
Roby Poteau* and **Ugur G. Abdulla**, Florida Institute of Technology (1125-93-3103)

10:30AM (2382) *New bounds for equiangular lines and spherical two-distance sets.*
Wei-Hsuan Yu, Michigan State University (1125-94-653)

10:45AM *An alternative perspective for EEG data*
(2383) *analysis.* Preliminary report.
Michelle R DeDeo, Univ. of North Florida
(1125-94-658)

11:00AM *Filtering and Decoding Non-binary*
▶ (2384) *Tenengolts Codes Capable of Correcting Multiple Insertion/Deletion Errors.*
Alexander T Drumm and **Hieu D Nguyen***, Rowan University
(1125-94-1033)

11:15AM *One-Round Authenticated Group*
(2385) *Key Establishment from Multilinear Mappings.*
Kashi Neupane, University of North Georgia (1125-94-2922)

11:30AM *Violations of The Ingleton inequality and*
▶ (2386) *the inclusion-exclusion ratio.* Preliminary report.
Michael E O'Sullivan* and **John Mackenzie**, San Diego State University
(1125-94-3102)

AMS Contributed Paper Session on Group Theory, Topological Groups, Lie Groups

8:00 AM – 11:10 AM   **Fairlie, Conference Level, Hyatt Regency**

8:00AM *A GAP-conjecture and its solution:*
(2387) *isomorphism classes of capable special p-groups of rank 2.*
Luise-Charlotte Kappe*, Binghamton University, **H. Heineken**, University of Wuerzburg, and **R. F. Morse**, University of Evansville (1125-20-203)

8:15AM *The Brauer Complex and Decomposition*
(2388) *Numbers of Symplectic Groups.*
Preliminary report.
Ian Hogan*, Department of Mathematical Sciences, Kent State University, and **Michael Decker**, Department of Computer Science, Kent State University
(1125-20-564)

8:30AM *Connections Between the Number of*
(2389) *Constituents and the Derived Length of a Group.*
Lisa Rose Hendrixson* and **Mark L. Lewis**, Kent State University
(1125-20-593)

8:45AM *The lattice of algebraic closure operators*
(2390) *on infinite subgroup lattices.*
Martha Kilpack, Brigham Young University, and **Arturo Magidin***, University of Louisiana at Lafayette
(1125-20-659)

9:00AM *A family of graphs that cannot occur as*
(2391) *character degree graphs of solvable groups.*
Mark W Bissler* and **Mark L Lewis**, Kent State University (1125-20-695)

9:15AM *For what finite lattices does the lattice of*
(2392) *closure operators form a subgroup lattice?*
Martha Lee H Kilpack*, Brigham Young University, and **Arturo Magidin**, University of Louisiana at Lafayette
(1125-20-905)

9:30AM *Inverse Semigroupoids and Their Free*
(2393) *Objects.*
Veny Liu*, University of Hawaii-West Oahu, and **Jon M Corson**, University of Alabama (1125-20-1006)

9:45AM *Generalized dihedral groups*
▶ (2394) *in non-commutative cryptographic protocols.* Preliminary report.
Randall D. Helmstutler, University of Mary Washington (1125-20-1236)

10:00AM *A generalization of the Hanoi towers*
(2395) *group.*
Rachel Skipper, Binghamton University
(1125-20-1640)

10:15AM *The word problem for some classes of*
(2396) *Adian semigroups, Adian inverse semigroups and Adian groups.*
Muhammad Inam, University of West Georgia (1125-20-2050)

10:30AM Break

10:45AM *A Spectral Sequence Reduction for Low*
(2397) *Dimensional Group Homology.*
Joshua Roberts, Georgia Gwinnett College (1125-20-2655)

11:00AM *Action of intertwining operators*
(2398) *on pseudo-spherical K-types and automorphic forms on metaplectic groups.*
Shiang Tang, University of Utah
(1125-22-89)

AMS Contributed Paper Session on Mathematics Applied to the Physical Sciences

8:00 AM – 11:55 AM   **Techwood, Conference Level, Hyatt Regency**

8:00AM *Surface Energy in Bond-Counting Models.*
▶ (2399) Preliminary report.
Tim Krumwiede* and **Tim P Schulze**, University of Tennessee (1125-70-1381)

8:15AM *Dynamics and locomotion of flexible foils*
▶ (2400) *in a frictional medium.*
Xiaolin Wang* and **Silas Alben**, University of Michigan (1125-70-2066)

8:30AM *Inverse problems related to monitoring*
▶ (2401) *depth profile of residual stress via Rayleigh-wave dispersion.*
Yue Chen*, Department of Mathematics and Computer Science, Auburn University at Montgomery, **Chi-Sing Man**, Department of Mathematics, University of Kentucky, and **Kazumi Tanuma**, Department of Mathematics, Gunma University, Japan (1125-74-1067)

8:45AM *Damage Modeling using Dissipation*
(2402) *Potentials for State Based Peridynamic*
Fracture Evolution.
Robert Lipton and **Eyad Said***, Louisiana
State University (1125-74-2251)

9:00AM *An efficient particle vortex method for*
▶ (2403) *vorticity dynamics in free space.*
Preliminary report.
Ling Xu* and **Robert Krasny**,
University of Michigan, Ann Arbor, MI
(1125-76-598)

9:15AM *Well-Posedness for Systems of*
(2404) *Fluid-Particle Interaction.*
Joshua Ballew*, Carnegie Mellon
University, and **Konstantina Trivisa**,
University of Maryland, College Park
(1125-76-739)

9:30AM *Viscous erosion and generalized traction*
(2405) *integral equations.*
William H Mitchell* and **Saverio**
Spagnolie, University of
Wisconsin-Madison (1125-76-1188)

9:45AM *Flying Spiders: Simulating and modeling*
▶ (2406) *the dynamics of ballooning.*
Longhua Zhao*, Case Western Reserve
University, **Angela Chuang**, University of
Tennessee, **Iordanka N. Panayotova**,
Christopher Newport University,
Kimberly S. Sheldon, University
of Tennessee, **Lydia Bourouiba**,
Massachusetts Institute of Technology,
and **Laura A. Miller**, University of North
Carolina at Chapel Hill (1125-76-2206)

10:00AM *Wave intensity analysis of left*
(2407) *ventricle-systemic arteries interaction.*
Preliminary report.
Weiwei Chen*, **Hao Gao**, **Xiaoyu Luo**
and **Nicholas A Hill**, University of
Glasgow (1125-76-2278)

10:15AM *Numerical Simulation of a Fluid Ratchet*
(2408) *using an Immersed Boundary*
Framework.
John C Chrispell, Indiana University of
Pennsylvania (1125-76-2691)

10:30AM *Tailoring Tails in Taylor Dispersion: How*
▶ (2409) *Boundaries Shape Chemical Deliveries in*
Microfluidics. Preliminary report.
Manuchehr Aminian, **Francesca**
Bernardi*, **Roberto Camassa**, **Daniel M.**
Harris and **Richard M. McLaughlin**,
University of North Carolina at Chapel
Hill (1125-76-2708)

10:45AM *Non-linear dynamics and analysis of*
(2410) *Intracranial Saccular Aneurysms with*
growth and remodeling.
Manal Badgaish*, **Jeng-Eng Lin** and
Padmanabhan Seshaiyer, George Mason
University (1125-76-2888)

11:00AM *A 3-dimensional model of sperm motility*
(2411) *in a Brinkman fluid.*
Nguyenho Ho*, University of Cincinnati,
Karin Leiderman, Colorado School of
Mines, and **Sarah Olson**, Worcester
Polytechnic Institute (1125-76-2917)

11:15AM *Coupled microring cavities under*
(2412) *PT-symmetry.* Preliminary report.
Alexey Sukhinin, University of Vermont
(1125-78-1706)

11:30AM *Computation of wavefront aberration in*
(2413) *rigid gas permeable corneal lenses.*
Sanjeewa S K Karunarathna* and
Ram Iyer, Texas Tech University
(1125-78-2545)

11:45AM *Prescribed Curvature and Optics.*
(2414) **Sarah G Rody**, Drexel University
(1125-78-2646)

AMS Contributed Paper Session on Partial Differential Equations, I

8:00 AM – 11:55 AM   **International A,**
International Level, Marriott Marquis

8:00AM *On Nonlocal Keller-Segel Type Equations.*
(2415) **Suleyman Ulusoy**, Sakarya, Turkey
(1125-35-1394)

8:15AM *Blow-up problems for the heat equation*
(2416) *with a local nonlinear Neumann*
boundary condition.
Xin Yang, Michigan State University
(1125-35-36)

8:30AM *Global regularity for the 2D*
(2417) *magneto-micropolar equations with*
partial dissipation.
Dipendra Regmi, Farmingdale State
College (SUNY) (1125-35-149)

8:45AM *On a family of inhomogeneous torsional*
(2418) *creep problems.*
Marian Bocea, Loyola University Chicago
(1125-35-326)

9:00AM *Weak well-posedness of a fully coupled*
(2419) *model of chemical thermo-poroelasticity*
arising in petroleum rock mechanics.
Tetyana Malysheva*, University of
Wisconsin - Green Bay, and **Luther**
W. White, University of Oklahoma
(1125-35-342)

9:15AM *Weak solutions and blow-up for wave*
(2420) *equations of p-Laplacian type with*
supercritical sources.
Pei Pei*, Otterbein University,
Mohammad Rammaha, University of
Nebraska-Lincon, and **Daniel**
Toundykov, University of
Nebraska-Lincoln (1125-35-479)

9:30AM *Identification of time dependent control*
▶ (2421) *parameter through finite difference*
method in parabolic partial differential
equation.
Melvin Lipka* and **Narayan Thapa**,
Cameron University (1125-35-518)

9:45AM *On the Semigroup Generator for the*
▶ (2422) *Total Linearization of a Hydro-Elasticity*
Model. Preliminary report.
Steven Derochers, North Carolina State
University (1125-35-579)

10:00AM *Operator Differential Equations in Hilbert*
(2423) *Spaces.* Preliminary report.
Zhivko S. Athanassov, Institute of
Mathematics, Bulgarian Academy of
Sciences (1125-35-675)

10:15AM *A Dual-Flux Conservation Law for Plume*
(2424) *Migration in Carbon Sequestration.*
Elisabeth MM Brown* and **Michael
Shearer**, North Carolina State University
(1125-35-786)

10:30AM *Existence and symmetry of*
(2425) *small-amplitude solitary water waves
with discontinuous vorticity.* Preliminary
report.
Adelaide Akers, University of
Missouri-Columbia (1125-35-822)

10:45AM *A theory of synchrony for active*
► (2426) *compartments with delayed coupled
through bulk diffusion.*
Bin Xu* and **Paul Bressloff**, University of
Utah (1125-35-834)

11:00AM *On Riemann-Roch-Liouville theorem for*
► (2427) *elliptic PDEs on abelian coverings.*
Preliminary report.
Minh Kha*, **Peter Kuchment**, Texas A&M
University, and **Yehuda Pinchover**,
Technion - Israel Institute of Technology
(1125-35-1074)

11:15AM *Analysis of steady states for classes of*
► (2428) *reaction-diffusion equations with
U-shaped density dependent dispersal on
the boundary.*
Jerome Goddard II, Auburn University at
Montgomery, **Quinn Morris***, **Catherine
Payne**, University of North Carolina at
Greensboro, **Jordan Price**, Auburn
University at Montgomery, and **R.
Shivaji**, University of North Carolina at
Greensboro (1125-35-1078)

11:30AM *Uniqueness results for classes of*
(2429) *semipositone p-Laplacian problems.*
Ratnasingham Shivaji, University of
North Carolina at Greensboro, **Inbo Sim**,
University of Ulsan, and **Byungjae
Son***, University of North Carolina at
Greensboro (1125-35-1092)

11:45AM *Validated Numerics Methods for Mixed*
(2430) *Boundary Value Problem for the System
of Elastostatics.*
Hussein Awala, Temple University
(1125-35-1520)

MAA Session on Discrete Mathematics in the Undergraduate Curriculum - Ideas and Innovations for Teaching, I

8:00 AM – 11:55 AM   A701, Atrium
                            Level, Marriott Marquis

Organizers: **John S. Caughman**, Portland
State University

Art Duval, University of
Texas El Paso

Elise Lockwood, Oregon
State University

8:20AM *Computational thinking in*
► (2431) *undergraduate discrete mathematics
using Python and Jupyter notebooks.*
Preliminary report.
Robert Talbert, Grand Valley State
University (1125-C1-1159)

8:40AM *Four Problems from Computer*
► (2432) *Engineering to Enhance Student
Enthusiasm in the Discrete Mathematics
Classroom.*
Gregory V. Bard, The University of
Wisconsin—Stout (1125-C1-1659)

9:00AM *New web-native animated interactive*
► (2433) *learning material for discrete math.*
Sandy Irani, Univ. of California, Irvine,
Frank Vahid* and **Alex Edgcomb**, Univ.
of California, Riverside / zyBooks
(1125-C1-1449)

9:20AM *Definitions and Asimov's Three Laws of*
► (2434) *Robotics.*
Joshua Hallam, Wake Forest University
(1125-C1-1688)

9:40AM *Projects for Graph Theory Course.*
(2435) **Yun Lu**, Kutztown University
(1125-C1-2192)

10:00AM *Tricks to make counting harder for*
► (2436) *students.*
Oscar Levin, University of Northern
Colorado (1125-C1-1976)

10:20AM *The Evolution of Problem Posing*
► (2437) *Approaches for Counting Problems.*
Aviva Halani, Phillips Exeter Academy
(1125-C1-910)

10:40AM *The Password Activity: An Instructional*
► (2438) *Tool for the Combinatorics Classroom.*
Zackery Kevin Reed, Oregon State
University (1125-C1-3100)

11:00AM *Avoiding minimal elements in the poset*
► (2439) *of ways to introduce posets.*
John S. Caughman, Portland State
University (1125-C1-3131)

11:20AM *Bridging Calculus and Discrete Math via*
► (2440) *the Discrete Derivative.*
Christopher J. Catone, Albright College
(1125-C1-668)

11:40AM *Many Incarnations of Pascal.* Preliminary
► (2441) report.
Hyman Bass, University of Michigan
(1125-C1-2606)

MAA Session on Innovative and Effective Ways to Teach Linear Algebra, II

8:00 AM – 9:55 AM   Courtland, Conference
                           Level, Hyatt Regency

Organizers: **Gil Strang**, Massachusetts
Institute of Technology

David Strong, Pepperdine
University

Megan Wawro, Virginia
Tech

8:00AM ▶ (2442) *Examining linear algebra students' endeavors in moving between the embodied, symbolic and formal worlds of mathematical thinking.* Preliminary report.
Sepideh Stewart, University of Oklahoma (1125-E5-3037)

8:20AM ▶ (2443) *Student Mathematical Connections in an Introductory Linear Algebra Course Employing Both Inquiry-Oriented Teaching and Traditional Lecture.*
Spencer Payton, Washington State University (1125-E5-1396)

8:40AM ▶ (2444) *Implementation of Various Teaching Practices to Address an Identity Crisis in Elementary Linear Algebra.*
Gulden Karakok* and **Emilie Hancock**, University of Northern Colorado (1125-E5-3020)

9:00AM (2445) *Multiplying Matrices: an activity based approach.*
Maria Trigueros*, Department of Mathematics ITAM Mexico, **Edgar Possani**, Department of Mathematics ITAM, and **Ana Paulina Figueroa**, Departamento de Matematicas ITAM (1125-E5-3065)

9:20AM (2446) *Inspiring Linear Algebra with Problems in Image Analysis.* Preliminary report.
Marie A. Snipes*, Kenyon College, and **Amanda Harsy Ramsay**, Lewis University (1125-E5-2635)

9:40AM ▶ (2447) *The Rank of a Circle of 1's in a Matrix.*
Gilbert Strang, Massachusetts Institute of Technology (1125-E5-2561)

MAA Session on Inquiry-Based Teaching and Learning, IV

8:00 AM – 11:55 AM   **International 7, International Level, Marriott Marquis**

Organizers: **Judith Covington**, Louisiana State University in Shreveport
Theron Hitchman, University of Northern Iowa
Angie Hodge, University of Nebraska Omaha
Brian P. Katz, Augustana College
Alison Marr, Southwestern University
Victor Piercey, Ferris State University

8:00AM ▶ (2448) *Examples of Inquiry-Based Teaching and Learning: Applications with Public-use Cancer Data.*
Khairul Islam, Eastern Michigan University (1125-G1-512)

8:20AM ▶ (2449) *Experiences in an IBL Numerical Analysis course.*
Andrew-David Bjork*, **John Duvall** and **Jesse Stires**, Siena Heights University (1125-G1-1829)

8:40AM ▶ (2450) *In a traditional Calculus class, students explored several topics using Excel with data. This helped connect the topics with their Engineering classes and introduced integration early in the course.*
James R Eby, Blinn College - Bryan Campus (1125-G1-962)

9:00AM ▶ (2451) *Weighing Fog: Hands on Modeling for Day 1 of Differential Equations.*
Thomas J Clark, Dordt College (1125-G1-1505)

9:20AM (2452) *Don't Drink the Kool-Aid!*
Audrey Malagon*, **Lydia Kennedy** and **Kristin Burney**, Virginia Wesleyan College (1125-G1-1821)

9:40AM ▶ (2453) *A Novice Attempt at Teaching IBL Real Analysis.* Preliminary report.
Jessica L Williams, Converse College (1125-G1-2009)

10:00AM ▶ (2454) *Students Teaching Students Through Video Presentations.* Preliminary report.
Matthew A Morena, Young Harris College (1125-G1-2049)

10:20AM (2455) *IBL with Jupyter notebooks.*
Carl Toews, University of Puget Sound (1125-G1-3074)

10:40AM ▶ (2456) *Using a Problem Sequence to Teach Mathematics Majors Basic Programming Skills.* Preliminary report.
Anneliese H. Spaeth, Huntingdon College (1125-G1-1811)

11:00AM ▶ (2457) *Pushing Symbols: IBL in Mathematics and Computer Science.*
Randall E. Cone, Salisbury University (1125-G1-706)

11:20AM (2458) *How Can We Foster Collaboration and Inquiry in an Online Mathematics Course?* Preliminary report.
Nermin Bayazit*, Fitchburg State University, and **Florian Enescu**, Georgia State University (1125-G1-2256)

11:40AM (2459) *Implementing inquiry-based learning via online polls.* Preliminary report.
Jonathan K. Hodge, Grand Valley State University (1125-G1-2541)

MAA Session on Intertwining Mathematics with Social Justice in the Classroom, I

8:00 AM – 11:55 AM   **Embassy A, International Tower, LL2, Hyatt Regency**

Organizers: **Catherine Buell**, Fitchburg State University
Zeynep Teymuroglu, Rollins College
Joanna Wares, University of Richmond
Carl Yerger, Davidson College

8:00AM (2460) *Supermarkets, Highways, and Oil Production: Statistics and Social Justice.*
John Ross* and **Therese Shelton**, Southwestern University (1125-H1-2670)

8:20AM ▶ (2461) *Social justice general education statistics course.* Preliminary report.
J. D. Berg*, **Catherine Buell**, **Danette Day** and **Rhonda Evans**, Fitchburg State University (1125-H1-778)

8:40AM (2462) *Quantitative Ethics – the Other Side of Mathematics and Social Justice.* Preliminary report.
Victor I Piercey, Ferris State University (1125-H1-2082)

9:00AM (2463) *Raising Awareness of Social Justice Issues in Calculus I: How to Get Started.* Preliminary report.
Kathy W Hoke, University of Richmond, and **Lauren Keough***, Grand Valley State University (1125-H1-1789)

9:20AM ▶ (2464) *Historical Perspectives on Social Justice in Mathematics.*
Nathan Napoleon Alexander*, University of San Francisco, and **Aditya Adiredja**, University of Arizona (1125-H1-2430)

9:40AM ▶ (2465) *Hard Conversations on Social Justice in Mathematical Spaces.*
Nathan Napoleon Alexander, University of San Francisco, **Zeynep Teymuroglu**, Rollins College, and **Carl R Yerger***, Davidson College (1125-H1-2501)

10:00AM ▶ (2466) *Discovering Undergraduate Mathematics in American Indian Culture.*
Charles Peter Funkhouser*, California State University Fullerton, **Miles R Pfahl**, Turtle Mountain Community College, and **Harriet C Edwards**, California State University Fullerton (1125-H1-294)

10:20AM ▶ (2467) *Athletes, Education, and Welfare: Problems that Promote Quantitative Literacy and Social Justice.* Preliminary report.
Samuel Luke Tunstall, Michigan State University (1125-H1-232)

10:40AM ▶ (2468) *A Quantitative Literacy Project on Poverty in the United States.*
Tricia Muldoon Brown, Armstrong State University (1125-H1-2010)

11:00AM ▶ (2469) *Mapping Police Violence in Introduction to Statistics.* Preliminary report.
Mikael Vejdemo-Johansson, CUNY College of Staten Island (1125-H1-212)

11:20AM ▶ (2470) *Authentic Messiness: Using data sourced from community-based partner organizations in an introductory level statistics course.* Preliminary report.
Phong Le, Goucher College (1125-H1-1855)

11:40AM ▶ (2471) *Bias in the Courts? A Student-led Study of New York City's Arraignment Courts.* Preliminary report.
Jared Warner, Guttman Community College (CUNY) (1125-H1-2566)

MAA Session on Me and My Gadgets: Teaching with Technology

8:00 AM – NOON   **Marquis Ballroom, Marquis Level, Marriott Marquis**

Organizers: **Thomas Hagedorn**, The College of New Jersey

Karl R. B. Schmitt, Valparaiso University

Michael Scott, California State University at Monterey Bay

John Travis, Mississippi College

8:00AM Setup

8:30AM Poster Viewing/Mingling Time

9:15AM (2472) *Using $LearningCatalytics^{TM}$ Technology as a Tool to Enhance Student Engagement in Pre-Calculus & Calculus.*
Denise Natasha Brewley* and **Priya Shilpa Boindala**, Georgia Gwinnett College (1125-97-400)

9:20AM ▶ (2473) *Flipped Mastery Cycle Learning of Calculus II using a Plethora of Tools.*
J Todd Lee, Elon University (1125-97-1657)

9:25AM ▶ (2474) *Slope and Direction Fields — Online, Without Java.*
Darryl K Nester, Bluffton University, Bluffton, Ohio (1125-34-2458)

9:35AM ▶ (2475) *Playing with Multivariable Calculus Concepts Wearing 3D Glasses.* Preliminary report.
Paul E Seeburger, Monroe Community College (1125-97-1718)

9:50AM (2476) *Interactive textbooks in MathBook XML.*
Matt Boelkins, Grand Valley State University, **Oscar Levin***, University of Northern Colorado, and **Bruce Yoshiwara**, Los Angeles Pierce College (1125-97-3046)

9:55AM ▶ (2477) *An OER textbook for Calculus-based Probability and Statistics using Mathbook XML.* Preliminary report.
John P. Travis, Mississippi College (1125-60-1338)

10:00AM One-On-One/Mingling Time

11:00AM ▶ (2478) *Adaptations of Learning Glass Technology in Undergraduate STEM Education.*
Shawn Firouzian*, University of California San Diego, **Chris Rasmussen**, **Richard Levine** and **Matt Anderson**, San Diego State University (1125-00-2994)

11:05AM ▶ (2479) *Creating a Synchronous Learning environment through Advances in Technology.* Preliminary report.
Vandana Sharma, Arizona State University (1125-97-2625)

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11:15AM ▶ (2480) *"You ask ME a question!" What happens when we let students "strike back" on online quizzes?*
Brendan W Sullivan, Emmanuel College (1125-97-2177)

11:20AM ▶ (2481) *Assessing online teaching versus traditional face-to-fact teaching across multiple sections of service mathematics courses.* Preliminary report.
Ju Zhou*, Kutztown University of Pennsylvania, and **Yun Lu**, Kutztown university of Pennsylvania (1125-00-1722)

11:30AM ▶ (2482) *Two gadgets – Simulations Using the Language Processing and Cell Phone Cameras.*
Frank Wattenberg, United States Military Academy (1125-97-2367)

11:35AM ▶ (2483) *The Clickers They Carry: Using smartphones and open platforms for spontaneous student feedback.* Preliminary report.
Drew C. Youngren, New York University (1125-97-2862)

11:45AM ▶ (2484) *Gesture-Based Geometry on Mobile Platforms.*
Michael Hvidsten, Gustavus Adolphus College (1125-97-449)

11:50AM ▶ (2485) *Using MyMathLab for teaching undergraduate Mathematics courses.*
Bariaa Ghazi Shatila, Flagler College (1125-97-603)

MAA Session on PIC Math and Preparing Students for Nonacademic Careers

8:00 AM – 11:55 AM
Embassy C, International Tower, LL2, Hyatt Regency

Organizers: **Michael Dorff**, Brigham Young University

Elly Farnell, Kenyon College

Suzanne Weekes, Worcester Polytechnic Institute

8:00AM (2486) *Students solving research problems from industry.*
Michael Dorff, Brigham Young University (1125-L1-3120)

8:20AM (2487) *Successes and Trials with PIC Math and Beyond.*
Michael W Schroeder, Marshall University (1125-L1-2514)

8:40AM ▶ (2488) *Joint Program for PIC Math between Two Institutions.*
Hyunju Oh, Bennett College, and **Jan Rychtar***, University of North Carolina at Greensboro (1125-L1-1443)

9:00AM (2489) *Mathematics Seminar class: undergraduate research in mathematics.*
Zhifu Xie, University of Southern Mississippi (1125-L1-1464)

9:20AM ▶ (2490) *Achieving Balance in a PIC Math Course.*
Steve M Cohen, Roosevelt University (1125-L1-2864)

9:40AM ▶ (2491) *Please Come Back: Analyzing Alumni and Donor Data in my PIC Math Course.* Preliminary report.
Chris Camfield, Hendrix College (1125-L1-2215)

10:00AM ▶ (2492) *Learning Objectives and Assessment Techniques in a Preparation for Industrial Careers in Mathematical Sciences Course.*
Christina M. Selby* and **Joseph A. Eichholz**, Rose-Hulman Institute of Technology (1125-L1-2652)

10:20AM ▶ (2493) *How to find good industrial mathematics problems?*
Namyong Lee, Minnesota State University (1125-L1-3126)

10:40AM ▶ (2494) *PIC Math at Winthrop University: Finding Problems, Course Design, and Lessons Learned.*
Zachary J Abernathy, Winthrop University (1125-L1-2601)

11:00AM (2495) *Gathering Research Problems from Local Industries: Our Experience in the N. Kentucky and Cincinnati Area.*
Dhanuja Kasturiratna* and **Lisa Holden**, Northern Kentucky University (1125-L1-1683)

11:20AM ▶ (2496) *Designing an Industrial Project Course for Mathematics Majors.* Preliminary report.
Laura M Smith, California State University, Fullerton (1125-L1-103)

11:40AM ▶ (2497) *Introducing Industrial Problems via Capstone Experience.*
Stephen Pankavich, Colorado School of Mines (1125-L1-2141)

MAA Session on The Advancement of Open Educational Resources, I

8:00 AM – 10:15 AM
A702, Atrium Level, Marriott Marquis

Organizers: **Benjamin Atchison**, Framingham State University

Jeremy Russell, The College of New Jersey

8:00AM (2498) *Curated Courses in Mathematics: Resources for Creation of Online Mathematics Content.* Preliminary report.
Petra Bonfert-Taylor*, Dartmouth College, **Sarah E. Eichhorn**, University of California, Irvine, and **Tom Roby**, UConn (1125-B5-216)

8:20AM (2499) *Open Source Materials for QL: Modeling & Personal Financial Mathematics.*
Lindsay Orlando* and **Mary Parker**, Austin Community College (1125-B5-3010)

8:40AM (2500) *Building a Better Business Calculus (for Free!).*
Eric D Bancroft, Grove City College (1125-B5-1703)

9:00AM *Active Calculus: Recent Developments.*
(2501) Preliminary report.
Matt Boelkins, Grand Valley State University (1125-B5-236)

9:20AM *Sage Cells: Making Sage Accessible to Students, Teachers, and Authors.*
► (2502) **Thomas W. Judson**, Stephen F. Austin State University (1125-B5-959)

9:40AM *The Journey of one Open Source Applied Combinatorics Text.*
► (2503) **Mitchel T. Keller**, Washington & Lee University (1125-B5-1166)

10:00AM *Using OERs Extensively in a Flipped Geometry Classroom.*
► (2504) **Roger Wolbert**, Edinboro University of Pennsylvania (1125-B5-3025)

MAA Session on The Creation and Implementation of Effective Homework Assignments, III

8:00 AM – 11:55 AM   L401 & L402, Lobby Level, Marriott Marquis

Organizers: **Sarah Greenwald**, Appalachian State University

Judy Holdener, Kenyon College

8:00AM *Are graphing skills a thing of the past?*
► (2505) **Monika Kiss***, **Brian Camp**, **Doris Van Kampen-Breit** and **Shawn Weatherford**, Saint Leo University (1125-A5-1141)

8:20AM *The Practicality of Writing Prompts in Freshman-Level Math Courses.*
► (2506) **Benjamin Gaines**, Iona College (1125-A5-741)

8:40AM *Shifting Feedback and Responsibility: Homework Presentations.*
► (2507) **Erika L. Ward**, Jacksonville University (1125-A5-2522)

9:00AM *Assigning Homework via Mixed Practice.*
► (2508) Preliminary report.
Lori Carmack, Salisbury University, Salisbury, MD (1125-A5-1859)

9:20AM *Learning Math Through Your Arm.*
► (2509) **Patricia L Hale**, Cal Poly Pomona (1125-A5-524)

9:40AM *A Blended Approach to Homework Design Promotes Critical Thinking.*
(2510) **Filippo Posta**, Grand Canyon University (1125-A5-2076)

10:00AM *Problem Exists Between Keyboard and Chair: Filling in the Gaps in Online Homework.* Preliminary report.
(2511) **Sara L Malec**, Hood College (1125-A5-2507)

10:20AM *Balancing online work and written work in calculus and general studies courses.*
(2512) **Shelley B. Rohde**, Metropolitan State University of Denver (1125-A5-285)

10:40AM *Attempting to develop students' communication and critical thinking skills while using an online homework system.* Preliminary report.
► (2513) **Michelle L Ghrist**, U.S. Air Force Academy (1125-A5-2938)

11:00AM *Creating Effective Online Homework Problems in Algebra, Calculus, and Differential Equations (Using WeBWorK).* Preliminary report.
► (2514) **Paul E Seeburger**, Monroe Community College (1125-A5-2233)

11:20AM *Writing effective questions and creating a successful homework system.*
(2515) **David McCune**, William Jewell College (1125-A5-353)

11:40AM *Challenge Investigations in a Sophomore/Junior-Level Geometry Course.* Preliminary report.
► (2516) **Matthew J Haines**, Augsburg College (1125-A5-2316)

MAA General Contributed Paper Session on Applied Mathematics, III

8:00 AM – 11:55 AM   Piedmont, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

8:00AM *A predator-prey model for the ecological system in a lake with the effect of acid rain.*
► (2517) **Sharee Brewer***, **Taylor Swett** and **Qingxia Li**, Fisk University (1125-VC-1310)

8:15AM *Incoherent Matrices for Compressed Sensing.* Preliminary report.
► (2518) **Ghanshyam Bhatt**, Tennessee State University (1125-VC-1313)

8:30AM *Multiplayer Fibonacci Nim.* Preliminary report.
► (2519) **Annela R Kelly**, Bridgewater State University (1125-VC-1325)

8:45AM *Efficient Numerical Methods for Magnetohydrodynamics Flow.*
(2520) **Timo Heister**, **Muhammad Mohebujjaman*** and **Leo Rebholz**, Clemson University (1125-VC-1337)

9:00AM *Development of Modal Interval Algorithm for Solving Continuous Minimax Problems.*
► (2521) **Xin Luo*** and **Min Sun**, The University of Alabama (1125-VC-1437)

9:15AM *Wave-Induced Momentum Transport through a Non-Uniformly Stratified Thin Layer near the Tropoause.*
► (2522) **Ryan Joseph Nicely***, **Ali S Cole** and **Mohammed Moustaoui**, Arizona State University (1125-VC-1448)

9:30AM ▶ (2523) *A Numerical Simulation of Mountain Waves.* Preliminary report.
Alexandra S Cole*, **Ryan J Nicely** and **Mohamed Moustaoui**, Arizona State University (1125-VC-1450)

9:45AM ▶ (2524) *Impact of Stability above, below and within the Tropopause on Mountain Wave-Induced Momentum Transfer to the Stratosphere.* Preliminary report.
Duane C Harris*, **Mohamed Moustaoui** and **Collin Kofroth**, Arizona State University (1125-VC-1452)

10:00AM ▶ (2525) *Elliptic Curve based RFID authentication scheme and its software implementation.* Preliminary report.
Parshuram Budhathoki, Cameron University (1125-VC-1527)

10:15AM ▶ (2526) *Numerical Simulation of the Protostellar Jet HH24 C/E.*
Connor D Lincoln* and **Carl Gardner**, Arizona State University (1125-VC-1551)

10:30AM (2527) *Leading indicators of bifurcations in ecological systems.* Preliminary report.
Suzanne M. O'Regan*, North Carolina A&T State University, and **Danielle L. Burton**, University of Tennessee (1125-VC-1578)

10:45AM ▶ (2528) *Global Existence of Solutions to Shallow Water Equations with Alternative Frictional Operators.*
Collin Kofroth* and **Don Jones**, Arizona State University (1125-VC-1592)

11:00AM ▶ (2529) *Pseudo Quantum Steganography and M-Band Wavelet based Denoising in Color Barcode.* Preliminary report.
Hieu Nguyen*, Western Connecticut State University, **Julia Yu**, Ridgefield High School, **Sarah Zhao**, Phillips Academy, and **Xiaodi Wang**, Western Connecticut State University (1125-VC-1625)

11:15AM ▶ (2530) *A Bisection Method for the Banded Hyperbolic Quadratic Eigenvalue Problem.*
Ahmed T. Ali* and **Li Ren-Ceng**, University of Texas Arlington (1125-VC-1633)

11:30AM ▶ (2531) *Connecting Regional-scale Tree Distribution Models with Seed Dispersal Kernels.*
Ram C Neupane, University of Wisconsin Whitewater (1125-VC-1654)

11:45AM (2532) *Techniques in Lattice Basis Reduction.*
Bal K. Khadka*, Georgia Military College, and **Spyros M. Magliveras**, Florida Atlantic University (1125-VC-1678)

MAA General Contributed Paper Session on Geometry

8:00 AM – 10:10 AM Kennesaw, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University
Melvin Royer, Indiana Wesleyan University

8:00AM ▶ (2533) *On Path Width and Bridge Index of Virtual Knots.*
Noureen Khan, University of North Texas at Dallas (1125-VE-76)

8:15AM ▶ (2534) *Intrinsic Surfaces of Revolution.*
Daniel J Freese, Liberty University (1125-VE-890)

8:30AM (2535) *A New Set of Axioms for Metric Geometry.*
Bangyan Wen, University of Electronic Science and Technology of China, **Yi Lin**, Slippery Rock University, Slippery Rock, PA, and **Zengxiang Tong***, Otterbein University (1125-VE-1002)

8:45AM (2536) *Distance in Geometry.*
Jerry Lodder, New Mexico State University (1125-VE-1254)

9:00AM ▶ (2537) *Minimal tilings of the unit square.*
Iwan Praton, Franklin & Marshall College (1125-VE-1451)

9:15AM ▶ (2538) *Who Really Proved the Ispoerimetric Theorem?*
James Case, Baltimore MD (1125-VE-1897)

9:30AM ▶ (2539) *Seeing the Light: Connecting Conic Section Representations Using Flashlights and Parametric Functions.*
Jonathan M. Clark* and **Lauren J. Clark**, The University of Tennessee, Knoxville (1125-VE-2032)

9:45AM ▶ (2540) *Random walks on Gromov hyperbolic spaces.* Preliminary report.
Matt Sunderland, Graduate Center CUNY (1125-VE-2825)

10:00AM ▶ (2541) *3-Ellipses on Spheres.*
Alfredo Villanueva, Savannah State University (1125-VE-2869)

MAA General Contributed Paper Session on Other Topics, III

8:00 AM – 10:25 AM Roswell, Conference Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University
Melvin Royer, Indiana Wesleyan University

8:00AM ▶ (2542) *Sugihara's Impossible Cylinder Illusion.*
David Richeson, Dickinson College (1125-VW-1195)

8:15AM ▶ (2543) *Outer Billiards, Fuchisan Groups, and Fundamental Regions.*
Stephanie Loewen, Grand Valley State University, and **Tristan Wells***, Kansas State University (1125-VW-1427)

8:30AM ▶ (2544) *When do we get erroneous roots?* Preliminary report.
Steven Gottlieb*, Saugerties, New York, and **Chris McCarthy**, Borough of Manhattan Community College, CUNY (1125-VW-1440)

8:45AM ► (2545) *Mathematics Education Research Abroad: Observations from ICME-13.*
Emelie A Kenney, Siena College (1125-VW-1531)

9:00AM ► (2546) *Enumerations on Non-decreasing Dyck Paths.*
Leandro Junes*, California University of Pennsylvania, **Rigoberto Florez**, The Citadel, and **Eva Czabarka**, University of South Carolina (1125-VW-1496)

9:15AM ► (2547) *The Settlers of "Catanbinatorics".*
Susanna Molitoris-Miller*, Kennesaw State University, **Brian Kronenthal**, Kutztown University, and **Jathan Austin**, Salisbury University (1125-VW-1697)

9:30AM ► (2548) *Constructing a matroid from a finite group.*
Xueyi Lei, Washington & Jefferson College (1125-VW-1931)

9:45AM ► (2549) *Subtraction Squares.* Preliminary report.
R. Daniel Hurwitz, Skidmore College (1125-VW-1988)

10:00AM ► (2550) *Four-Movement Classical Symphony: Mentoring Pre-Service Teachers Through IBL Model.* Preliminary report.
Annie Han*, Department of Mathematics, BMCC, The City University of New York, and **Fangyang Shen**, City Tech, The City University of New York (1125-VW-2008)

10:15AM ► (2551) *Principal Component Analysis in Image Processing.*
Mohamed Allali, Chapman University (1125-VW-1892)

MAA General Contributed Paper Session on Probability and Statistics, III

8:00 AM – 11:40 AM   **Baker, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College
Kimberly Presser, Shippensburg University
Melvin Royer, Indiana Wesleyan University

8:00AM ► (2552) *Machine Learning for the Classification of Toxicological Endpoints.* Preliminary report.
Channing S. Parker*, James Madison University, **Joshua R. Abrams**, University of Arizona, **Denise J. Harness**, East Tennessee State University, and **Nina E. Galanter**, Grinnell College (1125-VP-115)

8:15AM ► (2553) *Mixing Times for a Generalization of the Curie-Weiss Model via Aggregate Path Coupling.*
Peter Otto, Willamette University, **Benjamin Savoie***, University of Michigan - Flint, **Ana Wright**, Willamette University, and **Renjun Zhu**, University of California - Berkeley (1125-VP-2631)

8:30AM ► (2554) *Corners in tree–like tableaux.*
Amanda Lohss* and **Paweł Hitczenko**, Drexel University (1125-VP-2805)

8:45AM ► (2555) *Towards Developing Strategies for Winning at Pick-n Lotteries.* Preliminary report.
Gerald Y Agbegha, Georgia Gwinnett College (1125-VP-2829)

9:00AM ► (2556) *Decentralized change-point detection in correlated sensor networks.*
Grigory Sokolov*, SUNY at Binghamton, and **Georgios Fellouris**, University of Illinois at Urbana-Champaign (1125-VP-2706)

9:15AM (2557) *Characterizing the space of distributions of simple stochastic processes.*
Josh M Beal, Indiana University East (1125-VP-2511)

9:30AM (2558) *Adjusted Empirical Likelihood for Long-memory Time Series Models.*
Ramadha D Piyadi Gamage*, **Wei Ning** and **Arjun K Gupta**, Department of Mathematics and Statistics, Bowling Green State University, Bowling Green, OH (1125-VP-2741)

9:45AM ► (2559) *A Return Level Analysis of the 2016 Blizzard in New York City.* Preliminary report.
Mintaek Lee* and **Jaechoul Lee**, Boise State University (1125-VP-2798)

10:00AM (2560) *A Multivariate Longitudinal Analysis of the effects of Depressive Symptoms, Financial Strain and Self Rated Health on Spiritual Connectedness.*
Budhinath Padhy*, State University of New York at Oswego, and **Gemechis Djira**, South Dakota State University (1125-VP-2800)

10:15AM (2561) *On the Association of Certain Feller Processes.*
Eddie Tu, University of Tennessee, Knoxville (1125-VP-2489)

10:30AM ► (2562) *If Twitter Could Vote: Predicting Primary Results using Social Media.*
Adam Swayze*, **Mikaela Jordan** and **Joseph Brown**, Tarleton State University (1125-VP-2666)

10:45AM ► (2563) *REML for cure rate model with extra partial information of diagnostic results.* Preliminary report.
Durga H Kutal, Florida Atlantic University, Boca Raton, FL (1125-VP-2874)

11:00AM ► (2564) *Mathematical Analysis of Lottery Voting.*
Stephanie Thrash*, St. Edward's University, and **Nicole Buczkowski**, Jacksonville University (1125-VP-3039)

11:15AM ► (2565) *The Role of Technology in Overcoming the Common and Resistant Misconceptions about Probability.* Preliminary report.
Kemal Akoglu, North Carolina State University (1125-VP-3067)

11:30AM ► (2566) *Regional Discrepancies in Cancer Mortality Rates.*
Keshav P. Pokhrel, University of Michigan-Dearborn (1125-VP-3116)

AWM Workshop: Special Session on Number Theory, I

8:00 AM – 11:50 AM   A704, Atrium
Level, Marriott Marquis

Organizers: **Alina Bucur**, University of California, San Diego

Ellen Eischen, University of Oregon

8:00AM *Ring-LWE for the number theorist.*
(2567) **Yara Elias**, Max Planck Institute for Mathematics, **Ekin Ozman**, Boğaziçi University, **Kristin E. Lauter**, Microsoft Research, and **Katherine E Stange***, University of Colorado Boulder (1125-11-747)

8:30AM *Curves with many automorphisms.*
(2568) **Irene Bouw**, Ulm University, **Wei Ho**, University of Michigan, **Beth Malmskog**, Villanova University, **Renate Scheidler**, University of Calgary, **Padmavathi Srinivasan**, Georgia Institute of Technology, and **Christelle Vincent***, University of Vermont (1125-14-159)

9:00AM *The inverse Galois problem for*
▶ (2569) *symplectic groups.*
Valentijn Karemaker*, University of Pennsylvania, **Sara Arias-de-Reyna**, University of Seville, **Cécile Armana**, Université de Franche-Comté, **Marusia Rebolledo**, Université Blaise Pascal Clermont-Ferrand 2, **Lara Thomas**, Université de Franche-Comté, and **Núria Vila**, University of Barcelona (1125-11-641)

9:30AM *Explicit constructions of Ramanujan*
(2570) *Bigraphs.*
Cristina M Ballantine*, College of the Holy Cross, **Brooke Feigon**, The City College of New York, **Radhika Ganapathy**, University of British Columbia, **Janne Kool**, Max Plank Institute for Mathematics, **Kathrin Maurischat**, University of Heidelberg, and **Amy Wooding**, McGill University (1125-20-746)

10:00AM *Classification of Elliptic Fibrations of a*
(2571) *Singular K3 Surface.*
Marie José Bertin, Jussieu Institute of Mathematics, Pierre and Marie Curie University, France, **Alice Garbagnai**, University of Milan,Italy, **Ruthi Hortsch***, Bridge to Enter Advanced Mathematics, **Odile Lecacheux**, Jussieu Institute of Mathematics, Pierre and Marie Curie University, France, **Makiko Mase**, Tokyo Metropolitan University, Japan, **Cecília Salgado**, Federal University of Rio de Janeiro, Brazil, and **Ursula Whitcher**, University of Wisconsin-Eau Claire (1125-11-783)

10:30AM *Symmetries of Rational Functions Arising*
(2572) *in Ecalle's Study of Multiple Zeta Values.*
Adriana Salerno*, Bates College, **Damaris Schindler**, Hausdorff Center for Mathematics, and **Amanda Tucker**, SUNY Geneseo (1125-11-1323)

11:00AM *Orbital Integrals and Shalika Germs for*
(2573) $\mathfrak{sl}_n$ *and* $\mathfrak{sp}_{2n}$. *Preliminary report.*
Sharon M Frechette*, College of the Holy Cross, **Julia Gordon**, University of British Columbia, and **Lance Robson**, Vancouver, British Columbia (1125-11-1139)

11:30AM *Transfer of Transfer.*
(2574) **Thomas C. Hales**, University of Pittsburgh, **Julia Gordon***, University of British Columbia, **Sharon Frechette**, College of the Holy Cross, and **Lance Robson**, Vancouver, BC (1125-22-1605)

Project NExT Workshop

8:00 AM – 6:00 PM   Regency Ballroom VI,
Ballroom Level, Hyatt Regency

AMS Special Session on Women in Analysis (In Honor of Cora Sadosky), I

8:30 AM – 11:50 AM   Embassy E, International
Tower, LL2, Hyatt Regency

Organizers: **Alexander Reznikov**, Vanderbilt University

Oleksandra Beznosova, University of Alabama

Hyun-Kyoung Kwon, University of Alabama

Katharine Ott, Bates College

8:30AM *Boundary value problems for second*
(2575) *order parabolic and elliptic operators.*
Jill C Pipher, Brown University (1125-35-1568)

9:00AM *The Dirichlet problem for elliptic systems*
(2576) *with data in Köthe function spaces.*
Irina Mitrea, Department of Mathematics, Temple University (1125-35-1949)

9:30AM *Analysis of 2+1 Diffusive-Dispersive PDE*
(2577) *Arising in River Braiding.*
Saleh Tanveer, The Ohio State University, and **Charis Tsikkou***, West Virginia University (1125-35-811)

10:00AM *Box approximation for a*
(2578) *pseudo-differential operator with an unbounded symbol.*
Vita Borovyk*, University of Cincinnati, and **Konstantin Makarov**, University of Missouri (1125-47-1261)

10:30AM *On an extension of Minkowski's theorem*
▶ (2579) *for measures.*
Galyna V Livshyts, Georgia institute of technology (1125-52-432)

11:00AM *Persistence as a spectral property.*
(2580) **Naomi Feldheim**, **Ohad Feldheim**, Stanford University, and **Shahaf Nitzan***, Georgia Institute of Technology (1125-42-1680)

11:30AM *Falconer conjecture and its variants.*
(2581) **Alex Iosevich**, University of Rochester (1125-42-620)

MAA Invited Paper Session on New Directions in Quantitative Literacy for General Education, in Honor of Lynn Steen

8:30 AM – 10:50 AM **A706, Atrium Level, Marriott Marquis**

Organizers: **Catherine Crockett**, Point Loma Nazarene University

Gary Franchy, Southwestern Michigan College

Andrew Miller, Belmont University

8:30AM *Carnegie's Quantway Pathway: Using a*
▶ (2582) *Network Improvement Approach to Improve Quantitative Literacy Pedagogies.*
Cinnamon Hillyard, University of Washington Bothell (1125-AD-3029)

9:00AM *A Quantitative Reasoning Approach to*
▶ (2583) *Algebra for Business Students: Analysis and Preliminary Results.*
Victor I Piercey, Ferris State University (1125-AD-613)

9:30AM *On Utilitarian and Aesthetic Goals of*
(2584) *Mathematics Education: Quantitative Literacy and Humanistic Mathematics.*
Gizem Karaali, Pomona College (1125-AD-781)

10:00AM *Quantitative Literacy and Social Justice:*
(2585) *From Basic Examples to Transformative Experiences.*
Lily S. Khadjavi, Loyola Marymount University (1125-AD-2252)

10:30AM *Thinking Quantitatively: Teaching and*
▶ (2586) *Assessing a Quantitative Reasoning Course.*
Eric Gaze, Bowdoin College (1125-AD-1853)

AMS Invited Address

9:00 AM – 9:50 AM **Atrium Ballroom, Atrium Level, Marriott Marquis**

(2587) *Arrival time.*
Tobias Holck Colding, Massachusetts Institute of Technology (1125-00-9)

ASL Invited Address

9:00 AM – 9:50 AM **A707, Atrium Level, Marriott Marquis**

(2588) *Expansions of Divisible Ordered Abelian Groups Without the Independence Property.*
Alfred R Dolich, Kingsborough Community College and The Graduate Center (CUNY) (1125-03-857)

MAA Minicourse #9: Part B

9:00 AM – 11:00 AM **L504 & L505, Lobby Level, Marriott Marquis**

Statistical Education of Teachers
Presenters: **Anna E. Bargagliotti**, Loyola Marymount University

Christine Franklin, University of Georgia

Denise Spangler, University of Georgia

MAA Minicourse #10: Part B

9:00 AM – 11:00 AM **L508, Lobby Level, Marriott Marquis**

Teaching an Applied Topology Course
Presenters: **Colin Adams**, Williams College

Robert Franzosa, University of Maine

MAA Minicourse #11: Part B

9:00 AM – 11:00 AM **L506 & L507, Lobby Level, Marriott Marquis**

Teaching an Introduction to the Mathematics of Computer Graphics
Presenter: **Nathan C. Carter**, Bentley University

MAA Panel

9:00 AM – 10:20 AM **International 6, International Level, Marriott Marquis**

Outside the Equation - Exploring Alternative Forms of Mathematical Communication
Organizer: **Samuel Hansen**, ACMEScience
Panelists: **Anna Haensch**, Dusquense Univeristy

Robert Schneider, Emory University

Edmund Harriss, University of Arkansas

Tim Chartier, Davidson College

MAA Panel Discussion

9:00 AM – 10:20 AM   International 5,
International Level, Marriott Marquis

*Roadblocks for Implementing Active
Learning Strategies in Calculus Courses*
Organizers: **Debbie Gochenaur**,
Shippensburg University

Larissa Schroeder,
University of Hartford
Panelists: **Angie Hodge**, University of
Nebraska Omaha

Matthew Boelkins, Grand
Valley State University

Darryl Yong, Harvey Mudd
College

MAA Workshop

9:00 AM – 10:20 AM   M304, Marquis
Level, Marriott Marquis

*Using Interactive Dynamic Technology in
Teaching Introductory Statistics:
Simulation-Based Inference.*
Organizer: **Gail Burrill**, Michigan State
University
Presenters: **Beth Chance**, California
Polytechnic State University
San Luis Obispo

Chris Franklin, American
Statistics Association

Darren Starnes, The
Lawrenceville School

NAM Panel Discussion

9:00 AM – 9:50 AM   A708, Atrium
Level, Marriott Marquis

*Transforming Post-Secondary Education
(TPSE) Mathematics: Implications for the
Preparation of African American
Undergraduates and Institutions.*
Moderator: **Duane Cooper**, Morehouse
College
Panelists: **Sylvester James Gates,Jr.**,
University of Maryland at
College Park

Frank Ingram,
Winston-Salem State
University

Asamoah Nkwanta, Morgan
State University

Suzanne L. Weekes,
Worcester Polytechnic
Institute

Exhibits and Book Sales

9:00 AM – NOON   Grand Hall, Exhibit
Level, Hyatt Regency

Employment Center

9:00 AM – NOON   Centennial Ballroom,
Ballroom Level, Hyatt Regency

ASL Invited Address

10:00 AM – 10:50 AM   A707, Atrium
Level, Marriott Marquis

(2589) *Computation and information in sofic
shifts.*
Linda Brown Westrick, University of
Connecticut (1125-00-123)

MAA Special Presentation

10:00 AM – 10:50 AM   Regency Ballroom
VII, Ballroom Level, Hyatt Regency

*Weird Ways to Multiply (and isn't the
spelling of "weird" weird?)*
Presenter: **James Tanton**, MAA

NAM Business Meeting

10:00 AM – 10:50 AM   A708, Atrium
Level, Marriott Marquis

MAA Invited Address

10:05 AM – 10:55 AM   Atrium Ballroom,
Atrium Level, Marriott Marquis

(2590) *Finding meaningful patterns: the
decoding of the human microbiome.*
Susan Holmes, Stanford University
(1125-A0-26)

MAA General Contributed Paper Session on
Logic and Foundations

10:30 AM – 11:55 AM   Kennesaw, Conference
Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena
College

Kimberly Presser,
Shippensburg University

Melvin Royer, Indiana
Wesleyan University
10:30AM *Split Principles.*
(2591) **Kaethe Minden**, The Graduate Center,
CUNY (1125-VJ-1927)
10:45AM *A Mitchell-like order for Ramsey
(2592) cardinals.*
Erin Carmody, Nebraska Wesleyan
University, **Victoria Gitman** and **Miha E.
Habič***, The Graduate Center, CUNY
(1125-VJ-1928)
11:00AM *Term Functors and Signature Product
(2593) Models: A Brief.* Preliminary report.
Cyrus F Nourani, DAI TU Berlin,DE & SFU
Burnaby, Vancouver, BC, Canada, and
Patrik Eklund*, Umea University,
Department of Computing Science,
SE-90187 Umea, Sweden (1125-VJ-2308)

11:15AM *Club Guessing in Prikry Models.*
(2594) Preliminary report.
Shehzad Ahmed, Ohio University
(1125-VJ-2463)

11:30AM *Separable equivalence.* Preliminary
▶ (2595) report.
Ron Taylor*, Berry College, **Carter
Smith**, Georgia Tech / Berry College, and
Michael Papazian, Berry College
(1125-VJ-2942)

11:45AM *Effective Categoricity of Infinite Directed*
(2596) *Graphs and Trees.* Preliminary report.
Hakim J. Walker, The George
Washington University (1125-VJ-3013)

MAA Panel

10:35 AM – 11:55 AM   International 5,
                 International Level, Marriott Marquis

*The Impact of High School Calculus on
the Transition to College Mathematics*

Organizers: **David Bressoud**, Macalester
             College

             Brendan Murphy, John
             Bapst High School

Panelists: **Vilma Mesa**, University of
             Michigan

             Dixie Ross, Pflugerville High
             School

             Phillip Sadler, Harvard
             University

             Bill Trapp, The College
             Board

MAA Panel

10:35 AM – 11:55 AM   International 6,
                 International Level, Marriott Marquis

*What We Talk About When We Talk About
Mathematics*

Organizers: **Samuel Hansen**,
             ACMEScience

             Colin Adams, Williams
             College and Author

Panelists: **Evelyn Lamb**, Scientific
             American Blog Network and
             Freelance Journalist

             Beth Malmskog, Villanova
             University

Project NExT Session

10:45 AM – NOON   Regency Ballroom VI,
             Ballroom Level, Hyatt Regency

*Surviving and Thriving in Your First
Course using Active Learning Techniques*

Organizers: **Leesa Anzaldo**, University
             of Wisconsin-Madison

             Sarah Hanusch, SUNY
             Oswego

             Scott Hottovy, United States
             Naval Academy

             Ben Wilson, Stevenson
             University

Panelists: **Amanda Sutherland**,
             Shenandoah University

Presenters: **Martha Byrne**, Sonoma
             State University

             Randall Crist, Creighton
             University

             Eric Hsu, San Francisco
             State University

             Thomas LoFaro, Gustavus
             Adolphus College

ASL Invited Address

11:00 AM – 11:50 AM   A707, Atrium
                 Level, Marriott Marquis

(2597) *An application of model theory to
        noncommutative algebra.*
        Rahim Moosa, University of Waterloo
        (1125-03-122)

SIGMAA on Math Circles for Students and Teachers(SIGMAA MCST) Special Presentation

11:00 AM – NOON   Regency Ballroom V,
             Ballroom Level, Hyatt Regency

Math Circle Demonstration

Mathemati-Con Special Presentation

11:00 AM – 11:20 AM   Regency Ballroom
             VII, Ballroom Level, Hyatt Regency

Mathemagician

Presenter: **Arthur Benjamin**, Harvey
             Mudd College

Mathemati-Con Presents: Showtime!

11:00 AM – NOON   Regency Ballroom VII,
             Ballroom Level, Hyatt Regency

*Three highly entertaining mathematics
presentations by Arthur Benjamin, Sarah
Greenwald, and Tim and Tanya Chartier.*

MAA Business Meeting

11:10 AM – 11:40 AM   Atrium Ballroom,
             Atrium Level, Marriott Marquis

Mathemati-Con Special Presentation

11:20 AM – 11:40 AM   Regency Ballroom
             VII, Ballroom Level, Hyatt Regency

*Mathematical morsels from the Simpsons
and Futurama.*

Presenter: **Sarah J. Greenwald**,
             Appalachian State University

Mathemati-Con Special Presentation

11:40 AM – NOON   Regency Ballroom VII,
Ballroom Level, Hyatt Regency

Mime-matics

Presenters: **Tanya Chartier**, The
Davidson Center

            Tim Chartier, Davidson
College

AMS Business Meeting

11:45 AM – 12:15 PM   Atrium Ballroom,
Atrium Level, Marriott Marquis

NAM Claytor-Woodard Lecture

1:00 PM – 1:50 PM   A708, Atrium
Level, Marriott Marquis

(2598) *Paths of minimal lengths on the set of
exact differential k–forms.*
Wilfrid D. Gangbo*, Mathematics
Department, UCLA, **Bernard Dacorogna**,
EPFL, Swiss, and **Olivier Kneuss**,
Industry (1125-49-2327)

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, IV

1:00 PM – 5:20 PM   International 8, International
Level, Marriott Marquis

Organizers: **Darren A. Narayan**,
Rochester Institute of
Technology

            Tamas Forgacs, California
State University, Fresno

            Ugur Abdulla, Florida
Institute of Technology

1:00PM *Impact of Light and Temperature on the*
▶ (2599) *Transpiration Ratio of Plants.*
Payson Merrit Lippert* and **Laurie
Battle**, Montana Tech of the University of
Montana (1125-92-440)

1:30PM *Living on the Edge: Improved*
▶ (2600) *Reconstruction of Fourier Series using
Jump Information with Applications to
MRI.*
Jade Larriva-Latt, Wellesley College,
Angela Morrison*, Albion College,
Alison Radgowski, Goucher College,
and **Joseph Tobin**, University of Virginia
(1125-42-2406)

2:00PM *Predicting methane concentration in the*
▶ (2601) *atmosphere through mathematical
modeling, computation and simulation.*
Christopher Moro*, Inter American
University of PR- Bayamon Campus,
Padmanabhan Seshaiyer, George Mason
University, and **Carmen Caiseda**, Inter
American University of PR- Bayamon
Campus (1125-65-2650)

2:30PM *On sets of cardinality 2 of nondecreasing*
▶ (2602) *diameter.*
Adam T. O'Neal* and **Michael
Schroeder**, Marshall University
(1125-05-792)

3:00PM *Classically Integral Quadratic Forms*
▶ (2603) *Excepting at Most Two Values.*
Madeleine Barowsky*, Wellesley
College, **William Damron**, Davidson
College, **Andres Mejia**, Bard College,
Frederick Saia, Tufts University,
Nolan Schock, California Polytechnic
State University San Luis Obispo, and
Katherine Thompson, DePaul University
(1125-11-125)

3:30PM *Enumeration of Triangles in a 2^t th*
▶ (2604) *Residue Graph.*
Benjamin J. Hamlin*, **Joshua K.
Lambert**, Armstrong State University,
and **Mark R. Budden**, Western Carolina
University (1125-05-1066)

4:00PM *Isoperimetric tiling in the hyperbolic*
▶ (2605) *plane.*
Leonardo Di Giosia, Lewis & Clark
College and Williams College, **Jahanger
Habib**, Williams College, **Lea
Kenigsberg**, Stony Brook University and
Williams College, **Dylanger Pittman**
and **Weitao Zhu***, Williams College
(1125-51-543)

4:30PM *The Log Convex Density Conjecture in*
▶ (2606) *Hyperbolic Space.*
Leonardo S. Digiosia*, Lewis & Clark
College, Williams College, **Lea
Kenigsberg**, Stony Brook University,
Williams College, **Dylanger Pittman**, **Jay
Habib**, Williams College, and **Weitao
Zhu**, WIlliams College (1125-53-583)

5:00PM *Double Bubbles In Borell Space.*
▶ (2607) Preliminary report.
Leonardo DiGiosia, Lewis & Clark
College, **Jahangir Habib**, Williams
College, **Lea Kenigsberg**, Stony
Brook University, **Dylanger Pittman***
and **Weitao Zhu**, Williams College
(1125-51-1372)

AMS Special Session on Advanced Mathematical Programming and Applications

1:00 PM – 5:50 PM   M301, Marquis
Level, Marriott Marquis

Organizers: **Ram N. Mohapatra**,
University of Central Florida

            Ram U. Verma, University of
North Texas

            Gayatri Pany, Indian
Institute of Technology

1:00PM *A study on vector invex equilibrium*
(2608) *problems with convexificator approach.*
Gayatri Pany, Indian Institute of
Technology (1125-90-338)

210

1:30PM ► (2609) *On the asymptotic behavior of the solutions to the general weighted low rank approximation as one block of the weights approach to infinity.* Preliminary report.
Xin Li* and **Aritra Dutta**, University of Central Florida (1125-15-2490)

2:00PM (2610) *Self Adjoint Operator Harmonic Chebyshev-Grüss Inequalities.*
George A Anastassiou, University of Memphis (1125-47-157)

2:30PM (2611) *Extended Complementarity Problems.*
Sabyasachi Pani* and **Bijaya Kumar Sahu**, Indian Institute of Technology Bhubaneswar (1125-90-1566)

3:00PM (2612) *A Problem of Weighted Low-Rank Approximation of Matrices and its Applications in Machine Learning.*
Aritra Dutta* and **Xin Li**, University of Central Florida (1125-65-2488)

3:30PM (2613) *Optimal methods to withstand cyber attacks: two case studies.*
Rachid Ait Maalem Lahcen, University of Central Florida (1125-49-3007)

4:00PM (2614) *Mathematical Programming Approach Applied to Solve Aircraft Recovery Problems.*
Deepmala*, SQC & OR Unit, Indian Statistical Institute, Kolkata, and **R. N. Mohapatra**, University of Central Florida (1125-49-757)

4:30PM (2615) *On relations between vector variational inequality and nonsmooth vector optimization problems via strict minimizers.*
Balendu Bhooshan Upadhyay, National Institute of Technology Manipur (1125-90-701)

5:00PM (2616) *Possibilistic Optimization: Some Recent Developments.* Preliminary report.
Pankaj Gupta, Department of Operational Research, Faculty of Mathematical Sciences, University of Delhi, Delhi-110007, India (1125-90-1758)

5:30PM (2617) *Portfolio Optimization: Some Recent Developments.* Preliminary report.
Mukesh Kumar Mehlawat, University of Delhi, India (1125-90-1764)

AMS Special Session on Analytic Number Theory and Arithmetic, II

1:00 PM – 5:50 PM   **Inman, Conference Level, Hyatt Regency**

Organizers: **Robert Lemke Oliver**, Tufts University

Paul Pollack, University of Georgia

Frank Thorne, University of South Carolina

1:00PM (2618) *Zeros of normalized combinations of the Riemann Xi function on the critical line.*
Sneha Chaubey*, **Amita Malik**, **Nicolas Robles** and **Alexandru Zaharescu**, University of Illinois at Urbana-Champaign (1125-11-990)

1:30PM (2619) *On r-gaps between zeros of the Riemann zeta-function.* Preliminary report.
Caroline Turnage-Butterbaugh, Duke University (1125-11-2148)

2:00PM (2620) *Microlocal analysis on representations and number-theoretic applications.*
Paul D Nelson, ETH Zurich (1125-11-2857)

2:30PM ► (2621) *Averages of twisted GL(2) L-functions.*
Jesse Thorner, Stanford University (1125-11-986)

3:00PM (2622) *Average central values of the degree 4 L-function on $\mathrm{GSp}(4)/\mathbb{Q}$.*
Maria Monica Nastasescu, Brown University (1125-11-1770)

3:30PM (2623) *Cubic Moments of L-functions and the Petersson formula for newforms.*
Ian Petrow, Ecole Polytechnique Fédérale de Lausanne (1125-11-803)

4:00PM (2624) *The 4th moment of quadratic Dirichlet L-functions in function fields.*
Alexandra M Florea, Stanford University (1125-11-825)

4:30PM (2625) *Sums of arithmetic functions over short intervals.*
Brad Rodgers, University of Michigan (1125-11-864)

5:00PM (2626) *Correlations of multiplicative functions and applications.*
Oleksiy Klurman, Department of Mathematics, University of Montreal and University College London (1125-11-1650)

5:30PM ► (2627) *New Sifting Iterations.* Preliminary report.
Zarathustra Elessar Brady, Stanford (1125-11-2077)

AMS Special Session on Applications of Partially Ordered Sets in Algebraic, Topological, and Enumerative Combinatorics, II

1:00 PM – 5:50 PM   **Spring, Conference Level, Hyatt Regency**

Organizers: **Rafael S. González D'León**, University of Kentucky

Joshua Hallam, Wake Forest University

1:00PM (2628) *Homology of Filters in the Partition Lattice.*
Dustin Hedmark, University of Kentucky (1125-05-816)

1:30PM (2629) *C-Monoids in Species and Posets.*
Miguel A. Mendez, Universidad Antonio Nariño (UAN) (1125-12-978)

2:00PM *On conjugacy classes of S_n containing all*
(2630) *irreducibles.* Preliminary report.
Sheila Sundaram, Pierrepont School,
Westport, CT (1125-05-1720)

2:30PM *A poset approach to the q-Stirling*
▶ (2631) *numbers.*
Yue Cai*, Texas A&M University, and
Margaret Readdy, University of Kentucky
(1125-05-316)

3:00PM *Infinite Neighbor Complexes.*
(2632) **James J Madden**, Louisiana State
University, and **Trevor McGuire***, Illinois
Wesleyan University (1125-05-1144)

3:30PM *Colorful Graph Associahedra.* Preliminary
(2633) report.
Satyan L Devadoss*, University of San
Diego, and **Mia Smith**, Williams College
(1125-05-648)

4:00PM *The configuration space of a robotic arm*
▶ (2634) *in a tunnel.*
Federico Ardila*, San Francisco State
University, **Hanner Bastidas**, Universidad
del Valle, **Cesar Ceballos**, University of
Vienna, and **John Guo**, San Francisco
State University (1125-05-303)

4:30PM *The Frankl Conjecture for subgroup*
(2635) *lattices.*
Alireza Abdollahi, University of Isfahan,
Russ Woodroofe*, Mississippi State
University, and **Gjergji Zaimi**, Los
Angeles, CA (1125-05-896)

5:00PM *Baxter posets.*
(2636) **Emily Meehan**, North Carolina State
University (1125-05-1101)

5:30PM *Parabolic generalizations of the Catalan*
(2637) *numbers.*
Matthew J Willis, Wesleyan University
(1125-05-357)

AMS Special Session on Continued Fractions, II

1:00 PM – 5:50 PM   **Dunwoody, Conference
Level, Hyatt Regency**

Organizers: **James McLaughlin**, West
Chester University
Geremías Polanco,
Hampshire College
Nancy J. Wyshinski, Trinity
College

1:00PM *Some questions related to R_{II} continued*
(2638) *fractions.*
Mourad E. H. Ismail, University of
Central Florida (1125-33-683)

2:00PM *Continued fractions and Stern*
(2639) *polynomials.*
Karl Dilcher*, Dalhousie University,
and **Larry Ericksen**, Millville, NJ
(1125-11-1306)

2:30PM *Continued fractions from Stern numbers*
▶ (2640) *and generalized polynomials.*
Larry Ericksen*, Millville, New Jersey,
and **Karl Dilcher**, Dalhousie University
(1125-11-1686)

3:00PM *Super-Apollonian continued fractions.*
(2641) Preliminary report.
Sneha Chaubey, University of Illinois,
Urbana-Champaign, **Elena Fuchs**,
University of California, Davis, **Robert
Hines*** and **Katherine Stange**, University
of Colorado, Boulder (1125-11-933)

3:30PM *Simple applications of continued*
▶ (2642) *fractions and an elementary result on*
Heron's algorithm (with a generalization
to n-adic numbers).
Antonino Leonardis, Milan, Italy
(1125-11-1224)

4:00PM *On multidimensional Diophantine*
(2643) *approximation of algebraic numbers.*
Csanád Bertók*, University of Debrecen,
Institute of Mathematics, Hungary, **Attila
Pethő**, University of Debrecen, Institute
of Informatics, Hungary, and **Michael E.
Pohst**, Technische Universität Berlin,
Berlin, Germany (1125-11-727)

4:30PM *On the subgroup generated by solutions*
(2644) *of Pell's equation and elements of order 2*
in the corresponding quotient group.
Elena C. Covill, **Mohammad Javaheri**
and **Nikolai A. Krylov***, Siena College
(1125-11-992)

5:00PM *Indefinite forms, continued fractions, and*
▶ (2645) *binary necklaces.* Preliminary report.
Barry R Smith, Lebanon Valley College
(1125-11-116)

5:30PM *Conjugates and reduced surds for non*
▶ (2646) *simple continued fractions.* Preliminary
report.
John Greene* and **Jesse Schmieg**,
University of Minnesota Duluth
(1125-11-82)

AMS Special Session on Graphs and Matrices, II

1:00 PM – 5:50 PM   **Embassy D, International
Tower, LL2, Hyatt Regency**

Organizers: **Sudipta Mallik**, Northern
Arizona University
Keivan Hassani Monfared,
University of Calgary
Bryan Shader, University of
Wyoming

1:00PM *Average mixing of quantum walks.*
(2647) **Chris Godsil**, University of Waterloo
(1125-15-887)

2:00PM *Quantum state transfer on graphs with*
(2648) *potential.* Preliminary report.
Mark Kempton, Center of Mathematical
Sciences and Applications, Harvard
University (1125-05-2788)

2:30PM *Nowhere–zero bases for the nullspace of*
▶ (2649) *the incidence matrices of graphs.*
Saieed Akbari, **Amir Hossein Ghodrati**,
Sharif University of Technology, and
Shahriar Shahriari*, Pomona College
(1125-05-1735)

3:00PM *The Eigenvalues of the Graphs $D(4, q)$.*
(2650) Preliminary report.
G. Eric Moorhouse, Department of Mathematics, University of Wyoming, **Shuying Sun***, Department of Mathematical Sciences, University of Delaware, and **Jason Williford**, Department of Mathematics, University of Wyoming (1125-05-225)

3:30PM *Combinatorial conditions that preclude*
▶ (2651) *SAPpiness.*
Louis Deaett, Quinnipiac University, and **Colin M Garnett***, Black Hills State University (1125-15-1620)

4:00PM *Algebraic conditions induced by matrix*
(2652) *patterns.* Preliminary report.
Louis Deaett*, Quinnipiac University, and **Colin Garnett**, Black Hills State University (1125-15-1645)

4:30PM *Generalizations of the Strong Arnold*
(2653) *Property and the inverse eigenvalue problem of a graph.*
Leslie Hogben, Iowa State University and American Institute of Mathematics (1125-15-334)

5:00PM *Signed graphs with maximum nullity at*
(2654) *most two.*
Marina Arav*, **Frank Hall**, **Hein van der Holst** and **Zongshan Li**, Georgia State University (1125-15-2169)

5:30PM *Essential sign change numbers of full*
▶ (2655) *sign pattern matrices.*
Xiaofeng Chen, Chongqing Jiaotong University, **Wei Fang**, North University of China, **Wei Gao**, Auburn University, **Yubin Gao**, North University of China, **Guangming Jing**, **Zhongshan Li***, Georgia State University, **Yanling Shao**, North University of China, and **Lihua Zhang**, Georgia State University (1125-15-2042)

AMS Special Session on Group Actions and Geometric Structures, II

1:00 PM – 4:50 PM   **International C, International Level, Marriott Marquis**

Organizers: **Anna Wienhard**, Universität Heidelberg
Jeffrey Danciger, University of Texas at Austin

1:00PM *Fast Nielsen–Thurston Classification.*
▶ (2656) **Dan Margalit***, **Balazs Strenner**, Georgia Institute of Technology, and **S. Öykü Yurttaş**, Dicle University (1125-57-1356)

2:00PM *The geometry of locally homogeneous*
(2657) *complex manifolds.*
Andrew Michael Sanders, University of Heidelberg (1125-51-557)

2:30PM *Classification of generalized cusps.*
(2658) **Samuel A Ballas***, Florida State University, **Daryl Cooper**, University of California Santa Barbara, and **Arielle Leitner**, Technion (1125-51-732)

3:00PM *A disconnected deformation space of*
(2659) *rational maps.* Preliminary report.
Eriko Hironaka*, Florida State University/AMS, and **Sarah Koch**, University of Michigan (1125-57-429)

4:00PM *On the complexity of finite subgraphs of*
(2660) *the curve graph.*
Edgar A Bering, University of Illinois - Chicago, **Gabriel Conant**, University of Notre Dame, and **Jonah Gaster***, Boston College (1125-51-1498)

4:30PM *The braid group of crystallographic*
(2661) *complex reflection groups.*
Philip C Puente, University of North Texas (1125-55-2703)

AMS Special Session on Inverse Problems and Multivariate Signal Analysis, II

1:00 PM – 5:50 PM   **International 9, International Level, Marriott Marquis**

Organizers: **M. Zuhair Nashed**, University of Central Florida
Willi Freeden, University of Kaiserslautern
Otmar Scherzer, University of Vienna

1:00PM *Shannon-Type Sampling, Paley-Wiener*
(2662) *Reproducing Hilbert Space Structure, and Multi-Variate Antenna Problem.*
Willi Freeden*, University of Kaiserslautern, and **M Zuhair Nashed**, University of Central Florida (1125-42-1477)

1:30PM *Ultrasonic tomography inversion of the*
(2663) *Helmholtz equation via indefinite convolution.*
Frank Stenger, University of Utah (1125-41-3121)

2:00PM *Some inverse problems and boundary*
(2664) *controls for phase-space transport equations.*
Guillaume Bal, Columbia University (1125-35-2144)

2:30PM *Inverse Transport and Acousto-Optic*
(2665) *Imaging.*
John C Schotland, Department of Mathematics, University of Michigan (1125-35-1587)

3:00PM *Numerical implementation of π-line*
(2666) *reconstruction formulas in tomography.*
Adel Faridani, Oregon State University (1125-65-2183)

3:30PM *Inverse Problems for the Wave Equation*
▶ (2667) *on Graphs.*
Sergei Avdonin*, **Nina Avdonina**, University of Alaska Fairbanks, and **Julian Edward**, Florida International University (1125-93-1028)

4:00PM *Stability in an hybrid inverse conductivity*
(2668) *problems from minimal data.* Preliminary report.
Alexandru Tamasan, University of Central Florida (1125-35-3135)

4:30PM *Graph filter banks and signal*
(2669) *reconstruction.* Preliminary report.
Cheng Cheng*, University of Central
Florida, **Junzheng Jiang**, Guilin
University of Electronic Technology, and
Qiyu Sun, University of Central Florida
(1125-94-1684)

5:00PM *Variational Multiscale Estimators for*
(2670) *Nonparametric Regression and Statistical*
Inverse Problems.
Miguel del Alamo*, **Axel Munk** and
Housen Li, Institute for Mathematical
Stochastics, Georg-August-University
Goettingen (1125-62-1825)

5:30PM *Parameter Choices for Fast Harmonic*
(2671) *Spline Approximation.*
Martin Gutting, University of Siegen,
Germany (1125-65-2263)

AMS Special Session on Mathematics of Signal Processing and Information, II

1:00 PM – 5:50 PM   International 10,
International Level, Marriott Marquis

Organizers: **Rayan Saab**, University of
California, San Diego

Mark Iwen, Michigan State
University

1:00PM *On Generalized Phase Retrieval.*
(2672) **Yang Wang**, The Hong Kong University of
Science and Technology (1125-41-893)

1:30PM *Phase Retrieval: under Corruption or*
(2673) *with Quantization.*
Thang Huynh, UC San Diego
(1125-90-1009)

2:00PM *Multichannel Blind Deconvolution:*
(2674) *New models, Fast algorithms, and*
Mathematical Performance Guarantees.
Justin Romberg*, **Kiryung Lee** and **Ning
Tian**, Georgia Institute of Technology
(1125-94-1143)

2:30PM *Error moments and optimal sampling*
(2675) *distributions for the randomized*
Kaczmarz algorithm.
Alexander M Powell*, Vanderbilt
University, and **Xuemei Chen**, University
of San Francisco (1125-42-1292)

3:00PM *Batched Stochastic Gradient Descent with*
▶ (2676) *Weighted Sampling.*
Deanna Needell*, Claremont McKenna
College / UCLA, and **Rachel Ward**, UT
Austin (1125-65-182)

3:30PM *Breaking sample complexity barriers via*
(2677) *nonconvex optimization?*
Mahdi Soltanolkotabi, Department of
Electrical Engineering, University of
Southern California (1125-49-795)

4:00PM *A tale of two bases: local-nonlocal*
(2678) *regularization on image patches with*
convolution framelets.
Rujie Yin*, **Tingran Gao**, Department of
Mathematics, Duke University, **Yue M. Lu**,
John A. Paulson School of Engineering
and Applied Sciences, Harvard University,
and **Ingrid Daubechies**, Department
of Mathematics, Duke University
(1125-41-627)

4:30PM *Some recent advances on equiangular*
(2679) *tight frames.*
Matthew Fickus, Dept. of Mathematics
& Statistics, Air Force Institute of
Technology (1125-42-224)

5:00PM *Biangular Harmonic Frames.*
(2680) **Peter G. Casazza***, **John Haas**, **Amineh
Farzannia**, University of Missouri, and
Tin T. Tran, Department of Mathematics
(1125-43-687)

5:30PM *1-Bit Tensor Completion.* Preliminary
(2681) report.
Navid Ghadermarzy*, **Yaniv Plan**
and **Ozgur Yilmaz**, Mathematics
Department, University of British
Columbia (1125-94-853)

AMS Special Session on Measure and Measurable Dynamics (In Memory of Dorothy Maharam, 1917-2014)

1:00 PM – 5:50 PM   M101, Marquis
Level, Marriott Marquis

Organizer: **Cesar Silva**, Williams
College

1:00PM *Benford's Law: Detecting Fraud in*
▶ (2682) *Business Using Ergodic Theory.*
Preliminary report.
Jane M. Hawkins, Univ. of N. Carolina at
Chapel Hill (1125-37-758)

2:00PM *Dorothy Maharam's "On orbits under*
(2683) *ergodic measure preserving*
transformations".
Terrence M Adams, U.S. Government
(1125-37-774)

2:30PM *Radon-Nikodym derivatives for rational*
(2684) *p-adic translations.*
Joanna Furno, Indiana University-Purdue
University Indianapolis (1125-37-1421)

3:00PM *Proximal and distal equivalence of*
(2685) *minimal flows.*
Joseph Auslander, University of
Maryland (1125-37-2217)

3:30PM *Polynomial ergodic descent and*
(2686) *uniformly metastable convergence.*
Eduardo Dueñez* and **José N Iovino**,
University of Texas, San Antonio
(1125-37-2337)

4:00PM *Distances between regular languages*
▶ (2687) *using entropy.* Preliminary report.
Kelly B. Yancey*, **Austin J. Parker** and
Matthew P. Yancey, Institute for Defense
Analyses - Center for Computing
Sciences (1125-37-691)

4:30PM *Partially Bounded Transformations have*
(2688) *Trivial Centralizer.*
Johann D. Gaebler*, Harvard University,
Cesar E. Silva, Williams College, **Xiaoyu
Xu**, Princeton University, and **Zirui Zhou**,
University of California, Berkeley
(1125-37-1077)

5:00PM *Qptimal Quantization.*
(2689) **Dogan Comez**, North Dakota
State University, and **Mrinal K
Roychowdhury***, University of Texas Rio
Grande Valley (1125-37-759)

5:30PM *The mathematical work of Dorothy*
▶ (2690) *Maharam in ergodic theory and measure
theory.* Preliminary report.
Cesar E Silva, Williams College
(1125-37-2600)

AMS Special Session on Minimal Integral Models of Algebraic Curves, II

1:00 PM – 5:50 PM **The Learning Center,
Ballroom Level, Hyatt Regency**

Organizer: **Tony Shaska**, Oakland
University

1:00PM *Regular models of curves.* Preliminary
(2691) report.
Dino J Lorenzini, University of Georgia
(1125-14-1334)

2:00PM *The Satake sextic in elliptic fibrations on*
(2692) *K3.*
Andreas Malmendier*, Utah State
University, and **Tony Shaska**, Oakland
University (1125-14-2062)

3:00PM *Surjectivity of Galois Representations in*
(2693) *Rational Families of Abelian Varieties.*
Ashvin A Swaminathan*, Harvard
University, **Aaron Landesman**, Stanford
University, **James Tao**, Harvard
University, and **Yujie Xu**, California
Institute of Technology (1125-11-879)

3:30PM *Dessins d'enfants and a curve of Wiman.*
(2694) **Emilio Bujalance**, **Antonio F. Costa**,
UNED, Spain, and **Milagros Izquierdo***,
Linköping University, Sweden
(1125-14-289)

4:00PM *Conductors and minimal discriminants of*
(2695) *hyperelliptic curves.*
Padmavathi Srinivasan, Georgia
Institute of Technology (1125-11-2325)

5:00PM *Higher-order Weierstrass points on*
(2696) *certain hyperelliptic curves, superelliptic
curves, and associated towers.*
Caleb McKinley Shor, Western New
England University (1125-14-2886)

5:30PM *An explicit theta lift from Hilbert modular*
(2697) *forms to Siegel parmodular forms.*
Malcolm Edward Rupert, University of
Idaho (1125-11-3012)

AMS Special Session on NSFD Discretizations: Recent Advances, Applications, and Unresolved Issues

1:00 PM – 5:50 PM **L405 & L406, Lobby
Level, Marriott Marquis**

Organizers: **Talitha M. Washington**,
Howard University

Ronald E. Mickens, Clark
Atlanta University

1:00PM *What is a NSFD Scheme?*
(2698) **Ronald E. Mickens**, Clark Atlanta
University (1125-39-485)

2:00PM *A NSFD Scheme For Discretizing Radial*
▶ (2699) *Derivatives: History, Application and
Significance.*
Ron Buckmire, National Science
Foundation (1125-65-407)

2:30PM *Construction of Dynamically-consistent*
(2700) *Discrete-time Models Arising in the
Natural and Engineering Sciences.*
Abba Gumell, Arizona State University
(1125-92-490)

3:00PM *Continuous and discrete models for the*
(2701) *declines of honeybee colonies.*
Jean MS Lubuma*, **Mataeli B Lerata** and
Abdullahi Yusuf, University of Pretoria
(1125-92-98)

3:30PM *NSFDMs as FOFDMs for robust simulation*
(2702) *of parameter sensitive partial differential
equations.*
Kailash C. Patidar, Department of
Mathematics and Applied Mathematics,
University of the Western Cape, South
Africa (1125-65-29)

4:00PM *Employing Conservation Laws to*
▶ (2703) *Construct Nonstandard Finite Difference
Schemes.*
Talitha M Washington, Howard
University (1125-39-957)

4:30PM *A Class of Nonstandard Finite Difference*
(2704) *Methods for Autonomous Dynamical
Systems.*
Hristo V Kojouharov*, The University of
Texas at Arlington, **Daniel T Wood** and
Dobromir T Dimitrov, Fred Hutchinson
Cancer Research Center (1125-65-850)

5:00PM *Creating Non-standard Finite Difference*
▶ (2705) *Schemes : Why Bother?* Preliminary
report.
Oluwaseye Adekanye* and **Talitha
Washington**, Howard University
(1125-39-401)

5:30PM *Global Dynamics and Geometry of*
▶ (2706) *Competitive Maps.* Preliminary report.
E Cabral Balreira*, **Saber Elaydi**, Trinity
University, and **Rafael Luis**, Center for
Mathematical Analysis, Geometry, and
Dynamical Systems, Technical University
of Lisbon (1125-51-1397)

AMS Special Session on New Developments in Noncommutative Algebra & Representation Theory, II

1:00 PM – 5:50 PM   A705, Atrium
Level, Marriott Marquis

Organizers: **Ellen Kirkman**, Wake Forest University
Chelsea Walton, Temple University

1:00PM *Cartan Subalgebras for Quantum*
(2707) *Symmetric Pair Coideals.* Preliminary report.
Gail Letzter, National Security Agency (1125-17-725)

1:30PM *Bernstein–Sato polynomials and*
(2708) *monodromy conjectures for Weyl arrangements.*
Asilata Bapat*, The University of Georgia, and **Robin Walters**, Northeastern University (1125-17-2191)

2:00PM *Quivers from Double Bruhat Cells of*
▶ (2709) *Kac-Moody Algebras.*
Maitreyee Chandramohan Kulkarni, Louisiana State University (1125-00-2164)

2:30PM *Higher Schur-Weyl duality for Lie*
(2710) *supersubalgebras.* Preliminary report.
Mee Seong Im, United States Military Academy, West Point (1125-16-476)

3:00PM *Automorphisms, derivations, and*
(2711) *subalgebras of the insertion-elimination algebra.*
Emilie B Wiesner*, Ithaca College, and **Matthew Ondrus**, Weber State University (1125-17-373)

3:30PM *Path algebras of quivers and*
(2712) *representations of locally finite Lie algebras.*
J Hennig*, University of Alberta, and **S Sierra**, University of Edinburgh (1125-17-2403)

4:00PM *On the structures of Hopf algebras in*
(2713) *prime characteristic.*
Van C. Nguyen*, Northeastern University, and **Xingting Wang**, Temple University (1125-16-1349)

4:30PM *Non-noetherian Hopf algebras versus*
(2714) *noetherian Hopf algebras.* Preliminary report.
Xingting Wang*, Temple University, **Xiaolan Yu**, Hangzhou Normal University, and **Yinhuo Zhang**, University of Hasselt (1125-16-1769)

5:00PM *Projectivity and tensor products for some*
(2715) *Hopf algebras.* Preliminary report.
Julia Plavnik* and **Sarah Witherspoon**, Texas A&M University (1125-16-998)

5:30PM *Eigenvalues of rotations in ribbon fusion*
(2716) *categories.*
Daniel Barter, University of Michigan, **Corey Jones**, Australian National University, and **Henry Tucker***, UC San Diego (1125-18-2833)

AMS Special Session on Open & Accessible Problems for Undergraduate Research, II

1:00 PM – 5:50 PM   International 4, International Level, Marriott Marquis

Organizers: **Allison Henrich**, Seattle University
Michael Dorff, Brigham Young University
Nicholas Scoville, Ursinus College

1:00PM *Some open problems in computational*
▶ (2717) *Galois theory.*
Chad Awtrey, Elon University (1125-12-1660)

1:30PM *Undergraduate Research for Non*
▶ (2718) *Academic Careers.*
Alicia Prieto Langarica, Youngstown State University (1125-97-2518)

2:00PM *Projects for Undergraduates in the*
▶ (2719) *construction of solutions to truncated Moment Problems and applications to PDEs.* Preliminary report.
C Flores, California State University Channel Islands (1125-35-3142)

2:30PM *Open accessible problems in knot theory.*
(2720) **Colin Adams**, Williams College (1125-57-606)

3:00PM *Knot mosaics - something for everyone.*
▶ (2721) **Lew Ludwig**, Denison University (1125-55-1639)

3:30PM *Some problems related to networks,*
▶ (2722) *random walks and choice.* Preliminary report.
Kenneth Stephen Berenhaut, Wake Forest University (1125-60-2951)

4:00PM *Undergraduate research projects in*
▶ (2723) *graph theory.*
Dewey Taylor, Virginia Commonwealth University (1125-05-2785)

4:30PM *Puzzle type undergraduate projects in*
▶ (2724) *combinatorics and graph theory.*
Darren A. Narayan, Rochester Institute of Technology (1125-05-1017)

5:00PM *Prime labelings of graphs with the*
▶ (2725) *Gaussian integers.*
Steven Klee, Seattle University (1125-05-1052)

5:30PM *Data Mining the MathFeed News App.*
▶ (2726) Preliminary report.
Francis Edward Su, Harvey Mudd College (1125-62-2632)

AMS Special Session on PDE Analysis on Fluid Flows, II

1:00 PM – 5:50 PM   Embassy F, International Tower, LL2, Hyatt Regency

Organizers: **Xiang Xu**, Old Dominion University
Geng Chen, Georgia Institute of Technology

Ronghua Pan, Georgia Institute of Technology

1:00PM *Deterministic and stochastic aspects of*
(2727) *fluid mixing.*
Michele Coti Zelati, University of Maryland (1125-35-772)

1:30PM *Uniqueness for shock reflection problem.*
(2728) **Gui-Qiang Chen**, University of Oxford, UK, **Mikhail Feldman***, University of Wisconsin-Madison, and **Wei Xiang**, City University of Hong Kong, Hong Kong (1125-35-2142)

2:00PM *Singular Shocks in a Chromatography*
(2729) *Model.*
Charis Tsikkou, West Virginia University (1125-35-812)

2:30PM *Hyperbolic Conservation Laws for*
(2730) *Isometric Immersions.*
Dehua Wang, University of Pittsburgh (1125-35-885)

3:00PM Break

3:30PM *Global wellposedness of cubic*
(2731) *Camassa-Holm equations.*
Qingtian Zhang, University of California, Davis (1125-35-922)

4:00PM *Global dynamics of*
(2732) *Cahn-Hilliard-Brinkman equations in critical space.*
Kun Zhao, Tulane University (1125-35-662)

4:30PM *Coupling of free flow with porous media*
(2733) *flow.*
Xiaoming Wang, Florida State University (1125-35-2097)

5:00PM *Analysis of microstructures in*
(2734) *martensite-austenite phase transitions using sharp variational bounds.*
Oleksandr Misiats*, **Robert Kohn**, Courant Institute, NYU, and **Stefan Muller**, University of Bonn (1125-35-109)

5:30PM *The quasi-geostrophic equations for*
(2735) *large-scale geophysical flows with a free surface.* Preliminary report.
Qingshan Chen, Clemson University (1125-35-456)

AMS Special Session on Pure and Applied Talks by Women Math Warriors Presented by EDGE (Enhancing Diversity in Graduate Education)

1:00 PM – 5:50 PM   **M106 & M107, Marquis Level, Marriott Marquis**

Organizers: **Candice Price**, University of San Diego

Amy Buchman, Tulane University

1:00PM *What is the EDGE(Enhancing Diversity in*
▶ (2736) *Graduate Education) Program?*
Amy Buchmann, Tulane University, and **Candice Price***, University of San Diego (1125-00-2899)

1:30PM *Slender body theory: an error analysis.*
▶ (2737) Preliminary report.
Laurel A Ohm, University of Minnesota, Twin Cities (1125-76-2530)

2:00PM *Synchrony and the dynamic dichotomy in*
▶ (2738) *a class of matrix population models.*
Amy Veprauskas, University of Louisiana, Lafayette (1125-92-1512)

2:30PM *Rat GPS: Drawing Place Field Diagrams*
▶ (2739) *of Neural Codes Using Toric Ideals.*
Nida K. Obatake*, Texas A&M University, **Elizabeth Gross**, San Jose State University, and **Nora E. Youngs**, Colby College (1125-92-246)

3:00PM *A Computational Model of Ciliary*
(2740) *Beating.* Preliminary report.
Amy Buchmann*, **Ricardo Cortez** and **Lisa Fauci**, Tulane University (1125-76-2889)

3:30PM *The Generating Family Cohomology Ring*
(2741) *for Legendrian Submanifolds.* Preliminary report.
Ziva Myer, Bryn Mawr College (1125-53-1051)

4:00PM *Forget Yellow: Follow the Properly*
▶ (2742) *Colored Brick Road Instead.*
Kathleen Ryan*, DeSales University, **Vincent Coll**, Lehigh University, **Jonelle Hook**, Mount St. Mary's University, **Colton Magnant**, Georgia Southern University, and **Karen McCready**, King's College (1125-05-1478)

4:30PM *Super-Catalan numbers and rooted*
▶ (2743) *binary trees.* Preliminary report.
Stefanie Wang, Iowa State University (1125-17-1194)

5:00PM *A new lower bound for a*
(2744) *vertex-identifying code in general graphs.*
Ryan R. Martin, Iowa State University, **Brendon Stanton**, US Government, and **Shanise Walker***, Iowa State University (1125-05-356)

5:30PM *Saturation and Constructing*
▶ (2745) $(K_t - e)$-*saturated graphs.* Preliminary report.
Jessica Fuller* and **Ronald J. Gould**, Emory University (1125-05-920)

AMS Special Session on Teaching Assistant Development Programs: Why and How?, II

1:00 PM – 5:50 PM   **International 3, International Level, Marriott Marquis**

Organizers: **Solomon Friedberg**, Boston College

Jessica Deshler, West Virginia University

Jeffrey Remmel, University of California, San Diego

Lisa Townsley, University Of Georgia

1:00PM *A Dean's Perspective.*
▶ (2746) **David Manderscheid**, The Ohio State University (1125-97-766)

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1:30PM ► (2747) *Graduate Student Instructor Mentorship Model: A professional development that trains experienced graduate students to pedagogically mentor novice mathematics graduate student instructors.* Preliminary report.
Sean P Yee*, University of South Carolina, and **Kimberly Rogers**, Bowling Green State University (1125-97-46)

2:00PM ► (2748) *The Teaching Seminar and Beyond: What Do Graduate Students Find Valuable as They Learn to Teach?*
Juliana V. Belding, Boston College (1125-97-719)

2:30PM (2749) *Using research on student learning and teachers' knowledge to design professional development for novice college mathematics instructors.*
Natasha M. Speer, The University of Maine (1125-97-2383)

3:00PM (2750) *Mentoring GTAs as they teach: Providing tools to develop successful teachers.*
Lisa Townsley, University of Georgia (1125-97-1428)

3:30PM ► (2751) *'I teach' versus 'I am a teacher': The Role of Identity in Graduate Student Professional Development.*
Eliza Dargan Gallagher, Clemson University (1125-97-813)

4:00PM (2752) *Identifying Opportunities to Renovate the Professional Development of Teaching Assistants.*
Fabiana Cardetti, University of Connecticut (1125-97-982)

4:30PM (2753) *How can we help novice college mathematics instructors know what their students know? Questioning strategies and formative assessment for the college mathematics classroom.*
Jack Bookman, Duke University (1125-97-2480)

5:00PM ► (2754) *Rutgers TA Training: Continuity and Change.*
Michael Weingart, Rutgers University (1125-00-1227)

5:30PM (2755) *From Graduate Student to Classroom Teacher: Constructing Pathways for Success.*
Robin J. Gottlieb* and **Jameel Habib Al-Aidroos**, Harvard University (1125-97-681)

AMS Special Session on Women in Analysis (In Honor of Cora Sadosky), II

1:00 PM – 5:50 PM   **Embassy E, International Tower, LL2, Hyatt Regency**

Organizers: **Alexander Reznikov**, Vanderbilt University
Oleksandra Beznosova, University of Alabama
Hyun-Kyoung Kwon, University of Alabama
Katharine Ott, Bates College

1:00PM (2756) *Equivalent definitions of product Hardy spaces on spaces of homogeneous type.* Preliminary report.
Maria Cristina Pereyra, University of New Mexico (1125-46-2015)

1:30PM (2757) *Higher order Journe commutators and multi-parameter BMO.*
Stefanie Petermichl, Universite Paul Sabatier (1125-42-360)

2:00PM (2758) *Cesàro-type operators on Hardy and Bergman space of analytic functions on the unit ball.*
Snehalatha Ballamoole*, Mississippi State University, Starkville, Mississippi, **Thomas Len Miller**, **Vivien Glass Miller** and **Mathew Scott McBride**, Mississippi State University (1125-32-2431)

2:30PM (2759) *Wavelet Sets in Vector Spaces over Cyclic Groups of Prime Order.*
Azita Mayeli, City University of New York, The Graduate Center and Queensborough (1125-42-2340)

3:00PM (2760) *Uniform sparse domination of singular integrals via dyadic shifts.*
Amalia Culiuc*, Georgia Institute of Technology, **Francesco Di Plinio**, The University of Virginia, and **Yumeng Ou**, Massachusetts Institute of Technology (1125-26-1894)

3:30PM ► (2761) *Recent Results in Sparse Domination.* Preliminary report.
Michael T Lacey, Georgia Institute of Technology (1125-42-114)

4:00PM ► (2762) *Muckenhoupt-Wheeden conjectures for sparse operators.*
Cong Q Hoang* and **Kabe Moen**, University of Alabama (1125-42-575)

4:30PM (2763) *Strong pseudoconvexity in infinite dimension.*
Sofia Ortega-Castillo, CIMAT (Mexico) (1125-32-3062)

5:00PM Discussion

MAA Minicourse #7: Part B

1:00 PM – 3:00 PM   **L504 & L505, Lobby Level, Marriott Marquis**

Mathematical Modeling Contest Papers: Insights for Instructors and Students
Presenters: **Gregory Rhoads**, Appalachian State University
William Bauldry, Appalachian State University

MAA Minicourse #13: Part B

1:00 PM – 3:00 PM   **L506 & L507, Lobby Level, Marriott Marquis**

Teaching Modeling-First Differential Equations–Technology and Complete End Game Efforts.
Presenters: **Rosemary Farley**, Manhattan College

Jon Paynter, US Military Academy

Therese Shelton, Southwestern College

Patrice Tiffany, Manhattan College

Brian Winkel, SIMIODE

MAA Minicourse #15: Part A

1:00 PM – 3:00 PM   **L508, Lobby Level, Marriott Marquis**

Unraveling Four Interesting Ciphers

Presenters: **Chris Christensen**, Northern Kentucky University

Jeffrey Ehme, Spelman College

AMS Contributed Paper Session on Associative and Nonassociative Rings and Algebras, Category Theory, and Homological Algebra

1:00 PM – 5:40 PM   **Fairlie, Conference Level, Hyatt Regency**

1:00PM *The Bar Simplicial Module.*
(2764)   **Jacob Laubacher***, **Mihai D. Staic**, Bowling Green State University, and **Alin Stancu**, Columbus State University (1125-16-106)

1:15PM *Global Dimension of Connected Hopf*
(2765)   *Algebras.* Preliminary report. **Daniel O Yee**, University of Wisconsin-Milwaukee (1125-16-274)

1:30PM *An Invitation to $\mathcal{A}$-Calculus for*
▶ (2766)   *Undergraduates.* **James S. Cook**, Liberty University (1125-16-276)

1:45PM *Calculus on a Real Associative Algebra.*
(2767)   **Daniel J Freese**, Liberty University (1125-16-892)

2:00PM *The Cancellation Problem for Some*
▶ (2768)   *Quantum Algebras.* Preliminary report. **Xin Tang**, Math & Computer Science, Fayetteville State University (1125-16-1485)

2:15PM *Associativity and Infinite Matrices.*
▶ (2769)   Preliminary report. **Daniel P. Bossaller*** and **Sergio R. López-Permouth**, Ohio University (1125-16-1499)

2:30PM *Presenting cyclotomic Schur algebras.*
(2770)   **Jieru Zhu*** and **Jonathan Kujawa**, University of Oklahoma (1125-16-1828)

2:45PM *On the representation theory of the*
(2771)   *marked Brauer algebra.* **Benjiman C Tharp**, University of Oklahoma (1125-16-2002)

3:00PM *Structure of certain von Neumann*
(2772)   *regular rings.* **Hazar M. Abu-Khuzam**, American University of Beirut, Beirut, Lebanon (1125-16-2026)

3:15PM *Drinfeld orbifold algebras for symmetric*
(2773)   *groups.* **Briana Foster-Greenwood***, Cal Poly Pomona, and **Cathy Kriloff**, Idaho State University (1125-16-2235)

3:30PM *Strongly Non-Singular Rings,*
(2774)   *Morita-Equivalence, and the Maximal Ring of Quotients.* **Bradley S. McQuaig**, Auburn University (1125-16-2253)

3:45PM *Gröbner basis for local Weyl modules*
(2775)   *for the hyper and trucated current $\mathfrak{sl}_2$-algebras.* **Angelo Bianchi**, Federal University of São Paulo (ICT - Unifesp), Brazil, and **Evan Wilson***, Franklin & Marshall University (1125-17-312)

4:00PM *New Realization of Twisted Toroidal Lie*
(2776)   *Algebras.* **Naihuan Jing**, North Carolina State University, **Chad R. Mangum***, Niagara University, and **Kailash C. Misra**, North Carolina State University (1125-17-335)

4:15PM *Crystal folding.*
(2777)   **John M. Dusel**, Whittier College (1125-17-1800)

4:30PM *Multiplicities of maximal dominant*
(2778)   *weights of integrable modules.* **Rebecca L. Jayne**, Hampden-Sydney College (1125-17-1993)

4:45PM *Principal Subspaces of Twisted Modules*
(2779)   *of Lattice Vertex Operator Algebras.* **Michael Penn***, Colorado College, **Christopher Sadowski**, Ursinus College, and **Gautam Webb**, University of Oregon (1125-17-2472)

5:00PM *Invariants of the Free-Fermion Vertex*
(2780)   *Algebra under the Action of $\mathbb{Z}/2$.* **Olivia Chandrasekhar***, **Hanbo Shao** and **Michael Penn**, The Colorado College (1125-17-2572)

5:15PM *Diagrammatic categorification of the*
(2781)   *Chebyshev polynomials.* Preliminary report. **Radmila Sazdanovic***, North Carolina State University, and **Mikhail Khovanov**, Columbia University (1125-18-1534)

5:30PM *Categorified Geometry through Stacks of*
(2782)   *2-Rings.* Preliminary report. **Karthik Yegnesh**, Lansdale, Pennsylvania (1125-18-1582)

AMS Contributed Paper Session on Combinatorics and Graph Theory, IV

1:00 PM – 4:55 PM **Greenbriar, Conference Level, Hyatt Regency**

1:00PM ▶ (2783) *Vertex Minimal Graphs with Dihedral Symmetry.*
Lindsey-Kay Lauderdale*, **Christina Graves** and **Stephen Graves**, University of Texas at Tyler (1125-05-2422)

1:15PM ▶ (2784) *On Robust Colorings of the Hamming-Distance Graph.*
Isaiah Harney* and **Heide Gluesing-Luerssen**, University of Kentucky (1125-05-2481)

1:30PM ▶ (2785) *Unimodal rooted forests.*
Katie Anders* and **Kassie Archer**, University of Texas at Tyler (1125-05-2500)

1:45PM ▶ (2786) *A Remmel-Whitney style rule for products of quasisymmetric and symmetric Schur functions.* Preliminary report.
Elizabeth Niese, Marshall University (1125-05-2533)

2:00PM ▶ (2787) *Pattern-avoiding cycles.* Preliminary report.
Kassie Archer* and **Lindsey-Kay Lauderdale**, University of Texas at Tyler (1125-05-2577)

2:15PM ▶ (2788) *Multiplicative properties of partitions of integers.*
Stephen M. Gagola III, Miami University (1125-05-2579)

2:30PM ▶ (2789) *Base Size Sets and Determining Sets.*
Joshua D Laison*, **Erin M McNicholas**, Willamette University, and **Nicole S Seaders**, Oregon State University (1125-05-2589)

2:45PM ▶ (2790) *A Pattern Avoidance Criteria for Parabolic Fiber Bundle Structures of Schubert Varieties.* Preliminary report.
Timothy Alland* and **Edward Richmond**, Oklahoma State University (1125-05-2649)

3:00PM ▶ (2791) *Reconstructing Partitions from their Multisets of k-Minors.*
Pakawut Jiradilok, Harvard University (1125-05-2661)

3:15PM ▶ (2792) *Not all communities are far apart: Incorporating community distance into community detection.* Preliminary report.
Stephen J Young*, **Tobias Hagge**, **Patrick Mackey**, **Kathleen Nowak** and **Jennifer Webster**, Pacific Northwest National Laboratory (1125-05-2851)

3:30PM (2793) *Oriented Gain Graphs, Line Graphs and Eigenvalues.*
Nathan H Reff, The College at Brockport, State University of New York (1125-05-2872)

3:45PM ▶ (2794) *Computing Odd Graceful Labelings in Noncomputable Graphs.*
Taylor McMillan* and **Oscar Levin**, University of Northern Colorado (1125-05-2900)

4:00PM Break

4:15PM ▶ (2795) *Enumeration of k-Fuss-Catalan paths and (k, r)-Fuss-Schröder paths.* Preliminary report.
JiYoon Jung*, Marshall University, **Suhyung An**, Yonsei University, and **Sangwook Kim**, Chonnam National University (1125-05-2996)

4:30PM (2796) *Involution Factorizations of Random Permutations Chosen from the Ewens Distribution.*
Charles D. Burnette* and **Eric Schmutz**, Drexel University (1125-05-3005)

4:45PM ▶ (2797) *On Chromatic Number of Generalized Kneser Graphs.* Preliminary report.
Amir Jafari* and **Sharareh Alipour**, Sharif University of Technology (1125-05-3106)

AMS Contributed Paper Session on Commutative Algebra, Linear and Multilinear Algebra and Matrix Theory

1:00 PM – 5:55 PM **International 1, International Level, Marriott Marquis**

1:00PM (2798) *Some properties of saturations of submodules.*
Lokendra Paudel, The University of Akron, and **Simplice Tchamna***, Georgia College (1125-13-565)

1:15PM ▶ (2799) *Polynomial and power series rings with finite quotients.*
Greg Oman, University of Colorado, Colorado Springs, and **Adam Salminen***, University of Evansville (1125-13-1264)

1:30PM (2800) *Foundations of Boij-Söderberg Theory for Grassmannians.*
Nic Ford, University of California, Berkeley, **Jake Levinson***, University of Michigan, Ann Arbor, and **Steven Sam**, University of Wisconsin, Madison (1125-13-1545)

1:45PM (2801) *A class of modules with infinite regularity.*
Luigi Ferraro, University of Nebraska-Lincoln (1125-13-1698)

2:00PM ▶ (2802) *The Classification of Zero-Divisor Graphs of Commutative Rings Without Identity.* Preliminary report.
Darrin Weber, The University of Tennessee, Knoxville (1125-13-1975)

2:15PM (2803) *Homological characterizations of quasi-complete intersections.*
Jason M Lutz, Gonzaga University (1125-13-2513)

2:30PM (2804) *Trace ideals of modules and algebras over commutative rings.*
Haydee Lindo, Williams College (1125-13-2702)

2:45PM *Nonunique factorization in the ring of*
▶ (2805) *integer-valued polynomials.*
Paul Baginski*, Fairfield University,
Gregory Knapp, Case Western Reserve
University, **Jad Salem**, Oberlin College,
and **Gabrielle Scullard**, University of
Rochester (1125-13-3031)

3:00PM *Existence of totally reflexive modules in*
(2806) *graded local rings with Hilbert series*
$1 + et + (e-1)t^2$.
Basanti Sharma Poudyal, University of
Texas at Arlington (1125-13-3134)

3:15PM *A Novel Technique for Calculating the*
(2807) *Effective Resistance of an Undirected*
Graph. Preliminary report.
Emily J Evans*, **Jeffery Humpherys** and
Nathaniel Merrill, Brigham Young
University (1125-15-730)

3:30PM *Weighted Moore-Penrose Inverses*
▶ (2808) *and the Fundamental Theorem of*
Even-Order Tensors with Einstein
Product. Preliminary report.
Jun Ji*, Kennesaw State University,
and **Yimin Wei**, Fudan University
(1125-15-1189)

3:45PM *The epr-sequence over a field of*
▶ (2809) *characteristic 2.*
Xavier Martinez-Rivera, Iowa State
University (1125-15-1278)

4:00PM *Derivations of the Lie algebra of strictly*
(2810) *block upper triangular matrices.*
Prakash Ghimire, Louisiana State
University Of Alexandria (1125-15-1833)

4:15PM *Symmetrization of Principal Minors and*
▶ (2811) *Cycle Sums.*
Huajun Huang and **Luke Oeding***,
Auburn University (1125-15-1973)

4:30PM *A New Characterization of Simultaneous*
(2812) *Lyapunov Diagonal Stability via*
Hadamard Products.
Mehmet Gumus* and **Jianhong Xu**,
Southern Illinois University Carbondale
(1125-15-2411)

4:45PM *A new spectral graph entropy.*
▶ (2813) Preliminary report.
Robert Erra*, **Marwan Burelle**,
Alexandre Letois, EPITA - FRANCE, and
Mark Angoustures, Akheros & CNAM
Paris (1125-15-2442)

5:00PM *The minimum rank problem on loop*
(2814) *graphs.*
Jephian C.-H. Lin, Iowa State University
(1125-15-2495)

5:15PM *The Determinant of Graphs Joined by*
▶ (2815) *Edges.*
Boyko Gyurov and **Daniel Pinzon***,
Georgia Gwinnett College
(1125-15-2890)

5:30PM *Related problems to the Bernstein-Szegő*
▶ (2816) *moment problem in two variables.*
Chung Y Wong*, The College of New
Jersey, and **Hugo J Woerdeman**, Drexel
University (1125-15-2934)

5:45PM *On the structure of certain class of*
(2817) *Hankel-like Kernels.*
Troy Banks, Salisbury University
(1125-15-3000)

AMS Contributed Paper Session on Geometry, Differential Geometry, Mathematical Physics

1:00 PM – 5:40 PM   **Techwood, Conference
Level, Hyatt Regency**

1:00PM *Is there a Simpson's line for a*
▶ (2818) *quadrilateral?*
Tanvir Prince, Hostos Community
College (1125-51-5)

1:15PM *History of Geometry's Origin and*
▶ (2819) *Development and Connection to Various*
Mathematical Fields. Preliminary report.
Lina Wu, Borough of Manhattan
Community College-The City University
of New York (1125-51-369)

1:30PM *Rational Points over Finite Fields on A*
(2820) *Family of Higher Genus Curves And*
Hypergeometric Functions.
Yih Sung, University of
Wisconsin-Madison (1125-51-497)

1:45PM *Image reconstruction from limited view*
(2821) *Radon data using GPCA.* Preliminary
report.
Sl-ghi Choi, University of Texas at
Arlington (1125-51-1070)

2:00PM *Topological Measure of Order on Lattice*
(2822) *Patterns.*
Rachel A. Neville*, **Patrick Shipman**,
Mark Bradley, Colorado State University,
Francis Motta, Duke University,
and **Daniel Pearson**, Colorado State
University (1125-51-2802)

2:15PM *On the Stationary Acceleration of the*
(2823) *Frenet Curves in 3-Dimensional Lie*
Groups.
Nemat Abazari*, University of
Mohaghegh Ardabili, Department of
Mathematics, Faculty of Mathematical
Sciences., and **Ilgin Sager**, Missouri
University of Science and Technology,
Department of Mathematics and
Statistics (1125-53-2)

2:30PM *Non-Solvable Subalgebras of g L (4, R).*
▶ (2824) Preliminary report.
Ryad Ghanam*, Virginia Commonwealth
University in Qatar, and **Gerard
Thompson**, University of Toledo
(1125-53-239)

2:45PM *The G-invariant spectrum and*
(2825) *non-orbifold singularities.*
Ian M Adelstein* and **Mary R Sandoval**,
Trinity College (1125-53-501)

3:00PM *Spectral Geometry of the Steklov Problem*
(2826) *on Orbifolds.*
Teresa Arias-Marco, University of
Extremadura, **Emily Dryden**, Bucknell
University, **Carolyn Gordon**, Dartmouth
College, **Asma Hassannezhad**, Max
Planck Institute for Mathematics, **Allie
Ray***, Trinity College, Hartford, CT, and
Elizabeth Stanhope, Lewis and Clark
College (1125-53-1622)

3:15PM *Compact Gradient Shrinking Ricci*
(2827) *Solitons, the Hitchin-Thorpe Inequality,*
and Spin Structures.
Brian Klatt, Lehigh University
(1125-53-1929)

3:30PM *Gauss Maps of Embeddings into*
(2828) *Calibrated Manifolds and the h-Principle.*
Ibrahim Unal, Middle East Technical
University (1125-53-2559)

3:45PM *Classification of Spacetimes with*
(2829) *Symmetry.* Preliminary report.
Jesse W. Hicks, Dixie State University
(1125-53-2565)

4:00PM *Symplectically replacing plumbings with*
(2830) *Euler characteristic 2 4-manifolds.*
Jonathan Simone, University of Virginia
(1125-53-2878)

4:15PM *Quantum analogues of geometric*
(2831) *information theoretic inequalities.*
Stefan Huber, **Robert Koenig**, IAS &
Technical University of Munich, Germany,
and **Anna Vershynina***, BCAM (Basque
Center for Applied Mathematics), Bilbao,
Spain (1125-81-197)

4:30PM *Fusion rules for some tensor categories*
(2832) *attached to Kazhdan-Lusztig cells in*
Coxeter groups. Preliminary report.
Tianyuan Xu, University of Oregon
(1125-81-973)

4:45PM *Critical Points in the Spectrum of Infinite*
▶ (2833) *Periodic Graphs.*
Ram Band, Technion - Israel Institute of
Technology, **Gregory Berkolaiko**, Texas
A&M University, and **Tracy Weyand***,
Baylor University (1125-81-1424)

5:00PM *Factor ordering and path integral*
(2834) *measure for quantum gravity in (1+1)*
dimensions.
Rachel Maitra* and **John Haga**,
Wentworth Institute of Technology
(1125-83-2830)

5:15PM *The Geometry of the Complex Matter*
(2835) *Space in Relativistic Quantum Mechanics.*
R. R. Ahangar, Texas A& M University
Kingsville (1125-83-2929)

5:30PM *Astrophysical Jet HH30: Hot, Dense, and*
▶ (2836) *Colorful.*
Perry Bialek Vargas*, **Carl Gardner** and
Jeremiah Jones, Arizona State University
(1125-85-1120)

AMS Contributed Paper Session on Mathematical Biology, III

1:00 PM – 5:55 PM   International B, International
Level, Marriott Marquis

1:00PM *A Mathematical Model of Translational*
▶ (2837) *Regulation by the Integrated Stress*
Response. Preliminary report.
Laura F. Strube* and **Frederick R. Adler**,
University of Utah (1125-92-2243)

1:15PM *"Fast" and "slow" traveling impulses and*
(2838) *trains in FitzHugh Model with diffusion*
and cross-diffusion.
Faina Berezovskaya, Howard University
(1125-92-2258)

1:30PM *Dynamics of a Two-Vector,*
▶ (2839) *Two-Pathogen, Two-Host Model.*
Preliminary report.
Caleb L Adams, Radford University
(1125-92-2286)

1:45PM *Density and Environmental-Dependent*
▶ (2840) *Transmission in the North American*
Gypsy and Its Two Pathogens.
Eli E Goldwyn*, Trinity College, and
Greg Dwyer, University of Chicago
(1125-92-2315)

2:00PM *Modeling the Role of Education in*
▶ (2841) *Preventing An Outbreak of the Ebola*
Virus Disease. Preliminary report.
Christina J Edholm*, University of
Tennessee, Knoxville, **Benjamin Levy**,
Fitchburg State University, **Orou G
Gaoue**, University of Hawaii at Manoa,
Roselyn Kaondera, Botho University,
Gaborone, **Moatlhodi Kgosimore**,
Botswana University of Agriculture and
Natural Resources, **Enock Koga**,
University of Namibia, and **Suzanne
Lenhart**, University of Tennessee,
Knoxville (1125-92-2348)

2:15PM *Critical population size for multitype*
(2842) *branching process approximation.*
Preliminary report.
Evan Milliken, University of Florida
(1125-92-2354)

2:30PM *Controlling Viral Outbreaks: Quantitative*
(2843) *Strategies.* Preliminary report.
Anna Mummert*, Marshall University,
and **Howard Weiss**, Georgia Tech
(1125-92-2475)

2:45PM *Modeling an Infectious Disease in a*
▶ (2844) *Continuous Region with an Embedded*
Metapopulation. Preliminary report.
Patrick T Davis, Central Michigan
University (1125-92-2544)

3:00PM ► (2845) *An Ito stochastic differential equations model for the dynamics of the MCF-7 breast cancer cell line treated by radiotherapy with the experimental results.* Preliminary report.
Amin Oroji, **Mohd Omar**, Department of mathematics, University of Malaya, Malaysia, **Ivy Chung**, Department Of Pharmacology, University of Malaya, Malaysia, and **Shantia Yarahmadian***, Department of Mathematics, Mississippi State University (1125-92-2690)

3:15PM ► (2846) *Modeling Epidemics: An Application Using Big Data.*
Turayo Tijani* and **Isabelle Kemajou-Brown**, Morgan State University (1125-92-2725)

3:30PM (2847) *B-CLL progression considering immune response.*
Seema Nanda*, Dartmouth College, **L G DePillis**, Harvey Mudd College, and **Ami Radunskaya**, Pomona College (1125-92-2744)

3:45PM ► (2848) *Modeling HIV-Antibody-Mucin Kinetics.*
Timothy Wessler*, University of North Carolina at Chapel Hill, **Alex Chen**, GE, **Scott A McKinley**, Tulane University, **Richard Cone**, Johns Hopkins University, **M Gregory Forest** and **Samuel K Lai**, University of North Carolina at Chapel Hill (1125-92-2772)

4:00PM ► (2849) *Understanding Adipocyte Dynamics through Mathematical Modeling.* Preliminary report.
Katrina Johnson* and **Frederick R. Adler**, University of Utah (1125-92-2775)

4:15PM (2850) *A mathematical model for calcium signaling in neurons in the presence of Amyloid Beta.* Preliminary report.
Joe Latulippe*, **Derek Lotito** and **Donovan Murby**, Norwich University (1125-92-2792)

4:30PM ► (2851) *Energy Conservation and the Function of Sleep: A Mathematical Model.*
Markus H. Schmidt, Ohio Sleep Medicine Institute, **Theodore W. Swang***, **Ian M. Hamilton** and **Janet A. Best**, The Ohio State University (1125-92-2807)

4:45PM (2852) *Implications of policy adjustment costs for fisheries management.*
Dan Ryan, NIMBioS, **Carl Toews***, University of Puget Sound, **James Sanchirico**, UC Davis, and **Paul Armsworth**, UT Knoxville (1125-92-2861)

5:00PM (2853) *Phase resetting and bistability in a neuronal network.*
Zeynep Akcay*, Queensborough Community College- CUNY, **Xinxian Huang**, **Farzan Nadim** and **Amitabha Bose**, New Jersey Institute of Technology (1125-92-2905)

5:15PM (2854) *Conditions for endemicity in a compartmental model with deceased-infectious class.* Preliminary report.
Matthew Glomski*, Marist College, and **Olivia Brozek**, George Mason University (1125-92-2974)

5:30PM (2855) *Modeling slow growth of thyroid nodules and initiation of cancer.*
Balamurugan Pandiyan, University of Wisconsin, Whitewater (1125-92-3003)

5:45PM ► (2856) *Modeling nucleosomal DNA in living yeast.*
Caitlin S Hult*, University of North Carolina, Chapel Hill, **Paula A Vasquez**, University of South Carolina, **David Adalsteinsson**, **Josh Lawrimore**, **M Gregory Forest** and **Kerry Bloom**, University of North Carolina, Chapel Hill (1125-92-3038)

AMS Contributed Paper Session on Partial Differential Equations, II

1:00 PM – 5:40 PM   **International A, International Level, Marriott Marquis**

1:00PM (2857) *Nodal solutions for indefinite Robin problems.*
Michael E. Filippakis, University of Piraeus, Department of Digital Systems, Piraeus, Greece (1125-35-1737)

1:15PM (2858) *Global existence and asymptotic behavior of classical solutions to a parabolic-elliptic chemotaxis system with logistic source on R^N.*
Rachidi Bolaji Salako* and **Wenxian Shen**, Auburn University (1125-35-1741)

1:30PM (2859) *Steklov Problems with Non-Smooth Boundary: Bounds and Asymptotics on Eigenvalues.* Preliminary report.
Josiah Park, Georgia Institute of Technology (1125-35-1848)

1:45PM (2860) *A Method of Directly Defining the Inverse Mapping for Solutions of Coupled Systems of Nonlinear Differential Equations.*
Mathew Baxter*, Florida Gulf Coast University, **Mangalagama Dewasurendra** and **Kuppalapalle Vajravelu**, University of Central Florida (1125-35-2019)

2:00PM ► (2861) *On quasi-static limits of one-dimensional dynamic cohesive fracture.* Preliminary report.
Farhod Abdullayev, Worcester Polytechnic Institute (1125-35-2080)

2:15PM ► (2862) *Using Torain's Equations as a Predictable Model in the Sciences.*
David S Torain II, Montgomery College (1125-35-2134)

2:30PM **Qualitative Properties of Solutions to**
(2863) *Nonlinear Parabolic PDEs with Double Degenerate Fast Diffusion.*
Adam Louis Prinkey* and **Ugur G. Abdulla**, Florida Institute of Technology (1125-35-2226)

2:45PM *Non-degeneracy and uniqueness of H^1*
(2864) *symmetric minima for combined power-type non-linearities.*
Daniele Garrisi*, Inha University, and **Vladimir Georgiev**, Universita' di Pisa (1125-35-2247)

3:00PM *Evolution of Interfaces for the*
(2865) *Nonlinear Parabolic p-Laplacian Type Reaction-Diffusion Equations.*
Ugur G. Abdulla and **Roqia A. Jeli***, Florida Institute of Technology (1125-35-2320)

3:15PM *On the Numerical Solution of Second*
▶ (2866) *Order Hyperbolic Nonlinear Partial Differential Equation.* Preliminary report.
Narayan Thapa, Cameron University (1125-35-2382)

3:30PM *On the global regularity of*
(2867) *two-dimensional incompressible Boussinesq equations with mixed partial dissipation.*
Dhanapati Adhikari, Marywood University (1125-35-2401)

3:45PM *Quasi-period solutions to reduced DKN*
(2868) *hierarchy.*
Yuan Zhou* and **Wen-Xiu Ma**, University of South Florida (1125-35-2467)

4:00PM *Periodic Oscillations in a Nonlinear*
▶ (2869) *Suspension Bridge Model.*
Ryan Honan Pellico, Trinity College (1125-35-2583)

4:15PM *Some blow-up rates of solutions to*
(2870) *nonlinear Schrödinger equations with rotations.* Preliminary report.
Nyla Basharat, Augusta University, **Yi Hu*** and **Shijun Zheng**, Georgia Southern University (1125-35-2648)

4:30PM *Global Existence for Volume Surface*
(2871) *Reaction Diffusion Systems with Dynamic Boundary Conditions.*
Jeff Morgan, University of Houston, and **Vandana Sharma***, Arizona State University (1125-35-2717)

4:45PM *Geometry of underlying set in Mean*
(2872) *Value Theorem for general divergence form elliptic operators.*
Ashok Aryal, Kansas State University (1125-35-2737)

5:00PM *Nonclassical Symmetries of a Nonlinear*
(2873) *Diffusion Equation and a System Equivalent.*
Danny Arrigo*, **Brandon Ashley**, **Seth Bloomberg** and **Thomas Deatherage**, University of Central Arkansas (1125-35-2781)

5:15PM *A Regularity Analysis of Parabolic*
(2874) *Transmission Problem on Polygonal Domain.*
Yajie Zhang, Pennsylvania State University (1125-35-3152)

5:30PM *Small data global existence and decay for*
(2875) *relativistic Chern-Simons equations.*
Preliminary report.
Sung-Jin Oh, UC Berkeley (1125-35-3068)

MAA Session on Discrete Mathematics in the Undergraduate Curriculum - Ideas and Innovations for Teaching, II

1:00 PM – 4:15 PM **A701, Atrium Level, Marriott Marquis**

Organizers: **John S. Caughman**, Portland State University

Art Duval, University of Texas El Paso

Elise Lockwood, Oregon State University

1:00PM *Introductory Combinatorics: Language,*
▶ (2876) *Visual Representations, and Models.*
Susanna S. Epp, DePaul University (1125-C1-611)

1:20PM *How to Help Your Students Prove*
▶ (2877) *Combinatorial Identities.*
Elise Lockwood, Oregon State University (1125-C1-2804)

1:40PM *Teaching Combinatorics to Diverse*
▶ (2878) *Student Interests.*
Jeffrey W. Clark, Elon University (1125-C1-760)

2:00PM *A Candy Exchange, Legos and a Brand*
▶ (2879) *New Car!*
Cayla D. McBee, Providence College (1125-C1-2887)

2:20PM *Team-Based Learning in Discrete Math.*
(2880) Preliminary report.
Katie V. Johnson, Florida Gulf Coast University (1125-C1-680)

2:40PM *"Small Teaching" in Introduction to*
▶ (2881) *Discrete Mathematics.* Preliminary report.
Debra L. Hydorn, University of Mary Washington (1125-C1-1799)

3:00PM *Success with Standards-Based Grading in*
(2882) *Discrete Mathematics.*
Jean Marie Linhart, Central Washington University (1125-C1-2363)

3:20PM *Guided Discovery Based Learning in*
(2883) *Discrete Mathematics via Pre & In-class Activities.*
Feryal Alayont, Grand Valley State University (1125-C1-2710)

3:40PM *Teaching Approaches in Discrete*
▶ (2884) *Mathematics for Pre-service Teachers.*
Ali S Shaqlaih, University of North Texas at Dallas (1125-C1-2505)

4:00PM
▶ (2885) *Partnering for Success: Developing a high school discrete mathematics curriculum Connecting a university course with a local high school course using the standards for mathematical practice.* Preliminary report. **Osvaldo D. Soto**, University of California San Diego (1125-C1-3110)

MAA Session on Do Mathematicians Really Need Philosophy?

1:00 PM – 2:50 PM   **A602, Atrium Level, Marriott Marquis**

Organizers: **Carl Behrens**, Alexandria VA
Bonnie Gold, Monmouth University

1:00PM
▶ (2886) *Otavio Bueno's Mathematical Fictionalism.* **James R Henderson**, Penn State Behrend (1125-C5-248)

1:30PM
▶ (2887) *Why Can't Those With Conflicting Views on the Foundations of Mathematics Just Get Along?* Preliminary report. **Thomas Drucker**, University of Wisconsin–Whitewater (1125-C5-2521)

2:00PM
(2888) *The unexpected usefulness of epistemological skepticism.* **Katalin Bimbó**, University of Alberta, Department of Philosophy (1125-C5-1670)

2:30PM
▶ (2889) *Melding realism and social constructivism.* Preliminary report. **Bonnie Gold**, Monmouth University (1125-C5-507)

MAA Session on Inquiry-Based Teaching and Learning, V

1:00 PM – 4:15 PM   **International 7, International Level, Marriott Marquis**

Organizers: **Judith Covington**, Louisiana State University in Shreveport
Theron Hitchman, University of Northern Iowa
Angie Hodge, University of Nebraska Omaha
Brian P. Katz, Augustana College
Alison Marr, Southwestern University
Victor Piercey, Ferris State University

1:00PM
(2890) *Cut-Apart Proofs: a hands-on activity in varied contexts.* Preliminary report. **Carol Gwosdz Gee**, St. Edward's University (1125-G1-2347)

1:20PM
▶ (2891) *Clock Buddies: An Engaging, Open-Ended Scheduling Activity with Mathematical Depth and Pedagogical Flexibility.* **Debra K. Borkovitz**, Wheelock College (1125-G1-2586)

1:40PM
▶ (2892) *Flipping Precalculus through Guided Notes.* **Dywayne A Nicely**, Ohio University-Chillicothe (1125-G1-379)

2:00PM
▶ (2893) *IBL Calculus I Successes and Failures.* **Susan B Crook**, Loras College (1125-G1-1724)

2:20PM
▶ (2894) *When IBL drops in to Calculus: A cautionary tale.* Preliminary report. **Karl-Dieter Crisman**, Gordon College (1125-G1-1205)

2:40PM
▶ (2895) *Implementing POGIL Activities in a Community College First-Semester Calculus Course.* Preliminary report. **Miriam Harris-Botzum**, Lehigh Carbon Community College (1125-G1-826)

3:00PM
▶ (2896) *Towards guided reinvention of Riemann sums and the Fundamental Theorem of Integral Calculus.* **Robert L Sachs**, George Mason University (1125-G1-2497)

3:20PM
▶ (2897) *Using Inquiry-Based Learning to Explore Applications of Integration.* **Jonathan P. Keiter**, East Stroudsburg University (1125-G1-2306)

3:40PM
(2898) *Inquiry based Calculus with Difference: Continuous and Discrete Modeling of Mathematics in Population Growth.* **Celil Ekici*** and **Christopher Plyley**, University of the Virgin Islands (1125-G1-1400)

4:00PM
(2899) *Using Image Processing to Inspire Inquiry in Real Analysis Courses.* Preliminary report. **Marie Snipes***, Kenyon College, **Tom Asaki**, Washington State University, **Chris Camfield**, Hendrix College, and **Heather Moon**, Lewis-Clark State College (1125-G1-2645)

MAA Session on Intertwining Mathematics with Social Justice in the Classroom, II

1:00 PM – 2:55 PM   **Embassy A, International Tower, LL2, Hyatt Regency**

Organizers: **Catherine Buell**, Fitchburg State University
Zeynep Teymuroglu, Rollins College
Joanna Wares, University of Richmond
Carl Yerger, Davidson College

1:00PM
(2900) *Revolutions in Flatland: Questioning Social Hierarchies with Geometry.* **Priya V. Prasad**, University of Texas at San Antonio (1125-H1-1058)

1:20PM
▶ (2901) *Enriching Student Experiences Through Service Learning.* Preliminary report. **Samuel R Kaplan**, University of North Carolina Asheville (1125-H1-148)

1:40PM ► (2902) *Social science and servant leadership: reflections on game theory at the secondary level.* Preliminary report. **Jason Quinley**, Brookstone School and University of Tuebingen (Germany) (1125-H1-2118)

2:00PM ► (2903) *Lessons Learned from School Mathematics and Global Citizenship.* Preliminary report. **Kyle Evans*** and **Fabiana Cardetti**, University of Connecticut (1125-H1-2137)

2:20PM ► (2904) *Using Context to Address Social Justice Issues in the Statway Classroom.* **John Kellermeier**, Vancouver, WA (1125-H1-2454)

2:40PM (2905) *Progress and Resistance in Exploring Social Justice Mathematics with Graduate Students.* **Erin R Moss**, Millersville University of Pennsylvania (1125-H1-987)

MAA Session on The Advancement of Open Educational Resources, II

1:00 PM – 3:55 PM   **A702, Atrium Level, Marriott Marquis**

Organizers: **Benjamin Atchison**, Framingham State University

Jeremy Russell, The College of New Jersey

1:00PM (2906) *Find, Review, Promote: CuratedCourses aligns OER to the course syllabus.* **Jim Fowler***, The Ohio State University, and **David Farmer**, American Institute of Mathematics (1125-B5-215)

1:20PM ► (2907) *How the Ohio Mathematics Initiative Influenced our OER Precalculus book.* **Jeff Zeager**, Lorain County Community College (1125-B5-2108)

1:40PM ► (2908) *Using Instructional Apps to Visualize Graph Theory.* **Anne Quinn**, Edinboro University of PA (1125-B5-510)

2:00PM ► (2909) *Design and Implementation of Affordable Learning Georgia Basic Statistics Project.* **Zephyrinus C Okonkwo*** and **Anilkumar Devarapu**, Albany State University (1125-B5-2838)

2:20PM ► (2910) *Do you get what you pay for?: Students' opinions of textbooks' formats.* **Brad Bailey*** and **Thomas Cooper**, University of North Georgia (1125-B5-562)

2:40PM ► (2911) *Using the bookdown R package to create a free modern introductory statistics textbook focused on data visualization, reproducibility, and resampling techniques.* **Chester I Ismay**, Reed College / Pacific University (1125-B5-2747)

3:00PM (2912) *Algorithmic generation of calculus problems: beyond random coefficients.* Preliminary report. **Jonathan Dahl**, Lafayette College (1125-B5-2701)

3:20PM ► (2913) *Using open resources in a freshman general education course for non-STEM majors to promote learning and improve attitudes towards mathematics.* **John Watson**, Arkansas Tech University (1125-B5-2391)

3:40PM (2914) *Classroom Discourse - your class's own private Stack-like forum.* Preliminary report. **Mark C McClure**, University of North Carolina Asheville (1125-B5-1305)

MAA Session on The Creation and Implementation of Effective Homework Assignments, IV

1:00 PM – 3:55 PM   **L401 & L402, Lobby Level, Marriott Marquis**

Organizers: **Sarah Greenwald**, Appalachian State University

Judy Holdener, Kenyon College

1:00PM ► (2915) *Developing Critical Thinking Skills in Introductory Statistics.* Preliminary report. **Karen B Stanish*** and **Kimberly Schmidl-Gagne**, Keene State College (1125-A5-1884)

1:20PM ► (2916) *Combining Online Homework and In-Class Writing Prompts for Increased Conceptual Understanding and Critical Thinking in Introductory Statistics.* **Alana Unfried***, California State University, Monterey Bay, and **Roger Woodard**, North Carolina State University (1125-A5-3083)

1:40PM (2917) *Intentionally Unstructuring Assignments for future elementary educators.* **Joanna G. Jauchen**, George Mason University (1125-A5-2988)

2:00PM (2918) *Grading geometry homework in less than 6 hours a week.* Preliminary report. **Tamas Szabo**, UW Whitewater (1125-A5-2404)

2:20PM (2919) *Proof-Writing Workshops.* **Daniel R. Jordan**, Columbia College Chicago (1125-A5-1495)

2:40PM ► (2920) *Developing Intermediate Algebra Students Mathematical Communications via Workspace Assignments in MyLabsPlus.* Preliminary report. **Ruthmae Sears***, **Kenneth Butler** and **Frances Hopf**, University of South Florida (1125-A5-2218)

3:00PM ► (2921) *Class Assignments as an Enhancement to Online Homework.* **Laura DiMillo Barnes**, The University of Rhode Island (1125-A5-1573)

3:20PM *How does Mastery Learning on*
▶ (2922) *Homework Affect Student Success in Precalculus?* Preliminary report.
Frances Hopf* and **Ruthmae Sears**, University of South Florida
(1125-A5-2303)

3:40PM *Online tools for homework assignments*
▶ (2923) *in hybrid courses - to use or not to use -.*
Rodica Cazacu, Georgia College
(1125-A5-2064)

MAA Session on Women in Mathematics

1:00 PM – 4:55 PM   **Courtland, Conference Level, Hyatt Regency**

Organizers: **Meghan De Witt**, St. Thomas Aquinas College

Semra Kilic-Bahi, Colby-Sawyer College

Kim Roth, Juniata College

1:00PM *Fisk University Math Club.*
▶ (2924) **Qingxia Li**, Fisk University (1125-R1-773)

1:20PM *Middle School Mathematics Day for Girls.*
▶ (2925) **Theresa N Martines**, University of the Incarnate Word (1125-R1-282)

1:40PM *Fullerton Mathematical Circle.*
▶ (2926) **Isabel M. Serrano**, California State University, Fullerton (1125-R1-345)

2:00PM *ExploreU Summer STEM Program.*
▶ (2927) **Jitka Stehnova**, University of Chicago, Department of Mathematics
(1125-R1-358)

2:20PM *GEM: Girls Exploring Mathematics.*
▶ (2928) **Meghan De Witt**, St. Thomas Aquinas College (1125-R1-1784)

2:40PM *AWE+SUM Outreach Program: Challenges*
▶ (2929) *after 12 Years.*
Carolyn Connell, Westminster College
(1125-R1-1324)

3:00PM *Southeastern Conference for*
▶ (2930) *Undergraduate Women in Math.*
Sarah Schott* and **Emily Braley**, Duke University (1125-R1-1488)

3:20PM *Building the Pipeline From High School to*
▶ (2931) *College Mathematics.*
Jillian Folino*, Indian River High School, Philadelphia, NY, and **Blair Madore**, State University of New York at Potsdam
(1125-R1-1752)

3:40PM *Engaging Women in Extracurricular Math*
▶ (2932) *Activities.* Preliminary report.
Violeta Vasilevska, Utah Valley University (1125-R1-721)

4:00PM *KWIM: struggles and successes.*
▶ (2933) Preliminary report.
Yuliya Babenko, Kennesaw State University (1125-R1-2477)

4:20PM *The MiA Scholars Program: Bringing an*
▶ (2934) *Interdisciplinary Mathematics Experience to Middle School Girls.*
D. Natasha Brewley* and **Alvina J. Atkinson**, Georgia Gwinnett College
(1125-R1-3019)

4:40PM *Keeping the Pipeline Full: A Woman*
▶ (2935) *Mathematician's Perspective.*
Junalyn P Navarra-Madsen, Texas Woman's University (1125-R1-3115)

MAA General Contributed Paper Session on Applied Mathematics, IV

1:00 PM – 4:55 PM   **Piedmont, Conference Level, Hyatt Regency**

Organizers: **Emelie Kenney**, Siena College

Kimberly Presser, Shippensburg University

Melvin Royer, Indiana Wesleyan University

1:00PM *Strategies and tactics to approximate the*
▶ (2936) *diameter and the center of a graph or a point set.* Preliminary report.
Robert Erra*, **Marwan Burelle**, **Alexandre Letois**, EPITA - FRANCE, and **Mark Angoustures**, Akheros & CNAM Paris (1125-VC-2388)

1:15PM *A new algorithm for finding valid*
▶ (2937) *permutations for solving Sudoku puzzles.*
Pallavi Mishra*, Indian Institute of Technology Kharagpur, and **Dharmendra Kumar Gupta**, Indian Institute of Technology (1125-VC-3118)

1:30PM *Coexistence and Extinction in*
(2938) *Time-Periodic Volterra-Lotka Type Systems with Nonlocal Dispersal.*
Nar Rawal*, Hampton University, and **Tung Nguyen**, University of Illinois Springfield (1125-VC-2531)

1:45PM *Polynomial systems of differential*
▶ (2939) *equations and functions with removable singularities.* Preliminary report.
David C. Carothers, James Madison University (1125-VC-2536)

2:00PM *Stalking methods for ensemble Kalman*
(2940) *filter covariance inflation.*
Thomas Bellsky, University of Maine
(1125-VC-2553)

2:15PM *Using Little's Law in Stochastic Modeling.*
▶ (2941) Preliminary report.
Celeste R Vallejo* and **James E Keesling**, University of Florida
(1125-VC-2571)

2:30PM *Periodic Advection-Diffusion-Reaction*
▶ (2942) *Systems.*
Curtis Taylor Peterson* and **Wenbo Tang**, Arizona State University
(1125-VC-2656)

2:45PM *A Network-Induced Multi-Neuronal Spike*
▶ (2943) *Train Metric.* Preliminary report.
Gary R. Engler* and **Kenneth R. Blaney**, Stevens Institute of Technology
(1125-VC-2813)

3:00PM *Numerical Study about the Origin of the*
▶ (2944) *Flow Chaos in Late Boundary Layer Transition.*
Manoj K Thapa, Georgia Southwestern State University (1125-VC-2841)

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3:15PM *Improved Probabilistic Principal*
(2945) *Component Analysis for Application to*
Reduced Order Modeling.
Indika Gayani Udagedara*, Clarkson
University, Potsdam, NY, **Brian**
Helenbrook, Clarkson university, and
Aaron Luttman, National security
technologies, Nevada (1125-VC-2845)

3:30PM *Comparison of Three Clustering*
(2946) *Algorithms, K-Means, Self-Organizing*
Maps, and Relational Self-Organizing
Maps, on Porcine Atherosclerotic Tissues.
Preliminary report.
Amanda J Mangum*, Niagara University,
and **Mansoor Haider**, North Carolina
State University (1125-VC-2882)

3:45PM *Numerical Solutions of the*
▶ (2947) *Taylor-Goldstein Equation for Gravity*
Waves Propagating through the
Tropopause Inversion Layer.
Collin Kofroth*, **Duane Harris** and
Mohamed Moustaoui, Arizona State
University (1125-VC-2902)

4:00PM *Stability in a scalar differential equation*
▶ (2948) *with multiple, distributed time delays.*
Israel Ncube, Alabama A & M University
(1125-VC-2912)

4:15PM *Analysis of Individual Greensboro*
▶ (2949) *Officers' Stopping Patterns Using*
Propensity Scores.
Ivanti Galloway*, Wake Forest University,
Brandon Joyce, **Christopher Pritchard**
and **Ashely Jones**, UNCG (1125-VC-2683)

4:30PM *Simplex Gradients and Generalized*
▶ (2950) *Simplex Derivatives.* Preliminary report.
Rommel G. Regis, Saint Joseph's
University (1125-VC-3009)

4:45PM *Qualitative analysis of the solutions of a*
(2951) *partial differential equation with*
piecewise constant arguments.
Mehtap Lafci* and **Huseyin**
Bereketoglu, Ankara University
(1125-VC-2429)

MAA General Contributed Paper Session on Teaching and Learning Introductory Mathematics, II

1:00 PM – 5:10 PM　　　　**Kennesaw, Conference**
Level, Hyatt Regency

Organizers: **Emelie Kenney**, Siena
College

Kimberly Presser,
Shippensburg University

Melvin Royer, Indiana
Wesleyan University

4:30PM　Break

1:00PM *Reflections on Emporium, Stretch, and*
(2952) *Corequisite for Developmental and*
Gateway Courses. Preliminary report.
Anna Mummert, Marshall University
(1125-VQ-2470)

1:15PM *Profile of a Quality Collegiate*
▶ (2953) *Mathematics Learner.*
Wade Ellis, West Valley College (retired)
(1125-VQ-3093)

1:30PM *Common Video Resources for*
▶ (2954) *Multi-Section Developmental Algebra*
Courses. Preliminary report.
Sarah V. Cook, Washburn University
(1125-VQ-2621)

1:45PM *Understanding Community College*
(2955) *Math Faculty Perceptions and Use of*
Cooperative Learning. Preliminary report.
Adam J Castillo, The University of Texas
at Austin, The Charles A. Dana Center
(1125-VQ-2644)

2:00PM *Introducing Fermi Problems and the*
▶ (2956) *Art of Reckoning to Students in an*
Introductory Statistics Class.
Alexander G. Atwood, SUNY
Suffolk County Community College
(1125-VQ-2663)

2:15PM *Vector Calculus as a Path to STEM*
▶ (2957) *Research Notes from the Secondary*
Level. Preliminary report.
Jason Quinley, Brookstone School and
University of Tuebingen (Germany)
(1125-VQ-2707)

2:30PM *Do College-Level Mathematics Courses*
(2958) *Support Student Success in Introductory*
Statistics? Preliminary report.
Leah Nicole Hollingsworth*, **Kelly**
Patrick Findley and **Elizabeth H**
Jakubowski, Florida State University
(1125-VQ-2293)

2:45PM *A Flipped Precalculus Course.* Preliminary
▶ (2959) report.
Michael P. Doyle, The Linsly School
(1125-VQ-2812)

3:00PM *Incorporating Reading-Writing*
(2960) *Assignments into a Liberal Arts*
Mathematics Course. Preliminary report.
Adam Giambrone, University of
Connecticut (1125-VQ-2815)

3:15PM *Using iClickers or Plickers and Worked*
(2961) *Examples in a College Algebra Course to*
Foster Discourse.
H. Tyrone Washington, Millersville
University (1125-VQ-3085)

3:30PM *Do We Teach the Wrong Thing? The*
▶ (2962) *Impact of Mathematical and Scientific*
Background on Economics Success.
Galit Eizman, Harvard University
(1125-VQ-2719)

3:45PM *Factoring: Knowing When To Do What*
▶ (2963) *You Know How To Do.* Preliminary report.
Jayson L Jackson, University of North
Alabama/University of Alabama
(1125-VQ-2516)

4:00PM *Measuring online student's motivation*
▶ (2964) *using MyMathLab and fuzzy logic.*
Preliminary report.
Jalalidin Jaenbai, Zayed University
(1125-VQ-3144)

4:15PM ► (2965) *Reversing the Feedback: Effective Technique for Assessing Students in an Online College Algebra Course.* Preliminary report. **Michael D. Miner**, American Public University System (1125-VQ-1642)

4:45PM ► (2966) *Teacher Education and Quantitative Literacy: Improved Training for Teachers.* Preliminary report. **Rachel M Bates**, Redlands Community College (1125-VQ-511)

5:00PM ► (2967) *Enriching the Flipped Classroom for All Students.* Preliminary report. **Matthew K Voigt**, San Diego State University (1125-VQ-1563)

SIAM Minisymposium on PDEs in Biology and Materials Science

1:00 PM **– 5:30** PM   A703, Atrium Level, Marriott Marquis

Organizers: **Yuliya Gorb**, University of Houston

Suncica Cancic, University of Houston

1:00PM (2968) *Free Boundary Problems Arising in Biology.* **Avner Friedman**, Ohio State University (1125-35-3162)

2:00PM (2969) *Multiscale Modeling of Blood Clotting.* **George Karniadakis**, Brown University (1125-35-3163)

2:30PM (2970) *Modeling Challenges for the Flutter of a Cantilevered Structure in a Flow.* **Justin T. Webster**, College of Charleston (1125-35-581)

3:00PM (2971) *Mathematical modeling of stents as a net of 1D elastic curved rods.* **Josip Tambaca**, University of Zagreb (1125-35-3166)

3:30PM (2972) *Global existence for fluid-structure models.* **Mihaela Ignatova**, Princeton University (1125-35-3164)

4:00PM (2973) *Multi-scale reduced order models with S-fraction sparsification for large wave propagation problems.* **Vladimir Druskin***, Schlumberger, **Alexander Mamonov**, University of Houston, and **Mikhail Zaslavsky**, Schlumberger (1125-65-2006)

4:30PM (2974) *Compatible meshfree discretization with applications to electrophoretic suspension flows.* **Nathaniel Trask**, Sandia National Laboratory (1125-35-3165)

5:00PM (2975) *Asymptotic Analysis for High Contrast Problems.* **Yuliya Gorb**, University of Houston (1125-35-3167)

ASL Contributed Paper Session, II

1:00 PM **– 3:50** PM   A707, Atrium Level, Marriott Marquis

1:00PM (2976) *Weihrauch reducibility and finite dimensional subspaces.* **Sean Sovine**, Marshall University (1125-00-3169)

1:30PM (2977) *Graph labelings and computability theory.* Preliminary report. **Oscar Levin**, University of Northern Colorado (1125-03-1961)

2:00PM (2978) *On-line algorithms and reverse mathematics.* **Seth Harris**, Drew University (1125-00-3178)

2:30PM (2979) *Skolem functions for a weakly o-minimal structure with a new convex predicate.* **Michael C. Laskowski**, University of Maryland, College Park, and **Christopher S. Shaw***, Columbia College Chicago (1125-03-1339)

3:00PM (2980) *The reverse mathematics of a theorem of Steffens.* Preliminary report. **Stephen Flood**, Bridgewater State University, **Matthew Jura***, Manhattan College, **Oscar Levin**, University of Northern Colorado, and **Tyler Markkanen**, Springfield College (1125-03-1963)

3:30PM ► (2981) *A Mathematical Linguistics.* Preliminary report. **Joachim Mueller-Theys**, Heidelberg, Germany (1125-00-1816)

AMS Special Presentation

1:00 PM **– 2:45** PM   Regency Ballroom VII, Ballroom Level, Hyatt Regency

Who Wants to be a Mathematician—national contest.

Organizers: **Michael S. Breen**, American Mathematical Society

William T. Butterworth, DePaul University

MAA Panel

1:00 PM **– 2:20** PM   International 5, International Level, Marriott Marquis

SAT Test Development Committee Reflections

Organizers: **Bill Trapp**, College Board

Katrina Piatek-Jimenez, Central Michigan University

Panelists: **Rinav Mehta**, Central Piedmont Community College

Gloria Barrett, North Carolina School of Mathematics and Science

Luke Wilcox, East Kentwood High School

SIGMAA on Math Circles for Students and Teachers

1:00 PM – 2:30 PM   Regency Ballroom V,
Ballroom Level, Hyatt Regency

Math Wrangle.

Organizers: **Ed Keppelmann**, University of Nevada Reno

Paul Zeitz, University of San Francisco

AWM Workshop: Special Session on Number Theory, II

1:30 PM – 4:50 PM   A704, Atrium Level, Marriott Marquis

Organizers: **Alina Bucur**, University of California, San Diego

Ellen Eischen, University of Oregon

1:30PM *Obstructions to the Hasse principle on*
(2982) *Enriques surfaces.*
Francesca Balestrieri, University of Oxford, **Jennifer Berg**, Rice University, **Michelle Manes**, University of Hawai'i, **Jennifer Park**, University of Michigan, and **Bianca Viray***, University of Washington (1125-11-712)

2:00PM *Galois action on Fermat curves.*
(2983) **R. Davis**, University of Wisconsin, **R. Pries**, University of Colorado, **V. Stojanoska**, UIUC, and **K. Wickelgren***, Georgia Institute of Technology (1125-11-1229)

2:30PM *Fermat curves and Heisenberg*
(2984) *extensions.*
Rachel Davis*, University of Wisconsin-Madison, **Rachel Pries**, Colorado State University, **Vesna Stojanoska**, University of Illinois at Urbana-Champaign, and **Kirsten Wickelgren**, Georgia Institute of Technology (1125-11-1253)

3:00PM *Kneser-Hecke operators for codes over*
(2985) *finite chain rings.*
Amy Feaver, The King's University, **Anna Haensch***, Duquesne University, **Jingbo Liu**, University of Hong Kong, and **Gabi Nebe**, RWTH Aachen (1125-11-166)

3:30PM *Generalized Legendre Curves and*
(2986) *Quternionic Multiplication.*
Alyson Deines, Center for Communications Research, **Jenny G. Fuselier**, High Point University, **Ling Long**, Louisiana State University, **Holly Swisher**, Oregon State University, and **Fang-Ting Tu***, Louisiana State University (1125-11-305)

4:00PM *p-adic q-expansion principle and families*
(2987) *of automorphic forms on unitary groups of arbitrary signature.*
Ana Caraiani, Universität Bonn, **Ellen Eischen**, University of Oregon, **Jessica Fintzen***, University of Michigan / University of Cambridge, **Elena Mantovan**, Caltech, and **Ila Varma**, Columbia University (1125-11-1108)

4:30PM *Bad reduction of genus 3 curves with*
(2988) *Complex Multiplication.*
Irene Bouw, Ulm University, **Jenny Cooley**, Department of Education, Warwick, England, **Elisa Lorenzo-Garcia**, Leiden University, **Kristin Lauter**, Microsoft Research, **Michelle Manes***, University of Hawaii at Manoa, **Rachel Newton**, University of Reading, and **Ekin Ozman**, Boğaziçi University (1125-11-435)

MAA Panel

2:35 PM – 3:55 PM   International 5, International Level, Marriott Marquis

Introductory Statistics: Where Are We and Where Do We Need to Go?

Organizer: **Gail Burrill**, Michigan State University

Panelists: **Roxy Peck**, California Polytechnic State University, San Luis Obispo

Uri Triesman, University of Texas at Austin

Rob Gould, University of California Los Angeles

Nathan Tintle, Dordt College

MAA-AMS-SIAM Gerald and Judith Porter Public Lecture

3:00 PM – 3:50 PM   Atrium Ballroom, Atrium Level, Marriott Marquis

(2989) *Mathematics for art investigation.*
Ingrid Daubechies, Duke University (1125-A0-14)

AMS Dinner Reception

6:30 PM – 7:30 PM   Imperial Ballroom Prefunction, Marquis Level, Marriott Marquis

AMS Dinner Celebration

7:30 PM – 10:30 PM   Imperial Ballroom, Marquis Level, Marriott Marquis

Brian Boe
AMS Associate Secretary
Athens, Georgia

Gerard A. Venema
MAA Associate Secretary
Grand Rapids, Michigan