Program of the Sessions

Baltimore, Maryland, January 15–18, 2014

Monday, January 13

AMS Short Course on Geometry and Topology in Statistical Inference, Part I

9:00 AM – 5:00 PM **Grand Ballroom, West, 1st Floor, Marriott Inner Harbor**

Organizer: **Sayan Mukherjee**, Duke University

9:00AM (1) *Geometry in statistical inference.* **Sayan Mukherjee**, Duke University (1096-62-2781)

11:00AM (2) *Topology in statistical inference.* **Sayan Mukherjee**, Duke University (1096-62-2782)

2:00PM (3) *Hodge operator in data analysis.* **Lek-Heng Lim**, University of Chicago (1096-55-2786)

4:00PM Discussion

MAA Short Course on Reading, Writing, and Doing the History of Mathematics: Learning the Methods of Historical Research, Part I

9:00 AM – 5:30 PM **Grand Ballroom, East, 1st Floor, Marriott Inner Harbor**

Organizer: **Amy Shell-Gellasch**, Montgomery College

7:30AM Registration.

8:30AM Introduction and Welcome by **Amy Shell-Gellasch**

9:00AM (4) *Ways of relating to the mathematics of the past (part 1).* **Michael Fried**, Ben Gurion University of the Negev

10:00AM Coffee break.

10:15AM (5) *Ways of relating to the mathematics of the past (part 2).* **Michael Fried**, Ben Gurion University of the Negev

1:00PM (6) *Contextualization of history.* **Ron Calinger**, Catholic University of America

2:15PM (7) *Historical documents and sources and implications to pedagogy (part 1).* **V. Frederick Rickey**, USMA

3:15PM Coffee break.

3:30PM (8) *The problem of translation: A case study using Book II of the Elements.* **Colin McKinney**, Wabash College

NSF-EHR Grant Proposal Writing Workshop

3:00 PM – 6:00 PM **Grand Ballroom, Salons ABC, 1st Floor, Marriott Inner Harbor**

Tuesday, January 14

AMS Department Chairs Workshop

8:00 AM – 6:30 PM **University Ballroom, 1st Floor, Marriott Inner Harbor**

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 35, 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.

MAA Short Course on Reading, Writing, and Doing the History of Mathematics: Learning the Methods of Historical Research, Part II

8:30 AM – 9:00 PM **Grand Ballroom, East, 1st Floor, Marriott Inner Harbor**

Organizer: **Amy Shell-Gellasch**, Montgomery College

8:30AM Welcome and recap, **Amy Shell-Gellasch**

9:00AM (9) *Historical documents and sources and their implications for pedagogy (part 2).* **V. Frederick Rickey**, U.S.M.A.

10:00AM Coffee break.

10:15AM (10) *Reading and writing the history of mathematics (part 1).* **Karen Parshall**, University of Virginia

11:00AM (11) *Cultural bias and translations (part 1).* **Joe Dauben**, Lehman College, CUNY

1:15PM (12) *Reading and writing the history of mathematics (part 2).* **Karen Parshall**, University of Virginia

2:00PM (13) *Cultural bias in research and translations (part 2).* **Joe Dauben**, Lehman College CUNY

2:45PM Coffee break.

3:00PM Panel discussion on pedagogical applications by all presenters, moderated by **Amy Shell-Gellasch**.

5:00PM Wrap-up and final words, **Amy Shell-Gellasch**.

AMS Short Course on Geometry and Topology in Statistical Inference, Part II

9:00 AM – 5:00 PM **Grand Ballroom, West, 1st Floor, Marriott Inner Harbor**

Organizer: **Sayan Mukherjee**, Duke University

9:00AM (14) *Computing geometric and topological summaries.* **Yusu Wang**, Ohio State University (1096-52-2783)

11:00AM (15) *Random geometry and topology.* **Matthew Kahle**, Ohio State University (1096-52-2785)

2:00PM (16) *Geometry and topology in cancer systems biology.* **Monica Nicolau**, Stanford University (1096-92-2784)

4:00PM Discussion

MAA Ancillary Workshop on Teaching the Statistical Investigation Process with Randomization-Based Inference

9:00 AM – 4:30 PM **Stadium Ballroom 5, 2nd Floor, Marriott Inner Harbor**

Presenter: **Nathan Tintle**, Dordt College

MAA Board of Governors

9:00 AM – 5:00 PM **Holiday Ballroom 6, 2nd Floor, Hilton**

MAA Ancillary Workshop on Interactive Probability Instruction

1:00 PM – 4:30 PM **Stadium Ballroom 4, 2nd Floor, Marriott Inner Harbor**

Presenters: **Dennis Pearl**, The Ohio State University

Kyle Siegrist, University of Alabama

Ivo Dinov, University of Michigan

AMS Council

1:30 PM – 10:00 PM **Holiday Ballrooms 1–3, 2nd Floor, Hilton**

Joint Meetings Registration

3:00 PM – 8:00 PM **Pratt Street Lobby, 300 Level, BCC**

Wednesday, January 15

MAA Minority Chairs Meeting

7:00 AM – 8:45 AM **Peale, 1st Floor, Hilton**

Joint Meetings Registration

7:30 AM – 6:00 PM **Pratt Street Lobby, 300 Level, BCC**

AMS Session on Analysis and Partial Differential Equations

7:45 AM – 10:55 AM **Room 304, BCC**

7:45AM ► (17) *Complex-Valued Functions and the Mean Value Theorem.* **Mohammed A. Qazi**, Tuskegee University (1096-30-2244)

8:00AM (18) *Almost everywhere convergence of Fourier integrals revisted.* **Chang-Pao Chen***, Hsuan Chuang University, and **Elijah Liflyand**, Bar Ilan University (1096-42-978)

8:15AM (19) *Multi-D Wavelet FB Design using Quillen-Suslin Theorem for Laurent Polynomials.* **Youngmi Hur***, Johns Hopkins University, **Hyungju Park**, Pohang University of Science and Technology, South Korea, and **Fang Zheng**, Johns Hopkins University (1096-42-124)

8:30AM (20) *Sharp Bounds for t-Haar Multipliers in L_2.*
Oleksandra V Beznosova*, Baylor University, **Maria Cristina Pereyra**, Univrsity of New Mexico, and **Jean Carlo Moraes**, Universidade Federal de Pelotas (1096-42-1089)

8:45AM (21) *Dynamical sampling in hybrid shift invariant spaces.* Preliminary report.
Roza Aceska*, **Akram Aldroubi** and **Sui Tang**, Vanderbilt University (1096-42-1799)

9:00AM (22) *Overcoming singularity of signal recovery by dynamical sampling in hybrid shift invariant spaces.*
Roza Aceska, **Akram Aldroubi** and **Sui Tang***, Vanderbilt University (1096-42-1819)

9:15AM ► (23) *Use of novel complex metrics in the derivation of the sum of paths transition function.* Preliminary report.
Clinton Cooper Zimmerman, Gaithersburg, MD (1096-32-742)

9:30AM (24) *Study of the Solution of the Hyperbolic Systems Analytically Via Decomposition Method.*
M Najafi, Kent State University (1096-37-1853)

9:45AM ► (25) *On multiplier sequences of the second kind.* Preliminary report.
George Csordas, University of Hawaii at Manoa, and **Tamas Forgacs***, California State University, Fresno (1096-30-1978)

10:00AM (26) *Generalized 2D Euler-Boussinesq equations with a singular velocity.* Preliminary report.
Durga Jang KC, Oklahoma State University (1096-35-1412)

10:15AM (27) *Small global solutions to the damped two-dimensional Boussinesq equations.*
Dhanapati Adhikari*, Marywood University, **Chongsheng Cao**, Florida International University, **Jiahong Wu**, Oklahoma State University and Chung-Ang University, and **Xiaojing Xu**, Beijing Normal University and Laboratory of Mathematics and Complex Systems, Ministry of Education, Beijing (1096-35-1914)

10:30AM ► (28) *Crime Modeling with Lévy Flights.*
Sorathan Chaturapruek*, Harvey Mudd College, **Jonah Breslau**, Pomona College, **Daniel Yazdi**, University of California, **Theodore Kolokolnikov**, Dalhousie University, and **Scott G. McCalla**, University of California (1096-35-2494)

10:45AM (29) *Morse Index Theory and Applications to Linear Elliptic Eigenvalue Problems.*
Mauricio A. Rivas* and **Giles Auchmuty**, University of Houston (1096-35-902)

AMS-ASL Special Session on Logic and Probability, I

8:00 AM – 10:50 AM **Room 319, BCC**

Organizers: **Wesley Calvert**, Southern Illinois University
Doug Cenzer, University of Florida
Johanna Franklin, University of Connecticut
Valentina Harizanov, George Washington University

8:00AM (30) *New investigations in probabilistic strategies for algorithmic randomness.*
Sam Buss and **Mia Minnes***, UCSD (1096-03-881)

8:30AM (31) *Probabilistic foundations for quantum theory.*
Alexander Wilce, Susquehanna University (1096-81-2258)

9:00AM (32) *Randomness, Probability, and Computation.* Preliminary report.
Christopher P Porter*, LIAFA, Université Paris Diderot - Paris 7, **Laurent Bienvenu**, LIAFA, Université Paris Diderto - Paris 7, and **Antoine Taveneaux**, LIAFA, Université Paris Diderot - Paris 7 (1096-03-1554)

9:30AM (33) *The Generic Degrees of Coarsely Computable Reals.*
Gregory Igusa, University of Notre Dame (1096-03-1276)

10:00AM (34) *SJT as an analog of K-triviality.*
Daniel Turetsky, Kurt Gödel Research Center (1096-03-1534)

10:30AM (35) *High(CR, MLR) and other properties close to PA.*
Joseph S. Miller, University of Wisconsin (1096-03-2325)

AMS Special Session on Advances in Analysis and PDEs, I

8:00 AM – 10:45 AM **Room 332, BCC**

Organizers: **Tepper L. Gill**, Howard University
Daniel A. Williams, Howard University

8:00AM (36) *Isoperimetric inequalities for extremal Sobolev functions.*
Jesse Ratzkin*, University of Cape Town, and **Tom Carroll**, University College Cork (1096-35-682)

8:30AM (37) *Li-Yau type gradient estimates and a Liouville Type Theorem for the Schrödinger Operator.* Preliminary report.
Xiangjin Xu, Binghamton University-SUNY (1096-35-727)

9:00AM (38) *Exponential Decay of Eigenfunctions of Higher Order Elliptic PDE's.*
Ira Herbst*, University of Virginia, and **Erik Skibsted**, Mathematics Institute, Aarhus University (1096-35-278)

10:00AM ► (39) *Monge-Kantorovich mass transport for modeling systems and solving partial differential equations and systems.*
David Kinderlehrer, Carnegie Mellon University (1096-35-1860)

AMS Special Session on Algebraic Geometry, I

8:00 AM – 10:45 AM **Room 303, BCC**

Organizers: **Christopher Hacon**, University of Utah
Zsolt Patakfalvi, Princeton University

8:00AM (40) *Positivity for Weil divisors.*
Alberto Chiecchio*, University of Washington, and **Stefano Urbinati**, Università di Padova (1096-14-190)

9:00AM (41) *Toward a generalization of the Oort conjecture.*
Andrew Obus, University of Virginia (1096-14-263)

10:00AM (42) *Kashiwara conjugation for twisted D-modules.* Preliminary report.
Patrick Gerald Brosnan, University of Maryland (1096-14-1862)

AMS Special Session on Algebraic Structures Motivated by Knot Theory, I

8:00 AM – 10:50 AM **Room 322, BCC**

Organizers: **Mieczyslaw K. Dabkowski**, University of Texas at Dallas
Jozef Przytycki, George Washington University
Radmila Sazdanovic, University of Pennsylvania
Alexander N. Shumakovitch, George Washington University
Hao Wu, George Washington University

8:00AM (43) *sl_4 webs.* Preliminary report.
Heather M Russell, Washington College (1096-05-1582)

8:30AM (44) *On a categorification for the sl(n) polynomial (for $n > 3$).* Preliminary report.
Carmen L Caprau, California State University, Fresno (1096-57-1442)

9:00AM (45) *Skein theory and Andrews-Gordon Identities for the false theta functions.* Preliminary report.
Mustafa Hajij, Louisiana State University (1096-55-667)

9:30AM (46) *Categorification of the ribbon element in quantum sl(2).*
Anna Beliakova*, University of Zurich, and **Kazuo Habiro**, RIMS (Kyoto) (1096-18-1513)

10:00AM ► (47) *Unification of associative, self-distributive, and Lie algebras.* Preliminary report.
Adam S. Sikora, University at Buffalo, SUNY (1096-16-1320)

10:30AM (48) *Theta functions and topological quantum field theory.*
Razvan Gelca* and **Alastair Hamilton**, Texas Tech University (1096-57-1091)

AMS Special Session on Applied Harmonic Analysis: Large Data Sets, Signal Processing, and Inverse Problems, I

8:00 AM – 10:45 AM **Room 315, BCC**

Organizers: **Mauro Maggioni**, Duke University
Naoki Saito, University of California, Davis
Thomas Strohmer, University of California, Davis

8:00AM (49) *Perfect reconstruction of signals from series of under sampled states.*
Akram Aldroubi, Vanderbilt University (1096-94-1311)

9:00AM (50) *Distances between surfaces, with biological applications.*
Ingrid Daubechies, Duke University (1096-51-2766)

10:00AM (51) *Phase Retrieval By Projections.*
Peter G. Casazza*, University of Missouri, **Jameson Cahill**, Duke University, **Jesse Peterson**, Air Force Institute of Technology, and **Lindsey M. Woodland**, University of Missouri (1096-43-905)

AMS Special Session on Classification Problems in Operator Algebras, I

8:00 AM – 10:50 AM **Room 331, BCC**

Organizers: **Ionut Chifan**, University of Iowa
David Penneys, University of Toronto

8:00AM (52) *Perturbation Problems for Subfactors.* Preliminary report.
Alan D Wiggins, University of Michigan-Dearborn (1096-46-1002)

9:00AM (53) *The Brauer-Picard groupoid of the Asaeda-Haagerup subfactor.* Preliminary report.
Pinhas Grossman, University of New South Wales, **Masaki Izumi**, Kyoto University, and **Noah Snyder***, Indiana University (1096-46-603)

10:00AM (54) *Composed inclusions of subfactors.*
Zhengwei Liu, Vanderbilt (1096-47-260)

10:30AM (55) *Guionnet, Jones, and Shlyakhtenko C* algebras.*
Michael Hartglass, University of Iowa (1096-19-201)

AMS Special Session on Difference Equations and Applications, I

8:00 AM – 10:50 AM **Room 320, BCC**

Organizer: **Michael A. Radin**, Rochester Institute of Technology

8:00AM ► (56) *A difference equation model for the evolutionary dynamics of a population subject to a strong Allee effect.* Preliminary report.
Jim M. Cushing, University of Arizona (1096-39-889)

8:30AM ► (57) *On the stability and bifurcation of A predator-prey model with Allee effect.* Preliminary report.
Laila Assas*, Umm Al-Qura University and King Abdul Aziz University, **S Elaydi**, **E Kwessi**, Trinity University, **G Livadiotis**, South West Research Institute, and **D Ribble**, Trinity University (1096-39-715)

9:00AM (58) *On the Dynamics of Discontinuous Discrete Beverton-Holt Model.*
Vlajko L. Kocic* and **Yevgeniy Kostrov**, Xavier University of Louisiana (1096-39-778)

9:30AM (59) *Qualitative Analysis of Solutions of Functional Difference Equations.*
Youssef Naim Raffoul, University of Dayton (1096-39-900)

10:00AM (60) *Existence of Antisymmetric Solutions for Second Order Difference Equations with Antiperiodic Boundary Conditions.*
Jeffrey W Lyons, Nova Southeastern University (1096-39-574)

10:30AM (61) *Existence of positive solutions for a system of second order multipoint discrete boundary value problems.*
Johnny Henderson*, Baylor University, and **Rodica Luca**, Gh. Asachi Technical University (1096-39-56)

AMS Special Session on Fractional, Stochastic, and Hybrid Dynamic Systems with Applications, I

8:00 AM – 10:50 AM **Room 324, BCC**

Organizers: **John Graef**, University of Tennessee at Chattanooga

Gangaram S. Ladde, University of South Florida

Aghalaya S. Vatsala, University of Louisiana at Lafayette

8:00AM (62) *Multiple Solutions of Systems of Fractional Boundary Value Problems: Part I.*
John R. Graef*, **Lingju Kong**, The University of Tennessee at Chattanooga, and **Qingkai Kong**, Northern Illinois University (1096-34-1197)

8:30AM (63) *Multiple Solutions of Systems of Fractional Boundary Value Problems: Part II.*
John R. Graef, **Lingju Kong***, The University of Tennessee at Chattanooga, and **Qingkai Kong**, Northern Illinois University (1096-34-1313)

9:00AM (64) *Numerical method to solve fractional Integro-differential equation using Wavelet.*
Amit Seti, BITS – Pilani, K. K. Birla Goa Campus, Goa (1096-41-1690)

9:30AM (65) *Application of μ_0-positive operators to boundary value problems for fractional differential equations.*
Paul Eloe*, University of Dayton, and **Jeffrey T. Neugebauer**, Eastern Kentucky University (1096-26-739)

10:00AM (66) *An existence result for fractional differential equations of order $1 < \alpha < 2$ with periodic boundary conditions.*
J Diego Ramirez, Lamar University (1096-34-610)

10:30AM ► (67) *Mathematical Modeling of Option Pricing Processes under Internal and External Stochastic Perturbations.* Preliminary report.
Patrick Assonken* and **G S Ladde**, University of South Florida, Tampa (1096-60-939)

AMS Special Session on Graph Theory: Structural and Extremal Problems, I

8:00 AM – 10:50 AM **Room 330, BCC**

Organizers: **Daniel Cranston**, Virginia Commonwealth University

Gexin Yu, College of William & Mary

8:00AM (68) *More about chorded cycles.*
Ronald J. Gould, Emory University (1096-05-2111)

8:30AM (69) *Odd and Even Cycle Lengths in Graphs.*
Michael S. Jacobson, University of Colorado Denver & National Science Foundation (1096-05-1141)

9:00AM (70) *Minimum degree thresholds for spanning subgraphs of directed and oriented graphs.* Preliminary report.
Andrzej Czygrinow, Arizona State University, **Louis DeBiasio**, Miami University, **H.A. Kierstead**, Arizona State University, and **Theodore Molla***, University of Illinois at Urbana-Champaign (1096-05-882)

9:30AM ► (71) *Induced subgraphs of hypercubes.*
Geir Agnarsson, George Mason University (1096-05-1034)

10:00AM (72) *Colored Saturation Problems.*
Michael Ferrara, University of Colorado Denver (1096-05-1203)

10:30AM (73) *Expected Reliability of Communication protocols.*
André Kündgen* and **Janina Patno**, California State University San Marcos (1096-05-2366)

AMS Special Session on Hyperplane Arrangements and Applications, I

8:00 AM – 10:50 AM **Room 318, BCC**

Organizers: **Takuro Abe**, Kyoto University
Max Wakefield, United States Naval Academy
Masahiko Yoshinaga, Hokkaido University

8:00AM (74) *Cohomology support loci and Bernstein-Sato ideals.*
Nero Budur, KU Leuven (1096-14-1047)

8:30AM (75) *Basis construction of extended Shi and Catalan arrangements of the type A_2.* Preliminary report.
Daisuke Suyama, Hokkaido University (1096-05-2196)

9:00AM (76) *Arrangement of tori and the topology of coamoebas complement of algebraic varieties.*
Mounir Nisse*, Max Planck Institute for Mathematics, Germany, and **Frank Sottile**, Texas A&M UNiversity (1096-14-890)

9:30AM (77) *Application of hyperplane arrangements to weight enumeration.*
Relinde Jurrius*, Vrije Universiteit Brussel, Belgium, and **Ruud Pellikaan**, Eindhoven University of Technology, The Netherlands (1096-05-757)

10:00AM ► (78) *Multinets in $\mathbb{P}^2$ and $\mathbb{P}^3$.* Preliminary report.
Jeremiah D Bartz, Francis Marion University (1096-52-1533)

10:30AM ► (79) *New ten-line arrangements: reflections and a notion of distance.*
Moshe Cohen*, Technion (Israel Institute of Technology), **Meirav Topol Amram**, Bar-Ilan University, **Hao Sun**, Huazhong Normal University, **Mina Teicher**, Bar-Ilan University, **Fei Ye**, The University of Hong Kong, and **Anna Zarkh**, Bar-Ilan University (1096-57-888)

AMS Special Session on Mathematics and Mathematics Education in Fiber Arts, I

8:00 AM – 10:50 AM **Room 314, BCC**

Organizers: **Sarah-Marie Belcastro**, Smith College
Carolyn Yackel, Mercer University

8:00AM ► (80) *Defining an "Optimal" Cross-Stitching Method.*
Mary D Shepherd, Northwest Missouri State University (1096-00-520)

8:30AM ► (81) *Extending existing enumerations: on the mathematics of tie knots.* Preliminary report.
Mikael Vejdemo-Johansson*, KTH Royal Institute of Technology, Stockholm, Sweden, and **Anders Sandberg**, Future of Humanity Institute, Oxford University (1096-51-296)

9:00AM ► (82) *Knitting Torus Knots and Links.*
Sarah-Marie Belcastro, Sarah Lawrence College / Smith College (1096-57-650)

9:30AM ► (83) *Families of p4m Knitted Square Tiles.* Preliminary report.
Carolyn A Yackel, Mercer University (1096-05-1001)

10:00AM ► (84) *Truly random cables.*
Elizabeth L. Wilmer, Oberlin College (1096-05-1905)

10:30AM (85) *The Chinese Remainder Theorem and knitting stitch patterns.*
Berit Nilsen Givens, Cal Poly Pomona (1096-11-1636)

AMS Special Session on Nonlinear Systems: Polynomial Equations, Nonlinear PDEs, and Applications, I

8:00 AM – 10:50 AM **Room 323, BCC**

Organizer: **Wenrui Hao**, University of Notre Dame

8:00AM ► (86) *Global regularity issue of fluid dynamics partial differential equations.*
Kazuo Yamazaki, Oklahoma State University (1096-35-83)

8:30AM (87) *A nonlinear PDE model for evaporation in unsaturated soils.*
Eric Sullivan, Carroll College (1096-35-139)

9:00AM (88) *Tracking Problems for Marine Robots with Input Delays: A Case Study in Feedback Control.*
Michael Malisoff, Louisiana State University (1096-93-198)

9:30AM (89) *Nodal Solutions for Neumann Problems with a Nonhomogeneous Differential Operator.*
Michael Filippakis, University of Piraeus (1096-00-1911)

10:00AM (90) *Numerical Fiber Products for the Study of Mechanisms.*
Eric M. Hanson*, **Daniel J. Bates**, Colorado State University, **Jonathan D. Hauenstein**, North Carolina State University, and **Charles W. Wampler**, General Motors Research Laboratories (1096-14-1968)

10:30AM (91) *An Introduction to Parameter Homotopies and paramotopy.*
Dan Bates, **Dan Brake** and **Matthew Niemerg***, Colorado State University (1096-14-2397)

AMS Special Session on Random Matrices: Theory and Applications, I

8:00 AM – 10:45 AM **Room 301, BCC**

Organizers: **Paul Bourgade**, Harvard University
Horng-Tzer Yau, Harvard University

8:00AM (92) *On the higher universality classes in the random matrix model.*
Alexander Its, Indiana University-Purdue University Indianapolis (1096-00-1510)

9:00AM (93) *Large random matrices with non-independent entries.*
Sean O'Rourke, Yale University (1096-60-1684)

10:00AM (94) *Universality of the Stochastic Airy Operator.*
Manjunath Krishnapur, Indian Institute of Science, Bangalore, **Brian Rider***, Temple University, and **Bálint Virág**, University or Toronto (1096-60-1892)

AMS Special Session on Recent Progress in Geometric and Complex Analysis, I

8:00 AM – 10:50 AM **Room 302, BCC**

Organizers: **Zheng Huang**, City University of New York, Graduate Center and College of Staten Island
Longzhi Lin, Rutgers University
Marcello Lucia, City University of New York, Graduate Center and College of Staten Island

8:00AM (95) *Metric Perspectives of the Ricci Flow.*
Michael Munn*, University of Missouri, and **Sajjad Lakzian**, MSRI and Mathematical Institute, University of Bonn (1096-53-864)

8:30AM (96) *Minkowski identities for codimension-2 surfaces and an Alexandrov-type theorem.*
Ye-Kai Wang, Columbia University (1096-53-449)

9:00AM (97) *On the Rigidity of Ricci Solitons.*
Brett Kotschwar, Arizona State University, and **Lu Wang***, Johns Hopkins University (1096-53-858)

9:30AM (98) *Multiplicity result for a class of elliptic systems.* Preliminary report.
Cyril Joel Batkam, University of Sherbrooke (1096-35-1258)

10:00AM ► (99) *A Hardy type inequality for $W_0^{m,1}$ functions with $m \geq 2$.*
Hernán Castro, Universidad de Talca, **Juan Dávila**, Universidad de Chile, and **Hui Wang***, Rutgers University (1096-26-866)

10:30AM (100) *New Heat Kernel Estimates on Riemannian Manifolds with Negative Curvature.* Preliminary report.
Xiangjin Xu, Binghamton University-SUNY (1096-58-272)

AMS Special Session on Recent Progress in the Langlands Program, I

8:00 AM – 10:50 AM **Room 321, BCC**

Organizers: **Moshe Adrian**, University of Utah
Shuichiro Takeda, University of Missouri

8:00AM (101) *Jacquet's conjecture on the local converse problem for epipelagic supercuspidal representations of GL(n,F).*
Moshe Adrian* and **Baiying Liu**, University of Utah (1096-11-709)

9:00AM (102) *Local models and nearby cycles for $\Gamma_1(p)$-level structure.*
Thomas J Haines*, University of Maryland, College Park, and **Benoit Stroh**, University of Paris 13 (1096-11-1971)

9:30AM (103) *On the moduli description of local models for ramified unitary groups.*
Brian D Smithling, Johns Hopkins University (1096-14-1708)

10:00AM (104) *Rigid inner forms and endoscopy.*
Tasho S Kaletha, Princeton University (1096-11-2278)

10:30AM (105) *Galois cohomology of real groups.* Preliminary report.
Jeffrey Adams, University of Maryland (1096-22-2348)

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

8:00 AM – 10:50 AM **Room 328, BCC**

Organizers: **Bernard Brooks**, Rochester Institute of Technology
Jobby Jacob, Rochester Institute of Technology
Jacqueline Jensen-Vallin, Slippery Rock University
Carl Lutzer, Rochester Institute of Technology
Darren Narayan, Rochester Institute of Technology
Tamas Wiandt, Rochester Institute of Technology

8:00AM ► (106) *Degree 14 2-adic fields.*
Chad Awtrey, **Nicole Miles**, Elon University, **Jonathan Milstead**, University of North Carolina-Greensboro, **Christopher Shill** and **Erin Strosnider***, Elon University (1096-11-724)

8:30AM ► (107) *An Exploration of Methods of Solving the Combinatorial Game Flood-it.*
Rachel Popp*, **Jason Jaeckel**, **Amanda Rose**, **Christie Burris**, **Francis Motta** and **Eric Hanson**, Colorado State University (1096-91-1196)

9:00AM ► (108) *Strong depth and quasi-geodesics in finitely generated groups.*
Brian Gapinski*, Wesleyan University, and **Tyler Weber**, UW Stout (1096-20-2211)

9:30AM ► (109) *Substance Abuse via Legally Prescribed Drugs: The Case of Vicodin in the United States.*
Wendy K. Caldwell*, University of Tennessee, Knoxville, **Benjamin Freedman**, Bucknell University, **Luke Settles**, University of Southern Illinois, Edwardsville, **Michael M. Thomas**, Kennesaw State University, **Anarina Murillo**, **Erika Camacho** and **Stephen Wirkus**, Arizona State University (1096-34-2338)

10:00AM ► (110) *The Isoperimetric Problem in the Plane with Density $e^{-1/r}$.* Preliminary report.
Paul Gallagher, University of Pennsylvania, **David Hu***, Georgetown University, **Zane Martin**, Williams College, **Maggie Miller**, University of Texas at Austin, and **Byron Perpetua**, Williams College (1096-53-157)

10:30AM ► (111) *Fast Generation and Tracking of GPS Visibility and Dilution of Precision Regions Using Level Set Methods.*
Nora Stack*, St. Mary's College of Maryland, **Walter Cai**, Cornell University, **Ana Cristina Perez-Gea**, Instituto Tecnologico Autonomo de Mexico, and **Scott Manifold**, University of California, Riverside (1096-65-1094)

AMS Special Session on Symplectic and Contact Structures on Manifolds with Special Holonomy, I

8:00 AM – 10:50 AM **Room 329, BCC**

Organizers: **Sergey Grigorian**, University of Texas Pan American
Sema Salur, University of Rochester
Albert J. Todd, University of California, Riverside

8:00AM (112) *Invariant contact structures on 7-dimensional nilmanifolds.*
Sergii M Kutsak, University of Florida (1096-53-585)

8:30AM (113) *Symmetries of closed differential forms and Lie algebras up to homotopy.*
Christopher L. Rogers, Georg-August-Universität Göttingen (1096-53-1527)

9:30AM (114) *Generalized complex geometry of hyperkähler and Quaternionic Kähler manifolds.*
Rebecca E Glover, University of Rochester (1096-53-1797)

10:00AM Discussion

10:30AM Discussion

AMS Special Session on The Changing Education of Preservice Teachers in Light of the Common Core, I

8:00 AM – 10:50 AM **Room 310, BCC**

Organizers: **William McCallum**, University of Arizona
Michael Nakamaye, University of New Mexico
Kristin Umland, University of New Mexico
Ellen Whitesides, University of Arizona

8:00AM ► (115) *Supporting Preservice Special Education Teachers with the Academic Rigor of the Common Core:.*
Joanne C Caniglia, Kent State University (1096-97-228)

8:30AM (116) *MTE-Partnership: Mathematicians, Mathematics Educators, and Secondary Mathematics Teachers Working Together to Transform the Preparation of Teachers.*
W Gary Martin*, Auburn University, **W. James Lewis**, University of Nebraska-Lincoln, and **Marilyn E. Strutchens**, Auburn University (1096-97-2043)

9:00AM (117) *Using and Contributing to the Illustrative Mathematics Project: Projects for Your Pre-service and In-service Teachers.*
Erin Militzer*, Bloomsburg University of Pennsylvania, and **Rohit Thomas**, University of Arizona (1096-97-203)

9:30AM (118) *Clear instruction of mathematical practice: Preparing teachers to use rich and ordinary problems to teach Common Core standards for mathematical practice.*
Yvonne Lai, University of Nebraska-Lincoln (1096-97-1695)

10:00AM (119) *Developing Mathematical Habits of Mind in Preservice Teachers.*
Davida Fischman* and **Madeleine Jetter**, CSU San Bernardino (1096-97-1999)

10:30AM Discussion

AMS Special Session on the History of Mathematics, I

8:00 AM – 10:50 AM **Room 317, BCC**

Organizers: **Sloan Despeaux**, Western Carolina University
Della Dumbaugh, University of Richmond
Glen van Brummelen, Quest University

8:00AM ► (120) *Circles and Spheres: A Comparison of Chinese and Greek Arguments and Proofs.*
Joseph W Dauben, Herbert H. Lehman College, The City University of New York (1096-01-1274)

8:30AM ► (121) *The Linear Algebra of Tevfik Hussein Pasha.* Preliminary report.
Fernando Q. Gouvêa, Colby College (1096-01-1007)

9:00AM ► (122) *Rediscovering George Strachan's Euclid.*
Gregg De Young, The American University in Cairo (1096-01-518)

9:30AM ► (123) *The Plain and Gunter's Scales – Seventeenth Century Additions to the Toolbox of Students and Practitioners of the Mathematicks.*
Joel S. Silverberg, Roger WIlliams University (1096-01-1103)

10:00AM ► (124) *John Wallis' Computations on the Cycloid.*
Maria R. Zack, Point Loma Nazarene University (1096-01-745)

10:30AM ► (125) *The Geometric Calculus of Bernoulli and l'Hôpital.*
Robert E. Bradley, Adelphi University (1096-01-1299)

MAA Invited Paper Session on the Unreasonable Effectiveness of Modern Mathematics

8:00 AM – 10:10 AM **Room 307, BCC**

Organizers: **Andrew Conner**, Wake Forest University
Ellen Kirkman, Wake Forest University

8:00AM ► (126) *The Unreasonable Effectiveness of Sheaf Cohomology in Networks.* Preliminary report.
Robert Ghrist, University of Pennsylvania (1096-AB-146)

8:35AM (127) *The Unreasonable Effectiveness of Representation Theory and the P vs NP Problem.*
Daniel K Nakano, University of Georgia (1096-AB-352)

9:10AM ► (128) *The Unreasonable Effectiveness of Number Theory in Cryptography.*
Alice Silverberg, University of California, Irvine (1096-AB-519)

9:45AM ► (129) *The Euclidean Distance Degree.*
Bernd Sturmfels, University of California at Berkeley (1096-AB-455)

AMS Session on Combinatorics, I

8:00 AM – 10:55 AM **Room 313, BCC**

8:00AM (130) *The Maximal Length of a k-separator Permutation.*
Benjamin P Gunby, Massachusetts Institute of Technology (1096-05-1464)

8:15AM (131) *Equipopularity classes of 132-avoiding permutations.*
Lynn Chua*, Massachusetts Institute of Technology, and **Krishanu Roy Sankar**, Harvard University (1096-05-376)

8:30AM ► (132) *Avoiding Permutation Patterns in Ordered Set Partitions.* Preliminary report.
Stephanie DeGraaf*, Iowa State University, **Kai Orans**, Pomona College, and **Ruyue (Julia) Yuan**, Valparaiso University (1096-05-447)

8:45AM ► (133) *Shattering sub-permutations in an array of n-permutations.* Preliminary report.
Stephanie De Graaf, Iowa State University, **Zoe Koch**, University of Utah, and **Kathleen Lan***, Duke University (1096-05-755)

9:00AM ► (134) *Covering n Permutations with $n+k$ Permutations.* Preliminary report.
Kathleen Lan, Duke University, **Amanda Laubmeier***, University of Arizona, and **Ruyue (Julia) Yuan**, Valparaiso University (1096-05-344)

9:15AM ► (135) *Catalan Numbers, Fine Numbers, and Partitions.* Preliminary report.
David C Vella, Skidmore College (1096-05-2113)

9:30AM ► (136) *Combinatorial Interpretations of Coefficients of Iterated Polynomials.* Preliminary report.
Gwyneth R Whieldon* and **Alison G Schuetz**, Hood College (1096-05-2531)

9:45AM ► (137) *A New Recursive relation arising from Fibonacci sequence.* Preliminary report.
Xinyun Zhu, UTPB, Odessa, TX (1096-05-265)

10:00AM ► (138) *Vertical recurrence relations for Stirling numbers of the second kind.* Preliminary report.
Ji Young Choi, Shippensburg University of PA (1096-05-1550)

10:15AM ► (139) *Descents of λ-unimodal cyclic permutations.*
Kassie Archer, Dartmouth College (1096-05-1293)

10:30AM ► (140) *Minimal Covering Sets on Young's Lattice.*
Adam King*, University of Louisville, and **Zach Gabor**, Haverford College (1096-05-432)

10:45AM (141) *An order-preserving analogue of O'Hara's structure theorem for Young's lattice.*
Vivek Dhand, Canandaigua, NY (1096-05-865)

AMS Session on Graph Theory

8:00 AM – 10:55 AM **Room 312, BCC**

8:00AM ► (142) *A Conjecture on Spanning Trees with Fixed Leaf Distance.* Preliminary report. **Catherine Erbes**, University of Colorado Denver, **Theodore Molla**, **Sarah Mousley** and **Michael Santana***, University of Illinois at Urbana-Champaign (1096-05-452)

8:15AM ► (143) *Degree lists for multiforests and near multiforests.* **Garth Isaak**, Lehigh University (1096-05-2205)

8:30AM (144) *The Cycle Intersection Matrix and Applications to Planar Graphs.* **Caitlin Phifer**, University of Rhode Island (1096-05-505)

8:45AM ► (145) *Minimum degree and immersions of complete graphs.* **Megan E. Heenehan***, Eastern Connecticut State University, and **Karen L. Collins**, Wesleyan University (1096-05-1575)

9:00AM (146) *Cyclic m-Cycle Systems of Complete Graphs minus a 1-factor.* Preliminary report. **Heather D. Jordon***, *Mathematical Reviews*, and **Joy Morris**, University of Lethbridge (1096-05-2037)

9:15AM (147) *A New Proof on the Characterization of Neighborhood Graphs in Maximum Packings of $2K_n$.* **Joseph Chaffee*** and **Chris Rodger**, Auburn University (1096-05-1282)

9:30AM (148) *Rainbow spanning trees in complete graphs.* **James M. Carraher***, **Stephen G. Hartke**, University of Nebraska-Lincoln, and **Paul Horn**, University of Denver (1096-05-1004)

9:45AM (149) *Forbidden Subgraphs for Pancyclicity.* **Timothy R Morris**, University of Colorado Denver (1096-05-1720)

10:00AM ► (150) *Recent Developments Concerning Two Conjectures by Frucht.* **Alessandra Graf**, Northern Arizona University (1096-05-2256)

10:15AM (151) *Algebraic Characterization of Hypergraph Colorings.* **M. Krul*** and **L. Thoma**, University of Rhode Island (1096-05-476)

10:30AM (152) *Spectral Properties of Oriented Hypergraphs.* **Nathan Reff**, Alfred University (1096-05-2624)

10:45AM (153) *Induced Complementation in Graphs.* Preliminary report. **Shyam S. Kamath*** and **Prameela Kolake**, National Institute of Technology Karnataka (1096-05-213)

AMS Session on Numerical Methods and Computing, I

8:00 AM – 10:25 AM **Room 305, BCC**

8:00AM (154) *The Convergence of a Class of Third Order Schemes for Conservation Laws.* Preliminary report. **Nan Jiang**, Univ. of South Dakota (1096-65-347)

8:15AM ► (155) *Numerical Smoothness and its Application to Error Analysis for RKDG on the Scalar Nonlinear Conservation Laws.* **Adamou Made Fode**, Bowling Green State University (1096-65-1832)

8:30AM (156) *Modified variational iterative method for solving the linear and nonlinear Klein-Gordon equations.* **Adekunle Ademola Araromi**, The Polytechnic Ibadan, Eruwa, Oyo State, Nigeria. (1096-65-1307)

8:45AM ► (157) *Spectral method for a 3D Spherical Interface Dynamo Equation.* **Lina Ma***, Purdue University, **Ting Cheng**, Central China Normal University, and **Jie Shen**, Purdue University (1096-65-575)

9:00AM (158) *A Novel Data-Driven Edge Sharpening D-bar Reconstruction Algorithm for 2D Electrical Impedance Tomography.* **Sarah Jane Hamilton***, **Andreas Hauptmann** and **Samuli Siltanen**, University of Helsinki (1096-65-2091)

9:15AM (159) *A high-order accurate accelerated direct solver for scattering from complicated 3D surfaces.* **Adrianna Gillman***, Dartmouth College, **James Bremer**, University of California, Davis, and **Per-Gunnar Martinsson**, University of Colorado at Boulder (1096-65-2087)

9:30AM (160) *Discontinuous Galerkin Methods for a Modified Cahn-Hilliard Equation and a Diffuse Interface Model of Tumor Growth.* **Andreas C. Aristotelous***, Duke University, **Ohannes Karakashian** and **Steven M. Wise**, The University of Tennessee, Knoxville (1096-65-1474)

9:45AM (161) *A multilevel domain decomposition algorithm using the hierarchical element structure.* Preliminary report. **Janitha Gunatilake*** and **Eugenio Aulisa**, Texas Tech University (1096-65-1263)

10:00AM (162) *Long Term High-Order Numerical Integration with Galerkin Variational Integrators.* **James Brian Hall**, University of California, San Diego (1096-65-2130)

10:15AM (163) *Block preconditioners for coupled physics problems.* **Geoffrey R Dillon***, **Victoria Howle**, Texas Tech University, and **Robert C Kirby**, Baylor University (1096-65-1627)

MAA Session on Assessing Quantitative Reasoning and Literacy

8:00 AM – 10:55 AM **Room 337, BCC**

Organizers: **Semra Kilic-Bahi**, Colby-Sawyer College
Eric Gaze, Bowdoin College
Andrew Miller, Belmont University
Aaron Montgomery, Central Washington University

8:00AM (164) *Standardizing assessment across QL courses.*
Jill Bigley Dunham and **Betty Mayfield***, Hood College (1096-B1-2626)

8:20AM ► (165) *Three Approaches to Assessment in the Quantitative Reasoning Classroom.*
Maura B. Mast, University of Massachusetts Boston (1096-B1-2424)

8:40AM ► (166) *Assessing Quantitative Reasoning in Introduction to Probability and Statistics.*
Robert J. Krueger, Concordia University, St. Paul (1096-B1-2346)

9:00AM (167) *A Collaborative approach to Assessing Quantitative Literacy within Carnegie's Quantway Pathway for Developmental Mathematics.*
Cinnamon Hillyard*, Carnegie Foundation for the Advancement of Teaching, **Eugene Milman**, Borough of Manhattan Community College, and **Duane Benson**, South Georgia State College (1096-B1-2153)

9:20AM ► (168) *QL Across the Curriculum at Colby-Sawyer College.*
Semra Kilic-Bahi, Colby-Sawyer College (1096-B1-2118)

9:40AM ► (169) *Measuring Habits of Mind: Toward a Prompt-less Instrument for Assessing Quantitative Literacy.*
Stuart Boersma* and **Dominic Klyve**, Central Washington University (1096-B1-1643)

10:00AM (170) *Results from an NSF TUES Quantitative Reasoning Assessment Project.*
Eric Gaze, Bowdoin College (1096-B1-1148)

10:20AM ► (171) *Assessment in an inquiry-based quantitative reasoning course for business students.* Preliminary report.
Victor I Piercey, Ferris State University (1096-B1-1093)

10:40AM ► (172) *The Need to Assess Quantitative Literacy in the Major.*
Rodney E McNair, Delaware State University (1096-B1-310)

MAA Session on Assessing Student Learning: Alternative Approaches, I

8:00 AM – 10:55 AM **Room 340, BCC**

Organizers: **Jane Butterfield**, University of Minnesota
Robert Campbell III, College of St. Benedict/St. John's University
David Clark, University of Minnesota
John Peter, Utica College
Cassie Williams, James Madison University

8:00AM (173) *Active Assessment and Group/Individual Final Exams.* Preliminary report.
Brian J. Winkel, US Military Academy (1096-B5-167)

8:20AM ► (174) *Oral Exams— They're Not Just for Dentists.*
Erin E. Bancroft, Grove City College (1096-B5-2151)

8:40AM ► (175) *Student-Driven Assessment.* Preliminary report.
Dan Callon, Franklin College (1096-B5-2467)

9:00AM (176) *Blending Evaluative and Formative Assessment.*
Amy T DeCelles, University of St. Thomas (1096-B5-2304)

9:20AM ► (177) *Using Exam Wrappers in a Calculus Class.* Preliminary report.
Jennifer Franko Vasquez, The University of Scranton (1096-B5-230)

9:40AM (178) *Standards and outcomes and grades, oh my!*
David C. Clark, University of Minnesota - Math Center for Educational Programs (1096-B5-240)

10:00AM (179) *Collaborative Assessments.*
Brian Katz, Augustana College (1096-B5-2678)

10:20AM ► (180) *The Scarlet Letter: How we repented and came to value purposeful assessment.*
M. Leigh Lunsford* and **Phillip L. Poplin**, Longwood University (1096-B5-1778)

10:40AM (181) *Reading vs. 'Rithmatic.*
Eric D. Bancroft, Grove City College (1096-B5-2155)

MAA Session on Projects, Demonstrations, and Activities that Engage Liberal Arts Mathematics Students, I

8:00 AM – 8:35 AM **Room 345, BCC**

Organizer: **Sarah Mabrouk**, Framingham State University

8:00AM ► (182) *Kaleidoscopes in the liberal arts mathematics classroom.* Preliminary report.
Teresa E. Moore*, Ithaca College, and **L. Christine Kinsey**, Canisius College (1096-J5-1894)

8:20AM ► (183) *Increasing Communication and Problem-Solving Skills in a Liberal Arts Probability Course.*
Chester Ivan Ismay, Ripon College (1096-J5-1250)

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

8:00 AM – 9:15 AM **Room 339, BCC**

Organizers: **Jackie Dewar**, Loyola Marymount University
Tom Banchoff, Brown University
Curtis Bennett, Loyola Marymount University
Pam Crawford, Jacksonville University
Edwin Herman, University of Wisconsin-Stevens Point

8:00AM ► (184) *The Relationship between Math Learning Communities and Student Retention.* Preliminary report.
Karla Childs* and **Jean Coltharp**, Pittsburg State University (1096-L5-488)

8:20AM ► (185) *Lesson Study: Collaboration, Improvement, and Reflection.*
Sarah Bennett, University of Wisconsin - Barron County (1096-L5-2259)

8:40AM ► (186) *A Modified-Moore Method in Precalculus: A Description of the Teaching Style and Student Outcomes.* Preliminary report.
Brad Bailey, University of North Georgia (1096-L5-2036)

9:00AM ► (187) *Does the Type of Variable Affect Undergraduates' Interpretations of Algebraic Expressions?*
Susan S Gray*, University of New England, **Barbara J Loud**, Regis College, and **Carole P Sokolowski**, Merrimack College (1096-L5-538)

MAA Session on Topics and Techniques for Teaching Real Analysis, I

8:00 AM – 10:55 AM **Room 349, BCC**

Organizers: **Paul Musial**, Chicago State University
Robert W. Vallin, Slippery Rock University
Erik Talvila, University of the Fraser Valley
James Peterson, Alma College

8:00AM ► (188) *A close look at the geometric series test.* Preliminary report.
Robert Kantrowitz*, Hamilton College, and **Michael M. Neumann**, Mississippi State University (1096-N1-1476)

8:20AM (189) *Constructing continuous functions.*
Judit Kardos, The College of New Jersey (1096-N1-1143)

8:40AM ► (190) *Using Daily Quizzes to Build Proof Skills in a Real Analysis Course.* Preliminary report.
Kimberly J Presser, Shippensburg University (1096-N1-2052)

9:00AM ► (191) *Applications of the Alexiewicz norm.*
Erik Talvila, University of the Fraser Valley (1096-N1-547)

9:20AM ► (192) *A classic counterexample examined in greater detail.*
James Peterson, Alma College (1096-N1-2347)

9:40AM ► (193) *Notions of function and continuity in college mathematics.* Preliminary report.
Radoslav Dimitric, CUNY (1096-N1-97)

10:00AM ► (194) *Hybrid Course Modules in an Introductory Real Analysis Course.*
Marion Weedermann, Dominican University (1096-N1-2186)

10:20AM (195) *Reorganizing a First Course in Real Analysis.* Preliminary report.
William C. Bauldry, Appalachian State University (1096-N1-777)

10:40AM ► (196) *Using Student Screencasts to Present Content in a Real Analysis Class.* Preliminary report.
Mark McKinzie, St. John Fisher College (1096-N1-2540)

MAA General Contributed Paper Session on Probability and Statistics, I

8:00 AM – 10:55 AM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:00AM ► (197) *Mixing coefficients and mixtures of distributions.*
Martial Longla, University of Mississippi (1096-VH-2738)

8:15AM ► (198) *Model Checking: Levy-Driven Ornstein-Uhlenbeck Processes.*
Ibrahim Abdelrazeq*, **Gail Ivanoff** and **Rafal KuliK**, University of Ottawa (1096-VH-2667)

8:30AM ► (199) *Approximations of the Generalized Exponential Distribution.*
Salam M. Khan, Alabama A&M University (1096-VH-2524)

8:45AM ► (200) *On the Properties of Exponentiated Weibull-Exponential Distribution.*
Ahmad Alzaghal, Central Michigan University (1096-VH-2289)

9:00AM (201) *Robust Penalized Functional Logistic Regression.*
Melody Denhere*, University of Mary Washington, and **Nedret Billor**, Auburn University (1096-VH-2199)

9:15AM (202) *Signed Rank with Responses Missing at Random.*
Huybrechts Frazier Bindele, University of South Alabama (1096-VH-2179)

9:30AM (203) *Functional Forecasting Models for Brain Tumor Mortality Rates.*
Keshav P. Pokhrel*, Mercyhurst University, and **Chris P. Tsokos**, University of South Florida (1096-VH-2139)

9:45AM ► (204) *The Gumbel-Weibull Distribution: Properties and Applications.*
Raid M Al-Aqtash, University of Cincinnati (1096-VH-2042)

10:00AM (205) *Markov Random Walk and Its application to Sequence Alignment Statistics.*
Y Park* and **J Spouge**, NIH (1096-VH-1985)

10:15AM (206) *Mixing Times of Markov Chains for Self-Organizing Lists and Biased Permutations.*
Prateek Bhakta, **Sarah Miracle***, **Dana Randall**, Georgia Institute of Technology, and **Amanda Pascoe Streib**, Center for Computing Sciences (1096-VH-1568)

10:30AM (207) *Bayesian Age-stratified Joinpoint Regression Model: An Application to Lung and Brain Cancer Mortality.*
Ram C. Kafle*, University of South Florida, **Netra Khanal**, The University of Tampa, and **Chris P Tsokos**, University of South Florida (1096-VH-1417)

10:45AM ► (208) *Strong Analytic Solution of Fractional Cauchy Problems.*
Jebessa B Mijena*, Georgia College & State University, and **Erkan Nane**, Auburn University (1096-VH-1560)

MAA General Contributed Paper Session on Teaching Introductory Mathematics

8:00 AM – 10:55 AM **Room 347, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:00AM ► (209) *Efficacy of Online Delivery of Introductory Statistics in English to Taiwanese Students.* Preliminary report.
Joseph B. Liddle, University of Alaska Southeast (1096-VP-1651)

8:15AM ► (210) *How to retain a perfect attendance rate at introductory level courses.* Preliminary report.
Ryo Ohashi, King's College (1096-VP-1688)

8:30AM ► (211) *Using Algebra in the Classroom to Understand the Way in which Automobiles Collide.*
Alexander G. Atwood* and **Vera Hu-Hyneman**, SUNY Suffolk County Community College (1096-VP-2530)

8:45AM ► (212) *High School (through College) Algebra.*
Christopher Schroeder, Morehead State University (1096-VP-2329)

9:00AM ► (213) *A Contemporary Approach to Intermediate Algebra.*
Don Small, U. S. Military Academy (1096-VP-2301)

9:15AM ► (214) *College Algebra: A Comparison of Traditional and Computer Aided Approaches.* Preliminary report.
Patricia Anderson* and **Kevin Brown**, Southern Adventist University (1096-VP-1396)

9:30AM ► (215) *A Word on Word Problems: How Improving Reading Comprehension and Mathematics Vocabulary Can Improve Performance on Mathematical Word Problems.*
Dywayne A Nicely, Ohio University-Chillicothe (1096-VP-1183)

9:45AM ► (216) *Online vs. Traditional On-ground Teaching for Basic Statistics.*
Ping Ye, Quincy University (1096-VP-633)

10:00AM ► (217) *Effective use of Chi-square Procedures in an Introductory Statistics Course.*
Daniel J. Ghezzi, King's College (1096-VP-2122)

10:15AM ► (218) *Supplemental Instruction in Precalculus.*
Grethe Hystad, The University of Arizona (1096-VP-1893)

10:30AM ► (219) *Innovative Student Projects on Exponential Growth and Decay in Pre-calculus.*
Vera Hu-Hyneman* and **Alexander G. Atwood**, SUNY Suffolk County Community College (1096-VP-2519)

10:45AM ► (220) *The Use of the Order of Operations in Reading, Writing and Solving Linear Equations.* Preliminary report.
Shumei C. Richman, Midlands Technical College, Columbia, SC (1096-VP-1508)

SIAM Minisymposium on Recent Advances in Financial Mathematics, I

8:00 AM – 10:50 AM **Room 325, BCC**

Organizers: **Maxim Bichuch**, Worcester Polytechnic Institute
Ronnie Sircar, Princeton University
Stephan Sturm, Worcester Polytechnic Institute

8:00AM Please see the JMM newsletter for details.

8:30AM (221) *On Bid-Ask Prices for Dividend Paying Securities: an acceptability index approach.*
Igor Cialenco* and **Tomasz R. Bielecki**, Illinois Institute of Technology (1096-60-1465)

9:00AM ► (222) *Systemic risk in large financial networks.*
Konstantinos Spiliopoulos, Boston University (1096-60-1387)

9:30AM (223) *Algorithmic trading with learning: informed versus uninformed.*
Alvaro Cartea, University College London, **Sebastian Jaimungal**, University of Toronto, and **Damir Kinzebulatov***, The Fields Institute, Toronto (1096-49-2599)

10:00AM Please see the JMM newsletter for details.

10:30AM Please see the JMM newsletter for details.

MAA General Contributed Paper Session on Research in Number Theory, I

8:15 AM – 10:55 AM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:15AM ► (224) *Accepted Elasticity in Local Arithmetic Congruence Monoids.*
Lorin Crawford, Clark Atlanta University, **Vadim Ponomarenko***, San Diego State University, **Jason Steinberg**, Princeton University, and **Marla Williams**, Willamette University (1096-VO-368)

8:30AM ► (225) *On the infinitude of prime elements.*
Jose A. Velez-Marulanda, Valdosta State University (1096-VO-271)

8:45AM (226) *The Reducibility of Constant-Perturbed Products of Cyclotomic Polynomials.*
Joshua Harrington*, **Lenny Jones** and **Daniel White**, Shippensburg University (1096-VO-564)

9:00AM (227) *Primes in Orbits of $z^d + c$.*
Spencer Hamblen*, McDaniel College, **Rafe Jones**, Carleton College, and **Kalyani Madhu**, University of Rochester (1096-VO-1255)

9:15AM ► (228) *A basis of the group of primitive almost pythagorean triples.*
Nikolai A Krylov, Siena College, NY (1096-VO-1324)

9:30AM (229) *On the Content Bound for Real Quadratic Field Extensions.*
Robert G. Underwood, Auburn University Montgomery (1096-VO-1367)

9:45AM (230) *Finiteness Results for Regular Ternary Quadratic Polynomials.* Preliminary report.
James L Ricci, Wesleyan University (1096-VO-2367)

10:00AM (231) *Bounds on the Number of Extensions of a Number Field with Bounded Discriminant and Specified Galois Group.* Preliminary report.
Evan P Dummit, University of Wisconsin-Madison (1096-VO-2513)

10:15AM (232) *On p-adic annihilators of real ray classes.*
Timothy James All, Rose-Hulman Institute of Technology (1096-VO-1877)

10:30AM (233) *Automorphism group schemes of p-divisible groups over fields of positive characteristic.*
Ding Ding, Binghamton University (1096-VO-2452)

10:45AM (234) *Siegel's trace problem and character values of finite groups.*
Amita Malik*, University of Illinois at Urbana-Champaign, **Florin Stan**, Simion Stoilow Institute of Mathematics of the Romanian Academy, and **Alexandru Zaharescu**, University of Illinois at Urbana-Champaign (1096-VO-2595)

MAA Session on the Intersection of Mathematics and the Arts, I

8:20 AM – 10:55 AM **Room 338, BCC**

Organizer: **Douglas Norton**, Villanova University

8:20AM ► (235) *Sets in Music.*
William C Linderman, King University (1096-C5-2690)

8:40AM ► (236) *Δ(rhythms)/Δt = ? What Base Are Rhythms In?*
Matt Lehman, UMass Boston (1096-C5-1242)

9:00AM ► (237) *Euclidean Rhythms and Tangles.* Preliminary report.
Neil R. Nicholson* and **Jonathon Kirk**, North Central College (1096-C5-343)

9:20AM ► (238) *Geometry, Visual Patterns, and Musical Rhythm: Problems at the Interface.* Preliminary report.
Godfried T. Toussaint, New York University Abu Dhabi (1096-C5-588)

9:40AM ► (239) *The Sound of Mathematics: Pythagorean Music and Beyond.*
Randall E Cone, Virginia Military Institute (1096-C5-1629)

10:00AM ► (240) *Giving freshmen a taste of abstract mathematics through ancient and modern concepts in music theory.*
Emily H. Sprague, Edinboro University of Pennsylvania (1096-C5-558)

10:20AM ► (241) *Bridging the Gap: Linking HIV/AIDS and Random Matrices to Theatre Arts.* Preliminary report.
Shirley Basfield Dunlap*, **Asamoah Nkwanta**, **Jalecia King**, **Brian Jamal Marshall**, **Sudani Rose**, **Eirin Stevenson** and **Keisheena Waldon**, Morgan State University (1096-C5-200)

10:40AM ► (242) *Dances of Heavenly Bodies: Dance, N-body Choreographies, and Change Ringing.*
Karl Schaffer, De Anza College (1096-C5-2672)

AMS Session on Number Theory, I

8:30 AM – 10:40 AM **Room 311, BCC**

8:30AM (243) *Systems of Diophantine inequalities in function fields.* Preliminary report.
Scott T. Parsell*, West Chester University, and **Craig V. Spencer**, Kansas State University (1096-11-2576)

8:45AM (244) *A one-parameter family of Dirichlet series whose coefficients are Sturmian words.*
DoYong Kwon, Chonnam National University (1096-11-2050)

9:00AM (245) *A Variation on Leopoldt's Conjecture: Part 2.* Preliminary report.
Dawn C. Nelson, Bates College (1096-11-1404)

9:15AM ► (246) *New Convolution Identities for Hypergeometric Bernoulli Polynomials.*
Hieu D Nguyen* and **Long Cheong**, Rowan University (1096-11-699)

9:30AM (247) *Designing Poincaré Series for Number Theoretic Applications.*
Amy T DeCelles, University of St. Thomas (1096-11-1186)

9:45AM (248) *A linear resolvent for degree 14 polynomials.*
Chad Awtrey, Elon University (1096-11-1273)

10:00AM ► (249) *Properties of digital representations.* Preliminary report.
Katherine A Anders, University of Illinois at Urbana-Champaign (1096-11-954)

10:15AM (250) *4959866698915122609810424451291 8.*
Samuel S Gross*, Bloomsburg University of Pennsylvania, and **Michael Filaseta**, University of South Carolina (1096-11-969)

10:30AM ► (251) *New bounds and computations on prime-indexed primes.*
Jonathan Bayless*, Husson University, and **Dominic Klyve**, Central Washington University (1096-11-2204)

MAA Minicourse: #12: Part A

9:00 AM – 11:00 AM **Room 344, BCC**

A game theory path to quantitative literacy.

Presenter: **David Housman**, Goshen College

MAA Minicourse #1: Part A

9:00 AM – 11:00 AM **Room 342, BCC**

Humanistic mathematics.

Presenters: **Gizem Karaali**, Pomona College
Eric Marland, Appalachian State University

MAA Minicourse #4: Part A

9:00 AM – 11:00 AM **Room 343, BCC**

Teaching introductory statistics (for instructors new to teaching intro stats).

Presenters: **Michael Posner**, Villanova University
Carolyn Cuff, Westminster College

MAA Committee on Technologies in Mathematics Education Panel Discussion

9:00 AM – 10:20 AM **Room 327, BCC**

Assistive technologies for math students and faculty with disabilities.

Organizers: **James Hamblin**, Shippensburg University
Bruce Yoshiwara, Los Angeles Pierce College

Panelists: **Rick Clinton**, Pearson Education
Gaier Dietrich, De Anza College
Kyle Keane, Wolfram Research

MAA Committee on Assessment Panel Discussion

9:00 AM – 10:20 AM **Room 316, BCC**

What do I need to know about Common Core and Common Core Assessments?

Organizers: **Bonnie Gold**, Monmouth University
Genevieve Knight, Coppin State University

Panelists: **Nancy Shapiro**, University System of Maryland
Bernadette Sandruck, Howard Community College
Denny Gulick, University of Maryland

MAA Inquiry-Based Learning Miniworkshop

9:00 AM – 10:20 AM **Room 345, BCC**

What is IBL and why use it?

Presenters: **Stan Yoshinobu**, Cal Poly San Luis Obispo
Matthew Jones, Cal State Dominguez Hills
Carol Schumaker, Kenyon College

Student Hospitality/Information Center

9:00 AM – 5:00 PM **Swing Hall, 100 Level, BCC**

MAA-AMS-SIAM Special Presentation

9:30 AM – 11:00 AM **Holiday Ballrooms 1–3, 2nd Floor, Hilton**

Access and opportunities in STEM education: The challenges of building an equitable diverse society.

Organizer: **Carlos Castillo-Chavez**, Arizona State University

Presenters: **Freeman Hrabowski**, University of Maryland at Baltimore County

James S. Gates, University of Maryland, College Park

Richard Tapia, Rice University

MAA Department Liaisons Committee Meeting

9:30 AM – 11:00 AM **Holiday Ballroom 6, 2nd Floor, Hilton**

AMS Invited Address

10:05 AM – 10:55 AM **Ballrooms I&II, 400 Level, BCC**

(252) *Critical points of complex polynomials from a symplectic viewpoint.*
Paul Seidel, MIT (1096-57-1052)

AMS-MAA Invited Address

11:10 AM – NOON **Ballrooms I&II, 400 Level, BCC**

► (253) *Paul Erdős and the rise of statistical thinking in elementary number theory.*
Paul Pollack, University of Georgia, and **Carl Pomerance***, Dartmouth College (1096-11-163)

Exhibits and Book Sales

12:15 AM – 5:30 PM **Exhibit Hall F, 100 Level, BCC**

Come to the Grand Opening at 12:15 p.m.!

AMS Colloquium Lectures, Lecture I

1:00 PM – 1:50 PM **Ballrooms I&II, 400 Level, BCC**

(254) *Symplectic Topology Today: Recent results and open questions.*
Dusa McDuff, Barnard College, Columbia University (1096-53-2195)

MAA Invited Address

2:15 PM – 3:05 PM **Ballrooms I&II, 400 Level, BCC**

(255) *Mathematics in stone and bronze.*
Helaman and Claire Ferguson (1096-A0-14)

AMS-SIAM Special Session on Mathematics of Computation: Differential Equations, Linear Algebra, and Applications, I

2:15 PM – 6:05 PM **Room 320, BCC**

Organizers: **Susanne C. Brenner**, Louisiana State University

Chi-Wang Shu, Brown University

2:15PM (256) *Stability and spectral convergence of Fourier method for nonlinear problems.*
Eitan Tadmor*, University of Maryland, and **Claude Bardos**, University of Paris 6 (1096-65-627)

2:45PM (257) *Fast Sweeping Methods for Hyperbolic Systems of Conservation Laws at Steady State.*
Bjorn Engquist, **Brittany Froese*** and **Richard Tsai**, University of Texas at Austin (1096-65-351)

3:15PM (258) *On the bounds and time-step restrictions for the DG and central DG spatial operators* Preliminary report.
Matthew Reyna* and **Fengyan Li**, Rensselaer Polytechnic Institute (1096-65-1180)

3:45PM (259) *A Partition of Unity Method for an Elliptic Optimal Control Problem with State Constraints.*
Susanne C. Brenner, **Christopher B. Davis*** and **Li-Yeng Sung**, Louisiana State University (1096-65-1940)

4:15PM (260) *Multigrid Preconditioners for Optimal Control Problems in Fluid Flow.* Preliminary report.
Ana Maria Soane*, Towson University, and **Andrei Draganescu**, University of Maryland, Baltimore County (1096-65-2596)

4:45PM (261) *KKT preconditioners for non-Hermitian indefinite PDE systems.* Preliminary report.
Denis Ridzal, Sandia National Laboratories, Albuquerque, **Stephen D. Shank***, Temple University, **Paul Tsuji** and **Ray Tuminaro**, Sandia National Laboratories, Livermore (1096-65-2384)

5:15PM ► (262) *A penalty method for coupling fluid-structure interactions.*
Yue Yu*, **Johnny Guzman** and **George Karniadakis**, Brown University (1096-76-1956)

5:45PM (263) *Efficient spectral-element methods for acoustic scattering and related problems.*
Ying He* and **Jie Shen**, Purdue University (1096-78-2041)

AMS-ASL Special Session on Logic and Probability, II

2:15 PM – 6:05 PM **Room 319, BCC**

Organizers: **Wesley Calvert**, Southern Illinois University

Doug Cenzer, University of Florida

Johanna Franklin, University of Connecticut

Valentina Harizanov, George Washington University

2:15PM (264) *Compressibility of Countable Subsets of Cantor Space.* Preliminary report. **Ferit Toska**, Gainesville, FL (1096-03-1727)

2:45PM (265) *How to hide from a nanobot.* **Timothy H. McNicholl**, Iowa State University (1096-03-933)

3:15PM (266) *Metastability of sequences and model theory.* **Jose Iovino**, The University of Texas at San Antonio (1096-03-1849)

3:45PM (267) *Uniqueness of an invariant probability measure concentrated on an orbit.* **Aleksandra Kwiatkowska**, University of California, Los Angeles (1096-03-1764)

4:15PM (268) *Model theory of probability spaces.* **Alexander Berenstein***, Universidad de los Andes, **Itaï Ben Yaacov**, Université Claude Bernard Lyon 1, and **Ward Henson**, University of Illinois at Urbana-Champaign (1096-03-1184)

4:45PM (269) *Random symmetric constructions via inverse limits of finite structures.* **Cameron E. Freer**, Massaschusetts Institute of Technology (1096-03-1937)

5:15PM (270) *A survey on Keisler randomizations.* **Uri Andrews**, University of Wisconsin Madison, **Isaac Goldbring***, University of Illinois at Chicago, and **H. Jerome Keisler**, University of Wisconsin Madison (1096-03-420)

5:45PM (271) *Amenability, unique ergodicity and random orderings.* **Alexander S. Kechris**, California Institute of Technology (1096-03-530)

AMS Special Session on Algebraic Geometry, II

2:15 PM – 6:00 PM **Room 303, BCC**

Organizers: **Christopher Hacon**, University of Utah

Zsolt Patakfalvi, Princeton University

2:15PM (272) *On generic vanishing in characteristic $p>0$.* **Christopher D. Hacon**, University of Utah (1096-14-820)

2:45PM ► (273) *On subadditivity of Kodaira dimension in positive characteristic.* **Zsolt Patakfalvi**, Princeton University (1096-14-2089)

3:15PM (274) *Effective results for toroidal compactifications.* **Gabriele Di Cerbo**, Columbia University (1096-14-691)

4:15PM (275) *Local cohomology with support in generic determinantal ideals.* **Claudiu Raicu***, Princeton University, and **Jerzy Weyman**, University of Connecticut (1096-14-666)

5:15PM (276) *F-singularities in families.* **Zsolt Patakfalvi**, Princeton University, **Karl Schwede***, Penn State University, and **Wenliang Zhang**, University of Nebraska (1096-14-972)

AMS Special Session on Algebraic Structures Motivated by Knot Theory, II

2:15 PM – 6:05 PM **Room 322, BCC**

Organizers: **Mieczyslaw K. Dabkowski**, University of Texas at Dallas

Jozef Przytycki, George Washington University

Radmila Sazdanovic, University of Pennsylvania

Alexander N. Shumakovitch, George Washington University

Hao Wu, George Washington University

2:15PM (277) *The role of spinners in determining clock number.* Preliminary report. **Kerry M. Luse***, Trinity Washington University, and **Mark Kidwell**, United States Naval Academy (1096-55-1661)

2:45PM (278) *The Kauffman bracket skein module of a connected sum of copies of $S^1 \times S^2$.* **Charles D. Frohman**, The University of Iowa, and **Joanna Kania-Bartoszynska***, National Science Foundation (1096-57-1669)

3:15PM (279) *An Obstruction to Knots Bounding Möbius Bands in B^4.* **M Kate Kearney**, Louisiana State University (1096-57-355)

3:45PM (280) *Continuous Families of Representations of Braid Groups.* **Michael Fitzpatrick*** and **Charles Frohman**, University of Iowa (1096-22-1773)

4:15PM (281) *Splittings of knot groups.* **Stefan Friedl**, Universität zu Köln, **Daniel S Silver*** and **Susan G Williams**, University of South Alabama (1096-57-1420)

4:45PM (282) *Links in thickened surfaces and virtual genus.* **J. Scott Carter**, **Daniel S. Silver** and **Susan G. Williams***, University of South Alabama (1096-57-1488)

5:15PM (283) *The Kauffman bracket ideal for genus-1 tangles.* **Susan M. Abernathy**, Louisiana State University (1096-57-1083)

5:45PM (284) *Measuring a knot's distance from alternating.* Preliminary report. **Adam M Lowrance**, Vassar College (1096-57-1357)

AMS Special Session on Applied Harmonic Analysis: Large Data Sets, Signal Processing, and Inverse Problems, II

2:15 PM – 6:05 PM **Room 315, BCC**

Organizers: **Mauro Maggioni**, Duke University

Naoki Saito, University of California, Davis

Thomas Strohmer, University of California, Davis

2:15PM (285) *The Preimage Problem for Laplacian Eigenmaps.* Preliminary report.
Alexander Cloninger, **Wojciech Czaja*** and **Timothy Doster**, University of Maryland College Park (1096-43-1462)

3:15PM (286) *Convex recovery from interferometric measurements.*
Laurent Demanet, Massachusetts Institute of Technology (1096-65-2772)

4:15PM (287) *Empirical intrinsic geometry as a tool for invariant parameter extraction.*
Ronald R. Coifman, Yale University (1096-94-2770)

5:15PM (288) *The Hierarchical Graph Laplacian Eigen Transform (HGLET) and Its Relatives for Data Analysis on Graphs and Networks.*
Naoki Saito* and **Jeff L. Irion**, University of California, Davis (1096-42-1322)

5:45PM (289) *Eigenvector Localization, Random Matrices, and Banach Algebras.* Preliminary report.
Thomas Strohmer, University of California, Davis (1096-65-853)

AMS Special Session on Classification Problems in Operator Algebras, II

2:15 PM – 6:05 PM **Room 331, BCC**

Organizers: **Ionut Chifan**, University of Iowa

David Penneys, University of Toronto

2:15PM (290) *Unitary equivalence to Jordan models for weak contractions of class C_0.*
Raphael Clouatre, University of Waterloo (1096-47-443)

3:15PM (291) *Analytic Function Theory for Operator-Valued Free Probability.*
John D. Williams, Texas A&M University (1096-47-444)

3:45PM (292) *Finite Factor Representations of Higman-Thompson Groups.*
Konstantin Medynets*, United States Naval Academy, and **Artem Dudko**, Stony Brook University (1096-20-472)

4:15PM (293) *Inner amenability for groups and central sequences in factors.*
Bogdan Teodor Udrea*, University of Illinois at Urbana-Champaign, **Ionut Chifan**, University of Iowa, and **Thomas Sinclair**, University of California at Los Angeles (1096-46-1081)

4:45PM (294) *Stabilizers of Ergodic Actions of Lattices.*
Darren Creutz, Vanderbilt University (1096-37-145)

5:45PM (295) *Extended von Neumann dimension for sofic groups and equivalence relations.*
Ben R Hayes, University of California Los Angeles (1096-46-2011)

AMS Special Session on Difference Equations and Applications, II

2:15 PM – 6:05 PM **Room 332, BCC**

Organizer: **Michael A. Radin**, Rochester Institute of Technology

2:15PM (296) *General Grüss and Ostrowski type inequalities involving s-convexity.*
George A Anastassiou, University of Memphis (1096-26-26)

2:45PM ► (297) *Calculus on Mixed Time Scales.*
Allan Peterson, University of Nebraska-Lincoln (1096-39-437)

3:15PM ► (298) *Restricted Feedback Control and Discrete-Time Dynamical Systems.*
John Wesley Cain*, University of Richmond and Harvard University, **Shuang Zhao** and **Kathryn G Workman**, University of Richmond (1096-39-393)

3:45PM ► (299) *Some Facts and Some Open Problems and Conjectures on Rational Systems.* Preliminary report.
Emmanouil Drymonis, Providence College (1096-39-1280)

4:15PM ► (300) *A Subclass of Anti-Competitive Systems Of Two, First-Order, Rational Linear Difference Equations.*
Chris D. Lynd, Bloomsburg University (1096-39-150)

4:45PM (301) *Global Asymptotic Stability for Quadratic Fractional Difference Equation.* Preliminary report.
Mark DiPippo, **Ed J. Janowski** and **Mustafa R. S. Kulenovic***, University of Rhode Island (1096-39-1540)

5:15PM (302) *On the Boundedness of Positive Solutions of a Reciprocal Max-Type Difference Equation with Periodic Parameters.*
Candace M. Kent*, Virginia Commonwealth University, and **Michael A. Radin**, Rochester Institute of Technology (1096-39-1023)

5:45PM (303) *Boundedness of Solutions of the Difference Equation* $x_n = \max\left\{\frac{A^1_{n-1}}{x_{n-1}}, \frac{A^2_{n-1}}{x_{n-2}}, \ldots, \frac{A^t_{n-1}}{x_{n-t}}\right\}$ *with Periodic Parameters.*
Daniel W. Cranston* and **Candace M. Kent**, Virginia Commonwealth University (1096-39-477)

AMS Special Session on Fractional, Stochastic, and Hybrid Dynamic Systems with Applications, II

2:15 PM – 6:05 PM **Room 324, BCC**

Organizers: **John Graef**, University of Tennessee at Chattanooga
Gangaram S. Ladde, University of South Florida
Aghalaya S. Vatsala, University of Louisiana at Lafayette

2:15PM (304) *Positive solutions for a system of nonlocal fractional boundary value problems.*
Johnny Henderson*, Baylor University, and **Rodica Luca**, Gh. Asachi Technical University (1096-34-54)

2:45PM (305) *On the Application of Random-Point Approximation for Identification of the Effective Diffusivity Coefficient of Polydisperse Spherical Suspension.*
Abhinandan Chowdhury, Gettysburg College (1096-60-2138)

3:15PM ► (306) *Energy Method for Dynamic Social Networks.* Preliminary report.
Jagdish Chandra*, The George Washington University, and **G S Ladde**, University of South Florida, Tampa (1096-91-2092)

3:45PM ► (307) *Hybrid dynamic inequalities and applications: Hereditary process.* Preliminary report.
G S Ladde, University of South Florida, Tampa (1096-93-948)

4:15PM ► (308) *Multivariate Stochastic Dynamic Model of Energy Commodities Under External Interventions.* Preliminary report.
Olusegun M Otunuga* and **G S Ladde**, University of South Florida, Tampa (1096-60-931)

4:45PM (309) *A Scale-Structured Network Stochastic Epidemic dynamic model with varying Incubation Period.* Preliminary report.
Divine T Wanduku, Keiser University (1096-60-1044)

5:15PM ► (310) *Logistic Comparison Growth Model: Parametric Domain Decomposition and Statistical Analysis.* Preliminary report.
Ryan M. Thurman* and **G S Ladde**, University of South Florida, Tampa (1096-60-2273)

5:45PM ► (311) *Existence and uniqueness of solutions for a fractional boundary value problem with a separated boundary condition.*
Lingju Kong, University of Tennessee at Chattanooga, **Qingkai Kong**, Northern Illinois University, and **Min Wang***, University of Tennessee at Chattanooga (1096-34-1198)

AMS Special Session on Graph Theory: Structural and Extremal Problems, II

2:15 PM – 6:05 PM **Room 330, BCC**

Organizers: **Daniel Cranston**, Virginia Commonwealth University
Gexin Yu, College of William & Mary

2:15PM (312) *Counting graphs with the Lovasz Local Lemma.*
Laszlo A. Szekely* and **Linyuan Lu**, University of South Carolina (1096-05-1635)

2:45PM (313) *Use of flag algebras with permutations.*
Jozsef Balogh, **Ping Hu**, **Bernard Lidicky***, University of Illinois at Urbana-Champaign, **Oleg Pikhurko**, University of Warwick, **Balazs Udvari**, University of Szeged, and **Jan Volec**, University of Warwick (1096-05-885)

3:15PM (314) *EKR on Graphs and Lattices.*
Glenn Hurlbert, Arizona State University (1096-05-855)

3:45PM ► (315) *Random Threshold Directed Graphs.* Preliminary report.
Edward R. Scheinerman* and **Yiguang Zhang**, Johns Hopkins University (1096-05-318)

4:15PM ► (316) *The inducibility of directed graphs.*
Hao Huang, Institute for Advanced Study & DIMACS (1096-05-704)

4:45PM (317) *New bounds for the existence of many perfect matchings and large matchings.*
Matthew Yancey*, Bowie, MD, and **Derrick Stolee**, Iowa State University (1096-05-1647)

5:15PM (318) *Demand Matching and Correlated Independent Sets in Trees.*
Mohit Singh, Microsoft Research, and **Hehui Wu***, Simon Fraser University (1096-05-1494)

5:45PM (319) *On Judicious Bisections of Graphs.*
Xingxing Yu*, Georgia Institute of Technology, and **Baogang Xu**, Nanjing Normal University (1096-05-895)

AMS Special Session on Hyperplane Arrangements and Applications, II

2:15 PM – 6:05 PM **Room 318, BCC**

Organizers: **Takuro Abe**, Kyoto University
Max Wakefield, United States Naval Academy

Masahiko Yoshinaga, Hokkaido University

2:15PM (320) *On the admissibility of certain local systems.*
Michele Torielli*, **Masahiko Yoshinaga**, Hokkaido Univeristy, Sapporo, Japan, and **Shaheen Nazir**, Government College University, Lahore, Pakistan (1096-14-400)

2:45PM (321) *The monodromy representation of Lauricella's F_C.*
Yoshiaki Goto, Hokkaido University (1096-33-1332)

3:15PM (322) *Lattice-Supported Splines on Polytopal Complexes.*
Michael R. DiPasquale, University of Illinois at Urbana-Champaign (1096-06-922)

3:45PM (323) *Properties of complete bipartite codimension two subspace arrangements.*
Douglas A. Torrance*, Monmouth College, and **Zach Teitler**, Boise State University (1096-14-1033)

4:15PM (324) *Computations for Coxeter arrangements and Solomon's descent algebra.* Preliminary report.
Marcus Bishop, Western New England University (1096-52-1726)

4:45PM (325) *The number of irreducible components of a linear free divisor.*
Brian Pike, University of Toronto, Scarborough (1096-32-2461)

5:15PM (326) *Combinatorial covers and vanishing cohomology.* Preliminary report.
Graham Denham*, University of Western Ontario, **Alexander I Suciu**, Northeastern University, and **Sergey Yuzvinsky**, University of Oregon (1096-55-1886)

5:45PM (327) *Abelian duality and propagation of resonance.* Preliminary report.
Graham C. Denham, University of Western Ontario, **Alexander I. Suciu***, Northeastern University, and **Sergey Yuzinsky**, University of Oregon (1096-55-1394)

AMS Special Session on Mathematics and Mathematics Education in Fiber Arts, II

2:15 PM – 6:05 PM **Room 314, BCC**

Organizers: **Sarah-Marie Belcastro**, Smith College
Carolyn Yackel, Mercer University

2:15PM (328) *Hilbert-like Curves on Hexagonal Grids and a Realization using Crochet.*
Kyle D Calderhead, Malone University (1096-05-487)

2:45PM ► (329) *More Granny, Less Square: Methods for center-worked polyomino designs.*
D. Jacob Wildstrom, University of Louisville (1096-05-863)

3:15PM ► (330) *Granny's Not So Square, After All: Hyperbolic Tilings with Truly Hyperbolic Crochet Motifs.*
Joshua Brandon Holden, Rose-Hulman Institute of Technology (1096-51-379)

3:45PM Viewing of Juried Mathematical Fiber Arts Exhibit

4:45PM ► (331) *A Borromean Rings Quilt.* Preliminary report.
Barbara E Nimershiem, Franklin & Marshall College (1096-57-2277)

5:15PM ► (332) *Geometry and Sewing with Embroidery.*
S. Louise Gould, Central Connecticut State University (1096-97-212)

5:45PM ► (333) *Visualizing Concepts from Modern Algebra Using Variations of Generalized Woven Figure Eights.*
Eva Knoll, Mount Saint Vincent University, **Wendy Landry**, Nova Scotia College of Art and Design, and **Tara Taylor***, St. Francis Xavier University (1096-00-512)

AMS Special Session on Nonlinear Systems: Polynomial Equations, Nonlinear PDEs, and Applications, II

2:15 PM – 6:05 PM **Room 323, BCC**

Organizer: **Wenrui Hao**, University of Notre Dame

2:15PM (334) *Numerical Study of KPP Equation.*
Long Chen*, **Jack Xin** and **Penghe Zu**, University of California at irvine (1096-35-1294)

2:45PM (335) *A curvature weakening Hele-Shaw model.*
Shuwang Li*, **Meng Zhao**, Illinois Institute of Technology, **Andrew Belmonte**, Penn State University, and **John Lowengrub**, University of California-Irvine (1096-76-711)

3:15PM ► (336) *Some dynamical system models for viral protein assembly.* Preliminary report.
James Liu, Colorado State University (1096-37-1330)

3:45PM ► (337) *Applications of homotopy method to differential equation.*
Wenrui Hao, Mathematical Biosciences Institute (1096-00-1344)

4:15PM (338) *Divergence-Free WENO Reconstruction-Based Finite Volume Scheme for Solving Ideal MHD Equations on Triangular Meshes.*
Zhiliang Xu, University of Notre Dame (1096-35-1471)

4:45PM (339) *Numerical Solution of 3D Poisson-Nernst-Planck Equations Coupled with Classical Density Functional Theory for Modeling Ion and Electron Transport in a Confined Environment.*
Bin Zheng*, **Da Meng**, **Guang Lin** and **Maria L. Sushko**, Pacific Northwest National Laboratory (1096-65-2016)

5:15PM ► (340) *Numerical Study for Potential Variation and Ion Transport in Ionic Polymer Membranes.* Preliminary report.
Xiaozhe Hu, Penn State University (1096-65-2007)

5:45PM (341) *Are Small Granulomas Stable?*
Avner Friedman, Ohio State University, and **King-Yeung Lam***, Mathematical Biosciences Institute, Ohio State University (1096-35-1665)

AMS Special Session on Random Matrices: Theory and Applications, II

2:15 PM – 5:05 PM **Room 301, BCC**

Organizers: **Paul Bourgade**, Harvard University
Horng-Tzer Yau, Harvard University

2:15PM (342) *Delocalization of eigenvectors of random matrices with independent entries.*
Roman Vershynin* and **Mark Rudelson**, University of Michigan (1096-60-1686)

3:15PM (343) *Isotropic Local Law and Deformed Random Matrix.*
Yin Jun, U. Wisconsin-Madison (1096-60-996)

4:15PM (344) *Large deviations for point process limits of random matrices.*
Diane C. Holcomb* and **Benedek Valkó**, University of Wisconsin - Madison (1096-60-1751)

4:45PM (345) *Growing random regular graphs and the Gaussian Free Field.*
Tobias Johnson* and **Soumik Pal**, University of Washington (1096-60-357)

AMS Special Session on Recent Progress in Geometric and Complex Analysis, II

2:15 PM – 6:05 PM **Room 302, BCC**

Organizers: **Zheng Huang**, City University of New York, Graduate Center and College of Staten Island
Longzhi Lin, Rutgers University
Marcello Lucia, City University of New York, Graduate Center and College of Staten Island

2:15PM (346) *An Example of Quasiconformal Motion.*
Yunping Jiang, **Sudeb Mitra**, Queens College and CUNY Graduate Center, **Hiroshige Shiga**, Tokyo Institute of Technology, and **Zhe Wang***, Bronx Community College (1096-30-683)

2:45PM ► (347) *Universal Local Quasiconformal Motions.*
Yunping Jiang*, **Sudeb Mitra**, City University of New York, Queens College and Graduate Center, **Hiroshige Shiga**, Tokyo Institute of Technology, and **Zhe Wang**, City University of New York, Bronx Community College (1096-30-980)

3:15PM (348) *Conical soliton metrics on Kähler manifolds.*
Ved V. Datar, Rutgers University (1096-51-626)

3:45PM (349) *The Laplacian on a hyperbolic triangle has no positive Neumann eigenvalues.*
Luc Hillairet, Université d'Orleans, and **Chris Judge***, Indiana University (1096-58-394)

4:15PM (350) *Poincare series map and k-differentials on Riemann surfaces.*
Nadya Askaripour, University of Cincinnati (1096-30-747)

4:45PM (351) *Scharzian derivatives and Euclidean-minimal surfaces.* Preliminary report.
Michael B. Deutsch, IMPA (1096-53-1112)

5:15PM (352) *A proof of the Alexanderov's uniqueness theorem for convex surfaces in $\mathbb{R}^3$.*
Xiangwen Zhang, Columbia University (1096-35-208)

5:45PM (353) *How the maximal dilatation of the Douady-Earle extension near the origin is controlled by the distortion of the boundary map on finitely many points.*
Oleg Muzician*, CUNY BMCC, and **Jun Hu**, CUNY Graduate Center, Brooklyn College (1096-30-1043)

AMS Special Session on Recent Progress in the Langlands Program, II

2:15 PM – 6:05 PM **Room 321, BCC**

Organizers: **Moshe Adrian**, University of Utah
Shuichiro Takeda, University of Missouri

2:15PM (354) *Geometric structure and the local Langlands conjecture.*
Paul Frank Baum, Penn State University (1096-22-132)

3:15PM (355) *The dual of a reductive algebraic group.* Preliminary report.
Jeffrey Adler* and **Joshua Lansky**, American University (1096-22-971)

3:45PM (356) *Explicit Liftings of Representations of Finite Reductive Groups.* Preliminary report.
Joshua M. Lansky* and **Jeffrey D. Adler**, American University (1096-22-2658)

4:15PM (357) *Local Converse Theorems and Symmetric Spaces.* Preliminary report.
Jeffrey Hakim*, American University, and **Omer Offen**, Technion University (1096-22-1722)

4:45PM (358) *Hecke algebra correspondence for the 2-adic metaplectic group.*
Aaron Wood, University of Missouri (1096-22-336)

5:15PM (359) *A sheaf-function dictionary for algebraic tori over local fields.*
Clifton Cunningham and **David Roe***, University of Calgary (1096-14-1723)

5:45PM (360) *The Ballad of Reading Guo.*
Kimball Martin, University of Oklahoma (1096-22-1944)

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

2:15 PM – 6:05 PM **Room 328, BCC**

Organizers: **Bernard Brooks**, Rochester Institute of Technology
Jobby Jacob, Rochester Institute of Technology
Jacqueline Jensen-Vallin, Slippery Rock University
Carl Lutzer, Rochester Institute of Technology
Darren Narayan, Rochester Institute of Technology
Tamas Wiandt, Rochester Institute of Technology

2:15PM ► (361) *Using PSM to study delay differential equations with chaos.*
Luke Edwards*, Pennsylvania State University, and **Benjamin Weidenaar**, Providence College (1096-34-103)

2:45PM ► (362) *Computing Galois groups of degree 12 2-adic fields with trivial automorphism group.*
Chad Awtrey, Elon University, **Brett Barkley**, University of Maryland, College Park, **Nicole Miles**, **Christopher Shill*** and **Erin Strosnider**, Elon University (1096-11-803)

3:15PM ► (363) *Long-term Behavior of Solutions to a Wave Equation with Degenerate Damping.*
Thomas G Anderson*, New Jersey Institute of Technology, **George Avalos**, University of Nebraska-Lincoln, **Elizabeth Galvin**, Marist College, **Ian Kessler**, Carroll College, **Michelle Kleckner**, Valparaiso University, **Daniel Toundykov**, University of Nebraska-Lincoln, and **William Tritch**, Andrews University (1096-35-408)

3:45PM ► (364) *The Colored Cubes Problem.* Preliminary report.
Ethan Berkove, Lafayette College, **David Cervantes Nava**, SUNY Potsdam, **Daniel Condon**, Georgia Tech, and **Rachel Katz***, The University of Chicago (1096-05-1481)

4:15PM ► (365) *Finite Geometry in the Card Game SET.*
Yumi Li*, Willamette University, **Jordan Awan**, Clarion University, **Claire Frechette**, Brown University, and **Liz McMahon**, Lafayette College (1096-52-1493)

4:45PM ► (366) *Random subtrees of complete graphs.*
Alex Chin*, North Carolina State University, **Kellie MacPhee**, Dartmouth College, and **Charles Vincent**, Lafayette College (1096-05-1479)

5:15PM ► (367) *The Krasnosel'skii Zero Theorem.*
Yaxi Gao*, **Eric Stucky** and **Francis Edward Su**, Harvey Mudd College (1096-54-818)

5:45PM ► (368) *A Combinatorial Approach to the Meunier-Babson Theorem.*
Elizabeth Kelley*, **Francis Edward Su** and **Patrick Tierney**, Harvey Mudd College (1096-05-824)

AMS Special Session on Symplectic and Contact Structures on Manifolds with Special Holonomy, II

2:15 PM – 6:05 PM **Room 329, BCC**

Organizers: **Sergey Grigorian**, University of Texas Pan American
Sema Salur, University of Rochester
Albert J. Todd, University of California, Riverside

2:15PM (369) *Einstein Metrics, Curvature Functionals, and Conformally Kähler Geometry.*
Claude LeBrun, Stony Brook University (1096-53-1899)

3:15PM (370) *Compact complex surfaces with geometric structures related to split quaternions.*
J Davidov, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, **G Grantcharov***, Florida International University, **O Mushkarov**, Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, and **M Yotov**, Florida International University (1096-53-1740)

3:45PM (371) *A reduction theorem for Spin(7) structures.* Preliminary report.
Mihai Bailesteanu, University of Rochester (1096-53-1861)

4:15PM (372) *Topology and duality in G_2 manifolds.* Preliminary report.
Selman Akbulut, Michigan State University (1096-57-1927)

5:15PM (373) *Algebraic topology of G_2 manifolds.*
Selman Akbulut, Michigan State University, and **Mustafa Kalafat***, Tunceli University (1096-53-1202)

5:45PM (374) *ϕ-free Submanifolds and Convexity in Calibrated Manifolds.*
Ibrahim Unal, Middle East Technical University Northern Cyprus Campus (1096-53-1545)

AMS Special Session on The Changing Education of Preservice Teachers in Light of the Common Core, II

2:15 PM – 6:05 PM **Room 310, BCC**

Organizers: **William McCallum**, University of Arizona
Kristin Umland, University of New Mexico

Ellen Whitesides, University of Arizona

2:15PM ► (375) *Evolving Content and Technology in a Capstone Course for Future Secondary Math Teachers.*
Eric Hsu, San Francisco State University (1096-97-1483)

2:45PM (376) *Pre-Service Teacher Task Study Project.*
Patrick Callahan, University of California Los Angeles (1096-00-2755)

3:15PM ► (377) *A story of...*
Ben McCarty, University of Memphis (1096-97-2099)

3:45PM (378) *Applying Lessons from Professional Development Work to Pre-service Content Courses.* Preliminary report.
Brigitte Lahme* and **Ben Ford**, Sonoma State University (1096-97-1848)

4:15PM ► (379) *The Challenges of Preparing Future Elementary Teachers at a Small Liberal Arts College.* Preliminary report.
Priscilla S. Bremser, Middlebury College (1096-97-1748)

4:45PM ► (380) *Using the Standards for Mathematical Practice to Assess the Performance of Preservice Teachers.*
Jennifer M Lewis, Wayne State University (1096-97-1491)

5:15PM (381) *Collaboratively Planning and Teaching an Inquiry Lesson Aligned with CCSS in an Elementary Mathematics Methods Course.*
Chepina Rumsey, Kansas State University (1096-97-1427)

5:45PM Discussion

AMS Special Session on the History of Mathematics, II

2:15 PM – 6:05 PM **Room 317, BCC**

Organizers: **Sloan Despeaux**, Western Carolina University
Della Dumbaugh, University of Richmond
Glen van Brummelen, Quest University

2:15PM ► (382) *Classifying Quadrilaterals.* Preliminary report.
Eisso J. Atzema, University of Maine (1096-01-463)

2:45PM ► (383) *Playing Checkers with Machines – from Ajeeb to Chinook*. Preliminary report.
Peggy Aldrich Kidwell, National Museum of American History, Smithsonian Institution (1096-01-421)

3:15PM ► (384) *The History of Slide Rules, As Told by the Smithsonian Collections.*
Amy Ackerberg-Hastings, NMAH/UMUC (1096-01-424)

3:45PM ► (385) *Julius Plücker's Pure Geometry.*
Jemma Lorenat, Simon Fraser University, Université Pierre et Marie Curie (1096-01-1304)

4:15PM ► (386) *"Merely a speculation of the mind?" William Henry Fox Talbot and mathematics.*
June E. Barrow-Green, The Open University, UK (1096-01-222)

4:45PM (387) *On Jacobi's transformation theory of elliptic functions.*
Alberto Cogliati, Università degli Studi di Milano, Italy (1096-01-1336)

5:15PM ► (388) *Knots in the Nursery: "(Cats) Cradle Song" of James Clerk Maxwell.*
Daniel S Silver, University of South Alabama (1096-01-395)

5:45PM ► (389) *Dear Professor Richardson.* Preliminary report.
James J. Tattersall*, Providence College, and **Shawnee L. McMurran**, California State University (1096-01-401)

MAA Minicourse #15: Part A

2:15 PM – 4:15 PM **Room 342, BCC**

Developing strong mentoring relationships.
Presenter: **Donna Joyce Dean**, Association for Women in Science

MAA Minicourse: #14: Part A

2:15 PM – 4:15 PM **Room 344, BCC**

Visualizing projective geometry through photographs and perspective drawings.
Presenters: **Annalisa Crannell**, Franklin & Marshall College
Marc Frantz, Indiana University Bloomington
Fumiko Futamura, Southwestern University

MAA Minicourse #9: Part A

2:15 PM – 4:15 PM **Room 343, BCC**

WeBWorK: An open-source alternative for generating and delivering online homework problems.
Presenters: **John Travis**, Mississippi College
Jason Aubrey, University of Missouri
Paul Pearson, Hope College

AMS Session on Fractal Geometry, Complex Dynamics, and Dynamical Systems

2:15 PM – 6:10 PM **Room 304, BCC**

2:15PM (390) *Totally Disconnected Sierpiński Relatives.*
Tara D Taylor, St. Francis Xavier University (1096-51-517)

2:30PM ► (391) *Golden Trees and Their Relatives: A Mathematical Arboretum in 3D.*
Bernat Espigule-Pons, Figueres, Catalonia (1096-37-749)

2:45PM (392) *A structure theorem for semi-parabolic Hénon maps.*
Remus Radu* and **Raluca Tanase**, Stony Brook University (1096-37-2676)

3:00PM (393) *Modeling Quasicrystals with Substitution Sequences and Tilings.*
May Mei, Denison Universtiy (1096-37-2145)

3:15PM ► (394) *A dynamics approach to an alternative to the Snowball Earth climate state.*
Chris Rackauckas, University of California Irvine, and **James A. Walsh***, Oberlin College (1096-37-148)

3:30PM ► (395) *Some Results of A Fractional Population Dynamic Model.*
Don Udita N. Katugampola, Delaware State University (1096-37-1497)

3:45PM (396) *Periodic Brake Orbits in the Planar Isosceles Three-Body Problem.*
Nai-Chia Chen, University of Minnesota (1096-37-544)

4:00PM (397) *Ergodicity for the Randomly Perturbed Navier-Stokes Equations.* Preliminary report.
Gregory Varner, John Brown University (1096-37-1133)

4:15PM (398) *A Scheme for Modeling and Analyzing the Dynamics of Logical Circuits.*
Aminur Rahman, New Jersey Institute of Technology (1096-37-629)

4:30PM (399) *Rank one dynamics near heteroclinic cycles.*
Anushaya Mohapatra*, Rice University, and **William Ott**, University of Houston (1096-37-869)

4:45PM ► (400) *A combinatorial proof of the Poincaré-Birkhoff Theorem.*
Kevin W. O'Neill*, University of California, Berkeley, and **Francis Edward Su**, Harvey Mudd College (1096-37-1701)

5:00PM (401) *The Artin-Mazur Zeta Function of a Rational Map in Positive Characteristic.*
Andrew Bridy, University of Wisconsin (1096-37-940)

5:15PM (402) *Investigation of Infinite-Dimensional Dynamical Systems Models Applicable to Granular Flows.*
Hao Wu* and **Denis Blackmore**, New Jersey Institute of Technology (1096-37-2012)

5:30PM (403) *Double Hopf Bifurcation with Huygens Symmetry.*
Petko M. Kitanov*, **William F. Langford** and **Allan R. Willms**, University of Guelph (1096-37-1702)

5:45PM (404) *Dynamics in hybrid complex systems of switches and oscillators.*
Elana J Fertig*, Johns Hopkins University, **Dane Taylor**, UNC and SAMSI, **Matthew R Francis**, Aers Technica, and **Juan G Restrepo**, University of Colorado, Boulder (1096-37-2444)

6:00PM (405) *Towards A Complete Understanding Of The Mixing Properties Of Rank-1 Cut And Stack Transformations With Bounded Parameters.* Preliminary report.
Andrew-David Bjork*, Siena Heights University, and **Aaron Hill**, University of North Texas (1096-37-2063)

AMS Session on Noncommutative Algebra and Lie Theory

2:15 PM – 5:25 PM **Room 313, BCC**

2:15PM (406) *Polynomials that kill each element of a finite ring.*
Nicholas J Werner, The Ohio State University-Newark (1096-16-405)

2:30PM (407) *Periodic free resolutions from twisted matrix factorizations.*
Andrew Conner*, Wake Forest University, **Thomas Cassidy**, Bucknell University, **Ellen Kirkman** and **W. Frank Moore**, Wake Forest University (1096-16-1730)

2:45PM (408) *Hopf orders in group rings over local fields.* Preliminary report.
G. Griffith Elder, University of Nebraska at Omaha (1096-16-1766)

3:00PM (409) *The Ghost Number for a Finite Group.*
Gaohong Wang, University of Western Ontario (1096-16-1638)

3:15PM (410) *Quantum Subgroups of SL_n.* Preliminary report.
Andrew Jaramillo, University of California, Santa Barbara (1096-16-852)

3:30PM (411) *Splitting Algebras: Koszul and Cohen-Macaulay.*
Tyler Kloefkorn, University of Oregon (1096-16-1836)

3:45PM (412) *Centers of invariant differential operator algebras for Jacobi groups of higher rank.*
Charles H Conley and **Rabin Dahal***, University of North Texas (1096-17-1201)

4:00PM (413) *Classification of orbifold modules using twisted modules.*
Jason R. Elsinger, North Carolina State University (1096-06-1252)

4:15PM ► (414) *Cyclic Leibniz Algebras.*
Allison McAlister Hedges, North Carolina State University (1096-17-1598)

4:30PM (415) *Twisted Toroidal Lie Algebras.*
Chad R Mangum, North Carolina State University (1096-08-1163)

4:45PM (416) *Demazure Crystals for $U_q(D_4^{(3)})$.* Preliminary report.
Alyssa M Armstrong* and **Kailash C Misra**, North Carolina State University (1096-08-1602)

5:00PM (417) *Integral forms and integral bases for universal enveloping algebras of map superalgebras.*
Irfan Bagci*, University of North Georgia, and **Samuel Chamberlin**, Park University (1096-17-363)

5:15PM (418) *Complexity of modules over Lie superalgebras.*
Houssein El Turkey, University of Oklahoma (1096-17-580)

AMS Session on Number Theory, II

2:15 PM – 5:55 PM **Room 311, BCC**

2:15PM (419) *A Polynomial Variation on Meinardus' Theorem.* Preliminary report.
Daniel Parry, Drexel University (1096-11-640)

2:30PM (420) *Self-conjugate core partitions and modular forms.*
Levent Alpoge, Harvard College (1096-11-553)

2:45PM (421) *Eta-quotients and the $\mathbb{Q}$-rational cuspidal subgroup of $J_0(2^n)$.*
John J. B. Webb* and **Jeremy Rouse**, Wake Forest University (1096-11-2291)

3:00PM (422) *Sato-Tate Equidistribution of Satake Parameters.* Preliminary report.
Fan Zhou, Ohio State University (1096-11-266)

3:15PM (423) *Zeros of partial sums of the Dedekind zeta function of a cyclotomic field.*
Arindam Roy*, University of Illinois at Urbana-Champaign, **Andrew Ledoan**, University of Tennessee at Chattanooga, and **Alexandru Zaharescu**, University of Illinois at Urbana-Champaign (1096-11-274)

3:30PM (424) *Weak arithmetic equivalence of number fields.*
Guillermo Mantilla-Soler, École Polytechnique Fédérale de Lausanne (EPFL) (1096-11-2306)

3:45PM (425) *The Lerch zeta function and the Eisenstein-Kronecker series.*
Hieu T Ngo, University of Michigan, Ann Arbor (1096-11-1934)

4:00PM (426) *Low lying zeros of Artin L-functions.*
Peter J Cho*, University at Buffalo, and **Henry H Kim**, University of Toronto (1096-11-542)

4:15PM (427) *Alternate Discriminants and Mass Formulae for Number Fields.* Preliminary report.
Silas Johnson, University of Wisconsin-Madison (1096-11-1826)

4:30PM (428) *Average frequency of local torsion on abelian surfaces.*
Adam Gamzon, Hebrew University of Jerusalem (1096-11-78)

4:45PM (429) *Elliptic curves and applications to concordant pairs within arithmetic progressions and in ratios.*
Bo-Hae Im, Chung-Ang University, Seoul, Korea (1096-11-98)

5:00PM (430) *A Uniform Version of a Finiteness Conjecture for CM Elliptic Curves.*
Abbey M Bourdon, Wesleyan University (1096-11-2345)

5:15PM ► (431) *Abelian Surfaces with Real Multiplication.* Preliminary report.
Hilary J. Smallwood, Colorado State University (1096-11-1286)

5:30PM (432) *Bounding sums of the Möbius function over arithmetic progressions.*
Lynnelle Ye, Stanford University (1096-11-2764)

5:45PM (433) *Numerical computations for a generalization of the theorem of Nakagawa on binary cubic forms.*
Jorge Dioses, Cottey College (1096-11-2702)

MAA Session on Assessing Student Learning: Alternative Approaches, II

2:15 PM – 5:50 PM **Room 340, BCC**

Organizers: **Jane Butterfield**, University of Minnesota
Robert Campbell III, College of St. Benedict/St. John's University
David Clark, University of Minnesota
John Peter, Utica College
Cassie Williams, James Madison University

2:15PM (434) *Students Presentation in Calculus I.*
Yun Lu, Kutztown University of PA (1096-B5-1622)

2:35PM ► (435) *Student Presentations in a Large-Section Calculus Course.* Preliminary report.
Christina E Therkelsen, University of Cincinnati (1096-B5-2460)

2:55PM ► (436) *Assessing Applications in Second-Semester Calculus.* Preliminary report.
Bonnie Gold, Monmouth University (1096-B5-822)

3:15PM (437) *Projects in a Quantitative Reasoning Course.*
Eric Gaze, Bowdoin College (1096-B5-1147)

3:35PM ► (438) *Assessment Across the Spectrum in Courses for Pre-Professional Majors with Calculus I Prerequisites.*
Christopher Oehrlein, Oklahoma City Community College (1096-B5-397)

3:55PM (439) *Assessment Using Typed Feedback and Portfolios in a Course for Middle School Teachers.* Preliminary report.
Reva Kasman, Salem State University (1096-B5-335)

4:15PM (440) *Assessing student learning through writing assignments.*
Joel Louwsma, The University of Oklahoma (1096-B5-609)

4:35PM (441) *Assessing a Capstone Course.*
Thomas R. Hagedorn, The College of New Jersey (1096-B5-2648)

4:55PM ► (442) *Moving Beyond Ritual.*
Clark Wells, Grand Valley State University (1096-B5-2442)

5:15PM (443) *A Mastery-Based Assessment Scheme for Upper-Division Mathematics Courses.* Preliminary report.
Jonathan K. Hodge, Grand Valley State University (1096-B5-282)

5:35PM (444) *Perceptuo-motor Activities as Assessment.*
Hortensia Soto-Johnson, University of Northern Colorado (1096-B5-1109)

MAA Session on Programs and Approaches for Mentoring Women and Minorities in Mathematics

2:15 PM – 4:50 PM **Room 341, BCC**

Organizers: **Jenna Carpenter**, Louisiana Tech University
Brooke Shipley, University of Chicago

2:15PM (445) *Establishing an interdisciplinary cohort to increase females and minorities in mathematics.*
Yu-Ju Kuo* and **Rick Adkins**, Indiana University of Pennsylvania (1096-J1-1792)

► 2:35PM (446) *Retaining and Advancing Female STEM Faculty at Teaching-Focused Institutions.* Preliminary report.
Kate G. McGivney* and **Sarah N Bryant**, Shippensburg University (1096-J1-1075)

► 2:55PM (447) *Grant-Writing Resources: Supporting Women Faculty in STEM through Mentoring.*
Elizabeth A. Burroughs, Montana State University (1096-J1-581)

► 3:15PM (448) *Redesigning Student Mentoring/Research Programs: From the Mentees Vantage Point.*
Abdramane Serme* and **Jean W. Richard**, BMCC/CUNY-The City University of New York (1096-J1-2462)

► 3:35PM (449) *Integrating South Texas Efforts in STEM Education.* Preliminary report.
Cristina Villalobos*, **Olga Ramirez** and **Sakshi Puri**, University of Texas-Pan American (1096-J1-2343)

► 3:55PM (450) *Challenging the Under-representation of women in mathematics: The York Tensor Scholars Program.*
Lidia Gonzalez, York College, CUNY (1096-J1-2310)

► 4:15PM (451) *National Research Experience for Undergraduates Program: A Mathematics Summer Research Program for Minorities.*
Gulden Karakok* and **Brian Christopher**, University of Northern Colorado (1096-J1-2251)

4:35PM (452) *Secret Communication Summer Camp.*
Semra Kilic-Bahi, Colby-Sawyer College (1096-J1-2164)

MAA Session on Projects, Demonstrations, and Activities that Engage Liberal Arts Mathematics Students, II

2:15 PM – 5:50 PM **Room 345, BCC**

Organizer: **Sarah Mabrouk**, Framingham State University

2:15PM (453) *Students Discover Math in the World Around Them: The Use of Projects in a Liberal Arts Mathematics Course.*
Tammy Muhs, University of Central Florida (1096-J5-2631)

► 2:35PM (454) *Civil Rights, Estimation, and Regression.*
Semra Kilic-Bahi, Colby-Sawyer College (1096-J5-2146)

2:55PM (455) *Two short projects for improving financial literacy.*
Paul Taylor, Shippensburg University (1096-J5-399)

► 3:15PM (456) *Engaging first-year students in the mathematics of cryptology: "Ciphers and Heroes".*
Sharon M Frechette, College of the Holy Cross (1096-J5-2609)

► 3:35PM (457) *Using Graph Representations to Solve Puzzles.*
M. Reba* and **D. Shier**, Clemson University (1096-J5-2497)

► 3:55PM (458) *A Tour through Graph Theory: Projects for a Liberal Arts Math Course.*
Karin R Saoub, Roanoke College (1096-J5-326)

► 4:15PM (459) *Projective Geometry for the Liberal Arts Mathematics Class.*
Donna A. Dietz, American University (1096-J5-1338)

► 4:35PM (460) *The Many Facets of Symmetry.*
Thomas Q. Sibley, St. John's University, College of St. Benedict (1096-J5-256)

4:55PM (461) *Creativity, Writing and Mathematics: The FancyPants Strip Pattern Portfolio.*
Shawn J. Chiappetta, University of Sioux Falls (1096-J5-40)

► 5:15PM (462) *Engaging liberal arts students in mathematics.*
Colleen Duffy, University of Wisconsin - Eau Claire (1096-J5-2443)

► 5:35PM (463) *An Exercise in the Philosophy of Mathematics.* Preliminary report.
Charles F. Rocca, Western Connecticut State University (1096-J5-1594)

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

2:15 PM – 5:50 PM **Room 339, BCC**

Organizers: **Jackie Dewar**, Loyola Marymount University
Tom Banchoff, Brown University
Curtis Bennett, Loyola Marymount University

Pam Crawford, Jacksonville University

Edwin Herman, University of Wisconsin-Stevens Point

2:15PM ► (464) *Flip vs. Traditional: A preliminary comparison of student performance and attitudes in Calculus I.* Preliminary report.
Larissa B. Schroeder*, **Jean McGivney-Burelle** and **Fei Xue**, University of Hartford (1096-L5-1452)

2:35PM ► (465) *Using Video, Online Quizzes and Peer Instruction to Teach Integral Calculus.* Preliminary report.
James S Rolf*, **Yu-Wen Hsu**, **Miki Havlickova**, **Susie Kimport** and **Jennifer Frederick**, Yale University (1096-L5-2476)

2:55PM ► (466) *Investigating Student Learning in a Hybrid Calculus I.*
Marilyn Reba*, Clemson University, and **Meredith Burr**, Clemson University (1096-L5-126)

3:15PM ► (467) *Investigating the effects of classroom voting and peer instruction on teaching and learning in an introductory differential equations course.* Preliminary report.
Ron Buckmire, Occidental College (1096-L5-2471)

3:35PM (468) *A Cost-Benefit Analysis of Online Homework Systems.* Preliminary report.
Gregory M. Boudreaux, **Janine M. Haugh***, **Ed Johnson** and **Cathy Whitlock**, University of North Carolina at Asheville (1096-L5-2248)

3:55PM (469) *An Examination of the Effect of Formative Feedback on Student Errors in a Calculus Course.*
H. Smith Risser, Montana Tech (1096-L5-1039)

4:15PM ► (470) *Analyzing Student-Generated Questions in Calculus.* Preliminary report.
Konstantina Christodoulopoulou*, **Fabiana Cardetti** and **Steven Pon**, University of Connecticut (1096-L5-2157)

4:35PM ► (471) *The Impact of WHYU and the Khan Academy on Student Learning in Mathematics.* Preliminary report.
Cynthia Y. Young* and **Heidi A Eisenreich**, University of Central Florida (1096-L5-1863)

4:55PM ► (472) *An Investigation of Mathematics Graduate Teaching Assistants' Teaching Philosophies.* Preliminary report.
Kedar M Nepal, Oklahoma State University, Stillwater, OK (1096-L5-835)

5:15PM ► (473) *The problem of transfer: Explicitly teaching critical thinking in a bridge course.* Preliminary report.
Jeremy Case, Taylor University (1096-L5-1938)

5:35PM ► (474) *The undergraduate mathematics preparation of middle school math teachers.*
Gary A. Harris*, **Tara Stevens** and **Raegan Higgins**, Texas Tech University (1096-L5-438)

MAA Session on Topics and Techniques for Teaching Real Analysis, II

2:15 PM – 5:10 PM **Room 349, BCC**

Organizers: **Paul Musial**, Chicago State University

Robert W. Vallin, Slippery Rock University

Erik Talvila, University of the Fraser Valley

James Peterson, Alma College

2:15PM ► (475) *It's Not the Moore Method But..: A Student Driven Textbook supported Approach to Teaching Real Analysis.* Preliminary report.
Kathleen M. Shannon, Salisbury University (1096-N1-535)

2:35PM ► (476) *Using Counterexamples of Calculus to Teach Real Analysis.*
Jeffrey Clark, Elon University (1096-N1-898)

2:55PM ► (477) *One Proof is Not Enough.* Preliminary report.
Cesar E. Silva, Williams College (1096-N1-2324)

3:15PM (478) *Helping Students Overcome Discouragement in Real Analysis.*
Rebekah B. Johnson Yates, Houghton College (1096-N1-2563)

3:35PM ► (479) *Spice up your Real Analysis Class with In-Class Presentations.*
Paul Martin Musial, Chicago State University (1096-N1-1485)

3:55PM ► (480) *Local Maximum Functions in Real Analysis.*
Peter A Loeb, Dept. of Mathematics, University of Illinois, Champaign-Urbana (1096-N1-643)

4:15PM ► (481) *Two sets of Moore-Method Analysis notes and two websites that support them.*
William T. Mahavier, Lamar University (1096-N1-1677)

4:35PM ► (482) *Teaching positive series and generalized derivatives.*
J. Marshall Ash, DePaul University (1096-N1-1992)

4:55PM ► (483) *Gently Introducing IBL in Advanced Calculus.*
Robert W. Vallin, Slippery Rock University (1096-N1-1042)

MAA Session on We Did More with Less: Streamlining the Undergraduate Mathematics Curriculum

2:15 PM – 4:30 PM **Room 350, BCC**

Organizers: **Wade Ellis**, West Valley College
Barbara Edwards, Oregon State University

2:15PM Introduction and discussion.

2:35PM (484) *Inverting the Classroom on a Tight Budget.*
Carren S Walker, C.S. Walker Educational Group, and **Joan M Zoellner***, Clark College (1096-Q5-1279)

2:55PM ► (485) *Activities That Help Understanding – That Cost the College Nothing!* Preliminary report.
Joanne Peeples, El Paso Community College, El Paso, TX (1096-Q5-1851)

3:15PM (486) *Maximizing Student Outcomes with Minimal Resources in College Algebra at the University of Illinois.* Preliminary report.
Alison Ahlgren Reddy, University of Illinois (1096-Q5-950)

3:55PM ► (487) *Adapting the Singapore Model Method of Problem Solving Framework to College Level.*
Umesh P. Nagarkatte*, **Joshua Berenbom**, **Kay Lashley**, **Herbert Odunukwe** and **Lavoizier St. Jean**, Medgar Evers College, CUNY (1096-Q5-1270)

4:15PM (488) *Improving success rates in developmental math with existing resources.*
John R Wilkins, California State University, Dominguez Hills (1096-Q5-2451)

MAA Session on the Intersection of Mathematics and the Arts, II

2:15 PM – 5:50 PM **Room 338, BCC**

Organizer: **Douglas Norton**, Villanova University

2:15PM ► (489) *More Mathematics of Pop-up Books.*
Jennifer Wilson* and **Vidhya Kamdar**, Eugene Lang College the New School for Liberal Arts (1096-C5-2224)

2:35PM ► (490) *Using Doodles to Teach the Math of Art.*
Martha Ellen Waggoner, Simpson College (1096-C5-2152)

2:55PM ► (491) *Incorporating art in mathematical teaching and assessment as image-based learning.*
Lina Wu, Borough of Manhattan Community College (1096-C5-1431)

3:15PM ► (492) *Symmetry Variation in Hmong Fabric Arts.* Preliminary report.
Darrah P. Chavey, Beloit College (1096-C5-2475)

3:35PM ► (493) *Spindle Design.*
Neal Brand, University of North Texas (1096-C5-303)

3:55PM ► (494) *A Mathematical Perspective of Rome's Twin Churches.* Preliminary report.
Michael Huber, Muhlenberg College (1096-C5-226)

4:15PM ► (495) *Which Planar Crystallographic Groups May Be Found in Mamluk Geometric Ornamentation?*
B Lynn Bodner, Monmouth University (1096-C5-844)

4:35PM ► (496) *Planar and Spherical Iterations of Borromean Rings.*
Douglas G. Burkholder, Lenoir-Rhyne University (1096-C5-848)

4:55PM ► (497) *Fibonacci Circle Curves.*
Susan Happersett, Artist (1096-C5-1802)

5:15PM ► (498) *Interesting Artworks on Magic Squares.*
Hossein Behforooz, Utica College (1096-C5-330)

5:35PM ► (499) *Finding the Way with Mathematics.*
Susan McBurney, Western Springs, IL (1096-C5-467)

MAA General Contributed Paper Session on Mathematics Education, I

2:15 PM – 5:55 PM **Room 347, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

2:15PM ► (500) *Math meets drama: Introducing constructivist pedagogy to prospective elementary teachers.*
Erin R Moss, Millersville University of Pennsylvania (1096-VE-2692)

2:30PM (501) *Using Think-Alouds in an Undergraduate Mathematics Course for Preservice Elementary School Teachers.* Preliminary report.
Donna L. Beers, Simmons College (1096-VE-2579)

2:45PM ► (502) *What to include in a numeracy course.*
Suzanne Keilson, Baltimore (1096-VE-2691)

3:00PM (503) *Using Inquiry-Based Learning in Courses for Prospective Elementary Teachers.*
Stan Yoshinobu, Cal Poly San Luis Obispo (1096-VE-429)

3:15PM ► (504) *Louisiana Mathematics Masters in the Middle.* Preliminary report.
Kathleen D. Lopez*, **Patricia Beaulieu**, University of Louisiana at Lafayette, and **Peter A. Sheppard**, EDCI Dept, University of Louisiana at Lafayette (1096-VE-2489)

3:30PM ► (505) *Improving the Quality of Instruction in Middle School Mathematics.* **Mahmoud A. Yousef*** and **Shing S. So**, University of Central Missouri (1096-VE-901)

3:45PM ► (506) *Organizing a Middle Grades Summer Math Camp with Pre-Service Teachers.* **Bethany Noblitt*** and **Brooke Buckley**, Northern Kentucky University (1096-VE-77)

4:00PM ► (507) *Providing opportunities for prospective teachers to engage in mathematical practice and mathematize situations outside of school mathematics.* Preliminary report. **Lynette D Guzman**, Michigan State University (1096-VE-632)

4:15PM ► (508) *Divvying up the Practice Field: Student Solutions.* **Diana S Cheng** and **Rachel Jones***, Towson University (1096-VE-354)

4:30PM (509) *Investigating the connections between content-based professional development and teachers' instructional choices.* **Priya V. Prasad**, University of Arizona (1096-VE-1793)

4:45PM (510) *Authentic Discovery Projects in Elementary Statistics: Implementation and Impact on Student Outcomes.* Preliminary report. **Dianna J. Spence*** and **Brad Bailey**, University of North Georgia (1096-VE-1130)

5:00PM ► (511) *What is the best approach to teach the Central limit theorem?* **Aldo R Maldonado**, Park University (1096-VE-914)

5:15PM ► (512) *The bane of notation abuse and the endangered art of symbolic reasoning in mathematics education.* Preliminary report. **Raymond T. Boute**, Ghent University (1096-VE-1343)

5:30PM ► (513) *Modeling the variations in students' coordination of units.* **Steven J Boyce**, Virginia Tech (1096-VE-651)

5:45PM ► (514) *Jeevan EXP-LOG Method for real, imaginary and complex homogeneous and non-homogeneous polynomial equations.* Preliminary report. **Jeevan Kumar Neelam**, Vaagdevi College of Engineering Warangal (1096-VE-17)

MAA General Contributed Paper Session on Research in Algebra and Topology, I

2:15 PM – 5:55 PM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

2:30PM (515) *Locally Solvable Subgroups of PLo(I).* **Amanda Taylor**, Binghamton University (1096-VJ-2708)

2:45PM ► (516) *On the Character Degree Simplicial Complex of a Finite Solvable Group.* Preliminary report. **Sara Jensen**, The University of Wisconsin Madison (1096-VJ-735)

3:00PM (517) *Lower Bounds on the Number of Maximal Subgroups in a Finite Group.* **L. K. Lauderdale**, University of Florida (1096-VJ-2243)

3:15PM ► (518) *Classifying Families of Polynomial Knots.* Preliminary report. **Lee Stemkoski*** and **Salvatore P Giunta**, Adelphi University (1096-VJ-2653)

3:30PM ► (519) *Absolute resolvents for quartic polynomials.* **Chad Awtrey***, Elon University, **Brett Barkley**, University of Maryland, College Park, **Jeremy Guinn** and **Mackenzie McCraw**, Elon University (1096-VJ-1275)

3:45PM (520) *On Classifying the Double Cosets* $H_k \backslash G_k / H_k$ *of* SL$(2, k)$. **Emma Norbrothen**, Plymouth State University (1096-VJ-2389)

4:00PM (521) *Connectivity in Semialgebraic Sets.* Preliminary report. **Hoon Hong**, **James Rohal***, North Carolina State University, **Mohab Safey El Din**, Université Pierre et Marie Curie, and **Éric Schost**, University of Western Ontario (1096-VJ-2257)

4:15PM ► (522) *Use of Topological Data Analysis to investigate species connectivity in the Northern Great Plains Ecoregion.* Preliminary report. **Carl Olimb**, Southwest Minnesota State University (1096-VJ-1699)

4:30PM (523) *Indicator of Tambara-Yamagami Categories.* **Ryan T Johnson**, Iowa State University (1096-VJ-2250)

4:45PM ► (524) *The number of zeros of linear recurring sequences over finite fields.* Preliminary report. **Yasanthi Kottegoda**, Southern Illinois University Carbondale (1096-VJ-1907)

5:00PM ► (525) *Tile Counting Group by Invariants.* **Amanda Bright***, Westminster College, MO, **Gregory Clark**, Westminster College, PA, **Brian Keating**, University of California San Diego, **Brian Whetter**, University of Puget Sound, **Kyle Evitts** and **Levi Altringer**, Linfield College (1096-VJ-1880)

5:15PM ► (526) *An Algebraic Approach to Annular Tilings.* **Gregory J. Clark**, Westminster College (1096-VJ-1790)

5:30PM ► (527) *Looking Glass Neofields.* **Scott Lacy**, University of Texas at Arlington (1096-VJ-1707)

5:45PM (528) *On a wonderful correspondence between Hilbert series of unitarizable highest weight modules.* Preliminary report.
Jordan Alexander, Baylor University (1096-VJ-1312)

MAA General Contributed Paper Session on Research in Graph Theory and Combinatorics, I

2:15 PM – 5:55 PM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

2:15PM ► (529) *On the Existence and Structure of Edge-Regular Graphs.*
K. Bragan*, **J. Hammer**, **P. Johnson**, Auburn University, and **K. Roblee**, Troy University (1096-VN-2680)

2:30PM ► (530) *Distinguished-color rainbow connection in graphs.* Preliminary report.
Janet L. Fierson* and **Katherine Boligitz**, La Salle University (1096-VN-2677)

2:45PM ► (531) *More Results on Harmoniously Critical Graphs.* Preliminary report.
Natacha C. Fontes-Merz*, Westminster College, **Jeffrey Boerner**, University of Wisconsin - Stout, and **James Anthony**, Westminster College (1096-VN-2647)

3:00PM (532) *On cyclic decompositions of $K_{n-1,n-1} + I$ into a 2-regular graph with at most 2 components.*
Ellen K Sparks*, St. Anne Community High School, **Adriana Arias**, California State University Long Beach, **Ryan C. Bunge**, Illinois State University, **Maira Carmona Herrera**, Central Washington University, **Saad I El-Zanati**, Illinois State University, and **Uthoomporn Jongthawonwuth**, Chulalongkorn University (1096-VN-2630)

3:15PM (533) *The generalized Terwilliger algebra of a distance-regular graph and a double affine Hecke algebra.*
Jae-Ho Lee, University of Wisconsin-Madison (1096-VN-2547)

3:30PM (534) *Finite Factors and Graph Labelings.*
Andrew Lazowski, Sacred Heart University (1096-VN-2364)

3:45PM (535) *Hamiltonian Ptolemaic Graphs are Cycle Extendable.*
Aydin Gerek* and **Garth T. Isaak**, Lehigh University (1096-VN-2238)

4:00PM (536) *Graphs defined by systems of equations.*
Brian G. Kronenthal, Kutztown University of Pennsylvania (1096-VN-2225)

4:15PM ► (537) *Assembly Number and Loop Saturated Graphs.* Preliminary report.
Tilahun A Muche, Savannah State University, GA (1096-VN-1857)

4:30PM (538) *Path Elongation of Graphs.* Preliminary report.
Brad Bailey* and **Dianna J. Spence**, University of North Georgia (1096-VN-1132)

4:45PM (539) *Representations Arising from an Action on D-neighborhoods of Cayley Graphs.*
Justin R. Hughes, Colorado State University (1096-VN-1072)

5:00PM (540) *Cyclic Dominating Sets in Cayley Graphs.*
Matthew Lee Force*, **Jon Woltz** and **Joe DeMaio**, Kennesaw State University (1096-VN-714)

5:15PM ► (541) *The Pac Man Graph: The Roots of a Class of Partition Polynomials.* Preliminary report.
Daniel Parry, Drexel Unviersity (1096-VN-635)

5:30PM ► (542) *Proper interval p-graphs.* Preliminary report.
Breeann M Flesch*, Western Oregon University, and **David E Brown**, Utah State University (1096-VN-571)

5:45PM ► (543) *The Fibonacci Number of the Tadpole Graph.* Preliminary report.
Joe DeMaio*, Kennesaw State University, and **John Jacobson**, Link Analytics (1096-VN-565)

SIAM Minisymposium on Recent Advances in Partial Differential Equations Modeling Physical Systems

2:15 PM – 6:10 PM **Room 325, BCC**

Organizer: **Edriss S. Titi**, University of California Irvine and Weizmann Institute of Science

2:15PM (544) *Local formulas for the hydrodynamic pressure and applications.* Preliminary report.
Peter Constantin, Princeton University (1096-35-1969)

2:45PM (545) *Wave turbulence closures and limits.* Preliminary report.
Zaher Hani, Courant Institute of Mathematical Sciences, NYU (1096-35-1243)

3:15PM (546) *A scattering theory construction of dynamical vacuum black hole spacetimes.*
Mihalis Dafermos*, Princeton University/University of Cambridge, **Gustav Holzegel**, Imperial College London, and **Igor Rodnianski**, Princeton University/MIT (1096-35-1590)

3:45PM (547) *Long time behavior of flow-structure interaction without mechanical dissipation.*
Irena Lasiecka, University of Memphis (1096-35-1233)

4:15PM ► (548) *The Multi-Configuration Time Dependent Hartree-Fock Equations.*
Saber Trabelsi, King Abdullah University of Science and Technology (1096-35-1757)

4:45PM (549) *2D Boussinesq equations and 2D MHD equations.*
Chongsheng Cao, Florida International University (1096-35-1611)

5:15PM (550) *Nonlinear lower bounds for linear nonlocal operators.*
Peter Constantin and **Vlad Vicol***, Princeton University (1096-35-1468)

5:45PM (551) *On a nonlinear model for tumor growth: Global in time weak solutions.*
Donatella Donatelli, University of L'Aquilla, and **Konstantina Trivisa***, University of Maryland (1096-35-1110)

MAA Poster Session of Projects Supported by the NSF Division of Undergraduate Education

2:15 PM – 4:15 PM **Exhibit Hall G, 100 Level, BCC**

Organizer: **Jon Scott**, Montgomery College

2:15PM (552) *WeBWorK: Improving Student Success in Mathematics.*
Arnold Pizer*, **Michael Gage**, **Vicki Roth**, University of Rochester, **Jason Aubrey**, University of Arizona, and **John Travis**, Mississippi College

2:15PM (553) *Collaborative Research: Updating the WeBWorK National Problem Library.*
Jeff Holt*, University of Virginia, and **John Jones**, Arizona State University

2:15PM (554) *STEM Real World Applications of Mathematics.*
Joy Lind, University of Sioux Falls, and **Darren A. Narayan***, Rochester Institute of Technology

2:15PM (555) *Collaborative Research: Maplets for Calculus.*
Philip B. Yasskin*, Texas A&M University, **Douglas B. Meade**, University of South Carolina, and **Matthew J. Barry**, Texas A&M University

2:15PM (556) *Colorado Momentum: Oral Assessment in the Mathematical Sciences Classroom.*
Mary Nelson*, **Harvey Segur** and **Anne Dougherty**, University of Colorado, Boulder

2:15PM (557) *Undergraduate Mathematical Biology Research at Marshall University Anna Mummert, Marshall University.*
Anna Mummert, Marshall University

2:15PM (558) *Collaborative Research on the Arthropod Way of Life (CRAWL): Interdisciplinary Training in Mathematical Biology.*
Michele L. Joyner*, **Darrell Moore**, **Thomas C. Jones**, **Karl Joplin** and **Edith Seier**, East Tennessee State University

2:15PM (559) *Using Research to Shape Instruction and Placement in Algebra and Precalculus.*
Bernard L. Madison*, University of Arkansas, **Linda Braddy**, MAA, **Caren Diefenderfer**, Hollins University, and **Marilyn Carlson**, Arizona State University

2:15PM (560) *Learning Mathematics Through Teaching.*
Karen Graham*, University of New Hampshire, **Tim Fukawa-Connelly**, Drexel University, **Sharon Soucy McCrone**, **Neil Portnoy**, **May Chaar**, University of New Hampshire, and **Brian Gleason**, Nevada State University, Las Vegas

2:15PM (561) *Supporting Pedagogical Innovation for a Generation of Transformation via Inquiry-Based Learning in Mathematics (SPIGOT).*
Stan Yoshinobu*, California Polytechnic State University, San Luis Obispo,, **Carol Schumacher**, Kenyon College, **Matthew Jones**, California State University, Dominguez Hills, and **Sandra L. Laursen**, University of Colorado

2:15PM (562) *Nebraska Math.*
Jim Lewis, University of Nebraska-Lincoln

2:15PM (563) *Mathematical ACES: Algebraic Concepts for Elementary Students.*
Davida Fischman*, **Shawn McMurran**, **Joseph Jesunathadas**, California State University, San Bernardino, **Karla Wells** and **Carol Cronk**, Ontario Montclair School District

2:15PM (564) *Developing an Innovative Randomization-Based Introductory Statistics Curriculum.*
Todd Swanson*, **Jill VanderStoep**, Hope College, **Nathan Tintle**, Dordt College, **George Cobb**, Mount Holyoke College, **Allan Rossman**, **Beth Chance** and **Soma Roy**, California Polytechnic State University, San Luis Obispo

2:15PM (565) *Kent State University Noyce Scholars Program.*
Joanne Caniglia*, **Lisa Donnelly**, **James Gleeson**, **Andrew Tonge** and **John Stalvey**, Kent State University

2:15PM (566) *Talented Teachers In Training for Texas (T4).*
Keith Hubbard*, **Lesa Beverly**, **Karen Embry Jenlink** and **Dennis Gravatt**, Stephen F. Austin State University

2:15PM (567) *An NSF MSP - Its Genesis, Goals, Activities, and Outcome.*
Amy Cohen*, Rutgers University, **Cecilia Aria**, **Lynda Ginsburg** and **Jennifer V. Jones**, Rutgers Center for Math, Science, and Computer Education

2:15PM (568) *Characteristics of Successful Programs in College Calculus.*
David Bressoud*, Macalester College, **Chris Rasmussen**, San Diego State University, **Vilma Mesa**, University of Michigan, and **Linda Braddy**, MAA

2:15PM (569) *UCI Mathematical and Computational Biology for Undergraduates (MCBU).*
Frederic Y. Wan, **Sarah Eichhorn***, **German Enciso**, **John S. Lowengrub** and **J. Lawrence Marsh**, University of California, Irvine

2:15PM (570) *Preparing Graduate Students to Teach Undergraduate Mathematics: A Working Conference.*
Robin Gottlieb*, Harvard University, **Natasha Speer**, University of Maine, **Jack Bookman** and **Sarah Schott**, Duke University

2:15PM (571) *Quantitative Literacy and Reasoning Assessment.*
Eric Gaze*, Bowdoin College, **Linda Misener**, Southern Maine Community College, and **Semra Kilic-Bahi**, Colby-Sawyer College

2:15PM (572) *Noyce at Montclair: Preparing the Effective Elementary Teacher.*
Steven Greenstein*, **Erin Krupa** and **Trina Wooten**, Montclair State University

2:15PM (573) *Research Based Videos for Developing Mathematical Thinking Skills in Proof Writing and Problem Solving.*
Jim Sandefur*, Georgetown University, **Kay Somers**, Moravian College, and **Connie Campbell**, Millsaps College

2:15PM (574) *Ithaca College Robert Noyce Teaching Scholarship Program.*
David Brown*, **Michael Rogers**, **Matthew Price**, **Aaron Weinberg**, **Linda Hanrahan**, **Marty Alderman** and **Jim Overhiser**, Ithaca College

2:15PM (575) *Emphasizing Core Calculus Concepts Using Biomedical Applications to Engage, Mentor and Retain STEM Students.*
Marilyn Reba*, **Taufiquar Khan**, **Irina Viktorova**, **Ellen Breazel** and **John DesJardins**, Clemson University

2:15PM (576) *Mathematics Partnering with Computer Sciences to Improve Calculus Instruction and Learning.*
Calvin L. Williams, **Marilyn Reba*** and **Roy Pargas**, Clemson University

2:15PM (577) *Quantitative and Mathematics Support Centers Workshop to Develop Handbook of Best Practices.*
Michael Schuckers*, St. Lawrence University, **Grace Coulombe**, Bates College, **Mary O'Neill**, Hamilton College, and **McKayla Nuffer**, St. Lawrence University

2:15PM (578) *Pathways to Calculus: Disseminating and Scaling Precalculus Curriculum and a Professional Development Model for Precalculus Teaching and Learning.*
Marilyn Carlson, Arizona State University

2:15PM (579) *Collaborative Research: Maplets for Calculus.*
Douglas B. Meade*, **Raymond E. Patenaude**, University of South Carolina, and **Philip B. Yasskin**, Texas A&M University

2:15PM (580) *PRIME: Preparing Regional Increases in Mathematics Educators.*
Teri J. Murphy*, **Brooke Buckley**, **Sarah Kasten** and **Bethany Noblitt**, Northern Kentucky University

2:15PM (581) *Delaware State University Scholarships for Teachers in Mathematics and Science.*
Rayton Sianjina, **Nicola Edwards-Omolewa***, **Sabrina McGary**, **Tomasz Smolinski** and **Cherese Winstead**, Delaware State University

2:15PM (582) *Paradigms in Physics: Interactive Electromagnetism Curricular Materials.*
Tevian Dray*, **Corinne Manogue**, **Emily van Zee**, **David Roundy** and **Eric Weber**, Oregon State University

2:15PM (583) *Attracting Liberal Arts STEM Majors to Teaching: Challenges and Successes in our Noyce Program.*
Catherine A. Roberts*, **D. Bukatko**, **B. Bell**, **D. Bitran**, **C. A. Roberts** and **J. Shertzer**, College of the Holy Cross

2:15PM (584) *Winthrop Initiative for STEM Educators.*
Joseph Rusinko*, **Beth Costner**, **Cassandra Bell** and **Kelly Costner**, Winthrop University

2:15PM (585) *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

2:15PM (586) *Enhancing the 5 YR Math and Science Education Programs at SJU.*
Sandra Fillebrown*, **Tetyana Berezovski**, **Michael Clapper**, **Michael McCann** and **Karen Snetselaar**, St Joseph's University

2:15PM (587) *The Northeast Tennessee Robert Noyce Scholarship Program.*
Jeff Knisley*, **Aimee Govett**, **Robert Beeler**, **Daryl Stephens** and **Ryan Nivens**, East Tennessee State University

2:15PM (588) *Preparing to Train STEM Professionals as Educators.*
Mohammed A. Qazi*, **Carlton Morris**, **Alicia Curry**, **Michael Curry**, **Melvin Gadson**, **Lauretta Garrett** and **Gerald Griffin**, Tuskegee, University

2:15PM (589) *Distributome: An Interactive Web-based Resource for Probability Distributions.*
Kyle Siegrist*, University of Alabama in Huntsville, **Ivo Dinov**, University of Michigan, and **Dennis Pearl**, The Ohio State University

2:15PM (590) *The Alfred University Calculus Initiative (AUCI).*
Joseph Petrillo*, **Darwyn Cook** and **Addison Frey**, Alfred University

2:15PM (591) *Columbus Region Academy of Future Teachers of STEM.*
Tim Howard*, **Deborah Gober**, **Kimberly Shaw** and **Cindy Ticknor**, Columbus State University

2:15PM (592) *Mobile Math Apps.*
Doug Ensley*, **Lea Adams**, Shippensburg University, and **Barbara Kaskosz**, University of Rhode Island

2:15PM (593) *Math in the City.*
Petronela Radu*, **Alexandra Seceleanu**, **Katie Haymaker** and **Stephen Hartke**, University of Nebraska-Lincoln

2:15PM (594) *Recruiting and Preparing Mathematics Majors for Houston-Area Classrooms: The University of Houston-Downtown Noyce Mathematics Teacher Scholarship Program.*
Timothy A. Redl*, **Rebecca J. Quander**, **Nancy A. Leveille**, **Jacqueline J. Sack** and **Michael L. Connell**, University of Houston-Downtown

2:15PM (595) *Mathematical Reasoning and Argumentation: What are the Tripping Points for Mathematics and Non-mathematics Undergraduates?*
K. Ann Renninger*, **D. Abram Lipman** and **Allison Gantt**, Swarthmore College

2:15PM (596) *Collaborative Research: Maplets for Calculus – Incorporating the M4C into MathLynx.*
John A. Velling*, Brooklyn College and the CUNY Graduate Center, **Terrence Blackman**, University of Colorado, Denver, and **Jerald Smith**, MathLynx Project (1096-00-1350)

2:15PM (597) *Discovery Learning Projects in Introductory Statistics.*
Dianna Spence* and **Brad Bailey**, University of North Georgia

2:15PM (598) *Quantitative Reasoning for Business: an Inquiry-Based Approach.*
Victor Piercey, Ferris State University

2:15PM (599) *PREP: MAA's Professional Development Program.*
Nancy Hastings*, Dickinson College, **Barbara Edwards**, Oregon State University, **Nathaniel Dean**, Texas State University San Marco, **Virginia Buchanan**, Hiram College, **Mike Brilleslyper**, United States Air Force Academy, **Linda Braddy**, MAA, **Jenna Carpenter**, Louisiana Tech University, and **Jon Scott**, Montgomery College

2:15PM (600) *Robert Noyce Teacher Academy at the College of Staten Island (CUNY).*
Jane Coffee*, **Irina Lyublinskaya** and **Susan Sullivan**, College of Staten Island (CUNY)

2:15PM (601) *Robert Noyce Program in Mathematics at the University of Houston-Clear Lake.*
Thomas Fox* and **Jana Willis**, University of Houston - Clear Lake

2:15PM (602) *Flipping Calculus at the University of Hartford.* Preliminary report.
John Williams, **Mako Haruta**, **Jean McGivney-Burelle**, **Ben Pollina**, **Larissa B. Schroeder*** and **Fei Xue**, University of Hartford

2:15PM (603) *Mathematics and Social Advocacy.*
Sandra Kingan* and **Jeff Suzuki**, Brooklyn College, City University of New York

2:15PM (604) *Central Washington University Robert Noyce Scholarship Program: Science and Mathematics Alliance for the Retention of Teachers (SMART).*
Janet Shiver*, **Chris Black**, **Martha Kurtz**, **Jan Byers-Kirsch** and **Tim Sorey**, Central Washington University

2:15PM (605) *Student Presentations; Engaging Students and "Delivering" Content.*
Katie Mawhinney, Appalachian State University

2:15PM (606) *Collaborative Research: Developing Inquiry Oriented Instructional Materials for Linear Algebra.*
Megan Wawro*, Virginia Tech, **Michelle Zandieh**, Arizona State University, **Chris Rasmussen**, San Diego State University, and **Christine Andrews-Larson**, Florida State University

2:15PM (607) *Should I Unplug?*
Lori Carmack, Salisbury University

2:15PM (608) *Undergraduate Sustainability Experiences in Mathematics.*
Benjamin Galluzzo*, Shippensburg University, and **Corrine Taylor**, Wellesley College

2:15PM (609) *Collaboration, Observation, and Revision: Lesson Study in Teacher Preparation.*
Usha Kotelawala* and **Robert Graham**, Fordham University (1096-00-2033)

2:15PM (610) *Preparing Students for Business, Industry, and Government Careers (Pre-BIG).*
Michael Dorff*, Brigham Young University, **Linda Braddy**, MAA, **Reza Malek-Madani**, U.S. Naval Academy, and **Suzanne Weekes**, Worcester Polytechnic Institute

2:15PM (611) *Revitalizing Complex Analysis at the Undergraduate Level.*
Russell Howell*, Westmont College, **Alan Noel**, Oklahoma State University, and **Paul Zorn**, St. Olaf College

2:15PM (612) *Dynamic Visualization Tools for Multivariable Calculus.*
Paul Seeburger*, Monroe Community College, and **Monica VanDieren**, Robert Morris University

2:15PM (613) *Modules for Teaching Statistics with Pedagogies using Active Learning (MTStatPAL).*
Tom Cheatham, **Nancy McCormick**, **Scott McDaniel**, **Ginger Holmes Rowell***, **Jeremy Strayer**, **Natasha Gerstenschlager** and **Brandon Hanson**, Middle Tennessee State University

2:15PM (614) *Mathematics as a FirstSTEP to Success in STEM.*
Tom Cheatham, **Donald Nelson**, **Elaine Bouldin Tenpenny**, **Ginger Holmes Rowell***, **Chris Stephens**, **Brittany Smith** and **Jennifer Yantz**, Middle Tennessee State University

2:15PM (615) *Tree and Graph Structures in the Java Programming Language.*
Joan M. Lucas* and **Rebecca Smith**, The College at Brockport, State University of New York

2:15PM (616) *Transforming Linear Algebra Education with GeoGebra Applets.*
James D. Factor* and **Susan Pustejovsky**, Alverno College

2:15PM (617) *Collaborative Research: Linear Algebra in New Environments (LINE).*
William O. Martin*, North Dakota State University, **Laurel Cooley**, Brooklyn College, CUNY, and **Draga Vidakovic**, Georgia State University

2:15PM (618) *Hampton University Robert Noyce Teacher Scholarship Program: Advancing A Research Focused Agenda for Pre-Service Math and Biology Teachers.*
Carolyn B. Morgan* and **Clair Berube**, Hampton University

2:15PM (619) *Open the Gate Robert Noyce Teacher Scholars Program.*
Ruth Cossey*, Mills College, **Margo Mc Inturff**, Montera Middle School, Oakland Unified School District, and **Steve Luntz**, Mills College

2:15PM (620) *Math Images.*
Gene Klotz, Swarthmore College

2:15PM (621) *Creating Effective Online Homework Problems in Calculus (Using WeBWorK).*
Paul Seeburger, Monroe Community College

2:15PM (622) *When Zombies Attack: Laboratory Experiences in Mathematical Biology.*
Andrea Bruder*, **B. Kohler**, **M. Kummel** and **J. Powell**, Colorado College

2:15PM (623) *Lurch, Educational Software for Writing Proofs.*
Kenneth Monks*, University of Scranton, and **Nathan Carter**, Bentley University

2:15PM (624) *Playing Games with a Purpose: A New Approach to Teaching and Learning Statistics.*
Shonda R. Kuiper*, Grinnell College, **Rodney Sturdivant**, **Billy Kaczynski**, **John Jackson** and **Kevin Cummiskey**, United States Military Academy

2:15PM (625) *Robert Noyce Teacher Scholarship Program at California State University, Stanislaus: Teachers from the Valley, for the Valley.*
Viji Sundar, California State University-Stanislaus

AMS-ASA-MAA-SIAM Special Presentation

2:15 PM – 3:45 PM **Room 336, BCC**

INGenIOuS: Workforce preparation for students in the mathematical sciences.

Organizers: **John Bailer**, Miami University
Jenna Carpenter, Louisiana Tech University
William Jaco, Oklahoma State University
Peter Turner, Clarkson University
Paul Zorn, St. Olaf College

MAA-Young Mathematicians' Network Panel Discussion

2:15 PM – 3:35 PM **Room 316, BCC**

Career options for undergraduate mathematics majors.

Organizers: **Timothy Goldberg**, Lenoir-Rhyne University
Ralucca Gera, Naval Posgraduate School

Panelists: **Emily Kessler**, Society of Actuaries
Rebecca Goldin, George Mason University
John Workman, The Advisory Board Company
Kim Sacra, National Security Agency

MAA-NSF Panel Discussion

2:15 PM – 3:35 PM **Room 327, BCC**

NSF programs supporting learning, teaching, and the future workforce in mathematics.

Organizers: **Lee Zia**, National Science Foundation
Michael Jacobson, National Science Foundation
Ron Buckmire, National Science Foundation
Jennifer Pearl, National Science Foundation

AWM Panel Discussion

2:15 PM – 3:40 PM **Room 326, BCC**

Building a research career in mathematics.

Organizers: **Bettye Ann Case**, Florida State University

Christina Sormani, City University of New York

Panelists: **Ruth Charney**, Brandeis University

Joan Hutchinson, Macalester College, Smith College emerita

Deleram Kahrobaei, CUNYGC and NYC College of Technology

Tanya Leise, Amherst College

Chikako Mese, John Hopkins University

Judy Walker, University of Nebraska

AMS Session on Geometric Applications of Combinatorics and K-Theory

2:30 PM – 5:55 PM **Room 312, BCC**

2:30PM (626) *Using a Generalization of Young Diagrams to Study a Normality Problem.* **Ellen J. Goldstein**, Boston College (1096-14-1223)

2:45PM ► (627) *Combinatorics of diagrams of permutations.* Preliminary report. **Joel Brewster Lewis**, University of Minnesota, and **Alejandro H. Morales***, LaCIM, Université du Québec à Montréal (1096-05-2473)

3:00PM (628) *Monomial Principalization in the Singular Setting.* **Corey Harris**, Florida State University (1096-14-2470)

3:15PM (629) *Peterson Varieties: a Uniform Giambelli's Formula.* **Elizabeth Drellich**, University of Massachusetts, Amherst (1096-05-1623)

3:30PM (630) *New aspects of lattice regions whose tilings are enumerated by perfect powers.* **Tri Lai**, Indiana University Bloomington (1096-05-625)

3:45PM (631) *Lozenge tilings, the weak Lefschetz property, and Laplace equations.* **David Cook II***, University of Notre Dame, and **Uwe Nagel**, University of Kentucky (1096-05-137)

4:00PM ► (632) *Tilings of Annular Regions.* **Kyle Evitts***, Linfield College, **Brian Whetter**, University of Puget Sound, and **Brian Keating**, University of California: San Diego (1096-51-1246)

4:15PM (633) *Realization spaces of phased matroids.* **Amanda Ruiz**, Harvey Mudd College (1096-05-2752)

4:30PM (634) *Macaulay decomposability and the flag f-vectors of generalized colored complexes.* **Kai Fong Ernest Chong**, Cornell University (1096-05-1883)

4:45PM (635) *A combinatorial duality theorem for syzygies of Veronese ideals of weighted projective space.* **Stepan Paul**, California Polytechnic State University (1096-13-985)

5:00PM (636) *An Elementary Construction of a Hive Associated to a Hermitian Matrix Pair, with Interpretations of Littelmann Path Operators.* Preliminary report. **Glenn Appleby*** and **Tamsen Whitehead**, Santa Clara University (1096-05-1855)

5:15PM ► (637) *On Virtual Group Presentation.* **Mayra Lopez** and **Noureen Khan***, University of North Texas at Dallas (1096-55-2614)

5:30PM (638) *A Bivariant Theory for Quasi-Projective Schemes.* **Mona Mocanasu**, Metropolitan State University of Denver (1096-19-645)

5:45PM (639) *The Real K-theory of compact Lie groups.* **Chi-Kwong Fok**, Cornell University (1096-19-702)

AMS Session on Mathematical Modeling and Mathematical Biology

2:30 PM – 5:25 PM **Room 305, BCC**

2:30PM ► (640) *Data clustering algorithms for ultrasound imaging of atherosclerotic plaques.* **Amanda J Mangum***, Biomathematics Graduate Program, NC State University, and **Mansoor A. Haider**, NC State University (1096-92-2070)

2:45PM ► (641) *Exploring the Uniformity of Transmembrane Alpha-helix.* **Jack Quine**, Florida State University, and **Yuanting Lu***, Mercer University (1096-92-1789)

3:00PM (642) *A mathematical model of macrophage reverse cholesterol transport by high density lipoproteins.* **Lake R Ritter**, Southern Polytechnic State University (1096-92-244)

3:15PM ► (643) *Optimal Control and Analysis of a Coupled ODE/PDE Immuno-epidemiological Model.* **Eric S Numfor**, University of Tennessee (1096-92-756)

3:30PM ► (644) *Effects of connectivity on dynamic behavior in neural networks.* **Anca R. Radulescu**, University of Colorado at Boulder (1096-92-2739)

3:45PM ► (645) *Linear algebra of the Crow-Kimura quasispecies model.*
Artem S. Novozhilov*, NDSU, **Yuri Semenov**, Moscow State University of Railway Engineering, Moscow, Russia, and **Alexander Bratus**, Lomonosov Moscow State University (1096-92-1170)

4:00PM ► (646) *Using FTLEs to Find Optimal Extinction Paths in Stochastic Population Models.*
Martha Bauver*, **Lora Billings** and **Eric Forgoston**, Montclair State University (1096-92-1191)

4:15PM ► (647) *Simulating Bistable Population Models.*
Michael Morley*, **Lora Billings** and **Eric Forgoston**, Montclair State University (1096-92-1193)

4:30PM ► (648) *Stochastic Modeling and Control of a Population.*
Jamila Haramuniz*, **Lora Billings** and **Eric Forgoston**, Montclair State University (1096-92-1194)

4:45PM ► (649) *Distance-based phylogenetic methods near a polytomy.*
Ruth Davidson* and **Seth Sullivant**, North Carolina State University (1096-92-1142)

5:00PM (650) *The Neural Ring: An Algebraic Tool for Analyzing the Intrinsic Structure of Neural Codes.*
Nora Youngs*, **Carina Curto**, **Vladimir Itskov**, University of Nebraska - Lincoln, and **Alan Veliz-Cuba**, University of Houston (1096-92-1798)

5:15PM ► (651) *The enumeration of $H\&S$ pseudoknots.* Preliminary report.
Aziza F Jefferson, University of Florida (1096-05-1714)

MAA Invited Address

3:20 PM – 4:10 PM **Ballrooms I&II, 400 Level, BCC**

(652) *Effective thinking and mathematics.*
Michael Starbird, University of Texas at Austin (1096-A0-10)

AWM Business Meeting

3:45 PM – 4:15 PM **Room 326, BCC**

MAA-Young Mathematicians' Network Panel Discussion

3:50 PM – 5:10 PM **Room 316, BCC**

What experiences matter on your resumé?

Organizers: **Kristine Roinestad**, Georgetown College
Ralucca Gera, Naval Posgraduate School

Panelists: **Michael Bardzell**, Salisbury University
Derrick Stolee, Iowa State University
Steve Horton, United States Military Academy
Robert Campbell, National Security Agency
Glenn Lilly, National Security Agency

MAA Section Officers

4:00 PM – 5:00 PM **Holiday Ballroom 6, 2nd Floor, Hilton**

Chair: **Rick Gillman**, Valparaiso University

Reception for Undergraduate Students

4:00 PM – 5:00 PM **Swing Hall, 100 Level, BCC**

AMS Committee on the Profession Panel Discussion

4:30 PM – 6:00 PM **Room 336, BCC**

Online courses: Benefits and pitfalls.

Organizers: **Dan Abramovich**, Brown University
Patricia Hersh, North Carolina State University

Moderator: **Abigail Thompson**, University of California, Davis

Panelists: **Tina Garrett**, St. Olaf College
Robert Ghrist, University of Pennsylvania
William (Brit) E. Kirwan, University System of Maryland
Randy McCarthy, University of Illinois at Urbana-Champaign

MAA Minicourse #3: Part A

4:45 PM – 6:45 PM **Room 342, BCC**

Improvisation for the mathematics classroom.

Presenter: **Andrea Young**, Ripon College

MAA Minicourse #7: Part A

4:45 PM – 6:45 PM **Stadium Ballrooms 4 & 5, 2nd Floor, Marriott Inner Harbor**

Mathematics and dance.

Presenter: **Karl Schaffer**, De Anza College

MAA Minicourse: #11: Part A

4:45 PM – 6:45 PM **Room 343, BCC**

Public and private-key cryptography.
Presenters: **Chris Christensen**, Northern Kentucky University
Jeffrey Ehme, Spelman College

MAA SIGMAA on the History of Mathematics Business Meeting, Reception, and Guest Lecture

5:30 PM – 7:20 PM **Room 341, BCC**

5:30PM Business Meeting and Reception; lecture immediately following at 6:30 p.m.

► (653) *The notebooks of George Washington on arithmetic, geometry, trigonometry, logarithms and surveying.* Preliminary report.
V. Frederick Rickey, West Point (1096-A0-497)

Reception for Graduate Students and First-Time Participants

5:30 PM – 6:30 PM **Grand Ballroom, 1st Floor, Marriott Inner Harbor**

AMS Josiah Willard Gibbs Lecture

8:30 PM – 9:30 PM **Ballrooms I&II, 400 Level, BCC**

(654) *Machines that see, powered by probability.*
Andrew Blake, Microsoft Research Cambridge

Thursday, January 16

Joint Meetings Registration

7:30 AM – 4:00 PM **Pratt Street Lobby, 300 Level, BCC**

MAA Session on Bridging the Gap: Designing an Introduction to Proofs Course

7:40 AM – 11:55 AM **Room 339, BCC**

Organizer: **Sarah Mabrouk**, Framingham State University

7:40AM *Teach What You Do.*
► (655) **Clark Wells**, Grand Valley State University (1096-D1-2104)

8:00AM *The Evolution of an Introduction to Proofs Course.*
► (656) **Susanna S. Epp**, DePaul University (1096-D1-1982)

8:20AM *Using Video Case-Studies to Develop Proof Writing Skills.* Preliminary report.
► (657) **Connie Campbell***, Millsaps College, **James Sandefur**, Georgetown University, and **Kay Somers**, Moravian College (1096-D1-365)

8:40AM *Using Portfolios in an Introduction to Proofs Course.* Preliminary report.
(658) **Frederick M Butler**, York College of Pennsylvania (1096-D1-701)

9:00AM *Writing Assignments in an Introduction to Proofs Course.* Preliminary report.
► (659) **Kate Overmoyer**, Clarion University of Pennsylvania (1096-D1-1126)

9:20AM *Developing community norms for proof: forum discussions of the nature and import of proof.* Preliminary report.
► (660) **Kristin A. Camenga**, Houghton College (1096-D1-2266)

9:40AM *Evaluating Peers' Arguments as the Catalyst for Learning in an Introduction to Proofs Course.* Preliminary report.
► (661) **Sarah K. Bleiler**, Middle Tennessee State University (1096-D1-1150)

10:00AM *Integrating the Elements of an Introductory Proof Course.*
► (662) **Ockle E Johnson**, Keene State College (1096-D1-2132)

10:20AM *Introduction to Proofs as A Survey Course in Mathematics.*
► (663) **William W. Johnston**, Butler University (1096-D1-1752)

10:40AM *Successes and Failures of Inquiry Based Learning in an Introduction to Proofs Course.* Preliminary report.
► (664) **Rachel Esselstein**, California State University Monterey Bay (1096-D1-1375)

11:00AM *How important is the final answer? : Using inquiry-based learning in an introductory proofs course.*
(665) **Susan Crook**, Loras College (1096-D1-2418)

11:20AM *Using an Inquiry-Based Learning Approach in Introduction to Proofs and Advanced Calculus Courses.* Preliminary report.
(666) **Jim Fulmer*** and **Tom McMillan**, University of Arkansas at Little Rock (1096-D1-2440)

11:40AM *Using Formal and Informal Proof Writing in an Introduction to Proofs Course.*
(667) **Katherine J. Mawhinney**, Appalachian State University (1096-D1-1639)

AMS Session on Combinatorics, II

7:45 AM – 11:55 AM **Room 312, BCC**

7:45AM *Fixed-point rotation families of cellular automorphisms.*
(668) **Lowell Abrams**, George Washington University (1096-05-446)

8:00AM *On matroid minors that guarantee their duals as minors.*
(669) **Jesse Taylor**, Louisiana State University (1096-05-1076)

8:15AM (670) *A Characterization of Tangle Matroids.*
Dennis W. Hall, Louisiana State University (1096-05-1585)

8:30AM (671) *Matroids that are extremal with respect to Bixby's Lemma.*
Tyler Moss, Louisiana State University (1096-05-1681)

8:45AM ► (672) *Polynomial-Generated Orthogonal Latin Squares and Hypercubes.*
Daniel R Droz, Penn State University (1096-05-2236)

9:00AM ► (673) *A Multiset Generalization of t-Designs.* Preliminary report.
Ryan K Therkelsen, Bellarmine University (1096-05-1966)

9:15AM ► (674) *Intractable Sums Tamed: New Upper Bounds for Covering Arrays.* Preliminary report.
Ruyue (Julia) Yuan*, Valparaiso University, and **Zoe Koch**, University of Utah (1096-05-385)

9:30AM ► (675) *Conjectures and questions on coin graphs in the Euclidean plane.*
Geir Agnarsson, George Mason University, and **Jill Bigley Dunham***, Hood College (1096-05-2625)

9:45AM ► (676) *Increasing Representations in Additive Bases.* Preliminary report.
Zoe Koch, University of Utah (1096-05-653)

10:00AM (677) *Zero-Sum Rado Numbers for some Linear Equations.*
Chad B Birger*, University of Sioux Falls, and **Daniel Schaal**, South Dakota State University (1096-05-2322)

10:15AM (678) *G-Ham Sandwich Theorems: Harmonic Analysis on Finite Measures.*
Steven Simon, Wellesley College (1096-05-1990)

10:30AM (679) *Probabilistic methods for minimum skew rank of graphs.*
Sudipta Mallik, University of Wyoming (1096-05-1278)

10:45AM ► (680) *Modeling functional connectivity of the human brain and gauging the effects of sub-concussive hits on athletes.*
Anthony Harkin and **Darren A Narayan***, Rochester Institute of Technology (1096-05-1555)

11:00AM ► (681) *Two-Player Variation on Graph Pebbling.* Preliminary report.
Matthew J Prudente, Lehigh University (1096-05-1640)

11:15AM (682) *Sprague-Grundy Values of the $\mathcal{R}$-Wythoff Game.*
Albert Gu, Carnegie Mellon University (1096-05-2646)

11:30AM ► (683) *The Origami Miura Map Fold and Graph Colorings.*
Jessica E Ginepro* and **Thomas C Hull**, Western New England University (1096-05-854)

11:45AM ► (684) *Extending Patches to Fullerenes.* Preliminary report.
Christina Graves, The University of Texas at Tyler, **Jennifer McLoud-Mann***, University of Washington Bothell, and **Kristen Stagg**, The University of Texas at Tyler (1096-05-2495)

AMS Session on Natural Resource Modeling and Mathematical Biology

7:45 AM – 11:40 AM **Room 305, BCC**

7:45AM (685) *Mathematical Model of Infection Risk to Travelers Entering Malaria Endemic Regions.*
Nairat Kanyamee, Silpakorn University (1096-92-1581)

8:00AM ► (686) *Modeling the Effects of Age-Specific Harvesting on Connected Subpopulations of Marine Fish Using a Discrete Age Continuous Time Approach.*
Elizabeth L Councill, University of Miami, Rosenstiel School of Marine and Atmospheric Science (1096-92-1617)

8:15AM ► (687) *Effect of predators in dynamics of niche construction.*
Faina Berezovskaya, Howard University (1096-92-1277)

8:30AM ► (688) *Effects of Stochastic Variation in Resource Availability in Ecological Community Structure.*
Seth D. Haney* and **Adam Siepielski**, University of San Diego (1096-92-2549)

8:45AM ► (689) *Symbolic Solutions For Radial-Symmetric and Axial-Symmetric Groundwater Flow in Term of Special Functions.* Preliminary report.
A. Bass Bagayogo, Saint-Boniface University (1096-35-2483)

9:00AM ► (690) *A Structured Avian Influenza Model with Imperfect Vaccination.*
Hayriye Gulbudak, University of Florida (1096-92-2480)

9:15AM ► (691) *A stoichiometric producer-grazer model incorporating the effects of excess food-nutrient content on consumer dynamics.*
Angela L Peace* and **Yang Kuang**, Arizona State University (1096-92-1816)

9:30AM ► (692) *Mathematically Decomposing an Ecological Network into Self-Sustaining Building Blocks.*
Linh Ngoc Khanh Huynh, Rice University (1096-92-188)

9:45AM (693) *The Inherent Randomness of Evolving Populations.*
Marc A Harper, University of California, Los Angeles (1096-92-1240)

10:00AM ► (694) *Two-Sample Tests and Recursive Partitioning with Latent Responses: Application to HIV Genetics.*
Shannon Stock*, College of the Holy Cross, and **Victor DeGruttola**, Department of Biostatistics, Harvard School of Public Health (1096-92-1801)

10:15AM ► (695) *Mathematical Modeling of the HIV/AIDS Epidemic in Cuba.* Preliminary report. **Antonio Mastroberardino***, Penn State Erie, The Behrend College, **Yuanji Cheng**, Malmo University, **Ahmed Abdelrazec**, York University, and **Hao Liu**, Arizona State University (1096-92-1654)

10:30AM (696) *A Hybrid Model of Hospital Infection Spread.* **Lester F. Caudill*** and **Barry Lawson**, University of Richmond (1096-92-2375)

10:45AM (697) *Mathematical Model of Carbapenem-Resistant Enterobacteriaceae with Prevalence Settings.* Preliminary report. **Mohammed Yahdi*** and **Hongli Chen**, Ursinus College (1096-92-2566)

11:00AM ► (698) *Predicting the time and mechanism for resistance in prostate cancer patients undergoing androgen suppression therapy.* **Rebecca A. Everett*** and **Yang Kuang**, Arizona State University (1096-92-1827)

11:15AM ► (699) *Modeling Stochasticity and Variability in Gene Regulatory Networks with Applications for Optimal Control.* **David Murrugarra**, Georgia Tech (1096-92-406)

11:30AM ► (700) *Precise Mass Measurements of Ions.* **Jeremy N. Ariche**, Morehouse College (1096-92-2133)

AMS-SIAM Special Session on Mathematics of Computation: Differential Equations, Linear Algebra, and Applications, II

8:00 AM – 11:50 AM **Room 320, BCC**

Organizers: **Susanne C. Brenner**, Louisiana State University
Chi-Wang Shu, Brown University

8:00AM (701) *Robust Polynomial Preserving Recovery On Boundary.* **Hailong Guo**, **Zhimin Zhang** and **Ren Zhao***, Wayne State University (1096-65-1719)

8:30AM (702) *Recovering exponential accuracy from collocation point values of smooth functions with end-point singularities.* **Zheng Chen*** and **Chi-Wang Shu**, Brown University (1096-65-720)

9:00AM (703) *Robust Methods for Eigenvalue Computations in Linear Stability Analysis.* **Howard C Elman***, University of Maryland, and **Minghao Wu**, Worcester Polytechnic Institute (1096-65-1559)

9:30AM (704) *A posteriori error estimates for biharmonic eigenvalue problems.* Preliminary report. **Joscha Gedicke**, Louisiana State University (1096-65-1902)

10:00AM (705) *A cochain complex for interior penalty methods: error estimates and multigrid through differential relations.* **G. Kanschat** and **Natasha S. Sharma***, University of Heidelberg, Heidelberg, Germany (1096-35-1057)

10:30AM (706) *L_2 and pointwise error estimates for FEM for elliptic PDE on surfaces.* **Fernando Camacho*** and **Alan Demlow**, University of Kentucky (1096-65-2382)

11:00AM (707) *Computational modeling of polycrystals: accuracy and sensitivity analysis.* **Maria Emelianenko***, George Mason University, **Claudio Torres**, Universidad Tecnica Federico Santa Maria, Chile, and **Dmitry Golovaty**, University of Akron (1096-65-1380)

11:30AM (708) *Eventual linear convergence of the Douglas-Rachford iteration for basis pursuit.* **Xiangxiong Zhang**, MIT (1096-65-1284)

AMS Special Session on Advances in Analysis and PDEs, II

8:00 AM – 11:45 AM **Room 332, BCC**

Organizers: **Tepper L. Gill**, Howard University
Daniel A. Williams, Howard University

8:00AM (709) *Towards a Comprehensive Stability Theory for Feynman's Operational Calculus: The Time Independent Setting.* Preliminary report. **Lance Nielsen**, Creighton University (1096-47-1079)

8:30AM (710) *Existence And Stability In Ageostrophic Flows With Viscoelastic-type Reynolds Stress.* **Maleafisha Stephen Tladi**, University of Limpopo, South Africa (1096-35-412)

9:00AM (711) *"On the quasi-potential for 2-D Navier-Stokes equations perturbed by space time white noise".* **Sandra Cerrai**, University of Maryland, College Park (1096-60-561)

10:00AM (712) *"Graph Paper" Trace Characterizations of Functions of Finite Energy.* **Robert S. Strichartz**, Cornell University (1096-46-277)

11:00AM (713) *Nonlinear flows and rigidity results on compact manifolds.* **Jean Dolbeault**, **Maria J. Esteban**, CEREMADE Universite Paris Dauphine, and **Michael Loss***, Georgia Tech (1096-35-207)

AMS Special Session on Algebraic Geometry, III

8:00 AM – 11:45 AM **Room 303, BCC**

Organizers: **Christopher Hacon**, University of Utah

Zsolt Patakfalvi, Princeton University

8:00AM (714) *Pseudo-effective numerical classes with vanishing pushforward.* **Mihai Fulger***, Princeton University, **Brian Lehmann**, Rice University, **Xiaolei Zhao** and **Zhixian Zhu**, University of Michigan (1096-14-75)

9:00AM (715) *On Betti numbers of tautological rings of Jacobians and Pryms.* Preliminary report. **Maxim V Arap**, Johns Hopkins University (1096-14-644)

10:00AM (716) *The Chow ring of the moduli space of genus 6 curves.* **Nikola Penev**, Stanford, and **Ravi Vakil***, Stanford University (1096-14-2369)

11:00AM Discussion

AMS Special Session on Algebraic Structures Motivated by Knot Theory, III

8:00 AM – 11:50 AM **Room 328, BCC**

Organizers: **Mieczyslaw K. Dabkowski**, University of Texas at Dallas

Jozef Przytycki, George Washington University

Radmila Sazdanovic, University of Pennsylvania

Alexander N. Shumakovitch, George Washington University

Hao Wu, George Washington University

8:00AM (717) *Elements of Khovanov Homology.* Preliminary report. **Louis H. Kauffman**, University of Illinois at Chicago (1096-57-1424)

8:30AM ► (718) *The many versions of odd Khovanov homology.* Preliminary report. **Krzysztof Karol Putyra**, Columbia University (1096-17-2649)

9:00AM (719) *An infinite rank summand of topologically slice knots.* Preliminary report. **Jennifer Hom**, Columbia University (1096-57-846)

9:30AM (720) *A bordered monopole Floer theory.* Preliminary report. **Jonathan M Bloom***, Massachusetts Institute of Technology, and **John A Baldwin**, Boston College (1096-57-838)

10:00AM (721) *Homology for quandles with partial group operations.* Preliminary report. **J. Scott Carter**, University of South Alabama, **Atsushi Ishii**, University of Tsukuba, and **Masahico Saito***, University of South Florida (1096-57-1174)

10:30AM ► (722) *Self-, multi- and G-distributivity with a braided flavor.* **Victoria Lebed**, Advanced Mathematical Institute, Osaka City University (1096-17-299)

11:00AM (723) *On some ternary algebras in knot theory.* Preliminary report. **Maciej Niebrzydowski**, University of Louisiana at Lafayette (1096-57-1389)

11:30AM (724) *Torsion in One-term Distributive Homology.* **Alissa S. Crans***, Loyola Marymount University, **Jozef Przytycki**, George Washington University, and **Krzysztof Putyra**, Columbia University (1096-22-1495)

AMS Special Session on Analytic Number Theory, I

8:00 AM – 11:50 AM **Room 329, BCC**

Organizers: **Angel Kumchev**, Towson University

Scott Parsell, West Chester University

Gang Yu, Kent State University

8:00AM (725) *Finite Euler product approximations of the Riemann zeta-function.* **Steven M. Gonek**, University of Rochester (1096-11-804)

8:30AM (726) *Pair correlation of the zeros of the derivative of the Riemann ξ-function.* **David W Farmer**, American Institute of Mathematics, **Steven M Gonek** and **Yoonbok Lee***, University of Rochester (1096-11-509)

9:00AM (727) *Low-lying zeros of elliptic curve L-functions: Beyond the ratios conjecture.* **Daniel Fiorilli***, University of Michigan, **James Parks**, University of Lethbridge, and **Anders Södergren**, University of Copenhagen (1096-11-897)

9:30AM ► (728) *Non-vanishing of derivatives of L-functions.* Preliminary report. **Ram M Murty** and **Naomi Tanabe***, Queen's University (1096-11-539)

10:00AM (729) *The mean square of the Riemann zeta-function and its twists.* Preliminary report. **J. Brian Conrey**, American Institute of Mathematics (1096-11-2024)

10:30AM (730) *Computing class numbers beyond Odlyzko's bounds: Real cyclotomic fields.* **John C. Miller**, Rutgers University (1096-11-631)

11:00AM ► (731) *Explicit estimates for $\psi(x)$.* **Laura Faber**, **Habiba Kadiri*** and **Allysa Lumley**, University of Lethbridge (1096-11-1499)

11:30AM (732) *Large values of the zeta function at critical points.* Preliminary report. **Hugh L. Montgomery***, University of Michigan, Ann Arbor, and **Steven M. Gonek**, University of Rochester (1096-11-2371)

AMS Special Session on Applied Harmonic Analysis: Large Data Sets, Signal Processing, and Inverse Problems, III

8:00 AM – 11:45 AM **Room 315, BCC**

Organizers: **Mauro Maggioni**, Duke University
Naoki Saito, University of California, Davis
Thomas Strohmer, University of California, Davis

8:00AM (733) *Geometric methods for graph partitioning.* Preliminary report.
Braxton Osting, University of California, Los Angeles (1096-49-1050)

9:00AM ► (734) *Interpolation via weighted l1 minimization.*
Rachel A Ward*, University of Texas at Austin, and **Holger Rauhut**, Aachen University (1096-65-2100)

10:00AM (735) *Optimal Shrinkage of Singular values and Eigenvalues.*
David L. Donoho* and **Matan Gavish**, Stanford University (1096-94-2769)

11:00AM (736) *Estimation of probability measures in high dimensions, with optimal transport and fast algorithms.*
Mauro Maggioni, Duke University (1096-60-2768)

AMS Special Session on Classification Problems in Operator Algebras, III

8:00 AM – 11:50 AM **Room 331, BCC**

Organizers: **Ionut Chifan**, University of Iowa
David Penneys, University of Toronto

8:00AM ► (737) *Nuclearity for C^*-algebras with real rank zero.* Preliminary report.
Nicola Watson, University of Toronto (1096-47-1613)

8:30AM (738) *Upper triangular forms for elements of finite von Neumann algebras.*
Ken Dykema*, Texas A&M University, **Fedor Sukochev** and **Dmitriy Zanin**, University of New South Wales (1096-46-1779)

9:30AM (739) *The structure of simple operator algebras.* Preliminary report.
Nate Brown, Penn State (1096-46-1607)

10:30AM (740) *Results on Nuclearity and Exactness for Groupoid Crossed Product C^*-algebras.* Preliminary report.
Scott M. LaLonde, Dartmouth College (1096-47-1709)

11:00AM (741) *The effect of homotopies of groupoid 2-cocycles on C^*-algebraic K-theory.*
Elizabeth A. Gillaspy, Dartmouth College (1096-19-1825)

11:30AM (742) *Crossed products and MF algebras.*
Weihua Li*, Columbia College Chicago, and **Stefanos Orfanos**, DePaul University (1096-46-34)

AMS Special Session on Complex Dynamics, I (a Mathematics Research Communities Session)

8:00 AM – 11:50 AM **Room 322, BCC**

Organizers: **Scott Kaschner**, University of Arizona
Holly Krieger, Massachusetts Institute of Technology
Paul Reschke, University of Michigan

8:00AM ► (743) *Shapes of Polynomial Julia Sets.*
Kathryn A. Lindsey, Cornell University (1096-37-317)

8:30AM ► (744) *Approximation of Julia sets with computer assisted validation for complex analytic dynamical systems.*
J. D. Mireles James*, Rutgers University, and **Haripriya Chakraborty**, University of Deleware (1096-37-515)

9:00AM (745) *On the bifurcation locus of cubic polynomials and the size of Siegel disks.*
Ilies Zidane, University of Toulouse (1096-37-2110)

9:30AM ► (746) *Rational Maps: Julia sets from accessible Mandelbrot sets are not homeomorphic.*
Elizabeth L. Fitzgibbon*, Boston University, and **Stefano Silvestri**, Indiana University-Purdue University Indianapolis (1096-30-819)

10:00AM (747) *Parameter Space Structures for Singular Perturbations of Polynomials.*
Daniel Cuzzocreo, Boston University (1096-37-1078)

10:30AM (748) *Periodic points in towers of finite fields for polynomials associated to algebraic groups.*
Bianca A. Thompson* and **Michelle Manes**, University of Hawaii at Manoa (1096-11-552)

11:00AM (749) *Haar Measures and Hausdorff Dimensions of p-adic Julia Sets.* Preliminary report.
Joanna Marie Furno, Dickinson College (1096-37-2094)

11:30AM (750) *p-adic Mandelbrot sets and their boundaries.*
Jacqueline Anderson, Bridgewater State University (1096-37-418)

AMS Special Session on Computability in Geometry and Topology, I

8:00 AM – 11:50 AM **Room 319, BCC**

Organizers: **Mieczyslaw Dabkowski**, University of Texas at Dallas
Rumen D. Dimitrov, Western Illinois University

8:00AM (751) *Notions of degree spectra.*
Valentina Harizanov, The George Washington University (1096-03-1364)

9:00AM (752) *Computability in Cantor space and in orderings of an abelian group.*
Reed Solomon, University of Connecticut (1096-03-925)

9:30AM (753) *Ordering algebraic structures on trees.*
Jennifer Chubb Reimann, University of San Francisco (1096-03-2219)

10:00AM (754) *The Power of Uniform Distribution Randomness.*
Wesley C Calvert*, Southern Illinois University, and **Johanna N. Y. Franklin**, University of Connecticut (1096-03-1729)

10:30AM (755) *Computability in the class of Real Closed Fields.*
Victor A. Ocasio, University of Notre Dame (1096-03-1138)

11:00AM (756) *Effective Symmetry Breaking.*
Rebecca M. Steiner, Vanderbilt University (1096-03-2131)

11:30AM (757) *Algebraic existential quantifiers.*
Michael Chris Laskowski, University of Maryland (1096-03-1680)

AMS Special Session on Geometric Group Theory, I (a Mathematics Research Communities Session)

8:00 AM – 11:50 AM **Room 321, BCC**

Organizers: **Tariq Aougab**, Yale University
Curt Kent, University of Toronto
Sang Rae Lee, Texas A&M University
Emily Stark, Tufts University

8:00AM (758) *Convex cocompactness in mapping class groups via quasiconvexity in right-angled Artin groups.*
Johanna Mangahas*, Brown University, and **Samuel J Taylor**, University of Texas at Austin (1096-20-1347)

8:30AM (759) *Pseudo-Anosov mapping classes with dilatation of algebraic degree* $2g$.
Hyunshik Shin, Georgia Institute of Technology (1096-57-2484)

9:00AM (760) *Higher dimensional filling and divergence functions for mapping class groups.*
Jason Behrstock*, CUNY, Lehman College and the Graduate Center, and **Cornelia Drutu**, Oxford (1096-20-2517)

9:30AM (761) *Generalizations of the Kan-Thurston Theorem.*
Raeyong Kim, The Ohio State University (1096-57-2520)

10:00AM (762) *Nonpositively curved Eulerian cube complexes and reciprocity.*
Richard A Scott, Santa Clara University (1096-57-826)

10:30AM (763) *Almost Hyperbolic—Flat Strips are "Rare" in Rank One CAT(0) Spaces.*
Russell M Ricks, University of Michigan (1096-51-2453)

11:00AM (764) *Quasi-isometry properties of subdivision rules.*
Brian C Rushton, Temple University (1096-57-2147)

11:30AM (765) *A Space of CAT(-1) structures.* Preliminary report.
Sang-hyun Kim, KAIST, and **Genevieve S Walsh***, Tufts University (1096-57-2619)

AMS Special Session on Graph Theory: Structural and Extremal Problems, III

8:00 AM – 11:50 AM **Room 330, BCC**

Organizers: **Daniel Cranston**, Virginia Commonwealth University
Gexin Yu, College of William & Mary

8:00AM (766) *Beyond Ohba's Conjecture: A bound on the choice number of* k*-chromatic graphs with* n *vertices.*
Jonathan A. Noel, McGill University, **Douglas B. West***, Zhejiang Normal University and University of Illinois, **Hehui Wu**, Simon Fraser University, and **Xuding Zhu**, Zhejiang Normal University (1096-05-1609)

► 8:30AM (767) *Steinberg's Conjecture, the Bordeaux Coloring Conjecture and Near-Coloring.*
Carl R Yerger* and **Kyle Yang**, Davidson College (1096-05-892)

► 9:00AM (768) *Maximizing the number of proper colorings of graphs.* Preliminary report.
Jie Ma*, Carnegie Mellon University, and **Humberto Naves**, UCLA (1096-05-320)

► 9:30AM (769) *The 1-2-3 Conjecture for Hypergraphs.*
Florian Pfender*, University of Colorado Denver, **Maciej Kalkowski** and **Michał Karoński**, AMU Poznan (1096-05-325)

10:00AM (770) *Extending Alon-Tarsi Orientations.*
Hal Kierstead, Arizona State University, and **Landon Rabern***, Branford, CT (1096-05-786)

10:30AM (771) *Graphs with* $\chi = \Delta$ *have Big Cliques.*
Daniel W. Cranston*, Virginia Commonwealth University, and **Landon Rabern**, Branford, CT (1096-05-258)

11:00AM (772) *Extensions from precoloured sets of edges.*
Katherine Edwards*, Princeton University, **Jan van den Heuvel**, LSE, **Ross J Kang**, Utrecht University, and **Jean-Sebastien Sereni**, CNRS, LORIA (1096-05-784)

11:30AM (773) *Tutte's* 5*-flow conjecture and Jaeger's modulo* 5*-orientation.*
Cun-Quan Zhang, West Virginia University (1096-05-1315)

AMS Special Session on My Favorite Graph Theory Conjectures, I

8:00 AM – 11:20 AM **Room 314, BCC**

Organizers: **Craig Larson**, Virginia Commonwealth University
Ralucca Gera, Naval Postgraduate School

8:00AM ► (774) *On the Eulerian Cycle Decomposition Conjecture.* **Gary Chartrand**, Western Michigan University, **Heather Jordon**, Mathematical Reviews and Illinois State University, and **Ping Zhang***, Western Michigan University (1096-05-526)

8:30AM (775) *The infinite motion conjecture.* Preliminary report. **Thomas W. Tucker**, Colgate University (1096-05-1319)

9:00AM (776) *All Graph Genus Distributions Are Log-Concave, and Related Conjectures.* **Jonathan L. Gross**, Columbia University (1096-05-583)

9:30AM ► (777) *Are almost all graphs determined by their spectrum?* Preliminary report. **Chris Godsil**, University of Waterloo (1096-05-481)

10:00AM ► (778) *Conjectures on Cops and Robbers.* **Anthony Bonato**, Ryerson University (1096-05-308)

10:30AM ► (779) *Some questions about generalized colorings.* **John Gimbel**, University of Alaska Fairbanks (1096-05-248)

11:00AM ► (780) *Optimal linear arrangements and graceful labelings of graphs.* **William R. Pulleyblank**, United States Military Academy, West Point (1096-05-2217)

AMS Special Session on Random Matrices: Theory and Applications, III

8:00 AM – 11:45 AM **Room 301, BCC**

Organizers: **Paul Bourgade**, Harvard University
Horng-Tzer Yau, Harvard University

8:00AM Discussion

9:00AM (781) *The Altshuler-Shklovskii formulas for random band matrices.* **Antti Knowles**, Courant Institute, NYU (1096-60-1837)

10:00AM (782) *From Kontsevich-Witten to (monotone) Hurwitz via HCIZ.* **Jonathan Novak**, MIT (1096-05-1012)

11:00AM (783) *Free Monotone Transport.* **Alice Guionnet**, MIT/CNRS Lyon, and **Dimitri Shlyakhtenko***, UCLA (1096-46-1064)

AMS Special Session on Regulatory Problems for Nonlinear PDEs Modeling Fluids and Complex Fluids, I (a Mathematics Research Communities Session)

8:00 AM – 11:50 AM **Room 324, BCC**

Organizers: **Jacob Bedrossian**, New York University
Hao Jia, University of Chicago
Jared Whitehead, Los Alamos National Laboratory
Tak Kwong Wong, University of Pennsylvania

8:00AM (784) *On the size of the Navier - Stokes singular set.* **Walter Craig**, Fields Institute and McMaster University (1096-35-638)

8:30AM (785) *Gevrey regularity of the Navier-Stokes Equations and its applications.* **Hantaek Bae***, UC Davis, and **Marco Cannone**, Université Paris-Est Marne-la-Vallée, France (1096-35-560)

9:00AM (786) *On the radius of analyticity of solutions to the 3D Navier-Stokes equations at interior points of a bounded domain.* **Zachary Bradshaw**, University of Virginia (1096-35-275)

9:30AM (787) *New advances in boundary layers for Navier Stokes equations.* **Emmanuel Grenier**, Ecole Normale Supérieure de Lyon (1096-76-1583)

10:00AM (788) *Vanishing viscosity limit of some symmetric flows.* **Gung-Min Gie***, Indiana University, **James P. Kelliher**, University of California, Riverside, **Milton C. Lopes Filho**, Universidade Federal do Rio de Janeiro, **Anna L. Mazzucato**, Penn State University, and **Helena J. Nussenzveig Lopes**, Universidade Federal do Rio de Janeiro (1096-35-821)

10:30AM (789) *Bounds on energy and enstrophy for the 3D Navier-Stokes-α and Leray-α models.* **Aseel Farhat***, **Michael Jolly**, University of Indiana, Bloomington, and **Evelyn Lunasin**, United States Naval Academy (1096-76-1571)

11:00AM (790) *Dispersive Navier-Stokes Systems for Gas Dynamics.* **C. David Levermore**, University of Maryland, College Park (1096-35-1136)

11:30AM (791) *On the well-posedness of an interface damped free boundary fluid-structure model.* **Mihaela Ignatova**, Stanford University, **Igor Kukavica***, University of Southern California, **Irena Lasiecka**, The University of Memphis, and **Amjad Tuffaha**, Petroleum Institute (1096-35-2638)

AMS Special Session on The Changing Education of Preservice Teachers in Light of the Common Core, III

8:00 AM – 11:50 AM **Room 310, BCC**

Organizers: **William McCallum**, University of Arizona
Kristin Umland, University of New Mexico
Ellen Whitesides, University of Arizona

8:00AM ► (792) *A Capstone Experience for Teacher Candidates.* **Laura McLeman**, University of Michigan-Flint (1096-97-1145)

8:30AM (793) *How future teachers use two distinct definitions to reason about proportional relationships.* Preliminary report. **Sybilla Beckmann*** and **Andrew Izsak**, University of Georgia (1096-97-2071)

9:00AM ► (794) *Three Specialized Courses for Preparing Secondary Mathematics Teachers.* **Elizabeth A. Burroughs**, Montana State University (1096-97-527)

9:30AM ► (795) *Developing and Sustaining Professional Communities of Teachers around Mathematical Content and Student Intellectual Need.* **Guershon Harel**, UCSD (1096-97-2454)

10:00AM (796) *Knowledge and Beliefs for Teaching Proof: A Conceptual Framework for Mathematics Teacher Educators.* **Justin D Boyle**, University of New Mexico (1096-97-577)

10:30AM (797) *Developing preservice teachers' conceptual understanding of algebra.* Preliminary report. **Cody L Patterson**, The University of Arizona (1096-97-1306)

11:00AM (798) *Using the ideas of Calculus to transition teachers from a computational to a conceptual understanding of functions.* Preliminary report. **Ayşe A. Şahin**, DePaul University (1096-97-2431)

11:30AM Discussion

AMS Special Session on The Ubiquity of Dynamical Systems, I

8:00 AM – 11:50 AM **Room 302, BCC**

Organizers: **Edray H. Goins**, Purdue University
Talitha M. Washington, Howard University

8:00AM (799) *The Effect of Latency Variables on Repeated Measures Inference Applied to the Measurement of Risk-taking as a function of Psychopathy.* **Monica Christine Jackson***, American University, **Adria Trotman**, **Melissa Stephens**, Washington, DC, and **Kimberly F Sellers**, Georgetown University (1096-62-1608)

9:00AM (800) *Nonstandard Finite Difference Discretizations of Population Models Satisfying Conservation Laws.* **Talitha M. Washington***, Howard University, and **Ronald E. Mickens**, Clark Atlanta University (1096-39-2571)

9:30AM (801) *ABC Triples in Families.* Preliminary report. **Edray H Goins**, Purdue University (1096-11-2561)

10:00AM (802) *Spectral correspondences on Quaternion Groups.* **Terrence Richard Blackman**, University of Denver, Morgridge College of Education (1096-11-2246)

11:00AM Discussion

11:30AM Discussion

AMS Special Session on Tropical and Nonarchimedean Analytic Geometry, I (a Mathematics Research Communities Session)

8:00 AM – 11:50 AM **Room 323, BCC**

Organizers: **Dustin Cartwright**, Yale University
Melody Chan, Harvard University
Joseph D. Rabinoff, Georgia Institute of Technology

8:00AM (803) *Tropical Del Pezzo Surfaces.* Preliminary report. **Qingchun Ren**, UC Berkeley, **Kristin Shaw**, University of Toronto, and **Bernd Sturmfels***, UC Berkeley (1096-14-457)

8:30AM (804) *Fock Space, Feynman Diagrams, Floor Diagrams, and (Refined) Severi Degrees.* **Florian Block***, UC Berkeley, and **Lothar Göttsche**, International Centre for Theoretical Physics, Trieste, Italy (1096-14-740)

9:00AM (805) *Stiefel tropical linear spaces.* **Alex Fink***, Queen Mary University of London, and **Felipe Rincón**, University of Warwick (1096-05-578)

9:30AM (806) *Harmonic Group Actions, Genus Bounds, and Combinatorial Maps.* Preliminary report. **Scott M Corry**, Lawrence University (1096-05-718)

10:00AM (807) *Towards a tropical Castelnuovo-Severi inequality.* Preliminary report. **Nathan Pflueger**, Harvard University (1096-14-1830)

10:30AM (808) *Rational points on curves and chip firing.* **David Zureick-Brown***, Emory University, and **Eric Katz**, University of Waterloo (1096-11-1490)

11:00AM (809) *P-adic integration on algebraic curves in the bad reduction case.* **Eric Katz**, University of Waterloo (1096-14-1689)

11:30AM (810) *Effective Chabauty for symmetric powers of curves.*
Jennifer Park, Massachusetts Institute of Technology (1096-11-1668)

AMS Special Session on the History of Mathematics, III

8:00 AM – 11:50 AM **Room 317, BCC**

Organizers: **Sloan Despeaux**, Western Carolina University
Della Dumbaugh, University of Richmond
Glen van Brummelen, Quest University

8:00AM ► (811) *Tarski in Poland: Teaching and Teacher Training.*
James T Smith, San Francisco State University (1096-01-233)

8:30AM ► (812) *Tullio Levi-Civita, Giuseppe Levi and the Fascist Loyalty Oath of 1931.* Preliminary report.
Judith R. Goodsein, California Institute of Technology (1096-01-321)

9:00AM (813) *On the representation of 'abstract' algebras by 'concrete' ones, and the rise of spectral methods : Marshall Stone's representation theorems (1936-1938).*
Michel Pierre Serfati, IREM- Universite Paris Diderot (1096-01-794)

9:30AM ► (814) *Mathematics for the World: Publishing Mathematics and the International Book Trade, Macmillan and Co. 1870-1910.*
Sylvia M Nickerson, Institute for the History and Philosophy of Science and Technology, University of Toronto (1096-01-1482)

10:00AM (815) *The teaching of mathematics during the Fascism dictatorship through the lens of the educational journals.*
Erika Luciano, University of Turin (1096-01-1531)

10:30AM ► (816) *The Influence of Some Twentieth-Century American Popularizers of Mathematics: E. T. Bell, Edward Kasner, James Newman, and Lillian Lieber.* Preliminary report.
David Lindsay Roberts, Prince George's Community College (1096-01-563)

11:00AM ► (817) *The Cajori Two Project.* Preliminary report.
Walter J. Meyer, Adelphi University (1096-01-466)

11:30AM ► (818) *Sino-US Mathematical Relations: 1950s–1970s.* Preliminary report.
Yibao Xu, City University of New York/BMCC (1096-01-597)

AMS Session on Applied Mathematics I: Mechanics, Fluids, Waves

8:00 AM – 11:55 AM **Room 304, BCC**

8:00AM (819) *Upper bounds on quantum dynamics for quasiperiodic Schrödinger operators with rough potentials.*
Rajinder Singh Mavi*, University of Virginia, and **Svetlana Jitomirskaya**, University of California, Irvine (1096-70-600)

8:15AM (820) *Buckling in vertex models of epithelial sheets.*
Nebojsa Murisic*, Lewis-Sigler Institute, Princeton University, **Basile Audoly**, CNRS & Institut de mecanique d'Alembert, **Yannis G. Kevrekidis**, Chemical and Biological Engineering, Princeton University, and **Stanislav Y. Shvartsman**, Lewis-Sigler Institute, Princeton University (1096-70-2512)

8:30AM (821) *Analytical Estimates for Pipe-lines Longevity.*
Alla V. Balueva, University of North Georgia (1096-74-868)

8:45AM (822) *Dynamics for a System of Screw Dislocations.* Preliminary report.
Timothy Blass, **Irene Fonseca**, **Giovanni Leoni**, Carnegie Mellon University, and **Marco Morandotti***, Instituto Superior Técnico, Lisbon, Portugal (1096-74-2493)

9:00AM (823) *Free Vibration Analysis of Thick Cylindrical Composite Shells Using Higher Order Shear Deformation Theory.*
Mohammad Salim Zannon*, CMU, **Mohamad S. Qatu** and **Leela Rakesh**, Central Michigan University (1096-76-1249)

9:15AM (824) *Interval analysis computation of the critical Rayleigh number for the asymmetric Rayleigh-Bénard problem.*
Matthew Glomski* and **Matthew A. Johnson**, Marist College (1096-76-1941)

9:30AM (825) *Spontaneous oscillations in simple fluid networks.*
Nathaniel Karst*, Babson College, **Brian Storey** and **John Geddes**, F.W. Olin College of Engineering (1096-76-621)

9:45AM (826) *Singularity approach to study the particle encapsulation in a liquid thread.*
Muhammad Hameed, University of South Carolina Upstate (1096-76-1670)

10:00AM ► (827) *Tsunami wave propagation over underwater obstacles and steps.*
Vladimir A. Chugunov, Institute of Mathematics and Mechanics, Kazan Federal University, Russia, **Sergei A. Fomin***, CSU Chico, and **Ravi Shankar**, Department of Chemistry, UC Davis (1096-76-618)

10:15AM ► (828) *A new numerical scheme based on the leapfrog method for atmospheric and ocean modeling.*
Lee M. Burke*, **Lauren R. Johnson**, **Chris Barton** and **Mohamed Moustaoui**, Arizona State University (1096-76-1997)

10:30AM ► (829) *Stability and accuracy analysis for a novel semi-implicit leapfrog time-stepping scheme.*
Lauren R. Johnson*, **Lee M. Burke**, **Chris Barton** and **Mohamed Moustaoui**, Arizona State University (1096-76-1771)

10:45AM (830) *Two Layer Model for Tear Film Dynamics.* Preliminary report.
Nicholas Gewecke*, **Rich Braun**, University of Delaware, **Chris Breward**, University of Oxford, and **P. Ewen King-Smith**, Ohio State University (1096-76-2176)

11:00AM ► (831) *Settling of a Porous Particle in Stratified Flow.*
Shilpa Khatri*, **Roberto Camassa**, **Claudia Falcon**, **Richard McLaughlin**, University of North Carolina at Chapel Hill, **Jennifer Prairie**, Departments of Mathematics and Marine Sciences, University of North Carolina at Chapel Hill, **Brian White** and **Sungduk Yu**, Department of Marine Sciences, University of North Carolina at Chapel Hill (1096-76-2395)

11:15AM (832) *Computational Modeling of the Dynamics of Edge Flames in Narrow Channels.* Preliminary report.
Joanna A Bieri, University of Redlands (1096-76-2496)

11:30AM (833) *Three dimensional hydro-thermal convective flow in an aquifer system.* Preliminary report.
Dambaru Bhatta, The University of Texas-Pan American (1096-76-634)

11:45AM ► (834) *Propagation of Waves in Homogeneous Isotropic Plates.*
Devinder Singh Bittoo, Guru Nanak Dev Engg. College Ludhiana,Punjab, India (1096-76-235)

AMS Session on Game Theory and Computing

8:00 AM – 10:40 AM **Room 313, BCC**

8:00AM (835) *Approximation algorithm for the visibility counting problem using randomized method.*
Sharareh Alipour, Sharif University of Technology (1096-68-283)

8:15AM (836) *Traversals of Infinite Graphs with Random Local Orientations.*
David White, Wesleyan University (1096-68-1517)

8:30AM ► (837) *mystic: a framework for high-dimensional nonlinear constrained optimization.* Preliminary report.
Michael McKerns*, UQ Foundation / Caltech, **Tim Sullivan**, UQ Foundation / University of Warwick, **Clint Scovel** and **Houman Owhadi**, UQ Foundation / Caltech (1096-68-2686)

8:45AM (838) *A quadratic cone relaxation-based algorithm for linear programming.* Preliminary report.
Mutiara Sondjaja* and **James Renegar**, Cornell University (1096-90-2299)

9:00AM (839) *Pattern Classification by Ellipsoidal Machines Using Semidefinite Programming.*
Sofya Chepushtanova* and **Michael Kirby**, Colorado State University (1096-90-2507)

9:15AM ► (840) *Finite Difference Method for the Black-Scholes Option Pricing Model.*
Justin Ziegler* and **Narayan Thapa**, Minot State University (1096-35-504)

9:30AM ► (841) *Systemic Risk and Financial Contagion in Agent-Based Networks.*
Yuanying Guan, Indiana University Northwest (1096-91-1782)

9:45AM (842) *Optimal asset trading under regime switching models.*
Duy Nguyen, Massachusetts College of Liberal Arts (1096-93-312)

10:00AM ► (843) *The evolution of cooperation - kin selection and greenbeard genes.*
Jan Rychtar*, The University of North Carolina at Greensboro, and **Mark Broom**, City University London (1096-91-431)

10:15AM (844) *Stability of Markov Chains: A Time Scales Viewpoint with Applications to Control.*
Dylan R Poulsen*, **John M Davis** and **Ian A Gravagne**, Baylor University (1096-93-311)

10:30AM (845) *Encryption Through Intrinsic Series.* Preliminary report.
Julio Enrique Posada, San Salvador, El Salvador (1096-94-45)

AMS Session on Logic and Probability

8:00 AM – 11:55 AM **Room 311, BCC**

8:00AM (846) *Domatic Partitions of A-Computable Graphs and c.e. Permitting.* Preliminary report.
Matthew Jura*, Manhattan College, **Oscar Levin**, University of Northern Colorado, and **Tyler Markkanen**, Manhattan College (1096-03-2105)

8:15AM (847) *Highly computable graphs and their domatic numbers.* Preliminary report.
Matthew Jura, Manhattan College, **Oscar Levin**, University of Northern Colorado, and **Tyler Markkanen***, Manhattan College (1096-03-1916)

8:30AM (848) *The Stable Matchings Exist, But Why?* **Olivia M. Carducci**, East Stroudsburg University (1096-05-2158)

8:45AM (849) *Long Graph Decompositions.* Preliminary report. **Stephen Flood**, University of Connecticut (1096-03-1472)

9:00AM (850) *Strong Finite Submodel Property of Countable Categorical Graphs.* **Yun Lu**, Kutztown University of PA (1096-03-1066)

9:15AM (851) *A Busy Beaver Problem for Infinite-Time Turing Machines.* **James T. Long*** and **Lee J. Stanley**, Lehigh University (1096-03-1881)

9:30AM (852) *A density question where the usual constructions haven't worked.* **Joshua A. Cole**, Butler University (1096-03-2629)

9:45AM (853) *Applications and Methods of Forcing.* **Cynthia Northrup**, University of California, Irvine (1096-03-2344)

10:00AM (854) *Large Cardinals: Killing Them Softly.* **Erin Kathryn Carmody**, The Graduate Center - City University of New York (1096-03-1167)

10:15AM (855) *The finite Steinhaus problem.* Preliminary report. **Jef f Lobe***, **Devon Henkis** and **Steve Jackson**, University of North Texas (1096-03-2415)

10:30AM (856) *Restricted Steinhaus sets in the plane.* Preliminary report. **Devon Henkis***, **Jeff Lobe** and **Steve Jackson**, University of North Texas (1096-03-2401)

10:45AM (857) *Ulam's measure problem, saturated ideals, and cardinal arithmetic.* **Monroe B Eskew**, UC Irvine (1096-03-2465)

11:00AM (858) *Restricting Martin's Axiom to a ccc ground model.* **Miha E. Habič**, CUNY Graduate Center (1096-03-1834)

11:15AM (859) *The complexity of transcendence bases in computable ordered fields.* **Oscar Levin**, University of Northern Colorado (1096-03-2464)

11:30AM (860) *On VC-minimal fields.* **Vincent N Guingona**, University of Notre Dame (1096-03-430)

11:45AM (861) *Certain Order Topologies on the Bicomplex Space and a Study of Bicomplex Nets.* **Sukhdev Singh***, Lovely Professional University, Phagwara, Punjab, India, and **Rajiv K. Srivastava**, Dr. B. R. Ambedkar University, Agra, India (1096-54-184)

MAA Session on Assessing Student Learning: Alternative Approaches, III

8:00 AM – 11:55 AM **Room 340, BCC**

Organizers: **Jane Butterfield**, University of Minnesota
Robert Campbell III, College of St. Benedict/St. John's University
David Clark, University of Minnesota
John Peter, Utica College
Cassie Williams, James Madison University

8:00AM (862) *The Utility and Practice of the Daily Quiz.* **Edwin O'Shea**, James Madison University (1096-B5-1457)

8:20AM (863) *Tell Me What You Know: Oral Exams in the Undergraduate Mathematics Classroom.* **Kristi Meyer**, Wisconsin Lutheran College (1096-B5-845)

8:40AM (864) *Assessing Students' Learning: The Interview Approach.* **Victor U. Odafe**, Bowling Green State University Firelands (1096-B5-381)

9:00AM (865) *Using oral examinations to improve student learning.* **Emma Smith Zbarsky**, Wentworth Institute of Technology (1096-B5-1648)

9:20AM (866) *The Old is New Again: Oral Assessment in Undergraduate Mathematics.* **Elizabeth Theta Brown**, James Madison University (1096-B5-2486)

9:40AM (867) *Learner-centered Assessment in Calculus.* Preliminary report. **Annela R Kelly**, Bridgewater State University (1096-B5-2570)

10:00AM (868) *Aligning Assessments to Problem-based Mathematics Classrooms: Three Examples of Assessment Tools.* **Polina Sabinin**, Bridgewater State University (1096-B5-1451)

10:20AM (869) *Beyond the Letter Grade: Teaching and Learning in Mathematics Classrooms.* **Girija S Nair-Hart**, University of Cincinatti Clermont College (1096-B5-177)

10:40AM (870) *Holistic, diagnostic grading rubric for student presentations in an IBL geometry course.* Preliminary report. **Nina Juliana White**, University of Michigan (1096-B5-1388)

11:00AM (871) *Assessing Projects and Inquiry-Based Activities in Quantitative Reasoning.* Preliminary report. **Victor I Piercey**, Ferris State University (1096-B5-1171)

11:20AM (872) *Spying on your students (mathematically, of course).* Preliminary report. **Gail M. Tang**, University of La Verne (1096-B5-143)

11:40AM ► (873) *Using Multiple-Choice Items to Assess Students Individually and Immediate Feedback Assessment Technique (IF-AT) to Foster Student Engagement and Small Group Discussion.* Preliminary report. **Kien H Lim**, University of Texas at El Paso (1096-B5-548)

MAA Session on Assessment of Proof Writing Throughout the Mathematics Major

8:00 AM – 9:15 AM **Room 337, BCC**

Organizer: **Sarah Cook**, Washburn University

Moderator: **Mariam Harris-Botzum**, Lehigh Carbon Community College

8:00AM ► (874) *Communal Assessment of Proof: Undergraduates' Development of Proof-Writing Criteria.* Preliminary report. **Sarah K. Bleiler***, Middle Tennessee State University, **Justin D. Boyle**, University of New Mexico, **Yi-Yin Ko**, Indiana State University, and **Sean P. Yee**, California State University Fullerton (1096-C1-569)

8:20AM ► (875) *Mathematics Professors' Evaluation of Students' Proofs.* **Robert C. Moore**, Andrews University (1096-C1-1787)

8:40AM (876) *Using Common Final Questions to Assess Proof.* **James E Hamblin**, Shippensburg University (1096-C1-707)

9:00AM ► (877) *Using a Rubric to Assess Development of Proof-Writing.* Preliminary report. **Sarah V Cook**, Washburn University (1096-C1-2623)

MAA Session on Student Activities, I

8:00 AM – 11:35 AM **Room 349, BCC**

Organizers: **Lisa Marano**, West Chester University of Pennsylvania

Jennifer Bergner, Salisbury State University

8:00AM ► (878) *Building Relationships with Student Activities in Math Learning Communities.* Preliminary report. **Karla M Childs*** and **Jean Coltharp**, Pittsburg State University (1096-M1-490)

8:20AM ► (879) *Building Community – The Good, the Bad and the Ugly.* **Nicholas J Willis**, George Fox University (1096-M1-1168)

8:40AM ► (880) *Activities for Undergraduate Students in Mathematics and Computer Science: Two Programs.* **Lidia Gonzalez**, York College, CUNY (1096-M1-2333)

9:00AM ► (881) *Lions and Tigers and Mathematicians.* **Cathy W. Grilli**, **George E. Gallarno*** and **Rebekah Herrman**, Christian Brothers University (1096-M1-2381)

9:20AM ► (882) *Math Club Hosts Math Circle.* Preliminary report. **Jacci White*** and **Monika Kiss**, Saint Leo University (1096-M1-301)

9:40AM ► (883) *Reviving the Math Club at Edinboro University of Pennsylvania: 2007 – 2013.* **Emily H. Sprague**, Edinboro University of Pennsylvania (1096-M1-665)

10:00AM ► (884) *Math Club Favorites at Lawrence Technological University.* **Ruth G Favro**, Lawrence Technological University (1096-M1-2567)

10:20AM ► (885) *Breaking Codes for Mathematics Enjoyment (and Cash).* **Jeffrey Liebner**, Lafayette College (1096-M1-2353)

10:40AM ► (886) *The Evolution of an Integration Bee at the University of Scranton.* **Stacey Muir**, University of Scranton (1096-M1-2514)

11:00AM ► (887) *A Non-Competitive ProblemFest.* **David E Molnar**, Felician College (1096-M1-2689)

11:20AM ► (888) *Mathematics – for life, for love, for a living.* **Deborah L Gochenaur*** and **Luis Melara**, Shippensburg University (1096-M1-2030)

MAA Session on the Intersection of Mathematics and the Arts, III

8:00 AM – 11:55 AM **Room 338, BCC**

Organizer: **Douglas Norton**, Villanova University

8:00AM ► (889) *Knot Theory: Rational Tangles and Wirtinger Presentations.* Preliminary report. **Sara E Rocha-Juarez**, University of North Texas at Dallas (1096-C5-2269)

8:20AM (890) *Patterns with Color Symmetry on Triply Periodic Polyhedra.* Preliminary report. **Douglas Dunham**, University of Minnesota, Duluth (1096-C5-1959)

8:40AM ► (891) *Triple gear.* **Saul Schleimer**, University of Warwick, and **Henry Segerman***, Oklahoma State University (1096-C5-730)

9:00AM ► (892) *Visualizing the Collatz conjecture.* **Elijah M. Allen***, Savannah Ga, and **Louis H. Kauffman**, University of Illinois (1096-C5-2748)

9:20AM ► (893) *Stumbling towards a pattern: how to make pants.* **Rebecca E. Field**, James Madison University (1096-C5-2660)

9:40AM (894) *Implementing Multiple Compositional and Color Constraints in Algorithmic Art.* **Robert M Spann**, Washington, DC (1096-C5-1407)

10:00AM ► (895) *Fractal Trees Inspired by Iterating Rational Functions.* Preliminary report. **Anne M. Burns**, Long Island University (1096-C5-434)

10:20AM ► (896) *Colorings of Plane Patterns Defined by Sequences ad Arrays, With Applications to Weaving.* Preliminary report.
Shelley Lynn Rasmussen, University of Massachusetts/Lowell (1096-C5-136)

10:40AM ► (897) *What does a finite nonabelian group sound like?* Preliminary report.
William DeMeo, University of South Carolina (1096-C5-2578)

11:00AM ► (898) *Animating Still Images.*
Michael Pilosov, SUNY Geneseo (1096-C5-1416)

11:20AM ► (899) *It Came from the Fourth Dimension!: Visualizing Higher Dimensions through the Art of Comic Books.*
Daniel M. Look, St. Lawrence University (1096-C5-229)

11:40AM (900) *Food for empathy in the School of Pythagoras and his wife Theano.*
Irene Iaccarino*, School of Music, Crotone, Italy, and **Rosanna Iembo**, University of Calabria, Italy and MAA member (1096-C5-1016)

MAA General Contributed Paper Session on Mathematics Education, II

8:00 AM – 11:55 AM **Room 347, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:00AM (901) *Putting Professional Development into Practice: How Teachers Implement and Share their Knowledge of the Common Core State Standards for Mathematics with Peers – The Research Process and Early Results* Preliminary report.
Kacey M Diemert, Montana State University - Bozeman (1096-VE-2374)

8:15AM ► (902) *A Mathematician's Foray into the Common Core State Standards (for Mathematical Practice): A Question of Interpretation?* Preliminary report.
D. Christopher Stephens*, **Sarah K. Bleiler** and **Wesley A. Baxter**, Middle Tennessee State University (1096-VE-2339)

8:30AM ► (903) *Rational Numbers and the Common Core: A Descriptive Case Study.* Preliminary report.
Roger Mark Fischer, Montana State University (1096-VE-1153)

8:45AM ► (904) *Examining Math-Educators Preparation CAEP's first Standard and CCSS for Math Practice.*
Atma R Sahu, Coppin State University (1096-VE-851)

9:00AM ► (905) *Mathematicians and K12 curriculum development.*
Victor Kostyuk, **Nathaniel Rounds** and **Paulette N Willis***, Reasoning Mind (1096-VE-1029)

9:15AM ► (906) *A comparison of the Common Core and the Indian Standards on Fractions.*
Sayonita Ghosh Hajra, University of Georgia (1096-VE-1084)

9:30AM ► (907) *Distorted mathematics: what math education teaches students about math.*
Victor Kostyuk, **Nathaniel Rounds*** and **Paulette N Willis**, Reasoning Mind (1096-VE-1027)

9:45AM ► (908) *Professional Development and Student Achievement on Standardized State Exams.* Preliminary report.
Melissa L Goss*, **Rebecca Anne Dibbs** and **Robert Powers**, University of Northern Colorado (1096-VE-2162)

10:00AM ► (909) *A Pilot Study on the Impact of Incorporating Problems with Incorrect Solutions into Exams on Students' Understanding of Mathematical Concepts.* Preliminary report.
Manyiu Tse, Molloy College (1096-VE-1986)

10:15AM ► (910) *Comparative of Stratified Alpha, Mosier, and Wang Reliability Coefficient.* Preliminary report.
Diana Suzana Mandar, Jakarta State University, Indonesia (1096-VE-1890)

10:30AM ► (911) *The effect of early high school mathematics achievement on public schools' students' college ready performance in Texas.*
Niloofar Ramezani, University of Northern Colorado (1096-VE-1115)

10:45AM ► (912) *A comparison and contrast of undergraduate students' mathematics and statistics anxiety levels based on gender, college-year, major field of study, and mathematics background.* Preliminary report.
Soofia Malik* and **Niloofar Ramezani**, University of Northern Colorado (1096-VE-1059)

11:00AM ► (913) *A Continuing Study of Gender Difference on a Qualifying Exam.*
Jane Butterfield, **Harvey Keynes**, **Jonathan Rogness**, University of Minnesota, and **Justin Sukiennik***, Colby College (1096-VE-2047)

11:15AM ► (914) *Strategies for teaching mathematics in a multicultural classroom.* Preliminary report.
Natalie M Aviles* and **Magdalena Mulvihill**, Adelphi University (1096-VE-1158)

11:30AM ► (915) *Quantitative and Mathematics Support Centers: Update from the National Science Foundation Workshop.* **Grace L. Coulombe***, Bates College, **Mary B. O'Neill**, Hamilton College, and **Michael E. Schuckers**, St. Lawrence University (1096-VE-123)

11:45AM ► (916) *The genesis of a mathematics learning community from a mathematics tutorial center.* **Ronald L Merritt**, Athens State University (1096-VE-39)

MAA General Contributed Paper Session on Research in Algebra and Topology, II

8:00 AM – 9:55 AM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:00AM ► (917) *Algebra with Anyonic Braiding.* Preliminary report. **Ik Jae Lee**, Rowan University (1096-VJ-1705)

8:15AM (918) *Twist Knots and Thickenings.* **Whitney Klaryn George**, West Chester University of PA (1096-VJ-1102)

8:30AM ► (919) *Algebraic structure in the card game SET.* Preliminary report. **Timothy E Goldberg**, Lenoir-Rhyne University (1096-VJ-1425)

8:45AM ► (920) *Characterizing Covering Properties Using Limited Information Strategies for Topological Games.* **Steven Clontz**, Auburn University (1096-VJ-1309)

9:00AM (921) *$R^n xG(n)$ is Algebraically Determined.* Preliminary report. **Weam M. Al-tameemi***, Texas A& M International University, and **Robert R. Kallman**, University of North Texas (1096-VJ-1222)

9:15AM ► (922) *Noetherian properties on generalized power series rings.* **Jung Wook Lim**, Kyungpook National University (1096-VJ-976)

9:30AM (923) *Finitary Incidence Algebras and the Idealization of $I(P)$.* Preliminary report. **Bradley M Wagner*** and **Manfred Dugas**, Baylor University (1096-VJ-860)

9:45AM ► (924) *On the k-involutions of $O(n,k)$ when k has characteristic 2.* Preliminary report. **Nathaniel J Schwartz**, Washington College (1096-VJ-836)

MAA General Contributed Paper Session on Research in Graph Theory and Combinatorics, II

8:00 AM – 11:55 AM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:00AM (925) *On atom expansions of Macdonald polynomials.* Preliminary report. **Avinash J. Dalal**, Drexel University (1096-VN-2434)

8:15AM (926) *Edelman-Greene insertion and the Little map.* **Zachary Hamaker***, Dartmouth College, and **Benjamin Young**, University of Oregon (1096-VN-2407)

8:30AM ► (927) *Prime Factorization of Kászonyi Numbers.* **Emily Marie Walther***, Westminster College, PA, and **Ariana Cappon**, Indiana University (1096-VN-2402)

8:45AM ► (928) *A new combinatorial interpretation of generalized Genocchi numbers.* **Feryal Alayont**, Grand Valley State University (1096-VN-2235)

9:00AM ► (929) *Explicit Formulas for Bernoulli and Euler Numbers.* Preliminary report. **Francesca Romano**, Siena College (1096-VN-1803)

9:15AM ► (930) *Generalized Fine and Motzkin Number Sequences.* Preliminary report. **Naiomi T. Cameron**, Lewis & Clark College (1096-VN-1159)

9:30AM ► (931) *(t,r)-Broadcasting Domination Numbers of Grids.* Preliminary report. **David Blessing***, **Erik Insko**, **Katie Johnson** and **Christie Mauretour**, Florida Gulf Coast University (1096-VN-953)

9:45AM ► (932) *Observations of $m-$ary partitions on an $m-$ary tree.* Preliminary report. **Timothy B. Flowers**, Indiana University of Pennsylvania, and **Shannon R. Lockard***, Bridgewater State University (1096-VN-2088)

10:00AM (933) *Extending the PC-Tree Algorithm to the Torus.* Preliminary report. **Charles Suer**, University of Louisville (1096-VN-1746)

10:15AM ► (934) *Counting Matrices Over a Finite Field With All Eigenvalues in the Field.* **Lisa Kaylor**, Wesleyan University, and **David Offner***, Westminster College (1096-VN-1964)

10:30AM (935) *Non-restricted fillings of layer polynominoes.* **Mitch A Phillipson*** and **Catherine Yan**, Texas A&M University (1096-VN-1882)

10:45AM ► (936) *Positive Semidefinite Propagation Time.* Preliminary report.
Nathan Warnberg, Iowa State University (1096-VN-290)

11:00AM ► (937) *Location of the First Ascent in a 123-Avoiding Permutation.*
Samuel Connolly, University of Pennsylvania, **Zachary Gabor***, Haverford College, and **Anant Godbole**, East Tennessee State University (1096-VN-1856)

11:15AM (938) *Bounds on superpatterns containing all layered permutations.* Preliminary report.
Daniel Gray, University of Florida (1096-VN-1842)

11:30AM ► (939) *Reconstruction of Tetrahedron from Edge length.* Preliminary report.
Derege H. Mussa, Texas A&M University-Commerce (1096-VN-1139)

11:45AM (940) *The polytope of fractional realizations of degree sequences.*
Michael D. Barrus, Brigham Young University (1096-VN-1019)

SIAM Minisymposium on Modeling Modules and Activities for Students

8:00 AM – 11:00 AM **Room 325, BCC**

Organizers: **Suzanne Lenhart**, University of Tennessee Knoxville
Maeve McCarthy, Murray State
Peter Turner, Clarkson University

8:00AM (941) *Modeling across the Curriculum.*
Peter R Turner, Clarkson University (1096-97-1123)

8:30AM ► (942) *Using a Virtual Laboratory to Teach Mathematical Modeling.*
Glenn Ledder, University of Nebraska-Lincoln (1096-97-2377)

9:00AM (943) *Modeling Calculus: A first course in the Calculus Sequence.*
Brian J. Birgen* and **Mariah H. Birgen**, Wartburg College (1096-97-1070)

9:30AM ► (944) *Quantitative modeling of biological and engineering systems through STEM problem solving activities.* Preliminary report.
Padmanabhan Seshaiyer, George Mason University (1096-65-2411)

10:00AM ► (945) *Mathematical Models in Medicine.*
Lester F. Caudill, University of Richmond (1096-92-2355)

10:30AM *How to introduce sustainability topics in classrooms grades 8-14 - with samples*,
Margaret (Midge) Cozzens,Rutgers University DIMACS Center.

SIAM Minisymposium on Recent Advances in Financial Mathematics, II

8:00 AM – 10:50 AM **Room 326, BCC**

Organizers: **Maxim Bichuch**, Worcester Polytechnic Institute
Ronnie Sircar, Princeton University
Stephan Sturm, Worcester Polytechnic Institute

8:00AM ► (946) *Taylor approximation of incomplete Radner equilibrium models.* Preliminary report.
Kasper Larsen* and **Jin Hyuk Choi**, Carnegie Mellon University (1096-60-1918)

8:30AM (947) *Understanding the Risks of Commodity Exchange-Traded Funds.*
Kevin Guo*, Columbia University, and **Tim Leung**, Columbia University, Industrial Engineering & Operations Research Department (1096-60-2005)

9:00AM (948) *Mean-Field Games of Inhomogeneous Populations in Financial Markets.*
Andrew Papanicolaou, University of Sydney (1096-60-2721)

9:30AM Please see the JMM newsletter for details.

10:00AM (949) *Time consistency of risk measures in markets with transaction costs.*
Zachary Feinstein* and **Birgit Rudloff**, Princeton University (1096-91-1821)

10:30AM (950) *Interactions in the system of interbank lending.*
Tomoyuki Ichiba, University of California Santa Barbara (1096-60-1501)

MAA Session on Research on the Teaching and Learning of Undergraduate Mathematics, I

8:20 AM – 11:55 AM **Room 341, BCC**

Organizers: **Kyeong Hah Roh**, Arizona State University
Michael Oehrtman, University of Northern Colorado
Timothy Fukawa-Connelly, University of New Hampshire

8:20AM (951) *Does inherent Platonism predict strength in abstract mathematics?* Preliminary report.
Gregory M Johnson, Carnegie Mellon University, **Hunter R Johnson**, City University of New York, and **Christopher S Shaw***, Columbia College Chicago (1096-L1-2075)

8:40AM (952) *The contributions of a history and philosophy of mathematics course on undergraduate students' mathematical thinking.* Preliminary report.
Kathleen M Clark, Florida State University (1096-L1-2592)

9:00AM ► (953) *An Investigation of Student Perceptions of Linear Algebra Modules.*
Laurel A Cooley, Brooklyn College, City University of New York, **William O Martin***, North Dakota State University, and **Draga Vidakovic**, Georgia State University (1096-L1-1954)

9:20AM ► (954) *Developing Reinvention Materials in Ring Theory: Analysis of Students' Mathematical Activity.* Preliminary report.
John Paul Cook, University of Science and Arts of Oklahoma, **Brian Katz***, Augustana College, and **Milos Savic**, University of Oklahoma (1096-L1-2618)

9:40AM ► (955) *On the reconciliation of different non-equivalent definitions designed for the same concept, in the context of limits for two-variable functions.*
Joanna Mamona-Downs, Arizona State University & University of Patras,Greece (1096-L1-2705)

10:00AM ► (956) *Relating Delta and Epsilon: How Students Graphically Create an Understanding of the Formal Definition of Limit at a Point.* Preliminary report.
Timothy C Boester, Wright State University (1096-L1-2380)

10:20AM ► (957) *A Unified Framework for Argumentation and Proof.*
Kelly M. Bubp* and **Michael A. Smith**, Ohio University (1096-L1-1302)

10:40AM ► (958) *A Comparison of Four Pedagogical Strategies in Calculus.*
Spencer Bagley, San Diego State University (1096-L1-529)

11:00AM ► (959) *Graduate students Teaching Assistants' (GTAs') beliefs, instructional practices, and student success.*
Jessica Ellis, San Diego (1096-L1-291)

11:20AM (960) *Analyzing student understanding in linear algebra through mathematical activity.*
Megan Wawro* and **David Plaxco**, Virginia Tech (1096-L1-1775)

Mathematics Awareness Month 2014

8:30 AM – 8:50 AM **Room 308, BCC**

The theme is "Mathematics, Magic, and Mystery"; please come to hear about the impressive presentation plans.

Presenters: **Eve Torrence**, Randolph-Macon College

Bruce Torrence, Randolph-Macon College

Colm Mulcahy, Spelman College and American University

MAA Invited Address

9:00 AM – 9:50 AM **Ballrooms I&II, 400 Level, BCC**

(961) *Snark attack! Visualizations of "uncolorable" graphs on surfaces.*
Sarah-Marie Belcastro, Sarah Lawrence College (1096-A0-13)

AMS Special Session on Recent Progress in the Langlands Program, III

9:00 AM – 11:50 AM **Room 318, BCC**

Organizers: **Moshe Adrian**, University of Utah
Shuichiro Takeda, University of Missouri

9:00AM (962) *Matching of Hecke operators for exceptional dual groups.*
Gordan Savin, University of Utah, and **Michael C Woodbury***, Columbia University (1096-11-1696)

9:30AM (963) *Cuspidal part of an Eisenstein series restricted to an index 2 subfield.*
Yueke Hu, University of Wisconsin-Madison (1096-11-967)

10:00AM (964) *L-functions from Langlands-Shahidi method and the generic Arthur packet conjecture.*
Yeansu Kim, University of Iowa (1096-11-659)

10:30AM (965) *On Extension of Ginzburg-Jiang-Soudry Correspondence to Certain Automorphic Forms on $Sp_{4mn}(\mathbb{A})$ and $\widetilde{Sp}_{4mn\pm 2n}(\mathbb{A})$.*
Baiying Liu, University of Utah (1096-11-159)

11:00AM (966) *The Langlands-Shahidi method for the classical groups in positive characteristic and the Riemann Hypothesis.* Preliminary report.
Luis A. Lomelí, University of Oklahoma (1096-11-161)

11:30AM (967) *Application of Langlands Functoriality to the special values of L-functions.* Preliminary report.
A. Raghuram, Indian Institute of Science Education and Research, Pune, India. (1096-11-1113)

MAA Invited Paper Session on Mathematics and Effective Thinking, I

9:00 AM – 11:50 AM **Room 307, BCC**

Organizer: **Michael Starbird**, University of Texas Austin

9:00AM ► (968) *A 21st century curriculum that raises education to a global maximum.*
Edward B. Burger, Southwestern University (1096-AF-636)

9:30AM ► (969) *Context and Evidence: Aligning Goals and Practice in the Undergraduate Mathematics Program.*
J Michael Pearson, Mathematical Association of America (1096-AF-641)

10:00AM ► (970) *Supporting Math Instructors to Teach in Ways that Foster Effective Thinking.*
Stan Yoshinobu, Cal Poly San Luis Obispo (1096-AF-425)

10:30AM ► (971) *Hearts and Minds: Waging the Battle to Win Over Liberal Arts Students.* Preliminary report.
Jodi Cotten, Westchester Community College, Valhalla, NY (1096-AF-750)

11:00AM ► (972) *Inquiry and Effective Thinking: Evidence from a Multi-Site Educational Research Study.*
Sandra Laursen, University of Colorado Boulder (1096-AF-716)

11:30AM ► (973) *Harnessing the Flow of History.* Preliminary report.
David Bressoud, Macalester College (1096-AF-353)

MAA Minicourse: #8: Part A

9:00 AM – 11:00 AM **Room 343, BCC**

Directing undergraduate research.

Presenter: **Aparna Higgins**, University of Dayton

MAA Minicourse #6: Part A

9:00 AM – 11:00 AM **Room 342, BCC**

Historical role-playing in the mathematics classroom.

Presenter: **John P. Curran**, Eastern Michigan University

MAA Minicourse: #13: Part A

9:00 AM – 11:00 AM **Room 344, BCC**

Teaching an applied topology course.

Presenters: **Colin Adams**, Williams College

Robert Franzosa, University of Maine

MAA Workshop

9:00 AM – 10:55 AM **Peale B/C, 1st Floor, Hilton**

Introductory proposal writing for grant applications to the NSF Division of Undergraduate Education. (advance registration required)

Presenters: **John Haddock**, Division of Undergraduate Education, NSF

Michael Jacobson, Division of Undergraduate Education, NSF

Lee Zia, Division of Undergraduate Education, NSF

MAA Committee on the Participation of Women Poster Session

9:00 AM – 11:00 AM **Exhibit Hall G, 100 Level, BCC**

Mathematical outreach programs.

Organizer: **Elizabeth Yanik**, Emporia State University

MAA-Young Mathematicians' Network Panel Discussion

9:00 AM – 10:20 AM **Room 316, BCC**

Undergraduate internships and research experiences for undergraduates.

Organizers: **Thomas Wakefield**, Youngstown State University

Ralucca Gera, Naval Posgraduate School

Panelists: **Emiily Kessler**, Society of Actuaries

Stephanie Edwards, Hope College

Krista Maxson, Shawnee State University

Saad El-Zanati, Illinois State University

Leslie Hogben, Iowa State University

Cindy Wyels, California State University Channel Islands

Student Hospitality/Information Center

9:00 AM – 5:00 PM **Swing Hall, 100 Level, BCC**

AMS Special Presentation

9:30 AM – 11:00 AM **Holiday Ballrooms 1–3, 2nd Floor, Hilton**

Who wants to be a mathematician—National contest.

Organizers: **Mike A. Breen**, AMS

William T. Butterworth, DePaul University

Exhibits and Book Sales

9:30 AM – 5:30 PM **Exhibit Hall F, 100 Level, BCC**

AWM Noether Lecture

10:00 AM – 10:50 AM **Ballrooms I&II, 400 Level, BCC**

► (974) *Walking on graphs the Representation Theory way.*
Georgia Benkart, University of WIsconsin-Madison (1096-05-1587)

MAA Invited Paper Session on Graphs Don't Have to Lie Flat: The Shape of Topological Graph Theory

10:00 AM – 11:50 AM **Room 308, BCC**

Organizers: **Sarah-Marie Belcastro**, Sarah Lawrence College
Mark Ellingham, Vanderbilt University

10:00AM ► (975) *Coloring graphs on surfaces, contrasted with coloring on the plane.* Preliminary report.
Joan P Hutchinson, Macalester College, emerita (1096-AE-1737)

10:30AM ► (976) *Superfluous crossings.*
Michael J. Pelsmajer, Illinois Institute of Technology (1096-AE-2761)

11:00AM (977) *Polynomials of graphs in surfaces.*
Joanna A. Ellis-Monaghan, Saint Michael's College (1096-AE-1947)

11:30AM ► (978) *Embeddings of graphs with hamilton cycle faces.*
Mark Ellingham, Vanderbilt University (1096-AE-513)

MAA General Contributed Paper Session on Teaching Mathematics Beyond the Calculus Sequence

10:00 AM – 11:55 AM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

10:00AM ► (979) *We Started a Directed Reading Program And So Can You.*
Steve Balady*, **Rebecca Black**, **Josh Ballew** and **Elizabeth Fleming**, University of Maryland, College Park (1096-VQ-2163)

10:15AM ► (980) *Learning to Write Arguments.*
Joyati Debnath, Winona State University (1096-VQ-2000)

10:30AM ► (981) *An IBL Approach to Advanced Calculus That Incorporates Proficiency.*
Scott Beaver, Western Oregon University (1096-VQ-1377)

10:45AM ► (982) *Mathematicians' views on transition-to-proof and advanced mathematics courses.* Preliminary report.
Milos Savic*, University of Oklahoma, **Melissa Mills**, Oklahoma State University, and **Robert Moore**, Andrews University (1096-VQ-1161)

11:00AM ► (983) *Analyzing Students' Difficulties with Proving in Light of the Structure of Proof Construction.* Preliminary report.
Tetsuya Yamamoto, the University of Oklahoma (1096-VQ-1082)

11:15AM (984) *Course Redesign Applied to a History of Math Course.* Preliminary report.
Cynthia Huffman Woodburn, Pittsburg State University (1096-VQ-70)

11:30AM ► (985) *Applications of Maxima CAS to Differential Equations.*
Leon Kaganovskiy, Touro College (1096-VQ-183)

11:45AM (986) *The Conundrum of Teaching Finite Mathematics.*
Michelle DeDeo, University of North Florida (1096-VQ-540)

AMS Special Presentation

10:30 AM – NOON **Room 336, BCC**

A conversation on nonacademic employment.

Moderator: **C. Allen Butler**, Daniel H. Wagner Associates, Inc.

MAA SIGMAA Officers Meeting

10:30 AM – NOON **Holiday Ballroom 6, 2nd Floor, Hilton**

Chair: **Karen A. Marrongelle**, Portland State University

MAA Council on Outreach Presentation

10:35 AM – 11:55 AM **Room 327, BCC**

Math Days for high school students at local colleges and universities.

Organizers: **Deanna Haunsperger**, Carleton College
Rebecca Swanson, Colorado School of Mines

Panelists: **Robert Devaney**, Boston University
Justin Gash, Franklin College
Teresa Moore, Ithaca College
Angela Spalsbury, Youngstown State University
David Strong, Pepperdine University

MAA Committee on Minority Participation in Mathematics and the Office of Minority Participation Panel Discussion

10:35 AM – 11:55 AM **Room 316, BCC**

Summer research programs.

Organizers: **William Hawkins Jr**, University of the District of Columbia
Robert Megginson, University of Michigan
Lloyd Douglas, University of North Carolina at Greensboro

Panelists: **Noureen Kahn**, University of North Texas at Dallas
Aprillya Lanz, Norfolk State University

SIAM Invited Address

11:10 AM – NOON **Ballrooms I&II, 400 Level, BCC**

(987) *On variational formulation of entropy solutions to nonlinear conservation laws.*
Eitan Tadmor, University of Maryland (1096-35-1675)

AMS Colloquium Lectures, Lecture II

1:00 PM – 1:50 PM **Ballrooms I&II, 400 Level, BCC**

(988) *Symplectic Topology Today: Embedding questions: obstructions and constructions.*
Dusa McDuff, Barnard College, Columbia University (1096-53-2197)

AMS-ASL Special Session on Logic and Probability, III

1:00 PM – 3:50 PM **Room 319, BCC**

Organizers: **Wesley Calvert**, Southern Illinois University
Doug Cenzer, University of Florida
Johanna Franklin, University of Connecticut
Valentina Harizanov, George Washington University

1:00PM (989) *Effective fractal dimensions for point processes.*
Jan S Reimann, Pennsylvania State University (1096-60-1236)

1:30PM (990) *Points and Lines, Randomness and Dimension.*
Jack H. Lutz, Iowa State University (1096-03-1435)

2:00PM (991) *Schnorr randomness for noncomputable measures.*
Jason M Rute, Pennsylvania State University (1096-03-2014)

2:30PM (992) *Dimension of the intersection of a translation of a subset of the reals by a Martin-Lof random real with the set of all numbers with a given constructive dimension .* Preliminary report.
R. Daniel Mauldin, University of North Texas (1096-03-2208)

3:00PM (993) *Algorithmic Randomness in Ergodic Theory.*
Johanna Franklin, University of Connecticut, and **Henry P Towsner***, University of Pennsylvania (1096-03-1208)

3:30PM (994) *Martin-Löf random Brownian motion.*
Kelty Allen, University of California, Berkeley (1096-03-1073)

AMS Special Session on Advances in Analysis and PDEs, III

1:00 PM – 3:50 PM **Room 332, BCC**

Organizers: **Tepper L. Gill**, Howard University
Daniel A. Williams, Howard University

1:00PM (995) *Strichartz Inequality for Orthonormal Functions.*
Elliott H Lieb, Princeton University (1096-91-360)

2:00PM (996) *On thresholds for scattering and blow up in the nonlinear Schroedinger equation.* Preliminary report.
Svetlana Roudenko, The George Washington University (1096-35-1515)

2:30PM (997) *A New Approach to Soliton Stability for the KdV Equation.*
Brian Pigott and **Sarah Raynor***, Wake Forest University (1096-35-2292)

3:00PM (998) *New monotonicity formulas and the optimal regularity in the Signorini problem with variable coefficients.*
Mariana Smit Vega Garcia*, Purdue University, and **Nicola Garofalo**, Universita' di Padova (1096-00-293)

3:30PM ► (999) *Regularization of nonautonomous ill-posed problems from linear to quasi-linear.* Preliminary report.
Matthew A Fury, Penn State Abington (1096-47-974)

AMS Special Session on Analytic Number Theory, II

1:00 PM – 3:50 PM **Room 310, BCC**

Organizers: **Angel Kumchev**, Towson University
Scott Parsell, West Chester University
Gang Yu, Kent State University

1:00PM (1000) *The range of Carmichael's universal exponent function.*
Kevin Ford*, University of Illinois at Urbana-Champaign, **Florian Luca**, Fundación Marcos Moshinsky, Instituto de Ciencias Nucleares UNAM, and **Carl Pomerance**, Dartmouth College (1096-11-215)

1:30PM (1001) *On the reciprocal sum of primes dividing Mersenne numbers.*
Zebediah Engberg, Dartmouth College (1096-11-970)

2:00PM ► (1002) *The primes that Euclid forgot.*
Enrique Treviño*, Lake Forest College, and **Paul P Pollack**, University of Georgia (1096-11-2552)

2:30PM (1003) *Abelian surfaces over finite fields with prescribed groups.*
Chantal David, Concordia University, **Derek Garton**, Portland State University, **Zachary Scherr**, University of Pennsylvania, **Arul Shankar**, Harvard University, **Ethan Smith**, Liberty University, and **Lola Thompson***, Oberlin College (1096-11-493)

3:00PM (1004) *Sieve weights in the GPY method and small gaps between primes.*
James Maynard, Universite de Montreal (1096-11-441)

3:30PM (1005) *Small gaps between primes: A new method.*
Yitang Zhang, University of New Hampshire (1096-11-2529)

AMS Special Session on Big Data: Mathematical and Statistical Modeling, Tools, Services, and Training

1:00 PM – 3:50 PM **Room 317, BCC**

Organizer: **Ivo Dinov**, University of California Los Angeles

► 1:00PM (1006) *Big Data Challenges in Neuroimaging, Informatics and Genomics Computing.*
Ivo D Dinov*, University of Michigan and UCLA, and **Arthur W Toga**, University of Southern California (1096-68-27)

► 1:30PM (1007) *Mathematical Challenges in Causal Inference with Emphasis on Transportability and External Validity.*
Elias Bareinboim* and **Judea Pearl**, University of California, Los Angeles (1096-62-2468)

2:00PM (1008) *Hidden Markov Model for High Frequency Data.*
Nguyet T Nguyen, Florida State University (1096-62-2312)

2:30PM (1009) *Consensus Spectral Techniques and Machine Learning.*
Jeff Randell Knisley, East Tennessee State University (1096-62-1122)

► 3:00PM (1010) *Covariance Matrix Adaptation Evolution Strategy for Link Prediction in Dynamic Social Networks.*
Catherine A. Bliss*, **Morgan R Frank**, **Chris M Danforth** and **Peter S Dodds**, University of Vermont (1096-65-1009)

► 3:30PM (1011) *My Life as a Tweet Word.*
John Ensley*, Brown University, **James Abello**, Rutgers University, and **Mika Sumida**, Yale University (1096-68-2249)

AMS Special Session on Complex Dynamics, II (a Mathematics Research Communities Session)

1:00 PM – 3:50 PM **Room 322, BCC**

Organizers: **Scott Kaschner**, University of Arizona

Holly Krieger, Massachusetts Institute of Technology

Paul Reschke, University of Michigan

1:00PM (1012) *Random iteration in CP^k.*
Turgay Bayraktar, Indiana University (1096-37-411)

1:30PM (1013) *Rational maps on $\mathbf{P}^2$ with invariant two form, piecewise linear maps on $\mathbf{R}^2$, and the rotation number.*
Jan-Li Lin, University of Notre Dame (1096-37-2015)

2:00PM (1014) *New Geometric Proof of Lambda Lemma.*
Tanya Firsova, Stony Brook University (1096-37-2391)

2:30PM (1015) *Fatou components of Chebyshev-like maps.* Preliminary report.
Joshua P Bowman, Smith College (1096-37-1308)

3:00PM (1016) *Trees of spheres and holomorphic dynamics.*
Matthieu Arfeux, Institut Mathematique de Toulouse (France) (1096-37-460)

3:30PM (1017) *Analytic and algebraic stability.* Preliminary report.
Laura G DeMarco, University of Illinois at Chicago (1096-37-2590)

AMS Special Session on Fractal Geometry: Mathematics of Fractals and Related Topics, I

1:00 PM – 3:50 PM **Room 315, BCC**

Organizers: **Michel Lapidus**, University of California Riverside

Erin Pearse, California State Polytechnic University, San Luis Obispo

Robert Strichartz, Cornell University

Machiel Van Frankenhuijsen, Utah Valley University

1:00PM Discussion

► 1:30PM (1018) *Hausdorff dimension of a certain measure.* Preliminary report.
Murat Akman*, University of Kentucky, **John Lewis**, University of Kentucky, and **Andrew Vogel**, Syracuse University (1096-35-89)

2:00PM (1019) *Vector analysis for Dirichlet forms on fractals.*
Alexander Teplyaev*, University of Connecticut, **Michael Hinz**, Bielefeld University, and **Daniel Kelleher**, University of Connecticut (1096-46-1876)

2:30PM (1020) *Magnetic operators on resistance spaces.*
Luke Rogers, University of Connecticut (1096-46-2477)

3:00PM (1021) *Bounded variation conditions and absolutely continuous spectrum.* **Milivoje Lukic**, Rice University (1096-47-459)

3:30PM (1022) *Fredholm modules and spectral triples associated with hyperbolic groupoids.* **Volodymyr Nekrashevych**, Texas A&M University, College Station, TX (1096-37-1038)

AMS Special Session on Geometric Group Theory, II (a Mathematics Research Communities Session)

1:00 PM – 3:50 PM **Room 321, BCC**

Organizers: **Tariq Aougab**, Yale University
Curt Kent, University of Toronto
Sang Rae Lee, Texas A&M University
Emily Stark, Tufts University

1:00PM (1023) *Hyperbolicity of the Cyclic Splitting Complex.* **Brian Mann**, University of Utah (1096-51-949)

1:30PM (1024) *Subfactor projections for Out(F_n).* **Samuel J Taylor**, University of Texas, Austin (1096-20-1151)

2:00PM (1025) *Quasi-isometry rigidity for right-angled Artin group with finite outer automorphism group.* Preliminary report. **Jingyin Huang**, New York University (1096-20-1936)

2:30PM (1026) *Stable commutator length in Baumslag–Solitar groups.* **Matt Clay**, University of Arkansas, **Max Forester** and **Joel Louwsma***, The University of Oklahoma (1096-20-608)

3:00PM (1027) *Finiteness Properties of Arithmetic Groups.* **Brendan Kelly**, University of Utah (1096-22-1810)

3:30PM (1028) *Acylindrically hyperbolic groups.* **Michael Hull**, University of Illinois at Chicago (1096-20-2725)

AMS Special Session on Homological and Characteristic p Methods in Commutative Algebra, I

1:00 PM – 3:50 PM **Room 303, BCC**

Organizers: **Neil Epstein**, George Mason University
Sean Sather-Wagstaff, North Dakota State University
Karl Schwede, Penn State University

1:00PM (1029) *Residual Intersections and Duality.* Preliminary report. **David Eisenbud**, MSRI/University of California, Berkeley (1096-13-1415)

1:30PM ► (1030) *Depth of modules at non sharply F-pure centers and base-change for the relative canonical sheaf.* **Zsolt Patakfalvi***, Princeton Universtiy, and **Karl Schwede**, Pennsylvania State University (1096-44-2038)

2:00PM (1031) *Ideals Generated by Principal Minors.* **A. K. Wheeler**, University of Michigan, Ann Arbor (1096-13-1620)

2:30PM ► (1032) *The Closure of a Linear Space in $(\mathbb{P}^1)^n$.* **Adam Boocher***, University of California Berkeley, and **Federico Ardila**, San Francisco State University (1096-13-409)

3:00PM (1033) *Non-simplicial decompositions of Betti diagrams of complete intersections.* **Branden Stone***, Bard College, **Courtney Gibbons**, Hamilton College, **Jack Jeffries**, University of Utah, **Sarah Mayes**, Quest University Canada, **Claudiu Raicu**, Princeton University, and **Bryan White**, University of New Mexico (1096-13-1831)

3:30PM (1034) *Applications of CI Matrix Factorizations.* Preliminary report. **Irena Peeva***, Cornell University, and **David Eisenbud**, UC Berleley and MSRI (1096-13-377)

AMS Special Session on Homotopy Theory, I

1:00 PM – 3:50 PM **Room 329, BCC**

Organizers: **Niles Johnson**, Ohio State University at Newark
Mark W. Johnson, Penn State University, Altoona
Nitu Kitchloo, Johns Hopkins University
James Turner, Calvin College
Donald Yau, Ohio State University at Newark

1:00PM (1035) *Models for infinity prop(erad)s.* **Marcy Robertson***, University of Western Ontario, **Philip Hackney**, Stockholm University, and **Donald Yau**, Ohio State Newark (1096-55-1645)

1:30PM (1036) *Formal Hecke algebras and algebraic oriented cohomology theories.* **Alex Hoffnung***, Temple University, **Jose Malagon-Lopez**, University of Toronto Mississauga, **Alistair Savage** and **Kirill Zainoulline**, University of Ottawa (1096-16-1800)

2:00PM (1037) *Recent work in Homotopy Type Theory.* **Steve Awodey**, Carnegie Mellon University (1096-03-417)

2:30PM (1038) *Homotopy coherent adjunctions.* **Emily Riehl**, Harvard University (1096-18-1432)

3:00PM (1039) *Bousfield Localization and Commutative Monoids.* **David White**, Wesleyan University (1096-55-1516)

3:30PM (1040) *Additional Structure on the Category of Mackey Functors.*
Kristen Luise Mazur, Lafayette College (1096-55-1014)

AMS Special Session on Hyperplane Arrangements and Applications, III

1:00 PM – 3:50 PM **Room 318, BCC**

Organizers: **Takuro Abe**, Kyoto University
Max Wakefield, United States Naval Academy
Masahiko Yoshinaga, Hokkaido University

1:00PM (1041) *Logarithmic vector fields and curve configurations in the projective plane.*
Hal Schenck*, University of Illinois, **Hiroaki Terao** and **Masahiko Yoshinaga**, Hokkaido University (1096-14-1200)

1:30PM (1042) *Classification of Factored Gain-Graphic Hyperplane Arrangements.*
Jackie Kaminski, Juniata College (1096-05-2262)

2:00PM (1043) *an oriented matroid with a disconnected realization space.*
Yasuyuki Tsukamoto, Department of Human Coexistence, Kyoto University (1096-05-1901)

2:30PM (1044) *Arrangements with quadratic complete intersection Orlik-Terao algebras.*
Graham Denham, Western University, **Mehdi Garrousian***, University of Windsor, and **Stefan Tohaneanu**, University of Idaho (1096-15-1325)

3:00PM (1045) *A construction for canonical systems of basic invariants for reflection groups.* Preliminary report.
Norihiro Nakashima, Hokkaido University (1096-16-1290)

3:30PM (1046) *Ideals generated by products of linear forms.* Preliminary report.
Stefan O Tohaneanu, University of Idaho (1096-13-615)

AMS Special Session on My Favorite Graph Theory Conjectures, II

1:00 PM – 3:50 PM **Room 314, BCC**

Organizers: **Craig Larson**, Virginia Commonwealth University
Ralucca Gera, Naval Postgraduate School

1:00PM (1047) *Circuit double cover conjecture.*
Cun-Quan Zhang, West Virginia University (1096-05-1316)

1:30PM (1048) *Selected extremal problems in graph theory.*
Douglas B. West, Zhejiang Normal University and University of Illinois (1096-05-386)

2:00PM (1049) *Some of my (and other people's) favorite conjectures on chromatic topological graph theory.* Preliminary report.
Joan P. Hutchinson, Macalester College (1096-05-1156)

2:30PM (1050) *Competition Graphs and Food Webs: Some of My Favorite Conjectures.*
Fred S Roberts, Rutgers University (1096-05-590)

3:00PM ► (1051) *Folkman Numbers: Some Results and Open Questions.*
Stanisław P. Radziszowski, Department of Computer Science, Rochester Institute of Technology (1096-05-1300)

3:30PM ► (1052) *The Meta-Conjecture for median graphs.*
Henry Martyn Mulder, Econometrisch Instituut, Erasmus Universiteit, Rotterdam (1096-05-300)

AMS Special Session on Nonlinear Systems: Polynomial Equations, Nonlinear PDEs, and Applications, III

1:00 PM – 3:50 PM **Room 328, BCC**

Organizer: **Wenrui Hao**, University of Notre Dame

1:00PM (1053) *Numerical algebraic geometry over number fields.*
Andrew Sommese, University of Notre Dame (1096-14-1040)

1:30PM (1054) *Applications of Numerical Real Algebraic Geometry to Kinematics.* Preliminary report.
Charles W. Wampler, General Motors R&D (1096-14-722)

2:00PM (1055) *The numerical factorization of polynomials.*
Wenyuan Wu, Chongqing Institute of Green and Intelligent Technology, Chinese Academy of Sciences, and **Zhonggang Zeng***, Northeastern Illinois University (1096-65-1370)

2:30PM (1056) *Linkage disequilibrium between independently assorting loci, via numerical algebraic geometry.*
Jesse W Drendel, **Michael F Antolin**, **Daniel J Bates***, **Patrick D Shipman** and **Simon J. Tavener**, Colorado State University (1096-92-951)

3:00PM ► (1057) *Homotopy continuation and signal decomposition.* Preliminary report.
Jonathan D Hauenstein*, North Carolina State University, **Alessandra Bernardi**, Universit`a di Torino, and **Noah S Daleo**, North Carolina State University (1096-65-1015)

3:30PM (1058) *Path tracking algorithms for homotopy continuation methods in weighted projective spaces.*
Tianran Chen* and **Tien-Yien Li**, Michigan State University (1096-65-1683)

AMS Special Session on Progress in Free Analysis and Free Probability, I

1:00 PM – 3:50 PM **Room 301, BCC**

Organizers: **Dmitry Kaliuzhnyi-Verbovetskyi**, Drexel University

Todd Kemp, University of California San Diego

1:00PM (1059) *Quantum symmetric states on free product C^*-algebras.*
Kenneth J. Dykema, Texas A&M University, **Claus Koestler***, University College Cork, Ireland, and **John D. Williams**, Texas A&M University (1096-46-1852)

2:00PM (1060) *On Second Order Fluctuations for Some Classes of Random Matrices.*
Mihai Popa*, University of Texas at San Antonio, **James A Mingo**, Queen's University, and **Yong Jiao**, Central South University (1096-47-2410)

2:30PM (1061) *Choquet simplices of quantum symmetric states.*
Yoann Dabrowski, Universite Claude-Bernard (Lyon I), **Ken Dykema***, Texas A&M University, **Claus Koestler**, University College, Cork, **Kunal Mukjherjee**, Indian Institute of Technology Madras, and **John D. Williams**, Texas A&M University (1096-46-1768)

3:00PM (1062) *Infinite Divisibility and Semigroups Indexed by Completely Positive Maps in Free Probability.*
John D. Williams, Texas A&M University (1096-47-1933)

3:30PM ► (1063) *Asymptotics of looped cumulant lattices.* Preliminary report.
Jonathan Novak, MIT (1096-46-906)

AMS Special Session on Recent Progress in Geometric and Complex Analysis, III

1:00 PM – 3:50 PM **Room 302, BCC**

Organizers: **Zheng Huang**, City University of New York, Graduate Center and College of Staten Island

Longzhi Lin, Rutgers University

Marcello Lucia, City University of New York, Graduate Center and College of Staten Island

1:00PM (1064) *Geometry and topology of noncompact, complete, finite volume, Riemannian 4-manifolds M with sectional curvature $-1 < K < 0$.*
Grigori Avramidi, Utah University, **Tam Nguyen Phan**, Binghamton University, and **Yunhui Wu***, Rice University (1096-53-753)

1:30PM (1065) *Topological type of Limit Laminations of Embedded Minimal Disks.*
Jacob Bernstein*, Johns Hopkins University, and **Giuseppe Tinaglia**, King's College London (1096-53-637)

2:00PM (1066) *Linear stability of gradient shrinking Ricci solitons.*
Chenxu He*, University of Oklahoma, and **Huai-Dong Cao**, Lehigh University (1096-53-721)

2:30PM (1067) *The Hyperplane is the Only Stable, Smooth Solution to the Isoperimetric Problem in Gaussian Space.*
Matthew McGonagle* and **John Ross**, Johns Hopkins University (1096-53-668)

3:00PM (1068) *Connected sum construction of constant Q-curvature manifolds in higher dimensions.*
Yueh-Ju Lin, University of Notre Dame (1096-53-655)

3:30PM (1069) *Conformally flat, constant Q-curvature metrics with isolated singularities.* Preliminary report.
Jesse Ratzkin, University of Cape Town (1096-53-675)

AMS Special Session on Recent Progress in Multivariable Operator Theory, I

1:00 PM – 3:50 PM **Room 331, BCC**

Organizers: **Ron Douglas**, Texas A&M University

Michael Jury, University of Florida

1:00PM (1070) *Determinantal representations of stable polynomials.*
Hugo J Woerdeman, Drexel University (1096-47-1305)

1:30PM (1071) *Determinantal representations of semi-hyperbolic polynomials.*
Greg Knese, Washington University in St. Louis (1096-15-1567)

2:00PM (1072) *Two-Variable Transfer Function Realizations and Agler Kernels.*
Kelly Bickel*, Georgia Institute of Techonology, and **Greg Knese**, Washington University in St. Louis (1096-46-1633)

2:30PM (1073) *Multidimensional linear systems and multivariable weighted Bergman spaces.* Preliminary report.
Joseph A Ball, Virginia Tech (1096-47-613)

3:00PM (1074) *Multipliers of embedded discs.*
Kenneth R. Davidson*, **Michael Hartz**, University of Waterloo, and **Orr M. Shalit**, Ben-Gurion University of the Negev (1096-47-1295)

3:30PM (1075) *The noncommutative lifting principle.*
J E Pascoe, UCSD (1096-47-1225)

AMS Special Session on Regulatory Problems for Nonlinear PDEs Modeling Fluids and Complex Fluids, II (a Mathematics Research Communities Session)

1:00 PM – 3:50 PM **Room 324, BCC**

Organizers: **Jacob Bedrossian**, New York University
Hao Jia, University of Chicago
Jared Whitehead, Los Alamos National Laboratory
Tak Kwong Wong, University of Pennsylvania

1:00PM (1076) *Invariant Manifolds for Euler Equations and related equations.*
Zhiwu Lin, Georgia Institute of Technology (1096-35-1926)

1:30PM (1077) *Ill-Posedness Issues for Truncated Series Models of Water Waves.*
David Ambrose*, Drexel University, **Jerry Bona** and **David Nicholls**, University of Illinois at Chicago (1096-35-267)

2:00PM (1078) *Existence and regularity of invariant measures for the three dimensional stochastic primitive equations.*
Nathan Glatt-Holtz, Virginia Tech, **Igor Kukavica**, University of Southern California, **Vlad Vicol***, Princeton University, and **Mohammed Ziane**, University of Southern California (1096-35-1460)

2:30PM (1079) *Regularity "in large" for the 3D Salmon's planetary geostrophic model of ocean dynamics.*
Chongsheng Cao, Florida International University, and **Edriss S. Titi***, Weizmann Institute of Science and The University of California - Irvine (1096-35-1011)

3:00PM (1080) *Stability of Solutions to the Dissipative Quasi-Geostrophic Equation.*
Mimi Dai, University of Illinois Chicago (1096-35-474)

3:30PM (1081) *Change of phase for the humid atmosphere.*
Roger M Temam* and **Michele Coti Zelati**, Indiana University (1096-76-825)

AMS Special Session on Symplectic and Contact Structures on Manifolds with Special Holonomy, III

1:00 PM – 3:50 PM **Room 320, BCC**

Organizers: **Sergey Grigorian**, University of Texas Pan American
Sema Salur, University of Rochester
Albert J. Todd, University of California, Riverside

1:00PM (1082) *The helicity invariant and topological strictly contact dynamics.*
Peter Spaeth, Penn State University, Altoona (1096-53-135)

1:30PM (1083) *Cylindrical contact homology as a well-defined homology?*
Joanna Nelson, Barnard College, Columbia University (1096-53-680)

2:00PM (1084) *On SFT invariants of the complements of ample normal crossing divisors in projective varieties.* Preliminary report.
Khoa Lu Nguyen, Stanford (1096-51-557)

2:30PM (1085) *Sasaki join, transverse Hamiltonian 2-forms, and Sasaki-Einstein metrics.* Preliminary report.
Charles P Boyer, University of New Mexico (1096-53-1379)

3:30PM (1086) *Bach-Maxwell Equations and Extremal Kähler Metrics.*
Caner Koca, Vanderbilt University (1096-53-1267)

AMS Special Session on Topological Graph Theory: Structure and Symmetry, I

1:00 PM – 3:50 PM **Room 330, BCC**

Organizers: **Jonathan L. Gross**, Columbia University
Thomas W. Tucker, Colgate University

1:00PM (1087) *Enumerating regular objects with a given automorphism group.*
Martin Downs, Phoenix, Arizona, and **Gareth A. Jones***, University of Southampton, Southampton, UK (1096-05-1539)

1:30PM (1088) *Pseudo-orientability versus orientability.*
Antonio Breda d'Azevedo, University of Aveiro (1096-05-1152)

2:00PM (1089) *Infinite regular median graphs.*
Wilfried Imrich, Department Mathematics and Information Technology, Montanuniversitaet Leoben, Austria (1096-05-1337)

► 2:30PM (1090) *Growth Rates of Face-Homogeneous Planar Tessellations.*
Stephen J. Graves, University of Texas at Tyler, and **Mark E. Watkins***, Syracuse University (1096-05-1068)

3:00PM (1091) *Graph coverings and harmonic functions on graphs.* Preliminary report.
Roman Nedela, Slovak Academy of Sciences (1096-05-2144)

► 3:30PM (1092) *Classical mathematical structures within topological graph theory.*
Oliver R Knill, Harvard University (1096-05-873)

AMS Special Session on Tropical and Nonarchimedean Analytic Geometry, II (a Mathematics Research Communities Session)

1:00 PM – 3:50 PM **Room 323, BCC**

Organizers: **Dustin Cartwright**, Yale University
Melody Chan, Harvard University
Joseph D. Rabinoff, Georgia Institute of Technology

1:00PM (1093) *Tropical Morse functions and their homological mirrors.*
Gabriel D Kerr, Kansas State University (1096-51-1576)

1:30PM (1094) *The skeleton of the Jacobian, the Jacobian of the skeleton, and lifting meromorphic functions from tropical to algebraic curves.*
Matt Baker* and **Joe Rabinoff**, Georgia Tech (1096-14-1272)

2:00PM (1095) *Algorithms for Mumford curves: period matrix and canonical embedding.*
Ralph Morrison and **Qingchun Ren***, University of California, Berkeley (1096-14-1445)

2:30PM (1096) *Algorithms for Mumford Curves: Good Starting Data.*
Ralph E Morrison* and **Qingchun Ren**, UC Berkeley (1096-14-993)

3:00PM (1097) *Faithful Tropicalization of Abelian Varieties.*
Tyler Foster, University of Michigan, **Joseph Rabinoff**, Georgia Institute of Technology, **Farbod Shokrieh***, Cornell University, and **Alejandro Soto**, University of Regensburg (1096-14-450)

3:30PM (1098) *Classical and nonarchimedean spaces.*
Andrew Joseph Dudzik, UC Berkeley (1096-54-1453)

MAA Invited Paper Session on Mathematics and Effective Thinking, II

1:00 PM – 4:00 PM **Room 307, BCC**

Organizer: **Michael Starbird**, University of Texas Austin

► 1:00PM (1099) *Mathematical writing and effective thinking.*
Paul Zorn, St. Olaf College (1096-AF-861)

► 1:30PM (1100) *On The Elements of Style.*
Katherine Socha, Math for America (1096-AF-801)

► 2:00PM (1101) *Think Before You Speak: using presentations and prepared questions to promote effective thinking.*
Deborah J Bergstrand, Swarthmore College (1096-AF-1443)

► 2:30PM (1102) *What is the Definition of Definition? and Other Conundrums.*
Carol Schumacher, Kenyon College (1096-AF-695)

► 3:00PM (1103) *Thinking about Mathematics and Meaning.*
Francis Edward Su, Harvey Mudd College (1096-AF-1235)

3:30PM Panel Discussion on Mathematics and Effective Thinking.

MAA Minicourse #2: Part A

1:00 PM – 3:00 PM **Room 342, BCC**

CATALST: Introductory statistics using randomization and bootstrap methods.

Presenters: **Andrew Zieffler**, University of Minnesota
Robert delMas, University of Minnesota
Nicola Parker, University of Minnesota

MAA Minicourse #5: Part A

1:00 PM – 3:00 PM **Room 343, BCC**

Using randomization methods to build conceptual understanding of statistical inference.

Presenters: **Robin H. Lock**, St. Lawrence University
Patti Frazer Lock, St. Lawrence University
Kari Lock Morgan, Duke University
Eric Frazer Lock, Duke University
Dennis Frazer Lock, Iowa State University

MAA Minicourse: #14: Part B

1:00 PM – 3:00 PM **Room 344, BCC**

Visualizing projective geometry through photographs and perspective drawings.

Presenters: **Annalisa Crannell**, Franklin & Marshall College
Marc Frantz, Indiana University Bloomington
Fumiko Futamura, Southwestern University

AMS Session on Difference Equations, Approximations, Sequences, and Special Functions

1:00 PM – 4:10 PM **Room 305, BCC**

1:00PM (1104) *The Spectral Analysis of the Exceptional Jacobi Differential Expression for Extreme Parameter Choices.*
Jessica D. Stewart*, **Lance L. Littlejohn** and **Constanze Liaw**, Baylor University (1096-33-1780)

1:15PM ► (1105) *Lacunary Statistical and Sliding Window Convergence for Measurable Functions.* Preliminary report.
Jeff Connor*, Ohio University, and **Ekrem Savas**, Istanbul Ticaret University (1096-40-679)

1:30PM ► (1106) *Regular Families of Interpolators on Scattered Data.*
Jeff Ledford, Virginia Commonwealth University (1096-41-779)

1:45PM (1107) **Mean value of entire functions of exponential type**. Preliminary report.
Tariq M Qazi, Virginia State University (1096-41-1546)

2:00PM (1108) *Beurling-Selberg Extremal Problems in de Branges Spaces.*
Mark A Spanier, North Dakota State University (1096-41-1804)

2:15PM (1109) *Using Osculatory Smoothing Splines To Approximate The Solutions To Ordinary Differential Equations.* Preliminary report.
Kendall A Gillies* and **Clyde F Martin**, Texas Tech University (1096-41-2190)

2:30PM (1110) *A Generalized Linear Functional Equation Defined on Groups.*
Heather B. Hunt* and **Prasanna K. Sahoo**, University of Louisville (1096-39-1652)

2:45PM (1111) *Weak Enveloping and Global Attractors for Periodic Dynamical Systems.* Preliminary report.
Justin Wright, Plymouth State University (1096-39-2097)

3:00PM ► (1112) *Dynamics and Estimation of Parameters in a Discrete Time Model linking Unemployment and Inflation.*
Mingfei Li and **Mihaela Predescu***, Bentley University (1096-39-2212)

3:15PM (1113) *Stochastic Persistence in a Contest-Competition Model with Allee Effect.* Preliminary report.
Eddy A Kwessi*, **Saber Elaydi**, Trinity University, **George Livatiodis**, Southwest Research Institute, **David Ribble**, Trinity University, and **Laila Assas**, Umm Al-Qura University (1096-39-1366)

3:30PM ► (1114) *Applications of stability analysis of model ecosystems to problems in sustainability and collapse.* Preliminary report.
Harold M Hastings, Simon's Rock College and Hofstra University (1096-39-2662)

3:45PM ► (1115) *On the discrete analogous to one initial-boundary value problem to nonlinear diffusion equation.*
Mikheil Tutberidze*, Ilia State University, and **Soso Pipia**, Delta Systems ltd. (1096-39-2307)

4:00PM (1116) *A number theoretic twist on second order recurrence relations.* Preliminary report.
John R Greene, University of Minnesota Duluth (1096-39-1189)

AMS Session on Mathematics Education

1:00 PM – 3:55 PM **Room 311, BCC**

1:00PM (1117) *Student Profiling and Mathematical Models for MOOCs.*
Mika K Seppala, Florida State University (1096-97-1631)

1:15PM ► (1118) *Investigating Strategies when designing Geometry in Art as an Online Course, student's attitudes, and achievement.* Preliminary report.
Pamela Lowry, Lawrence Technological University (1096-51-1182)

1:30PM ► (1119) *Visually Verifying Homework Problems in Multivariable Calculus.*
Paul E. Seeburger, Monroe Community College (1096-97-2659)

1:45PM ► (1120) *Teaching and Learning Differential Equations for Engineers through Modelling and Technology.* Preliminary report.
Ruth Rodriguez, Tecnologico de Monterrey (1096-97-2598)

2:00PM ► (1121) *Teaching in College without Calculator.*
Mulugeta Markos* and **Bishal Karanjit**, North Carolina Wesleyan College (1096-97-238)

2:15PM (1122) *From the Spiral Program at UMCP: Research projects suitable for students after completing a first course in mathematical proofs.*
Kenneth R Berg, University of Maryland, College Park (1096-97-1369)

2:30PM (1123) *Mathematical Fidelity of Virtual Manipulatives: Teacher Candidates' Perceptions.*
Mara Alagic, Wichita State University (1096-97-2736)

2:45PM ► (1124) *Investigating Statistical Concepts, Applications and Methods using Minitab.*
Julie M Clark, Hollins University (1096-62-808)

3:00PM ► (1125) *Using Knitting To Construct Seamless Regular and Semi-Regular Polyhedra.*
Rebecca Plassmann, Central Oregon Community College (1096-00-2695)

3:15PM ► (1126) *MArTH Madness: Building a Culture of Creating Math Through Art at Saint Ann's School.*
Anna Weltman, Saint Ann's School (1096-97-1791)

3:30PM ► (1127) *Communicating snapshots of news from contemporary mathematics - an on-going study carried out in senior high-schools in Israel.* Preliminary report.
Nitsa B. Movshovitz-Hadar, Technion - Israel Institute of Technology, Haifa, Israel. (1096-97-323)

3:45PM ► (1128) *Problems and methods that develop creativity.*
Ellina Grigorieva, TWU (1096-97-693)

AMS Session on Numerical Methods and Computing, II

1:00 PM – 3:55 PM **Room 313, BCC**

1:00PM (1129) *A new a posteriori error estimate for numerical solutions of the radiative transport equation.*
Joseph A Eichholz, Rose-Hulman Institute of Technology (1096-65-1943)

1:15PM (1130) *Fast Solution Methods for the Space-Time Fractional Diffusion Equations.*
Treena Basu*, Rhodes College, Memphis, TN, and **Hong Wang**, University of South Carolina (1096-65-1467)

► 1:30PM (1131) *Computer-Assisted Proof of Periodic Solutions of ODE and PDE systems.*
A. R. Hungria*, University of Delaware, **J. D. Mireles James**, Rutgers University, and **J. P. Lessard**, Laval University, Quebec City, Canada (1096-65-725)

1:45PM (1132) *Regularized Restoration for Two Dimensional Band-Limited Signals.*
Weidong Chen, University of Georgia (1096-65-396)

2:00PM (1133) *Data-Fitted Generic Second Order Macroscopic Traffic Flow Models and Model Accuracy on Real Data.*
Shimao Fan, University of Illinois at Urbana Champaign (1096-65-622)

2:15PM (1134) *The Mathematics of Hierarchical T-splines.*
Emily J Evans* and **Michael A. Scott**, Brigham Young University (1096-65-1181)

► 2:30PM (1135) *Fuzzy Logic: A Departure from Mathematical Modeling to Computing Problem Solving.*
Atma R. Sahu, Coppin State University (1096-65-847)

2:45PM (1136) *New Fibonacci Type Collocation Approach for n-th Order Uncertain Differential Equations.*
S. Chakraverty* and **Smita Tapaswini**, National Institute of Technology Rourkela, Odisha, India (1096-65-1359)

► 3:00PM (1137) *Guaranteed Adaptive, Automatic, Quadrature.*
Fred J. Hickernell, Illinois Institute of Technology (1096-65-499)

3:15PM (1138) *Analyzing the Errors of an Extension of Wilkinson's Iterative Refinement or Improvement Algorithm.*
Abdramane Serme* and **Jean W. Richard**, BMCC/CUNY-The City University of New York (1096-65-2528)

3:30PM (1139) *A Reduction Method For Matrix Pairs with Application to Tikhonov Regularization.*
Xuebo Yu* and **Lothar Reichel**, Kent State University (1096-65-1355)

► 3:45PM (1140) *The Universal Algebra Calculator at the command line and in the cloud.* Preliminary report.
William DeMeo, University of South Carolina (1096-06-2287)

AMS Session on Optimization, Calculus of Variations, Nonlinear Programming

1:00 PM – 4:25 PM **Room 304, BCC**

► 1:00PM (1141) *The Log-Convex Density Conjecture.* Preliminary report.
Frank Morgan, Williams College (1096-49-153)

► 1:15PM (1142) *Centroidal Voronoi Tessellations of Rigid Shapes: A Variational Perspective.*
Lisa J Larsson*, **Rustum Choksi** and **Jean-Christophe Nave**, McGill University (1096-49-185)

1:30PM (1143) *A Levenberg-Marquardt method using Sobolev gradients.*
Parimah Kazemi*, Beloit College, and **Robert Renka**, University of North Texas (1096-49-531)

1:45PM (1144) *Continuous Newton Method for Elliptic Inverse Problems.*
Corinne Teravainen, Rochester Institute of Technology (1096-49-2554)

► 2:00PM (1145) *Treatment of Single Special Constraint in the Framework of Interval Method for Global Optimization.* Preliminary report.
Mengyi Ying* and **Min Sun**, University of Alabama (1096-49-1808)

2:15PM (1146) *Solution of delay systems in optimization problems by hybrid functions.*
Mohsen Razzaghi, Mississippi State University (1096-49-369)

► 2:30PM (1147) *Effect of convection on optimal design of a bar with attached mass.* Preliminary report.
John Matthews*, **Boris Belinskiy** and **James W. Hiestand**, University of Tennessee at Chattanooga (1096-49-1754)

► 2:45PM (1148) *Gradient and Extragradient Methods for Elliptic Inverse Problems with an Application to the Tumor Identification Problem.* Preliminary report.
Brian C Winkler, Rochester Institute of Technology (1096-49-1867)

► 3:00PM (1149) *Optimal Control of SIR Model with Education.* Preliminary report.
Hem Raj Joshi, Xavier University, Cincinnati (1096-49-2448)

3:15PM (1150) *An Equation Error Approach for the Elasticity Imaging Inverse Problem for Predicting Tumor Location.* Preliminary report.
Erin R. Crossen, Rochester Institute of Technology (1096-49-2300)

3:30PM (1151) *Parameter Estimation for Atmospheric Vortices.*
Lynn Raburn Greenleaf, Stephen F. Austin State University (1096-49-1667)

3:45PM (1152) *A Characterization of the Reflected Quasipotential.* Preliminary report.
Kasie G Farlow, USMA West Point (1096-49-1365)

4:00PM (1153) *Existence and Uniqueness of Solution of Second Order Hyperbolic Partial Differential Equation with Point Effect.* **Narayan Thapa**, Minot (1096-49-2054)

4:15PM (1154) *On Handling Free Variables in Semidefinite Programming Using a Primal-Dual Regularized Interior-Point Method.* **Ahad Dehghani***, Queen's University, **Jean-Louis Goffin**, McGill University, and **Dominique Orban**, Mathematics and Industrial Engineering Department Montreal Ecole Polytechnique (1096-49-2622)

AMS Session on Structural and Extremal Problems in Graph Theory

1:00 PM – 4:25 PM **Room 312, BCC**

1:00PM (1155) *Degree conditions for weakly geodesic pancyclic graphs and their exceptions.* Preliminary report. **Emlee W Nicholson***, Millsaps College, and **Bing Wei**, University of Mississippi (1096-05-1716)

1:15PM (1156) *On the maximum induced decomposition of graphs.* **Zoltan Furedi**, Renyi Institute of Mathematics of the Hungarian Academy of Sciences, and **Zeinab Maleki***, Isfahan University of Technology (1096-05-2642)

1:30PM (1157) *Planar Graphs of Fixed Tree Width.* Preliminary report. **Brett C. Smith**, Wesleyan University (1096-05-1187)

1:45PM (1158) *Circumference and Pathwidth of Highly Connected Graphs.* **Emily A. Marshall***, Vanderbilt University, and **David R. Wood**, Monash University (1096-05-2106)

2:00PM (1159) *Uniqueness and minimal obstructions for tree depth.* **Michael D. Barrus**, Brigham Young University (1096-05-1010)

► 2:15PM (1160) *On semi-linkage with prescribed lengths.* **Alexander Halperin**, Lehigh University (1096-05-706)

2:30PM (1161) *On The Potential Function For Degree Sequences Of Multi-Graphs.* Preliminary report. **Casey Kenneth Moffatt**, University Of Colorado - Denver (1096-05-2361)

2:45PM (1162) *Degree-Sequence Stability of Graphs.* **Catherine Erbes***, **Michael Ferrara**, University of Colorado Denver, **Ryan R. Martin**, Iowa State University, and **Paul Wenger**, Rochester Institute of Technology (1096-05-1700)

► 3:00PM (1163) *A construction of uniquely n-colorable digraphs without short cycles.* **Michael Severino**, University of Montana (1096-05-2074)

► 3:15PM (1164) *Sidon sets and graphs without 4-cycles.* **Craig M Timmons*** and **Michael Tait**, University of California, San Diego (1096-05-2437)

► 3:30PM (1165) *On $L(2,1)$ labeling of trees.* **Jobby Jacob***, Rochester Institute of Technology, and **Christopher Wood**, University of California, Irvine (1096-05-2456)

► 3:45PM (1166) *On the $L(2,1)$-Labelings of Amalgamations of Graphs.* **Sarah Spence Adams**, **Noura Howell**, Franklin W. Olin College of Engineering, **Nathaniel Karst**, **Denise Sakai Troxell**, Babson College, and **Junjie Zhu***, Franklin W. Olin College of Engineering (1096-05-1099)

► 4:00PM (1167) *$L(d,1)$-labelings of Edge-Path-Replacements by Factorization of Graphs.* **Nathaniel Karst**, Babson College, **Jessica Oehrlein***, Franklin W. Olin College of Engineering, **Denise Sakai Troxell**, Babson College, and **Junjie Zhu**, Franklin W. Olin College of Engineering (1096-05-1098)

► 4:15PM (1168) *Independence sequences in a graph, constrained and unconstrained.* Preliminary report. **Allen J. Schwenk**, Western Michigan University (1096-05-1753)

MAA Session on the History of Mathematical Communities

1:00 PM – 4:15 PM **Room 337, BCC**

Organizers: **Amy Shell-Gellasch**, Montgomery College
Linda McGuire, Muhlenberg College

► 1:00PM (1169) *Where Zijes Went: The Travels of Astronomical Tables in Medieval Islam.* Preliminary report. **Glen R Van Brummelen**, Quest University (1096-E3-1382)

► 1:20PM (1170) *The Mathematics Class at the Berlin Academy in the 18th Century.* Preliminary report. **Lawrence D'Antonio**, Ramapo College (1096-E3-1487)

► 1:40PM (1171) *The "Partly-Visible" College: Euler and the mathematical community in the 18th century.* **Dominic Klyve**, Central Washington University (1096-E3-2220)

► 2:00PM (1172) *History of Mathematics in Punjab.* **Satish C Bhatnagar**, University of Nevada Las Vegas (1096-E3-1253)

► 2:20PM (1173) *Origins and National Character of the Polish School of Mathematics in pre-WWII Lwow, Warszawa, and Krakow.* Preliminary report. **Emelie A. Kenney**, Siena College (1096-E3-532)

2:40PM ► (1174) *Time and Place: Sustaining the American Mathematical Community.* Preliminary report.
Della Dumbaugh, University of Richmond (1096-E3-484)

3:00PM ► (1175) *Queering Mathematical History: A Queer Genealogy of the Mathematical Community, Bourbaki.*
Kat Rands, Elon University (1096-E3-2751)

3:20PM ► (1176) *The NCTM Oral History Project: Documenting Community Memory of Mathematics Education in the United States.*
Penny H. Dunham, Muhlenberg College (1096-E3-96)

3:40PM ► (1177) *40+ Years of the AWM (Association for Women in Mathematics): The History of AWM and the AWM Archives.*
Sarah J Greenwald, Appalachian State University (1096-E3-221)

4:00PM ► (1178) *An incident in planning national meetings for the mathematical community.* Preliminary report.
James J. Tattersall*, Providence College, and **Kenneth A. Ross**, University of Oregon (1096-E3-1586)

MAA Session on Is Mathematics the Language of Science?

1:00 PM – 4:15 PM **Room 340, BCC**

Organizers: **Carl Behrens**, Alexandria, VA
Thomas Drucker, University of Wisconsin-Whitewater
Dan Sloughter, Furman University

1:00PM ► (1179) *Mathematics Is a Science in its Own Right.*
Carl E. Behrens, Alexandria, VA (1096-G1-1195)

1:30PM ► (1180) *The Mathematics of Quantum Mechanics: Making the Math Fit the Philosophy.*
James R Henderson, University of Pittsburgh-Titusville (1096-G1-149)

2:00PM ► (1181) *A group theory perspective of mathematical constructs in physics.* Preliminary report.
Horia I. Petrache, Department of Physics, Indiana University Purdue University Indianapolis (1096-G1-2359)

2:30PM ► (1182) *The Roots Of Kalmár's Empiricism.*
Mate Szabo, Carnegie Mellon University, Department of Philosophy (1096-G1-842)

3:00PM ► (1183) *No surprise for the effectiveness of mathematics in the natural sciences.*
Ruggero Ferro, University of Verona, Italy (1096-G1-2034)

3:30PM ► (1184) *Mathematics as an Emergent Feature of the Physical Universe.*
Ronald E. Mickens, Clark Atlanta University (1096-G1-743)

3:55PM ► (1185) *A New Look at Wigner's 'The Unreasonable Effectiveness of Mathematics in the Natural Sciences'.* Preliminary report.
Jeff Buechner, Rutgers University-Newark & Saul Kripke Center, CUNY (1096-G1-1414)

MAA Session on Projects, Demonstrations, and Activities that Engage Liberal Arts Mathematics Students, III

1:00 PM – 3:55 PM **Room 345, BCC**

Organizer: **Sarah Mabrouk**, Framingham State University

1:00PM ► (1186) *Juggling as an Introduction to Mathematical Thinking.*
Otis C. Wright, III, Cedarville University (1096-J5-1214)

1:20PM ► (1187) *The Stable Marriage Problem in the Classroom.*
Raymond N Greenwell* and **Daniel E Seabold**, Hofstra University (1096-J5-120)

1:40PM ► (1188) *Walking the Line.*
Cathy W. Grilli, Christian Brothers University (1096-J5-2370)

2:00PM ► (1189) *Adapting liberal arts mathematics hands-on activities to a large-lecture format.*
Darci L. Kracht, Kent State University (1096-J5-2316)

2:20PM ► (1190) *Infographics Activities to Promote Graphical and Quantitative Literacy.* Preliminary report.
Debra L. Hydorn, University of Mary Washington (1096-J5-2039)

2:40PM ► (1191) *Counting Melodies: A Musical Introduction to Recursion.* Preliminary report.
Kurt Ludwick, Salisbury University (1096-J5-2237)

3:00PM ► (1192) *Win, Lose, or Draw: An Analytical Reasoning Course at Butler University.*
Karen Holmes, Butler University (1096-J5-52)

3:20PM ► (1193) *Venn Diagram Bingo and other Games for Liberal Arts Math Classes.*
Teena Carroll, Emory & Henry College (1096-J5-2490)

3:40PM ► (1194) *Puzzles + Games = Mathematical Thinking.*
Edmund A Lamagna, University of Rhode Island (1096-J5-576)

MAA Session on Research on the Teaching and Learning of Undergraduate Mathematics, II

1:00 PM – 4:15 PM **Room 341, BCC**

Organizers: **Kyeong Hah Roh**, Arizona State University

Michael Oehrtman, University of Northern Colorado

Timothy Fukawa-Connelly, Drexel University

1:00PM ► (1195) *Calculus Instructors' Resources, Orientations and Goals in Teaching Low Achieving Students.* **Misun Lee**, University of Oklahoma (1096-L1-1650)

1:20PM ► (1196) *How can we (or should we) assess undergraduate students' creativity?* Preliminary report. **Milos Savic***, University of Oklahoma, and **Gulden Karakok**, University of Northern Colorado (1096-L1-2538)

1:40PM (1197) *Investigating the Links between Students' Knowledge of Rational Numbers and Algebraic Procedures and Students' Success in Undergraduate Mathematics.* **Jennifer Yantz**, Middle Tennessee State University (1096-L1-1413)

2:00PM ► (1198) *Developing the Notion of Function Between Sets of Equivalence Classes from the APOS Perspective.* Preliminary report. **Harrison E. Stalvey***, **Draga Vidakovic** and **Mariana Montiel**, Georgia State University (1096-L1-1096)

2:20PM (1199) *The effectiveness of 5 minute preview video lectures using Smart Board, Camtasia Studio, and Podcasting on mathematical achievement and mathematics self-efficacy.* **Minsu Kim**, University of North Georgia (1096-L1-364)

2:40PM ► (1200) *An Evaluation of Argumentation and Proof Opportunities in Transition-to-Proof Textbooks.* Preliminary report. **Michael A. Smith*** and **Kelly M. Bubp**, Ohio University (1096-L1-2128)

3:00PM ► (1201) *Promoting Calculus Understanding Through Explanation and Reflection.* **Daniel Lee Reinholz**, University of California, Berkeley (1096-L1-913)

3:20PM ► (1202) *The Emergence of Algebraic Structure: Students Come to Understand Units and Zero-divisors.* **John Paul Cook**, University of Science and Arts of Oklahoma (1096-L1-2332)

4:00PM ► (1203) *Inverting the transition-to-proof course.* Preliminary report. **Robert Talbert**, Grand Valley State University (1096-L1-1566)

MAA Session on Student Activities, II

1:00 PM – 2:15 PM **Room 349, BCC**

Organizers: **Lisa Marano**, West Chester University of Pennsylvania

Jennifer Bergner, Salisbury State University

1:00PM ► (1204) *Hosting mathematics treasure hunts.* Preliminary report. **Julie Barnes**, Western Carolina University (1096-M1-1845)

1:20PM ► (1205) *A Mathematical Scavenger Hunt.* **Janine E. Janoski**, King's College (1096-M1-2264)

1:40PM ► (1206) *Pi-Miler: An Irrational Race.* **Brooke Buckley*** and **Bethany Noblitt**, Northern Kentucky University (1096-M1-76)

2:00PM ► (1207) *The Radical Dash: A Mathematical Amazing Race.* Preliminary report. **Jennifer Bergner**, Salisbury University (1096-M1-2053)

MAA Session on the Intersection of Mathematics and the Arts, IV

1:00 PM – 3:55 PM **Room 338, BCC**

Organizer: **Douglas Norton**, Villanova University

1:00PM ► (1208) *Symmetries of generalized Truchet tiles.* **David A Reimann**, Albion College (1096-C5-2682)

1:20PM ► (1209) *Math, Art and GeoGebra.* Preliminary report. **Violeta Vasilevska**, Utah Valley University (1096-C5-1213)

1:40PM ► (1210) *Magic Squares and Their Magic Secrets.* Preliminary report. **Margaret E Kepner**, Washington, DC (1096-C5-2154)

2:00PM ► (1211) *Hyperbolic Fractal Tilings.* **Robert W Fathauer**, Tessellations Company (1096-C5-1922)

2:20PM ► (1212) *Applying an Historical Approach to Contemporary Pattern Design.* **Elizabeth Whiteley**, Washington DC (1096-C5-1405)

2:40PM ► (1213) *Artists and Their Use of Mathematics.* **Elizabeth C Rogers**, Piedmont College (1096-C5-2758)

3:00PM ► (1214) *Interlocking Polygonal Tiling of Some Special Class of Star Polygons.* **Reza Sarhangi**, Towson University (1096-C5-413)

3:20PM ► (1215) *Extending the poetry of mathematics to non-mathematicians.* **JoAnne Growney**, http://poetrywithmathematics.blogspot.com (1096-C5-1781)

3:40PM ► (1216) *Literary Mathematics and Mathematical Literature.* **Rita A. Capezzi*** and **L. Christine Kinsey**, Canisius College (1096-C5-1522)

MAA General Contributed Paper Session on Interdisciplinary Topics

1:00 PM – 1:55 PM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University

Bem Cayco, San Jose State University

Kimberly Presser, Shippensburge University

1:00PM (1217) *Modeling the Reliability of a Hydrogen Gas Nanosensor.* **Kristin McCullough***, Grand View University, **Nader Ebrahimi** and **Zhili Xiao**, Northern Illinois University (1096-VD-2425)

1:15PM (1218) *Parameter Estimation of Tumor Growth Model.* Preliminary report. **Breanne M Hatfield*** and **Narayan Thapa**, Minot State University (1096-VD-1767)

1:30PM (1219) *Patients with Advanced Cancer and their Survival in a Rural Community: The Impact of Hospice Services.* Preliminary report. **Veera Holdai***, Salisbury University, and **David Eric Cowall**, Coastal Hospice, Inc (1096-VD-1164)

1:45PM (1220) *Modeling the Energy Level of Hydrogen Using the Schrödinger Equation.* **Johannah M Miller*** and **Narayan Thapa**, Minot State University (1096-VD-533)

MAA General Contributed Paper Session on Research in Geometry and Linear Algebra

1:00 PM – 4:10 PM **Room 347, BCC**

Organizers: **Jennifer Beineke**, Western New England University

Bem Cayco, San Jose State University

Kimberly Presser, Shippensburge University

1:00PM (1221) *Uniform Edge-c-Colorings of the Archimedean Tilings.* Preliminary report. **Casey Mann***, University of Washington Bothell, **Laura Asaro**, East Central University, **John Hyde**, The University of Texas at Tyler, **Melanie Jensen**, Tulane University, and **Tyler Schroeder**, North Central College (1096-VM-2714)

1:15PM (1222) *On some* 3*-way transportation polytopes.* Preliminary report. **Bernd Sing**, The University of the West Indies, Barbados (1096-VM-2527)

1:30PM (1223) *Computer Models of Negatively-Curved Surfaces.* Preliminary report. **Benjamin H DeMeo***, Williams College, **Chaim Goodman-Strauss**, University of Arkansas, **Matthew Cole**, University of Notre Dame, and **Diana Davis**, Brown University (1096-VM-2386)

1:45PM (1224) *The Construction of Faces of* CP_2*.* Preliminary report. **Andrew J. Klimas**, Xavier University of Louisiana (1096-VM-2134)

2:00PM (1225) *Two old geometrical chestnuts revisited.* Preliminary report. **Ivko M Dimitric**, Pennsylvania State University Fayette (1096-VM-1988)

2:15PM (1226) *Some inequalities on Riemannian submersion and isometric immersions.* **Yun Myung Oh**, Andrews University (1096-VM-1784)

2:30PM (1227) *Determining Properties of Semifields by Investigating Their Cubical Arrays.* **Kelly Aman**, University of Texas at Arlington (1096-VM-1178)

2:45PM (1228) *On the Hausdorff dimension of p-adic Cantor sets.* Preliminary report. **William C Abram**, Hillsdale College, and **Artem Bolshakov***, University of Texas at Dallas (1096-VM-1146)

3:00PM (1229) *Hadwiger's Theorem for Functions.* **Matthew L. Wright**, Institute for Mathematics and its Applications, University of Minnesota (1096-VM-751)

3:15PM (1230) *Generalized Signed-Rank Estimation for Nonlinear Models with Multidimensional Indices.* **Brice M. Nguelifack***, Auburn University, **Eddy A. Kwessi**, Trinity University, and **Asheber Abebe**, Auburn University (1096-VM-197)

3:30PM (1231) *Spectrally Arbitrary Patterns and Algebraic Solutions.* **Timothy C Melvin**, Washington State University and Carroll College (1096-VM-362)

3:45PM (1232) *Classical Linear Optimization in an Abstract Setting.* Preliminary report. **Tien Chih**, University of Montana (1096-VM-2226)

4:00PM (1233) *Electronic Computation of Simple Perfect Squared Squares.* **Joseph F DiNatale**, Armstrong Atlantic State University (1096-VM-2254)

MAA General Contributed Paper Session on Research in Graph Theory and Combinatorics, III

1:00 PM – 4:10 PM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University

Bem Cayco, San Jose State University

Kimberly Presser, Shippensburge University

1:00PM (1234) *On Distributive Cross Section Lattices of $\mathcal{J}$-irreducible Reductive Monoids.* Preliminary report. **Stephen M. Adams**, North Carolina State University (1096-VN-1731)

1:15PM (1235) *Aperiodic Binary Strings.* **Zachary George Pochiba*** and **Sean Leavor**, Washington & Jefferson College (1096-VN-1656)

1:30PM ► (1236) *Bounds on the Maximum Number of Minimum Dominating Sets.*
Samuel Connolly*, University of Pennsylvania, **Zachary Gabor**, Haverford College, **Anant Godbole**, East Tennessee State University, and **Bill Kay**, Emory University (1096-VN-1473)

1:45PM ► (1237) *Odd-Neighbored Subsets.*
Ralph P. Grimaldi, Rose-Hulman Institute of Technology (1096-VN-1216)

2:00PM (1238) *The Flag Descent Algebra.* Preliminary report.
Matthew Moynihan, The College of Wooster (1096-VN-2613)

2:15PM ► (1239) *Finding mono-chromatic K^3 shapes within a complete, unweighted graph with variable c-edge-coloring.* Preliminary report.
Marilyn Titus, Bentonville, Arkansas (1096-VN-32)

2:30PM ► (1240) *Enumeration of bipartite graphs and blocks.*
Andrew R Gainer-Dewar, Carleton College (1096-VN-442)

2:45PM ► (1241) *Exploiting Connections Between Graph Theory and Finite Geometry.*
Elizabeth Lane-Harvard* and **Tim Penttila**, Colorado State University (1096-VN-445)

3:00PM ► (1242) *Universal and Overlap Cycles.*
Kai Orans*, Pomona College, **Adam D. King**, University of Louisville, and **Amanda N. Laubmeier**, University of Arizona (1096-VN-962)

3:15PM (1243) *Enclosings of λ-fold 5-cycle systems.*
John Asplund*, **C. A. Rodger**, Auburn University, and **Melissa Keranen**, Michigan Technological University (1096-VN-799)

3:30PM (1244) *Some Consequences of a New Bijective Proof of the shape-Wilf-equivalence of 231 and 312.*
Jonathan S Bloom, Dartmouth College (1096-VN-782)

3:45PM (1245) *Dominating Sets in $Cay(\mathbb{Z}_n, \{\pm 1, \pm 3, \pm 5, \ldots, \pm(2k-1)\})$.*
Jon Woltz*, **Matthew Lee Force** and **Joe DeMaio**, Kennesaw State University (1096-VN-712)

4:00PM ► (1246) *Connections between Hamming codes over q-element fields and Singer block designs.*
Bud Brown, Virginia Tech (1096-VN-628)

SIAM Minisymposium on New Developments with Entropic Solutions to Nonlinear Conservation Laws

1:00 PM – 3:55 PM **Room 325, BCC**

Organizers: **Pierre-Emmanuel Jabin**, University of Maryland
Eitan Tadmor, University of Maryland
Konstantina Trivisa, University of Maryland

1:00PM (1247) *Long Time Behavior of Periodic Solutions to Scalar Conservation Laws In Several Space Dimensions.*
Constantine M. Dafermos, Brown University (1096-35-1017)

1:30PM (1248) *New development of the relative entropy method applied to shocks of conservation laws.*
Alexis F Vasseur, The University of Texas at Austin (1096-35-908)

2:00PM (1249) *Non-uniqueness and boundary effects for the incompressible Euler equations.*
Emil Wiedemann, University of British Columbia and Pacific Institute for the Mathematical Sciences (1096-35-1221)

2:30PM (1250) *Numerical schemes that converge to the entropy measure valued solutions of systems of conservation laws.*
Siddhartha Mishra, ETH Zurich, Switzerland (1096-35-1172)

3:00PM (1251) *Singular limit of a nonlinear hyperbolic system with a two-scale relaxation parameter at an interface.*
Jian-Guo Liu*, Duke University, **Frederic Coquel**, École Polytechnique, **Shi Jin**, University of Wisconsin-Madison, and **Li Wang**, UCLA (1096-35-1095)

3:30PM (1252) *Relaxation approximations to hyperbolic balance laws.*
Alexey Miroshnikov, University of Massachusetts at Amherst, and **Konstantina Trivisa***, University of Maryland (1096-35-1108)

MAA Committee on Mutual Concerns-College Board Panel Discussion

1:00 PM – 2:20 PM **Room 316, BCC**

AP calculus, computer science, and statistics.

Organizer: **Roxy Peck**, Cal Poly San Luis Obispo

Panelists: **Don King**, Northeastern University
Paul Tymann, Rochester Institute of Technology
Allan Rossman, California Polytechnic State University, San Luis Obispo
Lien Diaz, College Board
Serena Magrogan, College Board

MAA-Young Mathematicians' Network Panel Discussion

1:00 PM – 2:20 PM **Room 327, BCC**

Finding the right grant.

Organizers: **Josh Laison**, Willamette University

Jacob White, Texas A&M University

Panelists: **Lloyd Douglas**, University of North Carolina at Greensboro

Florence Fasanelli, AAAS

Eric Gaze, Bowdoin College

Frank Sottile, Texas A&M University

Joint Committee on Women in the Mathematical Sciences Panel Discussion

1:00 PM – 2:30 PM **Room 326, BCC**

Negotiating in mathematical careers.

Organizers: **Janet Best**, Ohio State University

Christine Guenther, Pacific University

Amber Puha, California State University San Marcos

Panelists: **Rachelle DeCoste**, Wheaton College

Peter March, Ohio State University

Tanya Moore, Building Diversity in Science

Catherine Roberts, College of the Holy Cross

Summer Program for Women in Mathematics (SPWM) Reunion

1:00 PM – 4:00 PM **Room 336, BCC**

MAA General Contributed Paper Session on Modeling and Applications of Mathematics, I

2:00 PM – 4:10 PM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University

Bem Cayco, San Jose State University

Kimberly Presser, Shippensburge University

2:00PM ► (1253) *An Enzymatic Model of Prion Aggregate Dynamics.*
Jason Karl Davis* and **Suzanne S Sindi**, University of California, Merced (1096-VG-2704)

2:15PM ► (1254) *Risk factors in the spread of Visceral Leishmaniasis in two highly endemic but ecologically different regions.* Preliminary report.
Kamal Kevin Barley, Arizona State University (1096-VG-2698)

2:30PM ► (1255) *Novel Properties of Deterministic and Stochastic SIR Models.*
Jessica Ginepro, Western New England University, **Emma Hartman**, Wheaton College, **Ryo Kimura**, Oberlin College, **Matthew McDermott**, Harvey Mudd College, **Colin Pawlowski***, Yale University, and **Dylan Shepardson**, Mount Holyoke College (1096-VG-2688)

2:45PM ► (1256) *Anti-tumor immune dynamics: using ODEs to model a novel cancer therapy.* Preliminary report.
Sean M. Laverty* and **Bryan Dawkins**, University of Central Oklahoma (1096-VG-2674)

3:00PM (1257) *Action Potentials in Peripheral Auditory Nervous System: A Novel PDE Distribution Model.* Preliminary report.
Rebecca E. Gasper, The University of Iowa (1096-VG-2632)

3:15PM ► (1258) *Descriptive analysis and modeling of wave propagation during epileptic seizures.*
Laura R. Gonzalez-Ramirez*, Boston University, **Omar Ahmed**, **Sydney S. Cash**, Department of Neurology, Massachusetts General Hospital; Harvard Medical School, **C. Eugene Wayne** and **Mark A. Kramer**, Boston University (1096-VG-2537)

3:30PM (1259) *A mathematical model of human papillomavirus with application to cervical cancer in African women.*
Najat Ziyadi*, Morgan State University, and **Avner Friedman**, The Ohio State University (1096-VG-2231)

3:45PM ► (1260) *Automated Estimation of Wound Size.*
James Brian Hall, University of California, San Diego (1096-VG-2143)

4:00PM ► (1261) *A Mathematical Model for a Self-Expanding Hemostatic Bandage.*
Keith Wojciechowski, University of Wisconsin Stout, and **Kelsey Linnell***, Bowdoin College (1096-VG-1980)

AMS Invited Address

2:15 PM – 3:05 PM **Ballrooms I&II, 400 Level, BCC**

(1262) *Random matrices and Dyson Brownian Motion.*
Horng-Tzer Yau, Harvard University (1096-60-2260)

Young Mathematicians' Network-Project NExT Poster Session

2:15 PM – 4:15 PM **Exhibit Hall G, 100 Level, BCC**

Organizers: **Kim Roth**, Juniata College

Mike Axtell, University of St. Thomas

MAA Committee on Two-Year Colleges Panel Discussion

2:35 PM – 3:55 PM **Room 327, BCC**

Collaborations between two-year and four-year institutions that create pathways to a math major.

Organizers: **Elizabeth Teles**, National Science Foundation
Judy Ackerman, Montbomery College, Rockville Campus

Panelists: **Debra Poese**, Montgomery College, Rockville Campus
Nancy Sattler, Terra State Community College
Eric Kostelich, Arizona State University

MAA Subcommittee on Research by Undergraduates Panel Discussion

2:35 PM – 3:55 PM **Room 316, BCC**

Directing undergraduate research: How to get started.

Organizers: **Herbert Medina**, Loyola Marymount University
Rebecca Garcia, Sam Houston State University

Panelists: **Michael Dorff**, Brigham Young University
Joyati Debnath, Winona State University
Angel Pineda, California State University, Fullerton
Sandy Ganzell, St. Mary's College of Maryland

AMS Retiring Presidential Address

3:20 PM – 4:10 PM **Ballrooms I&II, 400 Level, BCC**

► (1263) *Reflections on a Mathematical World.*
Eric M. Friedlander, Uniiversity of Southern California (1096-00-1505)

Joint Prize Session

4:25 PM – 5:25 PM **Ballrooms I&II, 400 Level, BCC**

Joint Prize Session Reception

5:30 PM – 6:30 PM **Ballrooms I&II Lobby, 400 Level, BCC**

SIGMAA on the Philosophy of Mathematics Reception, Business Meeting, and Guest Lecture

5:30 PM – 7:20 PM **Room 340, BCC**

5:30PM Reception and Business Meeting; lecture to follow immediately at 6:30 p.m.

(1264) *Hermann Minkowski: The quiet genius.*
Steve Gimbel, Gettysburg College (1096-A0-79)

MAA Two-Year College Reception

5:45 PM – 7:00 PM **Holiday Ballroom 4, 2nd Floor, Hilton**

SIGMAA on Mathematical and Computational Biology Reception, Business Meeting, and Guest Lecture

6:00 PM – 7:50 PM **Room 349, BCC**

6:00PM Reception and Business Meeting; lecture to follow immediately at 7:00 p.m.

(1265) *Explorations in phytoplankton fluid dynamics.*
Lisa Fauci, Tulane University (1096-A0-59)

SIGMAA on Quantitative Literacy Reception, Business Meeting, and Guest Lecture

6:00 PM – 7:50 PM **Room 338, BCC**

6:00PM Reception and Business Meeting; talk to immediately follow at 7:00 p.m.

(1266) *Sustainability + Serendipity = Math Awareness Month 2013.*
Victor Donnay, Bryn Mawr College (1096-A0-2787)

AMS-MAA Special Film Presentation

6:00 PM – 7:10 PM **Ballrooms I&II, 400 Level, BCC**

The Genius of Srinivasa Ramanujan.

MAA Committee on the Undergraduate Program in Mathematics Discussion Session

7:30 PM – 9:00 PM **Room 347, BCC**

Course Area Reports (broad umbrella definitions): Abstract Algebra; Geometry; Transitions to Proofs; Probability and Statistics

Presenters: **Carol Schumacher**, Kenyon College
Martha Siegel, Towson University

MAA Committee on the Undergraduate Program in Mathematics Discussion Session

7:30 PM – 9:00 PM **Room 348, BCC**

Course Area Reports (broad umbrella definitions): Linear Algebra; Differential Equations; Real and Complex Analysis; Mathematical Modeling

Presenters: **Carol Schumacher**, Kenyon College
Martha Siegel, Towson University

MAA Committee on the Undergraduate Program in Mathematics Discussion Session

7:30 PM – 9:00 PM **Room 346, BCC**

Program Area Reports (concentrations, double majors, minors, integrated majors): Financial Math and Actuarial Science; Statistics; Computing; Mathematical Programming; Applied Math

Organizers: **Carol Schumacher**, Kenyon College
Martha Siegel, Towson University

MAA Committee on the Undergraduate Program in Mathematics Discussion

7:30 PM – 9:00 PM **Room 345, BCC**

Program Area Reports (concentrations, double majors, minors, integrated majors): Teacher Education; Biomathematics and Environmental Science; Operations Research; Engineering

Organizers: **Carol Schumacher**, Kenyon College
Martha Siegel, Towson University

Young Mathematicians' Network Open Forum

7:30 PM – 8:30 PM **Room 337, BCC**

Friday, January 17

Joint Meetings Registration

7:30 AM – 4:00 PM **Pratt Street Lobby, 300 Level, BCC**

AMS Session on Lattices, Polynomials, and Linear Algebra

7:45 AM – 10:55 AM **Room 311, BCC**

7:45AM ► (1267) *Closure Operators on a Subgroup Lattice.* Preliminary report.
Martha Lee H Kilpack, SUNY Oneonta (1096-06-2055)

8:00AM (1268) *A Solution Formula for finite-dimensional systems.*
Berhanu Bekele Belayneh*, Addis Ababa University, and **Eva Zerz**, RWTH Aachen University (1096-08-2776)

8:15AM (1269) *Packing Polynomials on Sectors of $\mathbb{R}^2$.*
Caitlin King Stanton, Harvard University (1096-12-1013)

8:30AM (1270) *Chebyshev action on finite fields.*
T. Alden Gassert, University of Massachusetts, Amherst (1096-12-1062)

8:45AM (1271) *Kernel Polynomials of Tile Digit Sets.*
Keenan Monks, Harvard University (1096-12-1458)

9:00AM ► (1272) *A Class of Irreducible Polynomials.*
Joshua Harrington and **Lenny Jones***, Shippensburg University (1096-12-795)

9:15AM (1273) *Constructing optimal finite frames with a given set of lengths.*
Justin Marks*, Bowdoin College, **Matthew Fickus** and **Miriam J. Poteet**, Air Force Institute of Technology (1096-15-2428)

9:30AM ► (1274) *Real linear maps preserving some complex subspaces.*
Adam Coffman, Indiana University - Purdue University Fort Wayne (1096-15-1190)

9:45AM (1275) *The Jacobian method and structured inverse eigenvalue problems.*
Keivan Hassani Monfared* and **Bryan L Shader**, University of Wyoming (1096-15-2004)

10:00AM (1276) *The Koteljanskii Inequalities for Mixed Matrices.*
Charles R. Johnson, College of William and Mary, and **Sivaram K. Narayan***, Central Michigan University (1096-15-1674)

10:15AM ► (1277) *On Product of Companion Matrices.*
Arthur Lim, University of Notre Dame, and **Jialing Dai***, University of the Pacific (1096-15-232)

10:30AM (1278) *Ordering maximal planar graphs by algebraic connectivity.*
Jason J Molitierno, Sacred Heart University (1096-15-2245)

10:45AM ► (1279) *Almost all trees are normalized Laplacian cospectral.*
Steven Osborne, Iowa State University (1096-15-319)

AMS-AWM Special Session on Geometric Applications of Algebraic Combinatorics, I

8:00 AM – 10:50 AM **Room 318, BCC**

Organizers: **Elizabeth Beazley**, Haverford College
Kristina Garrett, St. Olaf College

8:00AM (1280) *From combinatorics to motives: Cutting and pasting in algebraic geometry.*
Melanie Matchett Wood, University of Wisconsin, and American Institute of Mathematics, and **Ravi Vakil***, Stanford University (1096-14-2376)

8:30AM (1281) *Fiber bundle structures of Schubert varieties.* Preliminary report.
Edward Richmond*, UBC, and **William Slofstra**, UC Davis (1096-05-2612)

9:00AM (1282) *Kazhdan–Lusztig elements for adjoint Schuberts.* Preliminary report.
Alexander K Woo*, University of Idaho, and **Alexander Yong**, University of Illinois, Urbana-Champaign (1096-05-2319)

9:30AM (1283) *Young tableaux and subvarieties of the Grassmannian.*
Kevin Purbhoo, University of Waterloo (1096-14-2466)

10:00AM (1284) *Schubert calculus on isotropic Grassmannians.*
Harry Tamvakis, University of Maryland (1096-14-1175)

10:30AM (1285) *The topology of toric origami manifolds.*
Tara S Holm* and **Ana Rita Pires**, Cornell University (1096-53-2102)

AMS Special Session on Accelerated Advances in Higher Order Invexities/Univexities with Applications to Optimization and Mathematical Programming, I

8:00 AM – 10:50 AM **Room 332, BCC**

Organizers: **Ram U. Verma**, International Publications USA

Alexander J. Zaslavski, Technion-Israel Institute of Technology

8:00AM (1286) *Concepts of Differentiability in Smooth and Non-smooth Analysis with Applications in Optimization Theory and Algorithms.* Preliminary report.
M Zuhair Nashed, University of Central Florida (1096-49-2416)

9:00AM (1287) *Common Solutions to Some Systems of Variational Inequalities and Fixed Point Problems.*
Behzad Djafari Rouhani*, University of Texas at El Paso, **Kaleem Raza Kazmi** and **Mohd Farid**, Aligarh Muslim University (1096-49-1209)

9:30AM (1288) *Extension of Golden Section Search method to Higher Dimensional Optimization Problem.*
Geetanjali Panda* and **Chakraborty Suvra Kanti**, Indian Institute of Technology, Kharagpur (1096-90-1823)

10:00AM (1289) *Linearly Connected Sequences and Spectrally Optimal Dual Frames for Erasures.*
Saliha Pehlivan, University of Central Florida (1096-00-1604)

10:30AM (1290) *Dynamical Game Theory.* Preliminary report.
Aden O Ahmed, Texas A&M University - Kingsville (1096-49-738)

AMS Special Session on Complex Dynamics, III (a Mathematics Research Communities Session)

8:00 AM – 10:50 AM **Room 322, BCC**

Organizers: **Scott Kaschner**, University of Arizona

Holly Krieger, Massachusetts Institute of Technology

Paul Reschke, University of Michigan

8:00AM (1291) *Torsion anomolous points and the Lattes family.*
Laura DeMarco, University of Illinois at Chicago, **Xiaoguang Wang**, Zhejiang University, and **Hexi Ye***, University of Toronto (1096-37-1843)

8:30AM (1292) *Matings with the Basilica.*
Jonguk Yang, University of Toronto (1096-37-1972)

9:00AM (1293) *Matings of critically preprediodic quadratic polynomials: dynamics through tile subdivisions.* Preliminary report.
Mary E. Wilkerson, Coastal Carolina University (1096-37-1925)

9:30AM (1294) *Thurston's Theorem and Misiurewicz points for polynomial maps.*
Benjamin Hutz*, Florida Institute of Technology, and **Adam Towsley**, CUNY Graduate Center (1096-11-1239)

10:00AM (1295) *When does an analytic map from Teichmueller space to itself have a fixed point?*
Stergios Antonakoudis, Harvard University (1096-32-2472)

10:30AM (1296) *Eigenvalues and Thurston's theorem.*
Sarah C. Koch, University of Michigan (1096-37-1327)

AMS Special Session on Ergodic Theory and Symbolic Dynamics, I

8:00 AM – 10:50 AM **Room 302, BCC**

Organizers: **Aimee Johnson**, Swarthmore College

Cesar Silva, Williams College

8:00AM (1297) *A characterization of topologically completely positive entropy for shifts of finite type.*
Ronnie Pavlov, University of Denver (1096-37-960)

8:30AM (1298) *A sufficient condition for non-soficness of higher-dimensional subshifts.*
Steve Kass*, Drew University, and **Kathleen Madden**, Drew University (1096-37-1421)

9:00AM (1299) *Bijective substitutions without topological subshift factors isomorphic to their maximal equicontinuous factors.*
Joseph L Herning, The George Washington University (1096-37-1179)

9:30AM (1300) *Symbolic Dynamics and the Infinite Staircase.*
David Ralston, SUNY College at Old Westbury (1096-37-1135)

10:00AM (1301) *Random $\mathbb{Z}^d$ subshifts of finite type.* Preliminary report.
Kevin McGoff*, Duke University, and **Ronnie Pavlov**, University of Denver (1096-37-1749)

10:30AM (1302) *Extender sets and multidimensional subshifts.* Preliminary report.
Nicholas Ormes* and **Ronnie Pavlov**, University of Denver (1096-37-1269)

AMS Special Session on Fractal Geometry: Mathematics of Fractals and Related Topics, II

8:00 AM – 10:50 AM **Room 315, BCC**

Organizers: **Michel Lapidus**, University of California Riverside
Erin Pearse, California State Polytechnic University, San Luis Obispo
Robert Strichartz, Cornell University
Machiel Van Frankenhuijsen, Utah Valley University

8:00AM ► (1303) *"Bowen Formula in Generalized Iterated Constructions and Applications".* Preliminary report.
Eugen Andrei Ghenciu*, University of Wisconsin Stout, and **Mario Roy**, York University, Toronto, Canada (1096-37-521)

8:30AM ► (1304) *Billiard dynamics on the T-fractal billiard table.*
Michel L. Lapidus, University of California, Riverside, **Robyn L. Miller**, Cornell University, and **Robert G. Niemeyer***, University of New Mexico, Albuquerque (1096-37-292)

9:00AM (1305) *Zero Lyapunov exponent for quasi-periodic Schrödinger operators.*
Chris Marx, California Institute of Technology (1096-37-1230)

9:30AM ► (1306) *Transition in the Fractal Geometry of Arctic Melt Ponds.*
Kenneth M. Golden, University of Utah (1096-51-1426)

10:00AM ► (1307) *Constraints of space in plant development: Where fractal forms come from?*
Przemyslaw Prusinkiewicz, Department of Computer Science, The University of Calgary (1096-51-2285)

10:30AM Discussion

AMS Special Session on Geometric Group Theory, III (a Mathematics Research Communities Session)

8:00 AM – 10:50 AM **Room 321, BCC**

Organizers: **Tariq Aougab**, Yale University
Curtis Kent, University of Toronto
Sang Rae Lee, Technion
Emily Stark, Tufts University

8:00AM (1308) *Visual Boundaries for Diestel-Leader Graphs.*
Keith M Jones, SUNY Oneonta (1096-20-1738)

8:30AM (1309) *Large-scale geometry of certain right-angled Coxeter groups.*
Pallavi Dani*, Louisiana State University, and **Anne Thomas**, University of Glasgow (1096-20-1477)

9:00AM (1310) *Asymptotic dimension with control.*
Alexander Dranishnikov, University of Florida (1096-51-1593)

9:30AM (1311) *Right-angled Artin groups and finite subgraphs of curve graphs.* Preliminary report.
Sang-hyun Kim, KAIST, Daejeon, Korea, and **Thomas Koberda***, Yale University (1096-20-713)

10:00AM (1312) *Uniform hyperbolicity for arc and curve graphs.*
Sebastian W. Hensel*, The University of Chicago, **Piotr Przytycki**, Institute of Mathematics of the Polish Academy of Sciences, and **Richard C. H. Webb**, The University of Warwick (1096-20-1511)

10:30AM (1313) *Stability phenomena for sequences of representations of the classical Weyl groups.*
Jennifer C. H. Wilson, University of Chicago (1096-20-2165)

AMS Special Session on Highlighting Achievements and Contributions of Mathematicians of the African Diaspora, I

8:00 AM – 10:50 AM **Room 317, BCC**

Organizers: **Asamoah Nkwanta**, Morgan State University
Talitha M. Washington, Howard University

8:00AM ► (1314) *The Adventures of Lee Lorch: What Two New Books by Barrett Brown, Edward Sebesta and Euan Hague Say about Vanderbilt University and Black Mathematicians.*
Jonathan David Farley, Morgan State University (1096-01-1998)

8:30AM ► (1315) *Enhancing the Achievements of African-American Mathematicians.*
Sylvia Bozeman, Spelman College, and **Ulrica Wilson***, Morehouse College (1096-00-92)

9:00AM *Albert Turner Bharucha-Reid.*
► (1316) **Ronald E. Mickens**, Clark Atlanta University, Atlanta, GA 30314, USA (1096-01-741)

10:00AM *The Life of David Harold Blackwell, Inspiration for Generations.*
► (1317) **William A. Hawkins JR**, University of the District of Columbia and MAA (1096-01-2279)

10:30AM *Some of David Blackwell's Reflections on the Work of David Blackwell (1919-2010).*
► (1318) Preliminary report.
William Alfred Massey, Princeton University, Department of Operations Research and Financial Engineering (1096-01-1910)

AMS Special Session on Homological and Characteristic p Methods in Commutative Algebra, II

8:00 AM – 10:50 AM **Room 303, BCC**

Organizers: **Neil Epstein**, George Mason University
Sean Sather-Wagstaff, North Dakota State University
Karl Schwede, Penn State University

8:00AM (1319) *Systems of parameters for complexes.* **Kristen A Beck***, University of Arizona, and **Sean Sather-Wagstaff**, North Dakota State University (1096-13-1829)

8:30AM (1320) *Gorenstein Dimensions, Amalgamated Duplication of a Ring, and Pseudocanonical Covers.* **Pye Phyo Aung**, North Dakota State University (1096-13-1663)

9:00AM (1321) *Codualizing Complexes.* Preliminary report.
Sean Sather-Wagstaff, North Dakota State University, and **Richard Wicklein***, Morningside College (1096-13-1711)

9:30AM (1322) *Syzygies and tensor product of modules.* **Olgur Celikbas***, University of Missouri - Columbia, and **Greg Piepmeyer**, Columbia Basin College (1096-13-1657)

10:00AM (1323) *Regular versus symbolic powers for ideals of points in positive characteristic.* **Alexandra Seceleanu*** and **Brian Harbourne**, University of Nebraska-Lincoln (1096-14-1374)

10:30AM (1324) *Koszul algebras and the Frobenius endomorphism.* **Hop Dang Nguyen**, Università di Genova, and **Thanh Quang Vu***, University of California at Berkeley (1096-13-501)

AMS Special Session on Homotopy Theory, II

8:00 AM – 10:50 AM **Room 329, BCC**

Organizers: **Niles Johnson**, Ohio State University at Newark
Mark W. Johnson, Penn State University, Altoona
Nitu Kitchloo, Johns Hopkins University
James Turner, Calvin College
Donald Yau, Ohio State University at Newark

8:00AM (1325) *Topological Hochschild Homology and Koszul Duality.* **Jonathan A Campbell**, University of Texas (1096-55-1741)

8:30AM (1326) *The Kervaire invariant one problem.* **Mike Hill**, University of Virginia (1096-55-2048)

9:00AM (1327) *Moduli spaces of algebra structures.* Preliminary report.
Justin Noel, University of Regensburg (1096-55-2298)

9:30AM (1328) *The adjoint action of a homotopy-associative H-space on its loop space.* Preliminary report.
Nicholas D Nguyen, University of Kentucky (1096-55-850)

10:00AM (1329) *Towards a resolution of the spectrum* $E^{h\mathbb{S}^1_2}$ *at the prime* 2.
Irina Bobkova, Northwestern University (1096-55-2615)

10:30AM (1330) *The Adams-Novikov* E_2 *term for* $Q(2)$ *at the prime 3.*
Donald M Larson, Penn State University, Altoona (1096-55-1067)

AMS Special Session on Mathematics in Natural Resource Modeling, I

8:00 AM – 10:50 AM **Room 326, BCC**

Organizers: **Shandelle Henson**, Andrews University
Catherine Roberts, College of the Holy Cross

8:00AM *Cannibalism can allow survival of a*
► (1331) *population endangered by decreased environmental resource availability.* Preliminary report.
Jim M. Cushing*, Interdisciplinary Program in Applied Mathematics, University of Arizona, **Shandelle Henson**, Andrews University, and **James Hayward**, Department of Biology, Andrews University (1096-92-887)

8:30AM *Reproductive synchrony in populations*
► (1332) *can ameliorate the effects of adult-on-juvenile cannibalism.* Preliminary report.
Shandelle M. Henson*, Andrews University, **J. M. Cushing**, University of Arizona, and **James L. Hayward**, Andrews University (1096-92-880)

9:00AM ► (1333) *Synergy of Mathematical Modeling and Ecology in Native Oyster Restoration.* **Romuald N. Lipcius***, Virginia Institute of Marine Science, College of William & Mary, **Leah B. Shaw**, Department of Applied Science, College of William & Mary, **Junping Shi**, College of William & Mary, **Jian Shen** and **Allison M. Colden**, Virginia Institute of Marine Science, College of William & Mary (1096-92-1185)

9:30AM ► (1334) *A Bovine Babesiosis Epidemic Model With Dispersion.* Preliminary report. **Abdul-Aziz Yakubu***, Howard University, and **Avner Friedman**, The Ohio State University (1096-92-473)

10:00AM ► (1335) *Modeling water-borne diseases: Environmental, ecological and climatic interaction.* Preliminary report. **Jin Wang**, Old Dominion University (1096-92-122)

10:30AM (1336) *PDE Models in Measuring Global Sustainability.* **Arni S.R. Srinivasa Rao**, Georgia Regents University (1096-35-151)

AMS Special Session on My Favorite Graph Theory Conjectures, III

8:00 AM – 10:50 AM **Room 314, BCC**

Organizers: **Craig Larson**, Virginia Commonwealth University
Ralucca Gera, Naval Postgraduate School

8:00AM (1337) *Symmetry breaking in graphs.* **Wilfried Imrich**, Montanuniversitaet Leoben, Austria (1096-05-1259)

8:30AM ► (1338) *Forbidden Conjectures.* **David P Sumner**, University of South Carolina (1096-05-1869)

9:00AM (1339) *Zarankiewicz' crossing number conjecture.* **Laszlo A. Szekely**, University of South Carolina (1096-05-250)

9:30AM (1340) *Two chromatic conjectures: one for vertices, one for edges.* **P. Mark Kayll**, University of Montana (1096-05-1807)

10:00AM (1341) *Conjectures and questions in graph reconfiguration.* **Ruth Haas**, Smith College (1096-05-1292)

10:30AM ► (1342) *On the Conjecture of Erdős and Gyárfás.* Preliminary report. **Geoffrey Exoo**, Indiana State University (1096-05-2392)

AMS Special Session on Progress in Free Analysis and Free Probability, II

8:00 AM – 10:50 AM **Room 301, BCC**

Organizers: **Dmitry Kaliuzhnyi-Verbovetskyi**, Drexel University
Todd Kemp, University of California San Diego

8:00AM (1343) *A Case for the Trace in Free Analysis.* Preliminary report. **Paul S. Muhly***, University of Iowa, and **Baruch Solel**, Technion (1096-46-1121)

9:00AM (1344) *New Examples of Exchangeable Noncommutative Brownian Motion.* **Stephen Avsec**, Texas A&M University (1096-46-1769)

9:30AM (1345) *Analysis in Non-tracial Non-commutative Probability Spaces.* **Natasha Blitvic**, Indiana University Bloomington (1096-60-2142)

10:00AM (1346) *Refinements of the Free Poincare Inequality.* **Ionel Popescu***, Georgia Institute of Technology And Institute of Mathematics of the Romanian Academy, and **Christian Houdre**, Georgia Institute of Technology (1096-46-907)

10:30AM (1347) *L_p-representations of free quantum groups.* **Michael Brannan*** and **Zhong-Jin Ruan**, University of Illinois at Urbana-Champaign (1096-46-1376)

AMS Special Session on Recent Progress in Multivariable Operator Theory, II

8:00 AM – 10:50 AM **Room 331, BCC**

Organizers: **Ron Douglas**, Texas A&M University
Michael Jury, University of Florida

8:00AM (1348) *Axler-Zheng type theorem on domains in $\mathbb{C}^K$.* **Zeljko Cuckovic***, University of Toledo, Ohio, and **Sonmez Sahutoglu**, University of Toledo (1096-47-480)

8:30AM (1349) *Weighted composition operators on the Drury–Arveson space.* **Trieu L. Le**, University of Toledo (1096-47-342)

9:00AM (1350) *Schatten class Toeplitz operators on generalized Fock spaces.* Preliminary report. **Joshua Isralowitz**, SUNY Albany (1096-47-1664)

9:30AM (1351) *On some basic operator theoretic questions in Bergman-type spaces.* **Joshua Isralowitz**, SUNY at Albany, **Mishko Mitkovski***, Clemson University, and **Brett Wick**, Georgia Tech (1096-32-1879)

10:00AM (1352) *Cyclic functions in Dirichlet type spaces over the bidisk.* **Constanze Liaw***, Baylor University, **Catherine Beneteau**, University of South Florida, **Alberto A. Condori**, Florida Gulf Coast University, **Daniel Seco**, University of Warwick, and **Alan A. Sola**, University of Cambridge (1096-32-947)

10:30AM (1353) *Numerical invariants of commuting isometric pairs.* Preliminary report. **Wei He**, Southeastern University, Nanjing, China, **Yueshi Qin** and **Rongwei Yang***, SUNY at Albany (1096-47-315)

AMS Special Session on Regulatory Problems for Nonlinear PDEs Modeling Fluids and Complex Fluids, III (a Mathematics Research Communities Session)

8:00 AM – 10:50 AM **Room 324, BCC**

Organizers: **Jacob Bedrossian**, New York University
Hao Jia, University of Chicago
Jared Whitehead, Los Alamos National Laboratory
Tak Kwong Wong, University of Pennsylvania

8:00AM (1354) *Regularizing Effect of the Forward Energy Cascade in the Inviscid Dyadic Model.* **Alexey Cheskidov** and **Karen Zaya***, University of Illinois at Chicago (1096-76-482)

8:30AM (1355) *Anomalous diffusion of tracer particles in fast cellular flows.* **Gautam Iyer***, Carnegie Mellon University, **Alexei Novikov**, Penn. State University, and **Lenya Ryzhik**, Stanford University (1096-76-1904)

9:00AM (1356) *Global Regularity for Oldroyd-B type models.* **Tarek M Elgindi***, Courant Institute, and **Frederic Rousset**, IRMAR, Universite de Rennes 1, (1096-35-994)

9:30AM (1357) *Pressure formulas and regularity criteria.* **Peter Constantin**, Princeton University (1096-35-1975)

10:00AM (1358) *The Harnack inequality for second-order elliptic and parabolic equations with divergence-free drifts of low regularity.* **Mihaela Ignatova***, Stanford University, **Igor Kukavica**, University of Southern California, and **Lenya Ryzhik**, Stanford University (1096-35-491)

10:30AM (1359) *On the second iterate for active scalar equations.* **Susan Friedlander***, University of Southern California, and **Walter Rusin**, Oklahoma State University (1096-35-862)

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

8:00 AM – 10:50 AM **Room 328, BCC**

Organizers: **Bernard Brooks**, Rochester Institute of Technology
Jobby Jacob, Rochester Institute of Technology
Jacqueline Jensen-Vallin, Slippery Rock University
Carl Lutzer, Rochester Institute of Technology
Darren Narayan, Rochester Institute of Technology
Tamas Wiandt, Rochester Institute of Technology

8:00AM ► (1360) *Applying the Bracket Polynomial to Multi-Crossing Projections.* **Daniel Reid Irvine***, Notre Dame, and **Samantha Nicole Petti**, Williams College (1096-54-545)

8:30AM ► (1361) *Avoiding monochromatic equations in groups.* Preliminary report. **Ruth Haas**, **Karen Lovejoy**, **Loren Santana**, **Jennifer Tripp*** and **Cloie Webster**, Smith College (1096-05-1288)

9:00AM ► (1362) *Developing surfaces that are hulls of two circles in space.* **Caitlyn Hannum**, **Christine Hoffman**, **Katherine Koch***, **Erin Linebarger**, **Joseph O'Rourke** and **Judy Wang**, Smith College (1096-05-1291)

9:30AM ► (1363) *New work on generalized splines.* **Nealy Bowden**, **Yue Cao**, **Sarah Hagen***, **Melanie King**, **Stephanie Reinders** and **Julianna Tymoczko**, Smith College (1096-14-1703)

10:00AM ► (1364) *Combinatorial Structure of Finite Frames.* Preliminary report. **Alice Chan**, Pomona College, **Martin S. Copenhaver**, MIT, **Sivaram K. Narayan**, Central Michigan University, **Logan Stokols**, UC Berkeley, and **Allison Theobold***, Colorado Mesa University (1096-15-129)

10:30AM ► (1365) *Fat Points on Grids and Hamming Distance.* Preliminary report. **Daniel R. Carmody**, Indiana University, **Susan M. Cooper**, Central Michigan University, **Nicholas A. Crispi***, Macaulay Honors College at Hunter College, The City University of New York, and **Marie N. Ermete**, Central Michigan University (1096-13-130)

AMS Special Session on Topological Graph Theory: Structure and Symmetry, II

8:00 AM – 10:50 AM **Room 330, BCC**

Organizers: **Jonathan L. Gross**, Columbia University
Thomas W. Tucker, Colgate University

8:00AM (1366) *Skew morphisms and group factorizations.* Preliminary report. **Thomas W. Tucker**, Colgate University (1096-05-1318)

8:30AM (1367) *Regular Cayley maps on some groups.* **Young Soo Kwon***, Yeungnam University, and **Istvan Kovacs**, University of Primorska (1096-05-1061)

9:00AM (1368) *Bounding the order of a regular map with nilpotent automorphism group.* **Shaofei Du**, Capital Normal University, Beijing, China, **Roman Nedela**, Matej Bel University, Banska Bystrica, Slovakia, and **Martin Skoviera***, Comenius University, Bratislava, Slovakia (1096-05-2276)

9:30AM (1369) *Non-orientable regular maps of any given type.* **Jozef Siran**, Open University, U.K. and Slovak University of Technology, Slovakia (1096-05-1553)

10:00AM (1370) *Graph symmetry and regular covering.* **Yan-Quan Feng**, Beijing Jiaotong University (1096-20-987)

10:30AM (1371) *Enumeration of orientable coverings of a non-orientable manifold.* **Jin Ho Kwak**, BJTU-China and POSTECH-Korea (1096-57-456)

AMS Special Session on Tropical and Nonarchimedean Analytic Geometry, III (a Mathematics Research Communities Session)

8:00 AM – 10:50 AM **Room 323, BCC**

Organizers: **Dustin Cartwright**, Yale University
Melody Chan, Harvard University
Joseph D. Rabinoff, Georgia Institute of Technology

8:00AM (1372) *Tropical Brill-Noether theory.* **Sam Payne**, Yale University (1096-14-1561)

8:30AM ► (1373) *Brill–Noether Theory of Maximally Symmetric Graphs.* **Timothy Leake** and **Dhruv Ranganathan***, Yale University (1096-14-736)

9:00AM (1374) *Projective normality for tropical curves.* **Milena Hering**, University of Edinburgh, and **Josephine Yu***, Georgia Institute of Technology (1096-05-1456)

9:30AM (1375) *Algebraic versus combinatorial rank of divisors on graphs.* **Yoav Len**, Yale University (1096-14-1762)

10:00AM (1376) *Linear systems of tropical curves: a geometric perspective.* **Ye Luo**, Georgia Institute of Technology (1096-52-2281)

10:30AM ► (1377) *Smoothing of limit g^1_ds on metrized complexes.* Preliminary report. **Madhusudan Manjunath*** and **Luo Ye**, Georgia Institute of Technology (1096-14-1486)

MAA Invited Paper Session on Six Crash Courses on Mapping Class Groups, I

8:00 AM – 10:45 AM **Room 308, BCC**

Organizers: **Benson Farb**, University of Chicago
Dan Margalit, Georgia Institute of Technology

8:00AM (1378) *Introduction to the mapping class group.* **Andrew Putman**, Rice University (1096-AG-879)

9:00AM ► (1379) *Finite generation of the mapping class group and the complex of curves.* **Tara Brendle**, University of Glasgow (1096-AG-2084)

10:00AM ► (1380) *The Nielsen-Thurston Classification of Mapping Classes.* **Johanna Mangahas**, Brown University (1096-AG-910)

MAA Invited Paper Session on the Continuing Influence of Paul Erdős in Number Theory

8:00 AM – 10:50 AM **Room 307, BCC**

Organizers: **Paul Pollack**, University of Georgia
Carl Pomerance, Dartmouth College

8:00AM ► (1381) *Problems and results in additive number theory.* **Melvyn B. Nathanson**, Lehman College (CUNY) (1096-AC-1100)

8:30AM ► (1382) *Applications of the prime factorization of the product of consecutive integers to polynomials.* **Michael Filaseta**, University of South Carolina (1096-AC-1436)

9:00AM (1383) *The pretentious approach to analytic number theory.* **Andrew Granville**, University of Montreal (1096-AC-1614)

9:30AM ► (1384) *Erdős and the abundant numbers.* **Mits Kobayashi**, Cal Poly Pomona (1096-AC-1698)

10:00AM ► (1385) *Paul Erdős and Egyptian Fractions.* Preliminary report. **Ron Graham**, UC San Diego (1096-AC-823)

10:30AM ► (1386) *Counting integers with special properties.* **Kevin B Ford**, University of Illinois, Urbana Champaign, **Florian Luca***, Mathematical Institute, UNAM, and **Carl B Pomerance**, Dartmouth College (1096-AC-806)

AMS Session on Applied Mathematics, II

8:00 AM – 10:55 AM **Room 305, BCC**

8:00AM ► (1387) *Multigrid Solution of Distributed Optimal Control Problems Constrained by Semilinear Elliptic Pdes.* **Jyoti Saraswat***, University of Maryland, Baltimore County, and **Andrei Draganescu**, University of Maryland Baltimore County (1096-35-1783)

8:15AM (1388) *Modeling Refugee Flow with the Continuum Mechanics of Porous Media.* Preliminary report.
Loren Cobb*, **Lynn Bennethum** and **Mark Mueller**, University of Colorado Denver (1096-76-2641)

8:30AM (1389) *Numerical Methods for Solving Cold-Fluid Maxwell's Equations with Applications to the Second Harmonic Generation from Metallic Nanoparticles.*
Yingxue Zhao, Delaware State University (1096-78-1402)

8:45AM (1390) *Transformation optics based local mesh refinement for solving Maxwell's equations.*
Jinjie Liu*, Delaware State University, **Moysey Brio** and **Jerome V Moloney**, The University of Arizona (1096-78-1626)

9:00AM (1391) *Moving Window Finite-Difference Time-Domain Method with Perfectly Matched Layer Boundary Conditions.*
Pengrui Hui, Delaware State University (1096-78-1298)

9:15AM (1392) *Numerical Simulation of the Space-Time Cloak.* Preliminary report.
Jason M. Cornelius*, Delaware State University, and **Jinjie Liu**, Delaware State University (1096-78-2183)

9:30AM (1393) *A TD-DFT Approach to Second Harmonic Generation at Metal Surfaces.* Preliminary report.
Justin Droba, Michigan State University (1096-78-1621)

9:45AM (1394) *Title: Numerical solution of Dyson Brownian motion and a sampling scheme for invariant matrix ensembles.*
Xingjie Helen Li* and **Govind Menon**, Brown University (1096-82-1228)

10:00AM (1395) *Coal Bed Methane: Micro-scale Models and Macro-scale Constraints.*
Mark P Mueller* and **Lynn Bennethum**, University of Colorado Denver (1096-82-1891)

10:15AM ► (1396) *Nonlinear Neutral Inclusions: Assemblages of Confocal Coated Spheres and Ellipsoids.*
Silvia Jimenez Bolanos*, Colgate University, and **Bogdan Vernescu**, Worcester Polytechnic Institute (1096-35-1058)

10:30AM (1397) *Spectra of Functionalized Operators Arising from Hypersurfaces.*
Gurgen Hayrapetyan*, Carnegie Mellon University, and **Keith Promislow**, Michigan State University (1096-35-2293)

10:45AM (1398) *An Optimization Based Domain Decomposition Method for PDEs with Random Inputs.*
Jangwoon Lee*, University of Mary Washington, **Jeehyun Lee** and **Yoongu Hwang**, Yonsei University (1096-65-776)

AMS Session on Complex and Geometric Analysis

8:00 AM – 10:40 AM **Room 312, BCC**

8:00AM (1399) *Stein open subsets with Analytic Complements in Compact Complex Spaces.*
Jing Zhang, University at Albany, SUNY (1096-32-1391)

8:15AM (1400) *Towards Oka-Cartan theory for algebras of holomorphic functions on coverings of Stein manifolds.*
Alexander Brudnyi, University of Calgary, and **Damir Kinzebulatov***, The Fields Institute, Toronto (1096-32-2656)

8:30AM ► (1401) *Holomorphic extensions in toric varieties with additional structures.*
Malgorzata Aneta Marciniak, Bowling Green State University (1096-32-2657)

8:45AM (1402) *Two-Point Distortion Bounds for Biholomorphic Mappings of the Ball in $\mathbb{C}^n$.* Preliminary report.
Jerry R. Muir, Jr., University of Scranton (1096-32-2492)

9:00AM (1403) *Weighted Bergman Kernel Functions Associated to Meromorphic Functions.*
Robert Jacobson, Roger Williams University (1096-32-2726)

9:15AM (1404) *Boundary Values of Components of Monogenic Functions.*
Brendon Kerr Ballenger* and **Craig A Nolder**, Florida State University (1096-32-1725)

9:30AM (1405) *Regularity of Extremal Functions in Weighted Bergman and Fock Type Spaces.*
Timothy J Ferguson, Vanderbilt University (1096-30-436)

9:45AM (1406) *On Segal theorem about two-sided ideals for real C*- and real locally C*-algebras.*
Oleg Friedman*, UNISA, Pretoria, RSA & Touro College/Lander College for Men, and **Alexander A. Katz**, St. John's University (1096-46-2487)

10:00AM (1407) *Expected Values of the Conformal Radius.* Preliminary report.
Brett Hafferkamp, Texas Tech University (1096-30-2352)

10:15AM ► (1408) *Projective Compactification of $\mathbb{R}^{1,1}$ and its Möbius Geometry.*
John A. Emanuello, The Florida State University (1096-30-186)

10:30AM ► (1409) *The Effect of Symmetry on the Riemann Map.*
Jeanine L. Myers, University of Arkansas-Fort Smith (1096-30-306)

AMS Session on Differential and Integral Equations and Their Applications

8:00 AM – 10:55 AM **Room 304, BCC**

8:00AM (1410) *Periodic Solutions of Ordinary Differential Equations.* Preliminary report.
Zhivko S. Athanassov, Institute of Mathematics, Bulgarian Academy of Sciences (1096-34-559)

8:15AM ► (1411) *An iterative method for solving boundary value problems of fourth-order and second-order differential equation systems.* Preliminary report.
Omar Abed Elkareem Abu Arqub, Al-Balqa Applied University (1096-34-2169)

8:30AM ► (1412) *The Implementation of Novel Kernel Functions.* Preliminary report.
Diandra M. Ryan-Mas, Westminster College (1096-34-805)

8:45AM (1413) *Singularity Structure of the Leah-Sine Function, Lsn(t), at t = 0.*
Tre Wells*, Morehouse College, and **Ronald E. Mickens**, Clark Atlanta University (1096-34-1031)

9:00AM ► (1414) *Analytical solutions of fuzzy initial value problems by RKHS method.* Preliminary report.
Mohammed Hamdi Al-smadi, Ajloun College, Al-Balqa Applied University (1096-34-2341)

9:15AM (1415) *Modeling and Qualitative Analysis of Immune Response to Tumor Growth.*
Qing Wang*, **Zhijun Wang**, Dept. of Computer Sciences, Mathematics and Engineering, Shepherd University, and **David J. Klinke**, Dept. of Chemical Engineering, and Dept. of Microbiology, Immunology and Cell Biology, West Virginia University (1096-34-2491)

9:30AM ► (1416) *A Global Uncertainty and Sensitivity Analysis on a Simple Age-of-Infection SIR Model.* Preliminary report.
Emmanuel J. Morales Butler*, Arizona State University, **Juan P. Aparicio**, Universidad Nacional de Salta, and **Carlos Castillo-Chavez**, Arizona State University (1096-45-2255)

9:45AM ► (1417) *Mathematical Model for Drug Therapy in Patients With Diabetes Mellitus.*
Boniface Otieno Kwach, School of Mathematics and Actuarial Science, Jaramogi Oginga Odinga University of Science and Technology, Bondo, Kenya (1096-34-58)

10:00AM (1418) *Delay induced oscillations in neural networks.*
Chuan Zhang*, **Gerhard Dangelmayr** and **Iuliana Oprea**, Colorado State University (1096-34-1334)

10:15AM (1419) *A Wavelet Based Method for the Solution of Integral Equations.*
Yousef Al-Jarrah, Central Michigan University (1096-45-2328)

10:30AM (1420) *Criteria for the Existence of Principal Eigenvalue of Time Periodic Nonlocal Dispersal Operators and Its Applications.*
Nar S Rawal* and **Wenxian Shen**, Auburn University (1096-45-407)

10:45AM (1421) *Large-scale particle dynamics simulations for pulse propagation in broadband optical fiber communication networks.*
Avner Peleg, State University of New York at Buffalo (1096-34-546)

MAA Session on Flipping the Classroom, I

8:00 AM – 10:55 AM **Room 337, BCC**

Organizers: **Krista Maxson**, Shawnee State University
Zsuzsanna Szaniszlo, Valparaiso University

8:00AM ► (1422) *A Flipped Class: The Challenges and Benefits of Changing the Classroom Dynamic to be Consistent with Cognitive Learning Theories and Focus on Student-Centered Learning.*
Michael A Posner, Villanova University (1096-E1-2159)

8:20AM ► (1423) *Flipping the Classroom—Creating an Active Learning Environment.*
Jianfeng Zhang, Chattanooga State Community College (1096-E1-639)

8:40AM ► (1424) *Adventures in flipping my college algebra classroom.*
Jenna R Van Sickle, Fontbonne University (1096-E1-18)

9:00AM ► (1425) *'Flipping' the Pre-calculus classroom: From ideation to execution.* Preliminary report.
Priya Shilpa Boindala, **D Natasha Brewley***, **Jennifer L Sinclair** and **Keith A Erickson**, Georgia Gwinnett College (1096-E1-800)

9:20AM (1426) *Flipping the Calculus Classroom.*
Joseph Petrillo, Alfred University, Alfred NY (1096-E1-623)

9:40AM ► (1427) *Designing the classroom flip for learner-centered mathematics instruction.*
Jeremy F. Strayer, Middle Tennessee State University (1096-E1-2684)

10:00AM ► (1428) *Flipping Calculus.*
Jean M. McGivney-Burelle*, **Larissa Schroeder**, **Mako Haruta**, **Fei Xue**, **John Williams** and **Ben Pollina**, University of Hartford (1096-E1-1563)

10:20AM ► (1429) *"A different type of math": Addressing student difficulties with proof by flipping the transition-to-proof course.* Preliminary report.
Robert Talbert, Grand Valley State University (1096-E1-1597)

10:40AM ► (1430) *Probing the Inverted Classroom: A Multi-year Multi-department Controlled Study.*
Rachel Levy* and **Darryl Yong**, Harvey Mudd College (1096-E1-1008)

MAA Session on Innovative and Effective Ways to Teach Linear Algebra, I

8:00 AM – 10:55 AM **Room 340, BCC**

Organizers: **David Strong**, Pepperdine University
Gilbert Strang, MIT
Megan Wawro, Virginia Tech

8:00AM (1431) *Using March Madness in the First Linear Algebra Course.* Preliminary report.
Steve Hilbert, Ithaca College Ithaca,NY 14850 (1096-F1-2650)

8:20AM (1432) *From March Madnesss to MATHness with linear algebra.*
Tim Chartier, Davidson College (1096-F1-783)

8:40AM (1433) *Using Classical Cryptography and Cryptanalysis as an Enrichment Exercise in a First Course in Linear Algebra.*
Don Spickler, Salisbury University (1096-F1-2035)

9:00AM (1434) *Bilbo and the Last Moon of Autumn.*
Andrew J. Simoson, King University (1096-F1-605)

9:20AM (1435) *On The Heliocentric Circular Mechanical Energy Curves of Galileo.*
Alexander Louis Garron, CEO Sand Box Geometry LLC (1096-F1-592)

9:40AM (1436) *Student Projects to Visualize Iteration Patterns of Matrices with Complex Eigenvalues.*
Rosemary Carroll Farley, Manhattan College (1096-F1-1192)

10:00AM (1437) *"Where Am I?" A Change of Basis Project.*
Christina M. Selby, Rose-Hulman Institute of Technology (1096-F1-2326)

10:20AM (1438) *Frame Construction in Linear Algebra: Frenet-Serret as Modified Gram-Schmidt.*
Itai Seggev, Wolfram Research (1096-F1-656)

10:40AM (1439) *Analogies between matrix equations and linear differential equations.*
Gilbert Strang, MIT (1096-F1-1538)

MAA Session on Open Source Mathematics Textbooks, I

8:00 AM – 10:55 AM **Room 341, BCC**

Organizers: **Albert Schueller**, Whitman College
Kent Morrison, American Institute of Mathematics

8:00AM (1440) *To Make Free Or Not to Make Free—That is the Question.*
John Wesley Cain, University of Richmond and Harvard University (1096-H5-392)

8:20AM (1441) *If you love something, (how to) set it free.*
Matt Boelkins, Grand Valley State University (1096-H5-572)

8:40AM (1442) *Open Textbooks and Solving the Textbook Cost Crisis.*
Nicole Allen, Scholarly Publishing & Academic Resources Coalition (1096-H5-1557)

9:00AM (1443) *Experiences from Publishing Open Source Textbooks.*
Thomas W Judson*, Stephen F. Austin State University, and **Robert Beezer**, University of Puget Sound (1096-H5-345)

9:20AM (1444) *A do-it-yourself guide to print on demand publishing.*
Richard Hammack, Virginia Commonwealth University (1096-H5-140)

9:40AM (1445) *A Collaborative Model for Open-Source Textbook Writing.*
Gregory Hartman* and **Troy Siemers**, Virginia Military Institute (1096-H5-930)

10:00AM (1446) *Be a Socialist and a Bit of a Capitalist.*
Ted Sundstrom, Grand Valley State University (1096-H5-780)

10:20AM (1447) *Groups and Fields in Open Text Authoring.*
Jim Hefferon, Saint Michael's College (1096-H5-684)

10:40AM (1448) *Avoid "Imperial Entanglements" and Other Advice from two Open-source Authors.*
Jeff Zeager, Lorain County Community College (1096-H5-1400)

MAA Session on Trends in Undergraduate Mathematical Biology Education, I

8:00 AM – 10:55 AM **Room 349, BCC**

Organizer: **Timothy Comar**, Benedictine University

8:00AM (1449) *Can Furry Animals and Albedo Replace Epsilons and Deltas in Calculus?*
Carrie Diaz Eaton, Unity College, Unity, ME (1096-N5-859)

8:20AM (1450) *Impacts of Introducing Projects to a Calculus for Biology and Medicine Course.* Preliminary report.
Melissa A Stoner, Salisbury University (1096-N5-1262)

8:40AM (1451) *Hands-on classroom demonstrations for a life sciences calculus course.* Preliminary report.
Sean M. Laverty* and **Brittany Bannish**, University of Central Oklahoma (1096-N5-2433)

9:00AM (1452) *Formative assessment and classroom community in calculus for the life sciences.* Preliminary report.
Rebecca-Anne Dibbs and **Brian Christopher***, University of Northern Colorado (1096-N5-1945)

9:20AM (1453) *Breathing life into mathematics for biologists: teaching quantitative practices to undergraduate biology students.*
Rebecca Dibbs*, University of Northern Colorado, and **Anne-Marie Hoskinson**, Michigan State University (1096-N5-2742)

► 9:40AM (1454) *QUBES Hub: A vision of online collaboration in teaching and learning in quantitative biology.*
M Drew LaMar*, College of William and Mary, **Carrie Diaz Eaton**, Unity College, **DorothyBelle Poli**, **Anil Shende**, Roanoke College, **Robert Sheehy**, Radford University, **Eungchun Cho**, Kentucky State University, and **Eric Friedman**, Roanoke College (1096-N5-2187)

10:00AM (1455) *An Undergraduate course on the Mathematics of Cancer.*
Eric J Kostelich*, Arizona State University, and **Yang Kuang**, Arizona State Univeristy (1096-N5-2675)

► 10:20AM (1456) *Biological Hacking by Stem Cells Derived from Gompertz Function Modeling.* Preliminary report.
Rhyzl Ayang-ang Guimbatan, El Centro College (1096-N5-2323)

10:40AM (1457) *A Mathematical Modeling for Alzheimer's disease and its Treatment Based on the Metal Hypothesis.*
Shantia Yarahmadian*, **Hadi Khani** and **Eda Asili**, Mississippi State University (1096-N5-1777)

MAA Session on Using Online Resources to Augment the Traditional Classroom, I

8:00 AM – 10:55 AM **Room 350, BCC**

Organizers: **Mike May**, Saint Louis University
Paul Seeburger, Monroe Community College

► 8:00AM (1458) *Allowing Students and Educators to Create Their Own Web Based Mathematical and Statistical Simulations.*
Paul R Bouthellier, University of Pittsburgh-Titusville (1096-P5-194)

8:20AM (1459) *Essay Answers: Using Free Response Questions in WeBWorK.*
Geoff R Goehle, Western Carolina University (1096-P5-943)

► 8:40AM (1460) *Using WeBWorK, Geogebra and other online resources in a Linear Programming course.* Preliminary report.
Michael E Gage, University of Rochester (1096-P5-1960)

► 9:00AM (1461) *Sage mathematics software in the classroom.*
Jason Grout, Drake University (1096-P5-2643)

► 9:20AM (1462) *Thou Shalt Compute, in One Click: Using (Embedded) Sage Cells Online.*
Karl-Dieter Crisman, Gordon College (1096-P5-2582)

9:40AM (1463) *Creating and Using Online Community Resources for Teaching Differential Equations with Modeling and Technology.* Preliminary report.
Brian J. Winkel, US Military Academy (1096-P5-171)

► 10:00AM (1464) *Maplets for Calculus: Expanding offerings and opportunities in Precalculus, Calculus and Differential Equations.*
Philip B. Yasskin*, Texas A&M University, **Douglas B. Meade**, University of South Carolina, and **Matthew J. Barry**, Texas A&M University (1096-P5-1996)

► 10:20AM (1465) *Using Online Technology in the Mathematics Classroom to Improve Student Learning.* Preliminary report.
Michael B. Scott, California State University, Monterey Bay (1096-P5-2511)

► 10:40AM (1466) *Creating Effective Online Homework Problems in Calculus (Using WeBWorK).* Preliminary report.
Paul E. Seeburger, Monroe Community College (1096-P5-2334)

MAA General Contributed Paper Session on Research in Number Theory, II

8:00 AM – 10:55 AM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:00AM (1467) *On decomposing complete multipartite graphs into 2-regular graphs.*
Uthoomporn Jongthawonwuth*, Chulalongkorn University, **Saad I El-Zanati**, Illinois State University, and **Chariya Uiyyasathian**, Chulalongkorn University (1096-VO-2605)

► 8:15AM (1468) *Applying a Galois Transformation to the Roots of a Polynomial.*
Ken McMurdy, Ramapo College of New Jersey (1096-VO-2286)

8:30AM (1469) *On the Sum of Dilations of a Set.*
George Shakan*, University of Wyoming, and **Antal Balog**, Alfred Renyi Institute of Mathematics (1096-VO-2009)

► 8:45AM (1470) *A Collatz-Like Iteration.* Preliminary report.
Vincent J. Matsko, Princeton International School of Mathematics and Science (1096-VO-2240)

► 9:00AM (1471) *Decent Polynomials.* Preliminary report.
Edward Early, St. Edward's University (1096-VO-2232)

9:15AM (1472) *Sets of integers which contain no three term in geometric progression.*
Nathan G McNew, Dartmouth College (1096-VO-2150)

9:30AM ► (1473) *Averaging Structure in the* $3x+1$ *Problem.* Preliminary report. **Marc Chamberland**, Grinnell College (1096-VO-1069)

9:45AM ► (1474) *A Generalization of Fibonacci Far-Difference Representations and Gaussian Behavior.* **Philippe Demontigny***, Williams College, **Thao T Do**, Stony Brook University, and **Steven J. Miller**, Williams College (1096-VO-1903)

10:00AM ► (1475) *Newman's Conjecture in Various Settings.* **Alan Chang***, Princeton University, **Steven J Miller**, Williams College, and **Julio Andrade**, Brown, IHES (1096-VO-1548)

10:15AM ► (1476) *Generalizing Zeckendorf's Theorem to* f*-decompositions.* **Umang Varma***, Kalamazoo College, **Philippe Demontigny**, Williams College, **Thao Do**, Stony Brook University, **Archit Kulkarni**, Carnegie Mellon University, **Steven J. Miller** and **David Moon**, Williams College (1096-VO-255)

10:30AM ► (1477) *A Delightful Interconnection Encompassing Pythagorean Triples, Algebra, Geometry and Modular Arithmetic.* Preliminary report. **Jay L. Schiffman**, Rowan University (1096-VO-49)

10:45AM (1478) *Generalized Locker Problem.* **Keneth Adrian Precillas Dagal**, Far Eastern University-Manila (1096-VO-21)

SIAM Minisymposium on Applied and Computational Geometry

8:00 AM – 10:50 AM **Room 325, BCC**

Organizers: **Erin Wolf Chambers**, St Louis University
Kathryn Leonard, California State University Channel Islands

8:00AM (1479) *Positional geometry of multi-object configurations from skeletal linking structures.* **James N. Damon**, University of North Carolina at Chapel HIll, and **Ellen K. Gasparovic***, Duke University (1096-53-1383)

8:25AM *Scale, Scale-Invariance and Metrics on Spaces of Plane Curves.* **Matt Feiszli**,Stepping Stone Mobile.

8:50AM (1480) *Extending Statistical Methods to Computational Topology.* **Elizabeth Munch**, IMA, University of Minnesota (1096-55-1361)

9:15AM ► (1481) *Relative critical sets, medial axes, and networks.* **Jason E Miller**, California State University Channel Islands (1096-92-2716)

9:40AM ► (1482) *Shape correspondence for biological applications.* Preliminary report. **Cindy Grimm***, Oregon State University, **Sandra Rugonyi**, Oregon Institute of Health, and **Rolf Mueller**, Virginia Tech (1096-51-957)

10:05AM (1483) *A class of Riemannian metrics for shape deformation analysis.* **Mario Micheli**, University of Washington (1096-53-734)

10:30AM (1484) *Topological measures of similarity for curves on surfaces.* **Erin Wolf Chambers**, Saint Louis University (1096-68-1000)

SIAM Minisymposium on Recent Advances in Financial Mathematics,III

8:00 AM – 10:50 AM **Room 313, BCC**

Organizers: **Maxim Bichuch**, Worcester Polytechnic Institute
Ronnie Sircar, Princeton University
Stephan Sturm, Worcester Polytechnic Institute

8:00AM ► (1485) *Filtered Likelihood for Point Processes.* Preliminary report. **Kay Giesecke**, Stanford University, and **Gustavo Schwenkler***, Boston University (1096-62-2733)

8:30AM ► (1486) *Risk management of volatility controlled variable annuity contracts.* **Eoin J Elliffe**, Lincoln Financial Group (1096-00-2762)

9:00AM ► (1487) *The state of High Frequency Trading from the perspective of an institutional investor.* Preliminary report. **Ionut Florescu***, **Khaldoun Khashanah** and **Steve Yang**, Stevens Institute of Technology (1096-62-2108)

9:30AM Please see the JMM newsletter for details.

10:00AM Please see the JMM newsletter for details.

10:30AM (1488) *Weak Convergence Analysis of Systemic Risk in Interbanking Networks.* **Agostino Capponi***, Johns Hopkins University, and **Lijun Bo**, Xidian University (1096-60-2120)

PME Council Meeting

8:00 AM – 11:00 AM **Mencken, 2nd Floor, Hilton**

MAA General Contributed Paper Session on Research in Applied Mathematics, I

8:15 AM – 10:55 AM **Room 347, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:15AM (1489) *Coexistence condition of two species of animals residing in an environment.* **Joon Hyuk Kang**, Andrews University (1096-VL-2080)

8:30AM ► (1490) *Agent-Based Models for Analyzing Complex Disease Dynamics and Tuberculosis Intervention Cost Effectiveness in the US.* **Jessica Ginepro**, Western New England University, **Emma Hartman**, Wheaton College, **Ryo Kimura**, Oberlin College, **Matthew McDermott***, Harvey Mudd College, **Colin Pawlowski**, Yale University, and **Dylan Shepardson**, Mt. Holyoke College (1096-VL-2685)

8:45AM ► (1491) *Brain Waves.* **Christina H Lee**, The College of New Jersey (1096-VL-2723)

9:00AM ► (1492) *Investigate the charactertics of blood flow in brain tumor using Finite Element methods.* **Ranadhir Roy*** and **Daniel N. Riahi**, University of Texas Pan American (1096-VL-833)

9:15AM ► (1493) *Methodological Insights to Exploring the Stability of General and Photorealistic Models of the Pupil Light Reflex (PLR).* Preliminary report. **A D Clark***, **K Chang**, **R S Gejji**, University of Maryland/Laboratory for Physical Sciences, **S Chrihalmeanu**, West Virginia University, and **A A Ross**, Michigan State University (1096-VL-789)

9:30AM ► (1494) *Modeling the Cutaneous Rabbit Effect.* **Evan C Cresswell-Clay*** and **G Bard Ermentrout**, University of Pittsburgh (1096-VL-2311)

9:45AM ► (1495) *A fast ADI algorithm for geometric flow equations in bio-molecular surface generation.* **Wufeng Tian*** and **Shan Zhao**, The University of Alabama (1096-VL-1406)

10:00AM (1496) *Analysis of Monte Carlo methods for computing parametric sensitivities in stochastic chemical kinetics.* Preliminary report. **Ting Wang*** and **Muruhan Rathinam**, University of Maryland, Baltimore County (1096-VL-2168)

10:15AM ► (1497) *Generalized Fractional Kinetic equations: Solutions and applications.* Preliminary report. **Ismail T Ali**, Kuwait University (1096-VL-16)

10:30AM (1498) *Nonuniform and Adaptive Mesh Refinement Finite-Difference Time-Domain method for Ground Penetrating Radar Simulations.* **Adonis O Ajayi**, Delaware State University (1096-VL-2479)

10:45AM ► (1499) *Large-scale Coordinated Platooning of Heavy-duty Vehicles.* **Jeffrey M Larson**, KTH - Royal Institute of Technology (1096-VL-891)

MAA General Contributed Paper Session on Calculus

8:30 AM – 10:25 AM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:30AM ► (1500) *From reddit to Calc III: How a picture led to a collaborative class project.* **Jody Sorensen**, Augsburg College (1096-VB-2546)

8:45AM ► (1501) *An Inquiry-Based Approach to Teaching Parameterization.* **Fabiana Cardetti***, University of Connecticut, **Nicole DeMatteo**, Providence College, **Jonathan Dollar**, Emory University, and **Gabriel Feinberg**, Haverford College (1096-VB-2379)

9:00AM (1502) *Faculty Learning Community Experience: Using Multidisciplinary Applications in Calculus Teaching.* **Stephen M. Walk**, St. Cloud State University (1096-VB-2290)

9:15AM ► (1503) *Adjusting Child Support Payments in Michigan.* **Michael A. Jones***, Mathematical Reviews, and **Jennifer Wilson**, Eugene Lang College The New School for Liberal Arts (1096-VB-2200)

9:30AM ► (1504) *Identifying Concepts Critical for Success in Calculus at the University of Illinois.* Preliminary report. **Alison Ahlgren Reddy***, University of Illinois, and **Marc A. Harper**, UCLA (1096-VB-1134)

9:45AM (1505) *Teaching Calculus through History, Intuition, Exploration, and Development (HIED).* **Paul Sisson*** and **Tibor Szarvas**, Louisiana State University in Shreveport (1096-VB-809)

10:00AM ► (1506) *Concept Modification: A Teaching Experiment.* **Girija S Nair-Hart**, University of Cincinatti Clermont College (1096-VB-176)

10:15AM ► (1507) *Introducing a proof on Fibonacci numbers to Calculus I students.* **Jaewoo Lee**, The City University of New York–Borough of Manhattan Community College (1096-VB-961)

AMS-MAA Grad School Fair

8:30 AM – 10:30 AM **Exhibit Hall G, 100 Level, BCC**

Undergrads! Take this opportunity to meet representatives from mathematical science graduate programs.

MAA Invited Address

9:00 AM – 9:50 AM **Ballrooms I&II, 400 Level, BCC**

(1508) *The mathematics of lattice-based cryptography.*
Jill Pipher, Brown University (1096-A0-11)

ASL Invited Address

9:00 AM – 9:50 AM **Room 319, BCC**

(1509) *New directions in reverse mathematics.*
Damir D Dzhafarov, University of Connecticut (1096-03-390)

MAA Minicourse: #12: Part B

9:00 AM – 11:00 AM **Room 344, BCC**

A game theory path to quantitative literacy.

Presenter: **David Housman**, Goshen College

MAA Minicourse #1: Part B

9:00 AM – 11:00 AM **Room 342, BCC**

Humanistic mathematics.

Presenters: **Gizem Karaali**, Pomona College

Eric Marland, Appalachian State University

MAA Minicourse #4: Part B

9:00 AM – 11:00 AM **Room 343, BCC**

Teaching introductory statistics (for instructors new to teaching intro stats).

Presenters: **Michael Posner**, Villanova University

Carolyn Cuff, Westminster College

MAA Workshop

9:00 AM – 10:55 AM **Peale B/C, 1st Floor, Hilton**

Advanced proposal writing for grant applications to the NSF Division of Undergraduate Education. (advance registration required)

Presenters: **John Haddock**, Division of Undergraduate Education, NSF

Michael Jacobson, Division of Undergraduate Education, NSF

Lee Zia, Division of Undergraduate Education, NSF

MAA Committee on the Teaching of Undergraduate Mathematics Panel Discussion

9:00 AM – 10:20 AM **Room 316, BCC**

Maximizing your impact in the classroom: Case studies in best practices for classroom teaching.

Organizers: **Martha Abell**, Georgia Southern University

Brigitte Lahme, Sonoma State University

Michael Oehrtman, University of Northern Colorado

Karen Rhea, University of Michigan

Panelists: **Lew Ludwig**, Denison University

Stan Yoshinobu, Cal Poly San Luis Obispo

Michelle Zandieh, Arizona State University

MAA Committee on Undergraduate Student Activities and Chapters-SIGMAA on Mathematics in Business, Industry, and Government Panel Discussion

9:00 AM – 10:20 AM **Room 327, BCC**

Nonacademic career paths for mathematicians.

Organizers: **Jennifer Bergner**, Salisbury University

Lisa Marano, West Chester University

Phil Gustafson, Colorado Mesa Univfersity

Ben Galluzzo, Shippensbburg University

Panelists: **Greg Coxson**, U.S. Naval Reserach Laboratory

Jim Fife, Educational Testing Service

Carla Martin, U.S. Government

Katie Ford, NASA Wallops

Student Hospitality/Information Center

9:00 AM – 5:00 PM **Swing Hall, 100 Level, BCC**

Exhibits and Book Sales

9:30 AM – 5:30 PM **Exhibit Hall F, 100 Level, BCC**

ASL Invited Address

10:00 AM – 10:50 AM **Room 319, BCC**

(1510) *A model theorist's geometry: Lascar rank, (non)orthogonality, triviality.*
Alice Medvedev, City College of New York, CUNY

AMS Invited Address

10:05 AM – 10:55 AM **Ballrooms I&II, 400 Level, BCC**

(1511) *The effectiveness of convex programming in the information and physical sciences.*
Emmanuel Candès, Stanford University

AMS-MAA Invited Address

11:10 AM – NOON **Ballrooms I&II, 400 Level, BCC**

► (1512) *Braids, homology, and polynomials: an emerging pattern in algebra and topology.*
Benson Farb, University of Chicago (1096-55-2588)

AMS Colloquium Lectures, Lecture III

1:00 PM – 1:50 PM **Ballrooms I&II, 400 Level, BCC**

(1513) *Symplectic Topology Today: Embedding ellipsoids and Fibonacci numbers.*
Dusa McDuff, Barnard College, Columbia University (1096-53-2198)

MAA Lecture for Students

1:00 PM – 1:50 PM **Holiday Ballrooms 1–3, 2nd Floor, Hilton**

► (1514) *An unexpected group.*
Carl Cowen, IUPUI (1096-A0-43)

AMS Current Events Bulletin

1:00 PM – 4:45 PM **Room 310, BCC**

Organizer: **David Eisenbud**, University of California, Berkeley

1:00PM ► (1515) *Earth's Carbon Cycle: A mathematical perspective.*
Daniel H Rothman, Massachusetts Institute of Technology (1096-86-2438)

2:00PM (1516) *The geometry of outer space.*
Karen Vogtmann, University of Warwick and Cornell University (1096-20-2543)

3:00PM (1517) *Recent advances in symplectic flexibility.*
Yakov Eliashberg, Stanford University (1096-53-744)

4:00PM ► (1518) *Infinitely many pairs of primes differ by no more than 70 million (and the bound's getting smaller every day).*
Andrew Granville, University of Montreal (1096-11-2337)

AMS-AWM Special Session on Geometric Applications of Algebraic Combinatorics, II

1:00 PM – 6:20 PM **Room 318, BCC**

Organizers: **Elizabeth Beazley**, Haverford College
Kristina Garrett, St. Olaf College

1:00PM (1519) *Polynomials for $GL_p \times GL_q$ orbit closures in the flag variety.*
Benjamin J. Wyser and **Alexander Yong***, University of Illinois at Urbana-Champaign (1096-05-593)

1:30PM (1520) *Generalized splines and Schubert calculus.*
Julianna S Tymoczko, Smith College (1096-05-2581)

2:00PM (1521) *A generalized GKM condition for p-compact flag varieties.*
Omar Ortiz, University of Western Ontario (1096-05-2302)

2:30PM (1522) *Equivariant cohomology of two-step flag varieties.*
Anders S. Buch, Rutgers University (1096-05-2124)

3:00PM (1523) *An equivariant rim-hook rule for quantum cohomology of Grassmannians.* Preliminary report.
Elizabeth Beazley, Haverford College, **Anna Bertiger**, University of Waterloo, and **Kaisa Taipale***, University of Minnesota, Minneapolis (1096-05-2399)

3:30PM (1524) *A quantum Chevalley rule for affine flag manifolds.* Preliminary report.
Liviu Mare, University of Regina, Canada, and **Leonardo C Mihalcea***, Virginia Tech University (1096-05-2189)

4:00PM (1525) *Flag Gromov-Witten invariants and Macdonald polynomials.*
Jennifer Morse, Drexel University (1096-05-2408)

4:30PM (1526) *A Constant Term Expression for the Character of Diagonal Harmonics.* Preliminary report.
Jim Haglund*, University of Pennsylvania, and **Adriano Garsia**, University of California at San Diego (1096-05-2060)

5:00PM (1527) *Macdonald polynomials with shifted parameters.* Preliminary report.
Arun Ram, University of Melbourne, **Martha Yip***, University of Pennsylvania, and **Meesue Yoo**, KIAS (1096-05-2394)

5:30PM (1528) *Specializations of nonsymmetric Macdonald-Koornwinder polynomials.*
Daniel Orr and **Mark Shimozono***, Virginia Tech (1096-05-448)

6:00PM ► (1529) *A Signed Little Map and Coxeter-Knuth Graphs.*
Sara C. Billey, University of Washington (1096-05-2510)

AMS Special Session on Accelerated Advances in Higher Order Invexities/Univexities with Applications to Optimization and Mathematical Programming, II

1:00 PM – 5:20 PM **Room 332, BCC**

Organizers: **Ram U. Verma**, International Publications USA

Alexander J. Zaslavski, Technion-Israel Institute of Technology

1:00PM (1530) *Exponential Type $A-(b,phi,eta,p,r)$ Univexities and Minimax Fractional Integral Programming.* **Ram N Mohapatra***, University of Central Florida, and **Ram U Verma**, Texas State University (1096-90-204)

2:00PM (1531) *Regularized Gap Function for Optimization Problems in Banach Spaces.* **C. Nahak**, Indian Institute of Technology Kharagpur (1096-49-2502)

3:00PM (1532) *The Reduction Method in Fractional Calculus and Fractional Ostrowski type inequalities.* **George A Anastassiou**, University of Memphis (1096-26-24)

► 4:00PM (1533) *General Efficiency Conditions for Multiobjective Fractional Programming Problems on Higher Order Invexity Frameworks.* Preliminary report. **Ram U Verma**, Texas State University (1096-90-205)

4:30PM (1534) *Structure of solutions of discrete-time optimal control systems.* **Alexander J Zaslavski**, The Technion-Israel Institute of Technology (1096-49-227)

► 5:00PM (1535) *Generalized Vector Variational Type Inequalities.* Preliminary report. **R. U. Verma***, Texas State University, **S. Salahuddin**, Aligarh Muslim University, and **A. P. Farajzadeh**, Raji University (1096-49-594)

AMS Special Session on Analytic Number Theory, III

1:00 PM – 2:50 PM **Room 320, BCC**

Organizers: **Angel Kumchev**, Towson University

Scott Parsell, West Chester University

Gang Yu, Kent State University

1:00PM (1536) *The genus behind Hilbert's Irreducibility Theorem and/or a connection of this theorem to Linnik's result on the smallest prime in an arithmetic progression.* **Michael Filaseta**, University of South Carolina (1096-11-1440)

1:30PM (1537) 8925840. **Morgan Cole**, **Scott M. Dunn*** and **Michael Filaseta**, University of South Carolina (1096-11-1489)

► 2:00PM (1538) *Bounded gaps between products of special primes.* Preliminary report. **Ping Ngai Chung***, Massachusetts Institute of Technology, and **Shiyu Li**, University of California, Berkeley (1096-11-1107)

2:30PM (1539) *Squarefree values of trinomial discriminants.* Preliminary report. **Greg Martin**, University of British Columbia (1096-11-338)

AMS Special Session on Computability in Geometry and Topology, II

1:00 PM – 5:50 PM **Room 320, BCC**

Organizers: **Mieczyslaw Dabkowski**, University of Texas at Dallas

Rumen D. Dimitrov, Western Illinois University

► 1:00PM (1540) *The Many Lives of Lattice Theory: An Expository Talk about Geometry, Topology, and Stanley.* **Jonathan David Farley**, Morgan State University (1096-06-1984)

2:00PM (1541) *Polynomial time complexity from Jones polynomial to Khovanov homology.* **Jozef H. Przytycki**, George Washington U., UMCP, and GU (1096-57-671)

3:00PM (1542) *Taut foliations.* Preliminary report. **Rachel Roberts**, Washington University in St Louis (1096-57-1578)

3:30PM (1543) *Seifert fibered homology spheres and the Heegaard Floer homology botany problem.* **Cagri Karakurt** and **Tye Lidman***, University of Texas at Austin (1096-57-584)

► 4:00PM (1544) *Computational topology via Discrete Morse Theory.* **Pawel Dlotko**, University of Pennsylvania (1096-55-348)

► 4:30PM (1545) *Kauffman States of Generalized Crossing.* Preliminary report. **Changsong Li*** and **Mieczyslaw K. Dabkowski**, University of Texas at Dallas (1096-57-1245)

5:00PM (1546) *Degree spectra of rack.* Preliminary report. **Kai Maeda**, Okinawa Institute of Science and Technology (1096-03-765)

► 5:30PM (1547) *Ultrahomogeneous Computable Structures.* **Francis Adams**, University of Florida (1096-03-1847)

AMS Special Session on Deformation Spaces of Geometric Structures on Low-Dimensional Manifolds, I

1:00 PM – 6:20 PM **Room 328, BCC**

Organizers: **Caleb Ashley**, Howard University
Michelle Lee, University of Maryland
Melissa Macasieb, University of Maryland
Andy Sanders, University of Illinois at Chicago

1:00PM (1548) *The Hyperbolic Geometry of $\mathbb{H}^3$ Hexagons and $PSL(2,\mathbb{C})$ Discreteness Sequences.* Preliminary report.
Jane Gilman*, Rutgers-Newark, and **Linda Keen**, Lehman College and the Graduate Center, CUNY (1096-51-689)

1:30PM (1549) *Toward a discreteness algorithm for rank 3 non-elementary subgroups of $PSL(2,R)$.*
Caleb J. Ashley, Howard University (1096-51-2644)

2:00PM (1550) *Minimal length, minimally intersecting filling pairs over Moduli space.*
Tarik Aougab, Yale University (1096-51-607)

2:30PM (1551) *Symbolic coding of Weil-Petersson geodesic flow.*
Babak Modami, University of Illinois at Urbana-Champaign (1096-51-816)

3:00PM (1552) *Uniqueness of Bidisk Bisectors.*
Todd A. Drumm*, Howard University, and **Virginie Charette**, University of Sherbrooke (1096-51-1056)

3:30PM (1553) *Ideal polyhedra in anti-de Sitter space.* Preliminary report.
Jeffrey Danciger, University of Texas at Austin, **Sara Maloni***, Brown University, and **Jean-Marc Schlenker**, Université du Luxembourg (1096-53-502)

4:00PM (1554) *A family of non-injective skinning maps with critical points.*
Jonah B Gaster, University of Illinois - Chicago (1096-51-1839)

4:30PM (1555) *Twist-bulge derivatives and deformations of convex real projective structures on surfaces.*
Terence D Long, University of Maryland - College Park (1096-51-1509)

5:00PM (1556) *Degeneration of convex projective structures on surfaces.* Preliminary report.
Tengren Zhang, University of Michigan (1096-51-324)

5:30PM (1557) *WZNW action and Kähler potentials on the moduli space of parabolic bundles over $\mathbb{P}^1$.* Preliminary report.
Claudio Meneses-Torres* and **Leon A. Takhtajan**, Stony Brook University (1096-30-327)

6:00PM (1558) *The classification of radial ends of properly convex real projective orbifolds.* Preliminary report.
Suhyoung Choi, KAIST (1096-57-555)

AMS Special Session on Fractal Geometry: Mathematics of Fractals and Related Topics, III

1:00 PM – 5:50 PM **Room 315, BCC**

Organizers: **Michel Lapidus**, University of California Riverside
Erin Pearse, California State Polytechnic University, San Luis Obispo
Robert Strichartz, Cornell University
Machiel Van Frankenhuijsen, Utah Valley University

1:00PM (1559) *Dimension of fractional Brownian motion with variable drift.*
Yuval Peres, Microsoft Research (1096-26-2340)

1:30PM (1560) *The Minkowski content of the Schramm-Loewner evolution (SLE).*
Gregory F. Lawler, University of Chicago (1096-60-175)

2:00PM (1561) *Multifractality of Whole-Plane SLE.*
Bertrand Duplantier, Institute for Theoretical Physics, CEA/Saclay, France (1096-60-1712)

2:30PM (1562) *Localization of eigenfunctions.*
Svitlana Mayboroda*, University of Minnesota, and **Marcel Filoche**, Ecole Polytechnique (1096-35-1874)

3:00PM (1563) *Entropic repulsion of Gaussian free field on high-dimensional Sierpinski carpet graphs.*
Joe P. Chen and **Baris Evren Ugurcan***, Cornell University (1096-60-206)

3:30PM (1564) *Some Very Rough Differential Equations.*
Davar Khoshnevisan*, University of Utah, **Jason Swanson**, University of Central Florida, **Yimin Xiao** and **Liang Zhang**, Michigan State University (1096-60-528)

4:00PM (1565) *Removable sets for homogeneous linear PDE in Carnot groups.*
Vasilis Chousionis, University of Illinois at Urbana-Champaign, **Valentino Magnani**, University of Pisa, Italy, and **Jeremy T Tyson***, University of Illinois at Urbana-Champaign (1096-35-541)

4:30PM (1566) *On the well-posedness of first order variable exponent Cauchy problems with Wentzell-Robin boundary conditions on arbitrary domains.*
Alejandro Vélez-Santiago, University of California at Riverside (1096-35-71)

5:00PM ► (1567) *Boundary Value Problems on a Half Sierpinski Gasket.*
Weilin Li*, University of Maryland, and **Robert S Strichartz**, Cornell University (1096-35-72)

5:30PM ► (1568) *Extensions and their Minimizations on the Sierpinski Gasket.*
Nicholas Ryder*, Rice University, **Pak Hin Li**, Chinese University of Hong Kong, **Baris Evren Ugurcan** and **Robert S. Strichartz**, Cornell University (1096-49-295)

AMS Special Session on Fractional, Stochastic, and Hybrid Dynamic Systems with Applications, III

1:00 PM – 3:50 PM **Room 324, BCC**

Organizers: **John Graef**, University of Tennessee at Chattanooga
Gangaram S. Ladde, University of South Florida
Aghalaya S. Vatsala, University of Louisiana at Lafayette

1:00PM (1569) *Stability Analysis of Stochastic Large-Scale Approximation Scheme.* Preliminary report.
M. Sambandham*, Morehouse College, and **G. S. Ladde**, University of South Florida, Tampa, FL (1096-34-2173)

1:30PM (1570) *Computational Aspects of the Estimation of Distributed Delays.*
Karyn L Sutton, University of Louisiana at Lafayette (1096-39-1662)

2:00PM (1571) *Superlinear Convergence via Iterative Methods for Scalar Caputo fractional differential equations with applications.* Preliminary report.
Sowmya Muniswamy* and **Aghalaya S. Vatsala**, University of Louisiana at Lafayette (1096-34-1660)

2:30PM (1572) *Positive solutions for nonlinear stochastic differential equations.* Preliminary report.
J Santanilla, University Of New Orleans (1096-37-2700)

3:00PM (1573) *Super Hyperbolic Linear Partial Fractional Differential Equations in One Dimensional Space.*
D S Stutson*, Xavier University of Louisiana, and **A S Vatsala**, University of Louisiana at Lafayette (1096-35-2439)

3:30PM (1574) *Sub and Super Hyperbolic Linear Partial Fractional Differential Equations with Numerical Results.* Preliminary report.
Aghalaya S. Vatsala*, University of Louisiana at Lafayette, and **Donna Sue Stutson**, Xavier University of Louisiana (1096-35-1328)

AMS Special Session on Heavy Tailed Probability Distributions and Their Applications, I

1:00 PM – 3:50 PM **Room 301, BCC**

Organizers: **Tuncay Alparslan**, American University
John P. Nolan, American University

1:00PM (1575) *Zolotarev type integral representations for multivariate stable laws.*
John P Nolan, American University (1096-60-2040)

1:30PM (1576) *Maxima of long memory stationary symmetric α-stable processes, and self-similar processes with stationary max-increments.*
Takashi Owada, Technion, Haifa, Israel, and **Gennady Samorodnitsky***, Cornell University (1096-60-117)

2:00PM (1577) *A Sum Characterization of Hidden Regular Variation in Multivariate Extremes.*
Grant B Weller*, Carnegie Mellon University, and **Daniel Cooley**, Colorado State University (1096-62-867)

2:30PM (1578) *Limit laws of maximal normalized set-indexed sum of heavy-tailed random variables.* Preliminary report.
Yizao Wang*, Cincinnati, and **Zakhar Kabluchko**, Ulm University, Germany (1096-60-959)

3:00PM (1579) *Fully Bayesian inference for spatial extremes using hierarchical extreme value processes.*
Benjamin A Shaby*, Penn State University, and **Brian J Reich**, North Carolina State University (1096-62-1653)

3:30PM (1580) *Extreme value theory with operator norming.*
Mark M. Meerschaert, Michigan State University, **Hans-Peter Scheffler**, University of Siegen, and **Stilian A. Stoev***, University of Michigan (1096-62-2066)

AMS Special Session on Homological and Characteristic p Methods in Commutative Algebra, III

1:00 PM – 5:50 PM **Room 303, BCC**

Organizers: **Neil Epstein**, George Mason University
Sean Sather-Wagstaff, North Dakota State University
Karl Schwede, Penn State University

1:00PM (1581) *Powers of ideals and Golod rings.*
Juergen Herzog, Univ. Essen, and **Craig Huneke***, University of Virginia (1096-13-389)

1:30PM (1582) *A Charaterization of F-jumping Numbers.* **Juan Felipe Perez**, University of Michigan (1096-13-1500)

2:00PM (1583) *A finiteness theorem in local cohomology.* **Bhargav Bhatt**, Institute for Advanced Study (1096-13-1744)

2:30PM (1584) *Toward an efficient algorithm for deciding the vanishing of local cohomology modules in prime characteristic.* **Yi Zhang**, University of Illinois at Urbana-Champaign (1096-13-981)

3:00PM (1585) *F-injectivity and Buchsbaum singularities.* Preliminary report. **Linquan Ma**, University of Michigan (1096-13-1763)

3:30PM (1586) *A generalization of Hilbert-Kunz multiplicity.* **Hailong Dao**, University of Kansas, and **Ilya Smirnov***, University of Virginia (1096-13-1866)

4:00PM (1587) *Generalized cover ideals and the persistence property.* **Ashwini Bhat**, Oklahoma State University, **Jennifer Biermann***, Mt Holyoke College, and **Adam Van Tuyl**, Lakehead University (1096-13-2724)

4:30PM (1588) *A Construction for Homogeneous Gorenstein Ideals.* Preliminary report. **Sema Gunturkun*** and **Uwe Nagel**, University of Kentucky (1096-13-1439)

5:00PM (1589) *Connected sums of k-algebras.* **H. Ananthnarayan**, I.I.T. Bombay, **Ela Celikbas***, University of Missouri-Columbia, and **Zheng Yang**, University of Nebraska-Lincoln (1096-13-1378)

5:30PM ► (1590) *Multiplicity Sequence of Graded Algebras.* Preliminary report. **Javid Validashti**, University of Illinois at Urbana-Champaign (1096-13-604)

AMS Special Session on Homotopy Theory, III

1:00 PM – 5:50 PM **Room 329, BCC**

Organizers: **Niles Johnson**, Ohio State University at Newark
Mark W. Johnson, Penn State University, Altoona
Nitu Kitchloo, Johns Hopkins University
James Turner, Calvin College
Donald Yau, Ohio State University at Newark

1:00PM (1591) *Gorenstein homological algebra.* **Daniel Bravo**, Universidad Austral de Chile, **James Gillespie**, Ramapo College of New Jersey, and **Mark Hovey***, Wesleyan University (1096-18-1005)

1:30PM (1592) *An equivariant infinite loop space machine.* **Anna Marie Bohmann***, Northwestern University, and **Angelica M. Osorno**, Reed College (1096-55-1776)

2:00PM (1593) *Equivariant algebraic K-theory.* Preliminary report. **Mona Merling**, University of Chicago (1096-55-2069)

2:30PM (1594) *Higher Chromatic Analogues of Twisted K-theory.* **Mehdi Khorami**, ECSU (1096-55-1558)

3:00PM (1595) *Equivariantly Twisted Cohomology Theories.* **John Lind**, Johns Hopkins University (1096-55-2049)

3:30PM (1596) *Completed power operations for Morava E-theory.* **Tobias Barthel**, Harvard University, and **Martin Frankland***, University of Western Ontario (1096-55-1526)

4:00PM (1597) *Power Operations and Commutative Ring Spectra.* **Sean M Tilson**, Royal Institute of Technology of Sweden (KTH) (1096-55-2141)

4:30PM (1598) *Power operation calculations in elliptic cohomology.* **Yifei Zhu**, Northwestern University (1096-55-1271)

5:00PM (1599) *The Slice Tower and Suspensions.* Preliminary report. **Carolyn M. Yarnall**, Wabash College (1096-55-2067)

5:30PM (1600) *tmf cooperations.* Preliminary report. **Mark Behrens***, **Kyle Ormsby**, **Nathanial Stapleton** and **Vesna Stojanoska**, MIT (1096-55-2365)

AMS Special Session on Mathematics in Natural Resource Modeling, II

1:00 PM – 5:50 PM **Room 322, BCC**

Organizers: **Shandelle Henson**, Andrews University
Catherine Roberts, College of the Holy Cross

1:00PM (1601) *Adaptation of complex traits in biological invasions.* Preliminary report. **Judith R Miller**, Georgetown University (1096-92-416)

1:30PM (1602) *The Forest Rotations Problem Under Risk and Uncertainty: Is There Anything Left To Study?* **Gregory Scott Amacher**, Virginia Tech (1096-49-1261)

2:00PM ► (1603) *Optimal control in models of management of forest resources.* Preliminary report. **Suzanne Lenhart**, University of Tennessee and NIMBioS (1096-92-975)

2:30PM (1604) *Valuing a timber harvest contract as a high-dimensional Amercian call option via least-squares Monte Carlo simulation.* **Bin Mei**, University of Georgia (1096-91-73)

3:00PM (1605) *Plant toxins and trophic cascades alter fire regime and succession on a boreal forest landscape.* **Zhilan Feng**, Purdue University (1096-92-22)

► 3:30PM (1606) *Applications of graph theory to optimize wildlife corridor systems for multiple species: Grizzly bear and wolverines in the northern Rockies.* Preliminary report. **Bistra Dilkina***, Georgia Institute of Technology, and **Claire A Montgomery**, Oregon State University (1096-90-1441)

4:00PM (1607) *Competition of Two Species for Two Limited Resources with One Species Mediated by Parasites.* Preliminary report. **Lih-Ing W. Roeger***, Texas Tech University, and **Sze-Bi Hsu**, National Tsing-Hua University (1096-92-1251)

4:30PM (1608) *A simple model of foraging activity in colonies of seed harvester ants.* **Oyita Udiani**, Applied Mathematics for the Life & Social Sciences, College of Liberal Arts and Sciences, Arizona State University, **Noa Pinter-Wollman**, BioCircuits Institute, University of California, San Diego, and **Yun Kang***, Arizona State University (1096-34-479)

► 5:00PM (1609) *Modeling the Impact of Food Availability on Disease Spread in Feral Hogs.* Preliminary report. **Rene A. Salinas**, Appalachian State University (1096-92-2059)

► 5:30PM (1610) *Modeling and Analysis of Fungus-Infected American Chestnut Populations.* **Eric Alan Eager***, **Anita Davelos Baines**, University of Wisconsin - La Crosse, and **Andrew M. Jarosz**, Michigan State University (1096-92-2458)

AMS Special Session on Nineteenth Century Algebra and Analysis

1:00 PM – 5:50 PM **Room 317, BCC**

Organizers: **Frank D. Grosshans**, West Chester University
Karen H. Parshall, University of Virginia
Paul R. Wolfson, West Chester University

► 1:00PM (1611) *Infinitesimals in Analysis 1780-1830.* Preliminary report. **Craig G Fraser**, University of Toronto (1096-01-791)

1:30PM (1612) *The Actual Infinite and Infinitesimals in the 19th Century—Boon or Bane?* **Joseph W Dauben**, Herbert H. Lehman College, The City University of New York (1096-01-1605)

► 2:00PM (1613) *The launch of invariant theory: seeking and finding.* **Anthony J. Crilly**, London, England (1096-01-591)

2:30PM (1614) *Transvectants and finiteness: Gordan's way of doing invariant theory:.* Preliminary report. **Joseph P Kung**, University of North Texas (1096-01-95)

3:00PM (1615) *Abel's Version of Abel's Theorem.* **Harold M. Edwards**, NYU-Courant (1096-01-1003)

3:30PM (1616) *Visual Representation in the Theory of Algebraic Functions and their Integrals in the late 19th Century.* **William Thomas Archibald**, Simon Fraser University (1096-01-965)

► 4:00PM (1617) *The irreducibility of the cyclotomic polynomials.* **Steven H. Weintraub**, Lehigh University (1096-01-19)

► 4:30PM (1618) *Group Theory and the Bumpy Road to Abstraction.* Preliminary report. **Victor J. Katz**, University of the District of Columbia (1096-01-919)

► 5:00PM (1619) *Mechanics and Mathematical Physics in Nineteenth-Century Britain: An Overview.* **Sloan Evans Despeaux**, Western Carolina University (1096-01-1125)

► 5:30PM (1620) *The three-body problem.* **June E. Barrow-Green**, The Open University, UK (1096-01-1528)

AMS Special Session on Outreach for Mathematically Talented Youth, I

1:00 PM – 5:50 PM **Room 314, BCC**

Organizers: **Christina Eubanks-Turner**, Loyola Marymount University
Virginia Watson, Kennesaw State University
Daniel Zaharopol, Art of Problem Solving Foundation

1:00PM (1621) *MATHCOUNTS - 3 unique approaches to extracurricular math.* **Lou DiGioia**, MATHCOUNTS Foundation (1096-97-2149)

► 1:30PM (1622) *MAA's American Mathematics Competitions.* **Steven R Dunbar**, Mathematical Association of America (1096-97-2129)

► 2:00PM (1623) *Ten Years Of Working Online With High-Performing Students.* **David Patrick**, Art of Problem Solving (1096-97-373)

2:30PM (1624) *Navajo Nation Math Circles Project (NNMCP).* **Tatiana Shubin***, San Jose State University, **Henry Fowler**, Diné College, and **David Auckly**, Kansas State University (1096-97-982)

3:00PM ► (1625) *Calculus in the Mites Program.*
Michael Craig* and **Alexander T. Frumosu**, Massachusetts Institute of Technology (1096-37-2079)

3:30PM ► (1626) *The kids don't bite, but they never stop asking questions: Two new recruits teach at MathPath.*
Jane Butterfield* and **David Clark**, University of Minnesota (1096-97-523)

4:00PM ► (1627) *Why MathPath Works.*
Sam Vandervelde, St. Lawrence University (1096-97-1176)

4:30PM ► (1628) *A viable pathway for underserved students to enter advanced mathematical study.*
Daniel Zaharopol, The Art of Problem Solving Foundation (1096-97-2732)

5:00PM ► (1629) *"Out of nothing I have created a strange new universe": the role of summer mathematics programs in the educational paths of talented students.*
Mira Bernstein, Canada/USA Mathcamp (1096-97-2664)

5:30PM ► (1630) *Exploration with PROMYS.*
Glenn Stevens, Boston University (1096-97-1987)

AMS Special Session on Quantum Walks, Quantum Computation, and Related Topics, I

1:00 PM – 5:20 PM **Room 323, BCC**

Organizers: **Chaobin Liu**, Bowie State University
Takuya Machida, University of Tokyo
Nelson Petulante, Bowie State University
Salvador E. Venegas-Andraca, Tecnológico de Monterrey, Campus Estado de México

1:00PM (1631) *Green's function approach for quantum walks.*
Fabiano M. Andrade, Universidade Estadual de Ponta Grossa (1096-81-2227)

1:30PM (1632) *Evolutionary quantum Prisoners Dilemma on the cycle graph C_n.* Preliminary report.
Michael Mc Gettrick*, **Colm O'Riordan**, **Meng Li**, National University of Ireland, Galway, and **Jaroslaw Miszczak**, Polish Academy of Sciences (1096-68-1625)

2:00PM (1633) *Quantum walks with memory.*
Peter P Rohde*, **Gavin Brennen** and **Alexei Gilchrist**, Macquarie University, Australia (1096-81-1504)

2:30PM ► (1634) *A quantum-walk based clustering algorithm.* Preliminary report.
Salvador E. Venegas-Andraca, Disruptive Computer Technologies and Monterrey Institute of Technology (1096-81-1993)

3:00PM (1635) *Fully inter-connected subgraph decomposition and continuous time quantum walks.*
Yusuke Ide, Kanagawa University (1096-60-1360)

3:30PM (1636) *A class of primitive quantum channels.* Preliminary report.
Chaobin Liu* and **Nelson Petulante**, Bowie State University (1096-81-1326)

4:00PM ► (1637) *Quantum walk as secured quantum memory.*
Chandrashekar Channipura Madaiah* and **Thomas Busch**, Okinawa Institute of Science and Technology (1096-81-587)

4:30PM ► (1638) *Limit distributions of quantum walks and open quantum random walks.* Preliminary report.
Hyun Jae Yoo, Hankyong National University, Korea (1096-60-1234)

5:00PM (1639) *The baker's transformation and quantum walk.*
Takao Namiki, Hokkaido University (1096-60-236)

AMS Special Session on Recent Progress in Multivariable Operator Theory, III

1:00 PM – 5:50 PM **Room 331, BCC**

Organizers: **Ron Douglas**, Texas A&M University
Michael Jury, University of Florida

1:00PM (1640) *A new approach to the sextic truncated moment problem.*
Raul E. Curto, University of Iowa (1096-47-1429)

1:30PM (1641) *Similarity of Cowen-Douglas Operators in the Multivariable Setting.* Preliminary report.
Hyun Kwon, The University of Alabama (1096-47-1981)

2:00PM (1642) *Eigenvalues of Self-Adjoint Toeplitz Operators with respect to a Constrained Algebra.*
Adam E. Broschinski, University of Florida (1096-47-1140)

2:30PM (1643) *Perturbation of multivariable operator functions.* Preliminary report.
Anna Skripka, University of New Mexico (1096-47-1285)

3:00PM (1644) *Semicrossed Products of Operator Algebras by Semigroups.* Preliminary report.
Kenneth R. Davidson, University of Waterloo, **Adam H. Fuller***, University of Nebraska - Lincoln, and **Evgenios T. A. Kakariadis**, Ben-Gurion University of the Negev (1096-47-1854)

3:30PM (1645) *Composition operators with closed range.*
Kristin Elizabeth Luery, University of Cincinnati (1096-47-485)

4:00PM (1646) *Model spaces and thin interpolating sequences.*
Pamela Gorkin*, Bucknell University, **Sandra Pott**, Lund University, and **Brett D. Wick**, Georgia Institute of Technology (1096-47-1358)

4:30PM (1647) *Triangular algebras vs. Tensor algebras.*
Christopher Ramsey, University of Virginia (1096-47-1570)

5:00PM (1648) *Berezin Transforms on Noncommutative Varieties.*
Gelu F Popescu, University of Texas at San Antonio (1096-47-461)

► 5:30PM (1649) *Generalized Corona Theorem and Wolff's Ideal Theorem on the Multiplier Algebra of Weighted Dirichlet Spaces, and on Q_p Spaces.*
Debendra P. Banjade, The University of Alabama (1096-47-2274)

AMS Special Session on The Ubiquity of Dynamical Systems, II

1:00 PM – 5:45 PM **Room 302, BCC**

Organizers: **Edray H. Goins**, Purdue University
Talitha M. Washington, Howard University

1:00PM (1650) *Foundations for the Thompson problem.* Preliminary report.
Tepper L Gill, Howard University (1096-35-119)

► 2:00PM (1651) *A dynamical systems and harmonic analysis based method for analyzing signals and fluid flows.*
Sherry E Scott, Milwaukee Wisconsin (1096-37-2318)

3:00PM (1652) *Introduction to Canonical Kahler metrics and Semistable Pairs.*
Sean T Paul, University of Wisconsin at Madison (1096-14-2109)

► 4:00PM (1653) *Introduction to the Euler-Poisson system.*
Ryan Hynd, University of Pennsylvania (1096-35-1995)

5:00PM (1654) *On the Poisson relation for compact symmetric spaces.* Preliminary report.
Craig J. Sutton, Dartmouth College (1096-53-2136)

AMS Special Session on Topological Graph Theory: Structure and Symmetry, III

1:00 PM – 5:50 PM **Room 330, BCC**

Organizers: **Jonathan L. Gross**, Columbia University
Thomas W. Tucker, Colgate University

1:00PM (1655) *Log-Concavity of Genus Distributions of Ring-Like Families of Graphs.*
Jonathan L. Gross, Department of Computer Science, Columbia University, **Toufik Mansour***, University of Haifa, and **Thomas W. Tucker**, Colgate University (1096-05-669)

1:30PM (1656) *Log-concavity of the genus polynomials of Ringel ladders.*
Jonathan L. Gross, Department of Computer Science, Columbia University, New York, NY 10027, USA., **Toufik Mansour**, Department of Mathematics, University of Haifa, 3498838 Haifa, Israel, **Thomas W. Tucker**, Department of Mathematics, Colgate University, Hamilton, NY 13346, USA, and **David G.L. Wang***, Department of Mathematics, University of Haifa, 3498838 Haifa, Israel (1096-05-670)

2:00PM (1657) *Log-Concavity of Combinations of Sequences and Applications to Genus Distributions.*
Jonathan L Gross*, Columbia University, **Toufik Mansour**, University of Haifa, **Thomas W Tucker**, Colgate University, and **David G.L. Wang**, University of Haifa (1096-05-269)

2:30PM (1658) *Enumeration of Digraph Embeddings.*
Yichao Chen*, Hunan University, **Jonathan L. Gross**, Department of Computer Science, Columbia University, and **Xiaodong Hu**, Chinese Academy of Sciences (1096-05-687)

3:00PM (1659) *Semicages and extremal problems for maximum genus.*
Michal Kotrbcik, Faculty of Informatics, Masaryk University, Brno, Czech Republic (1096-05-2032)

► 3:30PM (1660) *Embeddings of circulants.*
Marston D E Conder*, University of Auckland, New Zealand, and **Ricardo Grande**, University of the Basque Country, Spain (1096-05-2270)

4:00PM (1661) *Distinguishing coloring of 3-regular graphs on closed surfaces.*
Seiya Negami, Yokohama National University (1096-05-1547)

4:30PM (1662) *A variation on Heawood-list-coloring for graphs on surfaces.*
Joan P Hutchinson, Macalester College, emerita (1096-05-1685)

5:00PM (1663) *Large odd order groups of fixed symmetric genus.* Preliminary report.
Jay Zimmerman* and **Coy L. May**, Towson University (1096-20-1710)

5:30PM (1664) *The strong symmetric genus of some D-type Generalized Symmetric Groups.* Preliminary report.
Michael A. Jackson, Grove City College (1096-20-1470)

MAA Invited Paper Session on Uniform Distribution, Discrepancy, and Related Fields

1:00 PM – 3:50 PM **Room 307, BCC**

Organizers: **Dmitriy Bilyk**, University of Minnesota
Jill Pipher, Brown University

1:00PM ► (1665) *Discrepancy estimates in continuous, discrete and arithmetic settings.* Preliminary report. **Alex Iosevich**, University of Rochester (1096-AD-1599)

1:30PM (1666) *Geometric proof of the Central Limit Theorem for Kronecker sequences.* **Artur Avila**, IMPA, **Dmitry Dolgopyat***, University of Maryland, **Eduard Duriev**, Harvard, and **Omri Sarig**, Weizmann Institute (1096-AD-1924)

2:00PM ► (1667) *Monte Carlo, Quasi-Monte Carlo and randomized Quasi-Monte Carlo.* **Art B. Owen**, Stanford University (1096-AD-1219)

2:30PM ► (1668) *The Small Ball Inequality.* Preliminary report. **Michael T Lacey**, Georgia Institute of Technology (1096-AD-223)

3:00PM ► (1669) *Multivariate numerical integration.* **Vladimir N Temlyakov**, University of South Carolina and Steklov Institute of Mathematics (1096-AD-1173)

3:30PM ► (1670) *Discretizing Manifolds with Minimal Energy.* **E B Saff**, Vanderbilt University (1096-AD-1032)

MAA Minicourse #15: Part B

1:00 PM – 3:00 PM **Room 342, BCC**

Developing strong mentoring relationships.

Presenter: **Donna Joyce Dean**, Association for Women in Science

MAA Minicourse: #10: Part A

1:00 PM – 3:00 PM **Room 344, BCC**

Heavenly mathematics: The forgotten art of spherical trigonometry.

Presenters: **Glen Van Brummelen**, Quest University

Joel Silverberg, Roger Williams University

MAA Minicourse #9: Part B

1:00 PM – 3:00 PM **Room 343, BCC**

WeBWorK: An open-source alternative for generating and delivering online homework problems.

Presenters: **John Travis**, Mississippi College

Jason Aubrey, University of Missouri

Paul Pearson, Hope College

AMS Session on Geometry and General Topology

1:00 PM – 6:10 PM **Room 311, BCC**

1:00PM (1671) *Blaschke's Rolling Ball Property and Conformal Metric Ratios.* **David A. Herron**, University of Cincinnati, and **Poranee K. Julian***, University of Cincinnati - Blue Ash College (1096-51-242)

1:15PM ► (1672) *Staircase metrics in space-time geometries.* **J Mealy*** and **Kusha Mohammadi**, Austin College (1096-51-254)

1:30PM (1673) *An origami locked triangular mesh in* $\mathbb{R}^3$. **Zachary Abel**, MIT, **Thomas Hull***, Western New England University, and **Tomohiro Tachi**, The University of Tokyo (1096-51-2282)

1:45PM ► (1674) *Bounding total curvature of random planar polygons sampled under the symmetric measure.* **Michael William Berglund**, University of Georgia at Athens (1096-53-309)

2:00PM (1675) *Simplicial Isometric Embeddings of Indefinite Metric Polyhedra.* **Barry Minemyer**, Alfred University (1096-53-251)

2:15PM (1676) $\mathbb{Z}_2-$*Systolic* $(1,2)-$*Freedom of* $\mathbb{R}P^3\#\mathbb{R}P^3$. **Lizhi Chen**, Oklahoma State University (1096-53-1965)

2:30PM (1677) *Fundamental Groups of Spaces with Bakry-Emery Ricci Tensor Bounded Below.* **Maree Jaramillo**, University of California, Santa Barbara (1096-53-1942)

2:45PM (1678) *The Geometry of Curves and Surfaces in the Heisenberg Group.* Preliminary report. **T. H. Wears*** and **Joseph Gills**, Longwood University, Farmville, VA 23909 (1096-53-2423)

3:00PM (1679) *Curve shortening flow and smooth projective planes.* **Yu-Wen Hsu**, Yale University (1096-53-2597)

3:15PM (1680) *Every totally umbilical* GCR*-lightlike submanifold of an indefinite nearly Kaehler manifold is totally geodesic.* **Rakesh Kumar**, Department of Applied Sciences, Faculty of Engineering, Punjabi University, Patiala, India. (1096-53-2710)

3:30PM (1681) *Classification of Quadratic Harmonic Maps of S7 into S7.* **Faen Wu***, Polytechnic Institute of NYU, **Yueshan Xiong**, Chinese Academy of Science, and **Xinnuan zhao**, Lushan college,China (1096-53-2261)

3:45PM (1682) *Basic Differential Forms on Geometric Stacks.* **Jordan A. Watts**, University of Illinois at Urbana-Champaign (1096-53-2275)

4:00PM ► (1683) *Homogeneity properties of continua.* **F H Sturm**, Auburn University (1096-54-2711)

4:15PM (1684) *Inverse Limits with Irreducible Set-Valued Functions.*
James P. Kelly, Baylor University (1096-54-1758)

4:30PM (1685) *Orbit Structures of Homeomorphisms on Cantor Sets.*
Casey Lynn Sherman, St. Edward's University (1096-54-2351)

4:45PM (1686) *Nets and Upper and Lower Semi-Continuities.*
Shing S. So, University of Central Missouri (1096-54-903)

5:00PM (1687) *The cardinality of $\beta_A(S_J)$.*
Arthur D. Grainger, Morgan State University (1096-08-231)

5:15PM ► (1688) *Supercoiled Tangles and Stick Numbers of 2-Bridge Links.*
Erik A Insko*, Florida Gulf Coast University, and **Rolland Trapp**, California State University - San Bernardino (1096-54-1655)

5:30PM ► (1689) *Tetrahedron and Nets.* Preliminary report.
Derege H. Mussa, Texas A&M University-Commerce (1096-51-703)

5:45PM ► (1690) *Computations on Parametrized Surfaces with Chebfun2.*
Courtney M. Page-Bottorff, Arizona State University (1096-51-2010)

6:00PM (1691) *New Invariants of Virtual Rational Tangle Moves.*
Noureen Khan, University of North Texas Dallas (1096-55-458)

AMS Session on Operator Theory and Banach Spaces

1:00 PM – 4:55 PM **Room 305, BCC**

1:00PM ► (1692) *Angle reserving linear ransformations.* Preliminary report.
Arsalan Chademan Shademan, University of Kurdistan, Sanandaj, Iran (1096-47-728)

1:15PM (1693) *Weighted Composition Operators between Weighted Bergman and S^p Spaces.*
Waleed K. Al-Rawashdeh, Montana Tech (1096-47-1745)

1:30PM (1694) *Eigenfunctions of composition and weighted composition operators.*
Bhupendra Paudyal, University of Toledo (1096-47-1385)

1:45PM (1695) *Resolvent algebras and Deddens algebras for rank-one and finite rank perturbations operators.* Preliminary report.
D Drissi, Kuwait university (1096-47-1398)

2:00PM (1696) *Topological structure of the spaces of composition operators on Hilbert spaces of Dirichlet series.*
Bingyang Hu, **Le Hai Khoi**, Nanyang Technological University, Singapore, and **Ruhan Zhao***, SUNY Brockport (1096-47-2017)

2:15PM (1697) *A range for quadratic hyponormality.* Preliminary report.
George R Exner*, Bucknell University, **Il Bong Jung**, **Mi Ryeong Lee** and **Sun Hyun Park**, Kyungpook National University (1096-47-2488)

2:30PM (1698) *Spectra of linear fractional composition operators on $H^2(B_N)$.*
Liangying Jiang*, Shanghai Finance University, China, and **Zhihua Chen**, Tongji University, China (1096-47-2161)

2:45PM (1699) *the spectrum of a hypercyclic operator.*
Nathan P Clements, University of Wyoming (1096-47-2639)

3:00PM (1700) *Scattering theory of a class of Schrödinger operators with sparse potentials.* Preliminary report.
Zhongwei Shen, Auburn University (1096-47-979)

3:15PM (1701) *Refinement of the Yosida-Hewitt decomposition of singular functionals on operator rearrangement invariant spaces.*
Genady Ya. Grabarnik*, St John's University, and **Ben-Zion Rubshtein**, Ben Gurion University, Beer-Sheva, Israel (1096-47-1518)

3:30PM ► (1702) *Cesaro Matrices: Where do they all come from.* Preliminary report.
Gabriel T Prajitura, College at Brockport, State University of New York (1096-47-2209)

3:45PM (1703) *An upper bound on the Kolmogorov widths of a certain family of integral operators.* Preliminary report.
Duaine S. Lewis* and **Bernd Sing**, The University of the West Indies, Barbados (1096-47-2550)

4:00PM (1704) *A class of integral operators on spaces of analytic functions.*
Snehalatha Ballamoole*, **Thomas Len Miller** and **Vivien Glass Miller**, Mississippi State University, Starkville (1096-47-241)

4:15PM (1705) *Analysis of the truncated Hilbert transform arising in limited data tomography.*
Reema Al-Aifari*, Vrije Universiteit Brussel, and **Alexander Katsevich**, University of Central Florida (1096-47-2400)

4:30PM (1706) *An Inversion Procedure for the Gaussian Radon Transform for Banach Spaces.*
Irina Holmes, Louisiana State University (1096-60-356)

4:45PM ► (1707) *Gaussian Left-Definite Variations of the Laguerre and Jacobi Differential Expressions and Their Applications to Learning Theory.*
Alexandra V Pasi* and **Richard Wellman**, Westminster College, Salt Lake City (1096-47-2522)

AMS Session on Partial Differential Equations

1:00 PM – 5:55 PM **Room 304, BCC**

1:00PM (1708) *Traveling wave solutions of Camassa-Holm equation.* Preliminary report.
Guoping Zhang, Morgan State University (1096-35-2580)

1:15PM (1709) *Travelling wave solutions for nonlinear Schrödinger and nonlinear Klein-Gordon equations on Riemannian manifolds.*
Mayukh Mukherjee, University of North Carolina at Chapel Hill (1096-35-492)

1:30PM (1710) *Traveling-wave solutions to the half-wave equation.* Preliminary report.
Daniele Garrisi*, Inha University, and **Vladimir Georgiev**, Universita' Degli Studi di Pisa (1096-35-1512)

1:45PM (1711) *Higher Moments for a Markov-Schrödinger Wave Equation on a Lattice.*
Clark Musselman*, Bard College at Simon's Rock, and **Jeffrey Schenker**, Michigan State University (1096-35-1393)

2:00PM (1712) *A Vector Field Method for Non-Trapping Radiating Space-Times.*
Jesus R Oliver, University of California, San Diego (1096-35-2498)

2:15PM (1713) *Multiplicity and regularity of large periodic solutions with rational frequency for a class of semilinear monotone wave equations.*
Jean Marcel Fokam, American University of Nigeria (1096-35-1128)

2:30PM (1714) *Symmetric rearrangement and the stability of NLS-KdV solitary waves.*
John Albert, University of Oklahoma, and **Santosh Bhattarai***, Trocaire College (1096-35-234)

2:45PM ► (1715) *A Hyperbolic Model from Plasma Physics: The Zakharov-Kuznetsov Equation.*
Nathan Glatt-Holtz, Virginia Polytechnic and State University, **Roger Temam**, The Institute for Scientific Computing and Applied Mathematics, Indiana University, and **Chuntian Wang***, Indiana University, Bloomington (1096-35-1641)

3:00PM (1716) *Well-Posedness of a Boundary Controlled Generalized Burgers-Korteweg-de Vries Equation.*
Andras Balogh, The University of Texas-Pan American (1096-35-2645)

3:15PM ► (1717) *Complex Valued Partial Differential Equations.*
Netra P Khanal, The University of Tampa (1096-35-2701)

3:30PM (1718) *Blow-up phenomena due to a concentrated nonlinear source in an infinite strip.*
C. Y. Chan, University of Louisiana at Lafayette, and **P. Tragoonsirisak***, Fort Valley State University (1096-35-1923)

3:45PM (1719) *Partial regularity of weak solutions to the imcompressible magnetohydrodynamic equations.*
Hijun Choe, Yonsei University, and **Minsuk Yang***, Korea Institute for Advanced Study (1096-35-1097)

4:00PM ► (1720) *On the global well-posedness of N-dimensional generalized MHD system in anisotropic spaces.*
Kazuo Yamazaki, Department of Mathematics, Oklahoma State University (1096-35-2295)

4:15PM (1721) *A Study on the Global Regularity for Two-dimensional Magnetohydrodynamic Equations.*
Dipendra Regmi, University of Central Oklahoma (1096-35-1035)

4:30PM (1722) *The Interior Transmission Problem for Regions on Conducting Surface.*
Fan Yang* and **Peter Monk**, University of Delaware (1096-35-2602)

4:45PM (1723) *A Harnack-Type Inequality for a Prescribing Curvature Equation on a Domain with Boundary.*
Mathew R Gluck*, University of Florids, **Ying Guo** and **Lei Zhang**, University of Florida (1096-35-1144)

5:00PM (1724) *Energy decay of type III linear thermoelastic plates with memory.*
Michele Coti Zelati*, Indiana University, **Filippo Dell'Oro** and **Vittorino Pata**, Politecnico di Milano (1096-35-2555)

5:15PM (1725) *The Dirichlet and regularity problems in bounded Lipschitz domains for second order elliptic operators with bounded, real, but not necessarily symmetric, coefficients.* Preliminary report.
Nguyen T Nguyen, University of Chicago (1096-35-2121)

5:30PM (1726) *Dynamics of Ginzburg-Landau and Gross-Pitaevskii Vortices on Manifolds.*
Ko-Shin Chen* and **Peter Sternberg**, Indiana University, Bloomington (1096-35-154)

5:45PM (1727) *Global existence of a weak solution of the Euler equations with helical symmetry and L^p vorticity.*
Anne Bronzi*, University of Illinois at Chicago, **Milton Lopes Filho** and **Helena Nussenzveig Lopes**, Universidade Federal do Rio de Janeiro, Brazil (1096-35-2127)

AMS Session on Undergraduate Research in Algebra, Combinatorics and Number Theory

1:00 PM – 4:10 PM **Room 313, BCC**

1:00PM ► (1728) *Properties of Full-Flag Johnson Graphs.* **Irving Dai**, Harvard College (1096-05-1447)

1:15PM ► (1729) *Betweenness Centrality of Cycle Power Graphs.* **Bryan Tyler Ek**, Rochester Institute of Technology (1096-05-1840)

1:30PM ► (1730) *Chromatic Bounds for Orbital Chromatic Roots.* Preliminary report. **Dae Hyun Kim**, **Alex Mun**, California Institute of Technology, and **Mohamed Omar***, Harvey Mudd College (1096-05-2378)

1:45PM ► (1731) *Subtraction Adds Nothing: The Minimum Sized h-fold Span of m-sized Subsets of Cyclic Groups.* Preliminary report. **Ryan W Matzke**, Gettysburg College (1096-05-2001)

2:00PM ► (1732) *Trees of Irreducible Numerical Semigroups.* **Taryn Laird**, Northern Arizona University (1096-13-2611)

2:15PM ► (1733) *Classifying degree 12 2-adic fields with automorphism group of order 4.* **Chad Awtrey**, Elon University, **Brett Barkley**, University of Maryland, College Park, **Nicole Miles***, **Christopher Shill** and **Erin Strosnider**, Elon University (1096-11-1572)

2:30PM ► (1734) *Interpolating Legendre multiplier sequences.* **Fernando Quintino**, California State University of Fullerton (1096-00-1811)

2:45PM ► (1735) *Polygonal Numbers and Fermat's Last Theorem.* Preliminary report. **Aseem Mukund Bhagwat**, Indian Statistical Institute, Bangalore Center (1096-11-225)

3:00PM ► (1736) *On the Stability of Ring Structures in Direct Limits.* Preliminary report. **Nicolas Allen Smoot**, Armstrong Atlantic State University (1096-13-2247)

3:15PM ► (1737) *A Classification Theorem for Diophantine Monoids with Special Defining Matrices.* **Fulton L. Jackson II**, Metropolitan State University of Denver (1096-13-834)

3:30PM ► (1738) *Local Generic Formal Fibers of Excellent Rings.* **Sander Mack-Crane***, Case Western Reserve University, and **Samuel Tripp**, Williams College (1096-13-813)

3:45PM ► (1739) *K-potent Groebner bases and Sudoku.* Preliminary report. **Lacey Johnson*** and **Elizabeth Arnold**, James Madison University (1096-13-1755)

4:00PM ► (1740) *Families of Plane Cubic Curves with Nine-Pointic Contact at a Point.* **Taylor C. Brysiewicz***, Northern Illinois University, and **Leah Balay-Wilson**, Smith College (1096-14-1422)

MAA Session on Data, Modeling, and Computing in the Introductory Statistics Course

1:00 PM – 5:55 PM **Room 339, BCC**

Organizers: **Andrew Zieffler**, University of Minnesota
Scott Alberts, Truman State University
Randall Pruim, Calvin College

1:00PM ► (1741) *Data Visualization Using Minitab, Google Fusion Tables, and Tableau.* Preliminary report. **Sue B Schou**, Idaho State University (1096-D5-101)

1:20PM ► (1742) *Visualizing the Central Limit Theorem through Simulation.* **Eric Ruggieri**, College of the Holy Cross (1096-D5-2335)

1:40PM ► (1743) *P-Values Through Simulation.* **Julie A. Belock**, Salem State University (1096-D5-1612)

2:00PM ► (1744) *Toward a Conceptual Understanding of P-values: The Advantages and Challenges of Randomization-Based Inference.* **Catherine Case***, **Melanie Battles** and **Tim Jacobbe**, University of Florida (1096-D5-849)

2:20PM ► (1745) *Playing and Getting "Messy" with Data.* **Rodney X. Sturdivant***, The Ohio State University, **Shonda Kuiper**, Grinnell College, and **Kevin Cummiskey**, United States Military Academy, West Point (1096-D5-2305)

2:40PM ► (1746) *Designing Simulated Experiments in the Introductory Statistics Course.* **Shonda R Kuiper**, Grinnell College (1096-D5-2230)

3:00PM ► (1747) *Using an Ever-Growing Data Set in an Introductory Statistics Course.* **Sarah L. Mabrouk**, Framingham State University (1096-D5-2627)

3:20PM ► (1748) *Big Data in the Intro Stats Class: Use of the Airline Delays Dataset to Expose Students to a Real-World, Complex Dataset.* Preliminary report. **Nicholas J. Horton***, Amherst College, **Benjamin S. Baumer**, Smith College, and **Hadley Wickham**, Rice University and RStudio (1096-D5-1770)

3:40PM ► (1749) *Statistical Crowd Counting.* **Grant L Innerst*** and **Ben Galluzzo**, Shippensburg University (1096-D5-1671)

4:00PM ► (1750) *Using Genomics Data in Introduction to Probability and Statistics.* **Kimberly A Roth**, Juniata College (1096-D5-894)

4:20PM (1751) *Predicting Drug Resistance: Probability and Statistics Meet the Building Blocks of Proteins.*
Majid Masso, George Mason University (1096-D5-402)

4:40PM (1752) *Modeling – It's harder than you might think.* Preliminary report.
Patricia B Humphrey, Georgia Southern University (1096-D5-2427)

5:00PM (1753) *Against All Odds: Inside Statistics.*
Marsha J. Davis, Eastern Connecticut State University (1096-D5-2541)

5:20PM (1754) *Using Faculty Research as a Teaching Tool In Statistics.* Preliminary report.
Phong Le, Niagara University (1096-D5-1887)

5:40PM (1755) *A Semester Project for Introductory Statistics.*
Murray H. Siegel, Arizona State University (1096-D5-85)

MAA Session on Flipping the Classroom, II

1:00 PM – 5:55 PM **Room 337, BCC**

Organizers: **Krista Maxson**, Shawnee State University
Zsuzsanna Szaniszlo, Valparaiso University

1:00PM (1756) *Group Work & Modified Moore Method in Flipping Calculus 1.* Preliminary report.
Karen M. Bliss, Quinnipiac University (1096-E1-1238)

1:20PM (1757) f^{-1}(*Calculus I*) : *how and why I decided to flip the Calculus classroom.* Preliminary report.
Peter L Staab, Fitchburg State University (1096-E1-904)

1:40PM (1758) *Several Devices and Software for Creating Math Videos.*
Reza O. Abbasian* and **John T. Sieben**, Texas Lutheran University (1096-E1-333)

2:00PM (1759) *Implementing the ICE Framework in a Hybrid Mathematics Classroom.* Preliminary report.
James S Rolf*, **Yu-Wen Hsu**, **Matthew Croasmun** and **Jennifer Frederick**, Yale University (1096-E1-2469)

2:20PM (1760) *Flipped versus Traditional: Measuring Success through Performance and Perceptions.*
Steven Pon*, **Fabiana Cardetti** and **Konstantina Christodoulopoulou**, University of Connecticut (1096-E1-2178)

2:40PM (1761) *Flipping Intermediate Algebra.*
Jacqueline A Jensen-Vallin, Slippery Rock University (1096-E1-63)

3:00PM (1762) *More than just a video – flipping the classroom to improve student learning.* Preliminary report.
Edwin P Herman, University of Wisconsin-Stevens Point (1096-E1-2474)

3:20PM (1763) *Does Flipping a Calculus Class Really Work?* Preliminary report.
Katrina Palmer, Appalachian State University (1096-E1-55)

3:40PM (1764) *Flipping for the first time.* Preliminary report.
Cassie Williams, James Madison University (1096-E1-1977)

4:00PM (1765) *Flipping the Classroom in a Calculus I Class via Online Learning Modules.* Preliminary report.
J Alfredo Jimenez, Penn State Hazleton (1096-E1-2499)

4:20PM (1766) *Journey Into Flipping the Calculus I Classroom.* Preliminary report.
Nathan P Clements, University of Wyoming (1096-E1-2670)

4:40PM (1767) *A Flipped Classroom Study in Second and Third Semester Calculus.*
Ellie Kennedy, Northern Arizona University (1096-E1-2485)

5:00PM (1768) *A Hybrid Flipped Classroom to Better Serve the Under-Resourced Student.* Preliminary report.
Joseph Sheridan* and **Kerry M. Luse**, Trinity Washington University (1096-E1-1682)

5:20PM (1769) *The Mathematics Laboratory and Student Presentations in Pre-Calculus.*
Randall E Cone, Virginia Military Institute (1096-E1-1149)

5:40PM (1770) *Engaging College Algebra Students via the Flipped/Inquiry-Based Learning Approach in a 'Large' Classroom Setting.*
Perry Y.C. Lee, Kutztown University of Pennsylvania (1096-E1-1041)

MAA Session on Innovative and Effective Ways to Teach Linear Algebra, II

1:00 PM – 2:55 PM **Room 340, BCC**

Organizers: **David Strong**, Pepperdine University
Gilbert Strang, MIT
Megan Wawro, Virginia Tech

1:00PM (1771) *Row rank equals column rank : Three good proofs.*
Gilbert Strang, MIT (1096-F1-1536)

1:20PM (1772) *Preparing students for linear algebra concepts with pre-class work.*
Feryal Alayont, Grand Valley State University (1096-F1-2586)

1:40PM (1773) *Peer instruction in linear algebra.* Preliminary report.
Robert Talbert, Grand Valley State University (1096-F1-1579)

► 2:00PM (1774) *Teaching Linear Algebra with Clickers in three Worlds of Embodied, Symbolic and Formal Mathematical Thinking.* **John Hannah**, University of Canterbury, Christchurch, New Zealand, **Sepideh Stewart***, University of Oklahoma, Norman, and **Michael Thomas**, The University of Auckland, New Zealand (1096-F1-2148)

► 2:20PM (1775) *Putting Together the Puzzle: Understanding Linear Independence, Spanning, and Bases via Group Exploration.* **Teresa D Magnus**, Rivier University (1096-F1-2267)

► 2:40PM (1776) *Transforming Linear Algebra with GeoGebra.* Preliminary report. **James D. Factor*** and **Susan Pustejovsky**, Alverno College, Milwaukee, WI (1096-F1-2709)

MAA Session on Instructional Approaches to Increase Awareness of the Societal Value of Mathematics

1:00 PM – 3:35 PM **Room 341, BCC**

Organizers: **Jessica Deshler**, West Virginia University
Elizabeth Burroughs, Montana State University

► 1:00PM (1777) *Graph clustering for the high school classroom.* Preliminary report. **Emilie Hogan***, Pacific Northwest National Laboratory, and **Gabriela Radu**, STEM Teacher and Researcher Program (1096-F5-2545)

► 1:20PM (1778) *Examples on using material from a standard college algebra course to enhance students understanding of some social issues.* **A. S. Elkhader**, Northern State University (1096-F5-1454)

► 1:40PM (1779) *College Algebra or Economics of Being Green.* **Yevgeniy V. Galperin**, East Stroudsburg University (1096-F5-453)

► 2:00PM (1780) *A Service-Learning Approach to Mathematical Modeling.* **Olivia M. Carducci**, East Stroudsburg University (1096-F5-817)

► 2:20PM (1781) *Supporting Quantitative Literacy with Service-Learning: The Pitfalls and the Promise.* Preliminary report. **Victor I Piercey**, Ferris State University (1096-F5-1092)

► 2:40PM (1782) *Using Service-Learning to Connect a Quantitative Literacy Course to the Community.* Preliminary report. **Andrew J Miller**, Belmont University (1096-F5-1813)

► 3:00PM (1783) *Building a capstone course on the theme of the relevance of mathematics to society.* **Maritza M. Branker**, Niagara University (1096-F5-662)

► 3:20PM (1784) *Math in the City: connecting the classroom to the local community through mathematical modeling.* **Alexandra Seceleanu*** and **Kathryn (Katie) Haymaker**, University of Nebraska-Lincoln (1096-F5-1090)

MAA Session on Mathematics Experiences in Business, Industry, and Government, I

1:00 PM – 4:15 PM **Room 345, BCC**

Organizers: **Carla Martin**, James Madison University
Phil Gustafson, Mesa State University
Michael Monticino, University of North Texas

1:00PM (1785) *Optimal production- sales strategies for a company at changing market price.* **Ellina V Grigorieva***, Texas Woman's University, and **Evgenii N Khailov**, Moscow State University (1096-H1-857)

► 1:20PM (1786) *Modeling to Help Government & Military Decision Making.* Preliminary report. **William P. Fox**, Naval Postgraduate School (1096-H1-828)

► 1:40PM (1787) *Applied and Industrial Mathematics Program at the Virginia Military Institute.* Preliminary report. **John A. David**, Virginia Military Institute (1096-H1-1177)

► 2:00PM (1788) *Memory Efficient Lagged Fibonacci Random Number Generators for GPU Supercomputing.* **Tim Andersen***, **C Allen Butler**, Daniel H. Wagner Associates, Inc., and **Michael Mascagni**, Florida State University (1096-H1-468)

► 2:20PM (1789) *Modeling the Key and Keying the Model: Combining Automatic Item Generation with Automated Scoring.* **James H. Fife**, Educational Testing Service (1096-H1-1154)

► 2:40PM (1790) *Modeling the Diffusion of Manual Irrigation Pumps.* Preliminary report. **Carol Brown**, Seattle, WA, **Rachel R Roe-Dale***, Skidmore College, and **Mark Staton**, Western Washington University (1096-H1-1601)

3:00PM (1791) *A New Basis for Graph Partitioning: Standardizing the Interactions Matrix.* **Genevieve Brown*** and **Sean Lynch**, Department of Defense (1096-H1-2363)

► 3:20PM (1792) *Data Stranglehold or: How the Government Can Learn to Stop Worrying and Love Math.* **Charles Tannouri**, Government (1096-H1-2687)

3:40PM ► (1793) *Application of Cluster Analysis to the MAA Member Database.* Preliminary report.
Gregory E Coxson*, Radar Division, U.S. Naval Research Laboratory, and **Grant Izmirlian**, National Cancer Institute, National Institutes of Health (1096-H1-1247)

4:00PM ► (1794) *Clustering on the Power Grid.*
Eduardo Cotilla-Sanchez, Oregon State University, **Mahantesh Halappanavar** and **Emilie Hogan***, Pacific Northwest National Laboratory (1096-H1-2463)

MAA Session on Mathematics and Sports, I

1:00 PM – 5:55 PM **Room 338, BCC**

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

1:00PM ► (1795) *Are Umpires Racist?*
Jeff Hamrick, University of San Francisco (1096-G5-2719)

1:20PM ► (1796) *A Network Based Method for Ranking NBA Players.*
Milica Hadži-Tanović* and **Stephen Devlin**, University of San Francisco (1096-G5-2436)

1:40PM ► (1797) *Machine Learning in NBA and NCAA Basketball.* Preliminary report.
James T Snyder* and **John David**, Virginia Military Institute (1096-G5-2482)

2:00PM (1798) *A profitable adjustive rating system for NBA teams.*
Jonathan Sargent, RMIT University (1096-G5-2023)

2:20PM ► (1799) *openWAR: An Open Source System for Overall Player Performance in Major League Baseball.*
Ben S Baumer*, Smith College, **Shane T Jensen**, The Wharton School, University of Pennsylvania, and **Gregory J Matthews**, University of Massachusetts (1096-G5-1199)

2:40PM ► (1800) *Optimizing a Volleyball Serve.*
Daniel J. Lithio, Indiana University, **Timothy J. Pennings***, Davenport University, and **Eric M. Webb**, Indiana University (1096-G5-775)

3:00PM ► (1801) *Effective Driving on the PGA Tour.* Preliminary report.
Roland Minton, Roanoke College (1096-G5-2112)

3:20PM (1802) *Moving On Up: Advancing Through the Ranks in Baseball and Medicine.*
Rick Cleary*, Babson College, and **Fred Ledley**, Bentley University (1096-G5-1063)

3:40PM ► (1803) *A New Basketball Defensive Efficiency Metric.*
Jeffrey W Heath* and **Alexander L Cope**, Centre College (1096-G5-2628)

4:00PM ► (1804) *Survival Analysis of the Athletic Records.*
Reza D. Noubary, Bloomsburg University (1096-G5-1756)

4:20PM ► (1805) *How Math Can Lead You to Fantasy Football Glory.*
Dave I. Kennedy* and **Ben Galluzzo**, Shippensburg University (1096-G5-2172)

4:40PM ► (1806) *Sports Analytics with Elementary Math.*
Andrew B. Perry, Springfield College (1096-G5-2526)

5:00PM ► (1807) *American Football and an Unexpected Introduction into Upper Level Mathematics.*
Eric B. Kahn*, Bloomsburg University, and **Tricia M. Brown**, Armstrong Atlantic State University (1096-G5-414)

5:20PM ► (1808) *Ice Math: Related Rates and Pairs Figure Skating.*
Diana Cheng*, Towson University, and **Tetyana Berezovski**, Saint Joseph's University (1096-G5-82)

5:40PM ► (1809) *Predicting a Team's Winning Percentage Using (Run Scored – Runs Allowed).*
Stanley Rothman* and **Faggella**, Quinnipiac University (1096-G5-50)

MAA Session on Trends in Undergraduate Mathematical Biology Education, II

1:00 PM – 2:00 PM **Room 349, BCC**

Organizer: **Timothy Comar**, Benedictine University

1:00PM ► (1810) *Locally-relevant biological projects as a foundation for teaching an upper level undergraduate math course.*
Marilyn Brandt, Cener for Marine and Environmental Science and College of Science and Mathematics, University of the Virgin Islands, and **Robert Stolz***, University of the Virgin Islands (1096-N5-1530)

1:20PM ► (1811) *Mentoring Undergraduate Research in Mathematical Biology.*
Timothy D Comar, Benedictine University (1096-N5-426)

1:40PM ► (1812) *Undergraduate Research in Gene Regulatory Networks.*
Dan Hrozencik*, Chicago State University, and **Tim Comar**, Benedictine University (1096-N5-1950)

MAA Session on Using Online Resources to Augment the Traditional Classroom, II

1:00 PM – 4:30 PM **Room 350, BCC**

Organizers: **Mike May**, Saint Louis University
Paul Seeburger, Monroe Community College

1:00PM ► (1813) *A College Readiness Math MOOC: Online Resources for Remedial Mathematics.*
Jennifer Kosiak, **Bob Hoar***, **Robert Allen** and **Jim Sobota**, University of Wisconsin-La Crosse (1096-P5-2601)

1:20PM ► (1814) *How online teaching has made me a better face to face instructor.* **Amanda M Harsy Ramsay**, IUPUI (Indiana University Purdue University Indianapolis) (1096-P5-652)

1:40PM ► (1815) *An Online Smorgasbord for Future Elementary Teachers.* **J. Lyn Miller**, Sllippery Rock University (1096-P5-2587)

2:00PM ► (1816) *Using Videos to Enhance Preservice Teachers' Understanding of Mathematical Justification and Proof.* **Elizabeth B. Uptegrove**, Felician College (1096-P5-2506)

2:20PM ► (1817) *History Alive! Online Resources in a History of Mathematics Course.* **Revathi Narasimhan**, Kean University (1096-P5-388)

2:40PM (1818) *Augmenting the Classroom with Web-Based Interactive Demonstrations.* **James P. Howard, II**, University of Maryland University College (1096-P5-380)

3:00PM ► (1819) *Solving Applications in Business, Life Sciences, and Transportation using Excel and Java Applets.* **Vesna Kilibarda**, Indiana University Northwest (1096-P5-570)

3:20PM (1820) *Working in a Laptop Classroom: Wolfram Alpha, WeBWorK Reading Quizzes, Google Help, and Modeling Data from the Web.* **Mike May**, Saint Louis University (1096-P5-579)

3:40PM Open discussion of using the internet to augment traditional classroom teaching.

MAA General Contributed Paper Session on Modeling and Applications of Mathematics, II

1:00 PM – 5:55 PM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

1:00PM (1821) *A Physiologically-Based Pharmacokinetic Model for Ertapenem.* **Whitney Leeann Forbes*** and **Michele Joyner**, East Tennessee State University (1096-VG-1974)

1:15PM ► (1822) *A Mathematical Model of Laser-Initiated Immunotherapy of Cancer.* **Bryan Alexander Dawkins*** and **Sean Michael Laverty**, University of Central Oklahoma (1096-VG-1962)

1:30PM ► (1823) *Effects of Synaptic Plasticity on Phase and Period Locking of a Network of Two Oscillatory Neurons.* **Zeynep Akcay***, **Amitabha Bose** and **Farzan Nadim**, New Jersey Institute of Technology (1096-VG-1921)

1:45PM (1824) *The Dynamics of Bone Turnover.* **Jason M Graham***, University of Scranton, **Bruce P Ayati**, **Sarah A Holstein** and **James A Martin**, University of Iowa (1096-VG-1795)

2:00PM ► (1825) *Mathematical Modeling of Fetal Electrocardiograms.* **Kiersten Utsey***, Carroll College, **Samuel Estes**, University of Tennessee-Knoxville, **Erick Kalobwe**, LeMoyne-Owen College, **Heather Finotti** and **Xiaopeng Zhao**, National Institute for Mathematical and Biological Synthesis (1096-VG-1283)

2:15PM ► (1826) *Multi-bond models of platelet adhesion.* **Tyler Skorczewski**, University of Utah (1096-VG-1227)

2:30PM ► (1827) *The role of avian stage-structure in the transmission of West Nile virus.* **Suzanne Robertson***, Virginia Commonwealth University, and **Kevin Caillouet**, St. Tammany Mosquito Abatement District (1096-VG-1218)

2:45PM ► (1828) *Elastic Network Model Extensions for Predicting Protein Residue-level Fluctuation.* Preliminary report. **Junkoo Park**, Houghton College (1096-VG-944)

3:00PM ► (1829) *The Tumors Cell Density and Immune Response System: A Mathematical Model.* **Sanjeev Kumar**, Dr. B.R. Ambedkar University, Agra (1096-VG-44)

3:15PM ► (1830) *Spatial Distribution of Calcium-Gated Chloride Channels in Olfactory Cilia.* **Dorjsuren Badamdorj**, Tennessee State University (1096-VG-433)

3:30PM ► (1831) *Modeling epidemics using differential equations.* Preliminary report. **Ghan S Bhatt***, **Ross Beckley**, **Cametria Weatherspoon**, **Michael Alexander**, Tennessee State University, **Anthony Johnson**, Philander Smith College, and **Marissa Chandler**, Tennessee State University (1096-VG-942)

3:45PM ► (1832) *The Schedule Effect: can recurrent peak infections be reduced without vaccines, quarantines or school closings?* **Danilo R. Diedrichs***, **Paul A. Isihara** and **Doeke D. Buursma**, Wheaton College (1096-VG-1794)

4:00PM ► (1833) *Stochastic Models for Population Dynamics.* Preliminary report. **Lochana Siriwardena**, Southern Illinois University Carbondale (1096-VG-1888)

4:15PM ► (1834) *Asymmetric population structure alters the molecular clock.* Preliminary report. **Benjamin Allen**, **Yulia Dementieva**, **Ruben Medeiros**, **Christopher Paoletti** and **Christine Sample***, Emmanuel College (1096-VG-2308)

4:30PM ► (1835) *Extensions to the Daley-Kendall model.* Preliminary report. **Ariel Cintron-Arias**, East Tennessee State University (1096-VG-2573)

4:45PM ► (1836) *A new application of the two-group competition model.* Preliminary report. **Alyssa Miller** and **Haley A Yaple***, Carthage College (1096-VG-2583)

5:00PM (1837) *Stability and bifurcation of a three dimensional Ricker model.* **Muna Khaled Khaleel Abu Alhalawa***, **Henrique Olivera**, Technical university of Lisbon, and **Saber Elaydi**, Trinity University (1096-VG-2368)

5:15PM ► (1838) *Numerical analysis of delay equations.* Preliminary report. **Felicia Maria G Magpantay**, University of Michigan (1096-VG-1658)

5:30PM (1839) *A Stochastic Simulation Model for Anelosimus studiosus during Prey Capture.* **Michele L Joyner***, **Chelsea R Ross**, **Colton Watts** and **Thomas C Jones**, East Tennessee State University (1096-VG-359)

5:45PM ► (1840) *New Paradigms for Collaborative Undergraduate Research in Biomathematics.* **Erin Bodine**, Rhodes College, and **Anne Yust***, Birmingham-Southern College (1096-VG-2763)

MAA General Contributed Paper Session on Research in Analysis

1:00 PM – 2:40 PM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

1:00PM ► (1841) *A fresh look at some very old formulas for pi.* **Thomas J Osler**, Rowan University (1096-VK-840)

1:15PM (1842) *Rates of Uniform Convergence for Riemann Integrals.* **J. Alan Alewine**, McKendree University (1096-VK-1022)

1:30PM (1843) *A Leibniz Test.* **Gabriel T Prajitura**, College at Brockport, State University of New York (1096-VK-2213)

1:45PM ► (1844) *On a Geometric Power Series.* **Hong Biao Zeng*** and **Mohammad Riazi-Kermani**, Fort Hays State University (1096-VK-1229)

2:00PM ► (1845) *Connecting Orbits of Complex Analytic Maps.* **Haripriya Chakraborty***, University of Delaware., and **Jason D. Mireles-James**, Rutgers University (1096-VK-1952)

2:15PM ► (1846) *On the Classification of W-Measurably Sensitive Actions.* Preliminary report. **Francisc Bozgan**, University of California, Los Angeles, **Anthony Sanchez***, Arizona State University, **Cesar Silva**, **David Stevens**, Williams College, and **Jane Wang**, Princeton Univeristy (1096-VK-2006)

2:30PM ► (1847) *Multiplication Operators on S^2.* Preliminary report. **Robert F. Allen***, University of Wisconsin-La Crosse, **Katherine C. Heller** and **Matthew A. Pons**, North Central College (1096-VK-2523)

MAA General Contributed Paper Session on Research in Applied Mathematics, II

1:00 PM – 5:40 PM **Room 347, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

1:00PM ► (1848) *Effect of general conductivities in Magneto Rotational Instability.* Preliminary report. **Pablo U Suarez**, Delaware State University (1096-VL-349)

1:15PM ► (1849) *FOURFUN: a new system for automatic computations using Fourier expansions.* Preliminary report. **Kristyn N. McLeod*** and **Rodrigo Platte**, Arizona State University (1096-VL-2636)

1:30PM ► (1850) *Reconstruction of functions from Fourier data using Gaussian based approximations.* Preliminary report. **Ian D Neufer*** and **Rodrigo B Platte**, Arizona State University (1096-VL-2542)

1:45PM ► (1851) *Cluster computing to visualize sound and engineer effective metrics of space and time.* **Stephen H. Harnish**, Bluffton University (1096-VL-2445)

2:00PM (1852) *A new method for Stability Analysis of Discrete time Recurrent Neural Networks.* **Jayant Singh**, North Dakota State University (1096-VL-475)

2:15PM ► (1853) *Graph Partitioning Algorithms for Load Balancing on Massively Parallel Computers.* **Kent William Ehrlich*** and **Eric Kostelich**, Arizona State University (1096-VL-2713)

2:30PM (1854) *Numerical Method for Optimization Problems Governed by Hyperbolic Systems of Conservation Laws.* **Michael Herty**, RWTH Aachen University, **Alexander Kurganov** and **Dmitry Kurochkin***, Tulane University (1096-VL-2693)

2:45PM (1855) *The compatibility of slender bodies and surface traction at low Reynolds number.* **Eva Marie Strawbridge***, James Madison University, and **Charles Wolgemuth**, University of Arizona (1096-VL-1733)

3:00PM (1856) *Double Wronskian Solutions for a Generalized (2+1)-Dimensional Boussinesq System with Variable Coefficients.* **Alrazi M Abdeljabbar**, Savannah State University (1096-VL-2635)

3:15PM (1857) *Chimera states on periodic spaces.* **Mark J Panaggio*** and **Daniel M Abrams**, Northwestern University (1096-VL-1634)

3:30PM ► (1858) *Sliding Singularity's of Two-Dimensional Invertible Piecewise Isometries.* **Jonathan Sullivan*** and **Miguel Cuadros**, University of North Texas at Dallas (1096-VL-2396)

3:45PM (1859) *Elliptic solutions of a coupled nonlinear Schrödinger system.* **Otis C. Wright, III**, Cedarville University (1096-VL-1215)

4:00PM (1860) *Model-based Sketching and Recovery with Expanders.* **Bubacarr Bah***, **Luca Baldassarre** and **Cevher Volkan**, Ecole Polytechnique Federale de Lausanne (EPFL) (1096-VL-2390)

4:15PM (1861) *Reduced uncertainty by targeting observations with the Kalman filter.* **Thomas Bellsky**, Arizona State University (1096-VL-1071)

4:30PM (1862) *A Modified Weak Galerkin Finite Element Method.* **Nolisa S. Malluwawadu***, **Xiaoshen Wang**, **F Gao** and **Thomas C. McMillan**, University of Arkansas at Little Rock (1096-VL-2174)

4:45PM ► (1863) *Stability Analysis of Non-Newtonian Rimming Flow.* **Ravi Shankar***, Department of Chemistry, UC Davis, **Peter Haine**, Massachusetts Institute of Technology, **Abigail Gartrell**, University of Maryland, College Park, **Alberto Mojica**, **Nathan Loker** and **Sergei Fomin**, CSU Chico (1096-VL-619)

5:00PM ► (1864) *Peixoto's Structural Stability Theorem: The One-dimensional Version.* **Aminur Rahman**, New Jersey Institute of Technology (1096-VL-2135)

5:15PM (1865) *A Restarted Homotopy Method for the Nonsymmetric Eigenvalue Problem.* **Brandon J Hutchison***, University of Arkansas Fort Smith, and **Mark Arnold**, University of Arkansas (1096-VL-387)

5:30PM ► (1866) *Applying the Eigendecomposition Pseudospectral Method to Wave Propagation Problems.* **Daniel Patrick Howard***, University of Wisconsin-Madison, and **Keith J Wojciechowski**, University of Wisconsin-Stout (1096-VL-2018)

SIAM Minisymposium on Frontiers in Geomathematics

1:00 PM – 6:25 PM **Room 325, BCC**

Organizers: **Willi Freeden**, University of Kaiserslauten

Zuhair Nashed, University of Central Florida

1:00PM (1867) *Multiscale Regularization in Seismic Tomography.* **Willi Freeden**, Geomathematics Group, University of Kaiserslautern (1096-31-1053)

1:30PM (1868) *Multiplicative frames for dimension reduction in reactive sensing.* Preliminary report. **John J Benedetto*** and **Wojciech Czaja**, Norbert Wiener Center/University of Maryland (1096-42-1006)

2:00PM ► (1869) *Planetary potential-field inversion from vectorial data: Using Slepian functions for varying satellite altitude.* **Alain Plattner*** and **Frederik J. Simons**, Princeton University (1096-86-1401)

2:30PM (1870) *A multiscale spline approach for the tensorial satellite gravity gradiometry problem.* **Helga Nutz**, University of Kaiserslautern (1096-65-1114)

3:00PM (1871) *Moment Discretization of Ill-Posed Problems.* **M Zuhair Nashed**, University of Central Florida (1096-65-2426)

3:30PM (1872) *Fusion of spatial and spectral features in hyperspectral imagery.* Preliminary report. **John J. Benedetto**, University of Maryland College Park, **Wojciech Czaja***, **Timothy Doster**, University of Maryland College Park, and **Martin Ehler**, University of Vienna, Austria (1096-43-1469)

4:00PM (1873) *Convergence of the ensemble Kalman filter in the large sample limit and in high and infinite dimension.* **Jan Mandel***, University of Colorado Denver, **Jonathan D. Beezley**, CERFACS and Meteo France, Toulouse, France, **Loren Cobb** and **Evan Kwiatkowski**, University of Colorado Denver (1096-62-2481)

4:30PM (1874) *Experimental evaluation of lattice reduction methods for discrete tomography.* **Peiliang Xu**, Disaster Prevention Research Institute, Kyoto University (1096-86-1116)

5:00PM ► (1875) *Mapping ice mass loss on Greenland and Antarctica, in space and time.* **Christopher Harig*** and **Frederik J. Simons**, Princeton University (1096-86-1399)

5:30PM (1876) *Fast Multipole Accelerated Multiscale Analysis on the Sphere.*
Martin Gutting, University of Siegen (1096-65-2297)

6:00PM ► (1877) *Optimized kernels for the combination of global and local data on different spheres.*
Christian Gerhards, University of Kaiserslautern (1096-41-1644)

NAM Granville-Brown-Haynes Session of Presentations by Recent Doctoral Recipients in the Mathematical Sciences

1:00 PM – 2:50 PM **Room 326, BCC**

Organizer: **Dawn Lott**

1:00PM ► (1878) *A Mixed Finite Element Method for Helmholtz Transmission Eigenvalues.*
Tiara D. Turner*, University of Maryland Eastern Shore, **Jiguang Sun**, Michigan Technological University, and **Xia Ji**, Chinese Academy of Sciences (1096-65-1046)

1:30PM (1879) *Mathematical Modeling of Adaptive Immune Regulation.*
Shelby N. Wilson, Morehouse College (1096-92-2085)

2:00PM ► (1880) *Sparse Monge Matrices Arising from Scheduling Problems.*
Charles N Glover*, Booz Allen Hamilton, and **Michael O. Ball**, University of Maryland (1096-90-2242)

2:30PM (1881) *The Enumeration of Dumont Permutation Containing Pattern 231 Exactly Once.*
Chinenye Ofodile, Albany State University (1096-05-2564)

MAA Panel Discussion

1:00 PM – 2:20 PM **Room 316, BCC**

Interactive dynamic technology: Its role in teaching and learning calculus.

Organizer: **Gail Burrill**, Michigan State University

Panelists: **Tom Dick**, Oregon State University
Wade Ellis, West Valley Community College
Steven Kokoska, Bloomsburg University
Gail Burrill

MAA Session for Chairs

1:00 PM – 2:20 PM **Room 327, BCC**

Planning for the future with new curriculum guides.

Organizers: **Catherine Murphy**, Purdue University Calumet
Daniel Maki, Indiana University Bloomington

Presenters: **Martha Siegel**, Towson University
William McCallum, University of Arizona
Christine Franklin, University of Georgia

AMS Session on Undergraduate Research in Applied Mathematics

1:15 PM – 4:10 PM **Room 312, BCC**

1:15PM ► (1882) *Agent-based Modeling of Pandemic Influenza.* Preliminary report.
Anna Mummert*, **Roger Estep**, **Robert Hughes**, Marshall University, and **Jessica Shiltz**, Marshall University, Biological Sciences (1096-92-814)

1:30PM ► (1883) *De Bruijn Graph Analysis of Transposable Elements in DNA.*
Neal Williams, Arizona State University (1096-92-2320)

1:45PM ► (1884) *Identification Problem in Pharmacokinetic-Pharmacodynamic Model for Treatment of Type II Diabetes Mellitus Using Metformin.*
Kowan T O'Keefe* and **Narayan Thapa**, Minot State University (1096-34-999)

2:00PM ► (1885) *A perturbation approach to approximate extinction time in ecological systems due to harsh conditions.* Preliminary report.
Matthew V. Cattivera*, **Seth D. Haney** and **Adam Siepielski**, University of San Diego (1096-92-2525)

2:15PM ► (1886) *Novel Approach for Evaluating Phases and Orientations of Polycrystalline Structures.* Preliminary report.
Bridget K Toomey*, University of Miami, **Chen Dan Dong**, Massachusetts Institute of Technology, **Xuchen Han**, Northwestern University, and **Verne Edward**, University of Arkansas (1096-82-1331)

2:30PM ► (1887) *Bar Code Localization in Images Using Neural Network and Linear Discriminant Analysis Frameworks.*
Dung T. Nguyen*, Bard College, **Mikaela Cashman**, Coe College, **Keenan Hawekotte**, Nebraska Wesleyan University, and **Elizabeth Newman**, Haverford College (1096-90-2651)

2:45PM ► (1888) *Improving conditioning for the electrochemical impedance spectroscopy inverse problem.*
Jakob Hansen, Arizona State University (1096-65-1870)

3:00PM ► (1889) *Dynamic models for the default risk of interbanking networks.* Preliminary report.
Mihnea Stefan Andrei, Worcester Polytechnic Institute (1096-60-508)

3:15PM ► (1890) *Modeling and Analysis of Strategies in the Symmetric and Asymmtric El Farol Problem.* Preliminary report.
Weicheng Ye, Stony Brook University (1096-91-1718)

3:30PM *Upset-downset.* Preliminary report.
► (1891) **Tim Hsu** and **Charles Petersen***, San Jose State University (1096-91-2303)

3:45PM *Music Genomics: Applying Seriation*
► (1892) *Algorithms to Billboard #1 Hits.*
Crista Arangala and **Nakhila Mistry***, Elon University (1096-15-815)

4:00PM *Cancer Screening Using Biomimetic*
► (1893) *Pattern Recognition with Hyper-Dimensional Planar Structures.*
Leonila Lagunes* and **Charles H Lee**, California State University-Fullerton (1096-92-2706)

ASL Invited Address

2:00 PM – 2:50 PM **Room 319, BCC**

► (1894) *Formal verification, interactive theorem proving, and automated reasoning.*
Jeremy Avigad, Departments of Philosophy and Mathematical Sciences, Carnegie Mellon University (1096-03-110)

Presentations by MAA Teaching Award Recipients

2:30 PM – 3:50 PM **Room 308, BCC**

2:30PM *Does Technology Help Students?*
► (1895) **Andrew G Bennett**, Kansas State University (1096-A0-2078)

3:00PM *Teaching as Capacity Building.*
► (1896) Preliminary report.
Carl W. Lee, University of Kentucky (1096-A0-2083)

3:30PM *Some thoughts about teaching in the*
► (1897) *presence of technology and life.*
Gavin LaRose, University of Michigan (1096-A0-956)

AMS Committee on Science Policy-AMS Committee on Education Panel Discussion

2:30 PM – 4:00 PM **Room 336, BCC**

The public face of mathematics.

Moderator: **Arthur Benjamin**, Harvey Mudd College

Panelists: **Keith Devlin**, Stanford University

Cathy O'Neill, Johnson Research Labs

Tom Siegfried, Freelance Journalist

Steve Strogatz, Cornell University

MAA Panel Discussion

2:35 PM – 3:50 PM **Room 316, BCC**

Designing and implementing a problem-based mathematics course.

Organizer: **Gail Burrill**, Michigan State University

Panelists: **Darryl Young**, Harvey Mudd College

Bowen Kerins, Educational Devlopment Center

Mary Pilgrim, Colorado State University

College Board-MAA Mutual Concerns Committee Panel Discussion

2:35 PM – 3:55 PM **Room 327, BCC**

The changing face of calculus at the university level.

Organizer: **David M. Bressoud**, Macalester College

Panelists: **Larissa Schroeder**, University of Hartford

Angela Kubena, University of Michigan

Elgin Johnston, Iowa State University

Mariah Birgen, Wartburg College

MAA General Contributed Paper Session on Assorted Topics, I

2:45 PM – 5:40 PM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University

Bem Cayco, San Jose State University

Kimberly Presser, Shippensburge University

2:45PM *Airport Simulation and Optimization of*
► (1898) *Passenger Flow using Arena.* Preliminary report.
Scott A Rega, Indiana University of PA (1096-VR-2539)

3:00PM *Modifications of Watershed Segmentation*
(1899) *in Digital Image Processing.*
Jonathan R Wayland, Indiana University of Pennsylvania (1096-VR-2536)

3:15PM *Image Enhancement Algorithm for*
► (1900) *Under-Water Images.*
Anthony F. Filiziani, Indiana University of Pennsylvania (1096-VR-2192)

3:30PM *Office Management: A Markov Model.*
► (1901) **David S. Torain, II**, Hampton University (1096-VR-1955)

3:45PM *Using Boundary Following Algorithms to*
► (1902) *Identify User-Defined Mountain Bike Trails in Topographic Map Images.*
Jeremy J Yagle, Indiana University of Pennsylvania (1096-VR-1552)

4:00PM *Connecting Pairwise and Multistage*
► (1903) *Election Outcomes.*
Mari Castle*, Kennesaw State University, and **Victoria Powers**, Emory University (1096-VR-1434)

4:15PM ► (1904) *Proving Special Cases using Alternate Methods.* Preliminary report.
Robert M. Sulman, S.U.N.Y. College at Oneonta (1096-VR-2177)

4:30PM (1905) *Using Circuits to Teach Truth Tables: Making the Math Real.*
Jenna Price Carpenter, Louisiana Tech University (1096-VR-2098)

4:45PM ► (1906) *Integrating Calculus and Residence Life: Does living with calculus help students learn calculus?*
Suraj Uttamchandani, SUNY Geneseo (1096-VR-1796)

5:00PM ► (1907) *Turn Off Machines: Turn On Minds!*
Padraig M. McLoughlin, Kutztown University of Pennsylvania (1096-VR-839)

5:15PM ► (1908) *Arithmetic algorithms taught in schools.* Preliminary report.
Patricia Baggett*, New Mexico State University, and **Andrzej Ehrenfeucht**, University of Colorado (1096-VR-252)

5:30PM ► (1909) *Flexible Option for Developmental Mathematics.*
Susan E Thompson, Otterbein University (1096-VR-1204)

MAA Session on Open Source Mathematics Textbooks, II

3:00 PM – 4:55 PM **Room 349, BCC**

Organizers: **Albert Schueller**, Whitman College
Kent Morrison, American Institute of Mathematics

3:00PM ► (1910) *How to write LaTeX that can be converted to various formats.* Preliminary report.
David W. Farmer, American Institute of Mathematics (1096-H5-624)

3:20PM ► (1911) *You say tomato and I say tomato....*
Joe Fields, Southern Connecticut State University (1096-H5-2640)

3:40PM ► (1912) *Accessibility and Open Source.*
D Scott Dillery, Lindsey Wilson College (1096-H5-2229)

4:00PM (1913) *Open online homework and courses to support open textbooks.*
David Lippman, Pierce College Ft Steilacoom (1096-H5-350)

4:20PM ► (1914) *OER blended model.*
Nathan Friess*, Lyryx Learning, **Claude Laflamme** and **Robert Woodrow**, University of Calgary (1096-H5-1155)

4:40PM ► (1915) *What a Difference 30 Years Makes! - Adventures in Mathematics Textbook Publishing.*
Ken Levasseur, University of Massachusetts Lowell (1096-H5-81)

ASL Contributed Paper Session, I

3:00 PM – 4:50 PM **Room 319, BCC**

3:00PM ► (1916) *The modal logic of Reverse Mathematics.* Preliminary report.
Carl Mummert*, **Alaeddine Saadaoui** and **Sean Sovine**, Marshall University (1096-03-1603)

3:30PM (1917) *Forking in Abstract Elementary Classes.*
Will Boney* and **Rami Grossberg**, Carnegie Mellon University (1096-03-963)

4:00PM (1918) *Combinatory inhabitants of $R_{\rightarrow}$ theorems extracted from sequent calculus proofs.*
Katalin Bimbó*, University of Alberta, Department of Philosophy, and **J. Michael Dunn**, School of Informatics and Computing, Indiana University (1096-03-1363)

4:30PM ► (1919) *Tarski in Poland: new translations and background.*
James T Smith, San Francisco State University (1096-01-973)

MAA Minicourse #3: Part B

3:30 PM – 5:30 PM **Room 342, BCC**

Improvisation for the mathematics classroom.
Presenter: **Andrea Young**, Ripon College

MAA Minicourse #7: Part B

3:30 PM – 5:30 PM **Stadium Ballrooms 4 & 5, 2nd Floor, Marriott Inner Harbor**

Mathematics and dance.
Presenter: **Karl Schaffer**, De Anza College

MAA Minicourse: #11: Part B

3:30 PM – 5:30 PM **Room 343, BCC**

Public and private-key cryptography.
Presenters: **Chris Christensen**, Northern Kentucky University
Jeffrey Ehme, Spelman College

AMS-MAA-SIAM Joint Panel Discussion

4:15 PM – 6:00 PM **Room 336, BCC**

Transforming post-secondary mathematics education.
Organizers: **Eric M. Friedlander**, University of Southern California
Mark L. Green, University of California, Los Angeles
Phillip A. Griffiths, Institute for Advanced Study

Tara Holm, Cornell University
Uri Treisman, University of Texas at Austin
Moderator: **Phillip A. Griffiths**, Institute for Advanced Study
Panelists: **Michele Cahill**, Carnegie Corporation of New York
Joan Leitzel, University of New Hampshire
William (Brit) E. Kirwan, University System of Maryland

AMS Congressional Fellowship Session

4:30 PM – 6:00 PM **Room 324, BCC**

Organizer: **Samuel M. Rankin III**, AMS
Presenter: **Karen Saxe**, AMS Congressional Fellow 2013-14

MAA Student Poster Session

4:30 PM – 5:30 PM **Exhibit Hall G, 100 Level, BCC**

Organizer: **Joyati Debnath**, Winona State University

MAA Special Presentation: Poetry Reading

4:30 PM – 6:30 PM **Room 308, BCC**

All mathematical poets and those interested in mathematical poetry are invited.

Organizers: **Gizem Karaali**, Pomona College
Mark Huber, Claremont McKenna College
JoAnne Growney, poetrywithmathematics.blogspot.com

SIGMAA on Mathematics Instruction Using the Web Business Meeting, Reception, and Guest Lecture

5:00 PM – 6:20 PM **Room 350, BCC**

5:00PM Business Meeting and Reception; talk to immediately follow at 5:30 p.m.
(1920) *Mobile math apps.*
Doug Ensley, Shippensburg University (1096-A0-61)

MAA Panel Discussion

5:00 PM – 7:00 PM **Room 327, BCC**

Actuarial science education session for faculty.

Organizers: **Kevin Charlwood**, Washburn University
Bettye Anne Case, Florida State University
Robert Buck, Slippery Rock University
Steve Paris, Florida State University
Panelists: **Steven Armstrong**, Plymouth Rock Management Company
Patrick Brewer, Lebanon Valley College
Jim Daniel, University of Texas at Austin
Michelle Guan, Indaian University Northwest
Stuart Klugman, Society of Actuaries

AWM Workshop Poster Presentations and Reception

6:00 PM – 7:15 PM **Pratt Street Lobby, 300 Level, BCC**

Organizers: **Maria Basterra**, University of New Hampshire
Erin Chambers, Saint Louis University
Kathryn Leonard, California State University Channel Islands

6:00PM (1921) *On decay properties of solutions to the IVP for the Benjamin-Ono equation.*
Cynthia V. Flores, University of California - Santa Barbara (1096-35-90)

► 6:00PM (1922) *Stability of Eigenvalues of Quantum Graphs.*
Tracy Weyand* and **Gregory Berkolaiko**, Texas A&M University (1096-34-133)

6:00PM (1923) *Ginzburg-Landau Vortices on Manifolds.*
Ko-Shin Chen, Indiana University, Bloomington (1096-35-155)

6:00PM (1924) *Finite generation behaves differently in negative cohomology.*
Van C. Nguyen, Texas A&M University, College Station, Texas (1096-18-162)

6:00PM (1925) *Bilinear pseudodifferential operators with symbols in Besov spaces.* Preliminary report.
Jodi Herbert* and **Virginia Naibo**, Kansas State University (1096-42-180)

6:00PM (1926) *Uncoupling Groundwater-Surface Water Flow Using Partitioned Methods.*
Michaela J. Kubacki, University of Pittsburgh (1096-65-189)

6:00PM (1927) *Elliptic curve discriminant twins.*
Alyson Deines* and **Ben Lundell**, University of Washington (1096-11-193)

► 6:00PM (1928) *The Design of Non-redundant Directional Wavelet Filter Bank Using 1-D Neville Filters.* Preliminary report.
Youngmi Hur and **Fang Zheng***, Johns Hopkins University (1096-14-247)

6:00PM (1929) *Uniqueness of extremizers for an endpoint inequality of the k-plane transform.*
Taryn C Flock, UC Berkeley (1096-44-262)

6:00PM (1930) *Positive-Definite Quaternary Quadratic Forms Over* $\mathbb{Q}(\sqrt{5})$.
Katherine Thompson, University of Georgia (1096-11-264)

► 6:00PM (1931) *Heart Rate and EEG modeling during labor: predicting fetal distress.* Preliminary report.
Aisha Najera Chesler*, Claremont Graduate University, and **Ami E Radunskaya**, Pomona College (1096-37-268)

► 6:00PM (1932) *Cyclic permutations realized by the signed shift.*
Kassie Archer* and **Sergi Elizalde**, Dartmouth College (1096-05-280)

6:00PM (1933) *Well-posedness and decay of energy for Mindlin-Timoshenko plate equations.*
Pei Pei, University of Nebraska-Lincoln (1096-35-289)

6:00PM (1934) *Corona and cluster value problem in infinite-dimensional spaces.*
Sofia Ortega Castillo* and **William B. Johnson**, Texas A&M University (1096-46-322)

6:00PM (1935) *Pointwise asymptotic behavior of modulated periodic reaction-diffusion waves.*
Soyeun Jung, Indiana University-Bloomington (1096-35-367)

6:00PM (1936) *Spatio-temporal sampling schemes in evolutionary systems.*
Jacqueline Davis, Vanderbilt University (1096-42-543)

► 6:00PM (1937) *Image estimation using optimal filters.* Preliminary report.
Viktoria Taroudaki*, AMSC Program, University of Maryland, and **Dianne P. O'Leary**, University of Maryland (1096-15-915)

► 6:00PM (1938) *Structured LDPC codes for flash memory.*
Kathryn A Haymaker, University of Nebraska-Lincoln (1096-94-926)

6:00PM (1939) *Genus 3 algebraic curves.*
Lubjana Beshaj, Oakland University (1096-14-927)

► 6:00PM (1940) *User-Aided Space Transformation of Color Images for Improved Edge Detection.* Preliminary report.
Brianna R Cash*, University of Maryland, College Park, and **Dianne O'Leary**, Department of Computer Science and Institute for Advanced Computer Studies (UMIACS), University of Maryland, College Par (1096-65-1131)

SIGMAA on Quantitative Literacy Business Meeting

6:00 PM – 7:30 PM **Room 339, BCC**

AMS Mathematical Reviews Reception

6:00 PM – 7:00 PM **Ruth, 1st Floor, Hilton**

SIGMAA on Business, Industry, and Government and SIGMAA on the History of Mathematics Guest Lecture

6:30 PM – 7:30 PM **Room 307, BCC**

6:00PM Business Meeting; lecture to immediately follow at 6:30 p.m.

(1941) *Eureka! The Archimedes Palimpsest.*
William Noel, University of Pennsylvania (1096-A0-60)

MAA Special Dramatic Presentation

7:30 PM – 8:30 PM **Holiday Ballrooms 1–3, 2nd Floor, Hilton**

Mathematically Bent Theater.

Presenter: **Colin Adams and the Mobiusbandaid Players**

MAA Committee on the Undergraduate Program in Mathematics Discussion Session

7:30 PM – 9:00 PM **Room 347, BCC**

Course Area Reports (broad umbrella definitions): Abstract Algebra; Geometry; Transitions to Proofs; Probability and Statistics

MAA Committee on the Undergraduate Program in Mathematics Discussion Session

7:30 PM – 9:00 PM **Room 348, BCC**

Course Area Reports (broad umbrella definitions): Linear Algebra; Differential Equations; Real and Complex Analysis; Mathematical Modeling

MAA Committee on the Undergraduate Program in Mathematics Discussion Session

7:30 PM – 9:00 PM **Room 346, BCC**

Program Area Reports (concentrations, double majors, minors, integrated majors): Financial Math and Actuarial Science; Statistics; Computing; Mathematical Programming; Applied Math

Organizers: **Carol Schumacher**, Kenyon College

Martha Siegel, Towson University

MAA Committee on the Undergraduate Program in Mathematics Discussion

7:30 PM – 9:00 PM **Room 345, BCC**

Program Area Reports (concentrations, double majors, minors, integrated majors): Teacher Education; Biomathematics and Environmental Science; Operations Research; Engineering

Organizers: **Carol Schumacher**, Kenyon College
Martha Siegel, Towson University

SIGMAA on Mathematics in Business, Industry, and Government, and SIGMAA on the History of Mathematics Joint Reception

7:30 PM – 8:00 PM **Room 310, BCC**

NAM Cox-Talbot Address

7:45 PM – 8:35 PM **Holiday Ballroom 6, 2nd Floor, Hilton**

(1942) *Solving our human problems.*
Nathaniel Dean, Texas State University, San Marcos

SIGMAA on Business, Industry, and Government Business Meeting

8:00 PM – 9:00 PM **Room 310, BCC**

Project NExT Reception

8:00 PM – 10:00 PM **Stadium Ballroom 1,2, & 3, 2nd Floor, Marriott Inner Harbor**

All Project NExT Fellows, consultants, and other friends of Project NExT are invited.

Organizers: **Julia Barnes**, Western Carolina University
Judith Covington, Louisiana State University Shreveport
Matthew DeLong, Taylor University
Aparna W. Higgins, University of Dayton

Saturday, January 18

Joint Meetings Registration

7:30 AM – 2:00 PM **Pratt Street Lobby, 300 Level, BCC**

AMS-AWM Special Session on Geometric Applications of Algebraic Combinatorics, III

7:30 AM – 10:50 AM **Room 318, BCC**

Organizers: **Elizabeth Beazley**, Haverford College
Kristina Garrett, St. Olaf College

7:30AM (1943) *A q-analog of the partition algebra.* Preliminary report.
Tom Halverson*, Macalester College, **Arun Ram**, University of Melbourne, and **Nathaniel Thiem**, University of Colorado, Boulder (1096-05-1408)

8:00AM (1944) *Crosshatch permutations.*
Gregory S. Warrington, University of Vermont (1096-05-2216)

8:30AM (1945) *Enumeration of strong, standard, starred tableaux.*
Susanna Fishel*, Arizona State University, and **Matjaz Konvalinka**, University of Ljubljana (1096-05-1991)

9:00AM ► (1946) *The immaculate basis of the non-commutative symmetric functions.*
Chris Berg, Universite du Quebec a Montreal, **Nantel Bergeron**, York University / Fields Institute, **Franco Saliola**, **Luis Serrano***, Universite du Quebec a Montreal, and **Mike Zabrocki**, York University / Fields Institute (1096-05-1817)

9:30AM (1947) *Product formulas for the volumes of flow polytopes.*
Karola Meszaros, Cornell University (1096-05-465)

10:00AM ► (1948) *A geometric interpretation of the weighted games poset.* Preliminary report.
Sarah K Mason* and **Robert Jason Parsley**, Wake Forest University (1096-05-1157)

10:30AM (1949) *Combinatorics of the tropical moduli space of curves.* Preliminary report.
Melody Chan, Harvard University (1096-05-1459)

AMS Special Session on Banach Spaces, Metric Embeddings, and Applications, I

7:30 AM – 10:50 AM **Room 331, BCC**

Organizers: **Mikhail Ostrovskii**, St. John's University
Beata Randrianantoanina, Miami University

7:30AM ► (1950) *The Lower Dimensional Busemann-Petty Problem in the Complex Hyperbolic Space.*
Susanna Dann, University of Missouri (1096-52-494)

8:00AM (1951) *Uniform homeomorphisms of asymptotic-c_0 spaces.*
Bunyamin Sari, University of North Texas (1096-46-1931)

8:30AM (1952) *Lipschitz p-convex and q-concave maps.* **J. Alejandro Chavez-Dominguez**, The University of Texas at Austin (1096-46-1715)

9:00AM (1953) *Embeddings of $\ell_p(\aleph)$ into L_p spaces.* Preliminary report. **William B. Johnson**, Texas A&M University (1096-46-1381)

10:00AM (1954) *Almost transitive and maximal norms in classical Banach spaces.* Preliminary report. **S J Dilworth***, University of South Carolina, and **B Randrianantoanina**, Miami University (1096-46-977)

10:30AM (1955) *Geometry of layers of cubes: applications in geometric group theory and nonlinear geometry of Banach spaces.* **Florent P. Baudier**, Texas A&M University (1096-46-1588)

AMS Special Session on Dispersive and Geometric Partial Differential Equations, I

7:30 AM – 10:50 AM **Room 322, BCC**

Organizers: **Shuanglin Shao**, University of Kansas
Chongchun Zeng, Georgia Institute of Technology
Shijun Zheng, Georgia Southern University

7:30AM ► (1956) *On solvability of elastodynamic flows.* Preliminary report. **Xianpeng Hu**, New York University (1096-35-314)

8:00AM (1957) *Uniqueness questions for the Navier-Stokes equation in the hyperbolic setting.* **Chi Hin Chan**, National Chiao Tung University, and **Magdalena Czubak***, Binghamton University (SUNY) (1096-35-1323)

8:30AM (1958) *The Gross-Pitaevskii hierarchy on the three-dimensional torus.* **Philip T. Gressman**, **Vedran Sohinger***, University of Pennsylvania, and **Gigliola Staffilani**, Massachusetts Institute of Technology (1096-35-486)

9:00AM (1959) *Out-of-equilibrium dynamics for the nonlinear Schrodinger equation.* Preliminary report. **Zaher Hani**, Courant Institute of Mathematical Sciences, NYU (1096-35-524)

9:30AM (1960) *Non-linear effect in the periodic KdV equation with rough initial data.* **Seungly Oh**, University of Missouri - Columbia (1096-35-1761)

10:00AM (1961) *Global well-posedness and scattering for focusing cubic NLS on the exterior of strictly convex obstacle in three dimensions.* **Xiaoyi Zhang***, University of Iowa, **Monica Visan** and **Rowan Killip**, UCLA (1096-35-1872)

10:30AM (1962) *Global existence for water waves in two dimensions.* **Fabio Pusateri**, Princeton University (1096-35-339)

AMS Session on Commutative Algebra and Homological Methods

7:45 AM – 10:55 AM **Room 304, BCC**

7:45AM (1963) *A Sufficient Condition for Covering Ideals.* Preliminary report. **Furuzan Ozbek***, University of Kentucky, **Pedro Guil Asensio** and **Sergio Estrada**, Universidad de Murcia (1096-18-307)

8:00AM (1964) *Totally Reflexive Modules and the AR-translate.* Preliminary report. **Denise Amanda Rangel**, University of Texas at Arlington (1096-18-2430)

8:15AM (1965) *Combinatorial Algorithms for Generating Free Resolutions of Ideals with Binomials and Monomial Generators.* **Trevor McGuire**, Louisiana State University (1096-13-785)

8:30AM ► (1966) *Graphical Representations of Factorizations in Commutative Rings.* **Michael Axtell**, University of St. Thomas, **Nicholas Baeth**, University of Central Missouri, and **Joe Stickles***, Millikin University (1096-13-1085)

8:45AM (1967) *Projective Dimension of Hypergraphs.* Preliminary report. **Kuei-Nuan Lin***, Smith College, and **Paolo Mantero**, UC, Riverside (1096-13-1317)

9:15AM (1968) *On the Intersection Algebra of Ideals.* **Sara L. C. Malec**, University of the Pacific (1096-13-2388)

9:30AM (1969) *Length multiset-complete Krull monoids.* **Paul Baginski***, Fairfield University, and **George T Schaeffer**, University of California, Los Angeles (1096-13-2532)

9:45AM (1970) *The Gröbner Basis Theory of Bracket Polynomials.* **Hongbo Li***, Chinese Academy of Sciences, **Changpeng Shao**, Chinese Academy of Sciences, and **Lei Huang**, Chinese Academy of Sciences (1096-13-673)

10:00AM (1971) *Extensions of Group Schemes in Characteristic p.* **Robert G. Underwood**, Auburn University Montgomery (1096-13-1694)

10:15AM (1972) *The Unimodality of Pure O-Sequences of Type Three in Three Variables.* **Bernadette Boyle**, Sacred Heart University (1096-13-1935)

10:30AM ► (1973) *Computational investigation of star operations with Macaulay 2.* **Bryan C White**, University of New Mexico (1096-13-2637)

10:45AM (1974) *On Local *-Completely Integrally Closed Domains.* **Olivier A. Heubo-Kwegna**, Saginaw Valley State University (1096-13-202)

AMS Session on History of Mathematics

7:45 AM – 10:55 AM **Room 305, BCC**

7:45AM ► (1975) *Sharaf al-Tusi (1135-1213): the grandfather of Differential Calculus?* Preliminary report.
Mustafa R.S. Kulenovic, University of Rhode Island (1096-01-1544)

8:00AM (1976) *A Study of Risāla al-watar wa'l jaib ("The Treatise on the Chord and Sine").* Preliminary report.
Mohammad K. Azarian, University of Evansville (1096-01-1419)

8:15AM ► (1977) *Nairizi: A Persian Mathematician For Consideration.*
Mohammad Moazzam, Salisbury University (1096-01-1036)

8:30AM ► (1978) *The Quaternion Wars: The 1890s and the Present.*
Paul R Bouthellier, University of Pittsburgh-Titusville (1096-01-196)

8:45AM (1979) *Analogy in William Rowan Hamilton's treatment of complex numbers.*
Maritza M. Branker, Niagara University (1096-01-660)

9:00AM (1980) *The transcendence of e in the 1870s. The story of a theorem.*
Michel Pierre Serfati, IREM- Universite Paris Diderot (1096-01-797)

9:15AM ► (1981) *Every math major should know this crazy theorem.*
Bruce Reznick, University of Illinois at Urbana-Champaign (1096-34-1392)

9:30AM (1982) *Fourier's Equations of Heat Motion in Fluid and Boltzmann's Transport Equations.*
Shigeru Masuda, RIMS, Kyoto University (1096-01-1503)

9:45AM (1983) *Florence Nightingale's Statistical Innovations.*
Eileen Magnello, University College London (1096-01-2215)

10:00AM (1984) *History of the Ideas that Led to Math-Based Currencies.*
Maryam Vulis, Norwalk Community College (1096-01-2683)

10:15AM ► (1985) *The Correspondence Between Cantor and Dedekind: the case for a surprising dialogue between mathematicians, historians, and philosophers.*
Adriana Monica Solomon, History and Philosophy of Science, University of Notre Dame (1096-01-2746)

10:30AM ► (1986) *Richard Courant: "Gottingen is Here".* Preliminary report.
Charlotte K Simmons* and **Jesse W. Byrne**, University of Central Oklahoma (1096-01-2621)

10:45AM ► (1987) *History of Combinatorial Group Theory in the US, Mid-Twentieth Century, a preliminary report.* Preliminary report.
Margaret H. Dean*, **Margaret Karrass**, BMCC/CUNY, and **Marianna Bonanome**, NYC College of Technology/CUNY (1096-01-2315)

AMS Session on Undergraduate Research in Analysis and Topology

7:45 AM – 10:55 AM **Room 312, BCC**

7:45AM ► (1988) *Convex Region Isoperimetric Conjecture.* Preliminary report.
Paul Gallagher, University of Pennsylvania, **David Hu**, Georgetown University, **Zane Martin**, Williams College, **Maggie Miller***, University of Texas at Austin, and **Byron Perpetua**, Williams College (1096-51-156)

8:00AM ► (1989) *Identification Problem in Parabolic Partial Differential Equation.*
Chloe L. Ondracek* and **Narayan Thapa**, Minot State University (1096-35-506)

8:15AM ► (1990) *Geometric Mean Value Properties.* Preliminary report.
Gary DeClerk*, **Jeremiah Bill** and **Quan Nguyen**, Hendrix College (1096-35-2313)

8:30AM ► (1991) *Nucleation in a Two Component Metal Alloy and the Corresponding Boundary Conditions.* Preliminary report.
Kalea A Sebesta, University of Nevada, Reno (1096-35-1165)

8:45AM ► (1992) *Polarizations with Respect to Infinite Type Hypersurfaces.*
Victoria Mansfield, University of Wisconsin - Stout, and **Michael McLaughlin***, Ohio University (1096-32-1088)

9:00AM ► (1993) *The Kauffman bracket for Singular Links.* Preliminary report.
Patrick Y Chu*, Rice University, and **Alex D Chichester**, SUNY Geneseo (1096-57-1492)

9:15AM ► (1994) *A Yang-Baxter model for specializations of the Kauffman polynomial.* Preliminary report.
Elaina K Aceves* and **Jennifer E Elder**, California State University, Fresno (1096-57-1818)

9:30AM ► (1995) *Three-Variable Bracket Polynomial for Two-Bridge Knots.* Preliminary report.
Matthew D. Overduin, California State University, San Bernardino (1096-55-2450)

9:45AM ► (1996) *An invariant for spatial graphs.* Preliminary report.
Jennifer E Elder* and **Elaina K Aceves**, California State University, Fresno (1096-57-1814)

10:00AM ► (1997) *Bounds on the Übercrossing and Petal Number of Knots.*
Ashley Weber, University of Michigan (1096-54-550)

10:15AM (1998) *The crossing spectrum of knots and the additivity of multi-crossing numbers under composition.*
Orsola A Capovilla-Seale*, Bryn Mawr College, and **Sicong C Zhang**, Columbia University (1096-54-1241)

10:30AM ► (1999) *The Meaning Behind the Coefficients of the sl_2 Weight System of Chord Diagrams.*
Austin J. Mack, National Research University – Higher School of Economics (Moscow, Russia) (1096-55-1809)

10:45AM ► (2000) *On the optimization of 1-cycle persistence under the Vietoris-Rips complex.*
Walter Zhen Cai, Cornell University (1096-55-1028)

AMS Special Session on Algebraic and Analytic Aspects of Integrable Systems and Painlev/'e Equations, I

8:00 AM – 10:50 AM **Room 320, BCC**

Organizers: **Anton Dzhamay**, University of Northern Colorado
Kenichi Maruno, University of Texas-Pan America
Christopher Ormerod, California Institute of Technology

8:00AM (2001) *On the geometry of difference Painlevé equations with symmetry group $E_6^{(1)}$.* Preliminary report.
Anton Dzhamay, University of Northern Colorado (1096-34-2589)

8:30AM (2002) *Schlesinger transformation and discrete Painlevé equation of type $A_1^{(1)*}$.* Preliminary report.
Anton Dzhamay, University of Northern Colorado, and **Tomoyuki Takenawa***, Tokyo University of Marine Science and Technology (1096-39-997)

9:00AM (2003) *A q-analogue of the Drinfeld-Sokolov hierarchy of type A and q-Painlevé system.*
Takao Suzuki, Kinki University (1096-34-237)

9:30AM (2004) *Initial value space of integrable lattice systems and discrete Painlevé equations.*
Sarah B Lobb, University of Sydney (1096-14-1541)

10:00AM (2005) *Geometric Asymptotics of q-difference Painlevé equations.*
Nalini Joshi, The University of Sydney (1096-34-498)

10:30AM (2006) *Classical integrability, quantum integrability and Dyson beta ensembles of random matrices.* Preliminary report.
Igor Rumanov, University of Colorado Boulder (1096-60-1989)

AMS Special Session on Analytic Number Theory, IV

8:00 AM – 10:50 AM **Room 308, BCC**

Organizers: **Angel Kumchev**, Towson University
Scott Parsell, West Chester University
Gang Yu, Kent State University

8:00AM (2007) *Squares and Primes.*
John B. Friedlander, University of Toronto (1096-11-404)

8:30AM (2008) *Estimates for the number of lattice points close to a curve and applications.*
Ognian Trifonov, University of South Carolina (1096-11-827)

9:00AM (2009) *Counting rational points near planar curves.*
Ayla R. Gafni, Pennsylvania State University (1096-11-726)

9:30AM (2010) *Equidistribution of polynomial sequences in function fields.*
T. H. Le, University of Texas at Austin, and **Y.-R. Liu***, University of Waterloo (1096-11-681)

10:00AM ► (2011) *2-Adic zeros of additive forms.*
Michael P. Knapp, Loyola University Maryland (1096-11-243)

10:30AM (2012) *the general goldbach problem with beatty primes.*
Robert C Vaughan, Penn State University & University of Michigan (1096-11-612)

AMS Special Session on Categorical Topology, I

8:00 AM – 10:45 AM **Room 330, BCC**

Organizers: **Frédéric Mynard**, Georgia Southern University
Gavin Seal, École Polytechnique Fédérale de Lausanne

8:00AM (2013) *Dualizing closure operators.* Preliminary report.
Walter Tholen, York University, Toronto ON (1096-18-2114)

9:00AM (2014) *Multiordered sets as topological spaces.*
Gavin J. Seal, Ecole Polytechnique Fédérale de Lausanne (1096-18-2123)

9:30AM (2015) *On L*-operators and around.* Preliminary report.
Andrzej A Szymanski, Slippery Rock University of Pennsylvania (1096-54-2557)

10:00AM (2016) *The limit closure of metric spaces in uniform spaces.*
Michael Barr*, McGill University, **John F. Kennison**, Clark University, and **Robert Raphael**, Concordia University (1096-54-1565)

AMS Special Session on De Bruijn Sequences and Their Generalizations, I

8:00 AM – 10:50 AM **Room 303, BCC**

Organizers: **Abbas Alhakim**, American University of Beirut
Steven Butler, Iowa State University

8:00AM ► (2017) *De Bruijn sequences with varying combs.* **Abbas Alhakim**, American University of Beirut, **Steve Butler***, Iowa State University, and **Ron Graham**, UC San Diego (1096-05-1264)

8:30AM ► (2018) *Gluing universal cycles and de Bruijn sequences.* **Dennis Wong**, University of Guelph (1096-05-1591)

9:00AM ► (2019) *The Discrepancy of de Bruijn Sequences.* **Joshua N. Cooper**, University of South Carolina (1096-05-2317)

9:30AM ► (2020) *Overlap Cycles.* Preliminary report. **Victoria E. Horan**, Air Force Research Laboratory, Rome, NY (1096-05-503)

10:00AM ► (2021) *Overlap Cycles for Steiner Systems.* **Glenn Hurlbert***, Arizona State University, and **Victoria Horan**, Air Force Research Laboratory (1096-05-1433)

10:30AM (2022) *Two Problems: Generation and Presentation.* **Alfred W Hales**, IDA Center for Communications Research - La Jolla (1096-05-923)

AMS Special Session on Deformation Spaces of Geometric Structures on Low-Dimensional Manifolds, II

8:00 AM – 10:50 AM **Room 328, BCC**

Organizers: **Caleb Ashley**, Howard University
Michelle Lee, University of Maryland
Melissa Macasieb, University of Maryland
Andy Sanders, University of Illinois at Chicago

8:00AM (2023) *On conformally flat circle bundles over surfaces.* **Son Lam Ho**, University of Maryland, College Park (1096-51-1371)

8:30AM (2024) *The Area of Projective Surfaces.* **Ilesanmi Adeboye**, Wesleyan University (1096-57-337)

9:00AM (2025) *Towards coordinate systems on G-character varieties of surfaces.* Preliminary report. **Adam S Sikora**, University at Buffalo, SUNY (1096-57-1475)

9:30AM (2026) *1-efficient triangulations and the index of a cusped hyperbolic 3-manifold.* **Stavros Garoufalidis**, Georgia Institute of Technology, **Craig D. Hodgson**, **J. Hyam Rubinstein**, University of Melbourne, and **Henry Segerman***, Oklahoma State University (1096-57-952)

10:00AM (2027) *Invariants of Character Varieties.* **Kate Petersen**, Florida State University (1096-57-2321)

10:30AM (2028) *Uniformly quasi-regular mappings on sub-Riemannian manifolds.* **Anton Lukyanenko**, University of Illinois Urbana-Champaign (1096-53-1822)

AMS Special Session on Ergodic Theory and Symbolic Dynamics, II

8:00 AM – 10:50 AM **Room 302, BCC**

Organizers: **Aimee Johnson**, Swarthmore College
Cesar Silva, Williams College

8:00AM (2029) *Coboundaries and ergodic sums.* Preliminary report. **Joseph Rosenblatt**, University of Illinois at Urbana-Champaign (1096-37-210)

8:30AM ► (2030) *Iterated Prisoners Dilemma: Dynamics of Zero-Determinant Strategies.* **Ethan Akin**, The City College of New York (1096-91-567)

9:00AM (2031) *Measuring complexity and interconnectivity in dynamical systems.* Preliminary report. **Karl Petersen*** and **Benjamin Wilson**, University of North Carolina at Chapel Hill (1096-37-435)

9:30AM (2032) *Partial difference equations over compact Abelian groups.* **Tim Austin**, Courant Institute, New York University (1096-39-554)

10:00AM (2033) *Recent developments in directional dynamics.* Preliminary report. **E. Arthur Robinson, Jr.**, George Washington University, **Joseph Rosenblatt**, University of Illinois, Urbana-Champaign, and **Ayşe A. Şahin***, DePaul University (1096-37-2417)

10:30AM ► (2034) *A measure-theoretic version of the divergence theorem.* Preliminary report. **Andres del Junco**, University of Toronto (1096-28-964)

AMS Special Session on Global Dynamics and Bifurcations of Difference Equations, I

8:00 AM – 10:50 AM **Room 329, BCC**

Organizers: **Mustafa Kulenovic**, University of Rhode Island
Orlando Merino, University of Rhode Island

8:00AM ► (2035) *Dynamics of a two patch gravity model.* **Emma Smith Zbarsky**, Wentworth Institute of Technology (1096-39-2584)

8:30AM ► (2036) *Local Qualitative Behavior of Discrete Dynamical Systems with Non-hyperbolic Equilibria: a Special Case.* **William T. Jamieson*** and **Orlando Merino**, University of Rhode Island (1096-39-710)

9:00AM (2037) *Multiple attractors in a Leslie-Gower competition system with Allee effects.* **Yunshyong Chow**, Academia Sinica, and **Sophia Jang***, Texas Tech University (1096-92-754)

9:30AM ► (2038) *Ordered Dynamics in Biased and Cooperative Boolean Networks.* **Winfried Just**, Ohio University, and **German A. Enciso***, University of California, Irvine (1096-39-1212)

10:00AM ► (2039) *Advances in Asymptotic Periodicity of Nonlinear Difference Equations.* **Raghib M. Abu-Saris**, King Saud bin Abdulaziz University for Health Sciences (1096-39-573)

10:30AM ► (2040) *Global Dynamics and Bifurcation of Difference Equations.* **Ronald E. Mickens**, Clark Atlanta University (1096-39-772)

AMS Special Session on Outreach for Mathematically Talented Youth, II

8:00 AM – 10:50 AM **Room 314, BCC**

Organizers: **Christina Eubanks-Turner**, Loyola Marymount University
Virginia Watson, Kennesaw State University
Daniel Zaharopol, Art of Problem Solving Foundation

8:00AM Discussion

8:30AM ► (2041) *The Junior Mathematical Congress series.* **Mikael Vejdemo-Johansson**, KTH Royal Institute of Technology (1096-97-297)

9:00AM ► (2042) *Math Beyond the Classroom.* **Jenny McNulty**, University of Montana (1096-00-1734)

9:30AM ► (2043) *Outreach without income: An approach to outreach without funding.* Preliminary report. **Paulette N Willis**, Reasoning Mind (1096-97-500)

10:00AM ► (2044) *SFSU $(CM)^2$: Creating Momentum Through Communicating Mathematics: Graduate students mentoring K-12 students in-school, after-school, and over the summer.* **Brandy S Wiegers**, San Francisco State University (1096-97-986)

10:30AM (2045) *Math Circle Examples from Kansas and the Navajo Nation.* **David Auckly***, Kansas State University, **Tatiana Shubin**, San Jose State University, and **Henry Fowler**, Dine College (1096-97-831)

AMS Special Session on Progress in Free Analysis and Free Probability, III

8:00 AM – 10:50 AM **Room 301, BCC**

Organizers: **Dmitry Kaliuzhnyi-Verbovetskyi**, Drexel University
Todd Kemp, University of California San Diego

8:00AM (2046) *Noncommutative Inequalities.* Preliminary report. **J. William Helton**, UC San Diego (1096-46-1970)

9:00AM (2047) *Noncommutative Inequalities.* Preliminary report. **Scott A. Mccullough**, University of Florida (1096-47-1535)

9:30AM (2048) *Asymptotic expansions of trace functionals.* Preliminary report. **Anna Skripka**, University of New Mexico (1096-47-1289)

10:00AM (2049) *Matricial Families and Weighted Shifts.* **Paul S Muhly**, University of Iowa, Iowa City, USA, and **Baruch Solel***, Technion, Israel Institute of Technology, Haifa, ISRAEL (1096-46-496)

10:30AM (2050) *Approximate subordination and random matrices.* **Hari Bercovici**, Indiana University (1096-46-1772)

AMS Special Session on Reaction Diffusion Equations and Applications, I

8:00 AM – 10:50 AM **Room 324, BCC**

Organizers: **Jerome Goddard,II**, Auburn University Montgomery
Ratnasingham Shivaji, University of North Carolina Greensboro

8:00AM (2051) *Existence Results for Classes of Infinite Semipositone Problems.* **Ratnasingham Shivaji**, University of North Carolina at Greensboro (1096-35-2166)

8:30AM (2052) *Stabilizability of Differential Equations.* **Mythily Ramaswamy***, T.I.F.R Center for Applicable Mathematics, Bangalore, **Jean-Pierre Raymond**, University of Toulouse, France, and **Debayan Maity**, T.I.F.R Center for Applicable Mathematics, Bangalore (1096-35-2194)

9:00AM (2053) *Bifurcation of steady state solutions of reaction-diffusion equations with nonlinear boundary conditions.* **Junping Shi**, College of William and Mary (1096-35-872)

9:30AM ► (2054) *MPE2013 and Reaction-Diffusion Problems.* **Hans G. Kaper**, Mathematics and Climate Research Network (1096-35-1024)

10:00AM (2055) *Avoidance behavior in intraguild predation communities: A cross-diffusion model.*
Robert Stephen Cantrell*, University of Miami, and **Daniel Ryan**, NIMBioS, The University of Tennessee (1096-92-1303)

10:30AM (2056) *Diffusive logistic equation with constant yield harvesting and negative density dependent emigration on the boundary.*
Jerome Goddard II*, Auburn University Montgomery, and **R. Shivaji**, University of North Carolina Greensboro (1096-35-1556)

AMS Special Session on Recent Advances in Homogenization and Model Reduction Methods for Multiscale Phenomena, I

8:00 AM – 10:50 AM **Room 317, BCC**

Organizers: **Silvia Jiménez Bolaños**, Colgate University
Burt S. Tilley, Worcester Polytechnic Institute

8:00AM ► (2057) *Chemotactic adhesion is bacterial flocs: a multi-scale model.*
Sarthok Sircar, University of Colorado, Boulder (1096-76-698)

8:30AM (2058) *Γ-limit for inextensible, elastic ribbons having centerlines with nonvanishing curvature.*
Nicholas O. Kirby*, University of Washington, and **Eliot Fried**, McGill University (1096-49-1384)

9:00AM (2059) *Γ-convergence of inhomogeneous functionals in Orlicz-Sobolev spaces and applications.*
Marian Bocea, Loyola University Chicago (1096-49-1362)

9:30AM (2060) *Homogenization of composite vicinal surfaces in 1+1 dimensions.*
Dionisios Margetis*, University of Maryland, College Park, and **Kanna Nakamura**, University of Maryland, College Park (1096-35-1086)

10:00AM (2061) *A mathematical homogenized model for the mechanical behavior of the lungs' parenchyma.*
Paul Cazeaux*, UPMC, and **Celine Grandmont**, Inria (1096-35-1265)

10:30AM (2062) *Biphasic Acoustic Behavior of a Non-periodic Porous Medium.*
Robert Pertsch Gilbert*, University of Delaware, **Alexander Panchenko**, Washington State University, and **Ana Vasilic**, United Arab Emirates University (1096-35-1428)

AMS Special Session on Set-Valued Optimization and Variational Problems with Applications, I

8:00 AM – 10:50 AM **Room 332, BCC**

Organizers: **Akhtar Khan**, Rochester Institute of Technology
Mau Nam Nguyen, Portland State University
Miguel Sama, Universidad Nacional de Educacin e Distancia
Christiane Tammer, Martin Luther University of Halle-Wittenberg

8:00AM (2063) *A unified approach for different concepts of robustness and stochastic programming via nonlinear scalarizing functionals.*
Christiane Tammer*, Martin-Luther-University Halle-Wittenberg, **Kathrin Klamroth**, University Wuppertal, **Elisabeth Koebis**, Martin-Luther-University Halle-Wittenberg, and **Anita Schoebel**, University Goettingen (1096-90-2020)

8:30AM (2064) *Necessary nondomination conditions in multiobjective optimization with variable ordering structures.* Preliminary report.
Bao Q. Truong, Northern Michigan University (1096-91-1507)

9:00AM (2065) *On Lipschitz Properties of Nonsmooth Functions and Set-Valued Mappings via Generalized Differentiation and Applications.*
Mau Nam Nguyen, Portland State University (1096-49-1411)

9:30AM (2066) *On the Modeling of Some Environmental Games with Uncertain Data.*
Baasansuren Jadamba*, Rochester Institute of Technology, and **Fabio Raciti**, University of Catania (1096-49-2505)

10:00AM (2067) *Full stability in second-order cone programming.*
Ebrahim Sarabi*, **Boris Mordukhovich**, wayne state university, and **Jiri Outrata**, Institute of Information Theory and Automation, Academy of Sciences of the Czech Republic (1096-49-802)

10:30AM (2068) *Solving generalized Nash games with shared constraints through evolutionary variational inequalities.*
Monica Gabriela Cojocaru, University of Guelph, Ontario, Canada (1096-49-2095)

AMS Special Session on Trends in Graph Theory, I

8:00 AM – 10:50 AM **Room 315, BCC**

Organizer: **Ralucca Gera**, Naval Postgraduate School

8:00AM ► (2069) *Independence in Function Graphs.*
Ralucca Gera*, Naval Postgraduate School, **Craig Larson**, Virginia Commonwealth University, **Ryan Pepper**, University of Houston Downtown, and **Craig Rasmussen**, Naval Postgraduate School (1096-05-246)

8:30AM ► (2070) *A Graph Theoretic Division Algorithm.*
Eric Andrews and **Ping Zhang***, Western Michigan University (1096-05-525)

9:00AM ► (2071) *On Irregular Eulerian Walks in Graphs.* **Eric S. Andrews**, Western Michigan University (1096-05-562)

9:30AM (2072) *A Contribution to Irredundance and Distance-2 Domination in Graphs.* Preliminary report. **Stephen T. Hedetniemi***, **Sandra M. Hedetniemi**, School of Computing, Clemson University, **Renu C. Laskar**, Clemson University, and **Gerd H. Fricke**, Morehead State University (1096-05-1805)

10:00AM ► (2073) *On Radio Labeling of Some Caterpillar Graphs.* Preliminary report. **Katherine F. Benson**, Westminster College (1096-05-2429)

10:30AM ► (2074) *Eigenvalues of Saturated Hydrocarbons.* **Craig E Larson**, Virginia Commonwealth University (1096-05-422)

AMS Session on Statistical Modeling, Big Data, and Computing

8:00 AM – 10:55 AM **Room 313, BCC**

8:00AM (2075) *Effect of Sample Size on the Performance of Ordinary Least Squares and Geographically Weighted Regression.* Preliminary report. **Mitra Lal Devkota***, **Gary D Hatfield** and **Rajesh Chintala**, South Dakota State University (1096-62-870)

8:15AM ► (2076) *Anthropometric indicators of obesity in Native American Adolescents and Exploratory Data Analysis.* **Margaret N. Barth**, **Melissa Wiggington**, **Benjamin David Knisley***, **Hanna Stipeak**, **Grace Crosby** and **Linn Carothers**, California Baptist University (1096-62-1812)

8:30AM (2077) *A Primary Study of Bisphosphonate Medications on Osteopathic Fractures for Male Patients in VA Healthcare System.* Preliminary report. **Mingfei Li**, Bentley University (1096-62-2558)

8:45AM ► (2078) *To pool or not to pool.* **Mouchumi Bhattacharyya**, University of the Pacific (1096-62-2393)

9:00AM ► (2079) *A Sequential Approach to Detecting Change Points.* Preliminary report. **Eric Ruggieri**, College of the Holy Cross (1096-62-2357)

9:15AM (2080) *Verification techniques for Bayesian model calibration.* Preliminary report. **Mami T Wentworth*** and **Ralph C Smith**, North Carolina State University (1096-62-1051)

9:30AM (2081) *Dependence and Association Concepts through Copulas.* **Zheng Wei***, Las Cruces, **Tonghui Wang**, New Mexico State University, and **Wararit Panichkitkosolkul**, Thammasat University, Thailand (1096-62-372)

9:45AM ► (2082) *Hierarchical Representation for High-Dimensional Data in Music Structure Tasks.* Preliminary report. **Katherine M. Kinnaird**, Dartmouth College (1096-62-2288)

10:00AM (2083) *Information Theoretic Partition Determination for Data Mining.* **Paul B Deignan**, University of Texas at Dallas (1096-68-2441)

10:15AM (2084) *Exploration of Flocking Clustering Algorithms for Information Display and Derivation of Structures in Big Data.* Preliminary report. **Ahlam E Tannouri*** and **Sam F Tannouri**, Morgan State University (1096-68-2717)

10:30AM (2085) *The Newton's Method Backpropagation Algorithm for Holomorphic Complex-Valued Neural Networks.* **Diana Thomson La Corte**, University of Wisconsin-Milwaukee (1096-68-1973)

10:45AM (2086) *Toric Geometry of Hypergraphs.* **Despina Stasi***, Pennsylvania State University, **Sonja Petrovic**, Illinois Institute of Technology, and **Elizabeth Gross**, North Carolina State University (1096-68-284)

MAA Session on Flipping the Classroom, III

8:00 AM – 10:55 AM **Room 337, BCC**

Organizers: **Krista Maxson**, Shawnee State University
Zsuzsanna Szaniszlo, Valparaiso University

8:00AM ► (2087) *A First Attempt at Flipping.* Preliminary report. **Melissa M. Tolley**, Wingate University (1096-E1-2170)

8:20AM ► (2088) *Idea of flipped classroom for Pre-calculus students.* **Joyati Debnath**, Winona State University (1096-E1-2003)

8:40AM ► (2089) *"Social reading" in the mathematics classroom.* **Albert Schueller**, Whitman College (1096-E1-328)

9:00AM (2090) *Sylvanus Thayer Flipped Out – Method Ahead of Its Time.* Preliminary report. **Brian J. Winkel**, US Military Academy (1096-E1-169)

9:20AM ► (2091) *Making Yourself the Lead Vocalist among many Secondary Sources in Flipped and Blended Differential Equations Courses.* **Christopher Oehrlein**, Oklahoma City Community College (1096-E1-398)

9:40AM (2092) *Learning Math by Making Math.* **Bruce Carpenter***, University of Illinois at Urbana-Champaign, and **Faisal Whelpley**, Making Math (1096-E1-2115)

10:00AM (2093) *A Faculty Learning Community on Flipped Classrooms at Valparaiso University.* **Alex Capaldi*** and **Melissa Desjarlais**, Valparaiso University (1096-E1-2280)

10:20AM ► (2094) *The Best of Both Worlds: The Flipped Classroom with a Moore Method Flavor for Undergraduate Analysis.* **Bryan Dawson**, Union University (1096-E1-1025)

10:40AM ► (2095) *Lessons Learned: A First Attempt at Using a Flipped Classroom Model.* **Marie P. Sheckels**, University of Mary Washington (1096-E1-1735)

MAA Session on Mathematics and Sports, II

8:00 AM – 10:55 AM **Room 338, BCC**

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

8:00AM ► (2096) *The MLB All Star Challenge.* **William Schellhorn**, Simpson College (1096-G5-1589)

8:20AM ► (2097) *Markov Chain Applications to Baseball Run Forecasting.* **Nicholas Taylor*** and **Narayan Thapa**, Minot State University (1096-G5-1595)

8:40AM ► (2098) *Discovering athlete treatment modalities at the Pan-American Games.* Preliminary report. **Charles Bergeron**, Albany College of Pharmacy and Health Sciences (1096-G5-2521)

9:00AM ► (2099) *Pitch Perfect? Analyzing the Passing Networks of Manhattan College Women's Soccer.* Preliminary report. **Alexandra Iovine***, **Janie Schlauder** and **Helene R. Tyler**, Manhattan College (1096-G5-1349)

9:20AM ► (2100) *How to Rate Bridge Players and Other Paired Competitors.* **T. S. Michael**, U. S. Naval Academy (1096-G5-2271)

9:40AM ► (2101) *The Minimum Number of Contests Needed for a Ranking Method to Approach Optimal Performance.* **E. Cabral Balriera**, Trinity University, and **Charles D. Wessell***, Gettysburg College (1096-G5-2284)

10:00AM ► (2102) *When Do We Know? Using Mathematics in NASCAR ranking.* **Danielle Shepherd***, College of Wooster, **Timothy Chartier**, Davidson College, and **Kenneth Massey**, Carson-Newman University (1096-G5-2503)

10:20AM ► (2103) *Estimating Goal Probabilities in the NHL.* **Calla Glavin*** and **Brian Macdonald**, United States Military Academy, West Point, NY (1096-G5-2703)

10:40AM ► (2104) *Predicting team and player performance in hockey.* **Brian Macdonald**, United States Military Academy, West Point, NY (1096-G5-2707)

MAA Session on Putting a Theme in a History of Mathematics Course

8:00 AM – 10:55 AM **Room 339, BCC**

Organizers: **Eugene Boman**, Pennsylvanis State University, Harrisburg
Robert Rogers, SUNY Fredonia

8:00AM ► (2105) *HoM Courses to Inspire Liberal Arts Majors (and Others): A Menu of Eleven Organizing Themes.* Preliminary report. **Emelie A. Kenney**, Siena College (1096-K1-534)

8:20AM (2106) *A History of Math Class Centered Around the Development of Number, Operation, and Solving Equations.* **Diana White**, University of Colorado Denver (1096-K1-1884)

8:40AM ► (2107) *Bringing together "older" and "newer" mathematics.* **Dorothee Jane Blum**, Millersville University of Pennsylvania (1096-K1-1932)

9:00AM ► (2108) *A web journey through the history of mathematics: two approaches Part I.* **Joseph P. Brennan**, University of Central Florida (1096-K1-2419)

9:20AM ► (2109) *A Web Journey Through the History of Mathematics: Two Approaches Part II.* **Tammy Muhs**, University of Central Florida (1096-K1-2500)

9:40AM (2110) *Mathematical Impossibilities.* **Alex M McAllister**, Centre College (1096-K1-2568)

10:00AM ► (2111) *Return to Infinity in the History of Mathematics Classroom.* **Thomas Drucker**, University of Wisconsin–Whitewater (1096-K1-51)

10:20AM ► (2112) *New approaches in History of Mathematics courses.* **Satish C Bhatnagar**, University of Nevada Las Vegas (1096-K1-1254)

10:40AM ► (2113) *Giuseppe Peano and Writing in a History Course.* **James T Smith**, San Francisco State University (1096-K1-331)

MAA Session on Teaching with Technology: Impact, Evaluation, and Reflection, I

8:00 AM – 10:55 AM **Room 341, BCC**

Organizer: **Peter Gavin LaRose**, University of Michigan

8:00AM (2114) *A complete technological transformation: From chalk to clickers and PowerPoint.* Preliminary report. **Joe Latulippe**, Norwich University (1096-M5-2501)

8:20AM (2115) *Taylor Turret Battle: An HTML5 video game teaching students to understand Taylor Approximation.* **Jason Cantarella**, University of Georgia (1096-M5-37)

8:40AM (2116) *Math Achievements: Gamification and Online Homework.*
Geoff R Goehle, Western Carolina University (1096-M5-945)

9:00AM ► (2117) *Enhancing Student Writing with LaTeX, and MATLAB in Multivariable Calculus.* Preliminary report.
Eric Sullivan, Carroll College (1096-M5-138)

9:20AM ► (2118) *To What Extent Does Visualization Improve Conceptual Understanding in Multivariable Calculus?*
Paul E. Seeburger, Monroe Community College (1096-M5-2634)

9:40AM (2119) *Maplets for Calculus: Impact on Learning and Other Lessons Learned.*
Douglas B Meade*, University of South Carolina, and **Philip B Yasskin**, Texas A&M University (1096-M5-2668)

10:00AM (2120) *Student Blogging in Major Courses.*
Andrew Cooper, North Carolina State University (1096-M5-551)

10:20AM (2121) *WeBWorK Online Homework in an Introduction to Proofs course.* Preliminary report.
John Travis, Mississippi College (1096-M5-1678)

10:40AM ► (2122) *WeBWorK: Building the Next Generation to Make an Impact in the Classroom.* Preliminary report.
Peter L Staab, Fitchburg State University (1096-M5-2073)

MAA Session on USE Math: Undergraduate Sustainability Experiences in the Introductory Mathematics Classroom

8:00 AM – 10:55 AM **Room 349, BCC**

Organizers: **Ben Galluzzo**, Shippensburg University
Monika Kiss, Saint Leo University
Corrine Taylor, Wellesley College

8:00AM ► (2123) *Commuting: A Sustainability Activity in an Intermediate Algebra Course.*
Charles Buehrle, Harrisburg Area Community College (1096-P1-2600)

8:20AM ► (2124) *USE Math in First-Year Seminar.* Preliminary report.
Amanda I Beecher, Ramapo College of New Jersey (1096-P1-1642)

8:40AM ► (2125) *To Mauna Loa and back again: bringing analysis of climate change data to life.*
Lily S Khadjavi, Loyola Marymount University (1096-P1-2712)

9:00AM ► (2126) *Arctic Sea Ice Activities in Class.*
Bill Bauldry*, Appalachian State University, **Victor Donnay**, Bryn Mawr College, and **Lynn Reed**, Office of Polar Programs, National Science Foundation (1096-P1-1878)

9:20AM ► (2127) *Is it "Worth It" to Change Your Light Bulbs?*
Elizabeth Biernat*, **Victor Donnay**, Bryn Mawr College, and **Hannah Weinstein**, University of Pennsylvania (1096-P1-1868)

9:40AM ► (2128) *Should I Unplug?* Preliminary report.
Lori Carmack, Salisbury University (1096-P1-1423)

10:00AM ► (2129) *Using Solar Panels to Teach Integration.* Preliminary report.
Victor J. Donnay, Bryn Mawr College (1096-P1-1137)

10:20AM ► (2130) *Multi-level Undergraduate Research in Sustainable Water Use for Agriculture Management.*
Kathleen R Fowler, Clarkson University (1096-P1-2518)

10:40AM ► (2131) *Climate Models and Differential Equations.*
James A. Walsh, Oberlin College (1096-P1-147)

MAA General Contributed Paper Session on Probability and Statistics, II

8:00 AM – 10:55 AM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:00AM (2132) *On Liu-type estimators for the logistic regression.*
Yasin Asar*, Necmettin Erbakan University, and **Asir Genc**, Selcuk University (1096-VH-2720)

8:15AM (2133) *An M/G/1 Queue System with Feedback, Disasters and Repairs with Vacation.*
George Mytalas, New Jersey Institute of Technology (1096-VH-1390)

8:30AM ► (2134) *Characterization of Tenable Pólya Urns.*
Allison Davidson*, Purdue University, **Hosam Mahmoud**, The George Washington University, and **Mark Daniel Ward**, Purdue University (1096-VH-1026)

8:45AM (2135) *Transition density of a Brownian motion in upper-half space under Brachistochrone-type metrics.*
Pradip R Aryal, New Mexico State University,Las Cruces,NM (1096-VH-697)

9:00AM (2136) *Sensitivity in Experimental Design.* Preliminary report.
Adam F Childers, Roanoke College (1096-VH-428)

9:15AM ► (2137) *Benford Behavior of Dependent Random Variables.* Preliminary report.
Taylor C Corcoran*, University of Arizona, and **Jirapat Samranvedhya**, Williams College (1096-VH-211)

9:30AM ► (2138) *Benford's Law of First Digits and the Mass of Exoplanets.*
Thomas W. Hair, Florida Gulf Coast University (1096-VH-47)

9:45AM ► (2139) *A Markov Chain Approach to Baseball Run Forecasting.*
Nicholas Taylor* and **Narayan Thapa**, Minot State University (1096-VH-511)

10:00AM ► (2140) *A Random Walk Theme for an Undergraduate Research Project.*
Marina Skyers, SUNY Maritime College (1096-VH-589)

10:15AM ► (2141) *Student involvement with the central limit theorem through software using MIT's Imagination Toolbox.* Preliminary report.
Ann E Moskol, Rhode Island College (1096-VH-2681)

10:30AM ► (2142) *Should anyone ever "Pass" on Family Feud?* Preliminary report.
Paul R. Coe, Dominican University (1096-VH-2679)

10:45AM ► (2143) *Let's Make a (New) Deal: Variations of the Monty Hall Problem.*
Howard Troughton*, **George Recck** and **William Rybolt**, Babson College (1096-VH-2435)

SIAM Minisymposium on Recent Mathematical Developments in Imaging

8:00 AM – 10:55 AM **Room 325, BCC**

Organizers: **Weihong Guo**, Case Western Reserve University
Luminita Vese, University of California Los Angeles

8:00AM (2144) *A New Detail-preserving Regularity Scheme.*
Weihong Guo*, Case Western Reserve University, **Jing Qin** and **Wotao Yin**, University of California, Los Angeles (1096-49-1967)

8:30AM ► (2145) *Generalized shrinkage and penalty functions.*
Rick Chartrand, Los Alamos National Laboratory (1096-90-1846)

9:00AM (2146) *Riemannian Metrics on Spaces of Deformable Images and Measures: from Singular to Smooth.*
Laurent Younes, Johns Hopkins University (1096-58-1529)

9:30AM (2147) *Operator-based Data Fusion.* Preliminary report.
Alexander Cloninger, **Wojciech Czaja*** and **Timothy Doster**, University of Maryland College Park (1096-43-2606)

10:00AM (2148) *Numerical Approximation Methods for Non-Uniform Fourier Data.*
Anne Gelb, Arizona State University, and **Aditya Viswanathan***, California Institute of Technology (1096-65-1946)

10:30AM (2149) *Intensity Non-uniformity Correction Method in MR Imaing.*
Yunho Kim*, Dept. Diagnostic Radiology, Yale University, and **Hemant Tagare**, Dept. Diagnostic Radiology and Dept. Biomedical Engineering, Yale University (1096-49-1596)

AWM Workshop Presentations, I

8:00 AM – 10:25 AM **Room 310, BCC**

Organizers: **Erin Chambers**, Saint Louis University
Kathryn Leonard, California State University Channel Islands
Luminita Vese, University of California, Los Angeles

8:00AM (2150) *Bayesian Abel Inversion with MCMC Sampling in Quantitative X-ray Radiography.*
Marylesa Howard*, **Michael Fowler**, National Security Technologies, and **Aaron Luttman**, Clarkson University (1096-62-239)

8:30AM ► (2151) *Computational Symmetry for Automatic Pattern Discovery.*
Yanxi Liu, Penn State University (1096-20-2223)

9:00AM ► (2152) *Partially blind deblurring of barcode from out-of-focus blur.* Preliminary report.
Yifei Lou*, **Ernie Esser**, **Hongkai Zhao** and **Jack Xin**, University of California Irvine (1096-68-281)

9:30AM ► (2153) *Open questions in user-guided manual 3D image segmentation.* Preliminary report.
Cindy Grimm*, Oregon State University, **Ruth West**, University of North Texas, **Tao Ju**, **Michelle Vaughan**, Washington University in St. Louis, and **Ross Sowell**, Cornell College (1096-51-2750)

10:00AM (2154) *Prior Information Guided Image Denoising and Reconstruction.*
Jing Qin*, UCLA, and **Weihong Guo**, Case Western Reserve University (1096-49-285)

AMS Session on Knots and Their Invariants

8:15 AM – 10:55 AM **Room 311, BCC**

8:15AM (2155) *Combinatorics of Link Diagrams and Volume.* Preliminary report.
Adam Giambrone, Michigan State University (1096-57-1260)

8:30AM (2156) *Patterns and Stability in the Coefficients of the Colored Jones Polynomial.*
Katherine P. Walsh, University of California, San Diego (1096-54-2457)

8:45AM (2157) *The Wriggle Polynomial.*
Lena C Folwaczny*, Urbana, IL, and **Louis Kauffman**, University of Illinois, Chicago (1096-54-2671)

9:00AM ► (2158) *The pop-switch planar algebra and the Jones-Wenzl projections.* Preliminary report.
Ellie A Grano, Pepperdine University (1096-54-2743)

9:15AM (2159) *Positive Links.*
Tim D. Cochran and **Eamonn Tweedy***, Rice University (1096-57-2509)

9:30AM ► (2160) *The fractal nature of the knot concordance group.*
Arunima Ray, Rice University (1096-57-2294)

9:45AM (2161) *Some Results Concerning Quantum Invariants of Links and 3-manifolds.*
Matt Sequin, Rutgers University (1096-57-1569)

10:00AM (2162) *The Three Loop Invariant.*
Heather A Dye*, McKendree University, and **Micah Chrisman**, Monmouth University (1096-57-2029)

10:15AM (2163) *Ruling polynomials and augmentations over finite fields.*
Michael Brad Henry*, Siena College, and **Dan Rutherford**, University of Arkansas (1096-57-1266)

10:30AM (2164) *Satellites of Legendrian knots and representations of the Chekanov-Eliashberg algebra.*
Lenhard Ng, Duke University, and **Dan Rutherford***, University of Arkansas (1096-57-1929)

10:45AM (2165) *Bridge numbers of knots in the page of an open book.* Preliminary report.
R Sean Bowman* and **Jesse Johnson**, Oklahoma State University (1096-57-1672)

MAA General Contributed Paper Session on Assorted Topics, II

8:15 AM – 10:55 AM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

8:15AM ► (2166) *Correspondence between geometric and differential definitions of the sine and cosine.*
Horia I. Petrache, Department of Physics, Indiana University Purdue University Indianapolis (1096-VR-2577)

8:30AM ► (2167) *Infimal Convolution of Convex Set-Valued Mappings.*
Qingxia Li and **James Schrader***, Lincoln University (1096-VR-2403)

8:45AM (2168) *Tiling properties of spectra of measures.*
Dorin Dutkay and **John Haussermann***, University of Central Florida (1096-VR-2222)

9:00AM ► (2169) *Differentiability at Infinity: Wrapping Curves Around the Sphere.* Preliminary report.
McKenzie R Lamb, Ripon College (1096-VR-1865)

9:15AM Discussion.

9:15AM ► (2170) *How Low Can You Go? Estimating the Maximum of a Polynomial.*
Hope K Snyder*, Washington & Jefferson College, **Dorothy Klein**, Kent State University, **Ryann Cartor**, Bellarmine University, **Rachel Carleton**, Hollins University, and **Andrew Tonge**, Kent State University (1096-VR-2221)

9:30AM ► (2171) *Discovering Universal Connections in Mathematics Through Native American Culture.*
Charles Peter Funkhouser*, California State University Fullerton, **Miles R. Pfahl**, Turtle Mountain Community College, and **Harriet C. Edwards**, California State University Fullerton (1096-VR-522)

9:45AM ► (2172) *Matrices, Twin Pythagorean Triples, and Pell Numbers.*
Jathan W. Austin, Salisbury University (1096-VR-366)

10:00AM ► (2173) *Transforming Sequences of Pythagorean Triples.*
Homer W. Austin, Salisbury University (1096-VR-1049)

10:15AM ► (2174) *Tiling m-Deficient Mutilated Chessboards with m-Polyominoes.* Preliminary report.
Kimberly Phillips, Washington & Jefferson College (1096-VR-1188)

10:30AM (2175) *Properties of the (a, b)-Fibonacci Sequence, Modulo m.*
Marc S. Renault, Shippensburg University (1096-VR-2125)

10:45AM (2176) *Algebraic Structure of Fuzzy Numbers.* Preliminary report.
Chuang Peng, Morehouse College (1096-VR-2356)

MAA Session on Mathematics Experiences in Business, Industry, and Government, II

8:20 AM – 10:35 AM **Room 345, BCC**

Organizers: **Carla Martin**, James Madison University
Phil Gustafson, Mesa State University
Michael Monticino, University of North Texas

8:20AM ► (2177) *A Starbucks Coffee in less than 5 minutes?* Preliminary report.
Brandon R Theiss, Rutgers University (1096-H1-620)

8:40AM ► (2178) *Use Convexity, Not 'Compactness', When Measuring the Shape of Legislative Districts.*
James R. Bozeman*, Lyndon State College, **Timothy Nicholson**, University of Wyoming, **Matthew Pilling**, University of Rhode Island, and **Melissa A. Rosato**, Lyndon State College (1096-H1-1543)

9:00AM (2179) *A 3-D face imaging method with applications to biometric identification.*
Thomas Höft, University of St. Thomas (1096-H1-2116)

9:20AM ► (2180) *Math in the City: Modeling ground water cycles based on local data.* Preliminary report.
Kathryn A Haymaker* and **Alexandra Seceleanu**, University of Nebraska-Lincoln (1096-H1-731)

9:40AM ► (2181) *Orderly Chaos (in the Stock Market).*
Andy Niedermaier, Jane Street Capital (1096-H1-216)

10:00AM ► (2182) *An Application of Computational Algebraic Geometry to Real-World Signal Processing Problems in an Industrial Organization.* Preliminary report.
John Sadowsky, Zeta Associates Incorporated (1096-H1-316)

10:20AM ► (2183) *A New National Program: Preparing Students for Business, Industry, and Government.*
Michael Dorff*, Brigham Young University, **Linda Braddy**, MAA, **Reza Malek-Madani**, U.S. Naval Academy, and **Suzanne Weekes**, Worcester Polytechnic Institute (1096-H1-2081)

AMS Special Session on Representation Theory of p-adic Groups and Automorphic Forms, I

8:30 AM – 10:50 AM **Room 321, BCC**

Organizers: **Arsalan Chademan**, University of Kurdistan
Manouchehr Misaghian, Prairie View A&M University

8:30AM (2184) *R–groups and reducibility for inner forms of classical groups.*
Kwangho Choiy, Oklahoma State University, and **David Goldberg***, Purdue University (1096-22-1979)

9:00AM (2185) *Using types and lattice models to relate theta-correspondences.*
David C Manderscheid, The Ohio State University (1096-22-2358)

9:30AM (2186) *Converse Theorems.* Preliminary report.
Muthu Krishnamurthy, University of Iowa (1096-11-2432)

10:00AM (2187) *Types and covers for some quaternionic hermitian groups.*
Thomas L. Madsen, University of Oklahoma (1096-22-1850)

10:30AM (2188) *An observation for the supercuspidal representation of GL_2 and its applications.*
Yueke Hu, University of Wisconsin-Madison (1096-11-968)

AMS Session on C-Algebras and Analysis*

8:30 AM – 10:40 AM **Room 323, BCC**

8:30AM (2189) *Solvable Leibniz Algebras with Heisenberg Nilradical.* Preliminary report.
Lindsey Bosko-Dunbar, **Jonathan D Dunbar**, Spring Hill College, **J.T. Hird**, West Virginia University, Institute of Technology, and **Kristen Stagg***, The University of Texas at Tyler (1096-17-2373)

8:45AM (2190) *Classifiaction theorems for operators preserving zeros in a strip.*
P. Brändén and **M. Chasse***, KTH (Royal Institute of Technology), Stockholm (1096-46-2045)

9:00AM (2191) *On Pedersen-Takahasi Theorem for locally C*-algebras.*
Alexander A. Katz, St. John's University, NY, USA (1096-46-1301)

9:15AM (2192) *Finitely Aligned Semigroupoids and Tight C*-algebras.* Preliminary report.
Allan P. Donsig, University of Nebraska-Lincoln, and **David Milan***, University of Texas at Tyler (1096-47-2745)

9:30AM (2193) *Orlicz spaces, Lorentz spaces, and self-improving Orlicz-Poincaré inequalities: Connections and consequences.*
Noel Ramsey DeJarnette, University of Illinois (1096-46-1060)

9:45AM ► (2194) *Continuous-trace graph C^*-algebras.* Preliminary report.
Danny Wray Crytser, Dartmouth College (1096-46-1704)

10:00AM (2195) *Some Remarks on Positivity in Operator Algebras.* Preliminary report.
Clifford A Bearden, **David P Blecher**, University of Houston, and **Sonia Sharma***, State University of New York at Cortland (1096-46-516)

10:15AM (2196) *Proof of a conjecture of Andrew Gleason for uniform algebras on manifolds.* Preliminary report.
Swarup Narayan Ghosh, Bowling Green State University (1096-46-1833)

10:30AM (2197) *Ergodic Jacobi matrices and conformal maps.*
Injo Hur, University of Oklahoma (1096-46-1897)

MAA General Contributed Paper Session on History and Philosophy of Mathematics

8:30 AM – 10:55 AM **Room 347, BCC**

Organizers: **Jennifer Beineke**, Western New England University

Bem Cayco, San Jose State University

Kimberly Presser, Shippensburge University

8:30AM ► (2198) *History of Applications of Operations Research (Yun Ch'ou Hsueh) Methods in China (1958 - 1960).*
Jean W Richard* and **Hong Yuan**, Borough of Manhattan Community College, City University of New York (CUNY) (1096-VC-2565)

8:45AM ► (2199) *Contribution of the Muslim Scientists in the field of mathematics.*
Salar Alsardary*, University of the Sciences, and **Mohammad Haraaz**, IT Consultant, IBM (1096-VC-2137)

9:00AM ► (2200) *A Kin Relations Lesson in Ethnomathematics: A Tribute to Marcia Ascher.*
Ximena Catepillan* and **Cynthia Taylor**, Millersville University of Pennsylvania (1096-VC-1616)

9:15AM ► (2201) *Thomas Leybourn and The Mathematical Repository.* Preliminary report.
William Zachary Wallace, Western Carolina University (1096-VC-568)

9:30AM (2202) *And Cantor said to God: I come away with You.*
Rosanna Iembo*, University of Calabria, Italy, and **Irene Iaccarino**, School of Music, Crotone, Italy (1096-VC-1018)

9:45AM ► (2203) *Techniques from the Ancients for Verification of Right Angles.*
John C.D. Diamantopoulos*, Northeastern State University, and **Cynthia Huffman Woodburn**, Pittsburg State University (1096-VC-91)

10:00AM (2204) *Methods of solving complex problems: history of mathematics approach.*
Ellina Grigorieva, Texas Woman's University (1096-VC-696)

10:15AM (2205) *The Development of Algebraic Symbolism for Pre-service Teachers.*
Robert Rogers, SUNY Fredonia (1096-VC-1713)

10:30AM ► (2206) *On Proofs Without Words and Beyond.*
Tim Doyle, **Lauren Kutler**, **Robin Miller** and **Albert Schueller***, Whitman College (1096-VC-329)

10:45AM ► (2207) *A Course to Address the Issue of Diversity.*
James F Kiernan, Brooklyn College (CUNY) (1096-VC-1896)

MAA Committee on Technologies in Mathematics Education-MAA Committee on the Undergraduate Program in Mathematics-WEBSIGMAA Panel Discussion

8:30 AM – 9:50 AM **Room 307, BCC**

Two worlds collide: MOOCs and the ivory tower.

Organizers: **John Travis**, Misissippi College

Martha Siegel, Towson University

Panelists: **Keith Devlin**, Stanford University

Robert Ghrist, University of Pennsylvania

Michael Starbird, University of Texas at Austin

Marilyn Carlson, Arizona State University

AMS Invited Address

9:00 AM – 9:50 AM **Ballrooms I&II, 400 Level, BCC**

(2208) *Which powers of a holomorphic function are integrable?*
Christopher D. Hacon, University of Utah (1096-14-955)

ASL Invited Address

9:00 AM – 9:50 AM **Room 319, BCC**

(2209) *The asymptotic structure of unstable theories.*
Maryanthe Malliaris, University of Chicago (1096-03-1373)

MAA Minicourse: #8: Part B

9:00 AM – 11:00 AM **Room 343, BCC**

Directing undergraduate research.

Presenter: **Aparna Higgins**, University of Dayton

MAA Minicourse #6: Part B

9:00 AM – 11:00 AM **Room 342, BCC**

Historical role-playing in the mathematics classroom.

Presenter: **John P. Curran**, Eastern Michigan University

MAA Minicourse: #13: Part B

9:00 AM – 11:00 AM **Room 344, BCC**

Teaching an applied topology course.

Presenters: **Colin Adams**, Williams College

Robert Franzosa, University of Maine

SIGMAA on Math Circles Presentation

9:00 AM – 9:50 AM **Room 327, BCC**

Demonstration for professional mathematicians as participants.

Organizers: **Paul Zeitz**, University of San Francisco

Tatiana Shubin, San Jose State University

Student Hospitality/Information Center

9:00 AM – 3:00 PM **Swing Hall, 100 Level, BCC**

NAM Panel Discussion

9:00 AM – 9:50 AM **Room 326, BCC**

Title to be announced.

Exhibits and Book Sales

9:00 AM – NOON **Exhibit Hall F, 100 Level, BCC**

ASL Invited Address

10:00 AM – 10:50 AM **Room 319, BCC**

(2210) *The complexity of isomorphism problems in symbolic dynamics.*
Su Gao, University of North Texas

SIGMAA on Math Circles Workshop

10:00 AM – 10:50 AM **Room 327, BCC**

Weird ways to work with pi: An accessible and interactive presentation for middle-and high-school educators.

Presenter: **James Tanton**, St. Mark's School

NAM Business Meeting

10:00 AM – 10:50 AM **Room 326, BCC**

MAA Invited Address

10:05 AM – 10:55 AM **Ballrooms I&II, 400 Level, BCC**

(2211) *Heron, Newton, Euler, and Barney.*
William Dunham, Muhlenberg College (1096-A0-12)

MAA Business Meeting

11:10 AM – 11:40 AM **Ballrooms I&II, 400 Level, BCC**

Chair: **Robert Devaney**, Boston University

AMS Business Meeting

11:45 AM – 12:15 PM **Ballrooms I&II, 400 Level, BCC**

NAM Claytor-Woodard Lecture

1:00 PM – 1:50 PM **Room 326, BCC**

(2212) *On the structure of βS_J.*
Arthur D. Grainger, Morgan State University (1096-20-2789)

AMS Special Session on Algebraic and Analytic Aspects of Integrable Systems and Painlevé Equations, II

1:00 PM – 5:50 PM **Room 320, BCC**

Organizers: **Anton Dzhamay**, University of Northern Colorado
Kenichi Maruno, University of Texas-Pan America
Christopher Ormerod, California Institute of Technology

1:00PM (2213) *Padé interpolation and hypergeometric series.* Preliminary report.
Masatoshi Noumi, Kobe University, Japan (1096-33-875)

2:00PM (2214) *Schrödinger systems from hypergeometric integrals of Euler type.*
Hajime Nagoya, Rikkyo University (1096-33-770)

2:30PM (2215) *Dispersionless limits of Hirota equations for map enumeration.*
Virgil U Pierce, University of Texas – Pan American (1096-35-1747)

3:00PM (2216) *The inverse scattering transform for the focusing nonlinear Schrödinger equation with fully asymmetric non-zero boundary conditions.* Preliminary report.
Barbara Prinari, University of Colorado at Colorado Springs and University of Salento (1096-35-2156)

3:30PM (2217) *Nonlinear Schrodinger systems with non-zero boundary conditions.*
Gino Biondini, State University of New York at Buffalo (1096-35-2421)

4:00PM (2218) *An IST-like solution to the Cauchy problem for a soliton cellular automaton.*
Ralph Willox*, the University of Tokyo, **Alfred Ramani**, Ecole Polytechnique, **Basil Grammaticos**, Paris VII & XI University, and **Junkichi Satsuma**, Aoyama Gakuin University (1096-39-556)

► 4:30PM (2219) *Twisted reductions of integrable lattice equations, and their Lax representations.*
Christopher M Ormerod, California Institute of Technology (1096-39-1676)

5:00PM (2220) *The pentagram map and the discrete Boussinesq equation.* Preliminary report.
Kenichi Maruno*, The University of Texas - Pan American, and **Jarmo Hietarinta**, Department of Physics and Astronomy, University of Turku (1096-39-2268)

5:30PM Discussion

AMS Special Session on Banach Spaces, Metric Embeddings, and Applications, II

1:00 PM – 6:20 PM **Room 331, BCC**

Organizers: **Mikhail Ostrovskii**, St. John's University
Beata Randrianantoanina, Miami University

1:00PM (2221) *Coarse differentiation of Lipschitz functions.*
Sean Li, The University of Chicago (1096-46-1224)

1:30PM (2222) *L_1 embeddings of geometrically restricted planar graphs.*
Anastasios Sidiropoulos, The Ohio State University (1096-68-2239)

2:00PM (2223) *Markov type and threshold embeddings.*
Yuval Peres, Microsoft Research (1096-46-2330)

3:00PM (2224) *Uniform embedding of groups into Banach spaces.*
Mark Sapir, Vanderbilt University (1096-20-383)

4:00PM (2225) *Super-expanders.*
Assaf Naor, New York University, Courant Institute (1096-51-440)

5:00PM (2226) *Negative type properties of finite ultrametric spaces.* Preliminary report.
Anthony R Weston, Canisius College (1096-46-642)

5:30PM (2227) *Expanders and K-theory.*
Rufus Willett, University of Hawaii at Manoa (1096-19-384)

6:00PM (2228) *Lipschitz p-nuclear operators from a finite metric space into a Banach space.*
Dongyang Chen, Xiamen University, and **Bentuo Zheng***, University of Memphis (1096-46-606)

AMS Special Session on Categorical Topology, II

1:00 PM – 5:20 PM **Room 330, BCC**

Organizers: **Frédéric Mynard**, Georgia Southern University
Gavin Seal, École Polytechnique Fédérale de Lausanne

1:00PM (2229) *The reflection of certain categories of domains in the category of commutative semiprime rings.* Preliminary report.
Robert Rapael, Concordia University, Montreal Canada (1096-13-746)

2:00PM (2230) *Regularity, function spaces and contractive extensions in Convergence Approach Spaces.*
Eva Colebunders, Vrije Universiteit Brussel, Belgium, **Frederic Mynard*** and **William Trott**, Georgia Southern University (1096-54-1542)

2:30PM (2231) *Duality of topological algebras and bornologies.*
Gábor Lukács, Halifax, NS (1096-18-1963)

3:30PM (2232) *The Escardó-Lawson-Simpson Construction.*
Jean Goubault-Larrecq, ENS Cachan (1096-18-1118)

4:30PM (2233) *Cauchy Continuous Actions.*
Bernd Losert and **Gary Richardson***, University of Central Florida (1096-54-507)

5:00PM (2234) *Convergence Space Actions.* Preliminary report.
Hatim Boustique*, Valencia College, **Bernd Losert**, University of Central Florida, and **Gary Richardson**, University of Central Florida (1096-54-510)

AMS Special Session on Communication of Mathematics via Interactive Activities

1:00 PM – 5:50 PM **Room 314, BCC**

Organizers: **Benjamin Levitt**, National Museum of Mathematics
Glen Whitney, National Museum of Mathematics

► 1:00PM (2235) *The Meaning of the Mean.* Preliminary report.
Bobson Wong, Bayside High School (1096-62-224)

► 1:30PM (2236) *Shapes (and Rates) of Vases.*
Heidi Burgiel, Bridgewater State University (1096-97-1928)

► 2:00PM (2237) *The effects of STEAM-centered modules on student learning.* Preliminary report.
Christina C Chestnut*, **Anneliese E Haines** and **L E Nichols**, Stoked on STEAM (1096-97-2072)

► 2:30PM (2238) *Inquiry-based problem solving strategies through interactive approaches for engaging students in mathematics.* Preliminary report.
Padmanabhan Seshaiyer* and **Jennifer Suh**, George Mason University (1096-97-294)

► 3:00PM (2239) *Permutation Playthings and Transformation Toys.*
Thomas Q. Sibley, St. John's University, College of St. Benedict (1096-20-341)

► 3:30PM (2240) *Using Technology Tools to Communicate Mathematics.*
Sandra Richardson, Virginia State University (1096-97-1732)

► 4:00PM (2241) *iMPaCT-Math: Using Programming Activities to Motivate Exploration of Foundational Concepts in High-School Algebra.*
Kien H Lim* and **Eric Freudenthal**, University of Texas at El Paso (1096-97-664)

► 4:30PM (2242) *Crafting activities which analyze QR codes.*
Sarah E. Anderson* and **Gretchen L. Matthews**, Clemson University (1096-97-830)

► 5:00PM (2243) *How Calculators Calculate: The Good, The Bad, The Truly Ugly-A Hands-On Tour.*
Paul R Bouthellier, University of Pittsburgh-Titusville (1096-65-195)

► 5:30PM (2244) *Chocolate covered pi.*
Tim Chartier*, Davidson College, and **Austin Totty**, Hammond School (1096-65-781)

AMS Special Session on De Bruijn Sequences and Their Generalizations, II

1:00 PM – 4:20 PM **Room 303, BCC**

Organizers: **Abbas Alhakim**, American University of Beirut
Steven Butler, Iowa State University

1:00PM (2245) *A potpourri of generalized De Bruijn sequences.* **Anant P Godbole**, East Tennessee State University (1096-05-36)

► 1:30PM (2246) *A 'Hot Potato' Gray code for Permutations.* Preliminary report. **Xi Sisi Shen***, Columbia University, and **Aaron Williams**, McGill University (1096-05-378)

2:00PM (2247) *Modified de Bruijn Sequences and m-Sequences.* Preliminary report. **Solomon W Golomb**, University of Southern California (1096-05-1226)

► 3:00PM (2248) *Greedy Constructions of de Bruijn Sequences and Gray Codes.* **Aaron Williams**, University of Guelph (1096-05-2515)

► 3:30PM (2249) *Generating and Compressing De Bruijn Sequences Using Preference Diagrams.* **Abbas M Alhakim**, American University of Beirut (1096-05-601)

► 4:00PM (2250) *A Point of Tangency Between Combinatorics and Differential Geometry.* **Francis C. Motta***, **Patrick D. Shipman**, Colorado State University, and **Bethany Springer**, Regis University (1096-05-1750)

AMS Special Session on Dispersive and Geometric Partial Differential Equations, II

1:00 PM – 6:20 PM **Room 322, BCC**

Organizers: **Shuanglin Shao**, University of Kansas
Chongchun Zeng, Georgia Institute of Technology
Shijun Zheng, Georgia Southern University

1:00PM (2251) *Uniform estimates for Fourier restriction to polynomial curves in $\mathbb{R}^d$.* **Betsy Stovall**, University of Wisconsin, Madison (1096-42-1562)

1:30PM (2252) *Bochner-Riesz estimates for functions with vanishing Fourier transform.* Preliminary report. **Michael Goldberg**, University of Cincinnati (1096-42-1403)

2:00PM (2253) *Discrete Fourier restriction associated with Schrödinger equations.* **Yi Hu***, Georgia Southern University, and **Xiaochun Li**, University of Illinois at Urbana-Champaign (1096-42-178)

2:30PM (2254) *Derivation of the 1D focusing nonlinear Schrödinger equation from quantum many-body dynamics.* **Xuwen Chen** and **Justin Holmer***, Brown University (1096-35-1706)

3:00PM (2255) *The nonlinear Schrodinger equation on quotients of the Euclidean space.* **Benoit Pausader**, Princeton University (1096-35-1912)

3:30PM (2256) *Stability of traveling waves of Gross-Pitaevskii equation.* **Zhiwu Lin***, **Chongchun Zeng**, Georgia Institute of Technology, and **Zhengping Wang**, Wuhan Institute of Physics and Mathematics (1096-35-1915)

4:00PM (2257) *Gibbs measure evolution and probabilistic global well-posedness for radial nonlinear Schrödinger and wave equations on the unit ball.* **Aynur Bulut**, University of Michigan and IAS (1096-35-2728)

4:30PM (2258) *Invariant measures for the Benjamin-Ono equation.* **Yu Deng**, Princeton University (1096-35-2068)

► 5:00PM (2259) *Li-Yau type gradient estimates and new bound estimates for the parabolic kernel of the Schrödinger operator on manifolds with negative curvature.* Preliminary report. **Junfang Li**, University of Alabama at Birmingham, and **Xiangjin Xu***, Binghamton University-SUNY (1096-35-273)

5:30PM (2260) *Wellposedness of the Chern-Simons-Schroedinger System.* **Paul Smith***, UC Berkeley, and **Baoping Liu**, University of Chicago (1096-35-2008)

6:00PM (2261) *Recent development on sharp Moser-Trudinger-Adams type inequalities.* **Nguyen H Lam**, Wayne State University (1096-35-1248)

AMS Special Session on Ergodic Theory and Symbolic Dynamics, III

1:00 PM – 5:50 PM **Room 302, BCC**

Organizers: **Aimee Johnson**, Swarthmore College
Cesar Silva, Williams College

► 1:00PM (2262) *Optimally Topologically Transitive Orbits of the Bernoulli Shift Map.* **Francis C. Motta***, **Patrick D Shipman**, Colorado State University, and **Bethany Springer**, Regis University (1096-37-841)

1:30PM (2263) *Topological mixing for residual sets of interval exchange transformations.* **Jon Chaika***, University of Utah, and **Jon Fickensher**, Princeton University (1096-37-916)

2:00PM (2264) *Weakly Mixing Vs. Rigid in the Infinite Setting.* Preliminary report.
Kelly B Yancey*, University of Maryland, and **Rachel Bayless**, Agnes Scott College (1096-37-1610)

2:30PM (2265) *Speedup equivalence of ergodic $\mathbb{Z}^d-$actions.*
David M. McClendon*, Ferris State University, and **Aimee S.A. Johnson**, Swarthmore College (1096-37-415)

3:00PM (2266) *The isomorphism problem for rank-1 systems.* Preliminary report.
Su Gao and **Aaron Hill***, University of North Texas (1096-37-209)

3:30PM (2267) *Second Order Ergodic Theorem for Substitution Tiling Systems.*
Konstantin Medynets*, United States Naval Academy, and **Boris Solomyak**, University of Washington (1096-37-469)

4:00PM (2268) *Orbit Equivalence Classes of p-adic Transformations.*
Joanna Marie Furno, Dickinson College (1096-37-2090)

► 4:30PM (2269) *Weak Rational Ergodicity and Rank-One Transformations.* Preliminary report.
Jane Wang*, Princeton University, **Francisc Bozgan**, UCLA, **Anthony Sanchez**, Arizona State University, **Cesar E Silva** and **David Stevens**, Williams College (1096-37-1919)

5:00PM (2270) *Parry's topological transitivity and f-expansions.*
E. Arthur Robinson, Jr., George Washington University (1096-37-427)

► 5:30PM (2271) *Bernoulli properties and Julia sets for maps of the real projective plane.* Preliminary report.
Jane M. Hawkins, NSF/University of N. Carolina at Chapel Hill (1096-37-495)

AMS Special Session on Global Dynamics and Bifurcations of Difference Equations, II

1:00 PM – 5:20 PM **Room 329, BCC**

Organizers: **Mustafa Kulenovic**, University of Rhode Island
Orlando Merino, University of Rhode Island

► 1:00PM (2272) *Global Dynamics of Triangular maps.*
Saber N. Elaydi*, **E Balreira**, Trinity University, and **R Luis**, Portugal (1096-39-663)

1:30PM (2273) *Pseudo-automorphisms of point blowups of projective space.* Preliminary report.
Eric Bedford, Stony Brook University (1096-37-1127)

2:00PM (2274) *Pseudo-automorphims with an invariant elliptic curve.*
Eric Bedford, Indiana University, **Jeffery Diller**, University of Notre Dame, and **Kyounghee Kim***, Florida State University (1096-37-876)

► 2:30PM (2275) *Bifurcations In A Discrete-Time SIMS Epidemic Model with Predator-Induced and Mating Limitation-Induced Allee Effects.*
Abdul-Aziz Yakubu*, Howard University, and **Najat Ziyadi**, Morgan State University (1096-92-470)

► 3:00PM (2276) *Nabla Fractional Difference Equations.*
Allan Peterson, University of Nebraska-Lincoln (1096-39-439)

► 3:30PM (2277) *Surprising Properties of Fractional Difference Operators.*
Christopher S. Goodrich, University of Rhode Island (1096-39-2447)

4:00PM (2278) *Reducibility of Planar Systems.* Preliminary report.
H. Sedaghat, Virginia Commonwealth University (1096-39-1724)

4:30PM (2279) *Generalised fractional Hermite-Hadamard Inequalities involving m-convexity and (s,m)-convexity.*
George A Anastassiou, University of Memphis (1096-26-25)

► 5:00PM (2280) *Global Dynamics of Quadratic Second Order Difference Equation in the First Quadrant.*
Jasmin Bektesevic, University of Sarajevo, **Mustafa R. S. Kulenovic***, University of Rhode Island, and **Esmir Pilav**, University of Sarajevo (1096-39-1537)

AMS Special Session on Heavy Tailed Probability Distributions and Their Applications, II

1:00 PM – 3:50 PM **Room 301, BCC**

Organizers: **Tuncay Alparslan**, American University
John P. Nolan, American University

1:00PM (2281) *Ruin with Single and Multiple Streams of Stable Claims.*
U. Tuncay Alparslan, American University (1096-60-2331)

1:30PM (2282) *Tempered fractional stable motion.*
Farzad Sabzikar* and **Mark M Meerschaert**, Michigan State University (1096-60-1074)

2:00PM (2283) *Properties of tempered stable distributions.*
Michael Grabchak, UNC Charlotte (1096-60-958)

2:30PM (2284) *Trace estimates for relativistic stable processes.*
Hyunchul Park*, The College of William and Mary, and **Renming Song**, UIUC (1096-60-179)

3:00PM (2285) *On a class of stable random processes that are self-similar but do not have stationary increments.* Preliminary report.
Joshua Levy, University of Massachusetts Lowell (1096-60-313)

3:30PM (2286) *Calibration of Stable Distributions to Option Prices.* Preliminary report.
Jeff Hamrick, University of San Francisco (1096-60-2718)

AMS Special Session on Highlighting Achievements and Contributions of Mathematicians of the African Diaspora, II

1:00 PM – 5:50 PM **Room 317, BCC**

Organizers: **Asamoah Nkwanta**, Morgan State University
Talitha M. Washington, Howard University

1:00PM ► (2287) *Mathematics: A Foundation for Advancing Research in Graduate Engineering Education.*
Monica Farmer Cox, Purdue University (1096-00-767)

1:30PM ► (2288) *Mathematicians of the African Diaspora on the Web.* Preliminary report.
Donald R. King, Northeastern University (1096-01-131)

2:00PM ► (2289) *Conferences for African-American Researchers in the Mathematical Sciences (CAARMS).* Preliminary report.
William Alfred Massey, Princeton University, Department of Operations Research and Financial Engineering (1096-01-1920)

2:30PM ► (2290) *"Representing the Race": Black Mathematicians and the Paths to Excellence.*
Erica N Walker, Teachers College, Columbia University (1096-01-332)

3:00PM ► (2291) *Benjamin Banneker's Original Handwritten Document: Observations and Study of the Cicada.*
Janet E Barber*, Central Michigan University and Prince George's Community College, and **Asamoah Nkwanta**, Morgan State University (1096-01-100)

3:30PM ► (2292) *The Influence of John Robert Kline on African-American Mathematics.* Preliminary report.
Idris Stovall, University of Pennsylvania / The Franklin Institute (1096-01-1949)

4:00PM ► (2293) *African Americans in Topology.* Preliminary report.
Scott W. Williams, University at Buffalo, SUNY (1096-01-104)

4:30PM ► (2294) *Mathematics at Howard University: 1900 – 1960.* Preliminary report.
James A. Donaldson, Howard University (1096-01-514)

5:00PM ► (2295) *Learning Mathematics With Clarence Stephens.*
Earl R Barnes, Madison, Georgia (1096-01-536)

5:30PM ► (2296) *Understanding the Experiences African American Mathematics Scholars: A Success Based Framework to Promote and Cultivates Success and Persistence in Mathematics.*
Roni M Ellington, Morgan State University (1096-97-94)

AMS Special Session on Quantum Walks, Quantum Computation, and Related Topics, II

1:00 PM – 4:50 PM **Room 323, BCC**

Organizers: **Chaobin Liu**, Bowie State University
Takuya Machida, University of Tokyo
Nelson Petulante, Bowie State University
Salvador E. Venegas-Andraca, Tecnológico de Monterrey, Campus Estado de México

1:00PM (2297) *Asymptotics of one-dimensional quantum walks.*
Tatsuya Tate, Graduate School of Sciences, Tohoku University (1096-46-1885)

1:30PM (2298) *quantum walk and zeta function of a graph.*
Iwao Sato*, Oyama National College of Technology, **Norio Konno**, Yokohama National University, **Yusuke Higuchi**, Showa University, and **Etsuo Segawa**, Tohoku University (1096-60-1524)

2:00PM (2299) *Limit distribution of a 2-state quantum walk on the line with a delocalized initial state.*
Takuya Machida, Research Fellow of Japan Society for the Promotion of Science (1096-81-935)

2:30PM (2300) *Limit behaviors of quantum walks and spectral measure on the unit circle.*
Etsuo Segawa, Tohoku university (1096-60-1119)

3:00PM (2301) *Results on the Hölder continuity of spectral measures of an extended CMV matrix.*
Darren C. Ong* and **Paul Munger**, Rice University (1096-47-276)

3:30PM (2302) *Universal State Transfer.*
Stephen Philip Cameron*, The College of William & Mary, and **Christino Tamon**, Clarkson University (1096-15-2184)

4:00PM (2303) *A Characterization of Continuous-time Quantum Walk with Phase Parameters.* Preliminary report.
Clement Boateng Ampadu, Boston, MA (1096-60-471)

4:30PM (2304) *Construction of a Functorial Euclidean QFT.* Preliminary report.
Santosh Kandel, University of Notre Dame (1096-81-2414)

AMS Special Session on Reaction Diffusion Equations and Applications, II

1:00 PM – 5:50 PM **Room 324, BCC**

Organizers: **Jerome Goddard,II**, Auburn University Montgomery

Ratnasingham Shivaji, University of North Carolina Greensboro

1:00PM (2305) *Evolutionary stability of ideal free dispersal in spatial population models with nonlocal dispersal.*
Robert Stephen Cantrell, **Chris Cosner***, University of Miami, **Yuan Lou**, Ohio State University, and **Daniel Ryan**, NIMBioS (1096-92-1372)

1:30PM (2306) *Diffusion-Driven Instability.*
Georg Hetzer, Auburn University (1096-35-1296)

2:00PM (2307) *Local behavior of Continua of Solutions for Asymptotically Linear Systems.*
Maya Chhetri*, UNC Greensboro, and **Petr Girg**, University of West Bohemia, Czech Republic (1096-35-1409)

2:30PM (2308) *Existence and nonexistence of positive solutions to exterior domain superlinear semipositone system.*
A Abebe*, **M Chhetri**, University of North Carolina at Greensboro, **L Sankar**, Mississippi State University, and **R Shivaji**, University of North Carolina at Greensboro (1096-35-451)

3:00PM (2309) *Asymptotic Constancy for Solutions of Neutral Functional Partial Differential Equations.*
M. N. Nkashama, University of Alabama at Birmingham (1096-35-2574)

3:30PM (2310) *Resonance problems with respect to the Fucik Spectrum.*
Stephen Robinson*, Wake Forest University, and **Pavel Drabek**, University of West Bohemia (1096-35-1521)

4:00PM (2311) *Bifurcation and multiplicity for elliptic equations with nonlinear boundary conditions.*
N. Mavinga*, Swarthmore College, and **M. N. Nkashama**, University of Alabama at Birmingham (1096-35-2562)

4:30PM (2312) *Approximations of Random Dispersal Operators/Equations by Nonlocal Dispersal Operators/Equations.*
Wenxian Shen and **Xiaoxia Xie***, Auburn University (1096-35-946)

5:00PM (2313) *Optimal fishery harvesting on a nonlinear parabolic PDE in a heterogeneous spatial domain.*
Preliminary report.
Michael R. Kelly* and **Suzanne Lenhart**, University of Tennessee, Knoxville (1096-49-649)

5:30PM (2314) *Traveling wave solutions with mixed dispersal for spatially periodic Fisher-KPP equations.*
Aijun Zhang, Drexel University (1096-37-1268)

AMS Special Session on Recent Advances in Homogenization and Model Reduction Methods for Multiscale Phenomena, II

1:00 PM – 5:50 PM **Room 318, BCC**

Organizers: **Silvia Jiménez Bolaños**, Worcester Polytechnic Institute

Burt S. Tilley, Worcester Polytechnic Institute

1:00PM ► (2315) *Double Negative Behavior in Metamaterials.*
Yue Chen*, University of Kentucky, and **Robert Lipton**, Louisiana State University (1096-35-334)

1:30PM (2316) *Finite element simulation of laminar three-dimensional particulate flows.*
Yuliya Gorb*, University of Houston, **Dmitri Kuzmin**, University Erlangen-Nuremberg, Germany, and **Otto Mierka**, Dortmund University of Technology (1096-35-1815)

2:00PM (2317) *Reduction in complexity in Multi-agents models.*
Pierre-Emmanuel Jabin*, University of Maryland, and **Denis Talay**, Inria Sophia-Antipolis (1096-35-1692)

2:30PM (2318) *Homogenization of nonlinear elliptic operators and periodic approximations.*
Alexander Pankov, Morgan State University (1096-35-582)

3:00PM (2319) *Up-scaling Reaction Rates from Pore to Core Scale.*
W. Brent Lindquist*, Stony Brook University, and **Daesang Kim**, King Abdullah University of Science and Technology (1096-76-1889)

3:30PM (2320) *Soret effects in electrokinetically-driven heat exchangers for electronics applications.*
B. S. Tilley*, Worcester Polytechnic Institute, **S. Jimenez**, Colgate University, and **B. Vernescu**, Worcester Polytechnic Institute (1096-35-478)

4:00PM (2321) *Homogenization for a kinetic description of self-assembly of fibrous materials.*
Adrian Muntean, Eindhoven University of Technology, The Netherlands (1096-35-2019)

4:30PM ► (2322) *Ideally plastic composites.*
Guillermo H Goldsztein, Georgia Tech (1096-74-912)

5:00PM ► (2323) *Homogenization for Free Boundary Problems in Layered Porous Media.*
Daniel M Anderson, George Mason University (1096-76-1237)

5:30PM (2324) *On reconstruction of dynamic permeability and tortuosity of poroelastic materials.*
M. Yvonne Ou, University of Delaware (1096-82-1666)

AMS Special Session on Representation Theory of p-adic Groups and Automorphic Forms, II

1:00 PM – 2:20 PM **Room 321, BCC**

Organizers: **Arsalan Chademan**, University of Kurdistan
Manouchehr Misaghian, Prairie View A&M University

1:00PM (2325) *Building Toward a "Twisted" Theta Correspondence.* Preliminary report.
Christian Zorn, Laurel, MD (1096-22-1244)

1:30PM (2326) *Test Vectors and Central L-values for GL(2).*
Daniel W. File*, Muhlenberg College, **Kimball Martin** and **Ameya Pitale**, University of Oklahoma (1096-11-2107)

2:00PM (2327) *A constuction of rigid analytic cohomology classes for split reductive linear algebraic groups.*
Bonita Lynn Graham, Wesleyan University (1096-11-1580)

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

1:00 PM – 5:50 PM **Room 328, BCC**

Organizers: **Bernard Brooks**, Rochester Institute of Technology
Jobby Jacob, Rochester Institute of Technology
Jacqueline Jensen-Vallin, Slippery Rock University
Carl Lutzer, Rochester Institute of Technology
Darren Narayan, Rochester Institute of Technology
Tamas Wiandt, Rochester Institute of Technology

1:00PM (2328) *A graph theoretic analysis of betweenness centrality in transportation and biological networks.*
Emily Carter* and **Danielle Gonzalez**, Rochester Institute of Technology (1096-05-106)

► 1:30PM (2329) *New Bounds on the Bipartite Ramsey Number b(2,5).*
Alex Weinstock-Collins*, Rochester Institute of Technology, and **Ethan Mark**, University of California - Berkeley (1096-05-107)

► 2:00PM (2330) *Basins of attraction of ECM solutions of the Lang-Kobayashi system.*
Robyn Ferg*, St. Olaf College, and **Anna Szczekutowicz**, Rutgers University (1096-37-108)

► 2:30PM (2331) *Community detection in graphs based on a generalization of modularity.*
David Mehrle*, Carnegie Mellon University, and **Amy Strosser**, Mount St. Mary's University (1096-05-109)

► 3:00PM (2332) *Numerical Analysis of Cardiac Electrophysiology Models.*
Josh Jacobson*, St. Olaf College, and **Peter Valdez**, Hunter College (1096-37-128)

► 3:30PM (2333) *Failed zero forcing and failed skew zero forcing on graphs.*
Thomas Ansill, Rochester Institute of Technology, **Bonnie Jacob**, National Technical Institute for the Deaf at Rochester Institute of Technology, **Jaime Penzellna** and **Daniel Saavedra***, Rochester Institute of Technology (1096-05-2093)

► 4:00PM (2334) *Restricted Feedback Control of a Cardiac Arrhythmia.*
Kathryn G. Workman*, **Shuang Zhao** and **John W. Cain**, University of Richmond (1096-92-566)

► 4:30PM (2335) *Modeling the Human Tear Film during a Blink while Wearing a Contact Lens.* Preliminary report.
Maria A. Corsaro*, University of Notre Dame, **Dan Anderson** and **Padmanabhan Seshaiyer**, George Mason University (1096-92-1549)

► 5:00PM (2336) *Sandpile Models on Fractal Graphs.* Preliminary report.
Ilse Haim, University of Maryland, **Robert Strichartz** and **Travis Westura***, Cornell University (1096-00-270)

5:30PM (2337) *Maximal Rank for Sections of Curves.*
Eric Larson, Massachusetts Institute of Technology (1096-14-2740)

AMS Special Session on Set-Valued Optimization and Variational Problems with Applications, II

1:00 PM – 5:50 PM **Room 332, BCC**

Organizers: **Akhtar Khan**, Rochester Institute of Technology
Mau Nam Nguyen, Portland State University
Miguel Sama, Universidad Nacional de Educacin e Distancia
Christiane Tammer, Martin Luther University of Halle-Wittenberg

1:00PM (2338) *Stochastic Approximation Schemes for Stochastic Variational Inequality Problems.*
Uday V Shanbhag, Pennsylvania State University (1096-90-1687)

1:30PM (2339) *Coderivative Characterizations of Local Monotonicity with Applications to Variational Systems.*
Nghia T. A. Tran, Irving K. Barber School, University of British Columbia (1096-49-1649)

2:00PM (2340) *Error estimates for conical regularization of abstract optimization problems.*
Baasansuren Jadamba, **Akhtar Khan**, Rochester Institute of Technology, and **Miguel Sama***, Universidad Nacional de Educación a Distancia (UNED) (1096-49-1525)

2:30PM (2341) *On the Density of Henig Efficeint Points in Locally Convex Topological Vector Spaces.*
Joseph Newhall*, Zayed University, Dubai, UAE, and **Robert K. Goodrich**, University of Colorado, Boulder (1096-46-1335)

► 3:00PM (2342) *Method of Cyclic Relaxed Projections for Nonconvex Systems.* Preliminary report.
Heinz H Bauschke, **Hung M Phan*** and **Xianfu Wang**, University of British Columbia Okanagan (1096-49-1759)

3:30PM (2343) *Vectorial Ekeland's variational principle with respect to the variable order structure.*
Behnam Soleimani* and **Christiane Tammer**, Martin-Luther-University Halle-Wittenberg (1096-90-2021)

4:00PM (2344) *The Rogalski-Cornet-type Surjectivity Theorem without Continuity Assumptions.*
Yingfan Liu, Nanjing University of Post and Telecommunications, and **Qinghong Zhang***, Northern Michigan University (1096-46-694)

4:30PM (2345) *Optimal solutions to a root minimization problem over a polynomial family with two constraints.* Preliminary report.
Julia Eaton*, University of Washington Tacoma, and **Michael Overton**, New York University (1096-49-2350)

5:00PM (2346) *Optimality Conditions for Problems of Geometric Optimal Control.* Preliminary report.
Robert J Kipka* and **Yuri S. Ledyaev**, Western Michigan University (1096-49-1101)

5:30PM (2347) *On Multi-valued Quasi Variational Inequalities.* Preliminary report.
Akhtar A Khan, Rochester Institute of Technology (1096-49-2551)

AMS Special Session on Trends in Graph Theory, II

1:00 PM – 5:50 PM **Room 315, BCC**

Organizer: **Ralucca Gera**, Naval Postgraduate School

1:00PM (2348) *The minimum rank of the set of symmetric zero-diagonal matrices associated with a graph.*
Cheryl Grood, Swarthmore College, **Johannes Harmse**, Azusa Pacific University, **Leslie Hogben**, Iowa State University and American Institute of Mathematics, **Thomas J. Hunter**, Swarthmore College, **Bonnie Jacob***, National Technical Institute for the Deaf at Rochester Institute of Technology, **Andrew Klimas**, Xavier University of Louisiana, and **Sharon McCathern**, Azusa Pacific University (1096-05-1418)

1:30PM (2349) *A Straight and Non-overlapping Walk on $n \times n$ Grid: Hamiltonian and Rectifiable Paths.*
Arni S.R. Srinivasa Rao*, Georgia Regents University, **Damer Blake** and **Fiona Tomley**, Royal Vet College, University of London (1096-05-165)

► 2:00PM (2350) *A prime factor theorem for bipartite graphs.*
Richard Hammack, Virginia Commonwealth University (1096-05-121)

► 2:30PM (2351) *New examples of strongly regular Cayley graphs.*
Eric A Swartz, The University of Western Australia (1096-05-2610)

► 3:00PM (2352) *Prime factorization in the generalized hierarchical product.*
Kirsti Wash, Clemson University (1096-05-752)

3:30PM (2353) *On independent sets in Cayley graphs over $\mathbb{Z}$.* Preliminary report.
James M. Carraher, **Stephen G. Hartke**, University of Nebraska-Lincoln, **David Galvin**, Notre Dame University, **A. J. Radcliffe**, University of Nebraska-Lincoln, and **Derrick Stolee***, Iowa State University (1096-05-2349)

► 4:00PM (2354) *Graph isomorphisms via discrete Morse theory.*
Nicholas A Scoville*, Ursinus College, **Seth Aaronson**, Temple University, **Mitch Smith**, University of Tennessee at Knoxville, **Marie Meyer**, University of Kentucky, and **Laura Stibich**, Johnstown, PA (1096-05-2058)

4:30PM (2355) *Matchings and eigenvalues in regular graphs or multigraphs.* Preliminary report.
Suil O, Georgia State University (1096-05-134)

5:00PM (2356) *Recent Development of Randic Connectivity Index and Applications in Life Sciences.*
Aihua Li, Montclair State University (1096-05-2665)

5:30PM ► (2357) *On a connection between commutative rings and graphs.*
Christopher Park Mooney, Viterbo University (1096-13-2385)

MAA Invited Paper Session on Six Crash Courses on Mapping Class Groups, II

1:00 PM – 4:45 PM **Room 308, BCC**

Organizers: **Benson Farb**, University of Chicago
Dan Margalit, Georgia Institute of Technology

1:00PM ► (2358) *Pseudo-Anosovs and the dynamics of surface homeomorphisms.*
Spencer Dowdall, University of Illinois at Urbana-Champaign (1096-AG-1606)

2:00PM ► (2359) *Hyperbolic geometry and surface bundles.*
Christopher J Leininger, University of Illinois at Urbana–Champaign (1096-AG-2694)

3:00PM (2360) *Characteristic classes for surface bundles.*
Dan Margalit, Georgia Institute of Techonology (1096-AG-2744)

4:00PM (2361) *Open problems on mapping class groups and related topics.*
Benson Farb, University of Chicago (1096-AG-2754)

MAA Minicourse #2: Part B

1:00 PM – 3:00 PM **Room 342, BCC**

CATALST: Introductory statistics using randomization and bootstrap methods.

Presenters: **Andrew Zieffler**, University of Minnesota
Robert delMas, University of Minnesota
Nicola Parker, University of Minnesota

MAA Minicourse: #10: Part B

1:00 PM – 3:00 PM **Room 344, BCC**

Heavenly mathematics: The forgotten art of spherical trigonometry.

Presenters: **Glen Van Brummelen**, Quest University
Joel Silverberg, Roger Williams University

MAA Minicourse #5: Part B

1:00 PM – 3:00 PM **Room 343, BCC**

Using randomization methods to build conceptual understanding of statistical inference.

Presenters: **Robin H. Lock**, St. Lawrence University
Patti Frazer Lock, St. Lawrence University
Kari Lock Morgan, Duke University
Eric Frazer Lock, Duke University
Dennis Frazer Lock, Iowa State University

AMS Session on Algebraic Geometry

1:00 PM – 6:10 PM **Room 312, BCC**

1:00PM (2362) *Rational Pairs: Motivation and Results.* Preliminary report.
Lindsay Erickson, University of Washington, Seattle (1096-14-370)

1:15PM (2363) *The primitive cohomology of the theta divisor of an abelian fivefold.*
Elham Izadi, University of California, San Diego, **CS Tamás**, N/A, and **Jie Wang***, University of Georgia (1096-14-1449)

1:30PM (2364) *Strong CM Lifting Problem.*
Taisong Jing, University of Pennsylvania (1096-14-1900)

1:45PM (2365) *Kisin modules which correspond to monogenic Hopf algebras.* Preliminary report.
Alan Koch, Agnes Scott College (1096-14-2096)

2:00PM (2366) *Derived intersections and the Hodge theorem.*
Marton Hablicsek*, **Andrei Caldararu** and **Dima Arinkin**, University of Wisconsin-Madison (1096-14-2516)

2:15PM (2367) *Bivariant Equivariant Cobordism.*
Jose Luis Gonzalez* and **Kalle Karu**, University of British Columbia (1096-14-1523)

2:30PM (2368) *Intersection theory on singular varieties.* Preliminary report.
Joseph A Ross* and **Eric M Friedlander**, University of Southern California (1096-14-1961)

2:45PM (2369) *The moduli stack of parabolic bundles and the additive Deligne-Simpson problem.*
Alexander Soibelman, University of North Carolina, Chapel Hill (1096-14-2405)

3:00PM (2370) *Hitchin's conjecture for simply-laced Lie algebras implies that for any simple Lie algebra.*
Nathaniel F. Bushek, University of North Carolina at Chapel Hill (1096-14-2412)

3:15PM (2371) *A Study of the Saturated Tensor Cone for Symmetrizable Kac-Moody Algebras.*
Merrick L Brown, Chapel Hill (1096-14-2409)

3:30PM (2372) *Normalized Berkovich spaces and surface singularities.* Preliminary report.
Lorenzo Fantini, University of Leuven (1096-14-2167)

3:45PM (2373) *Automorphisms of genus 2 Berkovich analytic curves and their skeletons.* **Amy Ksir** and **Caroline Grant Melles***, United States Naval Academy (1096-14-2182)

4:00PM (2374) *Mirror Symmetry on Toric Surfaces via Tropical Geometry.* **M Brandon Meredith**, University of California, San Diego (1096-14-2737)

4:15PM (2375) *Exceptional linear series on curves.* **Nathan Pflueger**, Harvard University (1096-14-1835)

4:30PM (2376) *On 2-Weierstrass points of genus 3 hyperelliptic curves with extra automorphisms.* **Caleb McKinley Shor**, Western New England University (1096-14-1875)

4:45PM (2377) *The compactification of moduli space of Burniat surfaces with* $2 \leq K^2 \leq 5$. **Xiaoyan Hu**, University of Georgia (1096-14-1466)

► 5:00PM (2378) *Bridgeland Stability of Line Bundles on Smooth Projective Surfaces.* Preliminary report. **Eric Miles***, Colorado State University, and **Daniele Arcara**, Saint Vincent College (1096-14-1828)

5:15PM (2379) *Information Theory and Moduli of Riemann Surfaces.* Preliminary report. **James S. Wolper**, Idaho State University (1096-14-2342)

5:30PM (2380) *Applications of function fields arising from certain linearized polynomials to compressed sensing.* Preliminary report. **Justin D Peachey**, Davidson College (1096-14-1844)

5:45PM (2381) *Dual numbers and invariant theory of the Euclidean group.* **Mohammed Daher*** and **Peter Donelan**, Victoria University of Wellington (1096-14-1520)

6:00PM (2382) *Scheme of cyclic-9; A numerical-symbolic approach.* **Rostam Sabeti**, Olivet College (1096-14-686)

AMS Session on Combinatorics and Number Theory

1:00 PM – 4:55 PM **Room 313, BCC**

► 1:00PM (2383) *Arithmetic Progressions in the Polygonal Numbers.* **Kenneth Brown**, **Scott M. Dunn*** and **Joshua Harrington**, University of South Carolina (1096-11-1484)

► 1:15PM (2384) *Markov-Sierpiński numbers.* Preliminary report. **Carrie E. Finch**, Washington and Lee University, **Lenny Jones**, Shippensburg University, and **Dylan Sorge***, Stuart Hall School (1096-11-2233)

► 1:30PM (2385) *On the Stern sequence and a related sequence.* **Jennifer L. Lansing**, University of Illinois at Urbana Champaign (1096-11-1220)

1:45PM (2386) *Arithmetic properties of generalized Fibonacci sequences.* **Soohyun Park**, Massachusetts Institute of Technology (1096-11-375)

► 2:00PM (2387) *Recurrence relations and combinatorial identities.* Preliminary report. **George Grossman***, Central Michigan University, **Tomas Zdrahal**, Palacky University in Olomouc, **Aklilu Zeleke**, Lyman Briggs College, and **Xinyun Zhu**, Universiy of Texas of the Permian Basin (1096-11-1841)

► 2:15PM (2388) *Cross Number Invariants of Finite Abelian Groups.* **Xiaoyu He**, Harvard College (1096-11-856)

► 2:30PM (2389) *Representing Integers as the Sum of Two Squares in the Ring* $\mathbb{Z}_n$. Preliminary report. **Joshua Harrington**, **Lenny Jones** and **Alicia Lamarche***, Shippensburg University (1096-11-798)

► 2:45PM (2390) *The Lind-Lehmer Constant for Cyclic Groups of Order Less Than 892,371,480.* **Vincent J. Pigno**, Kansas State University (1096-11-692)

► 3:00PM (2391) *Graph Theory Conjectures Triangular Planes from Nash/Williams (hexagonal graphs) with Buckminster Fuller's Triangular Tetrahedral Planes forming a Six Dimensional Triangular Coordinate.* Preliminary report. **James Garnett Sawyer**, Six Dimension Design (1096-00-2663)

3:15PM (2392) *Hypergeometric Solutions of Second Order Linear Differential Equations with Five Singularities.* **Vijay Jung Kunwar*** and **Mark van Hoeij**, Florida State University (1096-05-2228)

3:30PM (2393) *Binomial Irreducible Decomposition.* **Christopher ONeill***, **Ezra Miller**, Duke University, and **Thomas Kahle**, Otto von Guericke Universitat Magdeburg (1096-05-2617)

3:45PM (2394) *Competitive Tiling.* **Levi A Altringer**, Linfield College (1096-05-2191)

► 4:00PM (2395) *Two Mode Matrix of Urban Structure.* **James R Gatewood**, United States Military Academy, West Point (1096-00-1329)

4:15PM (2396) *Blow-Ups and Injectivity of Quivers.* **Will Grilliette**, University of Texas at Tyler (1096-05-2201)

► 4:30PM (2397) *Logarithmic Potential on a Triangle.* Preliminary report. **James R. Valles, Jr.**, Prairie View A&M University (1096-00-2327)

4:45PM (2398) *Virtual Pascal's Triangles, Poisson's Equation and the Method of Images.* **Chris McCarthy*** and **Johannes Familton**, BMCC, City University of New York (1096-05-1632)

AMS Session on Group Theory

1:00 PM – 5:40 PM **Room 311, BCC**

1:00PM (2399) *Variation on a Theme of I.D. MacDonald.* Preliminary report. **Joseph P Brennan***, **Luise-Charlotte Kappe**, Binghamton University SUNY, and **Gabriela Mendoza**, Riverside City College (1096-20-1646)

► 1:15PM (2400) *On the covering number of some small symmetric groups and some sporadic simple groups.* **Luise-Charlotte Kappe***, Binghamton University, **Daniela Nikolova-Popova**, Florida Atlantic University, and **Eric Swartz**, University of Western Australia (1096-20-1637)

1:30PM (2401) *Chermak-Delgado Chains in p-Groups of Small Order.* **Elizabeth Wilcox***, State University of New York at Oswego, **Ben Brewster**, Binghamton University, and **Peter Hauck**, Eberhard-Karls-Universität Tübingen (1096-20-1437)

1:45PM (2402) *Universal deformation rings and fusion.* **David C Meyer**, University of Iowa (1096-20-1502)

► 2:00PM (2403) *A short proof of a theorem of Claas Roever.* Preliminary report. **Nathan A Corwin**, Rutgers University (1096-20-2420)

2:15PM (2404) *Thompson-like groups acting on Julia sets.* **James Belk**, Bard College, and **Bradley Forrest***, Richard Stockton College of New Jersey (1096-20-646)

2:30PM (2405) *Relative Subgroup Growth and Subgroup Distortion.* **Tara C. Davis***, Hawaii Pacific University, and **Alexander Yu. Olshanskii**, Vanderbilt University (1096-20-1717)

2:45PM (2406) *The Bieri-Neumann-Strebel Invariant of the Pure Symmetric Automorphisms of a Right-angled Artin Group.* **Nic Koban**, University of Maine Farmington (1096-20-811)

3:00PM (2407) *Fuchsian Groups, Circularly Ordered Groups, and Dense Invariant Laminations on the Circle.* **Hyungryul Baik**, Cornell University (1096-20-932)

3:15PM (2408) *Every Non-Elementary Hyperbolic Group Admits a Highly Transitive Action of Maximal Growth.* **Vladimir V Chaynikov**, Central Michigan University (1096-20-1951)

3:30PM (2409) *Boundaries of Lamplighter groups.* **Gregory A. Kelsey***, Trinity College, and **Keith Jones**, SUNY Oneonta (1096-20-2593)

3:45PM (2410) *Character Estimates for Adjoint Simple Lie Groups.* **Corey M. Manack**, Amherst College (1096-20-2406)

4:00PM (2411) *A proof that a 4-generated group of class 2 and prime exponent is either cyclic, extra-special, or capable, using algebraic geometry.* **Arturo Magidin**, University of Louisiana at Lafayette (1096-20-737)

4:15PM (2412) *On maximal quasi $\mathbb{R}$-split tori invariant under an involution.* **Catherine A Buell**, Bates College (1096-20-1691)

4:30PM (2413) *Inner Involutions of* SO(n, k, β), $(n2)$. **Robert W. Benim***, **Aloysius Helminck**, North Carolina State University, **Chris Dometrius**, Forsyth Technical Community College, and **Ling Wu**, China (1096-22-53)

4:45PM (2414) *The Amenable Actions of Locally Compact Groups.* Preliminary report. **Amanda Harsy Ramsay**, IUPUI (Indiana University Purdue University Indianapolis) (1096-22-1463)

5:00PM ► (2415) *Monotonicity in Higher Dimensions.* **Heather A Van Dyke***, St. Mary's College of Maryland, **Kevin R Vixie** and **Thomas J Asaki**, Washington State University (1096-26-2360)

5:15PM ► (2416) *On partial algebras of full difunctional relations and dual symmetry.* **Nathan E Bloomfield**, University of Central Oklahoma (1096-20-837)

5:30PM (2417) *Representing groups by permutation polynomials.* **Chris Castillo*** and **Robert S. Coulter**, University of Delaware (1096-12-1659)

AMS Session on Probability and Stochastic Dynamical Systems

1:00 PM – 5:10 PM **Room 304, BCC**

1:00PM ► (2418) *Slow Passage Problem via Markov and Itô Processes.* **Stephanie Taylor*** and **Bruno Welfert**, Arizona State University (1096-60-2655)

1:15PM (2419) *On an almost sure functional central limit theorem for Semi-Markov processes.* **Adina Oprisan**, Barry University (1096-60-2296)

1:30PM (2420) *Stability of Numerical Methods for Jump Diffusions and Markovian Switching Jump Diffusions.* **Zhixin Yang***, **George Yin**, Wayne State University, and **Haibo Li**, Tsinghua University, China (1096-60-152)

1:45PM (2421) *Parameter Sensitivities for Discrete Stochastic Models in Continuous Time.* **Elizabeth Skubak Wolf**, University of Wisconsin – Madison (1096-60-537)

► 2:00PM (2422) *Kolmogorov Equations Applied to a Metapopulation Epidemiological Model.* Preliminary report. **Maytee Cruz-Aponte**, Arizona State University (1096-60-2206)

► 2:15PM (2423) *Dynamics and Control of an Invasive Species: The Case of the Rasberry crazy ant Colonies.* **Octavious Talbot***, Morehouse College, **Valerie Cheathon**, Arizona State University, **Agustin Flores**, Northern Illinois University, and **Victor Suriel**, SUNY-Stony Brook (1096-60-1231)

2:30PM (2424) *Evolutionary Stability in Finite Populations.* **Marc Harper**, UCLA, and **Dashiell Fryer***, Pomona College (1096-60-614)

► 2:45PM (2425) *A bi-parameter New Quasi Lindley Probability Distribution.* **Rama Shanker**, Statistics Unit, Eritrea Institute of Technology, Asmara, Eritrea, and **Amanuel Habte Ghebretsadik***, Department of Statistics & Actuarial Sciences, Jomo Kenyatta University of Agriculture & Technology (1096-60-2027)

3:00PM (2426) *Large Deviations for a Stochastic Burgers' Equation.* **Leila Setayeshgar**, University of Alabama in Huntsville (UAH) (1096-60-158)

3:15PM (2427) *Recent developments in Stochastic Dynamic Equations.* **S. Sanyal**, Marshall University, Huntington, WV (1096-60-2181)

3:30PM (2428) *On the existence of almost automorphc solutions of nonlinear Volterra stochastic difference equation.* **Paul H Bezandry**, Howard University (1096-60-2126)

► 3:45PM (2429) *An algebraic framework for random satisfiability.* Preliminary report. **Ted Theodosopoulos**, Saint Ann's school (1096-60-1906)

4:00PM (2430) *Using l_1 to define a natural diffusion distance.* Preliminary report. **Seonja Kim***, New Jersey Institute of Technology, and **Maxim J. Goldberg**, Ramapo College of New Jersey (1096-60-2654)

4:15PM (2431) *Parameter Estimation in Diffusion Processes on the Space of Shapes.* **Valentina Staneva*** and **Laurent Younes**, Johns Hopkins University (1096-60-2253)

► 4:30PM (2432) *A new, direct, and elementary proof of the Central Limit Theorem.* **Patricia Mehron Garmirian**, Tufts University (1096-60-843)

4:45PM (2433) *Predicting the Outcome of a Soccer Championship.* **Sajjad Z. Meymand***, **Mittu Pannala** and **John B. Ferris**, Mechanical Engineering Department, Virginia Tech. (1096-60-2553)

5:00PM (2434) *A Stochastic Approach of the Total Variation-Based Model for Image Reconstruction.* **Walid K Sharabati***, Purdue University, and **Mohamed El-Gebeily**, KFUPM (1096-60-1574)

MAA Session on Flipping the Classroom, IV

1:00 PM – 2:35 PM **Room 337, BCC**

Organizers: **Krista Maxson**, Shawnee State University
Zsuzsanna Szaniszlo, Valparaiso University

► 1:00PM (2435) *Intro Stats - To Flip or Not to Flip?* Preliminary report. **Scott A. Stevens**, Champlain College (1096-E1-419)

► 1:20PM (2436) *Experiences and Experiments in Implementing a Flipped Classroom Design in an Introductory Statistics Course.* **William J Heuett**, Marymount University (1096-E1-1930)

► 1:40PM (2437) *Intermediate Algebra: A First Attempt at Flipping a Classroom, and the Lessons Learned.* Preliminary report. **Miriam Harris-Botzum**, Lehigh Carbon Community College (1096-E1-896)

► 2:00PM (2438) *A Flipped Course Version of Introductory Statistics - Part I.* Preliminary report. **Sarah Abramowitz** and **Kathleen Madden***, Drew University (1096-E1-1207)

2:20PM (2439) *A Flipped Course Version of Introductory Statistics - Part II.* **Sarah Abramowitz*** and **Kathleen Madden**, Drew University (1096-E1-1210)

MAA Session on Reinventing the Calculus Sequence

1:00 PM – 3:35 PM **Room 340, BCC**

Organizers: **David Dwyer**, University of Evansville
Mark Gruenwald, University of Evansville

► 1:00PM (2440) *Making Sense of Series and Sequences in The First Calculus Course.* Preliminary report. **Martin E Flashman**, Humboldt State Universtiy (1096-K5-1742)

► 1:20PM (2441) *New Approaches to Some Topics in Calculus.* Preliminary report. **Daniel J Velleman**, Amherst College (1096-K5-173)

1:40PM (2442) *Addressing the AP Calculus Problem at a SLAC: An Integrated Approach.* **Matthew E Cathey*** and **Joseph A. Spivey**, Wofford College (1096-K5-192)

► 2:00PM (2443) *How about a free set of IBL Calculus notes that covers all of Calculus I, II and III?* **William T. Mahavier**, Lamar University (1096-K5-1679)

► 2:20PM (2444) *Reshuffling Calculus.* **Vincent J. Matsko**, Princeton International School of Mathematics and Science (1096-K5-2241)

► 2:40PM (2445) *Modeling Calculus.* **Daniel T Kaplan**, Macalester College (1096-K5-2616)

► 3:00PM (2446) *Moving Multivariable topics to Calculus II: Does it work?* Preliminary report. **Heather A. Lewis**, Nazareth College (1096-K5-647)

3:20PM (2447) *Resequencing Calculus — An early multivariate approach.* Preliminary report. **Nicholas Baeth**, University of Central Missouri (1096-K5-1673)

MAA Session on Teaching with Technology: Impact, Evaluation, and Reflection, II

1:00 PM – 5:35 PM **Room 341, BCC**

Organizer: **Peter Gavin LaRose**, University of Michigan

► 1:00PM (2448) *Using Online Technology to Improve Student Learning in Mathematics Courses.* Preliminary report. **Michael B. Scott**, California State University, Monterey Bay (1096-M5-2354)

► 1:20PM (2449) *Teaching and Learning with Technology in a Community College: How far it has come; How far could it go; What makes it effective; How it might evolve?* Preliminary report. **Michael Rene Kent**, Borough of Manhattan Community College (1096-M5-2749)

1:40PM (2450) *Maximizing the Effectiveness of an On-Line Homework System.* **Nell K. Rayburn***, **Samuel Jator** and **Bonnie Hodge**, Austin Peay State University (1096-M5-220)

► 2:00PM (2451) *WEPS Online Math Courses vs. Traditional Instruction.* **Mika K Seppala**, Florida State University (1096-M5-1619)

2:20PM (2452) *Going State-Wide with MOOC-like Precalculus in Coursera.* **Lisa Townsley**, University of Georgia (1096-M5-1321)

► 2:40PM (2453) *College Readiness Math MOOC: A Fast Track Approach.* **Jennifer Kosiak***, **Robert Hoar**, **Robert Allen** and **Jim Sobota**, University of Wisconsin - La Crosse (1096-M5-2591)

3:00PM (2454) *Technology Permeated Teaching of Differential Equations Course with Modeling at the Core.* Preliminary report. **Brian J. Winkel**, US Military Academy (1096-M5-170)

► 3:20PM (2455) *Mathematical Investigations Using Interactive Graphing Tools in Precalculus.* Preliminary report. **Lee Windsperger*** and **Aaron Wangberg**, Winona State University (1096-M5-2699)

► 3:40PM (2456) *Technology as a tool for self-regulated learning in an inverted calculus class.* Preliminary report. **Robert Talbert**, Grand Valley State University (1096-M5-1584)

► 4:00PM (2457) *Mobile Delivery vs. Paper and Pencil: A Comparison of Student Learning.* Preliminary report. **Barbara Kaskosz***, University of Rhode Island, and **Doug Ensley**, Shippensburg University (1096-M5-2283)

► 4:20PM (2458) *Transforming the Calculus Classroom with WeBWorK CLASS.* **Aaron Wangberg***, Winona State University, **Gulden Karakok**, University of Northern Colorado, **Nicole Engelke**, West Virginia University, and **Alees Seehausen**, University of Northern Colorado (1096-M5-672)

► 4:40PM (2459) *Preparing Secondary Math Teachers in a Tablet World.* Preliminary report. **Hazel I. Coltharp*** and **Danielle J. Frey**, Pittsburg State University (1096-M5-489)

► 5:00PM (2460) *The Impact of Technology in Teaching College Mathematics to Nontraditional Students in Nontraditional Learning Environments.* Preliminary report. **Michael D Miner**, American Public University System (1096-M5-2669)

► 5:20PM (2461) *Beyond Short Answers: Improving Verbal Problem Software.* Preliminary report. **John C Miller**, The City College of The City University of New York (1096-M5-160)

MAA Session on Wavelets in Undergraduate Education

1:00 PM – 4:55 PM **Room 350, BCC**

Organizers: **Caroline Haddad**, SUNY Geneseo

Edward Aboufadel, Grand Valley State University

John Merkel, Oglethorpe University

► 1:00PM (2462) *3D Printing and Wavelets.* Preliminary report. **Edward F Aboufadel**, Grand Valley State University (1096-Q1-261)

1:20PM ► (2463) *Making Waves in the Business Cycle: Applying Wavelet Transforms to Economics.*
Ashley E. Orr, Youngstown State University (1096-Q1-1551)

1:40PM ► (2464) *M-Band Wavelet-Based Audio Watermarking Algorithm.*
Robert D Dolan, Western Connecticut State University (1096-Q1-1087)

2:00PM ► (2465) *Haarmony: Chord Recognition Using Wavelets and Other Methods.*
Katherine Weber*, State University of New York at Geneseo, **Chance Rodriguez**, Mississippi State University, **Tiffany Reyes**, Whittier College, **Erlan Wheeler**, Carthage College, and **Amber Emmell**, Saint Michael's College (1096-Q1-1871)

2:20PM ► (2466) *The Morphological Wavelet Transformation.* Preliminary report.
Patrick J Van Fleet, University of St. Thomas (1096-Q1-245)

2:40PM ► (2467) *Wavelet-Based Multilevel Methods for Eigenvalue Problems.*
Malena Ines Espanol, The University of Akron (1096-Q1-1166)

3:00PM ► (2468) *Incorporating Wavelets into a course "Mathematics in Modern Technology".*
Yevgeniy V Galperin, East Stroudsburg University of Pennsylvania (1096-Q1-454)

3:20PM ► (2469) *Forecasting with Wavelets Projects.* Preliminary report.
Bruce Atwood* and **Lingzhi Meng**, Beloit College (1096-Q1-1438)

3:40PM ► (2470) *Signature Authentication Using Wavelets and Fourier Analysis.* Preliminary report.
Beth Kate Matys*, Gettysburg College, **Ayush Singhal**, University of Maryland, **Sarah Coulson**, University of Oklahoma, **Karina Pena**, Rio Hondo College, and **Joel Venzke**, Drake University (1096-Q1-1895)

4:00PM ► (2471) *Orthogonal Parameterized Wavelets in Undergraduate Research.*
David W. Roach, Murray State University (1096-Q1-2652)

4:20PM ► (2472) *Image Fusion of Satellite Images.*
Brenda T. Gonzalez, **Jasmine Puente*** and **Helmut Knaust**, UT El Paso (1096-Q1-2633)

4:40PM ► (2473) *Whale Shark Identification via Discrete Wavelets.*
John C. Merkel, Oglethorpe University (1096-Q1-2336)

MAA General Contributed Paper Session on Assessment and Outreach

1:00 PM – 2:25 PM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

1:00PM ► (2474) *Martin Gardner's Outreach in his Centennial Year: Mathematics Awareness Month 2014.*
Colm Mulcahy*, Spelman College & American University, **Bruce Torrence** and **Eve Torrence**, Randolph-Macon College (1096-VA-2608)

1:15PM ► (2475) *Girls in Science: 15 Years of STEM Outreach for Middle School Girls.*
Susan E Kelly, University of Wisconsin - La Crosse (1096-VA-1160)

1:30PM ► (2476) *An index to aid in the development of High School recruitment of future Engineering and Science students.*
Galen E. Turner III, Louisiana Tech University (1096-VA-2272)

1:45PM (2477) *A Remediation Program for Calculus: Initial Findings.* Preliminary report.
Caitlin Phifer* and **Jessica Libertini**, University of Rhode Island (1096-VA-462)

2:00PM ► (2478) *Evaluating student understanding and role of the Student Response Systems: What pre-service teachers say?*
Tharanga Mahesh Kumara Wijetunge*, Lyon College, and **Dennis St. John**, Central Michigan University (1096-VA-871)

2:15PM (2479) *Undergraduate Research Activities for Two-year College Students.*
Shenglan Yuan*, **Yelena Baishanski**, LaGuardia Community College, CUNY, and **Reem Jaafar**, LaGuardia Community College,CUNY (1096-VA-2760)

MAA General Contributed Paper Session on Mathematics Education, III

1:00 PM – 4:55 PM **Room 347, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

1:00PM (2480) *Precalculus Preparation Program for Mathematically Underprepared STEM Majors: A Tool for Increasing Retention.*
Brittany D. Smith*, **Elaine Bouldin Tenpenny**, **Jennifer Yantz**, **Thomas Cheatham**, **Donald Nelson**, **Ginger Holmes Rowell** and **Chris Stephens**, Middle Tennessee State University (1096-VE-2666)

1:15PM ► (2481) *Lessons Learned from Students' Views on Algebraic Misconceptions for Precalculus Readiness.*
Jesse C. Beck*, **Jennifer Yantz**, **Andrea R. Cline** and **Ginger Holmes Rowell**, Middle Tennessee State University (1096-VE-2314)

► 1:30PM (2482) *Alternative Teaching Strategies in Pre-Calculus.*
Qingxia Li, Lincoln University (1096-VE-288)

► 1:45PM (2483) *Creating a Dual-Credit/Dual Enrollment "OnRamps" Precalculus Course to Enhance the College Readiness of High School and Community College Students.* Preliminary report.
Mark L. Daniels, University of Texas at Austin (1096-VE-46)

► 2:00PM (2484) *Alternate Base Arithmetic as a Tool for Preparing Future Elementary Teachers.*
Murray H. Siegel, Arizona State University (1096-VE-87)

2:15PM (2485) *Flipped model utilizing Effective Learner-Centered and Performance-Based Instruction.*
Hashim A Saber, University of North Georgia (1096-VE-2455)

2:30PM (2486) *Using smart-pen technology to study problem solving.*
Sarah Mall Hanusch, Texas State University (1096-VE-1939)

► 2:45PM (2487) *Engaging student discussion outside the classroom using Twitter.* Preliminary report.
Salvatore P Giunta, Adelphi University (1096-VE-1788)

► 3:00PM (2488) *Resources to Aid the Transition into an IBL Mathematics Course.*
Gabriel Feinberg*, Haverford College, **Lily An**, Williams College, **Victoria Lewis**, California State University Sacramento, and **Fabiana Cardetti**, University of Connecticut (1096-VE-2252)

3:15PM (2489) *Inquiry Based Learning and Hybrid Inquiry Based Learning in College Geometry.*
Ali S. Shaqlaih, University of North Texas at Dallas (1096-VE-2076)

3:30PM (2490) *What Role Does (or does not) the Content Area Play in Proof Production Using Mathematical Definitions?*
Nermin Bayazit, Georgia State University (1096-VE-2077)

3:45PM (2491) *Introducing Interesting Groups in an Introductory Abstract Algebra Course.*
Marianna Bonanome*, NYC College of Technology/CUNY, and **Margaret H. Dean**, BMCC/CUNY (1096-VE-2572)

► 4:00PM (2492) *An Early Course on Modeling and Computation with Differential Equations.*
Jason Howell, College of Charleston (1096-VE-2203)

► 4:15PM (2493) *The Evolution of Teaching Mathematical Modeling in China.*
Hong Yuan* and **Jean W Richard**, Borough of Manhattan Community College, City University of New York (1096-VE-2594)

4:30PM (2494) *Mathematical Concept Construction through the Interaction of Reflective and Structural Abstraction.* Preliminary report.
Thorsten Scheiner, University of Hamburg, Germany (1096-VE-2534)

► 4:45PM (2495) *Making Calculus Come Alive with Dynamic Visualization Tools.*
Paul E. Seeburger, Monroe Community College (1096-VE-2673)

MAA General Contributed Paper Session on Modeling and Applications of Mathematics, III

1:00 PM – 4:55 PM **Room 348, BCC**

Organizers: **Jennifer Beineke**, Western New England University
Bem Cayco, San Jose State University
Kimberly Presser, Shippensburge University

► 1:00PM (2496) *Traveling wave solutions of reaction-diffusion fire model with fuel depletion.*
Minjeong Kim* and **Jan Mandel**, University of Colorado, Denver (1096-VG-2413)

1:15PM (2497) *Time Optimal Control in General Relativity.* Preliminary report.
Brandon J Wilson, Brigham Young University, Provo (1096-VG-2218)

1:30PM (2498) *Kepler Problems mathematically contributed to Quantum Mechanics.*
Shigeru Masuda, RIMS, Kyoto University (1096-VG-1506)

► 1:45PM (2499) *Verifying the Hanging Chain Model.*
Michael A. Karls, Ball State University (1096-VG-1297)

► 2:00PM (2500) *Algebraic topology in computational electromagnetism.*
Pawel Dlotko, University of Pennsylvania (1096-VG-374)

2:15PM (2501) *Phase transitions in gels with two-phase model.* Preliminary report.
Longhua Zhao*, Case Western Reserve University, and **Maria-Carme Calderer**, University of Minnesota (1096-VG-93)

► 2:30PM (2502) *Maps and Mirrors.* Preliminary report.
Dan Carroll, **Nora Stack** and **Caroline VanBlargan***, St. Mary's College of Maryland (1096-VG-2398)

► 2:45PM (2503) *Regularization of languages by learners: a mathematical framework.*
Jacquelyn L. Rische* and **Natalia L. Komarova**, University of California, Irvine (1096-VG-1721)

► 3:00PM (2504) *Correlation and Regression Between Habits and Dental Hygiene.* Preliminary report.
Kimberly A Carstens* and **Salvatore Giunta**, Adelphi University (1096-VG-928)

► 3:15PM (2505) *Gradient and Laplacian-Type Edge Detection.*
Mohamed Allali, Chapman University (1096-VG-1728)

► 3:30PM (2506) *A Probabilistic Exploration of Consistency in Positional Voting Procedures.* Preliminary report.
Mark A. Krines, University of Iowa (1096-VG-1743)

► 3:45PM (2507) *Mathematical Modeling for Empowering Decision Making.*
William P. Fox, Naval Postgraduate School (1096-VG-829)

► 4:00PM (2508) *Best policy implementation when there is parameter uncertainty; a Bayesian and adaptive control approach.* Preliminary report.
Romarie Morales* and **Jay Taylor**, Arizona State University (1096-VG-1496)

4:15PM (2509) *Modeling Scenarios and Strategies in Differential Equations Course.* Preliminary report.
Brian J. Winkel, US Miltary Academy (1096-VG-168)

► 4:30PM (2510) *A Mathematical Modeling Approach to Informing Student Retention Programming.*
Larry Wayne Lewis*, Ivy Tech Community College, and **Rebecca Patterson**, University of Louisville (1096-VG-2575)

► 4:45PM (2511) *Relationship between hitch-hiking and Mathematics.*
Youssef M Dib*, University of Louisiana, Monroe, and **Anton Dudko**, Kyiv University (1096-VG-2727)

SIAM Minisymposium on Turbulence and Mixing in Fluids: Analysis and Applications

1:00 PM – 5:55 PM **Room 325, BCC**

Organizers: **Animikh Biswas**, University of Maryland Baltimore County
Evelyn Lunasin, U.S. Naval Academy

1:00PM (2512) *Turbulence Modeling via Entropy Functionals.*
Jean-Luc Guemond, **Adam Larios***, Texas A&M University, and **Travis Thompson**, Oakridge National Lab (1096-76-2309)

1:30PM (2513) *Inertial manifolds and foliations via Newton's method.*
Yu-Min Chung*, University of Kansas, and **Ricardo Rosa**, Universidade Federal do Rio de Janeiro (1096-65-2171)

2:00PM (2514) *Vorticity concentration at the boundary for Taylor-Couette flows in the zero viscosity limit.*
Anna L Mazzucato, Penn State University (1096-76-771)

2:30PM (2515) *Turbulent transport in 3D incompressible plasma.*
Zachary Bradshaw and **Zoran Grujic***, University of Virginia (1096-76-1983)

3:00PM (2516) *Reduced order approximate deconvolution models for turbulent flows: analysis and benchmark computations.*
Leo G Rebholz, Clemson University (1096-35-917)

3:30PM Break

4:00PM (2517) *Lower bounds on the mix norm of passive scalars advected by incompressible enstrophy-constrained flows.*
Gautam Iyer*, Carnegie Mellon University, **Alexander Kiselev** and **Xiaoqian Xu**, University of Wisconsin, Madison (1096-76-1913)

4:30PM (2518) *A Lagrangian and Eulerian Analysis of a Geophysical Fluid Flow arising in the Chesapeake Bay.*
Reza Malek-Madani*, **Kevin McIlhany**, United States Naval Academy, and **Kayo Ide**, University of Maryland (1096-35-2759)

5:00PM (2519) *Time analyticity with higher norm estimates for the 2D Navier-Stokes equations.*
Ciprian Foias, Texas A&M University, **Michael S Jolly***, Indiana University, **Ruomeng Lan**, **Rishika Rupam**, **Yong Yang** and **Bingsheng Zhang**, Texas A&M University (1096-76-2044)

5:30PM (2520) *Filtered turbulence models - rough variants of nonlinear Galerkin and post-processing Galerkin methods.*
Edriss S. Titi, Weizmann Institute of Science & University of California Irvine (1096-65-2446)

AWM Workshop Presentations, II

1:00 PM – 4:25 PM **Room 310, BCC**

Organizers: **Erin Chambers**, Saint Louis University
Kathryn Leonard, California State University Channel Islands
Luminita Vese, University of California, Los Angeles

1:00PM (2521) *Skeletal linking structures for multiple-region analysis.*
James Damon, University of North Carolina at Chapel Hill, and **Ellen Gasparovic***, Duke University (1096-58-125)

1:30PM (2522) *A convex relaxation segmentation scheme based on shearlets.* Preliminary report.
Weihong Guo, Case Western Reserve University (1096-65-1953)

► 2:00PM (2523) *The Intersection of Statistics and Topology.* Preliminary report.
Brittany Terese Fasy, Tulane University (1096-55-708)

2:30PM (2524) *Combinatorial Optimization for PDE based Approaches to Computer Vision.* **Noha El-Zehiry**, Siemens Corporation, Corporate Technology (1096-68-2188)

3:00PM (2525) *Output-Sensitive Well-Separated Pair Decompositions for Dynamic Point Sets.* **Eunhui Park*** and **David Mount**, University of Maryland (1096-68-1478)

► 3:30PM (2526) *On map construction and map comparison.* **Carola Wenk**, Tulane University (1096-68-2002)

► 4:00PM (2527) *A Quadratic Program to Stratify High Dimensional Data Based on Proximity to the Convex Hull.* **Lori Beth Ziegelmeier***, Macalester College, **Michael Kirby** and **Chris Peterson**, Colorado State University (1096-52-141)

Pure and Applied Talks by Women Math Warriors presented by EDGE (Enhancing Diversity in Graduate Education)

1:00 PM – 5:55 PM **Room 336, BCC**

Organizers: **Amy Buchmann**, University of Notre Dame
Candice Price, United States Military Academy

► 1:00PM (2528) *Women in Research, Professional Growth and Services.* **Joyati Debnath**, Winona State University (1096-00-1498)

► 1:30PM (2529) *The Forbidden Number.* **Alissa S. Crans***, Loyola Marymount University, **Sandy Ganzell**, St. Mary's College of Maryland, and **Blake Mellor**, Loyola Marymount University (1096-57-249)

► 2:00PM (2530) *Homology of the D-Neighborhood Complex of Graphs.* Preliminary report. **Corrine Previte**, Colorado State University (1096-05-1310)

2:30PM (2531) *Generalizing Group Boundaries.* **Molly A. Moran**, University of Wisconsin-Milwaukee (1096-54-1410)

3:00PM (2532) *Successive Quotients of Filtrations of the String Link Concordance Group.* Preliminary report. **Carolyn Ann Otto**, University of WI- Eau Claire (1096-57-2061)

3:30PM (2533) *Students' Understanding of the Limit of a Sequence: A Case Study of Three Pre-service Elementary Teachers.* **Nadia Monrose Mills**, North Carolina State University (1096-97-2140)

► 4:00PM (2534) *Folic acid supplementation and recovery from spinal cord injury: a mathematical model.* Preliminary report. **Laurel A. Ohm**, University of Washington (1096-92-279)

► 4:30PM (2535) *An Age-Based Stochastic Model of HPV.* **Buffy Joy Lloyd** and **Omayra Ortega***, Arizona State University (1096-60-1395)

5:00PM (2536) *Maximizing anti-tumor effects in combination drug therapy.* **Shelby N. Wilson**, Morehouse College (1096-92-2086)

5:30PM (2537) *A parameter-free framework for model discrimination using algebraic geometry, differential algebra, statistics and data.* **Heather A. Harrington***, University of Oxford, **Kenneth L. Ho**, Stanford University, **Nicolette Meshkat**, North Carolina State University, **Paul Kirk**, Imperial College London, **Thomas Thorne**, University of Edinburgh, and **Michael P.H. Stumpf**, Imperial College London (1096-92-911)

SIGMAA on Math Circles Presentation

1:00 PM – 1:50 PM **Room 327, BCC**

Demonstration for precollege students and teachers as participants.

Organizers: **Paul Zeitz**, University of San Francisco
Tatiana Shubin, San Jose State University

MAA Committee on the Mathematical Education of Teachers Panel Discussion

1:00 PM – 2:20 PM **Room 316, BCC**

Mathematicians supporting implementation of the Common Core State Standards for mathematics.

Organizers: **Elizabeth Burroughs**, Montana State University
Pari Ford, University of Nebraska at Kearney
Debbie Gochenaur, Shippensburg University

Panelists: **Sybilla Beckman**, University of Georgia
Jessica Deshler, West Virginia University
Alison Superfine, University of Illinois at Chicago
Kristin Umland, University of New Mexico
Rose Mary Zbiek, Pennsylvania State University

AMS Session on Knots, Topological Graphs, and Algebraic Topology

1:15 PM – 5:55 PM **Room 305, BCC**

► 1:15PM (2538) *On Braids and the Jones Polynomial.* Preliminary report. **Johanna Stromberg**, Royal Holloway, University of London (1096-55-2082)

1:30PM (2539) *A new grading in HOMFLY-PT homology via virtual crossings.* Preliminary report. **Michael A Abel***, University of North Carolina-Chapel Hill, and **Lev Rozansky**, University of North Carolina at Chapel Hill (1096-55-2535)

1:45PM (2540) *Steenrod structures on quantum groups.* Preliminary report. **Benjamin Cooper***, **Anna Beliakova**, University of Zurich, and **Hoel Queffelec**, Berkeley (1096-57-1838)

2:00PM (2541) *Heegaard Floer Homology and L-space Knots.* **Faramarz Vafaee**, Michigan State University (1096-57-2119)

2:15PM (2542) *Applications of knot Floer homology for singular knots.* Preliminary report. **Allison L Gilmore**, University of California Los Angeles (1096-57-2404)

2:30PM (2543) *Stable equivalence of knotted spheres, smooth automorphisms, and positive scalar curvature metrics.* **David Auckly***, Kansas State University, **Hee Jung Kim**, Pohang Mathematics Institute, **Paul Melvin**, Bryn Mawr, and **Danny Ruberman**, Brandeis (1096-57-832)

2:45PM (2544) *Big Homotopy Theory.* **Keith Penrod**, Morehouse College (1096-55-773)

3:00PM (2545) *Smoothly knotted surfaces in 4-manifolds.* **Nathan Sunukjian**, Stony Brook University (1096-57-1514)

3:15PM (2546) *Non-contractibility of the Teichmüller space of negatively curved metrics on certain non-locally symmetric negatively curved manifolds.* Preliminary report. **Gangotryi Sorcar**, Binghamton University (1096-57-1976)

3:30PM (2547) *On the equivariant formal group law of the equivariant complex cobordism ring* MU_G^*. **William C. Abram**, Hillsdale College (1096-55-38)

3:45PM (2548) *Intersection numbers on moduli spaces of curves through topological recursion.* **Ayman Mohammad Almomany***, CMU, and **Brad Safnuk**, Central Michigan University (1096-55-1859)

4:00PM ► (2549) *Linking Nielsen Equivalence with Character Varieties.* Preliminary report. **Emily R Landes**, Technion – Israel Institute of Technology (1096-57-1342)

4:15PM (2550) *Systoles and Dehn surgery for hyperbolic 3-manifolds.* **Grant S Lakeland*** and **Christopher J Leininger**, University of Illinois Urbana-Champaign (1096-57-788)

4:30PM (2551) *Ordinary voltage graphs, pseudosurfaces, and derived graph embeddings: lifting cellular homology.* **Steven Schluchter**, The George Washington University (1096-57-1124)

4:45PM ► (2552) *Defining a graph theoretic analog to a Riemannian orbifold.* Preliminary report. **Colin Gavin**, **Elizabeth Stanhope*** and **Sam Stewart**, Lewis & Clark College (1096-05-1446)

5:00PM (2553) *Curvature-constrained path planning in nonpositively curved cube complexes.* **Jason Thomson La Corte**, University of Wisconsin-Milwaukee (1096-57-2788)

5:15PM (2554) *Polyhedral nonagonal and decagonal fullerenes.* Preliminary report. **Maryam Verdian-Rizi***, San Diego, CA, and **Martin Knor**, Slovak University of Technology (1096-05-2459)

5:30PM (2555) *A survey of topological data analysis and available toolsets.* **Mikael Vejdemo-Johansson***, KTH Royal Institute of Technology, Stockholm, Sweden, and **Primoz Skraba**, Jozef Stefan Institute, Ljubljana, Slovenia (1096-55-298)

5:45PM (2556) *A Homotopy Theory of Diffeological Spaces.* **Enxin Wu**, The University of Western Ontario (1096-55-2057)

ASL Invited Address

2:00 PM – 2:50 PM **Room 319, BCC**

(2557) *Embeddability amongst the countable models of set theory.* **Joel David Hamkins**, The City University of New York, College of Staten Island & CUNY Graduate Center (1096-03-199)

SIGMAA on Math Circles Special Presentation

2:00 PM – 3:00 PM **Room 327, BCC**

A Math Wrangle!

Organizers: **Steve Dunbar**, American Mathematics Competitions
Tatiana Shubin, San Jose State University

MAA Workshop

2:00 PM – 5:00 PM **Room 345, BCC**

The environment, mathematics, and community engagement.

Presenters: **Ben Fusaro**, Florida State University
Charlie Hadlock, Bentley University
Marty Walter, University of Colorado Boulder

MAA General Contributed Paper Session on Mathematics and Technology

2:30 PM – 4:40 PM **Room 346, BCC**

Organizers: **Jennifer Beineke**, Western New England University

Bem Cayco, San Jose State University

Kimberly Presser, Shippensburge University

2:30PM (2558) *Technology in Mathematics Education.* Preliminary report. **Ping Wang**, Penn State University (1096-VF-80)

2:45PM (2559) *Computer assisted instruction in mathematics.* **Victor Kostyuk***, **Nathaniel Rounds** and **Paulette N. Willis**, Reasoning Mind (1096-VF-1080)

3:00PM (2560) *A program of weekly activities for learning Calculus using the computer algebra system Maxima.* Preliminary report. **Charles Bergeron**, Albany College of Pharmacy and Health Sciences (1096-VF-2508)

3:15PM (2561) *Handheld calculators and mathematics thinking.* **Sofokli Garo**, "Aleksander Moisiu" University (1096-VF-2022)

3:30PM (2562) *Modern Technology In The Classroom - Calculators and Accessories for the applied math experiment.* **Jeffrey C. Kallenbach*** and **Timothy H Husband**, Siena Heights University (1096-VF-1909)

3:45PM (2563) *Screencasting on the iPad to Enhance Student Engagement.* **Lea L Rosenberry**, Kaplan University (1096-VF-1615)

4:00PM (2564) *Strengthening Communication Skills Through Student Created Homework Videos.* **Pamela E Harris**, United States Military Academy-West Point (1096-VF-1120)

4:15PM (2565) *The Game Makers Toolshed - Tools for Creating Serious Games.* **Tamara Eyster**, Kaplan University (1096-VF-1573)

4:30PM (2566) *Constructing Complicated Spheres.* **Mimi Tsuruga*** and **Frank H. Lutz**, TU Berlin (1096-VF-214)

MAA-AMS-SIAM Gerald and Judith Porter Public Lecture

3:00 PM – 4:00 PM **Ballrooms I&II, 400 Level, BCC**

(2567) *Movie magic: The mathematics behind Hollywood's visual effects.* **Eitan Grinspun**, Columbia University (1096-00-15)

ASL Contributed Paper Session, II

3:00 PM – 4:50 PM **Room 319, BCC**

3:00PM (2568) *Partially computable functions and symbolic dynamics.* **Sebastian Wyman**, Aurora University (1096-03-774)

3:30PM *The automorphism group of a just saturated model of Peano Arithmetic.* **Ermek Nurkhaidarov**, Pennsylvania State University Mont Alto.

4:00PM (2569) *An Epistemological Summary of the Significance of Self-Justifying Axiom Systems.* **Dan E. Willard**, SUNY Albany (1096-03-1129)

4:30PM *Jump inversion, linear orderings, and types.* **Wesley Calvert, Valentina Harizanov, Julia Knight, Charles McCoy*, Alexandra Soskova, and Stefan Vatev**, University of Portland.

AMS Dinner Celebrating Connection & Collaboration Reception

6:30 PM – 7:30 PM **Key Ballrooms, South Foyer, 2nd Floor, Hilton**

AMS Dinner Celebrating Connection & Collaboration

7:30 PM – 10:30 PM **Key Ballrooms 7–12, 2nd Floor, Hilton**

Georgia Benkart
AMS Associate Secretary
Madison, Wisconsin

Gerard A. Venema
MAA Associate Secretary
Grand Rapids, Michigan