# Program of the Sessions

*San Diego, California, January 9–12, 2013*

## Monday, January 7

### *MAA Short Course on Conceptual Climate Models, Part I*

**8:30 AM – 5:30 PM** **Room 5B, Upper Level, San Diego Convention Center**

Organizers: **Esther Widiasih**, University of Arizona
**Mary Lou Zeeman**, Bowdoin College
**James Walsh**, Oberlin College

7:30AM Registration outside Room 5A, SDCC upper level.

8:30AM (1) *Zero-dimensional energy balance models.* **Hans Kaper**, Georgetown University

10:30AM (2) *Hands-on Session: Dynamics of energy balance models, I.* **Anna Barry***, Institute for Math and Its Applications, and **Samantha Oestreicher***, University of Minnesota

2:00PM (3) *One-dimensional energy balance models.* **Hans Kaper**, Georgetown University

4:00PM (4) *Hands-on Session: Dynamics of energy balance models, II.* **Anna Barry***, Institute for Math and Its Applications, and **Samantha Oestreicher***, University of Minnesota

### *AMS Short Course on Random Matrices, Part I*

**9:00 AM – 3:45 PM** **Room 4, Upper Level, San Diego Convention Center**

Organizer: **Van Vu**, Yale University

8:00AM Registration outside Room 5A, SDCC upper level.

9:00AM (5) *Random Matrices: The Universality phenomenon for Wigner ensemble.* Preliminary report. **Terence Tao**, University of California Los Angles

10:45AM (6) *Universality of random matrices and Dyson Brownian Motion.* Preliminary report. **Laszlo Erdos**, LMU, Munich

2:30PM (7) *Free probability and Random matrices.* Preliminary report. **Alice Guionnet**, Massachusetts Institute of Technology

### *NSF-EHR Grant Proposal Writing Workshop*

**3:00 PM – 6:00 PM** **Marina Ballroom F, 3rd Floor, Marriott**

**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 34, 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.

# Tuesday, January 8

### *AMS Department Chairs Workshop*

**8:00 AM – 6:30 PM** **Marina Ballroom F, 3rd Floor, Marriott**

### *MAA Short Course on Conceptual Climate Models, Part II*

**8:30 AM – 5:30 PM** **Room 5B, Upper Level, San Diego Convention Center**

Organizers: **Esther Widiasih**, University of Arizona
**Mary Lou Zeeman**, Bowdoin College
**James Walsh**, Oberlin College

8:30AM (8) *Paleoclimate data, Milankovitch cycles, and extending energy balance models.* **Richard McGehee**, University of Minnesota

10:30AM (9) *Hands-on Session: Comparing energy balance models with the paleoclimate record.* **Richard McGehee***, University of Minnesota, and **Esther Widiasih***, University of Arizona

2:00PM (10) *The greenhouse effect in energy balance models.* **Jim Walsh**, Oberlin College

4:00PM (11) *Hands-on Session: Greenhouse gas effect explorations.* **Anna Barry***, Institute for Math and Its Applications, and **Esther Widiasih***, University of Arizona

### *MAA Ancillary Workshop on Identifying and Addressing Difficult Concepts for Students in the Introductory Statistics Course*

**8:30 AM – 4:30 PM** **Point Loma Room, 1st Floor, Marriott**

Presenter: **Marjorie Bond**, Monmouth College

### *MAA Board of Governors*

**8:30 AM – 5:00 PM** **Marina Ballroom D, 3rd Floor, Marriott**

### *AMS Short Course on Random Matrices, Part II*

**9:00 AM – 4:45 PM** **Room 4, Upper Level, San Diego Convention Center**

Organizer: **Van Vu**, Yale University

9:00AM (12) *Random matrices, numerical computation, and remarkable applications.* Preliminary report. **Alan Edelman**, Massachusetts Institute of Technology

10:30AM (13) *Non-asymptotic theory of random matrices.* Preliminary report. **Mark Rudelson**, University of Michigan

2:00PM (14) *Around the circular law.* Preliminary report. **Djalil Chafai**, Université Paris-Est Marne-la-Vallée, Paris

3:30PM (15) *Random Matrices: The Universality phenomenon for non-hermitian random matrices.* Preliminary report. **Van Vu**, Yale University

### *MAA Ancillary Workshop on Playing Games with a Purpose: A New Approach to Teaching and Learning Statistics*

**9:00 AM – 4:00 PM** **Balboa/Mission Hills Room, 3rd Floor, Marriott**

Presenters: **Shonda Kuiper**, Grinnell College
**Rod Sturdivant**, U.S. Military Academy

### *MAA Ancillary Workshop on Functions, Parameters, and Fitting for Teaching Calculus*

**9:00 AM – 4:00 PM** **Cardiff/Carlsbad Room, 3rd Floor, Marriott**

Presenters: **Daniel Kaplan**, Macalester College
**Randall Pruim**, Calvin College

### *AMS Council*

**1:30 PM – 10:00 PM** **Marina Ballroom E, 3rd Floor, Marriott**

### *Joint Meetings Registration*

**3:00 PM – 7:00 PM** **Exhibit Hall B1, Ground Level, San Diego Convention Center**

# Wednesday, January 9

### *Joint Meetings Registration*

**7:30 AM – 6:00 PM** **Exhibit Hall B1, Ground Level, San Diego Convention Center**

### *AMS-ASL Special Session on Effective Algebra and Model Theory, I*

**8:00 AM – 10:50 AM** **Room 7B, Upper Level, San Diego Convention Center**

Organizers: **Sam Buss**, University of California, San Diego
**Mia Minnes**, University of California, San Diego

**Jeff Remmel**, University of California, San Diego

8:00AM (16) *Independent Sets in Computable Free Groups and Fields.* Preliminary report. **Charles McCoy**, University of Portland, and **Russell Miller***, Queens College & CUNY Graduate Center (1086-03-623)

8:30AM (17) *An algebraic characterization of recursively saturated real closed fields.* **Paola D'Aquino**, Seconda Università degli Studi di Napoli, **Salma Kuhlmann**, University of Konstanz, and **Karen Lange***, Wellesley College (1086-03-1033)

9:00AM (18) *Turing degrees of orders on torsion-free abelian groups.* **Asher M Kach**, Google Chicago, **Karen Lange**, Wellesley College, and **Reed Solomon***, University of Connecticut (1086-03-1345)

9:30AM (19) *Effectively Categorical Torsion Free Abelian Groups.* **Rodney Downey***, School of Maths, Stats and OR, Victoria University, and **Alexander Melnikov**, Nanyang University of Technology (1086-03-447)

10:00AM ► (20) *Complexity of orders on algebraic structures.* **Valentina Harizanov**, George Washington University (1086-03-1669)

10:30AM (21) *The complexity of ascendant sequences in locally nilpotent groups.* **Chris J. Conidis***, Vanderbilt University, and **Richard A Shore**, Cornell Univeristy (1086-03-421)

## *AMS Special Session on Arithmetic and Ideal Theory of Integral Domains and Monoids, I*

**8:00 AM – 10:50 AM** **Room 15A, Mezzanine Level, San Diego Convention Center**

Organizers: **Scott T. Chapman**, Sam Houston State University

**Vadim Ponomarenko**, San Diego State University

8:00AM (22) *Some remarks on ideal factorizations in Prüfer domains.* **Marco Fontana**, Università degli Studi, "Roma Tre", Italy (1086-13-990)

8:30AM ► (23) *Factorization theory and decompositions of modules.* **Nicholas R. Baeth**, University of Central Missouri, and **Roger Wiegand***, University of Nebraska–Lincoln (1086-13-966)

9:00AM (24) *Huneke-Wiegand Conjecture for complete intersection numerical semigroup rings.* **Pedro A. García-Sánchez***, Universidad de Granada, and **Micah J. Leamer**, Chennai Mathematical Institute, India (1086-20-1021)

9:30AM (25) *Noetherian property of subrings of power series rings.* **Byung Gyun Kang*** and **Phan Thanh Toan**, POSTECH (1086-13-847)

10:00AM (26) *What does elasticity tell us about direct-sum behavior of torsion-free modules?* **Silvia Saccon***, The University of Arizona, and **Nicholas R. Baeth**, University of Central Missouri (1086-13-194)

10:30AM (27) *Multiplicative Sets of Atoms.* Preliminary report. **Ashley Rand**, University of Tennessee, Knoxville (1086-13-193)

## *AMS Special Session on Celestial Mechanics, I*

**8:00 AM – 10:50 AM** **Room 31A, Upper Level, San Diego Convention Center**

Organizers: **Gareth Roberts**, College of the Holy Cross

**Zhifu Xie**, Virginia State University

8:00AM ► (28) *Stability of elliptic Lagrangian solutions of the classical three body problem via index theory.* Preliminary report. **Yiming Long**, Chern Institute of Mathematics, Nankai University (1086-37-54)

9:00AM (29) *Linear Stability of the periodic solution in the spatial isosceles three-body problem.* **Tiancheng Ouyang**, Brigham Young University, **Zhifu Xie***, Virginia State University, and **Duokui Yan**, Beihang University (1086-37-1191)

9:30AM (30) *Global regularization in the planar equilateral restricted four-body problem.* **Martha Alvarez***, **Joaquin Delgado**, UAM-Iztapalapa, and **Claudio Vidal**, Universidad del Bio Bio (1086-70-235)

10:00AM (31) *Global Regularization and Reduction for Newtonian N body problems.* **Richard Montgomery**, UCSC (1086-70-367)

10:30AM (32) *Complex Blow-up of Triple Collision.* **Richard Moeckel**, University of Minnesota (1086-70-709)

## *AMS Special Session on Commutative Algebra and Algebraic Geometry, I*

**8:00 AM – 10:50 AM** **Room 14A, Mezzanine Level, San Diego Convention Center**

Organizers: **Kuei-Nan Lin**, University of California, Riverside

**Tai Ha**, Tulane University

8:00AM (33) *Uniform Symbolic Topologies and Finite Extensions.* Preliminary report. **Craig Huneke***, University of Virginia, **Daniel Katz**, University of Kansas, and **Javid Validashti**, University of Illinois (1086-13-779)

8:30AM (34) *Multidegree of toric ideals.* Preliminary report.
**Uwe Nagel** and **Augustine B. O'Keefe***, University of Kentucky (1086-13-2450)

9:00AM (35) *Sufficient conditions for F-injectivity to deform.* Preliminary report.
**Lance Edward Miller***, University of Utah, **Kazuma Shimomoto** and **Jun Horiuchi**, Meiji University (1086-13-1343)

9:30AM (36) *Hochster's theta pairing and numerical equivalence.*
**Hailong Dao**, University of Kansas, Lawrence (1086-13-610)

10:00AM (37) *Constructing some classes of Gorenstein rings via connected sums.*
**Ananthnarayan Hariharan**, University of Nebraska at Lincoln, **Paolo Mantero***, Mathematical Sciences Research Institute (MSRI) and UC Riverside, and **Alexandra Seceleanu**, University of Nebraska at Lincoln (1086-13-2553)

10:30AM (38) *Algebraic Properties of Square-free Monomial Ideals.*
**Susan E. Morey**, Texas State University (1086-13-646)

## *AMS Special Session on Complex Dynamics, I*

**8:00 AM – 10:50 AM** **Room 14B, Mezzanine Level, San Diego Convention Center**

Organizers: **Laura DeMarco**, University of Illinois, Chicago
**Rodrigo Perez**, Indiana University-Purdue University Indianapolis
**Roland Roeder**, Indiana University-Purdue University Indianapolis

8:00AM (39) *The Central Strip Lemma for Laminations of Degree* 2. Preliminary report.
**John C Mayer**, University of Alabama at Birmingham (1086-37-228)

8:30AM (40) *Antipode Preserving Cubic Rational Maps and Herman rings.* Preliminary report.
**A. Bonifant***, University of Rhode Island, **X. Buff**, Universite Paul Sabatier, and **J. W. Milnor**, Institute for Mathematical Sciences (1086-37-2354)

9:00AM (41) *Baby Julia sets and combinatorial models.* Preliminary report.
**Suzanne Boyd**, University of Wisconsin Milwaukee (1086-37-1921)

9:30AM (42) *Rational functions with identical measure of maximal entropy.*
**Hexi Ye**, University of Illinois at Chicago (1086-37-391)

10:00AM ► (43) *Catalan, Fibonacci, and Siegel.* Preliminary report.
**Rodrigo A Perez***, IUPUI, and **Magnus Aspenberg**, Lund University (1086-37-2954)

10:30AM (44) *Bounded Geometry and Characterization of post-singularly Finite (p,q)-Exponential Maps.*
**Linda Keen***, CUNY Graduate Center and Lehman College, **Tao Chen**, CUNY Graduate Center and Bronx Community College, and **Yunping Jiang**, CUNY Queens College and Graduate Center (1086-37-1226)

## *AMS Special Session on Difference Equations and Applications, I*

**8:00 AM – 10:50 AM** **Room 30B, Upper Level, San Diego Convention Center**

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

8:00AM (45) *Difference equations arising in evolutionary population dynamics.*
**Jim M. Cushing***, Interdisciplinary Program in Applied Mathematics, University of Arizona, and **Simon Maccracken Stump**, Department of Ecology and Evolutionary Biology, University of Arizona (1086-39-1569)

8:30AM ► (46) *Global Stability of a class of non-monotone competition models via singularity theory.* Preliminary report.
**Saber N Elaydi***, **Eduardo Balreira**, Trinity University, and **Rafael Luis**, Center for Mathematical Analysis, Geometry and Dynamical Systems,Tecnical University of Lisbon (1086-39-1834)

9:00AM (47) *A Contest-Competition model with Allee Effect.* Preliminary report.
**Eddy A Kwessi**, Trinity University (1086-39-1900)

9:30AM ► (48) *Stability and invariant manifolds of a discrete host-parasitoid model.* Preliminary report.
**Sinan Kapcak***, Izmir University of Economics and Trinity University, **Saber Elaydi**, Trinity University, and **Unal Ufuktepe**, Izmir University of Economics (1086-39-1009)

10:00AM ► (49) *Discrete Fractional Calculus.*
**Allan C. Peterson**, University of Nebraska-Lincoln (1086-39-599)

10:30AM (50) *Solving linear difference equations in rings using reduction of order.*
**H. Sedaghat**, Virginia Commonwealth University (1086-39-931)

## *AMS Special Session on Graph Theory, I*

**8:00 AM – 10:50 AM** **Room 16B, Mezzanine Level, San Diego Convention Center**

Organizers: **Andre Kundgen**, California State University, San Marcos
**Michael Pelsmajer**, Illinois Institute of Technology
**Douglas West**, University of Illinois, Urbana-Champaign

8:00AM ► (51) *Trees and cycles in hypergraphs.* Preliminary report.
**Zoltan Furedi**, Rényi Institute of Mathematics, Budapest, Hungary (1086-05-1742)

8:30AM (52) *Hypergraph Turan numbers of loose cycles and linear cycles.* Preliminary report.
**Zoltán Füredi**, University of Illnois and Hungarian Academy of Sciences, and **Tao Jiang***, Miami University (1086-05-1288)

9:00AM (53) *Ordered Turán Problems.*
**Craig M. Timmons**, University of California San Diego (1086-05-1067)

9:30AM ► (54) *Minimum K(2,3)-Saturated Graphs.*
**Ya-Chen Chen**, Sacramento, CA (1086-05-1519)

10:00AM ► (55) *The Manickam-Miklós-Singhi Conjecture for Small k.* Preliminary report.
**Ameera N Chowdhury**, UCLA (1086-05-1676)

10:30AM (56) *Recent results and problems in spectral graph theory.*
**Fan Chung**, University of California, San Diego (1086-05-2421)

## *AMS Special Session on Mathematical and Numerical Analysis of Nonlocal Problems, I*

**8:00 AM – 10:50 AM** **Room 31B, Upper Level, San Diego Convention Center**

Organizers: **Qiang Du**, Pennsylvania State University
**Tadele Mengesha**, Pennsylvania State University

8:00AM (57) *The Peridynamic Nonlocal Continuum Theory.*
**Rich Lehoucq**, Sandia National Labs (1086-74-1373)

9:00AM (58) *Multiscale Analysis of Heterogeneous Media in the Peridynamic Formulation.*
**Bacim Alali**, Florida State University, and **Robert Lipton***, Louisiana State University (1086-74-2095)

9:30AM ► (59) *Mathematical Modeling and Analysis of Interface Problems for Nonlocal Diffusion.*
**Pablo Seleson***, The University of Texas at Austin, **Max Gunzburger**, Florida State University, and **Michael L Parks**, Sandia National Laboratories (1086-45-2438)

10:00AM (60) *Mathematical Analysis of linear peridynamics.*
**Tadele Mengesha*** and **Qiang Du**, Penn State University (1086-45-1692)

10:30AM (61) *Results on the well-posedness of nonlinear peridynamics.*
**Dimitri Puhst**, TU Berlin (1086-35-410)

## *AMS Special Session on Nonlinear Evolution Equations and Integrable Systems, I*

**8:00 AM – 10:50 AM** **Room 30E, Upper Level, San Diego Convention Center**

Organizers: **Jennifer Gorsky**, University of San Diego
**Alex Himonas**, University of Notre Dame

8:00AM (62) *Non-homogeneous Boundary-Value Problems for the Schrödinger Equation.*
**Jerry L. Bona***, University of Illinois at Chicago, **Shu-Ming Sun**, Virginia Polytechnic Institute and State University, and **Bing-Yu Zhang**, University of Cincinnati (1086-35-1832)

8:30AM (63) *Initial-boundary value problem for coupled dispersive equations.*
**Hongqiu Chen**, University of Memphis (1086-35-2545)

9:00AM (64) *Global well-posedness for the eBBM-model.*
**Sanja V Pantić*** and **Jerry L Bona**, University of Illinois at Chicago (1086-76-2623)

9:30AM (65) *Near-parallel vortex filament dynamics.*
**Walter Craig**, McMaster University (1086-35-1744)

10:00AM (66) *Continuity Properties of the Solution Map for the Generalized Reduced Ostrovsky Equation.*
**Melissa Davidson**, University of Notre Dame (1086-35-2367)

10:30AM (67) *The initial-boundary value problem for a class of evolution equations.*
**Dionyssis Mantzavinos**, University of Notre Dame (1086-35-1228)

## *AMS Special Session on Recent Advances and New Challenges in Applied Analysis, I*

**8:00 AM – 10:50 AM** **Room 17A, Mezzanine Level, San Diego Convention Center**

Organizer: **Marian Bocea**, Loyola University, Chicago

8:00AM (68) *Random homogenization for solid suspensions in a fluid.* Preliminary report.
**Florian Maris**, University of Houston (1086-35-2142)

8:30AM ► (69) *Dispersion relations for double negative metamaterials.*
**Yue Chen**, University of Kentucky, and **Robert Lipton***, Louisiana State University (1086-35-2086)

9:00AM (70) *Variational Methods for Crystal Surface Instability.*
**Irene Fonseca**, Carnegie Mellon University (1086-49-505)

9:30AM (71) *Quasiconvexity, Nonlinear PDEs, and Principal Curvature.*
**E N Barron**, **R Goebel** and **R R Jensen***, Loyola University Chicago (1086-35-2043)

10:00AM (72) *New variational problems for material defect evolution.*
**Chris Larsen**, WPI (1086-49-2703)

10:30AM (73) *A continuum model for epitaxial growth with elasticity on vicinal surfaces.*
**Giovanni Leoni**, Carnegie Mellon University (1086-49-1449)

### *AMS Special Session on Stochastic Analysis of Stochastic Differential Equations and Stochastic Partial Differential Equations, I*

**8:00 AM – 10:50 AM** **Room 32B, Upper Level, San Diego Convention Center**

Organizers: **Edward Allen**, Texas Tech University
**Armando Arciniega**, The University of Texas at San Antonio
**Gangaram Ladde**, University of South Florida
**Sivapragasam Sathananthan**, Tennessee State University

8:00AM ► (74) *Network Dynamic Process under Stochastic Perturbations.* Preliminary report.
**Gangaram S Ladde**, University of South Florida at Tampa (1086-93-1364)

8:30AM (75) *A Stochastic Analysis Of Power Doubling Time For A Subcritical System.*
**Edward J. Allen**, Texas Tech University (1086-60-1274)

9:00AM (76) *On Logistic Models and their Properties.*
**Janusz S Golec**, Fordham University (1086-60-1771)

9:30AM ► (77) *Derivation of stochastic differential equations for macroevolutionary process.*
**Ummugul Bulut*** and **Edward J. Allen**, Texas Tech University, Lubbock (1086-39-1107)

10:00AM ► (78) *Nonlinear Stochastic Energy Spot Prices Processes with Delayed Volatility.* Preliminary report.
**Olusegun M Otunuga*** and **Gangaram S Ladde**, University of South Florida at Tampa (1086-60-1359)

10:30AM (79) *Global analysis of a stochastic two-scale network human epidemic dynamic model with varying immunity period.* Preliminary report.
**Divine Tito Wanduku***, Keiser University, and **Gangaram S Ladde**, University of South Florida (1086-60-1821)

### *AMS Special Session on The Mathematics Teacher Education Partnership and the Common Core Standards, I*

**8:00 AM – 10:50 AM** **Room 17B, Mezzanine Level, San Diego Convention Center**

Organizers: **W. Gary Martin**, Auburn University
**Michael Mays**, West Virginia University

8:00AM ► (80) *The Mathematics Teacher Education Partnership.*
**Michael Mays***, West Virginia University, and **W. Gary Martin**, Auburn University (1086-97-813)

9:00AM (81) *Preparing and Supporting Mentor Teachers of Field Experiences for Secondary Mathematics.*
**Marilyn E. Strutchens**, Auburn University (1086-97-2827)

9:30AM (82) *Developing a Course to Address Mathematical Knowledge for Teaching Functions and Modeling.* Preliminary report.
**Laurie O. Cavey***, **U. Kaiser** and **M. Kinzel**, Boise State University (1086-97-881)

10:00AM ► (83) *$C^3$ Institutes for improving teachers understanding of mathematics and pedagogy.* Preliminary report.
**Andrew G Bennett*** and **Carlos W Castillo-Garsow**, Kansas State University (1086-97-1764)

10:30AM ► (84) *Facing the Reality: Reforming the Teacher Preparation Curriculum.*
**William H. Schmidt**, Michigan State University (1086-97-1367)

### *AMS Special Session on Theory and Interdisciplinary Applications of Dynamical Systems, I*

**8:00 AM – 10:50 AM** **Room 31C, Upper Level, San Diego Convention Center**

Organizer: **Sukanya Basu**, Central Michigan University

8:00AM ► (85) *Analysis of Dynamical Systems in Accelerator Physics using Verified Computation.*
**Alexander Wittig*** and **Martin Berz**, Michigan State University (1086-37-1262)

8:30AM (86) *From Billiard Dynamics to Thermodynamics.*
**Tim Chumley**, Washington University in St. Louis, **Scott Cook***, Swarthmore College, and **Renato Feres**, Washington University in St. Louis (1086-37-2649)

9:00AM (87) *Discrete Schrödinger Operators with Primitive Invertible Substitution Potential.*
**May Mei**, University of California, Irvine (1086-37-1427)

9:30AM ► (88) *Chaos Control in Cardiac Tissue: Local Stimulation Versus Far-Field Pacing.* Preliminary report.
**John W Cain**, University of Richmond (1086-92-732)

10:00AM (89) *Control and Robustness Analysis for Curve Tracking with Unknown Control Gains.*
**Michael Malisoff**, Louisiana State University (1086-93-157)

10:30AM (90) *A Comparison of the Local and Global Dynamics of Monotone and Antimonotone Maps in the Plane.*
**Sukanya Basu**, Central Michigan University (1086-37-443)

### *AMS Special Session on Topics and Issues in Electronic Publishing, I*

**8:00 AM – 10:20 AM** **Room 9, Upper Level, San Diego Convention Center**

Organizers: **Klaus Kaiser**, University of Houston
**Steven Krantz**, Washington University in St. Louis
**Elizabeth Loew**, Springer

8:00AM ► (91) *Making Content Reflowable for the Reading Device.*
**Henry Krell**, Springer Science + Business Media (1086-00-396)

8:30AM (92) *Challenges in digital preservation – local choice / global concerns.*
**Randy S. Kiefer**, CLOCKSS Archive (1086-00-2129)

9:00AM ► (93) *Changes and enhancements of the publication structure in mathematics.* Preliminary report.
**Gert-Martin W. Greuel**, Mathematical Research Institute Oberwolfach and University of Kaiserslautern (1086-00-997)

9:30AM (94) *Lessons learned from G&T and MSP.*
**Walter D Neumann**, Barnard College, Columbia University (1086-00-1036)

10:00AM (95) *My proposal for a zero-fee replacement for traditional mathematical journals.*
**Greg Kuperberg**, UC Davis (1086-00-342)

### *AMS Special Session on Tropical Geometry, I*

**8:00 AM – 10:50 AM** **Room 16A, Mezzanine Level, San Diego Convention Center**

Organizers: **Florian Block**, University of California Berkeley
**Melody Chan**, Harvard University

8:00AM (96) *The Brill-Noether rank of a tropical curve.*
**Yoav Len**, Yale University (1086-14-900)

8:30AM (97) *Tropical Convexity, Linear Systems, and General Reduced Divisors.*
**Ye Luo**, School of Math, Georgia Institute of Technology (1086-05-2216)

9:00AM (98) *Geometric rank functions and rational points on curves.*
**Eric Edward Katz**, University of Waterloo (1086-14-2930)

9:30AM ► (99) *A tropical proof of the matrix-tree theorem.*
**Farbod Shokrieh**, Georgia Institute of Technology (1086-05-2093)

10:00AM (100) *Tropical geometry and cluster algebras.* Preliminary report.
**Mark Gross**, UCSD Mathematics (1086-14-1060)

10:30AM (101) *Automorphisms of algebraic, tropical, and non-Archimedean analytic curves.*
**Amy Ksir*** and **Caroline Grant Melles**, US Naval Academy (1086-14-1833)

### *MAA Invited Paper Session on the Beauty and Power of Number Theory*

**8:00 AM – 10:45 AM** **Room 6F, Upper Level, San Diego Convention Center**

Organizers: **Shannon Lockard**, Bridgewater State University
**Tim Flowers**, Indiana University of Pennsylvania

8:00AM ► (102) *Generalizing Fermat's Last Theorem.* Preliminary report.
**Michael A. Bennett***, University of British Columbia, **Imin Chen**, Simon Fraser University, **Sander Dahmen**, Utrecht University, and **Soroosh Yazdani**, University of Lethbridge (1086-AB-1156)

8:45AM (103) *Groups of elliptic over finite fields and the Cohen-Lenstra Heuristics.*
**Chantal David***, Concordia University, and **Ethan Smith**, Michigan Tech (1086-AB-684)

9:30AM ► (104) *Primality proving and elliptic curves.*
**Alice Silverberg**, University of California, Irvine (1086-AB-524)

10:15AM ► (105) *Reg & Neg.*
**Richard K Guy**, The University of Calgary (1086-AB-971)

### *AMS Session on Combinatorics, I*

**8:00 AM – 10:55 AM** **Room 13, Mezzanine Level, San Diego Convention Center**

8:00AM (106) *Convergence of the Bruhat Iteration.* Preliminary report.
**Mary Clair Thompson*** and **Tin-Yau Tam**, Auburn University (1086-22-1448)

8:15AM ► (107) *The VC Dimension of Random Set Systems, Word Sets, and Permutation Sets.* Preliminary report.
**Yan Zhuang**, Goucher College (1086-05-1304)

8:30AM (108) *Representation function of finite additive bases.*
**Anant Godbole***, East Tennessee State University, **Sam Gutekunst**, Harvey Mudd College, **Vince Lyzinski**, The Johns Hopkins University, and **Yan Zhuang**, Goucher College (1086-05-2070)

8:45AM ► (109) *Symmetric Difference Free Families.*
**Samantha Pinella***, University of Edinburgh, and **Kristen Bartosz**, Oregon State University (1086-05-894)

9:00AM ► (110) *Extended Skolem-type Difference Sets.* **Tina Helms**, Illinois State University, **Heather Jordon***, Mathematical Reviews, **Maggie Murray** and **Stephanie Zeppetello**, Illinois State University (1086-05-1735)

9:15AM ► (111) *An inductive approach to constructing Universal Cycles on* $\binom{n}{k}$. **Yevgeniy Rudoy**, Johns Hopkins University (1086-05-898)

9:30AM ► (112) *Multiscale approach to the near-unit distance problem.* **Steven Michael Senger**, University of Delaware (1086-05-2775)

9:45AM ► (113) *EKR sets for large* $n$ *and* $r$. **Ben Bond**, MIT (1086-05-1086)

10:00AM ► (114) *Rado Numbers for a Linear Inequality.* **Daniel Schaal***, South Dakota State University, and **Corey Vorland**, North Dakota State University (1086-05-2598)

10:15AM ► (115) *Non-existence of difference sets with order* $n = m^2$*, where* $m$ *is a natural number greater than 1.* **Solomon Adegoke Osifodunrin**, Livingstone College, Salisbury, NC, 28144 (1086-05-115)

10:30AM (116) *What makes finite geometry designs so special?* **David Clark**, University of Minnesota (1086-05-1730)

10:45AM ► (117) *Quadratic Leaves of Partial Triple Systems.* **Joseph Chaffee*** and **Chris Rodger**, Auburn University (1086-05-492)

## *AMS Session on Functional Analysis and Operator Theory, I*

**8:00 AM – 10:55 AM** **Room 30C, Upper Level, San Diego Convention Center**

8:00AM (118) *TALK CANCELLED: A weakly dense sequence that is not norm dense.* **Antonia E. Cardwell**, Millersville University of Pennsylvania (1086-47-1894)

8:15AM (119) *Numerical radius inequalities for several operators.* **Omar Hirzallah**, Hashemite Univesity, and **Fuad Kittaneh***, University of Jordan (1086-47-188)

8:30AM (120) *Finding some Berger measures.* Preliminary report. **Raul E. Curto**, The University of Iowa, and **George R. Exner***, Bucknell University (1086-47-387)

8:45AM (121) *On extension of positive definite functions.* **Robert Niedzialomski**, The University of Iowa (1086-46-2666)

9:00AM ► (122) *An Alternate Proof that the Hermite Functions Form a Basis for* $L^2(\mathbb{R})$. Preliminary report. **William W. Johnston**, Butler University (1086-46-2327)

9:15AM ► (123) *A functional representation of commutative symmetrical algebras, possessing an eigen-vector and acting on the Pontryagin* $\Pi_1$ *space.* Preliminary report. **Sofya S Masharipova** and **Shukhrat M Usmanov***, Ashford University, Clinton, Iowa (1086-46-1637)

9:30AM (124) *Multidimensional extensions of Pólya-Knopp-type inequalities over spherical cones.* Preliminary report. **Chang-Pao Chen***, Hsuan Chuang University, **Jin-Wen Lan**, National Tsing Hua University, and **Dah-Chin Luor**, I-Shou University (1086-47-565)

9:45AM (125) *Scaled-Free Properties for Matrix-Normed Objects.* Preliminary report. **William Benjamin Grilliette**, Tyler Junior College (1086-47-2424)

10:00AM Discussion

10:15AM (126) *A formula for the resolvent of the doubly infinite CMV matrix.* **Darren C. Ong*** and **Paul Munger**, Rice University (1086-47-1351)

10:30AM ► (127) *The Geometry of* $P$*-matrices and the Gale-Nikaido Theorem and Applications.* Preliminary report. **E. Cabral Balreira**, Trinity University (1086-58-875)

10:45AM (128) *On a sharpened form of Leray-Lions ellipticity criterion.* **Dan D. Pascali**, Courant Institute, New York University (1086-47-1717)

## *MAA Session on How Assessment Results Changed our Program*

**8:00 AM – 10:35 AM** **Room 11B, Upper Level, San Diego Convention Center**

Organizers: **Miriam Harris-Botzum**, Lehigh Carbon Community College
**Bonnie Gold**, Monmouth University

8:00AM ► (129) *Reducing the Gender Gap on a Qualifying Exam.* Preliminary report. **Jonathan Rogness***, **Harvey Keynes**, **Jane Butterfield**, University of Minnesota, and **Justin Sukiennik**, Colby College (1086-G1-2516)

8:20AM (130) *From assessment to a mathematics-focus NSF S-STEM program.* **Yu-Ju Kuo*** and **Frederick Adkins**, Indiana University of Pennsylvania (1086-G1-2015)

8:40AM ► (131) *Assessment 2.0; SAUM meets Accreditation.* Preliminary report. **Alex Heidenberg***, **Jerry Kobylski** and **Rod Sturdivant**, United States Military Academy (1086-G1-2654)

9:00AM ► (132) *A Comprehensive Assessment Program.* **Barbara Moskal** and **Lyndsey Wright***, Colorado School of Mines (1086-G1-2099)

9:20AM ► (133) *Closing the Loop: How Creating and Administering Assessments for NCATE / NCTM Program Recognition Directed Us to Data Analysis that Improved our Program.* Preliminary report.
**Sherry L Hix*** and **Dianna J Spence**, North Georgia College and State University (1086-G1-1888)

9:40AM (134) *How We Stopped Worrying and Learned to Love Assessment: One Department's Story.* Preliminary report.
**Thomas R Hagedorn**, The College of New Jersey (1086-G1-2819)

10:00AM (135) *Making Assessment Meaningful.*
**James Hamblin**, Shippensburg University (1086-G1-1908)

10:20AM ► (136) *Five Years of Math Programmatic and Course Assessment at UC Irvine.* Preliminary report.
**Sarah E. Eichhorn*** and **Tommy Occhipinti**, University of California, Irvine (1086-G1-2822)

### *MAA Session on Innovative Ideas for Courses in the First Two Years, I*

**8:00 AM – 10:55 AM** **Room 5A, Upper Level, San Diego Convention Center**

Organizer: **Andrew Granville Bennett**, Kansas State University

8:00AM ► (137) *i-IBL Interactive Inquiry Based Learning: Improving Student Conceptual Learning in Precalculus.*
**Cynthia Y. Young**, University of Central Florida (1086-H1-711)

8:20AM (138) *An Online Pre-Calculus Course using ALEKS.*
**Sarah E. Eichhorn*** and **Rachel Lehman**, University of California, Irvine (1086-H1-2896)

8:40AM (139) *The Alfred University Calculus Initiative.*
**Joseph Petrillo**, Alfred University (1086-H1-1029)

9:00AM ► (140) *Signing on to Redesign.*
**Christopher Schroeder**, Morehead State University (1086-H1-2931)

9:20AM (141) *Combining Khan Academy and Active Learning in Pre-calculus.*
**Michael S Gagliardo**, California Lutheran University (1086-H1-2686)

9:40AM ► (142) *Flipping A College Algebra Classroom.* Preliminary report.
**Regina D. Aragon***, **Tom Brown** and **Matt Bell**, Eastern New Mexico University (1086-H1-406)

10:00AM ► (143) *Improving Student Learning Using Interactive Lecture Notes.*
**Rachel Frankel**, University of Cincinnati, Blue Ash College (1086-H1-160)

10:20AM ► (144) *Rethinking Business Calculus with Spreadsheets and Laptops.* Preliminary report.
**Mike May**, Saint Louis University (1086-H1-320)

10:40AM (145) *Preparing Students to Make Mathematical Connections for Better Success.* Preliminary report.
**Feryal Alayont***, Grand Valley State University, and **Derek Habermas**, SUNY Potsdam (1086-H1-973)

### *MAA Session on Mathematics and the Arts: Practice, Pedagogy, and Discovery, I*

**8:00 AM – 10:55 AM** **Room 6E, Upper Level, San Diego Convention Center**

Organizer: **Douglas Norton**, Villanova University

8:00AM ► (146) *When two colours suffice - even for children.*
**Barbora Kamrlova**, Comenius University Bratislava, Slovakia (1086-K1-1020)

8:20AM ► (147) *Intersections: Undergraduate students' engagement with projective geometry and the arts.*
**J Brooke Ernest***, San Diego State University, and **Ricardo Nemirovsky**, San Diego State University/Center for Research in Mathematics and Science Education (1086-K1-2910)

8:40AM ► (148) *Mathematics to Inspire Art to Inspire Mathematics to ...* Preliminary report.
**James Morrow**, Mount Holyoke College (1086-K1-1559)

9:00AM (149) *Math/Art Course.*
**Ann C Hanson**, Columbia College, Chicago, IL (1086-K1-1070)

9:20AM ► (150) *Teaching hyperbolic geometry using the works of Escher and Gaudi.*
**Anneke Bart**, Saint Louis University (1086-K1-922)

9:40AM ► (151) *A New Unit in a MWSU Liberal Arts Math Course: Math and the Fine Arts.*
**Jeff Poet**, Missouri Western State University (1086-K1-545)

10:00AM ► (152) *Context Free Art in the Classroom.* Preliminary report.
**Charles Redmond**, Mercyhurst University (1086-K1-464)

10:20AM ► (153) *A Freshman Writing Seminar on Mathematics.* Preliminary report.
**Mark Kozek**, Whittier College (1086-K1-2897)

10:40AM ► (154) *TALK CANCELLED: Joining "the mathematician's delirium to the poet's logic": Interdisciplinary Teaching and Constrained Writing in the Canisius College All-College Honors Program.* Preliminary report.
**Rita Capezzi*** and **Christine Kinsey**, Canisius College (1086-K1-2733)

### *MAA Session on Writing the History of the MAA*

**8:00 AM – 10:55 AM** **Room 3, Upper Level, San Diego Convention Center**

Organizers: **Victor J. Katz**, University of the District of Columbia
**Amy Shell-Gallasch**, Hood College
**Janet Beery**, University of Redlands

8:00AM ► (155) *Leading Players and Supporting Cast.* Preliminary report.
**Agnes M. Kalemaris**, Farmingdale State College (1086-S1-407)

8:20AM ► (156) *The History of the Officers of the Kansas Section.* Preliminary report.
**Timothy W Flood**, Pittsburg State University (1086-S1-819)

8:40AM (157) *Writing a History of the OK-AR MAA Section.*
**James R Choike**, Oklahoma State University (1086-S1-972)

9:00AM ► (158) *CUPM: The History of an Idea.*
**J. Michael Pearson**, Mathematical Association of America (1086-S1-1446)

9:20AM ► (159) *The Early History of POMSIGMAA.*
**Bonnie Gold**, Monmouth University (1086-S1-317)

9:40AM (160) *The History and Impact of IHMT, the Institute in the History of Mathematics and its Use in Teaching.*
**V Frederick Rickey***, United States Military Academy, and **Victor J Katz**, University of the District of Columbia (1086-S1-1616)

10:00AM ► (161) *The Kentucky Section of the MAA: 1917-2013.*
**Daniel J. Curtin**, Northern Kentucky University (1086-S1-1318)

10:20AM ► (162) *The Last Quarter-Century in the Missouri Section.* Preliminary report.
**Leon M Hall**, Missouri S&T (1086-S1-1935)

10:40AM ► (163) *Digging up More History in the Capital Section.* Preliminary report.
**Caren Diefenderfer***, Hollins University, and **Elizabeth Mayfield**, Hood College (1086-S1-2443)

### *MAA General Contributed Paper Session: Interdisciplinary Topics*

**8:00 AM – 10:10 AM** **Room 33B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Sujin Kim**, Savannah State University
**Scott Beaver**, Western Oregon University

8:00AM ► (164) *Modeling the dynamics of competitive systems, with applications to religious shift and ferromagnetism.* Preliminary report.
**Haley A Yaple**, Northwestern University (1086-VD-2297)

8:15AM (165) *Filter-Based Multiscale Entropy Analysis of Complex Physiologic Time Series.*
**Yuesheng Xu** and **Liang Zhao***, Syracuse University (1086-VD-1588)

8:30AM ► (166) *The Twisted Tale of Protein-Bound DNA.* Preliminary report.
**Mary Therese Padberg***, **Isabel Darcy**, The University of Iowa, **Stefan Giovan**, **Stephen Levene**, The University of Texas at Dallas, and **Rob Scharein**, Hypnagogic Software (1086-VD-329)

8:45AM ► (167) *Cyber Security with Handwritten CAPTCHA.*
**Amalia Rusu**, Fairfield University, **Stephen B Mislich***, Greenville College, **Lukas Missik**, Harvard University, and **Benjamin Schenker**, The Cooper Union (1086-VD-1595)

9:00AM ► (168) *Interdisciplinary Research of Case Study in Low-Income Neighborhoods to Identify Risk Factors Contributing to Obesity.* Preliminary report.
**Sujin Kim*** and **Deden Rukmana**, Savannah State University (1086-VD-1996)

9:15AM ► (169) *Counting Pitch Class Sets with Burnside's Lemma.* Preliminary report.
**Lori Koban***, University of Maine Farmington, **Jordan LeGrand**, University of Colorado Denver, and **Joshua Case**, University of Maine (1086-VD-478)

9:30AM (170) *Implementing an Institutional Interdisciplinary Program with Mathematicians at the Lead (a Follow-Up Report).*
**David M Gohlich**, **Christopher E Weld** and **Gerald Kobylski***, United States Military Academy (1086-VD-2555)

9:45AM (171) *A Multidisciplinary Sciences Teacher Education Program.*
**David Lamp**, **Rebecca Ortiz**, **Magdalena Pando**, **G. Brock Williams** and **M. Carol Williams***, Texas Tech University (1086-VD-2854)

10:00AM ► (172) *What would a map of mathematics look like?*
**Alexi Hoeft**, Virginia Commonwealth University (1086-VD-2821)

### *MAA General Contributed Paper Session: Mathematics and Technology, I*

**8:00 AM – 10:40 AM** **Room 5B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College

**Gizem Karaali**, Pomona College

**Douglas Norton**, Villanova University

Moderator: **David Hecker**, St. Joseph's University

8:00AM ► (173) *Flash-enhanced WeBWorK problems in Differential Equations.* Preliminary report.
**L. Felipe Martins***, **Barbara Margolius**, Cleveland State University, and **Dan Gries**, Hopkins School (1086-VF-2761)

8:15AM ► (174) *Interactive Math Texts on the Web using MathJax, JSXGraph, and HTML5.*
**Michael D Hvidsten**, Gustavus Adolphus College (1086-VF-2683)

8:30AM (175) *Customizable graphical user interface applets integrated with WeBWorK calculus problems.*
**Daniel Gries**, Hopkins School (1086-VF-1023)

8:45AM ► (176) *Online Remedial Mathematics to Enter Precalculus: An analysis of the relative value of a traditional classroom courses vs an online course.* Preliminary report.
**Daniel Lee McGee**, **Pedro Vazquez-Urbano*** and **Jesus Cajigas**, University of Puerto Rico - RUM (1086-VF-758)

9:00AM ► (177) *Teaching online mathematics courses with an accent.* Preliminary report.
**Petre Ion Ghenciu**, University of Wisconsin-Stout (1086-VF-717)

9:15AM ► (178) *TALK CANCELLED: The Benefits of Using Email to Maintain Instructor Accessibility in Assisting Student-Driven Learning of Mathematics.* Preliminary report.
**Troy A. Bupp**, United States Military Academy (1086-VF-2075)

9:30AM (179) *Teaching hybrid online classes to secondary school teachers.*
**Mark C Ginn**, Appalachian State University (1086-VF-2548)

9:45AM ► (180) *Electronic grading of paper assessments.* Preliminary report.
**Matthew Leingang**, New York University (1086-VF-1369)

10:00AM ► (181) *Lurch: a word processor that checks students' mathematical reasoning.*
**Nathan C Carter***, Bentley University, and **Kenneth G Monks**, University of Scranton (1086-VF-2456)

10:15AM (182) *Lore.com: Experiences Using This Free Online Course Management System in a Liberal Arts Math Class.* Preliminary report.
**Jonathan D Dunbar**, Spring Hill College (1086-VF-2563)

10:30AM ► (183) *Some Notes on the Calculation of the Continued Exponents.* Preliminary report.
**Hossein Behforooz**, Utica College (1086-VF-513)

## *MAA General Contributed Paper Session: Probability and Statistics, I*

**8:00 AM – 10:55 AM** **Room 33A, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College

**Gizem Karaali**, Pomona College

**Douglas Norton**, Villanova University

Moderators: **Michael A. Posner**, Villanova University

**Lerna Pehlivan**, York University

8:00AM (184) *Rank Based Group Variables Selection in Linear Models.*
**Guy-vanie M Miakonkana*** and **Ash Abebe**, Auburn University (1086-VI-2959)

8:15AM ► (185) *TALK CANCELLED: Mixed-Frequency Estimation and Regression in Linear and Generalized Linear Models.* Preliminary report.
**Yu Weng**, University of North Texas (1086-VI-2879)

8:30AM (186) *Testing Equality of Nonparametric Quantile Regression Functions.*
**Chinthaka N Kuruwita***, Hamilton College, **Colin M Gallagher**, Clemson University, and **K B Kulasekera**, University of Louisville (1086-VI-2754)

8:45AM (187) *Robust Functional Logistic Regression.*
**Melody B. Denhere*** and **Nedret Billor**, Auburn University (1086-VI-2573)

9:00AM Break.

9:15AM (188) *Tempered Fractional Brownian Motion.* Preliminary report.
**Farzad Sabzikar*** and **Mark M Meerschaert**, Michigan State University (1086-VI-2204)

9:45AM (189) *Robust Covariance Matrix Estimation with Canonical Correlation Analysis.*
**Janfeng Zhang**, Chattanooga State Community College, **David J. Olive**, Southern Illinois University, and **Ping Ye***, Quincy University (1086-VI-1484)

10:00AM ► (190) *Comparison of clustering methods for longitudinal data.*
**Brianna C Heggeseth**, University of California, Berkeley (1086-VI-1269)

10:15AM ► (191) *Flexible Families of Skew T Distributions with Applications.* Preliminary report.
**Abeer Hasan**, Bowling Green State University (1086-VI-1004)

10:30AM (192) *Visualizing Distributions in a Probability & Statistics Class.*
**Jason J. Molitierno**, Sacred Heart University (1086-VI-977)

10:45AM ► (193) *On Generating New Generalized Distributions Using the Logit Transformation.*
**R M Al-Aqtash**, Central Michigan University (1086-VI-976)

### *MAA General Contributed Paper Session: Research in Algebra and Topology, I*

**8:00 AM – 10:55 AM** **Room 33C, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Jay Stine**, Misericordia University
**Ellie Abernethy**, University of Tennessee

8:00AM (194) *The Gerby Gopakumar-Marino-Vafa Formula.*
**Dustin J Ross**, Colorado State University (1086-VJ-2942)

8:15AM ► (195) *Arc Presentations and Grid Diagrams of Multi-Crossing Knots.*
**Benjamin H DeMeo**, Williams College (1086-VJ-2858)

8:30AM (196) *Gauss Diagram Formulas for Milnor Invariants.* Preliminary report.
**Eleanor McNair Abernethy**, University of Tennessee, Knoxville (1086-VJ-2052)

8:45AM ► (197) *Knot projections with a single multi-crossing.*
**Michael Landry***, UC Berkeley, and **MurphyKate Montee**, Notre Dame University (1086-VJ-2047)

9:00AM (198) *Automorphisms of buildings constructed via covering spaces.*
**Aliska L Gibbins**, Ohio State University (1086-VJ-2350)

9:15AM (199) *Equivalence of Cyclic $p^2$ Actions on Handlebodies of Genus $g$.*
**Jesse Tyler Prince-Lubawy**, Saint Louis University (1086-VJ-426)

9:30AM (200) *Topological Enrtophy of Non-Archimedean Topologies.*
**Rahim G Karimpour**, Belleville, Illinois (1086-VJ-88)

9:45AM ► (201) *Classifying Extensions of a Characteristic $p$ Local Field.*
**Alfeen Hasmani***, Molloy College, **Lindsey Hiltner**, University of North Dakota, **Angela Kraft**, Bethany Lutheran College, **Daniel Scofield**, Grove City College, **Kirsti Wash** and **Jim Brown**, Clemson University (1086-VJ-2861)

10:00AM (202) *The Graev Metrics Over Free Groups.*
**Xiaohui Shi**, University of North Texas (1086-VJ-2715)

10:15AM (203) *Smale Flows on Three Dimensional Manifolds.* Preliminary report.
**Elizabeth L. Haynes**, Muhlenberg College (1086-VJ-2529)

10:30AM (204) *A new generalization of the Khovanov Homology.* Preliminary report.
**Ik Jae Lee**, Rowan University (1086-VJ-1266)

10:45AM ► (205) *A Brief History of Pre-Hausdorff Spaces.*
**Jay R. Stine**, Misericordia University (1086-VJ-1141)

### *MAA General Contributed Paper Session: Research in Applied Mathematics, I*

**8:00 AM – 10:55 AM** **Room 1B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Gizem Karaali**, Pomona College
**Ahad Dehghani**, McGill University

8:00AM (206) *TALK CANCELLED: On the stability and convergence results of finite volume schemes for diffusion problems with a gradient-dependent diffusion coefficient.* Preliminary report.
**Du Pham**, Butler University (1086-VL-2983)

8:15AM (207) *TALK CANCELLED: Fast direct solvers for elliptic boundary value problems.*
**Adrianna M Gillman**, Dartmouth College (1086-VL-2405)

8:30AM (208) *Small Steady Self-Similar Inviscid Flows.*
**Joseph Roberts*** and **Volker Elling**, University of Michigan, Ann Arbor (1086-VL-2197)

8:45AM (209) *Optimization of a Monte Carlo Variance Reduction Method Based on Sensitivity Derivatives.*
**Yaning Liu***, **M. Yousuff Hussaini** and **Giray Okten**, Florida State University (1086-VL-2104)

9:00AM ► (210) *An Implicit Interface Boundary Integral Method for Poisson's Equation on Arbitrary Domains.*
**Catherine Mareva Kublik***, Madison WI, **Nicolay M Tanushev**, Z-Terra Inc., Houston TX, and **Richard Tsai**, University of Texas at Austin (1086-VL-1480)

9:15AM (211) *Nonlinear Linear Programming for Multivalued Mappings.*
**Qingxia Li** and **James Schrader***, Lincoln University (1086-VL-788)

9:30AM ► (212) *Resource Networks' Influence on the Social Network and the Effectiveness of Public Policy.* Preliminary report.
**Csilla Szabo**, United States Military Academy (1086-VL-2895)

9:45AM ► (213) *Mathematical Modeling of Language.* Preliminary report.
**Jacquelyn L. Rische**, University of California, Irvine (1086-VL-1610)

10:00AM ► (214) *Optical black holes and solitons.*
**Shawn Michael Westmoreland**, Kansas State University (1086-VL-1507)

10:15AM ► (215) *WENO Simulations of Astrophysical Jets.* Preliminary report.
**Andrew J. Knapp**, Arizona State University (1086-VL-2718)

10:30AM (216) *A Primal-Dual Regularization Interior-Point Method for Semidefinite Programming.*
**Ahad Dehghani***, **Jean-Louis Goffin**, McGill University, and **Dominique Orban**, GERAD (1086-VL-2432)

10:45AM ► (217) *Stability estimates for semigroups on Banach space.*
**Xinyao Yang**, University of Missouri (1086-VL-293)

### *MAA General Contributed Paper Session: Research in Number Theory, I*

**8:00 AM – 10:55 AM** **Room 2, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderator: **Stephen Davis**, Davidson College

8:00AM ► (218) *Mind the Gap: Distribution of Gaps in Generalized Zeckendorf Decompositions.*
**Rachel R. Insoft***, Wellesley College, and **Amanda G. Bower**, University of Michigan Dearborn (1086-VO-532)

8:15AM ► (219) *Distribution of the Longest Gap in Positive Linear Recurrence Sequences.*
**Shiyu Li***, University of California, Berkeley, **Philip D. Tosteson** and **Steven J. Miller**, Williams College (1086-VO-2728)

8:30AM ► (220) *When Almost All Generalized Sumsets Are Difference Dominated.*
**Virginia A Hogan***, Stanford University, and **Steven J Miller**, Williams College (1086-VO-595)

8:45AM ► (221) *Most Sets are Balanced in many Finite Groups.*
**Kevin Vissuet***, University of California, San Diego, and **Steven Miller**, Williams College (1086-VO-2611)

9:00AM ► (222) *Convergence of the Maximum Zeros of a Class of Fibonacci-Type Polynomials.*
**Kristi Karber***, University of Central Oklahoma, and **Rebecca Miller**, University of Oklahoma (1086-VO-1081)

9:15AM (223) *New classes of permutation polynomials over finite fields defined by functional equations.* Preliminary report.
**Neranga Fernando***, **Xiang-dong Hou** and **Stephen Lappano**, University of South Florida (1086-VO-1134)

9:30AM ► (224) *TALK CANCELLED: An Empirical Study on the Iteration of the Total Stopping Time of 3x+1 Iterates.*
**Amanda M. Kovacs**, Molloy College (1086-VO-1361)

9:45AM ► (225) *On the distribution of the last digits under the Syracuse iteration.*
**Henrique Oliveira**, Technical Institute of Lisbon (1086-VO-2924)

10:00AM ► (226) *Estimating Success When Combining RSA and the Diffie-Hellman Key Exchange.* Preliminary report.
**Rick Klima***, Appalachian State University, and **Neil Sigmon**, Radford University (1086-VO-370)

10:15AM ► (227) *There is an infinite number of twin primes: An application of set theory.* Preliminary report.
**Bao Qi Feng**, Kent State University at Tuscarawas (1086-VO-1591)

10:30AM (228) *Irreducible integers under the congruence modulo $n$ relation.*
**James Lanterman*** and **Jeremiah Reinkoester**, Mercer University (1086-VO-1623)

10:45AM (229) *The Completed Zeta Function and the Riemann Hypothesis.* Preliminary report.
**Badih N. Ghusayni**, Lebanese University (1086-VO-450)

### *MAA General Contributed Paper Session: Teaching Introductory Mathematics*

**8:00 AM – 10:55 AM** **Room 7A, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderator: **Lynette Boos**, Providence College

8:00AM (230) *The transition from school to university – a transition between two distinct worlds of concept acquisition?*
**Thorsten Scheiner**, University of Hamburg (1086-VP-878)

8:15AM ► (231) *Using Computer Programming to Teach High School Mathematics.* Preliminary report.
**Spencer O. Sims*** and **Kahmya McAlpin**, Los Angeles Adventist Academy (1086-VP-1185)

8:30AM ► (232) *iMPaCT-Math: Fostering Foundational Concepts in Algebra 1 via Programming Activities on Graphing Calculators.*
**Kien H Lim**, **Art Duval*** and **Eric Freudenthal**, University of Texas at El Paso (1086-VP-1016)

8:45AM ► (233) *Trigonometric applets using GeoGebra.*
**Salvatore P Giunta**, Adelphi University (1086-VP-1339)

9:00AM ► (234) *Fundamental Equation for Quadratic Polynomials.* Preliminary report.
**Waclaw Szymanski***, West Chester University, and **Ximena Catepillan**, Millersville University (1086-VP-1392)

9:15AM ► (235) *Constructing an apollonian section parabola, onto a right cone having slope (m) and altitude (A).*
**Alexander L. Garron; Jr.**, CEO Sand Box Geometry LLC (1086-VP-1320)

9:30AM (236) *College Algebra and One Instructor's Attempt to Build a Better Mousetrap.* Preliminary report.
**Lindsey R. Bosko-Dunbar**, Spring Hill College (1086-VP-2558)

9:45AM (237) *Projects in Finite Mathematics Courses.*
**Yun Lu**, Kutztown University of PA (1086-VP-1889)

10:15AM ► (238) *A Word on Word Problems: How Improving Reading Comprehension and Mathematics Vocabulary Can Improve Performance on Mathematical Word Problems.* Preliminary report.
**Dywayne A. Nicely**, Ohio University-Chillicothe (1086-VP-1775)

10:30AM ► (239) *What is Mathematics and Why Do We Care?*
**Kayla Bradley Dwelle**, Ouachita Baptist University (1086-VP-1584)

10:45AM ► (240) *Learning math like a mathematician.* Preliminary report.
**Shenglan Yuan**, LaGuardia Community College, CUNY (1086-VP-2578)

## *SIAM Minisymposium on Mathematical Models and Fast Algorithms in Imaging Sciences*

**8:00 AM – 10:55 AM** **Room 11A, Upper Level, San Diego Convention Center**

Organizers: **Peter Blomgren**, San Diego State University
**Yongang Shi**, University of California, Los Angeles
**Xue-Cheng Tai**, University of Bergen
**Luminita Vese**, University of California, Los Angeles

8:00AM (241) *Developing a "light-weight" skin cancer image screening system.*
**Peter Blomgren**, San Diego State University (1086-65-1964)

8:30AM (242) *Conformal Metric Optimization on Surfaces (CMOS) for Mapping Neuroanatomical Shapes.*
**Yonggang Shi***, **Arthur Toga**, Laboratory of Neuro Imaging (LONI), Dept. of Neurology, UCLA School of Medicine, and **Rongjie Lai**, University of Southern California (1086-53-1562)

9:00AM (243) *A Splitting Method for Orthogonality Constrained Problems.* Preliminary report.
**Rongjie Lai***, University of Southern California, and **Stanley Osher**, University of California, Los Angeles (1086-49-1581)

9:30AM (244) *Convex Variational Models and Efficient Optimization Algorithms for Image Segmentation.*
**Egil Bae**, UCLA (1086-65-2974)

10:00AM (245) *An MBO scheme on graphs for segmentation and image processing.*
**Andrea L. Bertozzi***, **Ekaterina Merkurjev** and **Tijana Kostic**, University of California Los Angeles (1086-65-2404)

10:30AM (246) *Bounded Variation Reglarization Revisited: Mathematical Aspects.* Preliminary report.
**M. Zuhair Nashed**, Department of Mathematics, University of Central Florida, Orlando, Florida 32143 (1086-65-2980)

## *Employment Center*

**8:00 AM – 6:00 PM** **Exhibit Hall A, Ground Level, San Diego Convention Center**

## *AMS Session on Categories, K-Theory, and Knots*

**8:15 AM – 10:55 AM** **Room 12, Mezzanine Level, San Diego Convention Center**

8:15AM (247) *Homogeneous Representations of Type $A$ Khovanov-Lauda-Rouquier Algebras.*
**Gabriel Feinberg*** and **Kyu-Hwan Lee**, University of Connecticut (1086-16-2519)

8:30AM (248) *Yangians and quantizations of slices in the affine Grassmannian.*
**Oded Yacobi***, **Joel Kamnitzer**, University of Toronto, **Ben Webster**, Northeastern University, and **Alex Weekes**, University of Toronto (1086-20-2381)

8:45AM (249) *Generalized $q, t$-Catalan Numbers and Jacobi Factors.*
**Mikhail Mazin**, Stony Brook University (1086-05-2829)

9:00AM (250) *Higher order Jones-Wenzl Projectors and Mapping Class Groups.*
**Benjamin Cooper***, University of Zurich, and **Matt Hogancamp**, University of Virginia (1086-18-2943)

9:15AM (251) *Foams and $sl(n)$ tangle cohomology.* Preliminary report.
**Carmen L. Caprau**, California State University, Fresno (1086-57-218)

9:30AM ► (252) *The singular Temperley-Lieb category.* Preliminary report.
**Joel Smith**, California State University, Fresno (1086-18-185)

9:45AM (253) *A perfect matching model for knot homology theories.* Preliminary report.
**Moshe Cohen**, Bar-Ilan University (Israel) (1086-57-344)

10:00AM (254) *G-Theory of a Complete Local CM Ring of Finite CM Type.*
**Viraj Navkal**, UCLA (1086-19-1991)

10:15AM (255) *K1 of an Exact Category by Mirror Image Sequences.*
**Clayton C. Sherman**, Missouri State University (1086-19-1909)

10:30AM (256) *Differential Circle Equivariant K-theory.* Preliminary report.
**Mio I Alter**, University of Texas-Austin (1086-19-2689)

10:45AM (257) *A new filtration of the Magnus kernel of the Torelli group.*
**R. Taylor McNeill**, Rice University (1086-57-127)

## *AMS Session on Undergraduate Research in Analysis*

**8:15 AM – 10:55 AM** **Room 18, Mezzanine Level, San Diego Convention Center**

8:15AM ► (258) *Energy Measures of Harmonic Functions on the Sierpinski Gasket.*
**Renee H Bell***, University of California, Berkeley, **Ching Wei Ho**, Chinese University of Hong Kong, and **Robert S Strichartz**, Cornell University (1086-28-1856)

8:30AM ► (259) *Positive Type Infinite Measure Ergodic Transformations.*
**Evangelie Zachos***, Princeton University, **Tudor Padurariu**, UCLA, and **Cesar Silva**, Williams College (1086-37-2853)

8:45AM ► (260) *On Rationally Ergodic and Rationally Weakly Mixing Rank-One Transformations.*
**Irving Dai***, Harvard College, **Xavier Garcia**, University of Minnesota, **Tudor Padurariu**, University of California, Los Angeles, and **Cesar E. Silva**, Williams College (1086-37-2181)

9:00AM DISCUSSION

9:15AM ► (261) *Nonlocal Models in Diffusion with Applications in Peridynamics.* Preliminary report.
**Christine S Hoffman**, University of Minnesota, Morris, **Amanda Brucker***, Cornell College, **Joshua Bracewell**, New Jersey Institute of Technology, and **Trevor Vossberg**, Illinois Institute of Technology (1086-35-1592)

9:30AM ► (262) *A Multiplicative Analogue of the Reynolds Operator and Construction of Invariants.* Preliminary report.
**Tyler A Russell***, Texas Tech University, **Jennifer Graetz** and **Steven Deckelman**, University of Wisconsin, Stout (1086-13-2747)

9:45AM ► (263) *Integral approximations in reconstructing functions from non-uniform Fourier data.* Preliminary report.
**Alexander Elkholy**, Arizona State University (1086-42-2755)

10:00AM ► (264) *Edge Detection from Non-Uniform Fourier Data via an Adapted Method of Convolutional Gridding.*
**Adam Martinez**, Arizona State University (1086-42-2742)

10:15AM ► (265) *Quantitative Analyses of Haar vs. Periodic Haar Wavelets.* Preliminary report.
**Jessica Christine De Silva**, California State University, Stanislaus (1086-42-2416)

10:30AM ► (266) *TALK CANCELLED: Simultaneous Approximation of a Function and Its Derivative by Linear Splines.*
**Ryan A. Anderson**, Kennesaw State University (1086-00-2869)

10:45AM ► (267) *Measure-Theoretic Sensitivity.*
**Emily A Wickstrom***, Williams College, **Shelby Heinecke**, Massachusetts Institute of Technology, and **Cesar E. Silva**, Williams College (1086-00-2439)

## *AMS Session on the History of Mathematics*

**8:15 AM – 10:55 AM** **Room 10, Upper Level, San Diego Convention Center**

8:15AM ► (268) *What was the smallest prime?*
**Chrs K. Caldwell*** and **Yeng Xiong**, University of Tennessee at Martin (1086-01-2296)

8:30AM ► (269) *Mahani of Mahan: A persian Mathematician of Long Ago.* Preliminary report.
**MM Moazzam**, Salisbury University, Salisbury MD (1086-01-1122)

8:45AM (270) *Final period of Mathematic in the west of Islamic world in Medieval.*
**Mohammadreza Shahidipak**, Islamic Azad University Central Tehran Branch (1086-01-148)

9:00AM ► (271) *Did Bernoulli discover Bernoulli's equation?* Preliminary report.
**Erik R. Tou**, Carthage College (1086-01-1600)

9:15AM ► (272) *Historical survey of solitary wave phenomena.* Preliminary report.
**Sanja V Pantić**, University of Illinois at Chicago (1086-01-2633)

9:30AM ► (273) *John Farrar's French mathematics textbooks translations for Harvard new curriculum (1818-1824).*
**Thomas Preveraud**, University of Nantes, France (1086-01-1524)

9:45AM ► (274) *Who discovered vector calculus? The case of Domenico Chelini (1802-1878).*
**Sandro Caparrini**, University of Torino, Italy (1086-01-1598)

10:00AM *Thomas Jefferson as Mathematician.*
► (275) **Andrew B Perry**, Springfield College (MA) (1086-01-1368)

10:15AM *Issai Schur.* Preliminary report.
► (276) **Charlotte K Simmons*** and **Jesse W Byrne**, University of Central Oklahoma (1086-01-1533)

10:30AM *Mamba vs JN-25.* Preliminary report.
► (277) **Jared E Antrobus**, Northern Kentucky University (1086-01-637)

10:45AM *Paradigm and Pan-paradigm*
► (278) *in Mathematics and Architecture.* Preliminary report.
**Young Hee Kye**, Kosin University, Busan, S. Korea (1086-01-1706)

### *AMS Special Session on Interplays Between Feynman Operational Calculus, Wiener and Feynman Integrals, Physics, and Analysis on Wiener Space, I*

**8:30 AM – 10:50 AM** **Room 32A, Upper Level, San Diego Convention Center**

Organizers: **Tepper Gill**, Howard University
**Lance Nielsen**, Creighton University
**Ian Pierce**, St. Olaf College

8:30AM (279) *Feynman Integral in the Context of Hyperintegration.* Preliminary report.
**Mark Burgin**, UCLA (1086-46-34)

9:00AM
► (280) *Building a Free Quantum Field Theory on a Curved Spacetime.* Preliminary report.
**Maurice J LeBlanc**, University of Georgia at Athens (1086-81-823)

9:30AM (281) *Relationships between the conditional Fourier-Feynman transform and convolution of unbounded functions on an analogue of wiener space.*
**Dong Hyun Cho**, Kyonggi University (1086-28-952)

10:00AM (282) *A Short Visit to Generalized Wiener Space.* Preliminary report.
**Ian Pierce**, St. Olaf College (1086-28-2614)

10:30AM (283) *Analytic Operator-Valued Feynman Integrals.*
**David L. Skoug**, University of Nebraska - Lincoln (1086-28-453)

### *AMS Special Session on Manifolds with Special Holonomy and Generalized Geometries, I*

**8:30 AM – 10:50 AM** **Room 30D, Upper Level, San Diego Convention Center**

Organizers: **Sema Salur**, University of Rochester
**Albert James Todd**, University of California, Riverside
**Yat Sun Poon**, University of California, Riverside

8:30AM (284) *Gluing Techniques in Calibrated Geometry.*
**Yongsheng Zhang**, Stony Brook University (1086-53-1289)

9:00AM (285) *A higher dimensional Donaldson theory for foliated manifolds.*
**Shuguang Wang**, University of Missouri (1086-58-1960)

9:30AM (286) *Calibrations in hyperkaehler geometry.*
**Gueo Grantcharov***, Florida International University, and **Misha Verbitsky**, HSE, Moscow, Russia (1086-53-1375)

10:00AM (287) *Short time behaviour of a modified Laplacian coflow of G2-structures.*
**Sergey Grigorian**, Simons Center for Geometry and Physics, Stony Brook (1086-53-1242)

10:30AM (288) *Spin(7) Manifolds - Old and new.*
**Mihai Bailesteanu**, University of Rochester (1086-53-1747)

### *AMS Session on Game Strategies*

**8:45 AM – 10:55 AM** **Room 19, Mezzanine Level, San Diego Convention Center**

8:45AM
► (289) *Sparse spaces in the game of Blash, Slash and Dash.* Preliminary report.
**Maximiliano Liprandi**, University of Calgary (1086-91-2639)

9:00AM
► (290) *Periodicity in 3-element Subtraction Games.* Preliminary report.
**Rachel Esselstein***, California State University Monterey Bay, **Jason Lee**, None, and **Jordan White**, California State University Monterey Bay (1086-91-1179)

9:15AM
► (291) *On the Sprague-Grundy Values of the $\mathcal{F}$-Wythoff Game.*
**Yang Jiao**, University of Pennsylvania (1086-91-408)

9:30AM
► (292) *On $p$-adic Sums of Games.* Preliminary report.
**Joseph M. DiMuro**, Biola University, La Mirada, CA (1086-00-1279)

9:45AM
► (293) *Misere Play Hackenbush Flowers.*
**Irene Yuan Lo**, Princeton University (1086-05-2153)

10:00AM (294) *Tchoukaillon: A single player Mancala game.*
**Ben Sebuufu***, Gordon College, and **Tyesha Hall**, James Madison University (1086-15-2952)

10:15AM
► (295) *The Stargate Switch.*
**Lihua Huang***, Rutgers University, and **Ron Evans**, University of California, San Diego (1086-20-286)

10:30AM
► (296) *Partially ordered sets and stratification.* Preliminary report.
**Raymond N. Greenwell*** and **Tadeusz Krauze**, Hofstra University (1086-91-169)

10:45AM
► (297) *Colonel Blotto Returns.* Preliminary report.
**Andrew Niedermaier**, Jane Street Capital (1086-91-94)

### *AMS Special Session on Mathematics and Social Interactions, I*

**9:00 AM – 10:50 AM** **Room 8, Upper Level, San Diego Convention Center**

Organizer: **Jeff Suzuki**, Brooklyn College

9:00AM (298) *Analysis of SI Models with Multiple Interacting Populations Using Subpopulations with Forcing Terms.* **Evelyn Kamaria Thomas***, **Katharine Gurski**, Howard University, and **Kathleen Hoffman**, University of Maryland Baltimore County (1086-92-2462)

9:30AM ► (299) *Gendered Division of Labor in Parenting.* **Angela G Vierling-Claassen**, Lesley University (1086-91-2284)

10:00AM (300) *TALK CANCELLED: In Search of Stable and Robust Metrics to Study Level-Specific Self-Similarity in Hierarchical Organizational Networks.* **Jeffrey Nielsen***, U.S. Military Academy at West Point, and **Jessica Libertini**, University of Rhode Island (1086-91-2026)

10:30AM (301) *Reductionist argument: Unexpected mathematical complexities.* **Donald G. Saari**, University of California, Irvine (1086-91-765)

### *AMS Special Session on Number Theory and Geometry, I*

**9:00 AM – 10:50 AM** **Room 15B, Mezzanine Level, San Diego Convention Center**

Organizers: **Jordan Ellenberg**, University of Wisconsin, Madison

**Akshay Venkatesh**, Stanford University

9:00AM (302) *Understanding Points on Twists.* **Ekin Ozman**, University of Texas-Austin (1086-11-2117)

9:30AM ► (303) *Iwasawa theory of the Igusa tower.* **Bryden R Cais**, University of Arizona (1086-11-778)

10:00AM (304) *A $p$-adic Birch and Swinnerton-Dyer conjecture for modular abelian varieties.* **Jennifer S. Balakrishnan***, Harvard University, **J. Steffen Müller**, Universität Hamburg, and **William A. Stein**, University of Washington (1086-11-1259)

10:30AM (305) *On uniform bounds for lattice points in plane regions and for rational points on rational curves of arbitrary degree.* **Patrick X Rault**, SUNY Geneseo (1086-11-568)

### *MAA Minicourse #10: Part A*

**9:00 AM – 11:00 AM** **Room 30A, Upper Level, San Diego Convention Center**

*The mathematics of the Common Core.*

Presenters: **William McCallum**, University of Arizona

**Cody L. Patterson**, University of Arizona

**Ellen Whitesides**, University of Arizona

**Kristin Umland**, University of New Mexico

### *MAA Minicourse #6: Part A*

**9:00 AM – 11:00 AM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*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 F. Lock**, University of North Carolina Department of Statistics and Operations Research

**Dennis F. Lock**, Iowa State University Department of Statistics

### *MAA Minicourse #5: Part A*

**9:00 AM – 11:00 AM** **Room 29C, Mezzanine Level, San Diego Convention Center**

*Visualizing projective geometry through photographs and perspective drawings.*

Presenters: **Annalisa Crannell**, Franklin & Marshall College

**Marc Frantz**, Indiana University Bloomington

**Fumiko Futamura**, Southwestern University

### *SIGMAA on Quantitative Literacy Panel Discussion*

**9:00 AM – 10:20 AM** **Room 1A, Upper Level, San Diego Convention Center**

*A survey of quantitative literacy teaching resources.*

Organizers: **Caren Diefenderfer**, Hollins University

**Semra Kilic-Bahi**, Colby-Sawyer College

**Maura Mast**, University of Massachusetts Boston

**Eric Gaze**, Bowdoin College

Panelists: **Jeff Bennett**, Boulder. CO

**Kay Somers**, Moravian College

**Eric Gaze**

**Andrew Miller**, Belmont University

**Bernard Madison**, University of Arkansas

**Judith Moran**, Trinity College

**Maura Mast**

### *MAA-NSF Panel Discussion*

**9:00 AM – 10:20 AM** **Room 4, Upper Level, San Diego Convention Center**

*National Science Foundation programs supporting learning, teaching, and the future workforce in the mathematical sciences.*

Panelists: **Jennifer Slimowitz Pearl**, NSF Division of Mathematical Sciences

**Richard Alo**, NSF Division of Undergraduate Education

**Robert Buckmire**, NSF Division of Undergraduate Education

**Lee Zia**, NSF Division of Undergraduate Education

### *Student Hospitality/Information Center*

**9:00 AM – 5:00 PM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

### *MAA Session on Integrating the Mathematics of Planet Earth 2013 in the College Mathematics Curriculum, I*

**9:30 AM – 10:45 AM** **Room 6C, Upper Level, San Diego Convention Center**

Organizer: **Ben Galluzzo**, Shippensburg University

9:30AM ► (306) *Environmental Mathematics: The Unifying Theme in an Introduction to Scientific Computing Course.*
**Erin McNelis**, Western Carolina University (1086-H5-2789)

9:50AM (307) *Supporting and Developing a Course to Save the World.*
**Jessica M. Libertini**, University of Rhode Island (1086-H5-2867)

10:10AM ► (308) *Global Climate Destabilization: Optimal Opportunity for the Mathematics of Planet Earth.* Preliminary report.
**Andrew E. Long**, Northern Kentucky University (1086-H5-2178)

10:30AM ► (309) *Development of an undergraduate course in mathematics and climate.* Preliminary report.
**Eric J Kostelich**, Arizona State University (1086-H5-2619)

### *MAA Department Liaisons Meeting*

**9:30 AM – 11:00 AM** **Marina Ballroom D, 3rd Floor, Marriott**

### *AMS Invited Address*

**10:05 AM – 10:55 AM** **Room 6AB, Upper Level, San Diego Convention Center**

(310) *Complexity of random functions of many variables.*
**Gerard Ben Arous**, Courant Institute of Mathematical Sciences, New York University (1086-60-9)

### *AMS-MAA Invited Address*

**11:10 AM – NOON** **Room 6AB, Upper Level, San Diego Convention Center**

(311) *Using mathematics to better understand the Earth's climate.*
**Emily F. Shuckburgh**, British Antarctic Survey (1086-86-2)

### *Exhibits and Book Sales*

**12:15 PM – 5:30 PM** **Exhibit Hall B1, Ground Level, San Diego Convention Center**

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

### *AMS Colloquium Lectures: Lecture I*

**1:00 PM – 2:00 PM** **Room 6AB, Upper Level, San Diego Convention Center**

(312) *Free probability, Random matrices, and map enumeration, I.*
**Alice Guionnet**, Ecole Normale Supérieure de Lyon (1086-60-15)

### *MAA Invited Address*

**2:15 PM – 3:05 PM** **Room 6AB, Upper Level, San Diego Convention Center**

(313) *Industrial strength mathematics in academia.*
**Suzanne Weekes**, Worcester Polytechnic Institute (1086-A0-10)

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

**2:15 PM – 6:05 PM** **Room 31C, Upper Level, San Diego Convention Center**

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

**Chi-Wang Shu**, Brown University

2:15PM (314) *New phase-field models and energy stable numerical schemes for multiphase flows with different densities.*
**Jie Shen**, Purdue University (1086-65-390)

2:45PM (315) *A Finite Element Method for the Total Variation Flow without Regularization.* Preliminary report.
**Abner J Salgado**, Department of Mathematics University of Maryland (1086-65-383)

3:15PM (316) *A Quadratic $C^0$ Interior Penalty Method for an Elliptic Optimal Control Problem with State Constraints.*
**Susanne C. Brenner**, **Li-yeng Sung** and **Yi Zhang***, Louisiana State University (1086-65-1431)

3:45PM ► (317) *Improved Alternating Direction Methods for Numerical Optimization.*
**Thomas A Goldstein**, Rice University (1086-65-1689)

4:15PM (318) *Maximum-principle-satisfying second order discontinuous Galerkin schemes for convection-diffusion equations on triangular meshes.*
**Yifan Zhang***, Division of Applied Mathematics, Brown University, **Xiangxiong Zhang**, Department of Mathematics, Massachusetts Institute of Technology, and **Chi-Wang Shu**, Division of Applied Mathematics, Brown University (1086-65-1635)

4:45PM ► (319) *A coupled finite volume and discontinuous Galerkin method for convection-diffusion problems.*
**Xin Yang**, Rice University (1086-65-1357)

5:15PM (320) *Convergence of goal-oriented adaptive finite element methods for semilinear problems.*
**Sara N Pollock**, University of California, San Diego (1086-65-1414)

5:45PM (321) *A posteriori estimation of hierarchical type for the Schrödinger operator with inverse square potential on graded meshes.*
**Jeffrey S Ovall***, University of Kentucky, and **Hengguang Li**, Wayne State University (1086-65-2287)

### *AMS Special Session on Algorithmic Problems of Group Theory and Their Complexity, I*

**2:15 PM – 6:35 PM** **Room 15A, Mezzanine Level, San Diego Convention Center**

Organizers: **Delaram Kahrobaei**, CUNY Graduate Center and New York College of Technology, City University of New York

**Vladimir Shpilrain**, City College of New York and CUNY Graduate Center, City University of New York

2:15PM (322) *Logspace computations in graph products.* Preliminary report.
**Volker Diekert**, University Stuttgart, Germany (1086-68-1027)

2:45PM (323) *Relating the compressed word problem and the word search problem.* Preliminary report.
**Markus Lohrey**, University of Leipzig (1086-20-429)

3:15PM (324) *Complexity of Groebner - Shirshov rewriting systems.*
**Efim Zelmanov**, University of California - San Diego (1086-20-2457)

4:15PM (325) *Approximation of Geodesics in Metabelian Groups.*
**Atefeh Mohajeri Moghaddam***, McGill University, and **Olga Kharlampovich**, Hunter college, CUNY (1086-20-1527)

4:45PM (326) *Distinguished equivalence classes of words in $F_2$.*
**Bobbe Cooper**, University of Minnesota, and **Eric Rowland***, LaCIM, Université du Québec à Montréal (1086-20-640)

5:15PM (327) *Some Consequences of the Solution to the Tarksi Problems.* Preliminary report.
**Benjamin Fine***, Fairfield University, **Anthony Gaglione**, United States Naval Academy, **Gerhard Rosenberger**, University of Hamburg, and **Dennis Spellman**, Temple University (1086-20-1701)

5:45PM (328) *Algorithmic theory of free solvable groups: randomized computations.*
**Alexander Ushakov**, Stevens Institute of Technology (1086-20-1599)

6:15PM (329) *A Secret Sharing Scheme Based on Group Presentations and the Word Problem.*
**Delaram Kahrobaei***, City University of New York, Graduate Center and NYCCT, **Maggie Habeeb**, California University in Pennsylvania, and **Vladimir Shpilrain**, City College of New York and CUNY Graduate Center (1086-00-2022)

### *AMS Special Session on Celestial Mechanics, II*

**2:15 PM – 6:35 PM** **Room 31A, Upper Level, San Diego Convention Center**

Organizers: **Gareth Roberts**, College of the Holy Cross
**Zhifu Xie**, Virginia State University

2:15PM ► (330) *Mathematics and the mystery of "dark matter".* Preliminary report.
**Donald G. Saari**, University of California, Irvine (1086-70-766)

2:45PM ► (331) *New Variational methods on n-body problem of celestial mechanics.*
**Tiancheng Ouyang**, Brigham Young University (1086-49-1684)

3:15PM (332) *Averaging theory for finding analytically periodic orbits for the 3-body problem.*
**Elizabeth A Zollinger**, St. Joseph's College (1086-70-2108)

3:45PM ► (333) *Solar System Formation and Co-orbital Dynamics.* Preliminary report.
**Samuel R Kaplan**, University of North Carolina Asheville (1086-70-590)

4:15PM (334) *The Kepler Problem on the Heisenberg Group.* Preliminary report.
**Corey Shanbrom**, University of California, Santa Cruz (1086-70-786)

4:45PM ► (335) *The Rhomboidal Symmetric-Mass Four-Body Problem.*
**Lennard F. Bakker*** and **Skyler C. Simmons**, Brigham Young University (1086-70-1250)

5:15PM ► (336) *The central configuration formed by two twisted regular polygons.* Preliminary report.
**Xiang Yu*** and **Shiqing Zhang**, Sichuan University, China (1086-70-746)

5:45PM ► (337) *Continua of central configurations with a negative mass in the $n$-body problem.*
**John B Little**, College of the Holy Cross (1086-70-1447)

6:15PM ► (338) *Generalized Albouy-Chenciner equations for central configurations: a test case for methods from tropical geometry and fewnomial theory.*
**Marshall Hampton**, University of Minnesota Duluth (1086-70-1545)

### *AMS Special Session on Commutative Algebra and Algebraic Geometry, II*

**2:15 PM – 6:35 PM** **Room 14A, Mezzanine Level, San Diego Convention Center**

Organizers: **Kuei-Nan Lin**, University of California, Riverside
**Tai Ha**, Tulane University

2:15PM (339) *Structure of certain conditional independence ideals.* Preliminary report.
**Irena Swanson***, Reed College, and **Amelia Taylor**, Colorado College (1086-13-1281)

2:45PM (340) *Hypergraphs and Regularity of Squarefree Monomial Ideals.* Preliminary report.
**Kuei-Nuan Lin**, University of California, Riveside, and **Jason McCullough***, Rider University (1086-13-1596)

3:15PM ► (341) *Lech's Inequality.* Preliminary report.
**Ananth Hariharan**, University of Nebraska, **Craig Huneke**, University of Virginia, and **Javid Validashti***, University of Illinois (1086-13-2187)

3:45PM (342) *Partitionable Simplicial Complexes.* Preliminary report.
**Ben Richert**, California Polytechnic State University (1086-13-2210)

4:15PM (343) *Stability of Syzygy Bundles.*
**Lawrence Ein**, University of Illinois at Chicago, **Robert Lazarsfeld**, University of Michigan, and **Yusuf Mustopa***, Boston College (1086-14-1188)

4:45PM (344) *Formulas for the generalized Hilbert Coefficients.*
**Yu Xie**, Georgia State University (1086-13-1530)

5:15PM (345) *Generalizing the Borel property.*
**Christopher A Francisco***, **Jeffrey Mermin** and **Jay Schweig**, Oklahoma State University (1086-13-1504)

5:45PM (346) *Colorings of simplicial complexes and vertex decomposability.*
**Jennifer Biermann***, Lakehead University, **Christopher Francisco**, Oklahoma State University, **Huy Tai Hà**, Tulane University, and **Adam Van Tuyl**, Lakehead University (1086-13-2915)

6:15PM (347) *High syzygy modules over complete intersections.* Preliminary report.
**David Eisenbud***, UC Berkeley and MSRI, and **Irena Peeva**, Cornell University (1086-13-910)

### *AMS Special Session on Complex Dynamics, II*

**2:15 PM – 6:35 PM** **Room 14B, Mezzanine Level, San Diego Convention Center**

Organizers: **Roland Roeder**, Indiana University-Purdue University Indianapolis
**Rodrigo Perez**, Indiana University-Purdue University Indianapolis

2:15PM (348) *Periodic Points in Towers of Finite Fields.* Preliminary report.
**Michelle Manes*** and **Bianca Thompson**, University of Hawaii at Manoa (1086-37-2460)

2:45PM (349) *Primitive prime divisors in the critical orbit of $z^d + c$.*
**Holly Krieger**, University of Illinois at Chicago (1086-30-1137)

3:15PM (350) *Non-Archimedean Dynamics and Degenerations of Complex Dynamical Systems.* Preliminary report.
**Xander Faber***, University of Hawaii at Manoa, and **Laura DeMarco**, University of Illinois at Chicago (1086-37-2195)

3:45PM (351) *Dynamics of Chebyshev-type maps on $\mathbb{P}^k$.*
**Joshua P Bowman**, Smith College (1086-37-1526)

4:15PM (352) *$\lambda$-lemma in $\mathbb{C}^2$ and its application to dynamics.*
**Tanya Firsova**, Stony Brook University (1086-37-2609)

4:45PM (353) *Salem Numbers and Complex Surface Automorphisms.*
**Paul M. Reschke**, Univ. of Ill.-Chicago (1086-37-617)

5:15PM (354) *Superstable Manifolds of Invariant Circles and Co-dimension 1 Böttcher Functions.*
**Scott R. Kaschner*** and **Roland K. W. Roeder**, Indiana University Purdue University Indianapolis (1086-37-600)

5:45PM ► (355) *On automorphisms of blowups of $P^3$ or $P^2 \times P^1$.*
**Tuyen Trung Truong**, Department of Mathematics, Syracuse University (1086-37-845)

6:15PM (356) *Postcritically finite rational mappings of $\overline{\mathcal{M}_{0,n}}$ arising from Thurston's Theorem.*
**Sarah Koch**, Harvard University, and **Roland Roeder***, IUPUI (1086-37-1095)

## *AMS Special Session on Graph Theory, II*

**2:15 PM – 6:05 PM** **Room 16B, Mezzanine Level, San Diego Convention Center**

Organizers: **Andre Kundgen**, California State University, San Marcos
**Michael Pelsmajer**, Illinois Institute of Technology
**Douglas West**, University of Illinois, Urbana-Champaign

2:15PM ► (357) *Equi-Distance Partitions in Graphs.* Preliminary report.
**K. Brooks Reid**, California State University San Marcos (1086-05-1267)

2:45PM ► (358) *A refinement of the Corrádi-Hajnal Theorem.* Preliminary report.
**H. Kierstead**, Arizona State University, **A. Kostochka*** and **E. Yeager**, University of Illinois at Urbana-Champaign (1086-05-1125)

3:15PM (359) *On directed versions of the Corrádi-Hajnal Corollary.* Preliminary report.
**Andrzej Czygrinow**, **H. A. Kierstead*** and **Theodore Molla**, Arizona State University (1086-05-2079)

3:45PM (360) *Codes with bounded distances, and their applications to distance graphs.*
**Sarah Anderson**, Clemson University, **Jeong-Hyun Kang***, University of West Georgia, and **Hiren Maharaj**, Clemson University (1086-05-2087)

4:15PM (361) *List-coloring on surfaces with varying list-sizes.* Preliminary report.
**Alice M. Dean**, Skidmore College, and **Joan P. Hutchinson***, Macalester College (1086-05-1076)

4:45PM ► (362) *Embedding a continuum in a surface.*
**R. Christian**, Perth, Australia, and **R. B. Richter***, University of Waterloo (1086-05-1718)

5:15PM (363) *Temporal Scale for Dynamic Graphs.*
**Hemanshu Kaul**, Illinois Institute of Technology (1086-05-2083)

5:45PM (364) *Game matching number of graphs.*
**Daniel W. Cranston**, Virginia Commonwealth University, **William B. Kinnersley**, Ryerson University, **Suil O**, College of William and Mary, and **Douglas B. West***, Zhejiang Normal University and University of Illinois (1086-05-1541)

## *AMS Special Session on Interplays Between Feynman Operational Calculus, Wiener and Feynman Integrals, Physics, and Analysis on Wiener Space, II*

**2:15 PM – 6:05 PM** **Room 32A, Upper Level, San Diego Convention Center**

Organizers: **Tepper Gill**, Howard University
**Lance Nielsen**, Creighton University
**Ian Pierce**, St. Olaf College

2:15PM (365) *A change of scale formula for a function space integral on $C_{a,b}[0,T]$.* Preliminary report.
**Byoung Soo Kim***, Seoul National University of Science and Technology, **Bong Jin Kim**, Daejin University, and **Il Yoo**, Yonsei University (1086-28-700)

2:45PM (366) *Results and Open Problems on Feynman's Operational Calculus.*
**Michel L Lapidus**, University of California, Riverside (1086-81-1338)

3:15PM (367) *Feynman path integrals as infinite dimensional oscillatory integrals.*
**Sonia Mazzucchi**, CIRM-FBK, Trento, Italy (1086-81-1028)

3:45PM (368) *Explicit Quantum Controls.*
**Katherine A. Kime**, University of Nebraska Kearney (1086-81-520)

4:15PM (369) *On the Feynman path integral with spin for non-relativsitic quantum electrodynamics.*
**Wataru Ichinose**, Shinshu University, Japan (1086-81-87)

4:45PM (370) *Geometry and Functional Integrals over Path Spaces.* Preliminary report.
**Ambar Niel Sengupta**, Louisiana State University (1086-58-1650)

5:15PM (371) *The Correct Hilbert Space for Feynman's Formulation of Quantum Theory.*
**Tepper L Gill**, Professor, Howard University (1086-81-895)

5:45PM (372) *Phase space Feynman path integrals with smooth functional derivatives by time slicing approximation.*
**Naoto Kumano-go**, Kogakuin University (1086-35-62)

### *AMS Special Session on Lie Algebras, Algebraic Transformation Groups, and Representation Theory, I*

**2:15 PM – 6:35 PM** **Room 17A, Mezzanine Level, San Diego Convention Center**

Organizers: **Andrew Douglas**, City University of New York
**Alistair Savage**, University of Ottawa
**Bart Van Steirteghem**, City University of New York

2:15PM (373) *Prehomogeneous vector spaces and number theory.*
**Gautam Chinta**, CCNY (1086-11-1539)

2:45PM (374) *On reductive automorphism groups of regular embeddings.*
**Guido Pezzini**, Universität Erlangen-Nürnberg (1086-14-1223)

3:15PM (375) *Invariant polynomial functions on tensors under the action of a product of orthogonal groups.*
**Lauren Kelly Williams**, University of Wisconsin Milwaukee (1086-22-1175)

3:45PM (376) *On $GL_n$ to $GL_{n-2}$ Branching Multiplicity Spaces.*
**Sangjib Kim**, The University of Queensland, and **Victor Protsak***, State University of New York at Oswego (1086-20-226)

4:15PM (377) *Limit Poisson structures and Richardson varieties.*
**Sam Evens**, University of Notre Dame (1086-22-1401)

4:45PM (378) *Springer varieties, Hessenberg varieties, and poset pinball.*
**Julianna Tymoczko**, Smith College (1086-14-2852)

5:15PM (379) *A uniform combinatorial model for Kirillov-Reshetikhin crystals and specialized Macdonald polynomials.* Preliminary report.
**Cristian Lenart**, SUNY Albany, **Satoshi Naito**, Technical Institute of Technology, Tokyo, **Daisuke Sagaki**, Tsukuba University, **Anne Schilling***, UC Davis, and **Mark Shimozono**, Virginia Tech (1086-20-797)

5:45PM (380) *A combinatorial description of the affine Gindikin-Karpelevich formula of type $A_n^{(1)}$.*
**Seok-Jin Kang**, Seoul National University, **Kyu-Hwan Lee**, University of Connecticut, **Hansol Ryu**, Seoul National University, and **Ben Salisbury***, The City College of New York (1086-17-725)

6:15PM (381) *Demazure operators, Whittaker functions and unique functionals.*
**Daniel Bump**, Stanford (1086-22-1531)

### *AMS Special Session on Manifolds with Special Holonomy and Generalized Geometries, II*

**2:15 PM – 5:35 PM** **Room 30D, Upper Level, San Diego Convention Center**

Organizers: **Sema Salur**, University of Rochester
**Albert James Todd**, University of California, Riverside
**Yat Sun Poon**, University of California, Riverside

2:15PM (382) *Recent results on Gromov-Hausdorff limits of Calabi-Yau manifolds.*
**Mark Gross***, UCSD, **Valentino Tosatti**, Northwestern University, and **Yuguang Zhang**, Capital Normal University, Beijing (1086-53-1061)

3:15PM (383) *Holomorphic Poisson cohomology and generalized complex geometry.* Preliminary report.
**Daniele Grandini**, University of New Mexico (1086-53-1557)

3:45PM (384) *Aspects of type change in generalized complex geometry.*
**Michael Bailey**, CIRGET/UQAM (1086-53-1353)

4:15PM (385) *Generalized almost contact structures and generalized Sasakian structures.* Preliminary report.
**Ken'ichi Sekiya**, Kawasaki city, Kanagawa, Japan (1086-53-951)

4:45PM (386) *The Join Construction and Extremal Sasakian Geometry.* Preliminary report.
**Charles P Boyer**, University of New Mexico (1086-53-1479)

5:15PM (387) *Jacobi Structures on Contact Quotients.*
**Fatima Mahmood**, University of Rochester (1086-53-2023)

### *AMS Special Session on Mathematical and Numerical Analysis of Nonlocal Problems, II*

**2:15 PM – 5:05 PM** **Room 31B, Upper Level, San Diego Convention Center**

Organizers: **Qiang Du**, Pennsylvania State University
**Tadele Mengesha**, Pennsylvania State University

2:15PM (388) *A Glimpse of Non-Gaussian Stochastic Dynamics.*
**Jinqiao Duan**, Institute for Pure and Applied Mathematics (1086-60-1284)

2:45PM (389) *Extensions of variational methods to non-local functionals.* Preliminary report.
**Mikil Foss** and **Joe Geisbauer***, University of Nebraska-Lincoln (1086-49-1145)

3:15PM (390) *A Posteriori Error Analysis of Finite Element Methods for Linear Nonlocal Diffusion and Peridynamic Models.*
**Qiang Du**, Pennsylvania State University, **Lili Ju***, University of South Carolina, **Li Tian** and **Kun Zhou**, Pennsylvania State University (1086-65-815)

3:45PM (391) *Nonlocal calculus and its applications to nonlocal models.*
**Qiang Du**, Pennsylvania State University (1086-49-1418)

4:15PM (392) *Peridigm: A New Paradigm in Computational Peridynamics.*
**Michael L Parks***, **David J Littlewood**, **John A Mitchell** and **Stewart A Silling**, Sandia National Laboratories (1086-65-1386)

4:45PM (393) *A PDE approach to fractional difussion: a priori and a posteriori error analysis.* Preliminary report.
**Abner J. Salgado**, University of Maryland (1086-65-465)

## *AMS Special Session on Mathematics and Social Interactions, II*

**2:15 PM – 4:05 PM** **Room 8, Upper Level, San Diego Convention Center**

Organizer: **Jeff Suzuki**, Brooklyn College

2:15PM ► (394) *The effects of sacred value networks within an evolutionary, adversarial game.*
**Scott G McCalla***, **P J Brantingham** and **M B Short**, University of California, Los Angeles (1086-91-1969)

2:45PM ► (395) *Synchronization of Schools of Fish.*
**Baldvin Einarsson***, Center for Complex and Nonlinear Science, **Bjorn Birnir**, UC Santa Barbara, and **Luis L. Bonilla**, Universidad Carlos III de Madrid (1086-70-861)

3:15PM ► (396) *A Game-Theoretic Approach to Manipulation.*
**Candace A. Ohm**, Florida State University (1086-91-857)

3:45PM ► (397) *The Mathematical Foundations Of Religion and Ethics*
**Salilesh Mukhopadhyay**, Feasible Solution LLC (1086-03-347)

## *AMS Special Session on Nonlinear Evolution Equations and Integrable Systems, II*

**2:15 PM – 6:35 PM** **Room 30E, Upper Level, San Diego Convention Center**

Organizers: **Jennifer Gorsky**, University of San Diego

**Alex Himonas**, University of Notre Dame

2:15PM (398) *Analysis of the $b$-family equation.*
**Katelyn J Grayshan**, University of Notre Dame (1086-35-187)

2:45PM (399) *Well-posedness and breakdown of solutions of an asymptotic equation for liquid crystals.* Preliminary report.
**Feride Tiglay**, Visiting Assistant Professor/Purdue University (1086-35-1938)

3:15PM (400) *Stability of traveling waves in two water wave models.*
**Milena Stanislavova**, University of Kansas (1086-35-1340)

3:45PM (401) *Continuation of weak solutions of systems of conservation laws.*
**Michael Sever**, The Hebrew University, Jerusalem, Israel (1086-35-40)

4:15PM (402) *On well-posedness and small data global existence for a damped free boundary fluid-structure model.*
**Mihaela Ignatova***, Stanford University, **Igor Kukavica**, University of Southern California, **Irena Lasiecka**, University of Virginia, and **Amjad Tuffaha**, The Petroleum Institute, Abu Dhabi, UAE (1086-35-2206)

4:45PM ► (403) *Drosophila Jet Lag.*
**Milica Miko Vesovic***, University of Illinois at Chicago, **Hassan Fathallah-Shaykh**, University of Alabma at Birmingham, and **Jerry Bona**, University of Illinois at Chicago (1086-34-1781)

5:15PM ► (404) *Stress wave propagation in one-dimensional Goupillaud-type layered elastic media with applications to optimization, resonance and impact problems.*
**Ani P. Velo***, Department of Mathematics and Computer Science, University of San Diego, and **George A. Gazonas**, US Army Research Laboratory (1086-39-1814)

5:45PM Discussion

6:15PM (405) *Existence of Nodal solutions for Neumann nonlinear differential equations driven by p-Laplacian equations.* Preliminary report.
**Michael E Filippakis***, Department of Digital Systems, University of Piraeus, Greece,, and **Nikolaos S. Papageorgiou**, NTUA, Greece (1086-35-2615)

## *AMS Special Session on Nonstandard Finite-Difference Discretizations and Nonlinear Oscillations (in honor of Ronald Mickens' 70th Birthday), I*

**2:15 PM – 5:35 PM** **Room 7B, Upper Level, San Diego Convention Center**

Organizers: **Ron Buckmire**, Occidental College

**Abba Gumel**, University of Manitoba

**Talitha Washington**, Howard University

2:15PM (406) *Dynamically-consistent NSFD Schemes for Epidemic Models.*
**Abba B. Gumel**, University of Manitoba (1086-39-801)

2:45PM (407) *NSFD schemes on two-dimensional Lotka-Volterra competition model and $SIS$ and $SIR$ epidemic models.* Preliminary report.
**Lih-Ing W Roeger**, Texas Tech University (1086-39-510)

3:15PM (408) *Truly Nonlinear Oscillators: from their Mathematical Models, the Methods for their Quantitative Investigations to the Phenomena Associated with their Behaviour.*
**Ivana Kovacic**, Department of Mechanics, University of Novi Sad, Serbia (1086-70-678)

3:45PM (409) *Diffusion versus cross diffusion in Biosciences: challenges in designing nonstandard finite difference schemes.*
**Jean M-S Lubuma***, University of Pretoria, and **Ronald E Mickens**, Clark Atlanta University (1086-65-893)

4:15PM ► (410) *Dynamical-systems insights into migration.* Preliminary report.
**Timothy C Reluga***, Penn State University, and **Allison K. Shaw**, Australian National University (1086-92-849)

4:45PM Discussion

## *AMS Special Session on Number Theory and Geometry, II*

**2:15 PM – 5:35 PM** **Room 15B, Mezzanine Level, San Diego Convention Center**

Organizers: **Jordan Ellenberg**, University of Wisconsin, Madison
**Akshay Venkatesh**, Stanford University

2:15PM (411) *Witt vectors, lambda-rings, and absolute algebraic geometry.*
**James M Borger**, Australian National University (1086-11-1703)

2:45PM (412) *Abelian varieties with big monodromy.*
**David Zureick-Brown***, Emory University, and **David Zywina**, Queen's University (1086-11-1790)

3:15PM (413) *Jumping ranks in families of elliptic surfaces.*
**Chris Hall***, University of Wyoming, **Jordan S. Ellenberg**, University of Wisconsin, and **Emmanuel Kowalski**, ETH Zurich (1086-11-2720)

3:45PM (414) *Genus one curves and Brauer-Severi varieties.*
**Wei Ho*** and **Aise Johan de Jong**, Columbia University (1086-11-937)

4:15PM (415) *Quadric surface bundles and quaternion algebras.*
**Asher Auel***, Courant Insitute of Mathematical Sciences, New York University, **R. Parimala** and **V. Suresh**, Emory University (1086-14-1135)

4:45PM (416) *Dynamical Degree and Arithmetic Entropy for Rational Maps.* Preliminary report.
**Joseph H Silverman**, Brown University (1086-11-1436)

5:15PM (417) *Geodesic lengths of arithmetic manifolds.*
**Jean-Francois Lafont**, The Ohio State, and **D. B. McReynolds***, Purdue University (1086-57-2089)

## *AMS Special Session on Stochastic Analysis of Stochastic Differential Equations and Stochastic Partial Differential Equations, II*

**2:15 PM – 6:05 PM** **Room 32B, Upper Level, San Diego Convention Center**

Organizers: **Edward Allen**, Texas Tech University
**Armando Arciniega**, The University of Texas at San Antonio
**Gangaram Ladde**, University of South Florida
**Sivapragasam Sathananthan**, Tennessee State University

2:15PM (418) *A stochastic model for transmission, extinction and outbreak of Escherichia coli O157:H7 in cattle as affected by ambient temperature and pathogen cleaning practices.*
**Xueying Wang***, Texas A&M University, **Raju Gautam**, College of Veterinary Medicine and Biomedical Sciences, Texas A&M University, **Pablo J. Pinedo**, College of Veterinary Medicine & Biomedical Sciences, Texas A&M University, **Renata Ivanek**, College of Veterinary Medicine and Biomedical Sciences, Texas A&M University, and **Linda J. S. Allen**, Texas Tech University (1086-60-81)

2:45PM (419) *PDE model, stochastic volatility and transaction costs.*
**Indranil SenGupta***, North Dakota State University, **Maria C. Mariani**, University of Texas-El Paso, and **Ionut Florescu**, Stevens Institute of Technology (1086-35-319)

3:15PM (420) *Multi-dimensional Stochastic Singular Control Via Dynkin Game and Dirichlet Form.* Preliminary report.
**Yipeng Yang**, University of Missouri-Columbia (1086-60-381)

3:45PM (421) *Regularization and Stabilization of Hybrid Diffusion System.*
**Guangliang Zhao**, Wayne State University (1086-60-537)

4:15PM (422) *Randomly Switching Stochastic Liénard Equations with Two-time Scales.*
**G. Yin**, Wayne State University, **Yousef A. Talafha***, Wayne State University, and **F. Xi**, Beijing Institute of Technology, PRC (1086-60-722)

► 4:45PM (423) *Smoluchowski-Kramers Approximation for Multidimensional systems.*
**Scott A Hottovy**, University of Arizona (1086-60-1048)

5:15PM (424) *Large deviations via almost sure CLT for functionals of Markov processes.*
**Adina Oprisan**, Barry University (1086-60-1551)

5:45PM (425) *Stochastic Modeling of Parasites in Host Populations.*
**Armando Arciniega***, **Michael Broome** and **Gabby Prieto**, The University of Texas at San Antonio (1086-60-1837)

## *AMS Special Session on Tropical Geometry, II*

**2:15 PM – 6:05 PM** **Room 16A, Mezzanine Level, San Diego Convention Center**

Organizers: **Florian Block**, University of Warwick
**Melody Chan**, University of California, Berkeley

2:15PM (426) *Tropical complexes.* Preliminary report.
**Dustin Cartwright**, Yale University (1086-14-2387)

2:45PM (427) *The tropical Stiefel map and hyperplane arrangements.* Preliminary report.
**Alex Fink***, North Carolina State University, and **Felipe Rincon**, University of Warwick (1086-05-1538)

3:15PM (428) *Limits of tropicalizations.*
**Tyler Foster**, Yale University, **Philipp Gross**, University of Duesseldorf, and **Sam Payne***, Yale University (1086-14-1915)

► 3:45PM (429) *The tropical Laplacian.*
**June Huh**, University of Michigan at Ann Arbor (1086-14-1547)

4:15PM (430) *Tropical Severi Varieties and Applications.*
**Jihyeon Jessie Yang**, McMaster University (1086-14-1751)

4:45PM (431) *The generalized order map, and k-convexity of the (co)amoeba complement components.*
**Mounir Nisse*** and **Frank Sottile**, Texas A&M University (1086-14-604)

5:15PM (432) *Non-Archimedean Tropical Discriminants.*
**Korben Allen Rusek**, Texas A&M Univesity (1086-14-2944)

5:45PM Discussion

## *AMS Special Session on Water Waves, Tsunamis, and Extreme Waves, I*

**2:15 PM – 6:35 PM** **Room 9, Upper Level, San Diego Convention Center**

Organizers: **Walter Craig**, McMaster University, Canada
**Philippe Guyenne**, University of Delaware
**David Nicholls**, University of Illinois, Chicago

2:15PM (433) *On the finite-time splash and splat singularities for the 3-D free-surface Euler equations.*
**Steve Shkoller**, UC Davis (1086-35-2161)

► 2:45PM (434) *Recovering the Water-wave Surface from Pressure Measurements.*
**Katie L Oliveras***, Seattle University, **Vishal Vasan**, Pennsylvania State University, **Bernard Deconinck**, University of Washington, and **Diane Henderson**, Pennsylvania State University (1086-76-820)

3:15PM (435) *Dynamical Criteria for Rogue Waves in Nonlinear Schrodinger Models.*
**Constance M Schober***, University of Central Florida, and **Annalisa Calini**, College of Charleston (1086-35-2811)

3:45PM (436) *Dispersion in shallow water.*
**John D Carter***, Seattle University, **Harvey Segur**, University of Colorado at Boulder, and **David George**, U.S. Geological Survey Cascades Volcano Observatory (1086-76-2402)

► 4:15PM (437) *Scattering and total reflection for oblique waves in a two-layer fluid.*
**Peter Zhevandrov***, Faculty of Physics and Mathematics, University of Michoacan, and **María Isabel Romero Rodríguez**, Faculty of Engineering, University of La Sabana (1086-76-1046)

4:45PM (438) *Time-Periodic and Traveling Waves in Interfacial Fluid Dynamics.*
**David M. Ambrose**, Drexel University, Department of Mathematics (1086-35-1869)

5:15PM (439) *Curvature singularities on the surface of water waves.*
**Gregory R. Baker***, **Chao Xie**, The Ohio State University, and **Jeong-Sook Im**, University of Nottingham, UK (1086-76-1910)

5:45PM (440) *Coupling between internal and surface waves in a two-layers fluid.*
**Catherine Sulem**, University of Toronto (1086-76-1731)

6:15PM (441) *Steady water waves with compactly supported vorticity.*
**Samuel Walsh**, Courant Institute of Mathematical Sciences, New York University (1086-35-1277)

### *MAA Minicourse #4: Part A*

**2:15 PM – 4:15 PM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*Experiments in circle packing.*

Presenters: **Ken Stephenson**, University of Tennessee

**G. Brock Williams**, Texas Tech University

### *MAA Minicourse #12: Part A*

**2:15 PM – 4:15 PM** **Room 30A, Upper Level, San Diego Convention Center**

*Teaching an applied topology course.*

Presenters: **Colin Adams**, Williams College

**Robert Franzosa**, University of Maine

### *MAA Minicourse #14: Part A*

**2:15 PM – 4:15 PM** **Room 29C, Mezzanine Level, San Diego Convention Center**

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

Presenters: **Michael Posner**, Villanova University

**Carolyn Cuff**, Westminster College

### *AMS Session on Difference Equations, Dynamical Systems, and Applications*

**2:15 PM – 6:10 PM** **Room 19, Mezzanine Level, San Diego Convention Center**

2:15PM ► (442) *TALK CANCELLED: Existence Results for Some Singular Difference Equations.* Preliminary report. **Toka Diagana*** and **Martin Arienmughare**, Howard University (1086-39-803)

2:30PM (443) *Recurrent Solutions to Systems of Difference Equations.* Preliminary report. **Zhivko S. Athanassov**, Institute of Mathematics, Bulgarian Academy of Sciences (1086-39-395)

2:45PM (444) *Numerical Solution and Convergence of the Difference Scheme for Initial-Boundary Value Problem to One Nonlinear Parabolic Equation.* **Mikheil Tutberidze***, Ilia State University, **George Katsia** and **Soso Pipia**, Delta Systems ltd. (1086-39-1857)

3:00PM (445) *Periodic Dynamical Systems of Population Models and Enveloping Functions.* Preliminary report. **Justin Wright**, North Carolina State University (1086-39-521)

3:15PM (446) *Learning Cycles in Hopfield-type Networks with Delayed Coupling.* **Chuan Zhang***, **Gerhard Dangelmayr** and **Iuliana Oprea**, Department of Mathematics at Colorado State University (1086-39-1665)

3:30PM (447) *Analysis of a Nonlinear Difference Equation Model.* **N Josephy**, **M Predescu*** and **S Woolford**, Bentley University (1086-39-1916)

3:45PM ► (448) *Reverse Engineering of the Unfolded Protein Response Network using Polynomial Dynamical Systems.* **Danilo R. Diedrichs**, Wheaton College (1086-37-2025)

4:00PM ► (449) *Numerical Methods for Delay Differential Equations with Application to Biology.* Preliminary report. **Ibrahim Oumar Diakite*** and **Benito Chen Charpentier**, University of Texas at Arlington (1086-37-1774)

4:15PM (450) *Time-scale Lyapunov functions for Incentive Dynamics on Riemannian Geometries.* **Dashiell E. A. Fryer***, Pomona College, and **Marc Harper**, UCLA (1086-37-546)

4:30PM (451) *Antidiffusion lattice differential equations with quadratic nonlinearity.* **Maila Capuno Brucal Hallare**, Thomas Nelson Community College (1086-37-2651)

4:45PM (452) *Competing Interactions and Traveling Wave Solutions in Lattice Differential Equations.* **Erik S. Van Vleck** and **Aijun Zhang***, University of Kansas (1086-39-584)

5:00PM ► (453) *On 3-Periodic Orbits of Polygonal Outer Billiards in The Hyperbolic Plane.* Preliminary report. **Filiz Dogru***, Grand Valley State University, Allendale MI, **Daniel Hast**, University of Michigan, and **Neil DeBoer**, Michigan State University (1086-37-752)

5:15PM (454) *Laminations from the Cubioid.* Preliminary report. **Alexander Blokh**, **Lex Oversteegen**, **Ross Ptacek***, University of Alabama at Birmingham, and **Vladlen Timorin**, Higher School of Economics (1086-37-2777)

5:30PM ► (455) *Identity Return Triangles For Cubic Laminations.* Preliminary report. **David J Cosper**, University of Alabama at Birmingham (1086-37-2006)

5:45PM (456) *Haar Measures of $p$-adic Julia Sets.* Preliminary report. **Joanna M. Furno**, University of North Carolina at Chapel Hill (1086-37-2282)

6:00PM (457) *Multiple solutions to second order symmetric boundary value problems: equivariant degree approach.* **My Linh Nguyen**, University of Texas at Dallas (1086-34-2956)

### *AMS Session on Functional Analysis and Operator Theory, II*

**2:15 PM – 5:25 PM** **Room 30C, Upper Level, San Diego Convention Center**

2:15PM (458) *On KSGNS-type theorem for representations in Hilbert O*-modules.* **Alexander A. Katz**, St. John's University, NY (1086-46-1126)

► 2:30PM (459) *TALK CANCELLED: Coisometric Extensions of Completely Contractive Covariant Representations.* Preliminary report. **Travis Wolf**, University of Iowa (1086-47-1512)

2:45PM (460) *Dirac-type operators in noncommutative geometry.* **Branimir Cacic**, California Institute of Technology (1086-58-1898)

3:00PM (461) *On Kadison Transitivity Theorem for real locally C*-algebras.* **Alexander A. Katz**, St. John's University, NY, USA, and **Oleg Friedman***, Lander College for Men- Touro College, USA/UNISA, RSA (1086-46-1631)

3:15PM (462) *An Isomorphism Between the Ranges of Two Representations.* **Rod Freed**, California State University at Dominguez Hills (1086-47-724)

3:30PM (463) *Extreme points of some noncommutative convex sets.* **Craig Kleski**, University of Virginia (1086-47-2645)

3:45PM (464) *Unital Dilations of Completely Positive Semigroups.* **David Gaebler**, University of Iowa (1086-47-601)

4:00PM (465) *Variational Inequalities for Perturbations of Maximal Monotone Operators in Reflexive Banach Spaces.* Preliminary report. **Teffera M. Asfaw*** and **Athanassios G. Kartsatos**, University of South Florida (1086-46-593)

4:15PM (466) *The Dunford-Pettis Property of Tensor Product Spaces.* **Ioana Ghenciu**, University of Wisconsin-River Falls (1086-46-454)

4:30PM (467) *On the Extension of the Bishop-Phelps-Bollobás Theorem.* **Antonio J. Guirao**, IUMPA, Universidad Politecnica de Valencia, and **Olena Kozhushkina***, Kent State University (1086-46-2838)

4:45PM (468) *TALK CANCELLED: Restrictions of Composition Operators to Invariant Subspaces.* Preliminary report. **Derek A Thompson**, Indiana University Purdue University Indianapolis (1086-47-860)

5:00PM (469) *omposition Operators between Weighted Bergman and $S^p$ Spaces.* **Waleed K. Al-Rawashdeh**, Montana Tech (1086-46-1360)

5:15PM ► (470) *Commutants of composition operators on the Hardy space.* Preliminary report. **James Carter**, IUPUI (1086-47-1316)

### *AMS Session on Geometric Measure Theory and Harmonic Analysis*

**2:15 PM – 6:10 PM** **Room 30B, Upper Level, San Diego Convention Center**

2:15PM (471) *Global Regularity Results for 2D Magnetohydrodynamic Equations.* Preliminary report. **Dipendra Regmi**, Oklahoma State University (1086-35-735)

2:30PM (472) *Comparison Theorem for Negatively Curved Sub-Riemannian Manifolds.* **Fabrice Baudoin**, Purdue University, **Michel Bonnefont**, Institut de Mathématiques de Bordeaux, **Nicola Garofalo** and **Isidro H Munive Lima***, Purdue University (1086-35-1736)

2:45PM (473) *Curvature-Dimension Inequalities and Ricci Lower Bounds for Contact Manifolds.* Preliminary report. **Fabrice Baudoin** and **Jing Wang***, Purdue University (1086-35-514)

3:00PM (474) *Weighted multi-parameter Hardy spaces associated with Zygmund dilations.* **Yayuan Xiao**, Wayne State University (1086-43-439)

3:15PM (475) *Asymptotic behavior of positive harmonic functions in certain unbounded domains.* **Koushik Ramachandran**, Purdue University (1086-31-1754)

3:30PM (476) *Green's function for second order parabolic systems with Neumann boundary condition.* **Jongkeun Choi*** and **Seick Kim**, Yonsei University (1086-35-110)

3:45PM (477) *The $L^p$ Regularity Problem for the Stokes System on Lipschitz Domains.* **Joel Kilty***, Centre College, and **Jun Geng**, Chinese Academy of Sciences (1086-35-100)

4:00PM (478) *Identification Problem for the Damped Nonlinear Klein-Gordon Equation.* Preliminary report. **Qinghua Luo**, Marian University (1086-35-2701)

4:15PM (479) *Hopf-Cole Type Transformations for a Viscous Burgers Equation.* **Danny Arrigo***, **Brandon Ashley** and **Thomas Deatherage**, University of Central Arkansas (1086-35-2571)

4:30PM (480) *Nondivergence form elliptic obstacle problem with VMO principal coefficients.* **Kubrom Teka***, State University of New York at Oswego, and **Ivan Blank**, Kansas State University (1086-35-1508)

4:45PM (481) *Logarithmically Super-Critical Case in Boussinesq Equations and its Generalization.* **Lizheng Tao**, Oklahoma State University (1086-35-2891)

5:00PM (482) *On the Dimension of a Certain Measure Arising From a PDE.* Preliminary report. **Murat Akman***, University of Kentuck, and **John L. Lewis**, University of Kentucky (1086-35-2398)

5:15PM ► (483) *Zeros of random reinhardt polynomials in* $\mathbb{C}^{m+1}$. **Arash Karami**, Johns Hopkins University (1086-32-1331)

5:30PM (484) *Extensions of* $L^d$*-Loewner Chains to Higher Dimensions.* **Hidetaka Hamada**, Kyushu Sangyo University, **Gabriela Kohr**, Babeş-Bolyai University, and **Jerry R. Muir, Jr.***, University of Scranton (1086-32-2699)

5:45PM (485) *Functions operating on sparse positive definite matrices encoded by graphs.* **Dominique Guillot***, **Apoorva Khare** and **Bala Rajaratnam**, Stanford University (1086-15-2207)

6:00PM (486) *Representation of* $K$*-Isotropic Harmonizable Random Fields and Completely Bounded Multilinear Forms.* **M. M. Rao**, University of California at Riverside, and **Bertram M. Schreiber***, Wayne State University (1086-60-1671)

## *AMS Session on Logic and Finite Mathematics*

**2:15 PM – 5:55 PM** **Room 13, Mezzanine Level, San Diego Convention Center**

2:15PM (487) *Combinatorics at* $\aleph_{\omega+1}$ *in Prikry-type extensions.* Preliminary report. **Ryan Holben**, University of California, Irvine (1086-03-2225)

2:30PM (488) *My strategy versus Kurt Gödel's strategy To the solution of Hilbert second problem.* Preliminary report. **J. Kuodo Huang**, The Association for International Uncertainty Computing (1086-68-1245)

2:45PM (489) *Computable categoricity for quasiminimal-excellent classes.* **Jesse W Johnson**, University of Notre Dame (1086-03-884)

3:00PM ► (490) *A computational approach to complete differential varieties (by way of model theory).* Preliminary report. **William D. Simmons**, University of Illinois at Chicago (1086-03-2302)

3:15PM ► (491) *Coding sets in abelian* $p$*-groups.* **Steven M. VanDenDriessche**, University of Notre Dame (1086-03-2349)

3:30PM (492) *Families of ultrafilters, and homomorphisms on infinite direct product algebras.* **George M. Bergman**, University of California, Berkeley (1086-03-2568)

3:45PM ► (493) *The Solution to the 3-Variable Frobenius Number Problem.* Preliminary report. **Mayla R Boguslav***, Columbia University and Auburn University, and **Overtoun Jenda**, Auburn University (1086-65-2636)

4:00PM (494) *Generating algebraic terms by evolutionary computation.* **David M. Clark**, State University of New York at New Paltz (1086-08-621)

4:15PM (495) *Simplifying Knuth Cubical Arrays for Semifields.* **Kelly C Aman**, University of Texas at Arlington (1086-17-2091)

4:30PM ► (496) *Gauss Composition and Bhargava Cubes.* Preliminary report. **Vijay Madhukar Patankar** and **Arun Kumar Kuchibhotla***, Indian Statistical Institute (1086-06-2185)

4:45PM ► (497) *Row reducing the Matrix of* $m$*-Generalized Combinations.* Preliminary report. **Ji Young Choi***, Shippensburg University of PA, and **Doug Ensley**, Shippensburg University (1086-05-2333)

5:00PM (498) *Rings and Covered Groups II.* **G. Alan Cannon**, **Lucyna Kabza***, Southeastern Louisiana University, **C. J. Maxson**, Texas A&M University, and **Kent M. Neuerburg**, LA (1086-08-1766)

5:15PM (499) $\Gamma$*-species and the enumeration of* $k$*-trees.* **Andrew Gainer-Dewar**, Carleton College (1086-05-2147)

5:30PM (500) *3D floor planning and tree representations.* **Paul Horn*** and **Gabor Lippner**, Harvard University (1086-05-2757)

5:45PM ► (501) *On the fixed-parameter tractability of Lattice Cut with applications to network security.* Preliminary report. **Robert Erbacher**, Army Research Lab, **Trent Jaeger**, **Nirupama Talele** and **Jason Teutsch***, Penn State University (1086-68-824)

## *AMS Session on Mathematics Education and Teaching Strategies*

**2:15 PM – 5:10 PM** **Room 17B, Mezzanine Level, San Diego Convention Center**

2:15PM ► (502) *Research for Beginning Mathematics Students.* Preliminary report. **Sue Geller**, Texas A&M University (1086-97-145)

2:30PM ► (503) *Message Authentication Codes using Quasigroups.* Preliminary report. **Ellen M Ziliak**, Benedictine University (1086-20-670)

2:45PM ► (504) *Proof Construction and Collaborative Revision in Undergraduate Mathematics.* Preliminary report. **Emily S Cilli-Turner**, University of Illinois at Chicago (1086-97-2193)

3:00PM ► (505) *A Course of Proofs and Higher-level Abstract mathematics for High Achieving High School Students.* Preliminary report. **Richard S Millman***, **Daniel Connelly** and **Cher Hendricks**, Georgia Institute of Technology (1086-97-340)

3:15PM ► (506) *Effects of Writing before Tests in College Algebra.* Preliminary report.
**Rachel E Sefton**, Middle Tennessee State University (1086-00-2575)

3:30PM ► (507) *Increasing retention of beginner secondary mathematics teachers through professional community building.*
**Imre Tuba***, San Diego State University, Imperial Valley, and **Jeffrey Burt**, San Diego State University (1086-97-2921)

3:45PM ► (508) *Improving Understanding, Grades and Retention: Oral Reviews.*
**Mary Ann Nelson**, George Mason University, Fairfax, VA (1086-97-401)

4:00PM ► (509) *Team Teaching with Math History and Ethnomathematics.* Preliminary report.
**Margo Alexander*** and **Iman Chahine**, Georgia State University, Atlanta, GA (1086-97-2028)

4:15PM ► (510) *Excavation Definition.*
**Girija S Nair-Hart**, University of Cincinnati Clermont College (1086-97-1618)

4:30PM ► (511) *Playing with Multivariable Calculus Concepts Wearing 3D Glasses.* Preliminary report.
**Paul E Seeburger**, Monroe Community College (1086-97-2109)

4:45PM ► (512) *Mathematical Games in Multiple Levels of Education.* Preliminary report.
**Deborah E. Seacrest**, The University of Montana Western (1086-97-1613)

5:00PM ► (513) *Maple, Mathlynx and The Tablet PC: On the emerging electronic classroom.* Preliminary report.
**Terrence Richard Blackman**, MIT (1086-97-1490)

## *AMS Session on Topology, Convex Geometry, and Ordered Structures*

**2:15 PM – 5:40 PM** **Room 18, Mezzanine Level, San Diego Convention Center**

2:15PM (514) *High Distance Heegaard Splittings via Dehn Twists.*
**Michael M. Yoshizawa**, University of California, Santa Barbara (1086-54-1082)

2:30PM (515) *Topology of Character Varieties of Abelian Groups.* Preliminary report.
**Sean Dodd Lawton***, The University of Texas-Pan American, and **Carlos Florentino**, Instituto Superior Tecnico (1086-14-1090)

2:45PM (516) *Stable representation theory and the geometry of flat connections.*
**Daniel A Ramras***, New Mexico State University, and **Thomas Baird**, Memorial University of Newfoundland (1086-55-431)

3:00PM (517) *Rigidification of homotopy algebras over multi-sorted semi-theories.* Preliminary report.
**Bruce R Corrigan-Salter**, State University of New York at Buffalo (1086-55-1297)

3:15PM (518) *Closure operators and algebraic closure operators.*
**Martha Lee Hollist Kilpack**, SUNY Oneonta (1086-06-1928)

3:30PM (519) *Determining Slice Towers.* Preliminary report.
**Carolyn M. Yarnall**, University of Virginia (1086-55-2550)

3:45PM ► (520) *Polyhedral Coverings of Tree Space.*
**Dominic Spadacene***, University of Michigan, **Craig Corsi**, **Satyan Devadoss**, Williams College, and **Daoji Huang**, Carleton College (1086-52-2286)

4:00PM (521) *Weak Convergence on Topological Semihypergroups.*
**Norbert N Youmbi**, Saint Francis University (1086-43-1646)

4:15PM (522) *Countable Paracompactness, Invariance under Clopen Mappings, and Metrization.* Preliminary report.
**Gangadhar R Hiremath**, University of North Carolina Pembroke (1086-54-654)

4:30PM (523) *An Esther Klein Type Coloring Theorem.*
**Jonathan E Beagley*** and **Walter Morris**, George Mason University (1086-52-1115)

4:45PM (524) *New Examples of Multinets in $\mathbb{P}^2$ and $\mathbb{P}^3$.* Preliminary report.
**Jeremiah D Bartz**, University of Oregon (1086-52-1402)

5:00PM ► (525) *The Hausdorff dimension of a graph-directed set whose underlying multigraph is a Cartesian product or a tensor product of multigraphs.*
**Stefaan Dirk Delcroix**, California State University, Fresno (1086-00-2694)

5:15PM (526) *Construction of k-interval orders.* Preliminary report.
**David E. Brown**, Utah State University, and **Larry J. Langley***, University of the Pacific (1086-06-1150)

5:30PM ► (527) *Separation in Gap Closures.*
**R E Jamison**, University of Illinois at Urbana-Champaign, **A J Gilbert*** and **A M Heissan**, University of Rhode Island (1086-06-642)

## *MAA Session on Computational Modeling in the Undergraduate Curriculum*

**2:15 PM – 5:30 PM** **Room 7A, Upper Level, San Diego Convention Center**

Organizers: **Kurt Matthew Bryan**, Rose-Hulman Institute of Technology

**Joseph Eichholz**, Rose-Hulman Institute of Technology

**Jeffrey Leader**, Rose-Hulman Institute of Technology

2:15PM ► (528) *Use of 3D Modeling Software in Undergraduate Math and Science Courses: Lessons Learned From Implementation Research.* **Erica Slate Young***, University of Alabama in Huntsville, and **Jack Bookman**, Duke University (1086-D5-2409)

2:35PM ► (529) *Design and Build of an Open Canoe: A Natural Path to Computation.* **D Scott Dillery**, Lindsey Wilson College (1086-D5-1229)

2:55PM ► (530) *Analyzing the Bald Eagle Population: Difficulties and Successes.* Preliminary report. **Gabriella Marie Muscat*** and **Salvatore P Giunta**, Adelphi University (1086-D5-1128)

3:15PM ► (531) *A Modeling Approach for First Semester Calculus.* **Joy L. Becker*** and **Brian J. Birgen**, Wartburg College (1086-D5-870)

3:35PM ► (532) *Approximating the Mass, Volume, Cross-Sectional Areas, Surface Areas and Trajectories of Projectiles.* **Paul R Bouthellier**, University of Pittsburgh-Titusville (1086-D5-151)

3:55PM ► (533) *Empowering Decision Makers Through Technology.* Preliminary report. **William P. Fox**, Naval Postgraduate School, Monterey, Ca 93943 (1086-D5-578)

4:15PM ► (534) *Modeling and Evaluation Strategy in Undergraduate Calculus Curriculum.* **Khairul Islam**, Eastern Michigan University (1086-D5-1561)

4:35PM ► (535) *Student Projects using Microphones and the FFT.* Preliminary report. **Phil Gustafson**, Colorado Mesa University (1086-D5-785)

4:55PM ► (536) *Some Class Activities of Digital Processing Using Mathematica and MathCAD.* Preliminary report. **Daniel G Kim***, Southern Oregon University, and **Sungsook Kim**, Pai Chai University (1086-D5-2053)

5:15PM ► (537) *Introducing the Split Step Fourier Method with MATLAB.* Preliminary report. **Pablo Ulises Suarez**, Delaware State University (1086-D5-357)

### *MAA Session on Innovative Ideas for Courses in the First Two Years, II*

**2:15 PM – 5:10 PM** **Room 5A, Upper Level, San Diego Convention Center**

Organizer: **Andrew Granville Bennett**, Kansas State University

2:15PM ► (538) *Visually Verifying Homework Problems in Multivariable Calculus.* **Paul E Seeburger**, Monroe Community College (1086-H1-1439)

2:35PM ► (539) *An Innovative Course for Teaching Topics from Calculus III and Linear Algebra for Computer Science-Related Majors Utilizing Game-Programming Applications.* Preliminary report. **Scott A Stevens**, Champlain College (1086-H1-76)

2:55PM ► (540) *An Online Discussion Forum for Calculus Students.* **Eve Torrence**, Randolph-Macon College (1086-H1-2357)

3:15PM ► (541) *Emphasizing Core Calculus Concepts Using Biomedical Applications to Engage, Mentor and Retain STEM Students.* **Marilyn A. Reba***, **Taufiquar Khan**, **Ellen Breazel**, **John DesJardin** and **Irina Viktorova**, Clemson University (1086-H1-2114)

3:35PM (542) *Flipping Calculus.* **Larissa B Schroeder***, **Mako Haruta**, **Jean McGivney-Burelle**, **Fei Xue** and **John Williams**, University of Hartford (1086-H1-1354)

3:55PM ► (543) *Single Variable Calculus Revisited.* **Maria Terrell***, Cornell University, and **Peter Lax**, Courant Institute of Mathematical Sciences New York University (1086-H1-1728)

4:15PM ► (544) *Changing Perspectives on Changing Coordinates.* **Itai Seggev**, Wolfram Research (1086-H1-1890)

4:35PM (545) *Stressing Physics Content in a Multivariable Calculus Class.* **Jeffrey W. Clark**, Elon University (1086-H1-143)

4:55PM ► (546) *Back to the Future.* **Poul G. Hjorth***, **Steen Markvorsen** and **Karsten Schmidt**, Technical University of Denmark (1086-H1-2217)

### *MAA Session on Integrating the Mathematics of Planet Earth 2013 in the College Mathematics Curriculum, II*

**2:15 PM – 4:50 PM** **Room 6C, Upper Level, San Diego Convention Center**

Organizer: **Ben Galluzzo**, Shippensburg University

2:15PM (547) *Environmental Mathematics via the Visual, Qualitative and Computational.* **Ben Fusaro**, Florida State University (1086-H5-2650)

2:35PM ► (548) *Earthquakes, Weatherquakes and Logicquakes in the College Mathematics Curriculum.* **Martin E. Walter**, University of Colorado, Boulder (1086-H5-1178)

2:55PM ► (549) *TALK CANCELLED: Seeing the World Differently: Mapping the Earth's Terrain with Elavation Angles and Why it Matters.* Preliminary report. **Michael A Brilleslyper**, U. S. Air Force Academy (1086-H5-1393)

3:15PM (550) *Crop Rotation Modeling to Meet A Sustainable Water Yield.*
**Katie Fowler**, Clarkson University (1086-H5-1117)

3:35PM ► (551) *Some Mathematics of Nonrenewable Resources: From Arithmetic to Optimal Control Theory.*
**Michael Olinick**, Middlebury College (1086-H5-885)

3:55PM ► (552) *Modeling TOMS (NASA) data to predict the depletion of the ozone layer for various latitudes of the earth.* Preliminary report.
**Dan Seth**, West Texas A&M University (1086-H5-458)

4:15PM ► (553) *TALK CANCELLED: Conceptual climate models and the undergraduate curriculum.*
**James A. Walsh**, Oberlin College (1086-H5-104)

4:35PM (554) *Arctic Sea Ice Extent: A Qualitative Literacy Project and an Entry Point for Environmental Mathematics.*
**William C Bauldry**, Appalachian State University (1086-H5-1927)

## *MAA Session on Mathematics and the Arts: Practice, Pedagogy, and Discovery, II*

**2:15 PM – 6:50 PM** **Room 6E, Upper Level, San Diego Convention Center**

Organizer: **Douglas Norton**, Villanova University

2:15PM ► (555) *Gaskets and Carpets From A(Apollonius) to Z(The complex plane).* Preliminary report.
**Anne M. Burns**, Long Island University, C.W. Post Campus (1086-K1-444)

2:35PM ► (556) *Point Symmetry Patterns on 1-Uniform Tessellations.*
**David A. Reimann**, Albion College (1086-K1-2836)

2:55PM ► (557) *Algorithms for Creating Self-Similar Curves and Surfaces in* $\mathbb{R}^3$. Preliminary report.
**Carissa M Brtalik**, Adelphi University (1086-K1-2321)

3:15PM ► (558) *The Art and Mathematics of Tiling and Tazhib for the Interior of Some Special Star Polygons.* Preliminary report.
**Reza Sarhangi**, Towson University (1086-K1-2214)

3:35PM ► (559) *Golden Ratio: Ornamentations of Chehelsotoun, a Safavid Dynasty Palace in Isfahan, Iran.* Preliminary report.
**Shahriar Piroozram**, Art University of Isfahan, **Sheida Riahi**, Mississippi State, MS, and **Shantia Yarahmadian***, Mississippi State University (1086-K1-1443)

3:55PM ► (560) *Iterative Arrangements of Polyhedra – Relationships to Classical Fractals and Haüy Constructions.*
**Robert W Fathauer**, Tessellations Company (1086-K1-1349)

4:15PM ► (561) *Tiling the Plane with the Z-Pentomino: an Artistic Interpretation.* Preliminary report.
**Margaret E Kepner**, Washington, DC (1086-K1-1827)

4:35PM (562) *Intriguing Tessellation Animations in Real Time.*
**Kevin Lee**, Normandale Community College (1086-K1-1152)

4:55PM ► (563) *Patterns on Semi-regular Triply Periodic Polyhedra.* Preliminary report.
**Doug Dunham**, University of Minnesota Duluth (1086-K1-1638)

5:15PM ► (564) *Bending Circle Limits.*
**Vladimir L Bulatov**, Corvallis, Oregon (1086-K1-1252)

5:35PM ► (565) *Euler's theorem and the "Plaited Mat" Sona Designs of Africa.*
**Darrah P. Chavey**, Beloit College (1086-K1-2066)

5:55PM ► (566) *Diagrammatic calculus for research and teaching.*
**Radmila Sazdanovic**, University of Pennsylvania (1086-K1-2017)

6:15PM (567) *On Homology Preserving Representations of Planar Rips Complexes.* Preliminary report.
**William C Kronholm**, Whittier College (1086-K1-2963)

6:35PM ► (568) *Optimizing balance in video games with asymmetrical choices.*
**Jeffrey J Beyerl**, Furman University (1086-K1-2306)

## *MAA Session on Research on the Teaching and Learning of Undergraduate Mathematics, I*

**2:15 PM – 4:50 PM** **Room 3, Upper Level, San Diego Convention Center**

Organizers: **Kyeong Hah Roh**, Arizona State University

**Stacy Brown**, Pitzer College

**Mike Oehrtman**, University of Northern Colorado

2:15PM (569) *How prospective grades 6 - 8 teachers use two definitions of ratio.* Preliminary report.
**Sybilla Beckmann***, **Andrew Izsak**, **Erik Jacobson**, **Eun Jung** and **Eun Kyung Kang**, University of Georgia (1086-N1-2326)

2:35PM (570) *Assessing high school teachers' Mathematical Meanings for Teaching secondary mathematics.* Preliminary report.
**Cameron Byerley***, **Neil Hatfield**, **Marilyn Carlson** and **Patrick W Thompson**, Arizona State University (1086-N1-2237)

2:55PM ► (571) *A Study of Effective Application of Semiotic Registers in the Development of the Definite Integral in Multivariable Calculus.*
**Daniel L. McGee**, University of Puerto Rico - Mayaguez (1086-N1-42)

3:15PM ► (572) *Computational thinking in linear algebra.*
**Spencer Bagley*** and **Jeff Rabin**, University of California, San Diego (1086-N1-1378)

3:35PM ► (573) *Over A Decade of Improving Pass Rates in Gateway Mathematics Courses using Interactive Software.*
**Michelle R DeDeo**, University of North Florida (1086-N1-1430)

3:55PM (574) *Implementing Inquiry-Oriented Curriculum: From the Mathematicians' Perspective.*
**Estrella Johnson***, **John Caughman**, Portland State University, **Julie Fredericks**, Teachers Development Group, and **Lee Gibson**, Indiana University Southeast (1086-N1-1970)

4:15PM ► (575) *Mathematics Anxiety and Performance: Finding the Source to Lead to the Cure.*
**Moira Kathleen Devlin*** and **Agnes Rash**, Saint Joseph's University (1086-N1-2710)

4:35PM (576) *Improving undergraduate mathematics education using dynamic graphics embedded within WeBWork.* Preliminary report.
**Sean P. Yee**, California State University, Fullerton (1086-N1-2071)

## *MAA General Contributed Paper Session: Calculus*

**2:15 PM – 5:55 PM** **Room 11B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Stephen Kokoska**, Bloomsburg University
**Michael Boardman**, Pacific University

2:15PM ► (577) *What it takes for a student today to be successful in calculus?*
**Paul Sisson**, Louisiana State University - Shreveport (1086-VB-2962)

2:30PM ► (578) *Oral Reviews in Calculus.*
**Dylan W Helliwell**, Seattle University (1086-VB-2729)

2:45PM (579) *Writing to learn in first semester calculus.*
**Chad Awtrey**, Elon University (1086-VB-2156)

3:00PM ► (580) *Improving Calculus learning through Boot camp and Study Hall.* Preliminary report.
**Lipika Deka** and **Gabriela Stanica***, California State University-Monterey Bay (1086-VB-2914)

3:15PM ► (581) *The Effects of GSP-Based Applets on Students' Understanding of Graphical Calculus Concepts.*
**Dov Zazkis**, Center for Research in Mathematics and Science Education (SDSU) (1086-VB-2293)

3:30PM ► (582) *The Impact of Arithmetic Skills on Success in Calculus II and III.* Preliminary report.
**Alison Ahlgren***, University of Illinois, and **Marc Harper**, UCLA (1086-VB-398)

3:45PM ► (583) *Restructuring Calculus 2, Inside-Out and Backwards.* Preliminary report.
**Janine M. Haugh**, University of North Carolina at Asheville (1086-VB-2779)

4:00PM (584) *Resequencing Calculus: An Early Multivariate Approach.*
**David Dwyer**, **Mark Gruenwald**, University of Evansville, **Michael Axtell**, University of St. Thomas, **Nicholas Baeth**, University of Central Missouri, **Kenneth Luther**, Valparaiso University, and **Joe Stickles***, Millikin University (1086-VB-1011)

4:15PM ► (585) *Development of an Online Multivariable Calculus Course for High School Students.* Preliminary report.
**Samantha N Andrews***, **Greg Mayer**, **Nathaniel Tindall**, **Daniel Connelly** and **Rui Hu**, Georgia Institute of Technology (1086-VB-2400)

4:30PM ► (586) *Learning the Chain Rule Using the DOTI Method.*
**Steve M. Anglin**, Case Western Reserve University (1086-VB-36)

4:45PM ► (587) *New Curves from Old via Tangents.* Preliminary report.
**Dragan Jankovic**, Cameron University (1086-VB-2394)

5:00PM ► (588) *The Development of the Fundamental Theorem of Calculus by Using the Limit Approach Only.*
**Jun Tao**, Tao Calculus Book Co. (1086-VB-627)

5:15PM ► (589) *A Dissection Proof of Leibniz's Series for $\pi/4$.*
**Mitsuo Kobayashi**, Cal Poly Pomona (1086-VB-2411)

5:30PM (590) *Convexity Conditions of Euler-Lagrange Equations in Optimization Problems.* **Mara Aruguete** and **Chelsey Stephenson***, Lincoln University (1086-VB-687)

5:45PM ► (591) *A project to evaluate the probability integral using Calculus II techniques.* **Daniel C. Kemp**, South Dakota State University (1086-VB-1433)

## *MAA General Contributed Paper Session: Mathematics and Technology, II*

**2:15 PM – 4:10 PM** **Room 5B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderator: **Ray Collings**, Georgia Perimeter College

2:15PM ► (592) *Classroom practices which integrate a variety of technological and communication tools to improve student learning in a Finite Mathematics and Applied Calculus.* **Jack Y Narayan**, State University of New York at Oswego (1086-VF-277)

2:30PM (593) *Using Graphs to Break Ciphers in Cryptography Using Maplets.* **Neil Sigmon***, Radford University, and **Rick Klima**, Appalachian State University (1086-VF-354)

2:45PM (594) *Geometry Playground v. 1.4.* **Daniel J. Heath**, Pacific Lutheran University (1086-VF-425)

3:00PM ► (595) *Series Tic-Tac-Toe.* **Barbara Margolius**, Cleveland State University (1086-VF-812)

3:15PM ► (596) *Resurrecting Hinton's Tesseract: Using 3D Graphics to Emulate the Four-Dimensonal Models of Charles Howard Hinton.* **Samuel Charles Herwood**, Adelphi University (1086-VF-1382)

3:30PM (597) *A Brief Tutorial on Building a "Flipped" Classroom.* **Reza O Abbasian*** and **John T Sieben**, Texas Lutheran University (1086-VF-2336)

3:45PM ► (598) *Effects of using tablets in lectures on student learning outcomes in mathematics courses.* **Wei Wei***, Metropolitan State University, and **Zhi Qiao**, Wells Fargo (1086-VF-355)

4:00PM ► (599) *A Mathematician's View of Educational Neuroscience: A Hunt for a Mathematical Genius.* **Alexander Y Vaninsky**, City University of New York/Hostos Community College (1086-VF-967)

## *MAA General Contributed Paper Session: Probability and Statistics, II*

**2:15 PM – 5:55 PM** **Room 33A, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Fei Xing**, University of Tennessee
**Chuck Wessell**, Gettysburg College

2:15PM (600) *Asymptotic Behavior of Bayesian Prediction Limits for the Poisson Distribution with an illustration from Tropical Storm Occurrences.* **Valbona Bejleri**, University of DC (1086-VI-2832)

2:30PM (601) *Time to extinction in two-sex branching processes.* **George P Yanev***, The University of Texas - Pan American, **David M Hull**, Valparaiso University, USA, and **Manuel Mota**, University of Extremadura, Spain (1086-VI-2295)

2:45PM ► (602) *A Bayesian Approach to Detecting Change Points in Climatic Records.* **Eric Ruggieri**, Duquesne University (1086-VI-1298)

3:00PM (603) *Estimating the Intrinsic Dimension of High-Dimensional Data Sets.* **Anna V Little***, Jacksonville University, **Mauro Maggioni**, Duke University, and **Lorenzo Rosasco**, Massachusetts Institute of Technology (1086-VI-417)

3:15PM ► (604) *Almost sure asymptotics for Ornstein-Uhlenbeck processes of Poisson potential.* **Fei Xing**, University of Tennessee, Knoxville (1086-VI-414)

3:30PM (605) *A Cental Limit Theorem for Multivariate Strongly Mixing Random Fields.* **Cristina Tone**, University of Louisville (1086-VI-403)

3:45PM (606) *Approximation of the Generalized Poisson Distribution.* **Salam Md. Mahbubush Khan**, Alabama A&M University (1086-VI-371)

4:00PM ► (607) *Methods of nonparametric selection of the least dispersed of k multivariate populations.* **Jeremy F Entner*** and **Pinyuen Chen**, Syracuse University (1086-VI-499)

4:15PM ► (608) *Effect of Potomac River on Salinity in Chesapeake Bay.* Preliminary report. **Vitaliy S Shvetsov**, University of the District of Columbia (1086-VI-2798)

4:30PM (609) *On Functional CLT for reversible Markov chains with nonlinear growth of the variance of partial sums.*
**Martial Longla***, **Costel Peligrad** and **Magda Peligrad**, University of Cincinnati (1086-VI-519)

4:45PM (610) *Estimating the Probability of Accurate Phylogeny Reconstruction by Quartet Aggregation.*
**Jason Michael Calmes**, Tulane University (1086-VI-2797)

5:00PM ► (611) *Chebyshev and Markov's Inequalities.* Preliminary report.
**Zengxiang Tong**, Otterbein University (1086-VI-2383)

5:15PM (612) *Testing Independence of Parallel Pseudorandom Number Streams: Incorporating the Data's Multivariate Nature.*
**Chester Ivan Ismay*** and **Randall Eubank**, Arizona State University (1086-VI-2128)

5:30PM (613) *A note on testing problem of equality of two covariance operators.* Preliminary report.
**K Kaphle***, University of Maine at Fort Kent, **F H Ruymgaart** and **G Gaines**, Texas Tech University (1086-VI-1906)

5:45PM ► (614) *Statistical Analysis of Firm Interdependence Using Duration Data—Semiparametric Approach.* Preliminary report.
**Yuting Hsu**, Penn State Univerysity - Harrisburg (1086-VI-1796)

## *MAA General Contributed Paper Session: Research in Graph Theory and Combinatorics, I*

**2:15 PM – 5:55 PM** **Room 33C, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Josh Laison**, Willamette University
**Ron Taylor**, Berry College

2:15PM ► (615) *Vexillary Permutations.*
**Max A Gross***, University of Maryland, College Park, and **Nicole Marsaglia**, University of Oregon (1086-VN-531)

2:30PM ► (616) *Up-Down Sequences: Inversions, Coinversions, and the Sum of the Major Indices.*
**Ralph P. Grimaldi**, Rose-Hulman Institute of Technology (1086-VN-1078)

2:45PM (617) *Counting consecutive patterns in up-down permutations using the maximum packing number.*
**A. Scott Duane*** and **Jeff Remmel**, University of California, San Diego (1086-VN-2768)

3:00PM ► (618) *Total Domination on the Triangular Honeycomb Chessboard.* Preliminary report.
**Taylor Kindred**, Kennesaw State University (1086-VN-1843)

3:15PM Break.

3:30PM ► (619) *Mutually Orthogonal Latin Squares via Polynomials Modulo $n$.*
**Serge C Ballif**, Nevada State College (1086-VN-998)

3:45PM (620) *Convolutions on the Geometry of Hosoya's Triangle.* Preliminary report.
**Rigoberto Florez***, The Citadel, **Eva Czabarka**, University of South Carolina, and **Leandro Junes**, Cal U (1086-VN-2440)

4:00PM ► (621) *Rook Polynomials.* Preliminary report.
**Bill Linderman**, King College (1086-VN-2787)

4:15PM ► (622) *Fine Ballot Numbers.*
**Shaun Sullivan**, Florida Gulf Coast University (1086-VN-1463)

4:30PM ► (623) *Dimension-Preserving Contractions and a Finite List of 3-Irreducible Posets.*
**Noah Streib**, National Institute of Standards and Technology (1086-VN-1720)

4:45PM ► (624) *Diagonal forms for incidence matrices and zero-sum Ramsey theory.*
**Wing Hong Tony Wong*** and **Richard M Wilson**, California Institute of Technology (1086-VN-2166)

5:00PM ► (625) *Projections on Parabolic Quotients of Affine Weyl Groups.*
**Elizabeth Beazley**, Haverford College, **Margaret Nichols**, Oberlin College, **Min Hae Park**, Williams College, **XiaoLin Shi**, Massachusetts Institute of Technology, and **Alexander Youcis***, University of Maryland - College Park (1086-VN-2449)

5:15PM ► (626) *On a Dynamic Positional Game.* Preliminary report.
**Mary J. Riegel**, University of Montana (1086-VN-2486)

5:30PM ► (627) *The ABC's of Property-D Cyclic Neofields.* Preliminary report.
**Scott Lacy**, University of Texas at Arlington (1086-VN-2805)

5:45PM (628) *Where Galerkin, Hilbert, and Wilf intersect: an application of the snake oil method for combinatorial sums to finite element method analysis.* Preliminary report.
**Chad N Vidden**, University of Wisconsin, Platteville (1086-VN-2567)

### *MAA General Contributed Paper Session: Research in Number Theory, II*

**2:15 PM – 4:55 PM** **Room 2, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Bernadette Tutinas**, Goucher College
**Nicholas Triantafillou**, University of Michigan

2:15PM (629) *Determinantal Expansions in Random Matrix Theory and Number Theory.* Preliminary report.
**Nicholas George Triantafillou***, University of Michigan-Ann Arbor, and **Steven J Miller**, Williams College (1086-VO-859)

2:30PM (630) *Explicit Bounds for Densities Pertaining to Lehmer-Type Questions.*
**Jesse Thorner**, Wake Forest University (1086-VO-1503)

2:45PM (631) *Carmichael meets Chebotarev.*
**Aaron M Yeager***, **William Banks**, University of Missouri, and **Ahmet Güloğlu**, Bilkent University (1086-VO-1722)

3:00PM ► (632) *Low-lying zeroes of Maass form $L$-functions.*
**Levent Alpoge***, Harvard University, and **Steven J. Miller**, Williams College (1086-VO-2362)

3:15PM (633) *Some Mordell-Weil Groups of Large Rank.*
**Thomas C. Occhipinti**, University of California, Irvine (1086-VO-1170)

3:30PM ► (634) *Torsion of Elliptic Curves over Quadratic Fields.*
**David B. Erf***, Pomona College, and **Jody Ryker**, CSU Chico (1086-VO-2911)

3:45PM (635) *An Elementary Proof of Ramanujan's Circular Summation Formula and its Generalizations.*
**Ping Xu**, University of Illinois at Urbana-Champaign (1086-VO-2844)

4:00PM ► (636) *Dynamics of the Riemann Zeta Function.*
**Donald L. Hitzl***, Lockheed Palo Alto Research Laboratory, and **Frank Zele**, Menlo Park , CA (1086-VO-934)

4:15PM (637) *$a$-Points of the Riemann zeta-function on the critical line.*
**S J Lester**, University of Rochester (1086-VO-1133)

4:30PM ► (638) *Semisimple Lie Theory and Optimization.* Preliminary report.
**Qingxia Li** and **Matthew Doughty***, Lincoln University (1086-VO-1031)

4:45PM ► (639) *Lind-Lehmer constant for groups of the form $\mathbb{Z}_p^2$.*
**Dilum De Silva*** and **Chris Pinner**, Kansas State University (1086-VO-2059)

### *SIAM Minisymposium on Vistas in Applied, Computational, and Discrete Mathematics*

**2:15 PM – 6:00 PM** **Room 11A, Upper Level, San Diego Convention Center**

Organizers: **Zuhair Nashed**, University of Central Florida
**Luminita Vese**, University of California, Los Angeles

2:15PM (640) *Variational Methods in Materials Science and Image Processing.*
**Irene Fonseca**, Carnegie Mellon University (1086-49-616)

3:15PM (641) *Invariant histograms and signatures for object recognition and symmetry detection.*
**Peter J. Olver**, University of Minnesota (1086-68-547)

4:15PM (642) *Hybrid inverse problems and redundant systems of partial differential equations.*
**Guillaume Bal**, Columbia University (1086-35-1270)

5:15PM ► (643) *Recent Developments in Quantum Information.*
**Peter W Shor**, Massachusetts Institute of Technology (1086-68-2348)

### *YMN/Project NExT Poster Session*

**2:15 PM – 4:15 PM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

Organizers: **Mike Axtell**, University of St. Thomas
**Kim Roth**, Juniata College

### *MAA Committee on the Mathematical Education of Teachers Panel Discussion*

**2:15 PM – 3:35 PM** **Room 1B, Upper Level, San Diego Convention Center**

*Mathematicians supporting the implementation of Common Core State Standards for Mathematics.*

Organizers: **Elizabeth Burroughs**, Montana State University
**James King**, University of Washington

Panelists: **James King**
**Brynja Kohler**, Utah State University
**W. Gary Martin**, Auburn University
**William McCallum**, University of Arizona
**Kristin Umland**, University of New Mexico

### *MAA-NSF Panel Discussion*

**2:15 PM – 3:35 PM** **Room 4, Upper Level, San Diego Convention Center**

*Reporting progress: A minisymposium of projects from the NSF Course, Curriculum, and Laboratory Improvement/Transforming Undergraduate Education in STEM program.*

Panelists: **Richard Alo**, NSF Division of Undergraduate Education
**Ron Buckmire**, NSF Division of Undergraduate Education
**Lee Zia**, NSF Division of Undergraduate Education

### *SIGMAA on the History of Mathematics Special Presentation*

**2:15 PM – 3:45 PM** **Room 6F, Upper Level, San Diego Convention Center**

*The Paul R. Halmos photograph collection of the Archives of American Mathematics.*

### *MAA Committee on Undergraduate Student Activities and Chapters Panel Discussion*

**2:15 PM – 3:35 PM** **Room 1A, Upper Level, San Diego Convention Center**

*What every student should know about the Joint Mathematics Meetings.*

Organizers: **Jacqueline Jensen-Vallin**, Slippery Rock University
**Lisa Marano**, West Chester University of Pennsylvania

Panelists: **Robert Vallin**, Slippery Rock University

### *AWM Panel Discussion*

**2:15 PM – 3:40 PM** **Room 10, Upper Level, San Diego Convention Center**

*The retention of women in mathematics.*

Organizers: **Ami Radunskya**, Pomona College
**Christina Sormani**, City University of New York

Moderator: **Cheryl Geisler**, Simon Fraser University

Panelists: **Julie Bergner**, University of California, Riverside
**Andrea Bertozzi**, University of California, Los Angeles
**Estela Gavosto**, University of Kansas
**Douglas Haynes**, University of California, Irvine
**Lisette de Pillis**, Harvey Mudd College
**Chuu-Lian Terng**, University of California, Irvine

### *AMS Session on Number Theory, I*

**2:30 PM – 5:55 PM** **Room 12, Mezzanine Level, San Diego Convention Center**

2:30PM (644) *Fibonacci and Lucas Identities as Binomial Sums.*
**Mohammad K. Azarian**, University of Evansville (1086-11-362)

2:45PM ► (645) *On the one-third squares in the psudo-Lucas sequence.*
**Behailu Mammo*** and **Arulappah Eswarthasan**, Hofstra University (1086-11-936)

3:00PM ► (646) *Divisibility properties of fourth order recurrent sequences.*
**Diane Fenton**, University of Calgary (1086-11-2644)

3:15PM ► (647) *Recursive relations and combinatorial identities.*
**Xinyun Zhu***, University of Texas at Permian Basin, **Aklilu Zeleke**, Michigan State University, **Sivaram Narayan** and **George Grossman**, Central Michigan University (1086-11-1089)

3:30PM (648) *Distribution of summands in generalized Zeckendorf decompositions.*
**Steven J Miller***, Williams College, **Amanda Bower**, University of Michigan – Dearborn, **Rachel Insoft**, Wellesley College, **Shiyu Li**, UC Berkeley, and **Philip Tosteson**, Williams College (1086-11-1098)

3:45PM ► (649) *Mining the OEIS: Ten Experimental Conjectures.*
**Hieu D Nguyen*** and **Douglas Taggart**, Rowan University (1086-11-512)

4:00PM (650) *Identities involving higher-order Bernoulli and Euler polynomials.*
**Dae San Kim***, Sogang University, Seoul, South Korea, and **Taekyun Kim**, Kwangwoon University, Seoul, Korea (1086-11-1010)

4:15PM ► (651) *Some Recent Results on Odd Perfect Numbers.* Preliminary report.
**C. Sung**, TAMIU (1086-11-2925)

4:30PM (652) *Appending digits to Sierpiński, Riesel and Riesel-Sierpiński numbers.*
**Lane E Bloome***, Millikin University, **Marcella Noorman**, Belmont University, and **Justin Ferguson**, Keuka College (1086-11-672)

4:45PM ► (653) *A generalization of the pentagonal number theorem.*
**Hayan Nam***, **SeungKyung Park** and **Jaebum Sohn**, Yonsei University (1086-11-171)

5:00PM (654) *A property of the Number 2013, preliminary Report.* Preliminary report.
**Claudia A Spiro**, Southern Polytechnic State University (1086-11-1123)

5:15PM Break.

5:30PM (655) *An exploration of the primality properties of Primitive Pythagorean Triplets.* **Vipin S Menon**, **Ryan Paul Lawrence*** and **Robert L Doucette**, McNeese State University (1086-11-2562)

5:45PM ► (656) *Solving the Diophantine equation* $nx^2 + 2^\ell 3^m = y^n$. Preliminary report. **Eva Goedhart**, Bryn Mawr College (1086-11-2513)

### *MAA General Contributed Paper Session: Teaching Mathematics Beyond the Calculus Sequence*

**2:30 PM – 5:55 PM** **Room 33B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Mark Mills**, Central College
**Horia I. Petrache**, Indiana University-Purdue University Indianapolis

2:30PM ► (657) *Math 351: A Work In Progress.* **Ricardo Enrique Rojas**, Northern State University, Aberdeen, South Dakota. (1086-VQ-1990)

2:45PM (658) *Engaging Students as Listeners to Enhance Student Oral and Written Communication.* **Erika L Ward*** and **Pam Crawford**, Jacksonville University (1086-VQ-1749)

3:00PM (659) *Introducing proof via discrete mathematics (with a twist or two).* **Sarah-Marie Belcastro**, Smith College / Sarah Lawrence College (1086-VQ-1102)

3:15PM (660) *Modeling Mathematical Practice in a Discrete Mathematics Course.* **Brian Drake*** and **Feryal Alayont**, Grand Valley State University (1086-VQ-1715)

3:30PM ► (661) *Exploring Escher's periodic drawings: A tour of mathematical ideas.* Preliminary report. **Alessandra Pantano**, University of California, Irvine (1086-VQ-2912)

3:45PM (662) *Using Music to Display Patterns in Geometry and Number Theory.* **Craig M. Johnson**, Marywood University (1086-VQ-2961)

4:00PM (663) *Teaching Elementary Number Theory: Something Old, Something New, Something Borrowed.* Preliminary report. **Timothy B Flowers**, Indiana University of Pennsylvania (1086-VQ-2543)

4:15PM ► (664) *Teaching Complex Variables with an Inverted Classroom.* **Alex Capaldi**, Valparaiso University (1086-VQ-579)

4:30PM ► (665) *The Moore Method As Applied To Abstract Algebra.* **Andrew B. Perry**, Springfield College (MA) (1086-VQ-2226)

4:45PM ► (666) *A Capstone Course - Assessed/Revised.* Preliminary report. **Ronald M. Brzenk**, Hartwick College (1086-VQ-325)

5:00PM ► (667) *Coset extensions of real numbers.* **Horia I Petrache**, Department of Physics, Indiana University Purdue University Indianapolis (1086-VQ-2389)

5:15PM (668) *Teaching Advanced Mathematics In An Online Setting.* Preliminary report. **Chad Wiley**, Emporia State University (1086-VQ-1165)

5:30PM (669) *Approval of mathematical axioms.* Preliminary report. **Bonface Nyakambi Ongeri**, Kenya (1086-VQ-25)

5:45PM ► (670) *Finding applications is the student's job, or, how to be integrative without really trying: a project-based approach to incorporating other disciplines.* Preliminary report. **Nathaniel Eldredge**, Cornell University (1086-VQ-1657)

### *MAA Invited Address*

**3:20 PM – 4:10 PM** **Room 6AB, Upper Level, San Diego Convention Center**

(671) *How mathematics has changed Hollywood.* **Tony DeRose**, Pixar Studios (1086-A0-11)

### *AWM Business Meeting*

**3:45 PM – 4:15 PM** **Room 10, Upper Level, San Diego Convention Center**

### *MAA-NSF Panel Discussion*

**3:50 PM – 5:10 PM** **Room 4, Upper Level, San Diego Convention Center**

*Bring your lab to work: A minisymposium of projects that incorporate instrumented laboratory devices into mathematics courses.*

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

### *MAA Committee on Articulation and Placement/NCTM-MAA Committee on Mutual Concerns Panel Discussion*

**3:50 PM – 5:10 PM** **Room 1B, Upper Level, San Diego Convention Center**

*Placement testing and the Common Core Curriculum.*

Organizer: **Sheldon P. Gordon**, Farmingdale State College

Moderator: **Bernard Madison**, University of Arkansas

Panelists: **Zalman Usiskin**, University of Chicago

**William McCallum**, University of Arizona

**Roxy Peck**, California State University, San Luis Obispo

**Chantel Reynolds**, The College Board

**Lavonne Mohn**, ACT Test Development

### *MAA Panel Discussion*

**3:50 PM – 5:10 PM** **Room 1A, Upper Level, San Diego Convention Center**

*Published or perished: Life after the tenure decision.*

Organizer: **Michael Posner**, Villanova University

Panelists: **Gary Towsley**, SUNY Geneseo

**Tevian Dray**, Oregon State University

**Curtis Bennett**, Loyola Marymount University

**Dexter Whittinghill**, Rowan University

**Rebecca Goldin**, George Mason University

### *MSRI / Museum of Mathematics Meeting*

**4:00 PM – 5:00 PM** **Rancho Santa Fe Room 3, Lobby Level, Marriott**

### *MAA Section Officers*

**4:00 PM – 5:00 PM** **Marina Ballroom D, 3rd Floor, Marriott**

Chair: **Rick Gillman**, Valparaiso University

### *Reception for Undergraduate Students*

**4:00 PM – 5:00 PM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

### *AMS Committee on the Profession Panel Discussion*

**4:30 PM – 6:00 PM** **Room 10, Upper Level, San Diego Convention Center**

*Getting started as a research mathematician.*

Organizer: **Patricia Hersh**, North Carolina State University

Moderator: **David Vogan**, Massachusetts Institute of Technology

Panelists: **Doug Arnold**, University of Minnesota

**Andrea Bertozzi**, University of California, Los Angeles

**Angela Gibney**, University of Georgia

**Tara Holm**, Cornell Unviersity

**Sean Lawton**, University of Texas

### *MAA Minicourse #3: Part A*

**4:45 PM – 6:45 PM** **Room 29C, Mezzanine Level, San Diego Convention Center**

*How to run a successful Math Circle.*

Presenters: **Sam Vandervelde**, St. Lawrence University

**Japheth Wood**, Bard College

**Amanda Katharine Serenevy**, Riverbend Community Math Center

### *MAA Minicourse #7: Part A*

**4:45 PM – 6:45 PM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*Teaching and assessing writing and presentations: Collaborative development of pedagogy.*

Presenters: **Susan Ruff**, Massachusetts Institute of Technology

**Mia Minnes**, University of California, San Diego

**Joel Lewis**, University of Minnesota

### *MAA Minicourse #11: Part A*

**4:45 PM – 6:45 PM** **Room 30A, Upper Level, San Diego Convention Center**

*Teaching differential equations with modeling.*

Presenters: **Darryl Yong**, Harvey Mudd College

**Ami Radunskaya**, Pomona College

**Tom LoFaro**, Gustavus Adolphus College

**Dan Flath**, Macalester College
**Michael Huber**, Muhlenberg College

### *SIGMAA on the History of Mathematics Special Presentation, Business Meeting, Reception, and Guest Lecture*

**5:00 PM – 7:30 PM** **Room 6F, Upper Level, San Diego Convention Center**

5:00PM ► (672) *Geometry and Baroque Architecture in Turin, Italy.* Preliminary report. **Cynthia Woodburn**, Pittsburg State University (1086-A0-113)

5:30PM Reception and business meeting.

6:30PM (673) *Leonardo Fibonacci, Liber abbaci, and the rise of the modern commercial world.* **Keith Devlin**, Stanford University (1086-A0-69)

### *SIGMAA on Environmental Mathematics Business Meeting*

**5:00 PM – 6:00 PM** **Room 6C, Upper Level, San Diego Convention Center**

### *SIGMAA on Quantitative Literacy Business Meeting*

**5:00 PM – 6:00 PM** **Room 5B, Upper Level, San Diego Convention Center**

### *Reception for Graduate Students and First-Time Participants*

**5:30 PM – 6:30 PM** **Marina Ballroom FG, 3rd Floor, Marriott**

### *Mathematical Institutes Open House: MPE 2013 U.S. Launch*

**5:30 PM – 8:00 PM** **San Diego Ballroom B, Lobby Level, Marriott**

### *AMS Josiah Willard Gibbs Lecture*

**8:30 PM – 9:30 PM** **Room 6AB, Upper Level, San Diego Convention Center**

(674) *On disorder, mixing, and equilibration.* **Cedric Villani**, Institut Henri Poincaré (1086-35-6)

# Thursday, January 10

### *Joint Meetings Registration*

**7:30 AM – 4:00 PM** **Exhibit Hall B1, Ground Level, San Diego Convention Center**

### *AMS Special Session on Quantum Walks and Related Topics, I*

**7:30 AM – 11:50 AM** **Room 32A, Upper Level, San Diego Convention Center**

Organizers: **Yusuke Ide**, Kanagawa University
**Chaobin Liu**, Bowie State University
**Nelson Petulante**, Bowie State University
**Salvador E. Venegas-Andraca**, Tecnológico de Monterrey, Campus Estado de México

7:30AM (675) *Universal computation by multi-particle quantum walk.* **Andrew M Childs**, **David Gosset***, Institute for Quantum Computing and Dept. of Combinatorics and Optimization, University of Waterloo, and **Zak Webb**, Institute for Quantum Computing and Dept. of Physics & Astronomy, University of Waterloo (1086-68-757)

8:30AM (676) *Spectral analysis of state and site recurrence for discrete unitary evolutions.* Preliminary report. **Jean Bourgain**, Institute for Advanced Studies, Princeton, **F. Alberto Grunbaum***, UC Berkeley, **Luis Velazquez**, Universidad de Zaragoza, **Albert Werner**, Institute for Theoretical Physics, **Reinhad Werner**, Institute for Theoretical Physics, Leibnitz University, and **Jon Wilkening**, UC Berkeley (1086-81-1189)

9:30AM ► (677) *Quantum walk-based Mathematical Morphology Operators.* Preliminary report. **S E Venegas-Andraca**, Tecnologico de Monterrey (1086-68-1687)

10:00AM (678) *Group Theoretic Analysis of Relativistic Quantum Walks.* Preliminary report. **Marco Lanzagorta**, US Naval Research Laboratory (1086-81-2445)

10:30AM (679) *Quantum random walks with open decoherence.* Preliminary report. **Matthew Largo**, Temple University, **Sheng Xiong***, University of Pittsburgh, and **Wei-Shih Yang**, Temple University (1086-81-1459)

11:00AM (680) *Limit distributions of quantum walks and 2nd order linear ordinary differential equations.* **Takuya Machida**, Meiji University (1086-81-679)

11:30AM (681) *Asymptotic Behavior of Unitary Quantum Walks on the Half Line.* Preliminary report. **Chaobin Liu*** and **Nelson Petulante**, Bowie State University (1086-81-1157)

### *AMS-SIAM Special Session on the Mathematics of Computation: Differential Equations, Linear Algebra, and Applications, II*

**8:00 AM – 11:50 AM** **Room 31C, Upper Level, San Diego Convention Center**

Organizers: **Susanne C. Brenner**, Louisiana State University
**Chi-Wang Shu**, Brown University

8:00AM ► (682) *Solving Planar Elasticity Interface Problems with Cartesian Meshes.* **Xu Zhang**, Virginia Tech (1086-65-814)

8:30AM (683) *3D Maxwell equations on Exterior Problem.* **Lina Ma**, Purdue University (1086-65-2497)

9:00AM (684) *Left and right preconditioning for Electrical Impedance Tomography with structural information.* **Daniela Calvetti**, **Debra McGivney*** and **Erkki Somersalo**, Case Western Reserve University (1086-65-1255)

9:30AM (685) *MPGMRES: a generalized minimum residual method with multiple preconditioners.* **Chen Greif**, Department of Computer Science, University of British Columbia, **Tyrone Rees**, STFC Rutherford Appleton Laboratory, and **Daniel B Szyld***, Temple University (1086-65-1525)

10:00AM (686) *Discontinuous Galerkin method for hyperbolic equations involving $\delta$-functions.* **Y. Yang*** and **C.-W. Shu**, Brown University (1086-65-723)

10:30AM (687) *Discontinuous Galerkin method for the $M_1$ moment closure model for radiative transfer.* **Prince Chidyagwai***, **Benjamin Seibold**, Temple University, **Martin Frank** and **Philipp Monreal**, Aachen University, Germany (1086-65-1763)

11:00AM (688) *Hybridizable Discontinuous Galerkin Methods for a Naghdi-type arch model.* **Li Fan***, **Fatih Celiker** and **Zhimin Zhang**, Wayne State University (1086-65-1050)

11:30AM ► (689) *Guaranteed Automatic Algorithms for Integration and Function Recovery.* **Fred J. Hickernell**, Illinois Institute of Technology (1086-65-612)

### *AMS-ASL Special Session on Effective Algebra and Model Theory, II*

**8:00 AM – 11:50 AM** **Room 7B, Upper Level, San Diego Convention Center**

Organizers: **Sam Buss**, University of California, San Diego
**Mia Minnes**, University of California, San Diego
**Jeff Remmel**, University of California, San Diego

8:00AM ► (690) *Uses of index set calculations.* **Julia F. Knight**, University of Notre Dame (1086-03-1037)

8:30AM (691) *Homogeneous Models and Weak Combinatorial Principles I.* Preliminary report. **Denis R. Hirschfeldt**, University of Chicago, **Karen Lange**, Wellesley College, and **Richard A. Shore***, Cornell University (1086-03-1570)

9:00AM (692) *Homogeneous Models and Weak Combinatorial Principles II.* Preliminary report. **Denis R. Hirschfeldt***, University of Chicago, **Karen Lange**, Wellesley College, and **Richard A. Shore**, Cornell University (1086-03-2041)

9:30AM (693) *A Feiner Look at the Intermediate Degrees.* **Denis R. Hirschfeldt**, University of Chicago, **Asher M. Kach***, Google Inc., and **Antonio Montalban**, The University of California, Berkeley (1086-03-2576)

10:00AM (694) *Lowness for isomorphism.* **Johanna N. Y. Franklin*** and **Reed Solomon**, University of Connecticut (1086-03-2281)

10:30AM (695) *Recursive spectra of strongly minimal theories satisfying the Zilber trichotomy.* **Uri Andrews***, University of Wisconsin, Madison, and **Alice Medvedev**, University of California, Berkeley (1086-03-2132)

11:00AM ► (696) *Autostability relative to decidable representations.* **Sergey S. Goncharov**, Novosibirsk state university, IM SB RAS (1086-03-892)

11:30AM (697) *Effective Two-to-One Structures.* Preliminary report. **Douglas Cenzer***, University of Florida, **Valentina Harizanov**, George Washington University, and **Jeffrey B. Remmel**, University of California – San Diego (1086-03-327)

### *AMS Special Session on Arithmetic Statistics, I (a Mathematics Research Communities session)*

**8:00 AM – 11:50 AM** **Room 31A, Upper Level, San Diego Convention Center**

Organizers: **Kevin McGown**, Ursinus College
**Jennifer Balakrishnan**, Harvard University
**Ethan Smith**, Liberty University

8:00AM (698) *Low-lying zeros of GL(2) L-functions.* **Steven J Miller**, Williams College (1086-11-534)

8:30AM (699) *Subconvexity and equidistribution of Heegner points in the level aspect.* **Sheng-Chi Liu***, **Riad Masri** and **Matt Young**, Texas A&M University (1086-11-153)

9:00AM (700) *Elliptic curves with prescribed groups over finite fields.* **Vorropan Chandee**, CRM, Montreal, **Chantal David***, Concordia University, **Dimitris Koukoulopoulos**, University of Montreal, and **Ethan Smith**, Michigan Tech (1086-11-685)

9:30AM Break

10:00AM (701) *Applications of Explicit Moduli Spaces and Geometry of Numbers.* Preliminary report. **Wei Ho**, Columbia University (1086-11-1225)

10:30AM (702) *A symmetric version of Chabauty's method on families of hyperelliptic curves.* **Jennifer Park**, Massachusetts Institute of Technology (1086-11-1957)

11:00AM ► (703) *Elliptic curves over Q(sqrt(5)).* Preliminary report. **William A Stein**, University of Washington (1086-11-2307)

11:30AM (704) *Arithmetic statistics of central zeroes of $L$-functions of the symmetric $n$-th powers of a given automorphic form.* **Barry C Mazur**, Harvard University (1086-11-1458)

## *AMS Special Session on Arithmetic Theory of Quadratic Forms and Lattices, I*

**8:00 AM – 11:50 AM** **Room 14B, Mezzanine Level, San Diego Convention Center**

Organizers: **Wai Kiu Chan**, Wesleyan University

**Lenny Fukshansky**, Claremont McKenna College

8:00AM ► (705) *Semistability of Root Lattices And Perfect Lattices.* **Youngsoo Kim**, Tuskegee University (1086-11-658)

8:30AM ► (706) *Group schemes and local densities of quadratic lattices in residue characteristic 2.* **Sungmun Cho**, Northeastern University (1086-11-437)

9:00AM (707) *Unimodular lattices.* Preliminary report. **Larry J. Gerstein**, University of California, Santa Barbara (1086-11-486)

9:30AM (708) *Well-Rounded Ideal Lattices.* **Lenny Fukshansky**, Claremont McKenna College, and **Kathleen Petersen***, Florida State (1086-11-569)

10:00AM (709) *On integral and ideal well-rounded lattices.* **Lenny Fukshansky**, Claremont McKenna College, **Glenn Henshaw**, California State University - Channel Islands, **Philip Liao**, Claremont McKenna College, **Matthew Prince**, Harvey Mudd College, **Xun Sun***, Claremont Graduate University, and **Samuel Whitehead**, Pomona College (1086-11-787)

10:30AM (710) *Lattice-theoretic methods in spectral geometry.* **Benjamin Linowitz**, University of Michigan (1086-11-111)

11:00AM (711) *Discriminants and the monoid of quadratic rings.* **John Voight**, University of Vermont (1086-11-1234)

11:30AM ► (712) *Metacommutation of Hurwitz primes.* **Abhinav Kumar***, Massachusetts Institute of Technology, and **Henry Cohn**, Microsoft Research New England (1086-11-1962)

## *AMS Special Session on Arithmetic and Ideal Theory of Integral Domains and Monoids, II*

**8:00 AM – 11:50 AM** **Room 15A, Mezzanine Level, San Diego Convention Center**

Organizers: **Scott T. Chapman**, Sam Houston State University

**Vadim Ponomarenko**, San Diego State University

8:00AM ► (713) *Local and global tameness in Krull monoids.* **Alfred Geroldinger**, University of Graz, Austria (1086-20-1024)

8:30AM (714) *Atomicity and Near Atomicity.* **Jim Coykendall**, North Dakota State University (1086-13-1628)

9:00AM (715) *The Large Davenport Constant for Non-Abelian Groups.* **David J. Grynkiewicz*** and **Alfred Geroldinger**, Karl-Franzens-Universität Graz (1086-11-641)

9:30AM (716) *Numerical Semigroups, $t$-core Partitions, and Weighted Theta Functions.* **Nathan Kaplan*** and **Noam Elkies**, Harvard University (1086-11-2024)

10:00AM (717) *Bounding some constants in quantitative non-unique factorization theory via coding theory, and generalizations.* **Wolfgang A Schmid**, LAGA / Université Paris 8 (1086-11-800)

10:30AM (718) *Full Elasticity in Atomic Monoids.* Preliminary report. **Paul Baginski**, Smith College (1086-13-1647)

11:00AM (719) *LMS-complete subsets of $\mathbb{Z}$.* **George J. Schaeffer**, UCLA (1086-08-1485)

11:30AM ► (720) *Arithmetic of Congruence Monoids.* **Arielle Fujiwara**, Roosevelt University, **Joseph Gibson**, University of Texas at San Antonio, **Matthew Jenssen**, University of Cambridge, **Daniel Montealegre**, University of California at Los Angeles, **Vadim Ponomarenko***, San Diego State University, and **Ari Tenzer**, Washington University in St. Louis (1086-20-1835)

### *AMS Special Session on Creating a Professional Community of Math Teachers K–20, I*

**8:00 AM – 11:50 AM** **Room 32B, Upper Level, San Diego Convention Center**

Organizers: **Patrick Callahan**, University of California Los Angeles

**William McCallum**, University of Arizona

**Kristin Umland**, University of New Mexico

8:00AM ► (721) *Quality Problems Through Collaboration.* Preliminary report. **Ben McCarty**, University of Memphis (1086-97-2013)

8:30AM (722) *Creating a professional community of mathematics teachers.* **Al Cuoco**, Center for Mathematics Education, EDC (1086-97-1213)

9:00AM ► (723) *Working with K-12 teachers changes our practice.* Preliminary report. **Ben Ford**, **Brigitte Lahme*** and **Katherine Morris**, Sonoma State University (1086-97-2062)

9:30AM ► (724) *Collaboration Among Mathematicians, Mathematics Educators, K-12 Teachers and K-12 Mathematics Supervisors in Virginia.* Preliminary report. **Bill Haver**, Virginia Commonwealth University (1086-97-1746)

10:00AM (725) *The Mathematics Teaching Community.* **Sybilla Beckmann*** and **Jacob Hicks**, University of Georgia (1086-97-2464)

10:30AM (726) *Northwest Mathematics Interaction: Two Decades of Math Learning and Sharing.* **James R King**, University of Washington (1086-97-2610)

11:00AM ► (727) *Mathematicasl Knowledge for Teaching.* **Hyman Bass**, University of Michigan (1086-97-1564)

11:30AM ► (728) *Geometry, the Common core, and Proof.* Preliminary report. **John T Baldwin***, University of Illinois at Chicago, and **Andreas N Mueller**, Curie High School Chicago IL (1086-97-818)

### *AMS Special Session on Discrete and Computational Geometry, I (a Mathematics Research Communities session)*

**8:00 AM – 11:50 AM** **Room 30C, Upper Level, San Diego Convention Center**

Organizers: **Emilie Hogan**, Pacific Northwest National Laboratory

**Elizabeth Munch**, Duke University

**Louis Theran**, Freie Universität

**Russ Thompson**, Texas A&M University

8:00AM TALK ADDED: An introduction to Euler Calculus, Robert Ghrist, Departments of Mathematics and Electrical/Systems Engineering, University of Pennsylvania.

8:00AM (729) *TALK CANCELLED: Topology, Geometry and Statistics: Merging Methods for Data Analysis.* Preliminary report. **John L Harer**, Duke University (1086-57-832)

9:00AM (730) *Probability measures on the space of persistence diagrams.* **Yuriy Mileyko***, University of Illinois at Urbana-Champaign, **Sayan Mukherjee**, Duke University, **Katharine Turner**, University of Chicago, and **John Harer**, Duke University (1086-55-1789)

9:30AM (731) *A Method for Collapsing Loops in Reeb Graphs of Noisy Data.* Preliminary report. **Eric Hanson***, Colorado State University, **Elizabeth Munch**, Duke University, and **Russ Thompson**, Texas A&M University (1086-54-1688)

10:00AM (732) *TALK CANCELLED: Features Reconstruction Gets Help From Unlikely Sources: Graph Laplacian and Reeb Graph.* **Issam I. Safa**, Ohio State University (1086-52-1464)

10:30AM ► (733) *Triangulation problems.* Preliminary report. **Igor Pak**, Los Angeles (1086-52-560)

11:30AM (734) *Tetrahedron Contact Graphs.* Preliminary report. **Md. Jawaherul Alam***, University of Arizona, **James R. Ashe**, University of Tennessee, **Michael Dobbins**, KAIST, **Muriel Dulieu**, Polytechnic Institute of New York University, and **Justin Iwerks**, Stony Brook University (1086-52-2058)

### *AMS Special Session on Environmental Mathematics: Evaluate the Past Climate Changes and Model the Future Climate Variations, I*

**8:00 AM – 11:50 AM** **Room 9, Upper Level, San Diego Convention Center**

Organizers: **Phillip Arkin**, University of Maryland

**Samuel Shen**, San Diego State University

**Thomas Smith**, University of Maryland

**Guang Zhang**, Scripps Institute of Oceanography, University of California, San Diego

8:00AM (735) *Convection Microphysics and its Interaction with Aerosols and Climate in a Global Climate Model.* **Guang Zhang*** and **Xiaoliang Song**, Scripps Institution of Oceanography (1086-86-2393)

8:30AM ► (736) *Fundamentals of parameter sensitivity in climate models.* **J. David Neelin***, Dept. of Atmospheric and Oceanic Sciences, UCLA, **Mickael Chekroun**, University of Hawaii at Manoa, **Annalisa Bracco**, **Hao Luo**, School of Earth and Atmospheric Sciences, Georgia Institute of Technology, **James C. McWilliams**, **Dmitri Kondrashov**, **Michael Ghil**, **Sandeep Sahany**, Dept. of Atmospheric and Oceanic Sciences, UCLA, and **Richard Neale**, National Center for Atmospheric Research (1086-86-2693)

9:00AM ► (737) *The Skeleton of the Madden-Julian Oscillation: A Nonlinear Oscillator Model.* **Andrew J Majda**, Courant Institute, New York University, and **Samuel N Stechmann***, University of Wisconsin-Madison (1086-86-2453)

9:30AM (738) *Stochastic Differential Equation Modeling of Precipitation in Convection.* **Kimberly D. Leung***, San Diego State University, **Aneesh Subramanian**, **Guang Zhang**, Scripps Institution of Oceanography, and **Samuel Shen**, San Diego State University (1086-86-2488)

10:00AM (739) *Capturing intermittent and low-frequency variability in high-dimensional data through nonlinear Laplacian spectral analysis.* **Dimitrios Giannakis**, Courant Institute of Mathematical Sciences, New York University (1086-86-2493)

10:30AM (740) *Rough parameter dependence in geophysical fluid models: The role of Ruelle resonances.* Preliminary report. **Mickael D. Chekroun***, Department of Atmospheric and Oceanic Sciences, UCLA; & Department of Mathematics, University of Hawaii, **David Neelin**, **Dmitri Kondrashov**, **James McWilliams**, Department of Atmospheric and Oceanic Sciences, UCLA, and **Michael Ghil**, Department of Atmospheric and Oceanic Sciences, UCLA; & CERES-ERTI, Ecole Normale Superieure, Paris (1086-37-2696)

11:00AM ► (741) *Hadley Cell Changes in Today's Climate and Paleoclimates.* **William F. Langford***, University of Guelph, Guelph, ON, Canada, and **Gregory M. Lewis**, University of Ontario Institute of Technology (1086-86-1311)

11:30AM ► (742) *Monsoons and the thermodynamic state of proximal deserts.* **William R. Boos**, Yale University (1086-86-1950)

### *AMS Special Session on Geometric Complexity Theory, I (a Mathematics Research Communities session)*

**8:00 AM – 11:45 AM** **Room 30E, Upper Level, San Diego Convention Center**

Organizers: **Christian Ikenmeyer**, Texas A&M University

**Ryan Kinser**, Northeastern University

8:00AM ► (743) *On the complexity of matrix multiplication.* **J. M. Landsberg**, Texas A&M University (1086-68-404)

9:00AM ► (744) *On the equations of the third secant variety of an n-fold Segre product.* **Yang Qi**, Texas A&M University (1086-14-1866)

9:30AM (745) *Geometric Complexity Theory and Tensor Rank.* Preliminary report. **Christian Ikenmeyer**, University of Paderborn (1086-68-1714)

10:00AM (746) *Kronecker coefficients for one hook shape.* **Jonah Blasiak**, University of Michigan (1086-05-400)

11:00AM (747) *Fourier-Malgrange transform and Kronecker coefficients.* Preliminary report. **Galyna Dobrovolska**, University of Chicago (1086-97-1142)

### *AMS Special Session on Harmonic Analysis, Partial Differential Equations, and Geometric Measure Theory, I (a Mathematics Research Communities session)*

**8:00 AM – 11:50 AM** **Room 30D, Upper Level, San Diego Convention Center**

Organizers: **Theresa Anderson**, Brown University
**Matthew Badger**, Stony Brook University
**Nathan Pennington**, Kansas State University
**Eric Stachura**, Temple University

8:00AM (748) *The Lifespan of Solutions to the Wave Equation in Exterior Domains.* **John A Helms***, University of California, Santa Barbara, and **Jason L Metcalfe**, University of North Carolina at Chapel Hill (1086-35-1263)

8:30AM ► (749) *The Wave Stands Alone: Journey of a Solitary Wave.* **Melissa Davidson**, University of Notre Dame (1086-01-336)

9:00AM (750) *New decay estimates for a class of 1D dispersive PDE and applications to the 2D water wave problem.* Preliminary report. **Jennifer Beichman**, University of Michigan (1086-35-1182)

9:30AM (751) *Sparse Signal Recovery and Remote Sensing.* **Michael F Minner**, Drexel University (1086-15-1911)

10:00AM (752) *Solution Method for Certain Evolution Equations.* Preliminary report. **Jose Manuel Vega-Guzman**, MCMSC/Arizona State University, Tempe (1086-35-728)

10:30AM (753) *Regularity criteria of active scalars in terms of partial derivatives.* **Kazuo Yamazaki**, Oklahoma State University (1086-35-630)

11:00AM (754) *Regularity and stochastic homogenization of fully nonlinear equations without uniform ellipticity.* **Scott Armstrong**, Universite Paris-Dauphine, and **Charles K Smart***, Massachusetts Institute of Technology (1086-35-2769)

11:30AM (755) *Neumann and regularity problems for second order elliptic operators with non-smooth coefficients.* **Jill Pipher**, Brown University (1086-42-556)

### *AMS Special Session on Homotopy Theory and Commutative Algebra, I*

**8:00 AM – 11:50 AM** **Room 16B, Mezzanine Level, San Diego Convention Center**

Organizers: **Julia Bergner**, University of California, Riverside
**Philip Hackney**, University of California, Riverside
**Inês Henriques**, University of California, Riverside

8:00AM (756) *Generalizations of the stable module category.* Preliminary report. **Daniel Bravo**, University of Southern Maine, **James Gillespie**, Ramapo College of New Jersey, and **Mark Hovey***, Wesleyan University (1086-18-597)

8:30AM (757) *Completeness of the Gorenstein projective and injective cotorsion pairs.* **James Gillespie**, Ramapo College (1086-18-2219)

9:00AM (758) *Exceptional Lie Groups, Commutators, and Commutative mod 3 Homology Rings.* Preliminary report. **Nicholas D. Nguyen**, University of California, San Diego (1086-55-2120)

9:30AM (759) *The Third and the Automatic Homotopy Exact Sequence of a Fibration in Module Theory.* **C. Joanna Su**, Providence College (1086-18-1026)

10:00AM (760) *The homotopy theory of coalgebras over a comonad.* **Brooke Shipley***, University of Illinois at Chicago, and **Kathryn Hess**, Ecole Polytechnique Federale de Lausanne (1086-55-981)

10:30AM (761) *Connecting $A_\infty$ and $L_\infty$ Algebras.* Preliminary report. **Melissa M Tolley**, North Carolina State University (1086-17-1248)

11:00AM (762) *On Topological Triangulated Orbit Categories.* **Marcy Robertson***, University of Western Ontario, **Andrew Salch**, Wayne State University, and **Julie Bergner**, University of California Riverside (1086-55-2616)

11:30AM (763) *Configuration spaces and operad actions.* Preliminary report. **William G Dwyer***, University of Notre Dame, and **Kathryn Hess**, EPFL Lausanne (1086-55-1462)

### *AMS Special Session on L-Functions and Arithmetic Geometry, I*

**8:00 AM – 11:50 AM** **Room 15B, Mezzanine Level, San Diego Convention Center**

Organizers: **Alina Bucur**, University of California, San Diego
**Kiran Kedlaya**, University of California, San Diego

8:00AM (764) *Zeros of period polynomials.* **J. Brian Conrey**, American Institute of Mathematics (1086-11-1202)

8:30AM (765) *L-packets and abelian varieties.* Preliminary report. **Jeffrey D Achter***, Colorado State University, and **Clifton Cunningham**, University of Calgary (1086-11-1664)

9:00AM (766) *$p$-adic heights of Heegner points and Heegner $L$-functions.*
**Jennifer S. Balakrishnan***, Harvard University, **Mirela Çiperiani**, University of Texas at Austin, and **William A. Stein**, University of Washington (1086-11-1174)

9:30AM (767) *The trace of Frobenius of elliptic curves and the $p$-adic gamma function.*
**Dermot McCarthy**, Texas A&M University (1086-11-1355)

10:00AM (768) *The $p$-rank of Jacobians of cyclic covers of the projective line.* Preliminary report.
**Ekin Ozman**, University of Texas at Austin, **Rachel Pries***, Colorado State University, and **Colin Weir**, University of Calgary (1086-11-1667)

10:30AM (769) *Distribution of zeta zeroes of Artin–Schreier curves.*
**Alina Bucur**, University of California, San Diego, **Chantal David**, Concordia University, **Brooke Feigon**, Citi College of New York, CUNY, **Matilde Lalin***, University of Montreal, and **Kaneenika Sinha**, IISER Kolkata (1086-11-466)

11:00AM (770) *Semiample Bertini Theorems over finite fields.*
**Daniel Erman***, University of Michigan, and **Melanie Matchett Wood**, University of Wisconsin (1086-14-472)

11:30AM (771) *Explicit points on a family of Jacobians of superelliptic curves over global function fields.* Preliminary report.
**Lisa Berger**, SUNY, Stony Brook, **Chris Hall**, University of Wyoming, **René Pannekoek**, University of Leiden, **Jennifer Park**, MIT, **Rachel Pries**, Colorado State University, **Shahed Sharif**, California State University San Marcos, **Alice Silverberg***, University of California, Irvine, and **Douglas Ulmer**, Georgia Institute of Technology (1086-11-525)

## *AMS Special Session on Lie Algebras, Algebraic Transformation Groups, and Representation Theory, II*

**8:00 AM – 11:50 AM** **Room 17A, Mezzanine Level, San Diego Convention Center**

Organizers: **Andrew Douglas**, City University of New York
**Alistair Savage**, University of Ottawa
**Bart Van Steirteghem**, City University of New York

8:00AM (772) *From skew Howe duality to knot invariants.*
**Aaron D Lauda**, University of Southern California (1086-16-585)

8:30AM (773) *The categorified super-Poincaré group.*
**John Huerta**, Instituto Superior Tecnico, Lisbon (1086-20-1310)

9:00AM (774) *Finite dimensional representations of KLR algebras.*
**Peter J McNamara**, Stanford University (1086-16-98)

9:30AM (775) *TALK CANCELLED: The representation theory of Hecke algebra via infinite twists.*
**Sabin Cautis**, University of Southern California (1086-16-665)

10:00AM (776) *Principal subspaces of standard modules for twisted affine Lie algebras.*
**Corina Calinescu***, CUNY, New York City College of Technology, **James Lepowsky**, Rutgers University, and **Antun Milas**, University at Albany (SUNY) (1086-17-1573)

10:30AM (777) *The Trotter property and differentiable vectors of continuous representations.*
**Karl-Hermann Neeb**, University of Erlangen-Nuremberg, and **Hadi Salmasian***, University of Ottawa (1086-22-313)

11:00AM (778) *TALK CANCELLED: Real semisimple subalgebras.*
**Andrey Minchenko**, Hebrew University of Jerusalem (1086-22-1120)

11:00AM (779) *The symplectic nature of $E_7$.* Preliminary report.
**Tevian Dray***, Oregon State University, **John Huerta**, The Australian National University, **Corinne A. Manogue**, Oregon State University, and **Robert A. Wilson**, Queen Mary University of London (1086-17-2397)

11:30AM (780) *Exceptional collections of line bundles on projective homogeneous varieties.*
**Alexey Ananyevskiy**, St. Petersburg State University, Russia, **Asher Auel**, **Skip Garibaldi***, Emory University, and **Kirill Zainoulline**, University of Ottawa (1086-14-428)

## *AMS Special Session on Several Complex Variables and Multivariable Operator Theory, I*

**8:00 AM – 11:50 AM** **Room 16A, Mezzanine Level, San Diego Convention Center**

Organizers: **Joseph Ball**, Virginia Tech University
**Ronald Douglas**, Texas A&M University

8:00AM (781) *Polynomials with no zeros on a face of the bidisk.* Preliminary report.
**Greg Knese***, University of Alabama, **Jeffrey S Geronimo** and **Plamen Iliev**, Georgia Institute of Technology (1086-32-1948)

8:30AM (782) *Regular and singular rational inner functions on the bidisc.* Preliminary report.
**David Scheinker**, Drexel University (1086-32-2112)

9:00AM (783) *Inner Functions on the Bidisk and Associated Hilbert Spaces.*
**Kelly Bickel**, Washington University in St. Louis (1086-46-1099)

9:30AM ► (784) *Norm-Constrained Determinantal Representations of Multivariable Polynomials.*
**Anatolii Grinshpan**, **Dmitry S Kaliuzhnyi-Verbovetskyi** and **Hugo J Woerdeman***, Drexel University (1086-47-1129)

10:00AM (785) *Generalized models and slope functions for the Schur class of the bidisc.*
**Nicholas Young**, Newcastle and Leeds Universities (1086-47-853)

10:30AM (786) *Nevanlinna Representations in Several Variables.*
**Jim Agler**, University of California at San Diego (1086-47-1712)

11:00AM (787) *Perturbation of operator functions.*
**Anna Skripka**, University of New Mexico (1086-47-1308)

11:30AM (788) *C*-algebras generated by truncated Toeplitz operators.*
**Stephan Ramon Garcia**, Pomona College (1086-47-1412)

## *AMS Special Session on Witt Vectors, Lifting and Descent, I*

**8:00 AM – 11:50 AM** **Room 14A, Mezzanine Level, San Diego Convention Center**

Organizers: **James Borger**, Australia National University
**Alexandru Buium**, University of New Mexico
**Taylor Dupuy**, University of New Mexico
**Lance Miller**, University of Utah

8:00AM (789) *Fields of Definition of G-Galois Branched Covers of the Projective Line.*
**Hilaf Hasson**, Pennsylvania State University (1086-14-2037)

8:30AM (790) *Geometrizing quasi-characters of tori.*
**Clifton Cunningham**, University of Calgary, and **David Roe***, PIMS/University of Calgary (1086-11-2646)

9:00AM (791) *Differential Modular forms and Hecke Operators.*
**Arnab Saha**, Australian National University (1086-11-1516)

9:30AM (792) *The Oort conjecture on lifting covers of curves.*
**Andrew Obus**, Columbia University (1086-14-843)

10:00AM (793) *Liftings of Elliptic and Hyperelliptic Curves.*
**Luis Finotti**, University of Tennessee (1086-11-1039)

10:30AM (794) *Derived Invariants of Calabi-Yau Threefolds in Positive Characteristic.*
**Matthew Ward**, University of Washington (1086-14-150)

11:00AM (795) *A Torsor of Lifts of The Frobenius (in characteristic zero).*
**Taylor Dupuy**, University of New Mexico (1086-11-2172)

11:30AM (796) *Witt-Burnside rings and rings of p-adic functions.* Preliminary report.
**Lance Edward Miller***, University of Utah, and **Benjamin Steinhurst**, Cornell (1086-11-1347)

## *AMS Special Session on the Influence of Ramanujan on his 125th Birthday, I*

**8:00 AM – 11:50 AM** **Room 8, Upper Level, San Diego Convention Center**

Organizers: **George Andrews**, Pennsylvania State University
**Bruce Berndt**, University of Illinois Urbana-Champaign
**Ae Ja Yee**, Pennsylvania State University

8:00AM ► (797) *Ramanujan and Moonshine and topology.*
**Andreas Malmendier**, Colby College, and **Ken Ono***, Emory University (1086-11-1828)

8:30AM ► (798) *q-series and quantum modular forms.*
**Robert C. Rhoades**, Stanford University (1086-11-2401)

9:00AM ► (799) *The odd moments of ranks and cranks.*
**George E Andrews**, The Pennsylvania State University, **Song Heng Chan***, Nanyang Technological University, and **Byungchan Kim**, Seoul National University of Science and Technology (1086-11-2177)

9:30AM (800) *Asymptotic inequalities for positive rank and crank moments.*
**Karl Mahlburg***, Louisiana State University, and **Kathrin Bringmann**, University of Cologne (1086-11-1951)

10:00AM ► (801) *Rank-Crank-type PDEs and generalized Lambert series identities.*
**Song Heng Chan**, Nanyang Technological University, **Atul Abhay Dixit***, Tulane University, and **Frank G. Garvan**, University of Florida, Gainesville (1086-11-1302)

10:30AM ► (802) *Automatic Proof of Theta-Function Identities.* Preliminary report.
**Frank Garvan** and **Jie L Liang***, University of Florida (1086-11-1518)

11:00AM (803) *Elliptic parameterizations for partition generating functions.*
**Tim Huber*** and **James Lloyd**, University of Texas - Pan American (1086-11-1619)

11:30AM ► (804) *Rademacher's infinite partial fractions conjecture is (almost certainly) false.*
**Andrew V. Sills***, Georgia Southern University, and **Doron Zeilberger**, Rutgers University (1086-11-582)

### *AMS Special Session on the Mathematics of Natural Resource Modeling, I*

**8:00 AM – 11:50 AM** **Room 17B, Mezzanine Level, San Diego Convention Center**

Organizers: **Shandelle Henson**, Andrews University
**Catherine A. Roberts**, College of the Holy Cross

8:00AM ► (805) *A basic model for the evolutionarily adaptive dynamics of a population subject to a strong Allee effect.*
**Jim M. Cushing***, Interdisciplinary Program in Applied Mathematics, University of Arizona, and **Jarred T. Hudson**, University of Arizona (1086-92-1471)

8:30AM ► (806) *Mathematical Analysis of Ecotone Resilience.*
**Jiang Jiang**, National Institute for Mathematical and Biological Synthesis, **Daozhou Gao**, Proctor Foundation, and **Donald L. DeAngelis***, Department of Biology, University of Miami (1086-92-1444)

9:00AM ► (807) *Host-pathogen interactions, induced plant defenses, and insect outbreaks.* Preliminary report.
**Bret D Elderd**, Dept of Biology, Louisiana State University, **Brian Rehill**, Dept of Chemistry, US Naval Academy, **Kyle Haynes**, Blandy Experimental Farm, University of Virginia, and **Greg Dwyer***, Dept of Ecology and Evolution, University of Chicago (1086-92-1452)

9:30AM ► (808) *Temporal Dynamics of Galapagos Marine Iguana (Amblyrhynchus cristatus)haulout.* Preliminary report.
**Brianna G. Payne***, Union College, **Shandelle M. Henson**, **James L. Hayward**, **Libby C. Megna**, Andrews University, and **Susana R. Velastegui Chavez**, Colegio Adventista del Ecuador (1086-92-2076)

10:00AM (809) *Optimal investment in a multi-mutualist system: Trees and ectomycorrhizal fungi.*
**Holly V Moeller***, Department of Biology, Stanford University, and **Michael G Neubert**, Department of Biology, Woods Hole Oceanographic Institution (1086-92-1753)

10:30AM ► (810) *Applications to wildfire and fire fuels management in forest landscape-level planning.* Preliminary report.
**Claire A Montgomery**, Oregon State University, College of Forestry, Corvallis, OR USA (1086-90-1285)

11:00AM (811) *A spatial model for chronic wasting disease in mule deer.*
**M. J. Garlick***, South Dakota School of Mines and Technology, **J. A. Powell**, **M. B. Hooten**, Utah State University, and **L. R. McFarlane**, Utah Division of Wildlife Resources (1086-92-1979)

11:30AM ► (812) *Features of biologically realistic fishery models frequently used in fish stock assessment.*
**Terrance J. Quinn**, Juneau Center, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks (1086-92-1295)

### *MAA-AMS-SIAM Invited Paper Session on Energy, Population, and Sustainability, I*

**8:00 AM – 11:40 AM** **Room 6C, Upper Level, San Diego Convention Center**

Organizers: **Ben Fusaro**, Florida State University
**Fred Roberts**, Center for Discrete Mathematics and Theoretical Computer Science, Rutgers University

8:00AM (813) *Measurement of Biodiversity.*
**Fred Roberts**, Rutgers University (1086-AC-1251)

8:45AM ► (814) *Impact of host demographic Allee effect, fatal disease and migration on biodiversity.*
**Abdul-Aziz Yakubu***, Howard University, and **Avner Friedman**, The Ohio State University (1086-AC-1075)

9:30AM ► (815) *The Malthusian Challenge – Increasing Human Demands vs Decreasing Resources.*
**Ben Fusaro**, Florida State University (1086-AC-1663)

10:15AM ► (816) *Sustainability and the Crisis in World Fisheries.*
**Roland Lamberson**, Humboldt State University, CA (1086-AC-1432)

11:00AM ► (817) *Overpopulation: A Central Factor in the Prospective Collapse of Civilization.*
**Paul R. Ehrlich**, Center for Conservation Biology, Stanford University (1086-AC-1309)

### *MAA Invited Paper Session on Mathematics in Industry*

**8:00 AM – 11:50 PM** **Room 2, Upper Level, San Diego Convention Center**

Organizer: **Suzanne Weekes**, Worcester Polytechnic Institute

8:00AM (818) *A Homogenization Analysis of the Compressible Flow Between a Slider and a Moving Rough Surface.*
**B. S. Tilley***, Worcester Polytechnic Institute, **D. W. Schwendeman**, Rensselaer Polytechnic Institute, **C. P. Please**, University of Southampton, and **F. Hendriks**, HGST, a Western Digital Company (1086-AE-573)

8:40AM ► (819) *The Role of Analytics in Ford's Blueprint for Sustainability.*
**Erica Klampfl**, Ford Motor Company (1086-AE-1952)

9:20AM ► (820) *Getting Math Off the Ground: Applied Mathematics at Boeing.*
**Stephen P. Keeler**, The Boeing Company (1086-AE-1169)

10:00AM ► (821) *Mathematics and Statistics in Drug Development.*
**Helen Moore**, Pharsight (1086-AE-2886)

10:40AM ► (822) *Graph Algorithms in MapReduce to Characterize Billion-Node Power Law Networks.* Preliminary report.
**Todd Plantenga**, Sandia National Laboratories (1086-AE-984)

11:20AM Discussion.

11:20AM ► (823) *Weapons of math destruction.* Preliminary report.
**Catherine Helen O'Neil**, Data Scientist, New York City (1086-AE-2953)

## *AMS Session on Mathematical Biology*

**8:00 AM – 11:55 AM** **Room 13, Mezzanine Level, San Diego Convention Center**

8:00AM ► (824) *TALK CANCELLED: Numerical Evidence for Sustaining Normal Intracellular Calcium Oscillations by Store-Operated Calcium Entry Alone in Pancreatic β-Cells.* Preliminary report.
**Weijiu Liu**, University of Central Arkansas (1086-92-316)

8:00AM ► (825) *A Dynamical Model for the Human Menstrual Cycle that Simulates the Key Hormonal Changes of the Menopausal Transition.*
**Alison Margolskee*** and **James Selgrade**, North Carolina State University (1086-92-2098)

8:15AM ► (826) *Foam cell formation in atherosclerosis: HDL and macrophage reverse cholesterol transport.* Preliminary report.
**L R Ritter**, Southern Polytechnic State University (1086-92-488)

8:30AM (827) *A Mathematical Model of the Effects of Growth and Remodeling on the Artery in a Hypertensive State.*
**Maya Elise Johnson**, Texas A&M University (1086-49-1872)

8:45AM ► (828) *Agent-based modeling of strain-induced lung inflammation.*
**Patrick Gaskill***, **Rebecca Heise**, **Ramana Pidaparti** and **Angela Reynolds**, Virginia Commonwealth University (1086-92-2612)

9:00AM (829) *An Optimal Control Approach for Modeling the Response to Head-Up Tilt.* Preliminary report.
**Nakeya D Williams***, **Mette S Olufsen**, **Hien Tran**, North Carolina State University, and **Jesper Mehlsen**, Frederiksberg University Hospital, Denmark (1086-92-1005)

9:15AM (830) *A Numerical Study and Stability Analysis of a Model for In Vitro Inhibition of Cancer Cell Mutation.* Preliminary report.
**Muhammad Usman***, **Giacomo Flora** and **Christopher Yakopcic**, University of Dayton (1086-65-2096)

9:30AM (831) *Coupled Flip-flops: Noise and Analysis for a Sleep-wake Cycle Model.*
**Justin R. Dunmyre*** and **Victoria Booth**, University of Michigan (1086-92-1514)

9:45AM (832) *A Mathematical Model of the Sleep/Wake Regulatory System.* Preliminary report.
**Lisa Rogers**, Courant Institute of Mathematical Sciences (1086-92-1989)

10:00AM ► (833) *Is our Sensing Compressed?*
**Victor Barranca**, Rensselaer Polytechnic Institute (1086-92-869)

10:15AM ► (834) *Dynamics of a Conductance-based Neuronal Network Model of Olfaction in Drosophila.*
**Dori Luli*** and **Sharon M Crook**, Arizona State University (1086-92-2031)

10:30AM ► (835) *Modelling musth and mate choice in an African elephant.*
**Tugba Yildirim*** and **Mike Mesterton-Gibbons**, Florida State University (1086-91-1863)

10:45AM ► (836) *Use of the heat kernel to establish naturals maps between anatomical surface models.*
**Jonathan R. Bates**, Florida State University (1086-92-2671)

11:00AM (837) *Applying Mathematical Tools to Accelerate Shigella Vaccine Development.*
**Courtney L Davis***, Pepperdine University, **Rezwanul Wahid**, **Franklin R Toapanta**, **Marcelo B Sztein**, Center for Vaccine Development, University of Maryland, and **Doron Levy**, Center for Scientific Computation and Mathematical Modeling, University of Maryland (1086-92-2530)

11:15AM (838) *A mathematical Model for the Spread of the West Nile Virus in Colorado.* Preliminary report.
**Ana Vivas-Barber***, Adams State University, and **Sunmi Lee**, Case Western Reserve University (1086-37-2592)

11:30AM (839) *Impact of temperature and bird species diversity on the transmission of West Nile virus.*
**Guihong Fan**, Arizona State University (1086-39-2209)

11:45AM (840) *Mathematical Models of Nutrient Recycling and Toxin Production in a Gradostat.*
**Xiaoyang Dong***, **Hristo Kojouharov**, University of Texas at Arlington, and **James Grover**, Department of Biology, University of Texas at Arlington (1086-92-1155)

### *AMS Session on Special Functions and Ordinary Differential Equations*

**8:00 AM – 11:55 AM** **Room 18, Mezzanine Level, San Diego Convention Center**

8:00AM ► (841) *Reality of zeros of the coefficient polynomials of Hermite-diagonal operators.* Preliminary report.
**Tamas Forgacs***, California State University, Fresno, and **Andrzej Piotrowski**, University of Alaska Southeast (1086-30-1233)

8:15AM Discussion

8:15AM ► (842) *TALK CANCELLED On The Differential Operator Representation of Linear Operators Which Are Diagonal With Respect To Legendre Basis.* Preliminary report.
**Hagop Karakazian*** and **Tamas Forgacs**, California State University, Fresno (1086-30-750)

8:30AM (843) *On the structure of a class of Invariant Kernels.*
**Troy Banks**, Salisbury University (1086-15-2873)

8:45AM ► (844) *Characterizing the General Sheffer Orthogonal Polynomial Sequences.* Preliminary report.
**Daniel Joseph Galiffa**, Penn State Erie (1086-33-2082)

9:00AM (845) *New series representations for Jacobi's triple product identity and more via the q-Markov method.*
**Moa Apagodu**, Virginia Commonwealth University (1086-05-1441)

9:15AM (846) *A New Algorithm on Hypergeometric Summations and Recursions on Wigner's 6 j-Symbols.* Preliminary report.
**Xinyu Sun**, Xavier University of Louisiana (1086-05-865)

9:30AM (847) *A differential theorem and its application to evaluations of special functions at some singularities.*
**Hoang Ngoc Minh***, University Lille 2, and **Gérard H.E. Duchamp**, University Paris 13 (1086-05-393)

9:45AM ► (848) *Power Series, Automatic Differentiation and Differential Equations.*
**R. Thelwell**, James Madison University (1086-34-1709)

10:00AM ► (849) *Slow passage through resonance: the big picture.* Preliminary report.
**Bruno D. Welfert*** and **Juan M. Lopez**, Arizona State University (1086-34-2360)

10:15AM (850) *First-order nonlinear nonlocal boundary value problem with p-Laplacian.*
**Douglas R. Anderson**, Concordia College Moorhead (1086-34-369)

10:30AM (851) *Asymptotic behavior of solutions of a BVP arising from fluid mechanics.*
**Susmita Sadhu***, Georgia College & State University, and **Joseph E Paullet**, Pennsylvania State University at Erie (1086-34-2499)

10:45AM (852) *On the solvability on nonlinear impulsive boundary value problems at resonance.*
**Dan M Maroncelli*** and **Jesus Rodriguez**, North Carolina State University (1086-34-2331)

11:00AM ► (853) *Stability of Impulsive Functional Differential Equations.*
**Dilbaj Singh***, Lovely Professional University, Punjab, India., and **Dr. Sanjay Kumar Srivastava**, Beant College of Engineering and Technology, Gurdaspur, Punjab, INDIA. (1086-34-626)

11:15AM (854) *Asymptotic Behavior of Orbits of Kolmogorov Type Planar Vector Fields with a Fixed Newton Polygon.*
**Faina Berezovskaya**, Howard University (1086-34-1639)

11:30AM (855) *Damping/Dissipative Forces having Finite-Time Dynamics.*
**Ronald E Mickens***, Clark Atlanta University, and **Tre Wells**, Morehouse College (1086-34-280)

11:45AM ► (856) *An Exact Solution to the Linear Plus One-third Amplitude Damping Problem.*
**Tre Wells***, Morehouse College, and **Ronald E Mickens**, Clark Atlanta University (1086-34-278)

### *AMS Session on Waves, Fluid Dynamics and Heat Transfer*

**8:00 AM – 11:25 AM** **Room 12, Mezzanine Level, San Diego Convention Center**

8:00AM ► (857) *Mathematical Modeling of Hurricanes and Atmospheric & Oceanic Whirlpools by Means of Linear and Nonlinear Internal Kelvin Waves Confined in Cylindrical Basins.*
**Ranis N Ibragimov**, University of Texas at Brownsville (1086-35-331)

8:15AM (858) *Orbital stability of standing-waves by means of the symmetric rearrangement.*
**Daniele Garrisi**, Inha University (1086-35-1710)

8:30AM (859) *Pitch-fork bifurcation of a steady-state Poisson-Nernst-Planck systems for ion channels with permanent charge: Multiple I-V relations.*
**Weishi Liu**, **Xuemin Tu** and **Mingji Zhang***, University of Kansas (1086-35-530)

8:45AM (860) *Regularity and uniqueness for a class of solutions to the hydrodynamic flow of nematic liquid crystals.*
**Tao Huang*** and **Changyou Wang**, University of Kentucky (1086-35-1740)

9:00AM (861) *A mathematical perspective on ketchup.*
**Yuriko Renardy***, Virginia Tech, and **Kara L Maki**, Rochester Institute of Technology (1086-76-837)

9:15AM (862) *Linear and First Order Solutions for a Three Dimensional Convective Flow in a Mushy layer.* Preliminary report. **Dambaru Bhatta*** and **Daniel N Riahi**, University of Texas-Pan American (1086-76-1546)

9:30AM (863) *Alternative powers of decay in swirling vortex solutions.* Preliminary report. **Pavel Belik**, Augsburg College, **Douglas P. Dokken**, **Mikhail M. Shvartsman*** and **Kurt Scholz**, University of St. Thomas, St. Paul, MN (1086-76-2751)

9:45AM (864) *Diffusion for Markov Wave Equations.* **Clark Musselman***, Bard College at Simon's Rock, and **Jeffrey Schenker**, Michigan State University (1086-81-475)

10:00AM (865) *Stabilizability of Coupling Controllers of Waves due to Energy functional and Decomposition methods.* **M. Najafi**, Kent State University, and **Mohammad Moe Najafi***, Same (1086-93-603)

10:15AM (866) *Well-posedness of boundary layers in viscoelastic flows.* **Michael Renardy***, Virginia Tech, and **Xiaojun Wang**, Pennsylvania State University (1086-76-2500)

10:30AM (867) *Singularities in Free interface problems and Universality.* **Stuart Kent*** and **Shankar Venkataramani**, University of Arizona (1086-76-2918)

10:45AM (868) *Transport of Brownian particles in a curved channel confined by a periodic potential.* **Xinli Wang***, University of South Carolina Upstate, and **German Drazer**, Rutgers The state University of New Jersey (1086-76-2289)

11:00AM (869) *A new application of the reproducing kernel Hilbert space method to solve MHD Jeffery-Hamel flows Problem in non-parallel walls.* **Ali Akgul**, Missouri University of Science and Technology (1086-34-1193)

11:15AM (870) *Design Parameter Settings for a Physically-Realizable Uniform Temperature Boundary Condition Specification on a Wall of a Cubicle Enclosure.* **Perry Y.C. Lee***, Kutztown University of Pennsylvania, and **Wey Herng Leong**, Ryerson University (1086-80-887)

## *MAA Session on Mathematics and the Arts: Practice, Pedagogy, and Discovery, III*

**8:00 AM – 11:55 AM** **Room 6E, Upper Level, San Diego Convention Center**

Organizer: **Douglas Norton**, Villanova University

8:00AM ► (871) *A Visual Tour of Lesser Known Art and Architecture as Examples of Mathematical Development of World Civilizations.* **Elizabeth C. Rogers**, Piedmont College (1086-K1-2932)

8:20AM ► (872) *The Plastic (or Silver) Number.* **Frode Rønning**, Sør-Trøndelag University College (1086-K1-929)

8:40AM ► (873) *The Gauss-Bonnet Theorem and the Sydney Opera.* **Alexander J Hahn**, University of Notre Dame (1086-K1-901)

9:00AM ► (874) *DaVinci Revisited.* **Susan McBurney**, Western Springs, Illinois (1086-K1-522)

9:20AM ► (875) *Pascal's Palette: Artworks Inspired by the Numbers 70 and 84.* **Charlene Morrow**, Mount Holyoke College (1086-K1-2788)

9:40AM ► (876) *Fibonacci Drawing - Exploring the beauty of the Fibonacci Sequence through abstract drawing.* **Susan Happersett**, Independent Artist (1086-K1-899)

10:00AM ► (877) *What's in an octave?* Preliminary report. **Shirley Yap**, California State University East Bay (1086-K1-2722)

10:20AM ► (878) *Discovering Connections Between Modern Mathematics, Music and Art.* **Monica VanDieren*** and **Heather Pinson**, Robert Morris University (1086-K1-2269)

10:40AM (879) *Numbers in Music. Harmonies, Numbers, Notes: the Values of Pythagorean School.* **Irene Iaccarino**, Music School, Crotone, Italy (1086-K1-830)

11:00AM (880) *A Model for Arranging Melodies for Ukulele.* **Christopher E Brown**, California Lutheran University (1086-K1-402)

11:20AM ► (881) *Teaching "Mathematics in Square Dancing".* Preliminary report. **David J Schmitz**, North Central College (1086-K1-1307)

11:40AM ► (882) *Mathematics and Ballet.* **Karl Schaffer**, De Anza College and the Dr. Schaffer and Mr. Stern Dance Ensemble (1086-K1-2780)

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

**8:00 AM – 11:55 AM** **Room 5A, Upper Level, San Diego Convention Center**

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

8:00AM (883) *Developing Voting Systems on the First Day: an IBL Approach.* **Eric B. Kahn**, Bloomsburg University (1086-M5-538)

8:20AM (884) *Voting Alliances: Using Politics to Motivate Combinatorial Counting.*
**Christopher S Shaw**, Columbia College Chicago (1086-M5-2946)

8:40AM ► (885) *The Future of Voting: Engaging students through designing voting systems.*
**Erin E. Bancroft**, Grove City College (1086-M5-1395)

9:00AM (886) *Voting: The Intersection of Mathematics & Citizen Leadership.*
**Jacqueline Anderson Hall**, Longwood University (1086-M5-2714)

9:20AM ► (887) *A final project in a mathematics of games class: create your own new game!*
**Andrew-David Bjork**, Siena Heights University (1086-M5-1824)

9:40AM ► (888) *Liberal Arts Mathematics: Do It Yourself with SNAP – Simulation, Random Walks.*
**Jerome L. Caldwell**, University of Wisconsin - River Falls (1086-M5-1603)

10:00AM ► (889) *A Strange Attractor in the Kitchen.*
**Rachel R. Roe-Dale**, Skidmore College (1086-M5-1391)

10:20AM ► (890) *Little Fractal on the Prairie: a study of fractal dimension.*
**Andrea N Young**, Ripon College (1086-M5-877)

10:40AM ► (891) *Bringing Mathematics to Life through Dialogue Based Activities and Manipulatives.*
**James C. Price**, Fort Smith (1086-M5-1256)

11:00AM ► (892) *Is it logical? Exploring the validity of arguments.*
**J. Christopher Tweddle**, University of Evansville (1086-M5-2021)

11:20AM ► (893) *Using JobQuests as a Capstone Project for Statistics in a Liberal Arts Mathematics Course.*
**Brian P. Beaudrie**, Northern Arizona University (1086-M5-2364)

11:40AM ► (894) *Projects for liberal arts majors explaining the concept of limit in probability problems simulated on the TI-84 calculator.*
**Patricia Baggett***, New Mexico State University, and **Andrzej Ehrenfeucht**, Computer Science Dept, University of Colorado (1086-M5-1896)

## *MAA Session on Research on the Teaching and Learning of Undergraduate Mathematics, II*

**8:00 AM – NOON** **Room 3, Upper Level, San Diego Convention Center**

Organizers: **Kyeong Hah Roh**, Arizona State University
**Stacy Brown**, Pitzer College
**Mike Oehrtman**, University of Northern Colorado

8:00AM (895) *The Connection between Calibration Levels and Students' Mathematical Proficiency.*
**Brian Arthur Christopher**, University of Northern Colorado (1086-N1-1978)

8:20AM ► (896) *The Emergence of Algebraic Structure: Students Come to Understand Zero-Divisors.*
**John Paul Cook**, University of Science and Arts of Oklahoma (1086-N1-1998)

8:40AM ► (897) *The effect of preview video lectures using Smart Board, Camtasia Studios, and Podcasting on mathematical achievement and mathematics self-efficacy.*
Preliminary report.
**Minsu Kim**, University of North Georgia (1086-N1-517)

9:00AM ► (898) *Reasoning About Solutions in Linear Algebra: The Case of Abraham and the Invertible Matrix Theorem.*
**Megan Wawro**, Virginia Tech (1086-N1-1163)

9:20AM (899) *Role of Instructor Prompts in Reinvention of Sequence Convergence Definition.*
Preliminary report.
**Jungeun Park***, University of Delware, and **Jason Martin**, University of Central Arkansas (1086-N1-2794)

9:40AM ► (900) *A Characterization of the Cognitive Demand of Calculus I Final Exams in U.S. Colleges and Universities.*
**Michael A. Tallman*** and **Marilyn P. Carlson**, Arizona State University (1086-N1-1420)

10:00AM ► (901) *Students' Ways of Thinking about Solution Sets Envisioned as Unions of Subsets and Their Relation to Over Counting in Combinatorics.*
**Aviva Halani**, Arizona State University (1086-N1-1465)

10:20AM (902) *Mathematicians Reading Mathematics—A View of the Experts.*
**Mary D Shepherd**, Northwest Missouri State University (1086-N1-1214)

10:40AM ► (903) *Conventions and Mathematical Meaning—An Exploration Through Functions and Inverses.*
**Stacy M. Musgrave***, University of Georgia, and **Kevin C. Moore**, University of Georgia, Department of Mathematics and Science Education (1086-N1-2734)

11:00AM ► (904) *Students' Differing Experiences in Calculus I.*
**Jessica Ellis***, UCSD/ SDSU, and **Chris Rasmussen**, SDSU (1086-N1-676)

11:20AM TALK ADDED: A model of students' combinatorial thinking, Elise Lockwood, Portland State University.

### *MAA Session on Student Success in Quantitative Reasoning, I*

**8:00 AM – 9:15 AM** **Room 11B, Upper Level, San Diego Convention Center**

Organizer: **Ray Collings**, Georgia Perimeter College

8:00AM ► (905) *Project Infinity, A Preliminary Report.* **Ray E. Collings**, Georgia Perimeter College (1086-P1-2960)

8:20AM (906) *Mathematics for the Liberal Arts, an Interdisciplinary Approach.* **A Al-Hasan**, Newberry College (1086-P1-2061)

8:40AM ► (907) *A Liberal Arts Quantitative Literacy Seminar Becomes an Institutional Research Team.* Preliminary report. **Jennifer A. Bruce**, Maryville College (1086-P1-2346)

9:00AM ► (908) *Teaching Multiple linear regression to business students.* **Aldo R Maldonado**, Park University (1086-P1-2157)

### *MAA General Contributed Paper Session: Assessment and Outreach*

**8:00 AM – 9:10 AM** **Room 33A, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College

**Gizem Karaali**, Pomona College

**Douglas Norton**, Villanova University

Moderator: **Angela Vierling-Claassen**, Lesley University

8:00AM ► (909) *Assessing the Reliability and Precision of the Visual Analog and Likert Response Scales in a Measurement of Statistical Anxiety in Undergraduate Students.* **Karen Traxler*** and **Soofia Malik**, University of Northern Colorado (1086-VA-624)

8:15AM ► (910) *Using fuzzy logic methods for assessing student learning outcome in a mathematics course.* **Jalalidin Jaenbai**, Rogers State University (1086-VA-2756)

8:30AM ► (911) *An Assessment of Math Proficiency Among High School Students Using the AMC Tests.* **Josaphat A. Uvah*** and **Kuiyuan Li**, University of West Florida, Pensacola, Florida (1086-VA-1198)

8:45AM ► (912) *The Danger of Narrow Calculus Assessments and How to Broaden Them.* **John Gruver**, San Diego State University and UC San Deigo (1086-VA-2664)

9:00AM ► (913) *Mentoring Mathematics and Science Majors in Applying Mathematics.* **Frederick A. Adkins*** and **Yu-Ju Kuo**, Indiana University of Pennsylvania (1086-VA-2767)

### *MAA General Contributed Paper Session: Research in Geometry and Linear Algebra*

**8:00 AM – 12:10 PM** **Room 7A, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College

**Gizem Karaali**, Pomona College

**Douglas Norton**, Villanova University

Moderators: **Andrew Klimas**, Xavier University of Louisiana

**Judith Silver**, Marshall University

8:00AM (914) *Ritz values of normal matrices and Ceva's theorem.* **Russell Lee Carden*** and **Derek J Hansen**, Rice University (1086-VM-1838)

8:15AM ► (915) *The probability of choosing a valid correlation matrix.* Preliminary report. **S. Eastman**, Armstrong Atlantic State University (1086-VM-1587)

8:30AM ► (916) *Spectrally Arbitrary Zero-Nonzero Patterns and the Nilpotent Jacobian Method.* **Timothy C Melvin**, Washington State University (1086-VM-2706)

8:45AM ► (917) *Conics in Extended Taxicab Geometry.* **Hope K Snyder*** and **Roman Wong**, Washington & Jefferson College (1086-VM-1899)

9:00AM (918) *Extremals and Faces of the Completely Positive and Positive Semidefinite-Preserving Cones.* **Andrew J. Klimas**, Xavier University of Louisiana (1086-VM-657)

9:15AM ► (919) *Fregier Families of Conics.* **Michael Woltermann**, Washington and Jefferson College (1086-VM-567)

9:30AM ► (920) *Conics on a Sphere.* **Judith A. Silver***, **Anna Mummert**, **Donald W. Silver** and **Leah Treadaway Billo**, Marshall University (1086-VM-487)

9:45AM ► (921) *Surface-area-minimizing $n$-hedral tiles.* Preliminary report. **Steven Waruhiu**, the University of Chicago (1086-VM-379)

10:00AM ► (922) *Angle constructability on lattices generated by different quadrilaterals.* **Julianne Teng**, Rosemead, CA (1086-VM-528)

10:15AM ► (923) *The parbelos, a parabolic analog of the arbelos.* **Jonathan Sondow**, New York, NY (1086-VM-1653)

10:30AM *Plane Geometry and Complex Numbers.*
► (924) **Marc Chamberland**, Grinnell College (1086-VM-2399)

10:45AM *Rolling down the hill from convex hull to*
► (925) *closure.* Preliminary report.
**Joshua Kaminsky**, Saint Mary's College of Maryland (1086-VM-2730)

11:00AM *Abstract Affine Programming and*
► (926) *Generalized Tucker Tableaux - Preliminary Report.* Preliminary report.
**Tien Chih**, University of Montana (1086-VM-2487)

11:15AM *From the Fermat point to a*
► (927) *generalization and some applications.*
**Michael de Villiers**, University of KwaZulu-Natal (1086-VM-2220)

11:30AM *Uniformly Distributed Sequences.*
(928) Preliminary report.
**Thomas M McKenzie**, Gonzaga University (1086-VM-988)

11:45AM *Riemannian submersion and Lagrangian*
(929) *isometric immersion.*
**Yun Myung Oh**, Andrews University (1086-VM-834)

NOON *Polyhedral differential geometry.*
► (930) Preliminary report.
**Alan Durfee**, Mount Holyoke College (1086-VM-827)

## *MAA General Contributed Paper Session: Research in Graph Theory and Combinatorics, II*

**8:00 AM – 11:55 AM** **Room 33C, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Eric Gottlieb**, Rhodes College
**Feryal Alayont**, Grand Valley State University

8:00AM *Equilaterally $k$-Isotoxal Tiles.* Preliminary
► (931) report.
**Casey Mann*** and **Ali Chick**, The University of Texas at Tyler (1086-VN-1750)

8:15AM *Moveable Firefighters in the Firefighter*
► (932) *Problem.*
**Daniel P Biebighauser**, Concordia College, Moorhead (1086-VN-816)

8:30AM *Optimized Routing of Unmanned Aerial*
(933) *Systems to Address Informational Gaps in Counterinsurgency.*
**Andrew C Lee**, United States Military Academy (1086-VN-2564)

8:45AM *Distribution of distances under the*
► (934) *Double Cut and Join model of genome rearrangement.*
**Manda Riehl**, University of Wisconsin-Eau Claire (1086-VN-1956)

9:00AM *Cartesian powers of graphs and*
(935) *consecutive radio labelings.*
**Amanda J Watkins Niedzialomski**, University of Iowa (1086-VN-2632)

9:15AM *Isoperimetric Inequalities for Directed*
► (936) *Graphs.*
**Franklin Hardin Jones Kenter*** and **Fan Chung**, University of California, San Diego (1086-VN-2702)

9:30AM *On Algebraically Defined Graphs and*
(937) *Generalized Quadrangles.*
**Brian G Kronenthal**, University of Delaware (1086-VN-721)

9:45AM *On the Erdős-Sós Conjecture and graphs*
► (938) *without a $P_{k+4}$.*
**Gary F. Tiner***, Faulkner University, and **Nancy Eaton**, University of Rhode Island (1086-VN-2203)

10:00AM *Topos Axioms and the Categories of*
(939) *Graphs.*
**Demitri J. Plessas**, The University of Montana (1086-VN-2385)

10:15AM *The 1-relaxed game chromatic number of*
► (940) *complete multipartite semi-Hamiltonian graphs.*
**John Portin***, Linfield College, **Alexander Sistko**, Bradley University, **Luke Naftz**, Colorado State University, **Tyler Hays**, Berklee University, **Nino Barrett**, Rochester College, **Susan Rufai**, McMinnville High School, **Jennifer Firkins-Nordstrom** and **Chuck Dunn**, Linfield College (1086-VN-2184)

10:30AM *Sprague-Grundy Numbers for Nim on*
► (941) *Graphs.*
**Janine E. Janoski***, King's College, **Neil J. Calkin**, Clemson University, **Allison Nelson**, Appalachian State University, **Sydney Ryan**, Grinnell College, and **Chao Xu**, Stony Brook University (1086-VN-2115)

10:45AM *A new lower bound for a variation of*
(942) *Cops and Robber on the hypercube, with an application to Graph Searching.*
**David Offner***, Westminster College, and **Kerry Ojakian**, Bronx Community College (CUNY) (1086-VN-2137)

11:00AM *Total Efficient Dominating Sets in Cayley*
► (943) *Graphs of Dihedral Groups.*
**Mari F Castle***, **Joe DeMaio** and **Keegan Gary**, Kennesaw State University (1086-VN-2171)

11:15AM *Total Efficient Dominating Sets in Cayley*
(944) *Graphs of Finite Abelian Groups.*
**Hollis Brewer***, **Mari F. Castle** and **Joe DeMaio**, Kennesaw State University (1086-VN-2175)

11:30AM *Downhill Domination Numbers of Graphs.*
► (945) **Jessie A. Deering***, **Teresa W. Haynes**, East Tennessee State University, **Stephen T. Hedetniemi**, Clemson University, and **William Jamieson**, East Tennessee State University (1086-VN-2900)

11:45AM ► (946) *Uphill Domination in Graphs.* **William B Jamieson***, **Jessie Deering**, **Teresa Haynes**, East Tennessee State University, and **Stephen Hedetniemi**, Clemson University (1086-VN-2902)

### *SIAM Minisymposium on Modeling Across the Curriculum: Bringing Relevance to Middle, High School and Early Undergraduate Math Experiences*

**8:00 AM – 10:25 AM** **Room 11A, Upper Level, San Diego Convention Center**

Organizers: **Ron Buckmire**, National Science Foundation

**Peter Turner**, Clarkson University

8:00AM ► (947) *SIAM NSF Workshop on Modeling across the Curriculum.* **Peter R. Turner**, Clarkson University (1086-97-2249)

8:30AM (948) *Coursework and Programs in Applied and Computational Mathematics at the University Level.* Preliminary report. **Jeffrey Humphreys***, Brigham Young University, and **Robert M. Panoff**, Shodor (1086-65-2987)

9:00AM (949) *Coursework in Applied and Computational Mathematics at the High School Level.* Preliminary report. **Katherine Socha**, Math for America (1086-97-2504)

9:30AM ► (950) *Reflections on Modeling based on the MAA National Survey of Calculus.* Preliminary report. **David Bressoud**, Macalester College (1086-97-2305)

10:00AM (951) *Discussion on the SIAM-NSF Workshop Report and next steps.* Preliminary report. **Ron Buckmire**, National Science Foundation (1086-97-2993)

### *Employment Center*

**8:00 AM – 6:00 PM** **Exhibit Hall A, Ground Level, San Diego Convention Center**

### *AMS Session on Combinatorics and Finite Groups*

**8:15 AM – 11:40 AM** **Room 19, Mezzanine Level, San Diego Convention Center**

8:15AM (952) *A group of class 2 and prime exponent is capable if its commutator subgroup is sufficiently large.* **Arturo Magidin**, University of Louisiana at Lafayette (1086-20-125)

8:30AM (953) *On Two Classes of Finite Inseparable $p$-Groups.* Preliminary report. **Joseph Kirtland**, Marist College (1086-20-118)

8:45AM (954) *The Chermak-Delgado Lattice of a Finite Group.* **Elizabeth Wilcox**, Colgate University (1086-20-1941)

9:00AM (955) *Loops categorically isomorphic to Bruck loops.* **Mark B. Greer**, University of Denver (1086-20-2001)

9:15AM (956) *Computations for Coxeter arrangements and Solomon's descent algebra.* **Marcus Bishop**, Ruhr University Bochum, Germany (1086-20-471)

9:30AM (957) *Algebras associated to finite Coxeter groups.* **Colleen Duffy**, University of Wisconsin - Eau Claire (1086-16-2572)

9:45AM (958) *Coxeter groups, palindromic Poincaré polynomials and triangle group avoidance.* Preliminary report. **Edward L Richmond***, University of British Columbia, and **William Slofstra**, University of California - Davis (1086-05-229)

10:00AM (959) *The Reduction Map for the Moduli Spaces of Weighted Stable Hyperplane Arrangements.* Preliminary report. **Jaeho Shin**, The University of Georgia (1086-14-2687)

10:15AM (960) *Path tableaux and Hecke algebra characters.* **Brittany Shelton*** and **Mark Skandera**, Lehigh University (1086-05-440)

10:30AM (961) *Divided difference operator on highest root Hessenberg varieties.* Preliminary report. **Nicholas Teff**, University of Iowa (1086-05-2977)

10:45AM ► (962) *On the Structure of Automorphisms and Symmetric Spaces of Dicyclic Groups.* Preliminary report. **A. Bishop***, **B. Turner**, **N. Schwartz**, **J. Hutchens**, North Carolina State University, **C. Cyr**, University of Florida, and **S. Kamholtz**, University of Oregon (1086-20-2390)

11:00AM ► (963) *Duoprisms: Polytope Numbers and Multiplication.* Preliminary report. **Eric Fairchild***, **Robin Mabe** and **Emma Polaski**, Grove City College (1086-05-2100)

11:15AM ► (964) *Expanded Simplices and Polytope Numbers.* Preliminary report. **Robin Mabe***, **Eric Fairchild** and **Emma Polaski**, Grove City College (1086-05-2102)

11:30AM ► (965) *Higher Order Rectification: Polytope Numbers and Cutting.* Preliminary report. **Emma Polaski***, **Eric Fairchild** and **Robin Mabe**, Grove City College (1086-05-2106)

### *AMS Session on Numerical Methods and Inverse, Optimization, and Variational Problems*

**8:15 AM – 11:55 AM** **Room 30B, Upper Level, San Diego Convention Center**

8:15AM ► (966) *Inverse boundary and source problem for fractional diffusion equations.* **Lihua Zuo***, Texas A&M University, **Xu**, Michigan State University, and **Rundell**, Texas A&M University (1086-35-586)

8:30AM (967) *Sparse texture patterns and solution to PDE.* **Hayden Schaeffer*** and **Stanley Osher**, University of California, Los Angeles (1086-49-2463)

8:45AM (968) *Nonlocal speckle denoising models based on total variation minimization.* Preliminary report. **Arundhati Bagchi Misra***, Saginaw Valley State University, and **Hyeona Lim**, Mississippi State University (1086-65-422)

9:00AM ► (969) *Computing 3D Rotations for Computer Graphics.* **Paul R Bouthellier**, University of Pittsburgh-Titusville (1086-65-152)

9:15AM ► (970) *Spectrally Matched Grids: Anisotropy and Semi-Infinite Spectral Intervals.* **Adnan H Sabuwala**, California State University, Fresno (1086-65-2566)

9:30AM (971) *Optimal Control of Neutral Functional Differential Inclusions.* **Lianwen Wang**, University of Central Missouri (1086-49-925)

9:45AM (972) *Optimization of classifiers' parameters based on pso/sa algorithms for classification of fMRI data.* **Mahdi Zarei*** and **Hijran Mirzayeva**, School of Science, Information Technology & Engineering University of Ballarat (1086-49-1194)

10:00AM ► (973) *Regularization for Second Order Hyperbolic Partial Differential Equation with Neumann Bounday Condition.* **Narayan Thapa**, Minot State University, Minot, ND (1086-49-411)

10:15AM (974) *Solution of Variational Problems by using a Hybrid Functions Approximation.* **Mohsen Razzaghi**, Mississippi State University (1086-49-633)

10:30AM (975) *Oscillation-Free Stability Analysis for Linear and Semilinear Diffusion Equations.* **R. C. Harwood***, George Fox University, and **V. S. Manoranjan**, Washington State University (1086-65-2478)

10:45AM (976) *Trigonometrically-fitted block hybrid second derivative algorithm for oscillatory problems.* **Fidele F Ngwane***, USC Salkehatchie, and **Samuel N Jator**, Austin Peay State University (1086-65-680)

11:00AM (977) *Solving an Ill Conditioned Linear System using the Extended Iterative Refinement Algorithm: The Convergence Theorem.* **Abdramane Serme*** and **Jean W. Richard**, The City University of New York (CUNY/BMCC) (1086-65-2748)

11:15AM (978) *Extragradient Methods for Inverse Problems.* Preliminary report. **Selin Sariaydin*** and **Baasansuren Jadamba**, Rochester Institute of Technology (1086-65-2431)

11:30AM (979) *A multi-level projected steepest descent iteration for nonlinear inverse problems in Banach spaces subject to stability constraints.* **Maarten de Hoop**, **Lingyun Qiu***, Purdue University, and **Otmar Scherzer**, Computational Science Center, University of Vienna, Austria (1086-65-2637)

11:45AM (980) *On extremum problem with constraints for discrete inclusions.* **Hijran Mirzayeva**, School of Science, Information Technology & Engineering, University of Ballarat (1086-49-1186)

### *AMS Session on Geometry and Differential and Hyperbolic Geometry*

**8:30 AM – 11:40 AM** **Room 31B, Upper Level, San Diego Convention Center**

8:30AM (981) *The Coarse Geometry of the Kakimizu Complex.* Preliminary report. **Roberto C Pelayo***, University of Hawaii at Hilo, **Jesse Johnson**, Oklahoma State University, and **Robin Wilson**, California State Polytechnic University, Pomona (1086-57-1694)

8:45AM (982) *Isotopy Convergence Theorem.* **Ji Li**, University of Connecticut (1086-57-926)

9:00AM (983) *Finding Formulas for the Complexity of Riemann Surfaces.* **Aldo-Hilario Cruz-Cota***, DePaul University, and **Teresita Ramirez-Rosas**, Chicago, IL (1086-57-2182)

9:15AM (984) *Desargues' Theorem in Laguerre Planes.* **Robert D. Knight**, Ohio University-Chillicothe (1086-51-2785)

9:30AM ► (985) *Asymptotically small pseudo-Anosov sequences.* **Aaron D Valdivia**, Florida Southern College (1086-51-1850)

9:45AM (986) *New Asymptotica in Snell Geometries.* **J Mealy**, Austin College (1086-51-377)

10:00AM (987) *Legendrian $\theta-$graphs.* **Danielle O'Donnol***, Imperial College London, and **Elena Pavelescu**, Oklahoma State University (1086-57-159)

10:15AM (988) *The topology of a subspace of the Legendrian curves in a closed contact 3-manifold.* Preliminary report. **Abbas Bahri**, **Ali Maalaoui***, Rutgers University, and **Vittorio Martino**, Sissa International School for Advanced Studies (1086-53-985)

10:30AM (989) *Chern-Simons classes and the Ricci flow on 3-manifolds.*
**Christopher R Godbout**, Ursinus College (1086-53-570)

10:45AM (990) *Conformal diffeomorphisms of gradient Ricci solitons and generalized quasi-Einstein manifolds.*
**Jeffrey Jauregui***, University of Pennsylvania, and **William Wylie**, Syracuse University (1086-53-1966)

11:00AM (991) *TALK CANCELLED: The Geometry of Space-Time-Matter.*
**David E Betounes**, University of Texas of the Permian Basin (1086-53-1254)

11:15AM (992) *Area growth of surfaces with bounded mean curvature.*
**Dechang Chen**, University of Massachusetts Amherst (1086-53-1972)

11:30AM (993) *Probability Theory of Random Polygons from the Quaternionic Viewpoint.*
**Jason Cantarella**, University of Georgia, **Tetsuo Deguchi**, Ochanomizu University, and **Clayton Shonkwiler***, University of Georgia (1086-53-1892)

## *MAA General Contributed Paper Session: Modeling and Applications of Mathematics, I*

**8:45 AM – 11:55 AM** **Room 33B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderator: **John Diamantopoulos**, Northeastern State University

8:45AM ► (994) *The Sequence Reconstruction Problem as an Integer Programming Problem.* Preliminary report.
**Angela Angeleska***, The University of Tampa, **Sabrina Kleessen** and **Zoran Nikoloski**, Max-Planck Institute of Molecular Plant Physiology, Potsdam, Germany (1086-VG-1358)

9:00AM (995) *Breakup of an extending particle-laden liquid jet.*
**Muhammad Irfan Hameed**, University of South Carolina Upstate (1086-VG-2262)

9:15AM (996) *Stability of the homeotropic orientation in the optical Fredericks transition of a liquid crystal layer.*
**Eric P. Choate**, Naval Postgraduate School (1086-VG-2455)

9:30AM ► (997) *Clustering Methods to Detect Gas Plumes in Hyperspectral Images.* Preliminary report.
**Justin Y Sunu** and **Torin A Gerhart***, California State University Long Beach (1086-VG-2695)

9:45AM (998) *An Integrated Fuzzy Production Model with shortages Under Two Warehouses.*
**Shiv Raj Singh**, Department of Mathematics, D.N. College, Meerut, UP,India (1086-VG-114)

10:00AM ► (999) *Application of Intuitionistic Fuzzy Set and Fuzzy Set in Medical Diagnosis.*
**Satyajit Das** and **Debashree Guha***, Indian Institute of Technology Patna, Patna, Bihar-800013, India (1086-VG-2261)

10:15AM ► (1000) *Theoretical model for metabolic blood flow regulation in a heterogeneous microvascular network.*
**Brendan C. Fry*** and **Timothy W. Secomb**, University of Arizona (1086-VG-1620)

10:30AM (1001) *A Mathematical Model of Denitrification Metabolic Network in* Pseudomonas aeruginosa.
**Seda Arat***, Department of Mathematics and Virginia Bioinformatics Institute/Virginia Tech, **George Bullerjahn**, Department of Biology and Center for Photochemical Sciences, Bowling Green State University, and **Reinhard Laubenbacher**, Department of Mathematics and Virginia Bioinformatics Institute/Virginia Tech (1086-VG-1071)

10:45AM (1002) *TALK CANCELLED: Numerical Simulations of a Multiphase Model for Biofilm Development.*
**Mark E Whidden**, Florida State University (1086-VG-2069)

11:00AM (1003) *On coarse-grained Normal Mode Analysis and refined Gaussian Network Model for protein structure fluctuations.*
**Jun-Koo Park**, Houghton College (1086-VG-2351)

11:15AM (1004) *Ultrasensitivity for Graded Multisite Activation Networks.*
**Shane Ryerson*** and **German Enciso**, University of California, Irvine (1086-VG-2976)

11:30AM ► (1005) *Action Potentials in Peripheral Auditory Nervous System: A Novel PDE Distribution Model.* Preliminary report.
**Rebecca Gasper**, The University of Iowa (1086-VG-415)

11:45AM ► (1006) *Stochastic switching and alternating activity bouts resulting from mutual inhibition and applications to sleep-wake cycling in mammals.*
**Badal Joshi***, University of Minnesota, and **Mainak Patel**, Duke University (1086-VG-864)

## *MAA Invited Address*

**9:00 AM – 9:50 AM** **Room 6AB, Upper Level, San Diego Convention Center**

(1007) *Thinking linearly about data.*
**Timothy Chartier**, Davidson College (1086-A0-13)

### *MAA Minicourse #8: Part A*

**9:00 AM – 11:00 AM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*Getting students involved in undergraduate research.*

Presenters: **Aparna Higgins**, University of Dayton
**Joseph Gallian**, University of Minnesota Duluth

### *MAA Minicourse #1: Part A*

**9:00 AM – 11:00 AM** **Room 29C, Mezzanine Level, San Diego Convention Center**

*Heavenly mathematics: The forgotten art of spherical trigonometry.*

Presenters: **Glen Van Brummelen**, Quest University
**Joel Silverberg**, Roger Williams University

### *MAA Minicourse #13: Part A*

**9:00 AM – 11:00 AM** **Room 30A, Upper Level, San Diego Convention Center**

*Problem-based courses for teachers, future teachers, and math majors.*

Presenters: **Gail Burrill**, Michigan State University
**Darryl Yong**, Harvey Mudd College
**Bowen Kerins**, Education Development Center
**James King**, University of Washington

### *MAA Session on Innovative Ideas for Courses in the First Two Years, III*

**9:00 AM – 11:55 AM** **Room 5B, Upper Level, San Diego Convention Center**

Organizer: **Andrew Granville Bennett**, Kansas State University

9:00AM ► (1008) *New Educational Program in Mathematics for STEM Majors, Part I.* Preliminary report. **Andrew Bucki*** and **Abebaw Tadesse**, Langston University (1086-H1-1738)

9:20AM (1009) *Exploratory Projects in an Introduction to Discrete Mathematics Course.* **Debra Hydorn**, University of Mary Washington (1086-H1-1980)

9:40AM ► (1010) *Strengthening data analysis knowledge and skills through practice.* Preliminary report. **Charles Bergeron***, **Lisa Morkowchuk** and **David Clarke**, Albany College of Pharmacy and Health Sciences (1086-H1-2406)

10:00AM ► (1011) *Mathematics and the Law: Recruiting from the Social Sciences.* **Jeff Suzuki**, Brooklyn College (1086-H1-1049)

10:20AM ► (1012) *Math Trails Across Your Campus.* **Lee J Fothergill** and **Mike Daven***, Mount Saint Mary College (1086-H1-1247)

10:40AM ► (1013) *Are Numbers Real? – a First Year Seminar.* Preliminary report. **Edwin P Herman**, University of Wisconsin-Stevens Point (1086-H1-2379)

11:00AM ► (1014) *Inspiring Mathematical Interest through Interdisciplinary Projects.* **Sheila K Miller**, City University of New York: New York City College of Technology (1086-H1-2860)

11:20AM ► (1015) *Experimental Mathematics for the First Year Student.* **David A. Brown**, Ithaca College (1086-H1-549)

11:40AM ► (1016) *Mathematical Problem-Solving and Algorithmic Thinking.* **Edmund A. Lamagna**, University of Rhode Island (1086-H1-2027)

### *MAA-YMN Panel Discussion*

**9:00 AM – 10:20 AM** **Room 1A, Upper Level, San Diego Convention Center**

*Career options for undergraduate mathematics majors.*

Organizers: **Nyles Breecher**, Brigham Young University
**Allison Oldham**, William and Mary University

Panelists: **Michael Dorff**, Brigham Young University

### *MAA Committee on the Participation of Women Poster Session*

**9:00 AM – 11:00 AM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

*Mathematical outreach programs.*

### *MAA Subcommittee on Research by Undergraduates Panel Discussion*

**9:00 AM – 10:20 AM** **Room 1B, Upper Level, San Diego Convention Center**

*The benefits of research with undergraduates for faculty.*

Organizers: **Steven Schlicker**, Grand Valley State University
**Zsuzsanna Zsaniszlo**, Valparaiso University

Panelists: **Edward Aboufadel**, Grand Valley State University
**David Carothers**, James Madison University
**Dennis Davenport**, Howard University

**Michael Dorff**, Brigham Young University

**Cynthia Wyels**, California State University, Channel Islands

### *MAA Session for Chairs*

**9:00 AM – 10:20 AM** **Room 4, Upper Level, San Diego Convention Center**

*The transition from high school to college mathematics.*

Organizers: **Daniel Maki**, Macalester College

**Catherine M. Murphy**, Purdue University Calumet

Panelists: **David Bressoud**, Macalester College

**Bernard Madison**, University of Arkansas

### *Student Hospitality/Information Center*

**9:00 AM – 5:00 PM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

### *Summer Program for Women in Mathematics (SPWM) Reunion*

**9:00 AM – NOON** **Room 10, Upper Level, San Diego Convention Center**

### *MAA General Contributed Paper Session: Probability and Statistics, III*

**9:30 AM – 11:10 AM** **Room 33A, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College

**Gizem Karaali**, Pomona College

**Douglas Norton**, Villanova University

Moderator: **Kimberly Presser**, Shippensburg University

9:30AM ► (1017) *$2\varphi + 1$ and Fibonacci Sequence.*
**Arulalan M. Rajan***, **Vittal Rao**, Centre for Electronics Design and Technology, Indian Institute of Science, **H S Jamadagni**, Centre for Electronics Design and Technology, Indian Institue of Science, and **Ashok Rao**, Mysore, Karnataka, India (1086-VI-1520)

9:45AM ► (1018) *Exponentiated Weibull-Exponential Distribution: Some Properties and Applications.*
**Ahmad M. Alzaghal**, Central Michigan University (1086-VI-1434)

10:00AM ► (1019) *An Empirical Likelihood Ratio Based Goodness-of-Fit Test for Skew Normal Distributions.*
**Grace Ngunkeng*** and **Wei Ning**, Bowling Green State University (1086-VI-1299)

10:15AM ► (1020) *Adaptive Design for Non-Stationary Surfaces Using Changes in Slope.*
**Marian Frazier*** and **William I. Notz**, The Ohio State University (1086-VI-1068)

10:30AM (1021) *Finite Priority Queueing System with Service Interruption.*
**Madhu Jain**, IIT Roorkee, Haridwar, India (1086-VI-500)

10:45AM (1022) *Reliability of a two class k-out-of-n system with repair.*
**George Dr Mytalas***, New York, NY, and **Michael Dr Zazanis**, Department of Statistics Athens University of Economics and Business (1086-VI-1608)

11:00AM (1023) *The Power Law, or: Just Your Everyday 25-sigma Event...*
**Andrew Niedermaier**, Jane Street Capital (1086-VI-95)

### *AMS Special Presentation*

**9:30 AM – 11:00 AM** **Room 6F, Upper Level, San Diego Convention Center**

*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 B1, Ground Level, San Diego Convention Center**

### *MAA Session on Learning Centers: Problems and Creative Solutions*

**10:00 AM – 11:55 AM** **Room 11B, Upper Level, San Diego Convention Center**

Organizers: **James M. Sobota**, University of Wisconsin-La Crosse

**Karoline Auby**, University of Wisconsin-La Crosse

**Maighread McHugh**, University of Wisconsin-La Crosse

10:00AM (1024) *Integration of a Math Tutoring Center with the Toys'n MORE Program.*
**Gina Monks**, Penn State Hazleton (1086-J1-806)

10:20AM ► (1025) *Thoughts and Experiences of a Faculty Member in the Tutoring Center.*
Preliminary report.
**Joseph P McCollum*** and **Yu Sun**, Siena College (1086-J1-1415)

10:40AM ► (1026) *Supporting Undergraduates' Growth as Effective Peer Tutors: What We've Tried, and What We've Learned.*
**Sarah L. Marsh***, **Shannon M. Griffith** and **Krista B. Hands**, Oklahoma Baptist University (1086-J1-1451)

11:00AM ► (1027) *Engaging Faculty in Your Learning Center.*
**Kathy J Willis**, Southern NH University (1086-J1-2145)

11:20AM ► (1028) *A Learning Center: Of the Students, By the Students, For the Students.*
Preliminary report.
**Maggie L. McHugh**, University of Wisconsin-La Crosse (1086-J1-1985)

11:40AM (1029) *A New Tutoring Center: Challenges, Opportunities, and Surprises.*
**Mary B. O'Neill**, Hamilton College (1086-J1-2602)

### *AWM Noether Lecture*

**10:05 AM – 10:55 AM** **Room 6AB, Upper Level, San Diego Convention Center**

(1030) *A Hasse principle for quadratic forms over function fields.*
**Raman Parimala**, Emory University

### *SIGMAA Officers Meeting*

**10:30 AM – NOON** **Marina Ballroom D, 3rd Floor, Marriott**

Chair: **Amy Shell-Gellasch**, Hood College

### *SIGMAA on Statistics Education Panel Discussion*

**10:35 AM – 11:55 AM** **Room 4, Upper Level, San Diego Convention Center**

*Creating and growing an applied statistics minor program.*

Organizer: **K. Scott Alberts**, Truman State University

Moderator: **Lisa Carnell**, High Point University

Panelists: **Robin Lock**, St. Lawrence University

**Daniel Kaplan**, Macalester College

**David Nelson**, Mercer University

**K. Scott Alberts**

### *MAA Workshop*

**10:35 AM – 11:55 AM** **Room 1A, Upper Level, San Diego Convention Center**

*Proposal writing for grant applications to the NSF Division of Undergraduate Education.*

Presenters: **Michael Jacobson**, Division of Undergraduate Education, National Science Foundation

**Ron Buckmire**, Division of Undergraduate Education, National Science Foundation

**Lee Zia**, Division of Undergraduate Education, National Science Foundation

### *MAA-YMN Panel Discussion*

**10:35 AM – 11:55 AM** **Room 1B, Upper Level, San Diego Convention Center**

*The on-campus interview survival guide.*

Organizers: **Nick Scoville**, San Francisco State University

**Jacob White**, Arizona State University

Panelists: **Sheldon Axler**, San Francisco State University

**Jeremy Martin**, University of Kansas

**Kristine Roinestad**, Georgetown College

**Francis Su**, Harvey Mudd College

### *SIAM Invited Address*

**11:10 AM – NOON** **Room 6AB, Upper Level, San Diego Convention Center**

(1031) *Inverse problems with minimal interior measurements.*
**Adrian I. Nachman**, University of Toronto (1086-35-163)

### *AMS Colloquium Lectures: Lecture II*

**1:00 PM – 2:00 PM** **Room 6AB, Upper Level, San Diego Convention Center**

(1032) *Free probability, Random matrices, and map enumeration, II.*
**Alice Guionnet**, Ecole Normale Supérieure de Lyon (1086-05-16)

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

**1:00 PM – 3:50 PM** **Room 8, Upper Level, San Diego Convention Center**

Organizers: **Bernard Brooks**, Rochester Institute of Technology

**Jobby Jacob**, Rochester Institute of Technology

**Jacqueline Jensen-Vallin**, Slippery Rock University

**Carl V. Lutzer**, Rochester Institute of Technology

**Darren Narayan**, Rochester Institute of Technology

**Tamas Wiandt**, Rochester Institute of Technology

1:00PM ► (1033) *On the Coarse Geometry of $L^p$: A Coarse Equivalence.* **Phanuel A. Mariano**, Western Connecticut State University (1086-28-24)

1:30PM (1034) *Ramsey Numbers $R(C_4, K_n)$, a Survey.* **Quinn Donahoe***, Pennsylvania State University, and **Jeremy Fehr**, Wesleyan University (1086-05-178)

2:00PM ► (1035) *Lang-Kobayashi.* **Ryan Mulcahy***, Augsburg College, and **Christiana Sabett**, St. Mary's College of Maryland (1086-37-140)

2:30PM ► (1036) *Rank numbers of graphs that are combinations of paths and cycles.* **Brianna Blake***, Augsburg College, and **Elizabeth Field**, Southern Connecticut State University (1086-05-144)

3:00PM ► (1037) *Efficiency of the Atlanta subway network and functional connectivity of the human brain.* **Bryan Ek***, Rochester Institute of Technology, and **Caitlin VerSchneider**, Nazareth College (1086-05-142)

3:30PM (1038) *Community Detection by Maximizing Partition Efficiency.* **Maggie Miller***, University of Texas, and **Brendan Shah**, Rochester Institute of Technology (1086-05-141)

## *AMS-MAA Special Session on Mathematics and Education Reform, I*

**1:00 PM – 3:45 PM** **Room 17B, Mezzanine Level, San Diego Convention Center**

Organizers: **William Barker**, Bowdoin College

**Cathy Kessel**, Berkeley, California

**William McCallum**, University of Arizona

**Bonnie Saunders**, University of Illinois, Chicago

1:00PM ► (1039) *Integrating the CCSS practice standards into mathematics teaching.* Preliminary report. **William McCallum**, The University of Arizona (1086-97-2909)

1:30PM ► (1040) *High School Teaching: standards, practices, and habits of mind.* **Al Cuoco**, Center for Mathematics Education, EDC (1086-97-1208)

2:00PM (1041) *Models for creating dialogue between mathematics and science teachers about the Common Core Standards and the Next Generation Science Standards.* **David Jabon*** and **Carolyn Narasimhan**, DePaul University (1086-97-2511)

2:30PM ► (1042) *Scientific practices in the Next Generation Science Standards.* Preliminary report. **Helen Quinn**, SLAC (1086-97-2966)

3:00PM ► (1043) *Standards for practice in the mathematics and science standards: a discussion.* Preliminary report. **William McCallum***, The University of Arizona, **David Jabon**, **Carolyn Narasimhan**, DePaul University, **Al Cuoco**, EDC, and **Helen Quinn**, Stanford Linear Accelerator Center (1086-97-2938)

## *AMS Special Session on Algorithmic Problems of Group Theory and Their Complexity, II*

**1:00 PM – 3:50 PM** **Room 15A, Mezzanine Level, San Diego Convention Center**

Organizers: **Delaram Kahrobaei**, CUNY Graduate Center and New York College of Technology, City University of New York

**Vladimir Shpilrain**, City College of New York and CUNY Graduate Center, City University of New York

1:00PM (1044) *Aspherical groups and manifolds with extreme properties.* **Markj Sapir**, Nashville (1086-20-1207)

2:00PM (1045) *Relative Subgroup Growth and Subgroup Distortion.* Preliminary report. **Tara C Davis***, Hawaii Pacific University, and **Alexander Yu. Olshanskii**, Vanderbilt University (1086-20-2034)

2:30PM (1046) *Conjugacy Growth in Finitely Generated Groups.* **Michael Hull**, Vanderbilt University (1086-20-1261)

3:00PM ► (1047) *Synchronizing groups: a survey.* Preliminary report. **Benjamin Steinberg**, City College of New York (1086-20-1654)

3:30PM (1048) *An Extension of a Theorem by B. Baumslag.* **Gerhard Rosenberger***, University of Hamburg, **Laura Ciobanu**, University of Fribourg, Switzerland, and **Benjamin Fine**, Fairfield University (1086-20-138)

## *AMS Special Session on Arithmetic Statistics, II (a Mathematics Research Communities session)*

**1:00 PM – 3:50 PM** **Room 31A, Upper Level, San Diego Convention Center**

Organizers: **Kevin McGown**, Ursinus College

**Jennifer Balakrishnan**, Harvard University

**Ethan Smith**, Liberty University

1:00PM (1049) *Correlations of Fractional Parts of Dilated Harmonic Sequences.* **Jeffrey C. Lagarias***, University of Michigan, Ann Arbor, and **David Montague**, Stanford University (1086-11-1475)

1:30PM (1050) *Periods of orbits modulo primes.* **Amir Akbary**, University of Lethbridge (1086-11-1622)

2:00PM (1051) *An alternative view of primitivity of Dirichlet characters.* **Nathan Jones***, University of Mississippi, and **Ryan Daileda**, Trinity University (1086-11-2503)

2:30PM (1052) *The smallest prime with a given splitting type in an abelian number field.* **Paul Pollack**, University of Georgia (1086-11-1634)

3:00PM (1053) *The Burgess inequality and the least k-th power non-residue.* **Enrique Treviño**, Swarthmore College (1086-11-923)

► 3:30PM (1054) *Some statistical problems concerning the arithmetic functions $\sigma$ and $\varphi$.* Preliminary report. **Carl Pomerance**, Dartmouth College (1086-11-515)

## *AMS Special Session on Arithmetic Theory of Quadratic Forms and Lattices, II*

**1:00 PM – 3:50 PM** **Room 14B, Mezzanine Level, San Diego Convention Center**

Organizers: **Wai Kiu Chan**, Wesleyan University

**Lenny Fukshansky**, Claremont McKenna College

1:00PM (1055) *Euclidean Ideals and Euclidean Forms.* **Pete L. Clark**, University of Georgia (1086-11-494)

1:30PM (1056) *Height bounds over quaternion algebras.* **Lenny Fukshansky**, Claremont McKenna College, and **Glenn Henshaw***, California State University - Channel Islands (1086-11-1398)

2:00PM (1057) *Quadratic forms representing all odd positive integers.* **Jeremy Rouse**, Wake Forest University (1086-11-736)

2:30PM (1058) *On almost universal ternary inhomogeneous quadratic polynomials.* **Anna Haensch**, Wesleyan University (1086-11-662)

3:00PM (1059) *Strictly Regular Positive Definite Quaternary Quadratic Forms and Lattices.* **Andrew G. Earnest**, Southern Illinois University Carbondale (1086-11-1085)

3:30PM (1060) *The represented values of a positive definite quaternary quadratic form.* Preliminary report. **David Leep**, University of Kentucky (1086-11-1627)

## *AMS Special Session on Continued Fractions, I*

**1:00 PM – 3:50 PM** **Room 31B, Upper Level, San Diego Convention Center**

Organizers: **James McLaughlin**, West Chester University

**Nancy J. Wyshinski**, Trinity College

1:00PM (1061) *Continued Fractions Converge with Probability One.* **Lisa Lorentzen**, Norwegian University of Science and Technology, Trondheim (1086-40-1515)

► 1:30PM (1062) *Symmetry in the Sequence of Approximation Coefficients.* **Avraham Bourla**, St. Mary's College of Maryland (1086-11-455)

2:00PM (1063) *A Favard type theorem associated with orthogonal polynomials on the unit circle.* Preliminary report. **A. Sri Ranga**, Universidade Estadual Paulista, Sao Jose do Rio Preto, SP, Brazil (1086-33-337)

2:30PM (1064) *Stern polynomials and continued fractions.* **Karl Dilcher***, Dalhousie University, and **Kenneth B. Stolarsky**, University of Illinois (1086-11-1643)

► 3:00PM (1065) *Renyi like Continued Fractions.* Preliminary report. **Eugen Andrei Ghenciu**, East Central University (1086-37-970)

► 3:30PM (1066) *Cubic Irrationals and Periodicity via a Family of Multi-dimensional Continued Fraction Algorithms.* **Krishna Dasaratha**, Harvard, **Laure Flapan**, UCLA, **Thomas Garrity***, Williams, **Chansoo Lee**, University of Michigan, **Cornelia Mihaila**, University of Texas, **Nicholas Neumann-Chu**, Williams, **Sarah Peluse**, University of Chicago, and **Matthew Stroffregen**, UCLA (1086-11-1426)

## *AMS Special Session on Difference Equations and Applications, II*

**1:00 PM – 3:50 PM** **Room 30B, Upper Level, San Diego Convention Center**

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

1:00PM (1067) *Stability in Highly Nonlinear Delay Difference Systems.* Preliminary report. **Youssef N Raffoul**, University of Dayton (1086-39-921)

1:30PM (1068) *On the Boundedness Nature of Positive Solutions of the Difference Equation* $x_{n+1} = \max\left\{\frac{A_n}{x_{n-k}}, \frac{B_n}{x_{n-l}}\right\}$ *with Variable Parameters.* Preliminary report.
**Candace M. Kent***, Virginia Commonwealth University, and **Michael A. Radin**, Rochester Institute of Technology (1086-39-1025)

► 2:00PM (1069) *Using Difference Equations to Generalize Results for Periodic Nested Radicals.*
**Chris D. Lynd**, University of Rhode Island (1086-39-634)

► 2:30PM (1070) *On Global Asymptotic Behavior of Some Classes of Nonlinear Nonautonomous Difference Equations.*
**Vlajko L. Kocic**, Xavier University of Louisiana (1086-39-675)

► 3:00PM (1071) *On Rational Difference Equations with Periodic Coefficients.*
**M Drymonis**, University of Rhode Island, **Y Kostrov***, Xavier University of Louisiana, and **Z Kudlak**, Mount Saint Mary College (1086-39-1652)

► 3:30PM (1072) *On the Boundedness Character of a System of Rational Difference Equations in the Plane with Nonnegative Periodic Coefficients.* Preliminary report.
**Yevgeniy Kostrov**, Xavier University, New Orleans, LA, and **Zachary Kudlak***, Mount Saint Mary College, Newburgh, NY (1086-39-1437)

## *AMS Special Session on Discrete and Computational Geometry, II (a Mathematics Research Communities session)*

**1:00 PM – 3:50 PM** **Room 30C, Upper Level, San Diego Convention Center**

Organizers: **Emilie Hogan**, Pacific Northwest National Laboratory
**Elizabeth Munch**, Duke University
**Louis Theran**, Freie Universität
**Russ Thompson**, Texas A&M University

► 1:00PM (1073) *Shearing, twisting and geodesics on polygon surfaces.*
**Diana Davis**, Brown University (1086-51-424)

► 1:30PM (1074) *Vertex Isoperimetric Inequalities for a Family of Graphs on* $\mathbb{Z}^k$.
**Ellen Veomett***, Saint Mary's College of California, and **A. J. Radcliffe**, University of Nebraska, Lincoln (1086-52-376)

2:00PM (1075) *Transforming Curves on Surfaces Redux.*
**Jeff Erickson**, University of Illinois at Urbana-Champaign (1086-57-1949)

3:00PM (1076) *Generic rigidity for frameworks with symmetry.*
**Justin Malestein***, Hebrew University of Jerusalem, and **Louis Theran**, Freie Universitat Berlin (1086-52-2291)

3:30PM (1077) *Undecidable tiling problems.*
**Jed Yang**, UCLA (1086-05-1404)

## *AMS Special Session on Finite Element Exterior Calculus and Applications, I*

**1:00 PM – 4:20 PM** **Room 16B, Mezzanine Level, San Diego Convention Center**

Organizers: **Douglas Arnold**, University of Minnesota
**Andrew Gillette**, University of California, San Diego
**Michael Holst**, University of California, San Diego

1:00PM (1078) *Local bounded cochain projections.* Preliminary report.
**Richard S. Falk**, Rutgers University, and **Ragnar Winther***, University of Oslo, Norway (1086-65-1723)

1:30PM (1079) *Polynomial extension operators.*
**Leszek Demkowicz**, The University of Texas at Austin, **Jay Gopalakrishnan***, Portland State University, and **Joachim Schoeberl**, Vienna University of Technology (1086-65-1632)

2:00PM (1080) *Approximation properties of tensor product finite element differential forms.* Preliminary report.
**Douglas N. Arnold**, University of Minnesota, **Daniele Boffi***, University of Pavia, Italy, and **Francesca Bonizzoni**, Politecnico di Milano, Italy (1086-65-1842)

2:30PM (1081) *Finite element systems of differential forms and applications to upwinding.*
**Snorre H. Christiansen**, University of Oslo (1086-65-1748)

3:00PM (1082) *Isogeometric Discrete Differential Forms with Application to Viscous Fluid Flow.*
**John A. Evans*** and **Thomas J. R. Hughes**, The University of Texas at Austin (1086-65-2642)

3:30PM (1083) *Geometric, Variational Discretization of Continuum Theories.*
**Mathieu Desbrun**, Caltech (1086-76-1823)

4:00PM (1084) *Hyperbolic Problems with Involutions and Discrete Differential Forms.*
**Holger Heumann**, LJAD, Université de Nice - Sophia Antipolis (1086-65-1809)

## *AMS Special Session on Geometric Complexity Theory, II (a Mathematics Research Communities session)*

**1:00 PM – 3:45 PM** **Room 30E, Upper Level, San Diego Convention Center**

Organizers: **Christian Ikenmeyer**, Texas A&M University

**Ryan Kinser**, Northeastern University

1:00PM (1085) *Eigenvectors of tensors and algorithms for Waring decomposition.* **Luke Oeding***, University of California, Berkeley, and **Giorgio Ottaviani**, Universita degli Studi di Firenze (1086-14-1918)

2:00PM (1086) *A study of the representations supported by the orbit closure of the determinant.* Preliminary report. **Shrawan Kumar**, UNC at Chapel Hill (1086-68-412)

3:00PM (1087) *Matrix Lie algebra isomorphism and symmetry-characterization in Geometric Complexity Theory.* **Joshua A. Grochow**, University of Toronto (1086-68-1851)

## *AMS Special Session on Geometric and Analytic Methods in Teichmüller Theory and Hyperbolic Geometry, I*

**1:00 PM – 3:50 PM** **Room 32B, Upper Level, San Diego Convention Center**

Organizers: **Ren Guo**, Oregon State University

**Zheng Huang**, City University of New York, Staten Island

**Marcello Lucia**, City University of New York, Staten Island

1:00PM (1088) *On the essential spectrum of complete Riemannian manifolds.* **Zhiqin Lu**, UC Irvine (1086-58-493)

1:30PM (1089) *Buser's Inequality and Cheeger Constants of Arithmetic Surfaces.* **Brian A. Benson**, University of Illinois at Urbana-Champaign (1086-57-945)

2:00PM (1090) *Iteration of mapping classes and limits of Weil-Petersson geodesics.* **Yunhui Wu**, Rice University (1086-53-310)

2:30PM (1091) *Half-plane differentials on Riemann surfaces.* **Subhojoy Gupta**, QGM Aarhus/Caltech (1086-30-1018)

3:00PM (1092) *Short time asymptotic behavior of the logarithm of heat kernel.* **Guoyi Xu**, University of California, Irvine (1086-53-651)

3:30PM (1093) *Quantifying Residual Finiteness in Terms of Geometric Data.* **Priyam Patel**, Rutgers University (1086-57-1013)

## *AMS Special Session on Harmonic Analysis, Partial Differential Equations, and Geometric Measure Theory, II (a Mathematics Research Communities session)*

**1:00 PM – 3:50 PM** **Room 30D, Upper Level, San Diego Convention Center**

Organizers: **Theresa Anderson**, Brown University

**Matthew Badger**, Stony Brook University

**Nathan Pennington**, Kansas State University

**Eric Stachura**, Temple University

1:00PM (1094) *The Dirichlet problem for higher order equations in composition form.* **Ariel Barton*** and **Svitlana Mayboroda**, University of Minnesota (1086-35-1769)

1:30PM (1095) *Chaotic dynamics of the heat semigroup in Riemannian symmetric spaces.* **Malabika Pramanik***, University of British Columbia, Vancouver, and **Rudra P. Sarkar**, Indian Statistical Institute, Kolkata, India (1086-43-1453)

2:00PM (1096) *Laminates Meet Burkholder Functions.* **Nicholas Boros**, Olivet Nazarene University (1086-42-93)

2:30PM ► (1097) *Lower bounds for $L_1$ discrepancy.* **Armen Vagharshakyan**, Brown University (1086-42-1056)

3:00PM (1098) *Wasserstein Distance and Rectifiability of Doubling Measures.* **Jonas Azzam**, University of Washington (1086-28-930)

3:30PM (1099) *The Geometry of Asymptotically Optimally Doubling Measures.* **Stephen David Lewis**, University of Washington (1086-28-1686)

## *AMS Special Session on L-Functions and Arithmetic Geometry, II*

**1:00 PM – 3:50 PM** **Room 15B, Mezzanine Level, San Diego Convention Center**

Organizers: **Alina Bucur**, University of California, San Diego

**Kiran Kedlaya**, University of California, San Diego

1:00PM ► (1100) *What is p-adic BSD for abelian varieties?* **William A Stein***, University of Washington, **Jennifer Balakrishnan**, Harvard, and **Steffan Muller**, Somewhere in Germany (1086-11-2311)

1:30PM (1101) *Computing Degrees of Parametrizations of Elliptic Curves by Shimura Curves.* **Alyson Deines**, University of Washington (1086-11-2016)

2:00PM (1102) *L-functions, periods and the relative trace formula for GL(2n).* **Brooke Feigon**, CCNY (1086-11-1593)

2:30PM (1103) *Identities for L-functions.* **Michael Rubinstein**, University of Waterloo (1086-11-2205)

► 3:00PM (1104) *Quaternionic lattice neighbours and automorphic forms.* Preliminary report. **Sarah A Chisholm**, University of Calgary (1086-11-1548)

3:30PM (1105) *The Fourier coefficients of harmonic Maass forms of weight one.* **William Duke**, UCLA (1086-11-1348)

## *AMS Special Session on Nonstandard Finite-Difference Discretizations and Nonlinear Oscillations (in honor of Ronald Mickens' 70th Birthday), II*

**1:00 PM – 3:50 PM** **Room 7B, Upper Level, San Diego Convention Center**

Organizers: **Ron Buckmire**, Occidental College
**Abba Gumel**, University of Manitoba
**Talitha Washington**, Howard University

► 1:00PM (1106) *Determination of Approximate Solutions to Non-linear Oscillatory Differential Equations.* **Kale Oyedeji**, Morehouse College (1086-34-121)

1:30PM (1107) *Analyzing Leah Cosine and Leah Sine through Polynomial Projection.* **G., Edgar Parker***, Guilford College and Emeritus, James Madison University, **James S. Sochacki** and **Stephen K. Lucas**, James Madison University (1086-34-699)

2:00PM (1108) *Properties of the Leah-Cosine (Lcn) Function.* **Sandra A Rucker**, Clark Atlanta University (1086-34-281)

► 2:30PM (1109) *A Generalized Finite Difference Time Domain Scheme for Solving Nonlinear Schrodinger Equation.* Preliminary report. **Weizhong Dai**, Louisiana Tech University (1086-65-811)

3:00PM Discussion

## *AMS Special Session on Quantum Walks and Related topics, II*

**1:00 PM – 4:20 PM** **Room 32A, Upper Level, San Diego Convention Center**

Organizers: **Yusuke Ide**, Kanagawa University
**Chaobin Liu**, Bowie State University
**Nelson Petulante**, Bowie State University
**Salvador E. Venegas-Andraca**, Tecnológico de Monterrey, Campus Estado de México

1:00PM (1110) *Time averaged distribution of discrete time quantum walks on the path.* **Yusuke Ide**, Department of Information Systems Creation, Faculty of Engineering, Kanagawa University (1086-81-1765)

► 1:30PM (1111) *On the study of quantum graph : a mapping to coined quantum walk.* Preliminary report. **Etsuo Segawa**, Tohoku University, Japan (1086-60-2081)

2:00PM (1112) *Return Probability of the Fibonacci Quantum Walk.* **Clement B. Ampadu**, Boston, MA (1086-00-351)

2:30PM (1113) *On Inhomogeneous Quantum Walk.* **Yutaka Shikano**, Institute for Molecular Science (1086-81-807)

3:00PM (1114) *Stationary Measures and Time-Averaged Limit Measures of Quantum Walks.* **Norio Konno**, Yokohama National University (1086-60-1114)

4:00PM (1115) *Quantum random walks under decoherence.* **Shimao Fan**, **Zhiyong Feng**, Temple University, **Sheng Xiong**, University of Pittsburgh, and **Wei-Shih Yang***, Temple University (1086-81-1461)

## *AMS Special Session on Recent Advances and New Challenges in Applied Analysis, II*

**1:00 PM – 3:50 PM** **Room 17A, Mezzanine Level, San Diego Convention Center**

Organizer: **Marian Bocea**, Loyola University, Chicago

1:00PM (1116) *Random Matrices, Spectral Measures, and Composite Media.* **N. Benjamin Murphy** and **Kenneth M. Golden***, University of Utah (1086-35-1278)

1:30PM (1117) *Nonlinear Neutral Inclusions: Assemblages of Spheres.* Preliminary report. **Silvia Jimenez***, **Bogdan Vernescu** and **William Sanguinet**, Worcester Polytechnic Institute (1086-35-918)

2:00PM (1118) *From Cheeger problem to limit analysis.* **Ioan R Ionescu**, University Paris 13, Sorbonne Paris Cite (1086-49-896)

2:30PM (1119) *Discrete Network Approximation for Dirichlet-to-Neumann Map for High Contrast Problems.* **Yuliya Gorb***, University of Houston, **Lilliana Borcea** and **Yingpei Wang**, Rice University (1086-35-2849)

3:00PM (1120) *Absolute Minimizers for Some $L^\infty$ Optimal Transport Problems.* **Danut Arama**, Loyola University Chicago (1086-49-2235)

3:30PM (1121) *The asymptotic behavior of solutions to the Robin eigenvalue problem for the $p(x)$-Laplacian as $p(x) \to \infty$.* **Farhod Abdullayev**, North Dakota State University (1086-35-1914)

### *AMS Special Session on Several Complex Variables and Multivariable Operator Theory, II*

**1:00 PM – 3:50 PM** **Room 16A, Mezzanine Level, San Diego Convention Center**

Organizers: **Joseph Ball**, Virginia Tech University
**Ronald Douglas**, Texas A&M University

1:00PM (1122) *Shift-invariant subspaces, inner functions and related linear systems: the weighted Bergman space setting.*
**Vladimir Bolotnikov***, The College of William and Mary, and **Joseph A Ball**, Virginia Tech (1086-32-1601)

1:30PM (1123) *Multiplication operators on reproducing kernel Hilbert spaces on Reinhardt domains in $\mathbb{C}^2$.*
**Raul E. Curto**, University of Iowa (1086-47-1609)

2:00PM (1124) *The Toeplitz corona problem for algebras of multipliers on a Nevanlinna-Pick space.*
**Mrinal Raghupathi***, United States Naval Academy, and **Ryan Hamilton**, PIMS (1086-47-1554)

2:30PM (1125) *Limits of positive flat bivariate moment matrices.*
**Lawrence A. Fialkow**, SUNY New Paltz (1086-47-529)

3:00PM (1126) *Cyclicity and optimal approximants.*
**Constanze Liaw***, Baylor University, **Catherine Beneteau**, University of South Florida, **Alberto Condori**, Florida Gulf Coast University, **Daniel Seco**, Universitat Autonoma de Barcelona, and **Alan Sola**, Cambridge University (1086-30-855)

3:30PM (1127) *Rank-one perturbations of Cuntz isometries.* Preliminary report.
**Michael Jury**, University of Florida (1086-47-2292)

### *AMS Special Session on Theory and Interdisciplinary Applications of Dynamical Systems, II*

**1:00 PM – 3:50 PM** **Room 31C, Upper Level, San Diego Convention Center**

Organizer: **Sukanya Basu**, Central Michigan University

1:00PM (1128) *A Monster Tower Approach to Goursat Multi-Flags.*
**Wyatt Howard***, University of California Santa Cruz, and **Alex Castro**, Pontífica Universidade Católica Do Rio de Janeiro (1086-53-1002)

► 1:30PM (1129) *Tire tracks geometry and bicycle kinematics.*
**Serge Tabachnikov**, Pennsylvania State University (1086-37-737)

► 2:00PM (1130) *On the asymptotic behavior of convergent solutions to difference equations.*
**William T Jamieson*** and **Orlando Merino**, University of Rhode Island (1086-39-1961)

2:30PM (1131) *Singular Perturbations in the Quadratic Family.*
**Elizabeth D Russell**, Western New England University (1086-37-720)

► 3:00PM (1132) *A dynamics approach of snowball events.* Preliminary report.
**Esther R. Widiasih**, University of Arizona (1086-37-2851)

3:30PM (1133) *Multi-scale Analysis in Ocean Circulation Models.*
**Andrew A Roberts**, University of North Carolina - Chapel Hill (1086-34-784)

### *AMS Special Session on Topics and Issues in Electronic Publishing, II*

**1:00 PM – 3:20 PM** **Room 9, Upper Level, San Diego Convention Center**

Organizers: **Klaus Kaiser**, University of Houston
**Steven Krantz**, Washington University in St. Louis
**Elizabeth Loew**, Springer

► 1:00PM (1134) *Remarks on the economics of math journal publishing.*
**Rob Kirby**, University of California, Berkeley (1086-00-1003)

1:30PM (1135) *"Author-Sponsored-Journals", a practical variation of the "Open-Access" business model.*
**Klaus Kaiser**, University of Houston (1086-00-389)

► 2:00PM (1136) *The Brave New World of Open Access and Creative Commons: A Humanistic Experiment in Mathematical Publishing.*
**Gizem Karaali**, Pomona College (1086-00-60)

► 2:30PM (1137) *SpringerOpen: Springer's open access platform.*
**Vindra Dass**, Springer Science+Business Media (1086-00-1162)

► 3:00PM (1138) *[Draft] Math Journal Epitaph.*
**Johan Rudnick**, Canadian Mathematical Society (1086-00-1321)

### *AMS Special Session on Witt Vectors, Lifting and Descent, II*

**1:00 PM – 3:50 PM** **Room 14A, Mezzanine Level, San Diego Convention Center**

Organizers: **James Borger**, Australia National University
**Alexandru Buium**, University of New Mexico
**Taylor Dupuy**, University of New Mexico

**Lance Miller**, University of Utah

1:00PM (1139) *Witt vectors and lambda-structures in arithmetic algebraic geometry.* Preliminary report.
**James M Borger**, Australian National University (1086-11-1700)

1:30PM (1140) *Differential lifts and differential symmetries.* Preliminary report.
**Alexandru Buium**, University of New Mexico, Albuquerque (1086-11-1450)

2:00PM (1141) *Base rings for global $(\varphi,\Gamma)$-modules.*
**Christopher Davis**, University of California, Irvine (1086-11-781)

2:30PM (1142) *Towards global $(\varphi,\Gamma)$-modules and comparison isomorphisms.*
**Kiran S. Kedlaya**, University of California, San Diego (1086-11-773)

3:00PM (1143) *Overconvergent de Rham-Witt cohomology for Algebraic Stacks.*
**David Zureick-Brown***, Emory University, and **Christopher Davis**, UC Irvine (1086-11-1797)

3:30PM (1144) *Lambda structures on stacks.*
**Lance Gurney**, Australian National University (1086-14-2232)

## *MAA-AMS-SIAM Invited Paper Session on Energy, Population, and Sustainability, II*

**1:00 PM – 3:45 PM** **Room 6C, Upper Level, San Diego Convention Center**

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

**Fred Roberts**, Center for Discrete Mathematics and Theoretical Computer Science, Rutgers University

► 1:00PM (1145) *Planet Earth in the Mathematics Curriculum.*
**Mary Lou Zeeman***, Bowdoin College, and **Gene Fiorini***, DIMACS, Rutgers University (1086-AC-1502)

1:45PM (1146) *Quantifying Uncertainty in Climate Model Experiments.*
**Steve Sain**, Institute for Mathematics Applied to Geosciences, NCAR (1086-AC-1301)

► 2:30PM (1147) *Infectious Disease & Sustainability: Lessons from Research at NIMBioS.*
**Suzanne Lenhart***, U of Tennessee, Knoxville and NIMBIoS, and **Louis Gross**, NIMBIoS, U of Tennessee (1086-AC-1272)

► 3:15PM (1148) *The Logic of Nature Versus the Logic of Industrial Humans: End Game.* Preliminary report.
**Martin E. Walter**, University of Colorado, Boulder (1086-AC-999)

## *MAA Minicourse #2: Part A*

**1:00 PM – 3:00 PM** **Room 30A, Upper Level, San Diego Convention Center**

*A game theory path to quantitative literacy.*

Presenter: **David Housman**, Goshen College

## *MAA Minicourse #9: Part A*

**1:00 PM – 3:00 PM** **Room 29C, Mezzanine Level, San Diego Convention Center**

*Shortest, quickest, or best: An introduction to the calculus of variations.*

Presenter: **Jeffrey Ehme**, Spelman College

## *MAA Minicourse #15: Part A*

**1:00 PM – 3:00 PM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*WeBWorK: An open source alternative for generating and delivering online homework problems.*

Presenters: **John Travis**, Mississippi College

**Jason Aubrey**, University of Missouri

## *AMS Session on Number Theory, II*

**1:00 PM – 4:25 PM** **Room 12, Mezzanine Level, San Diego Convention Center**

► 1:00PM (1149) *The abc Conjecture and non-Wieferich primes in Arithmetic Progressions.*
**Hester K. S. Graves***, IDA, and **M. Ram Murty**, Queen's University (1086-11-270)

1:15PM (1150) *Behavior of $\ell$-regular partitions modulo powers of $\ell$.*
**John J. Webb**, Wake Forest University (1086-11-1871)

► 1:30PM (1151) *Transcendence of the Artin-Mazur Zeta Function for Polynomial Maps in Positive Characteristic.*
**Andrew D Bridy**, University of Wisconsin-Madison (1086-11-652)

1:45PM (1152) *Ramanujan's forty identities for the Rogers-Ramanujan functions and further identities of the same type.* Preliminary report.
**Zhu Cao**, Southern Polytechnic State University (1086-11-2758)

2:00PM (1153) *Congruence Properties of Borcherds Product Exponents.*
**Keenan Monks**, Harvard University, **Sarah Peluse**, University of Chicago, and **Lynnelle Ye***, Stanford University (1086-11-2188)

2:15PM (1154) *Continuous Distribution Arising from the Three Gap Theorem.*
**Geremias Polanco E.***, Illinois Wesleyan University, **Daniel Schultz** and **Alexandru Zaharescu**, University of Illinois at Urbana-Champaign (1086-11-748)

2:30PM ► (1155) *Partial sums and geometric series.*
**Eduardo Giovanni Aponte**, Universidad Nacional Experimental Antonio José de Sucre. Caracas, Venezuela (1086-11-41)

2:45PM (1156) *A New Algorithm for Computing Endomorphism Rings of Supersingular Elliptic Curves.*
**Ken McMurdy**, Ramapo College of New Jersey (1086-11-713)

3:00PM ► (1157) *$\tau_n$-Number Theory.* Preliminary report.
**Reyes Matiel Ortiz-Albino**, University of Puerto Rico-Mayaguez (1086-11-2892)

3:15PM (1158) *Reduced $\tau_n$-factorizations of the Integers.* Preliminary report.
**Alina A Florescu**, The University of Iowa (1086-13-1971)

3:30PM ► (1159) *Diophantine Monoids Defined by a Single Linear Equation.* Preliminary report.
**Trey Brock**, University of Central Missouri (1086-11-2388)

3:45PM ► (1160) *Patterns in continued fractions for $\sqrt{n}$.* Preliminary report.
**Duff G. Campbell**, Hendrix College (1086-11-1974)

4:00PM ► (1161) *eCF: Encoding Continued Fraction Knowledge in Computational Form.* Preliminary report.
**Eric W Weisstein*** and **Michael Trott**, Wolfram Alpha LLC (1086-12-2653)

4:15PM ► (1162) *On SA, CA, and GA numbers.*
**Geoffrey Caveney**, Chicago, IL, **Jean-Louis Nicolas**, Universite de Lyon; CNRS, Institut Camille Jordan, and **Jonathan Sondow***, New York, NY (1086-11-2318)

## *AMS Session on Permutations and Pattern Avoidance*

**1:00 PM – 4:25 PM** **Room 18, Mezzanine Level, San Diego Convention Center**

1:00PM ► (1163) *Pattern Popularity in 132-avoiding Permutations.*
**Kate Rudolph**, Massachusetts Institute of Technology (1086-05-416)

1:15PM (1164) *312-Pattern Avoiding Permutations With Determined Points.* Preliminary report.
**Neal Madras** and **Lerna Pehlivan***, York University (1086-05-223)

1:30PM ► (1165) *Stack Sorting.* Preliminary report.
**Kristen Bartosz**, Oregon State University (1086-05-890)

1:45PM ► (1166) *Pattern Avoidance in Permutations on the Boolean Lattice.*
**Morgan Weiler***, Univserity of California, Berkeley, and **Samuel Hopkins**, Reed College (1086-05-1509)

2:00PM (1167) *Longest Common Patterns of Random Permutations.*
**Michael J Earnest**, Harvey Mudd College (1086-05-1489)

2:15PM (1168) *Counting permutations with exactly $r$ occurrences of a pattern.*
**Brian Nakamura*** and **Doron Zeilberger**, Rutgers University (1086-05-2790)

2:30PM ► (1169) *Avoiding Colored Partitions of Two Elements.*
**Jonathan S. Sheperd**, University of Notre Dame (1086-05-872)

2:45PM ► (1170) *Pattern avoidance in permutations on posets.*
**Samuel Francis Hopkins***, Reed College, and **Morgan Weiler**, University of California, Berkeley (1086-05-905)

3:00PM ► (1171) *de Bruijn Sequences that Avoid Certain Patterns.* Preliminary report.
**Abbas M Alhakim**, American University of Beirut (1086-05-2248)

3:15PM ► (1172) *Block transpositions, scrambling numbers, and commutativity.* Preliminary report.
**Thomas Langley**, Rose-Hulman Institute of Technology (1086-05-2593)

3:30PM (1173) *The Colored Eulerian Descent Algebra.*
**Matthew Moynihan**, The College of Wooster (1086-05-2803)

3:45PM (1174) *The Hopf Algebra of Sashes.*
**Shirley Elizabeth Law**, North Carolina State University (1086-05-572)

4:00PM (1175) *New results on decomposable Specht modules.*
**Craig J Dodge**, Allegheny College (1086-20-128)

4:15PM (1176) *Counting copies of vincular patterns among pattern-avoiding permutations.* Preliminary report.
**Andrew M Baxter**, Pennsylvania State University (1086-05-628)

## *AMS Session on Polynomials, Field Theory, and Factorizations*

**1:00 PM – 4:10 PM** **Room 13, Mezzanine Level, San Diego Convention Center**

1:00PM (1177) *The Decomposition of Solutions to the Polynomial Pell Equation.*
**Benjamin L Weiss***, Bates College, and **Michael E Zieve**, University of Michigan (1086-12-2434)

1:15PM ► (1178) *Common Values of Polynomials Over Finite Fields.* Preliminary report.
**Hanna Astephan**, **Solly Parenti**, **Joe Varilone**, **Nick Wasylyshyn**, University of Michigan, **Ben Zinberg***, Massachusetts Institute of Technology, and **Michael Zieve**, University of Michigan (1086-11-2656)

1:30PM Discussion

1:30PM (1179) *TALK CANCELLED Explicit Factorizations Of Generalized Cyclotomic Polynomials Over Finite Fields.*
**Cemile Tosun**, Southern Illionis University Carbondale (1086-12-2948)

► 1:45PM (1180) *Irreducibility criteria for polynomials and linear transformations.*
**Martin Juras**, Qatar University (1086-12-368)

► 2:00PM (1181) *Title: Orbits under polynomials that coincide with subgroups of the units of Z/nZ.* Preliminary report.
**Robert M Sulman**, S.U.N.Y. College at Oneonta (1086-11-262)

► 2:15PM (1182) *Newly Irreducible Iterates of Some Families of Quadratic Polynomials.* Preliminary report.
**Katharine Chamberlin**, **Emma Colbert***, **Sharon Frechette**, **Patrick Hefferman**, College of the Holy Cross, **Rafe Jones**, Carleton College, and **Sarah Orchard**, College of the Holy Cross (1086-11-2358)

► 2:30PM (1183) *Monoids Determined by a Linear Homogeneous Diophantine Equation.* Preliminary report.
**Madeline Handschy**, **Katherine Meyer***, **Katherine Phillips** and **Jennifer Sadler**, Smith College (1086-11-2130)

2:45PM (1184) *TALK CANCELLED: The divisor class numbers of certain function fields.*
**Qingquan Wu**, Texas A&M International University (1086-11-928)

3:00PM (1185) *Computing Galois-theoetic invariants for certain degree six $p$-adic fields.*
**Chad Awtrey**, Elon University (1086-11-2150)

► 3:15PM (1186) *Minimal ramification and the Inverse Galois Problem over function fields.*
**Meghan M De Witt**, Brigham Young University (1086-12-1895)

► 3:30PM (1187) *On the Maximal Cross Number of Unique Factorization Multisets.*
**Daniel J. Kriz**, Princeton (1086-11-1658)

3:45PM (1188) *Differential Invariants in Cryptography.*
**Daniel C Smith**, University of Louisville/National Institute of Standards and Technology (1086-12-2786)

4:00PM (1189) *Mean values of certain multiplicative functions.* Preliminary report.
**Sankar Sitaraman**, Howard University, Washington DC. (1086-11-2673)

## *AMS Session on Statistics, Stochastic Processes, and Applications*

**1:00 PM – 3:55 PM** **Room 19, Mezzanine Level, San Diego Convention Center**

1:00PM (1190) *Bias reduction in optimality gap estimation for stochastic programs.*
**Rebecca Stockbridge*** and **Guzin Bayraksan**, University of Arizona (1086-90-1511)

► 1:15PM (1191) *Modeling and Analysis of an Inventory System with Ramp Type Demand Rate and Backlogging.*
**Vikramjeet Singh**, Lovely Professional University, Punjab, India (1086-90-254)

1:30PM (1192) *semi-parametric rank regression with missing response.*
**Huybrechts Bindele***, University of South Alabama, and **Asheber Abebe**, Auburn University (1086-62-550)

1:45PM (1193) *Approximating the Distribution of Fisher's Combined p-Values from Multiple Experiments with Application.* Preliminary report.
**Mehdi Razzaghi**, Bloomsburg University, Bloomsburg, PA (1086-62-1752)

► 2:00PM (1194) *Forecasting Using Functional Data Analysis Models in Cancer Epidemiology.*
**Keshav P Pokhrel*** and **Chris P Tsokos**, University of South Florida, Tampa (1086-62-2631)

2:15PM (1195) *Inferring Fitness in Finite, Variably-Sized, Evolving, and Dynamically-Structured Populations.* Preliminary report.
**Marc A Harper**, UCLA (1086-60-385)

► 2:30PM (1196) *Invariant perfect matchings in Cayley graphs via short augmenting paths in expanders.* Preliminary report.
**Miklos Abert**, Renyi Institute, Budapest, **Endre Csoka**, Eotvos University Budapest, **Gabor Lippner***, Harvard University, and **Tamas Terpai**, EPFL Lausanne (1086-60-2741)

2:45PM (1197) *A novel approach to analyzing graphons.*
**Apoorva Khare*** and **Bala Rajaratnam**, Stanford University (1086-05-2606)

3:00PM (1198) *Regularization of positive definite matrices: connections between algebra, graph theory and statistics.*
**Dominique Guillot**, Stanford University, **Alfred O Hero**, University of Michigan, Ann Arbor, **Brett Naul** and **Bala Rajaratnam***, Stanford University (1086-05-2628)

3:15PM (1199) *Model choice for gene pathway-based priors in Bayesian association studies.*
**Abra Brisbin***, University of Wisconsin-Eau Claire, **Liewei Wang**, Mayo Clinic, and **Brooke Fridley**, University of Kansas Medical Center (1086-92-2341)

3:30PM (1200) *Computing percolation threshold bounds using the substitution method without a reference lattice.* Preliminary report.
**John C. Wierman**, Johns Hopkins University (1086-60-1057)

► 3:45PM (1201) *An Analysis of Systems Readiness Functions.* Preliminary report.
**David J. Marchette**, Naval Surface Warfare Center, Dahlgren, VA (1086-05-1312)

### *MAA Session on Bridging the Gap: Designing an Introduction to Proofs Course*

**1:00 PM – 4:15 PM** **Room 5A, Upper Level, San Diego Convention Center**

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

► 1:00PM (1202) *Becoming successful proof-writers through peer review, journals, and portfolios.* **Jennifer B. Schaefer**, Dickinson College (1086-C5-1408)

► 1:20PM (1203) *Transition to Mathematical Proofs: Assessment of an online proofs course.* Preliminary report. **Roberto C Pelayo**, University of Hawaii at Hilo (1086-C5-1846)

► 1:40PM (1204) *Lessons Learned from a Teaching Experiment Focused on Proof Validation.* **Sarah K. Bleiler***, Middle Tennessee State University, **Denisse R. Thompson** and **Mile Krajcevski**, University of South Florida (1086-C5-2134)

► 2:00PM (1205) *A Course for Bridging the Gap.* **Larry J. Gerstein**, University of California, Santa Barbara (1086-C5-484)

2:20PM (1206) *TALK CANCELLED: Bridge Course Assessments That Motivate and Engage.* Preliminary report. **Theresa L Friedman**, Colorado Mesa University (1086-C5-2876)

2:40PM (1207) *Teaching an Introduction to Proof Course Using Inquiry-Based Learning.* **Jim Fulmer*** and **Tom McMillan**, University of Arkansas at Little Rock (1086-C5-2648)

► 3:00PM (1208) *Understanding the Problem: Unification, Generalization or Abstraction?* Preliminary report. **Martin E Flashman**, Humboldt State University (1086-C5-1096)

► 3:20PM (1209) *Mathematical Reasoning course at Winthrop.* Preliminary report. **Heakyung Lee*** and **Joseph P Rusinco**, Winthrop University (1086-C5-1276)

► 3:40PM (1210) *Building a mathematical community while learning strategies for discovering and writing proofs.* **Megan Paddack**, Southern New Hampshire University (1086-C5-2692)

► 4:00PM (1211) *Teaching proving techniques using MIZAR proof checker.* **Krystyna Kuperberg**, Auburn University (1086-C5-2154)

### *MAA Session on Communicating Mathematics, I*

**1:00 PM – 4:15 PM** **Room 33A, Upper Level, San Diego Convention Center**

Organizers: **Brian Katz**, Augustana College

**Elizabeth Thoren**, University of California Santa Barbara

► 1:00PM (1212) *Communicating in a Statistical Consulting Course.* **Kimberly A Roth**, Juniata College (1086-D1-2111)

► 1:20PM (1213) *Scaffolding Oral Communication in Math Classes.* **Violeta Vasilevska**, Utah Valley University (1086-D1-1290)

► 1:40PM (1214) *Presentations by participants in class consisting of two distinct groups of students.* **Krystyna Kuperberg**, Auburn University (1086-D1-2164)

2:00PM (1215) *Scaffolding Writing in the Mathematics Classroom.* **Julie C Beier**, Mercer University (1086-D1-552)

2:20PM (1216) *A Writing Guide and Rubric for Mathematics.* **Geoffrey W Buhl**, California State University Channel Islands (1086-D1-2765)

► 2:40PM (1217) *(Explain It) x 3.* Preliminary report. **Linda McGuire**, Muhlenberg College (1086-D1-504)

► 3:00PM (1218) *Giving Students an Active Role in Creating Homework Feedback.* Preliminary report. **Nina Juliana White**, University of Michigan (1086-D1-1611)

3:20PM (1219) *Writing Projects in Mathematics: Student Data and Suggestions Gained from Our Experience.* **Joe Latulippe*** and **Christine Latulippe**, Norwich University (1086-D1-2708)

► 3:40PM (1220) *Student-centered versus instructor-centered approaches to teaching mathematics.* Preliminary report. **Tara C Davis*** and **Hung Lu**, Hawaii Pacific University (1086-D1-1052)

► 4:00PM (1221) *Interactions with the Writing Center.* Preliminary report. **Jeremy Case**, Taylor University (1086-D1-2549)

### *MAA Session on Effective Strategies and Programs for Mentoring Women and Minorities in Mathematics, I*

**1:00 PM – 3:55 PM** **Room 5B, Upper Level, San Diego Convention Center**

Organizers: **Jenna Price Carpenter**, Louisiana Tech University

**Jessica M. Deshler**, West Virginia University

**Elizabeth A. Burroughs**, Montana State University

1:00PM (1222) *The College of New Jersey Advancement Program, or What We Did With Our NSF-Advance PAID grant.*
**Karen Clark***, **Diane Bates**, **Elizabeth Borland**, **Lisa Grega**, **Amanda Norvell**, **Suriza van der Sandt** and **Chang Karen Yan**, The College of New Jersey (1086-E5-1488)

► 1:20PM (1223) *Girls Doing Research: A Case Study.*
**Sheila K Miller**, City University of New York: New York City College of Technology (1086-E5-2750)

► 1:40PM (1224) *Leveling the Playing Field: Benefits for Women of Inquiry-Based Approaches in the Undergraduate Mathematics Classroom.*
**Sandra Laursen*** and **Marja-Liisa Hassi**, University of Colorado Boulder (1086-E5-2738)

► 2:00PM (1225) *Mentoring Women and Minorities in General Summer Programs.* Preliminary report.
**Sue Geller**, Texas A&M University (1086-E5-146)

2:20PM (1226) *Helping Students Engage in Successful Mentoring Relationships.*
**Levi Johnson**, **Kent Pearce** and **G. Brock Williams***, Texas Tech University (1086-E5-2454)

2:40PM (1227) *Mentoring Paradigms for Underrepresented Groups in STEM Scholarship Programs.*
**Jerry Dwyer**, **Kent Pearce*** and **G. Brock Williams**, Texas Tech University (1086-E5-2426)

3:00PM (1228) *STAGE: A pilot project in mentoring underrepresented undergraduate students.* Preliminary report.
**Christina Eubanks-Turner*** and **Patricia Beaulieu**, University of Louisiana at Lafayette (1086-E5-448)

► 3:20PM (1229) *$M^3$: Mentoring, Motivation and Mancala.* Preliminary report.
**Anthony Tongen**, James Madison University (1086-E5-2484)

► 3:40PM (1230) *Promoting diversity in the mathematical sciences: the Infinite Possibilities Conference.* Preliminary report.
**Lily S Khadjavi***, Loyola Marymount University, and **Tanya Moore**, Building Diversity in Science (1086-E5-2525)

## *MAA Session on Innovative and Effective Ways to Teach Linear Algebra, I*

**1:00 PM – 4:15 PM** **Room 11B, Upper Level, San Diego Convention Center**

Organizer: **David M. Strong**, Pepperdine University

1:00PM (1231) *Hidden treasures $2 \times 2$ linear systems—applications of non-orthonormal coordinate systems.*
**Jon Davidson**, Southern State Community College, Hillsboro, Ohio (1086-G5-2303)

► 1:20PM (1232) *Teaching Matrix Algebra with Magic Squares.*
**Karsten K. Schmidt**, Schmalkalden University of Applied Sciences, Germany (1086-G5-1698)

► 1:40PM (1233) *G-Sets and Linear Recurrences Modulo Primes.* Preliminary report.
**Robert C Ray**, Gonzaga University (1086-G5-2308)

► 2:00PM (1234) *The Spectral Basis of a Linear Operator.*
**Garret E. Sobczyk**, Universidad de Las Americas, Cholula, Puebla, Mexico (1086-G5-126)

► 2:20PM (1235) *The Wronskian as a method for introducing vector spaces.*
**Daniel A Ramras**, New Mexico State University (1086-G5-432)

► 2:40PM (1236) *A Geometry-first Introduction to Determinants.*
**C Ray Rosentrater**, Westmont College (1086-G5-1260)

► 3:00PM (1237) *The incorporation of weekly laboratory explorations with MATLAB in the Linear Algebra Curriculum.* Preliminary report.
**Dan Seth**, West Texas A&M University (1086-G5-456)

► 3:20PM (1238) *TALK CANCELLED: Active Learning in the Linear Algebra Classroom Using Sage.*
**Brandy A. Benedict**, Merrimack College (1086-G5-2569)

3:40PM (1239) *Sage E-books on Linear Algebra and Calculus.* Preliminary report.
**Sang-Gu Lee*** and **Kyung-Won Kim**, Sungkyunkwan University (1086-G5-1206)

4:00PM (1240) *How a little linear algebra can go a long way in the Math Stat course.*
**Randall Pruim**, Calvin College (1086-G5-2928)

## *MAA Session on Mathematics and Sports, I*

**1:00 PM – 3:55 PM** **Room 2, Upper Level, San Diego Convention Center**

Organizer: **R. Drew Pasteur**, College of Wooster

► 1:00PM (1241) *A Value-Added Metric for NFL Field Goal Kickers.* Preliminary report.
**R. Drew Pasteur*** and **Kyle Cunningham-Rhoads**, College of Wooster (1086-K5-2470)

► 1:20PM (1242) *Putting on the PGA Tour.* Preliminary report.
**Roland Minton**, Roanoke College (1086-K5-2407)

► 1:40PM (1243) *Interpreting Imperfect Data to Perfect Performance in a NASCAR Race.*
**Timothy Chartier**, Davidson College, **Donour Sizemore**, Michael Waltrip Racing, and **Erica Dominic***, Kalamazoo College (1086-K5-1958)

► 2:00PM (1244) *The National Football League's Overtime Rule Revisited.*
**Michael A. Jones***, Mathematical Reviews/American Mathematical Society, and **Laura VerHulst**, Albion College (1086-K5-1196)

► 2:20PM (1245) *The NFL Overtime Rule Change: Was it really necessary?*
**Nicholas Gorgievski***, Nichols College, and **Thomas C. DeFranco**, University of Connecticut (1086-K5-2408)

► 2:40PM (1246) *Using Figure Skating Activities to Develop Middle School Teachers' Rational Number Sense.*
**Tetyana Berezovski**, St. Joseph's University, and **Diana S Cheng***, Towson University (1086-K5-267)

3:00PM (1247) *Mathematical Analysis Raises Questions About The Wisdom of Conventional Decision Making In Sports.*
**Andrew B Perry**, Springfield College (MA) (1086-K5-2234)

► 3:20PM (1248) *A Mathematical Model Of A Volleyball Serve, From Projectile Motion To Fluid Dynamics.*
**Scott B. White*** and **Jacci White**, Saint Leo University (1086-K5-906)

► 3:40PM (1249) *Should I get new wheels? The effects of rotational versus non-rotational mass in bicycling.*
**J. Christopher Tweddle**, University of Evansville (1086-K5-1995)

## *MAA Session on Research on the Teaching and Learning of Undergraduate Mathematics, III*

**1:00 PM – 4:15 PM** **Room 3, Upper Level, San Diego Convention Center**

Organizers: **Kyeong Hah Roh**, Arizona State University
**Stacy Brown**, Pitzer College
**Mike Oehrtman**, University of Northern Colorado

► 1:00PM (1250) *In-Service Secondary Teachers' Conceptualization of Complex Numbers.*
**Hortensia Soto-Johnson***, **Gulden Karakok** and **Stephenie Anderson**, University of Northern Colorado (1086-N1-996)

► 1:20PM (1251) *The effects of formative assessment on students' Zone of Proximal Development in introductory calculus.* Preliminary report.
**Rebecca-Anne Dibbs*** and **Michael C Oehrtman**, University of Northern Colorado (1086-N1-1549)

► 1:40PM (1252) *Two Students' Negotiation of Constructing Surfaces in Space.*
**Eric D Weber**, Oregon State University (1086-N1-1249)

► 2:00PM (1253) *Students' Idiosyncratic Usage of the Equal Sign While Verifying Trigonometric Identities.* Preliminary report.
**Benjamin Wescoatt**, Oklahoma State University (1086-N1-2848)

► 2:20PM (1254) *Developing Instructor Support Materials for an Inquiry-Oriented Curriculum.*
**Elise Lockwood**, University of Wisconsin - Madison, **Estrella Johnson** and **Sean Larsen***, Portland State University (1086-N1-555)

► 2:40PM (1255) *What is pre-service understanding on the concept of vector?*
**Hyunkyoung Yoon**, Arizona State University (1086-N1-2862)

► 3:00PM (1256) *University Calculus Students' Meanings for Fraction and Quotient.*
**Cameron O Byerley** and **Neil Hatfield***, Arizona State University (1086-N1-2173)

3:20PM (1257) *Analyzing Conceptual Gains in Introductory Calculus with Interactively-Engaged Teaching Styles.*
**Matthew Thomas*** and **Guadalupe Lozano**, University of Arizona (1086-N1-2067)

3:40PM TALK ADDED: Student concept images of function and linear transformation, Michelle Zandieh*, Arizona State University, Jessica Ellis, UCSD/SDSU; and Chris Rasmussen, SDSU.

## *MAA Session on Student Success in Quantitative Reasoning, II*

**1:00 PM – 3:55 PM** **Room 7A, Upper Level, San Diego Convention Center**

Organizer: **Ray Collings**, Georgia Perimeter College

► 1:00PM (1258) *Quantitative Reasoning through Consumer Finance.* Preliminary report.
**Andrew J Miller**, Belmont University (1086-P1-2518)

► 1:20PM (1259) *Dual Credit for Quantitative Reasoning Courses: What Are the Challenges?*
**Gregory D. Foley**, Athens (1086-P1-2951)

1:40PM (1260) *Quantway and Statway: Successful Models for Teaching Quantitative Reasoning.*
**Cinnamon Hillyard*** and **Karon Klipple**, Carnegie Foundation for the Advancement of Teaching (1086-P1-2088)

► 2:00PM (1261) *Reverse Engineering a Quantitative Reasoning Course.*
**Bernard L Madison**, University of Arkansas (1086-P1-2314)

► 2:20PM (1262) *Partner Disciplines and Implications for the Mathematics Curriculum: Moving Forward with the Curriculum Foundations Project.*
**Susan L. Ganter***, East Carolina University, and **William E. Haver**, Virginia Commonwealth University (1086-P1-2688)

2:40PM (1263) *First and Second Year Quantitative Reasoning Courses according to Members of the National Numeracy Network.* Preliminary report.
**Caren Diefenderfer**, Hollins University Roanoke, VA 24020 (1086-P1-2437)

3:00PM (1264) *Guided Discovery and Concept Development in Applied Calculus.*
**Chris Oehrlein**, Oklahoma City (1086-P1-2680)

3:20PM (1265) *Incorporating More Quantitative Reasoning in an Applied Calculus Course.*
**Theresa Laurent**, St. Louis College of Pharmacy (1086-P1-2608)

3:40PM (1266) *Promptless instruments and Habits of Mind: Quantitative Literacy as an honors course.*
**Dominic Klyve*** and **Stuart Boersma**, Central Washington University (1086-P1-2277)

## *MAA Session on the History of Geometry, Its Applications, and Their Uses in the Classroom*

**1:00 PM – 4:15 PM** **Room 6E, Upper Level, San Diego Convention Center**

Organizers: **Amy Shell-Gellasch**, Hood College
**Glen Van Brummelen**, Quest University

1:00PM (1267) *The History of Motion in Geometry.* Preliminary report.
**Meighan I. Dillon**, Southern Polytechnic State University (1086-F5-871)

1:20PM (1268) *Pleasure, Pedagogy and Performance for an American High School Geometry Teacher – The Dissected Polyhedra and Polygons of A. Harry Wheeler.* Preliminary report.
**Peggy Aldrich Kidwell**, National Museum of American History, Smithsonian Institution (1086-F5-1030)

1:40PM (1269) *Triangle Congruence in Absolute Plane Geometry.*
**John Donnelly**, University of Southern Indiana (1086-F5-613)

2:00PM (1270) *A Wiki, Some Geometry, and the Parallel Postulate.*
**Sarah L Mabrouk**, Framingham State University (1086-F5-2213)

2:20PM (1271) *Steiner-Lehmus revisited - again.* Preliminary report.
**James J Tattersall**, Providence College (1086-F5-638)

2:40PM (1272) *Euler and the Figure of the Earth.*
**George W. Heine**, Pueblo, CO (1086-F5-1394)

3:00PM (1273) *Diophantine Geometry, Eulerian Number Theory, and Undergraduates.* Preliminary report.
**Christopher Goff**, University of the Pacific (1086-F5-1470)

3:20PM (1274) *TALK CANCELLED: The Constructive Geometry of the Śulbasūtras.*
**Toke L Knudsen**, SUNY Oneonta (1086-F5-1649)

3:40PM (1275) *Albert Girard's Iterative Method for solving Cubic Equations.* Preliminary report.
**Stacy G. Langton**, University of San Diego (1086-F5-2403)

4:00PM (1276) *Applications of Geometry in the Philosophy Classroom and Beyond.* Preliminary report.
**Thomas Drucker**, University of Wisconsin–Whitewater (1086-F5-620)

## *MAA General Contributed Paper Session: Modeling and Applications of Mathematics, II*

**1:00 PM – 3:55 PM** **Room 33B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Caroline Haddad**, SUNY Geneseo
**Mariah Birgen**, Wartburg College

1:00PM (1277) *Optimizing a female-killing strategy to control the dengue vector, Aedes aegypti.*
**Michael A Robert***, **Alun L Lloyd**, Biomathematics Graduate Program, Department of Mathematics, North Carolina State University, and **Fred Gould**, Department of Entomology, North Carolina State University (1086-VG-2595)

1:15PM (1278) *The Utility of Transient Sensitivity Analysis for Malaria Intervention Strategies.* Preliminary report.
**Nathanial Burch***, North Carolina State University, **Levis Eneya**, University of Malawi – Chancellor College, **Sean Kramer**, Clarkson University, and **Samantha Tracht**, University of Tennessee (1086-VG-2239)

1:30PM (1279) *Compartmentalizing The Sunlight Vitamin: Using PBPK Modeling to explore Levels of Vitamin D and its Metabolites.*
**Megan E Sawyer**, North Carolina State University (1086-VG-1812)

1:45PM (1280) *Enhanced surveillance on food-borne disease outbreaks: dynamics of cross-contamination in biocidal wash procedure.*
**Daniel S. Munther*** and **Jianhong Wu**, Centre for Disease Modelling, Department of Mathematics and Statistics, York University (1086-VG-1806)

2:00PM (1281) *Mathematical analysis of a scrapie disease transmission model.*
**Najat Ziyadi***, Morgan State University, **Said Boulite**, University Hassan II, **M. Lhassan Hbid**, Cadi Ayyad University, and **Suzanne Touzeau**, French National Institute For Agricultural Research (1086-VG-1491)

2:15PM (1282) *Malaria Drug Resistance: The impact of Human Movement and Spatial Heterogeneity.* Preliminary report.
**Folashade B. Agusto**, Austin Peay State University (1086-VG-912)

► 2:30PM (1283) *Characterization of Melanoma and Moles using Invariant Histograms.*
**Jack T Stangl**, University of St. Thomas (1086-VG-527)

► 2:45PM (1284) *Characterization of Melanoma and Moles using Fractal Dimension.*
**Aaron Rodriguez***, Iowa State University, **Cheri Shakiban** and **Jack Stangl**, University of St. Thomas (1086-VG-420)

► 3:00PM (1285) *Analysis of Diabetes Data Using Wavelet Scalograms.*
**Edward F Aboufadel**, Grand Valley State University (1086-VG-59)

3:15PM (1286) *Stability and bifurcation of a three dimensional Ricker model.*
**Muna A Alhalawa***, Technical University of Lisbon, **Saber Elaydi**, Trinity University, San Antonio,Texas, and **Henrique Oliveira**, Technical University of Lisbon (1086-VG-1282)

3:30PM (1287) *Existence and Uniqueness of steady state solution for a general population model.*
**Joon Hyuk Kang**, Andrews University (1086-VG-858)

3:45PM (1288) *Fractional model of phytoplankton allelopathy.*
**Abbas Syed*** and **Lakshman Mahto**, Indian Institute of Technology Mandi (1086-VG-771)

## *MAA General Contributed Paper Session: Research in Graph Theory and Combinatorics, III*

**1:00 PM – 4:10 PM** **Room 33C, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Feryal Alayont**, Grand Valley State University
**John Villalpando**, California Lutrheran University

► 1:00PM (1289) *Nonrepetitive Colorings of Grid Graphs.*
**André Kündgen** and **Alex Toole***, California State University, San Marcos (1086-VN-863)

► 1:15PM (1290) *Defective (3,0,0)-colorings of planar graphs with no 4- or 5-cycles.*
**Diana L Smith**, University of Rhode Island (1086-VN-1131)

► 1:30PM (1291) *The minimum cardinality of the range of irreducible L(2,1) Colorings.*
**Vesta Coufal**, **Rob Ray**, Gonzaga University, **John J. Villalpando***, California Lutheran University, and **Kathi A. Yerion**, Gonzaga University (1086-VN-1410)

1:45PM (1292) *Degree Vector Sequences of Edge-Colored Graphs in Specified Families.*
**Kathleen M Ryan*** and **Garth Isaak**, Lehigh University (1086-VN-2700)

► 2:00PM (1293) *An extension of the (strong) rainbow connection number.* Preliminary report.
**Janet L. Fierson*** and **Kristen Heaney**, La Salle University (1086-VN-2864)

► 2:15PM (1294) *On the spectrum problem for cubic graphs of order 8.*
**Peter Adams**, **Darryn E Bryant**, University of Queensland, **Saad I El-Zanati***, Illinois State University, and **Wannasiri Wannasit**, Chiang Mai University (1086-VN-2243)

► 2:30PM (1295) *Adding Edges to Graphs and its Effect on the Pebbling Number.* Preliminary report.
**Natacha C. Fontes-Merz***, **Jeffrey T. Boerner** and **James Anthony**, Westminster College (1086-VN-2374)

► 2:45PM (1296) *Improved Lower Bounds of Radio Numbers for Some Trees.* Preliminary report.
**Katherine Benson**, University of Iowa (1086-VN-1073)

► 3:00PM (1297) *On the spectra of simplicial rook graphs.*
**Jeremy L. Martin**, University of Kansas, and **Jennifer D. Wagner***, Washburn University (1086-VN-1034)

3:15PM (1298) *Toughness of Some Graphs.* Preliminary report.
**Wiseley Wong**, University of Delaware (1086-VN-744)

► 3:30PM (1299) *Generalizations of Book Embeddings to Books with Modified Pages and Spines.* Preliminary report.
**Shannon R Overbay**, Gonzaga University (1086-VN-986)

► 3:45PM (1300) *Side lengths of pseudoconvex fullerene patches.*
**Jennifer McLoud-Mann*** and **Christina Graves**, The University of Texas at Tyler (1086-VN-1220)

► 4:00PM (1301) *Independent Sets in Chain Paths and Cycles.*
**Emily A Sasala*** and **Roman Wong**, Washington & Jefferson College (1086-VN-1934)

### *SIAM Minisymposium on Hybrid Inverse Problems in Medical Imaging*

**1:00 PM – 3:55 PM** **Room 11A, Upper Level, San Diego Convention Center**

Organizer: **Adrian Nachman**, University of Toronto

1:00PM (1302) *Inverse Problem of Acousto-Optic Imaging.*
**John C Schotland**, University of Michigan (1086-35-1642)

1:30PM (1303) *Quantitative photoacoustic imaging.*
**Hongkai Zhao**, UC Irvine (1086-65-1683)

2:00PM (1304) *Title: Quantitative thermo-acoustics and related problems.*
**Ting Zhou**, MIT (1086-35-1882)

2:30PM (1305) *Local inversions in ultrasound modulated optical tomography.*
**Shari Moskow***, Drexel University, and **Guillaume Bal**, Columbia University (1086-35-1726)

3:00PM (1306) *Conductivity imaging from minimal interior data.*
**Amir Moradifam***, Columbia University, **Adrian Nachman**, University of Toronto, **Alexandru Tamasan**, University of Central Florida, and **Alexandre Timonov**, University of South Carolina (1086-49-2940)

► 3:30PM (1307) *Estimating cortical activity from EEG by spatiotemporal regularization exploiting anatomical connectivity and signal propagation delay.* Preliminary report.
**David K Hammond**, University of Oregon NeuroInformatics Center (1086-92-1419)

### *MAA Workshop*

**1:00 PM – 2:20 PM** **Room 1B, Upper Level, San Diego Convention Center**

*An introduction to inquiry-based learning.*

Presenters: **Stan Yoshinobu**, California Polytechnic State University—San Luis Obispo
**Matthew Jones**, California State Unviersity, Dominguez Hills
**Carol Schumacher**, Kenyon College

### *MAA-YMN Panel Discussion*

**1:00 PM – 2:20 PM** **Room 1A, Upper Level, San Diego Convention Center**

*Graduate school: Choosing one, getting in, staying in.*

Organizers: **Timothy Goldberg**, Lenoir-Rhyne University
**Kristine Roinestad**, Georgetown College

Panelists: **Richard A. Levine**, San Diego State University
**William Y. Velez**, University of Arizona
**Annalisa Crannell**, Franklin & Marshall College
**Cynthia J. Wyels**, California State University, Channel Islands

### *MAA Assessment Committee-MAA Committee on the Mathematical Education of Teachers Panel Discussion*

**1:00 PM – 2:20 PM** **Room 4, Upper Level, San Diego Convention Center**

*PRAXIS mathematics exams for prospective teachers: Responsibilities of and reflections on mathematics departments.*

Organizers: **William Martin**, North Dakota State University
**Myron Rigsby**, University of Arkansas-Fort Smith

Panelists: **Barbara Weren**, Educational Testing Service
**Karen King**, National Council of Teachers of Mathematics
**William Martin**
**Angela Hodge**, University of Nebraska at Omaha
**Jack L. Jackson**, University of Arkansas-Fort Smith

### *Joint Committee on Women in the Mathematical Sciences Panel Discussion*

**1:00 PM – 2:30 PM** **Room 10, Upper Level, San Diego Convention Center**

*You are promoted! Great, what is next?*

Organizer: **K. Renee Fister**, Murray State University

Panelists: **Christina Sormani**, Lehman College
**Catherine Roberts**, College of the Holy Cross
**Suzanne Lenhart**, University of Tennessee, Knoxville
**Michael Dorff**, Brigham Young University

### *MAA Invited Paper Session on Mathematics, Computer Graphics, and Film Production*

**1:30 PM – 3:50 PM** **Room 6F, Upper Level, San Diego Convention Center**

Organizers: **Tony DeRose**, Pixar Animation Studios
**Michael Dorff**, Brigham Young University

1:30PM ► (1308) *Animating Class with Computer Graphics.*
**Tim Chartier**, Davidson College (1086-AD-303)

2:00PM ► (1309) *Non-parametric image optimization.*
**Dan B Goldman**, Adobe (1086-AD-285)

2:30PM (1310) *Sparse and Multiresolution Representations of Visual Appearance.*
**Ravi Ramamoorthi**, University of California, Berkeley (1086-AD-251)

3:00PM (1311) *Visual Effects and Fluids - The search for artistic realism.*
**Doug Roble**, Digital Domain Productions, Inc. (1086-AD-2986)

3:30PM ► (1312) *Plausibly unrealistic: Physical simulation in animated feature films.*
**Rasmus Tamstorf**, Walt Disney Animation Studios (1086-AD-2202)

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

**2:00 PM – 4:00 PM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

Organizer: **Jon Scott**, Montgomery College

2:00PM (1313) *Resequencing Calculus Phase 2.*
**Mike Axtell***, University of St. Thomas, **Nick Baeth**, University of Central Missouri, **Dave Dwyer**, **Mark Gruenwald**, University of Evansville, and **Ken Luther**, Valparaiso University

2:00PM (1314) *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

2:00PM (1315) *Research by Undergraduates in Mathematical Biology: Modeling Cellular Processes in Bioremediation and Biofuels.*
**George T Yates**, Youngstown State University

2:00PM (1316) *Integrating Knowledge: A Model for Secondary Teacher Preparation.*
**David Barker***, **Matthew Winsor**, **Beverly Rich**, **John Dossey**, Illinois State University, and **Wendy O'Hanlon**, Illinois Central College

2:00PM (1317) *College Ready in Mathematics and Physics Partnership.*
**Bernard Madison***, **Gay Stewart**, **Shannon Dingman**, University of Arkansas, **John Jones**, University of Arkansas at Fort Smith, and **Pete Joenks**, Springdale High School

2:00PM (1318) *WeBWorK: Improving Student Success in Mathematics.*
**Arnold Pizer***, **Mike Gage**, **Vicki Roth**, University of Rochester, **Michael Pearson** and **John Wyatt**, MAA

2:00PM (1319) *Combining Empirical and Theoretical Approaches to Better Understand the Persistence of Waterfowl Disease in the Upper Mississippi River.*
**Barbara Bennie*** and **James Peirce**, University of Wisconsin, La Crosse

2:00PM (1320) *Biocalculus: Text Development, Dialog, and Assessment.*
**Timothy Comar*** and **Brenda Alberico**, Benedictine University

2:00PM (1321) *Texas Leadership Initiative: Mathematics Instruction Transformed.*
**Lesa Beverly***, **Kimberly Childs**, **Debbie Pace** and **Betty Alford**, Stephen F. Austin State University

2:00PM (1322) *Texas Middle and Secondary Mathematics Project Leadership Initiative.*
**Kimberly Childs***, **Debbie Pace** and **Lesa Beverly**, Stephen F. Austin State University

2:00PM (1323) *Development of a New Calculus and Differential Equations Sequence for Undergraduate Life Sciences Majors.*
**Chichia Chiu***, **Peter Bates** and **Jue Wang**, Michigan State University

2:00PM (1324) *Paradigms in Physics: Interactive Electromagnetism Curricular Materials.*
**Tevian Dray***, **Corinne Manogue** and **Emily van Zee**, Oregon State University

2:00PM (1325) *Native American-based Mathematics Materials for Integration into Undergraduate Courses.*
**Charles Funkhouser***, **Scott Annin**, California State University Fullerton, and **Miles Pfahl**, Turtle Mountain Community College

2:00PM (1326) *Transforming Linear Algebra Education with GeoGebra Applets.*
**James Factor**, Alverno College

2:00PM (1327) *Quantitative Literacy and Reasoning Assessment (QLRA) Project.*
**Eric Gaze***, Bowdoin College, **Linda Misener**, Southern Maine Community College, **Semra Kilic-Bahi**, Colby Sawyer College, **Aaron Montgomery**, Central Washington University, **Corri Taylor**, Wellesley College, and **Deann Leoni**, Edmonds Community College

2:00PM (1328) *Math in the City.*
**Joe Geisbauer***, **Petronela Radu** and **Stephen Hartke**, University of Nebraska-Lincoln

2:00PM (1329) *POGIL Math - Guided Inquiry Materials for Gatekeeper Courses in Mathematics.*
**Zdeňka Guadarrama***, Rockhurst University, **Catherine Beneteau**, University of South Florida, **Jill Guerra**, University of Arkansas Fort Smith, **Laurie Lenz**, Marymount University, **Richard Moog**, Franklin & Marshall College, **Jennifer Noll**, Portland State University, and **Andrei Straumanis**, POGIL Project

2:00PM (1330) *Research Experiences for Undergraduates (REU): Modeling and Industrial Applied Mathematics.*
**Aloysius Helminck*** and **Hien Tran**, North Carolina State University

2:00PM (1331) *Mathematics and Social Advocacy.*
**Sandra Kingan*** and **Jeff Suzuki**, Brooklyn College, City University of New York

2:00PM (1332) *Biology and Mathematics in Populations Studies II.*
**Maeve McCarthy*** and **Renee Fister**, Murray State University

2:00PM (1333) *Lurch, Educational Software for Writing Proofs.*
**Kenneth Monks***, University of Scranton, and **Nathan Carter**, Bentley University

2:00PM (1334) *The West Texas Middle School Math Partnership.*
**Gary Harris***, **Raegan Higgins**, Texas Tech University, and **Warren Koepp**, University of Texas, Permian Basin

2:00PM (1335) *The Learning Curve: Faculty Implementation of IBL Techniques Following Professional Development Workshops.*
**Chuck Hayward***, **Sandra Laursen**, University of Colorado Boulder, **Doug Moore**, **Bill Jacob**, University of California, Santa Barbara, **Paul Sally**, **John Boller**, University of Chicago, **Ralf Spatzier**, University of Michigan, and **Mike Starbird**, University of Texas, Austin

2:00PM (1336) *Talented Teachers in Training for Texas.*
**Keith Hubbard***, **Lesa Beverly**, **Karen Embry-Jenlink** and **Dennis Gravatt**, Stephen F. Austin State University

2:00PM (1337) *Graph Theory and Social Networks – It's Hard to Hide, Even in a Crowd.*
**Joan Lucas**, The College at Brockport, State University of New York

2:00PM (1338) *UTMOST: Undergraduate Teaching of Mathematics with Open Software and Textbooks.*
**Thomas Judson***, Stephen F. Austin State University, **Jason Grout**, Drake University, **Robert Beezer**, University of Puget Sound, **Susan Lynds**, **Sandra Laursen**, University of Colorado at Boulder, **Kiran Kedlaya**, University of California, San Diego, and **William Stein**, University of Washington, Seattle

2:00PM (1339) *Arizona Mathematics Partnership (AMP).*
**April Strom**, Scottsdale Community College

2:00PM (1340) *The Impact of the Math S-STEM Program on a Mathematics Department.*
**Alexandra Kurepa**, North Carolina A&T State University

2:00PM (1341) *LINE: Linear Algebra in New Environments–Focusing on Students' Learning.*
**Sergio Loch***, Grand View University, **Draga Vidakovic**, Georgia State University, **William Martin**, North Dakota State University, **Jeff Suzuki**, **Laurel Cooley**, **Scott Dexter**, Brooklyn College, CUNY, and **Christopher McClure**, Des Moines Area Community College

2:00PM (1342) *Using Research to Shape Instruction and Placement in Algebra and Precalculus.*
**Bernard L. Madison***, University of Arkansas, **Michael Pearson**, MAA, **Caren Diefenderfer**, Hollins University, and **Marilyn Carlson**, Arizona State University

2:00PM (1343) *The Predictability of Student Attributes and Instructional Milieu on Success in Developmental Math, College Algebra, the Collegiate Assessment of Academic Proficiency, and Matriculation to Degree.*
**Lee Pearce***, **Curtis Card**, **Daluss Siewert** and **Kristi Pearce**, Black Hills State University

2:00PM (1344) *WeBWorK Homework Problems with Embedded Flash Applets.*
**Barbara Margolius***, **L. Felipe Martins**, Cleveland State University, and **Daniel J. Gries**, Hopkins School

2:00PM (1345) *Maplets for Calculus (M4C) – Evaluation and Assessment.*
**Douglas B. Meade***, **Edwin M. Dickey**, **Ray Patenaude**, **Paula Adams**, University of South Carolina, **Philip B. Yasskin**, Texas A&M University, and **Robert Petrulis**, Evaluation, Policy and Research in Education Consulting

2:00PM (1346) *STEM Real World Applications of Mathematics.*
**Darren A. Narayan***, Rochester Institute of Technology, and **Joy Lind**, University of Sioux Falls

2:00PM (1347) *The Alfred University Calculus Initiative.*
**Joseph Petrillo***, **Darwyn Cook** and **Addison Frey**, Alfred University

2:00PM (1348) *Dynamic Visualization Tools for Multivariable Calculus.*
**Paul Seeburger***, Monroe Community College, and **Monica VanDieren**, Robert Morris University

2:00PM (1349) *Risky Business: Using Discrete Mathematics to Assess the Risks Involved in Business and Straight Up Gambling.*
**Rebecca Smith*** and **Joan M. Lucas**, The College at Brockport, State University of New York

2:00PM (1350) *Research Based Videos for Developing Mathematical Thinking Skills in Proof Writing and Problem Solving.*
**Kay Somers***, Moravian College, **Jim Sandefur**, Georgetown University, and **Connie Campbell**, Millsaps College

2:00PM (1351) *Discovery Learning Projects in Introductory Statistics.*
**Dianna Spence***, **Sherry Hix** and **Brad Bailey**, North Georgia College & State University

2:00PM (1352) *UBM: Team Research Training Program in Biology and Mathematics.*
**Edwin Tecarro***, **Jeong-Mi Yoon**, **Akif Uzman** and **Youn-Sha Chan**, University of Houston-Downtown

2:00PM (1353) *UBM: Integrated Undergraduate Training in Mathematics and Life Sciences at NCSU.*
**Hien Tran***, **James Gilliam**, **Aloysius Helminck** and **Alun Lloyd**, North Carolina State University

2:00PM (1354) *Maplets for Calculus (M4C) – New Developments.*
**Philip Yasskin***, **Matthew J. Barry**, **Logan N. Collins**, Texas A&M University, and **Douglas B. Meade**, University of South Carolina

2:00PM (1355) *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

2:00PM (1356) *DIYModeling: Do It Yourself Modeling and Simulation for STEM Learning.*
**Frank Wattenberg***, **Rod Sturdivant**, United States Military Academy, **Jim Rolf**, United States Air Force Academy, **Bill Bauldry**, Appalachian State University, **Joe Yanik**, **Betsy Yanik**, Emporia State University, **Amy H. Erickson** and **Keith Erickson**, Georgia Gwinnett College

2:00PM (1357) *PREP: MAA's Professional Development Program.*
**Nancy Hastings***, Dickinson College, **Barbara Edwards**, Oregon State University, **Nathaniel Dean**, Texas State University San Marcos, **Virginia Buchanan**, Hiram College, **Mike Brilleslyper**, United States Air Force Academy, **Michael Pearson**, MAA, **Jenna Carpenter**, Louisiana Tech University, and **Jon Scott**, Montgomery College

2:00PM (1358) *Evaluation and Assessment of Teaching and Learning about Statistics (e-ATLAS).*
**Andy Zieffler***, **Joan Garfield** and **Bob delMas**, University of Minnesota

2:00PM (1359) *Project MathVote: Teaching Mathematics with Classroom Voting.*
**Holly Zullo***, **Kelly Cline**, Carroll College, **Ann Stewart**, Hood College, and **Christopher Storm**, Adelphi University

2:00PM (1360) *A New Approach to Intermediate & College Algebra: It Starts with A Word Problem.*
**Sheryl Dohm**, Chaminade University of Honolulu

2:00PM (1361) *Integrative Research-focused Experiences and Curriculum in Mathematical Biology.*
**Jason Miller*** and **Pam Ryan**, Truman State University

2:00PM (1362) *STEM Real World Applications of Mathematics.*
**Linyuan Lu*** and **Joshua Cooper**, University of South Carolina

2:00PM (1363) *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

## *AMS Invited Address*

**2:15 PM – 3:05 PM** **Room 6AB, Upper Level, San Diego Convention Center**

► (1364) *Combining complex and arithmetic dynamics: A study of critically-finite maps.*
**Laura De Marco**, University of Illinois at Chicago (1086-37-5)

## *MAA-YMN Panel Discussion*

**2:40 PM – 4:00 PM** **Room 1A, Upper Level, San Diego Convention Center**

*You published your dissertation; now what?*

Organizers: **Ralucca Gera**, Naval Posgraduate School
**Rachel Esselstein**, California State University, Monterey Bay

Panelists: **Chris Storm**, Adelphi University
**Nick Scoville**, Ursinas College
**Joyati Debnath**, Winona State University
**Allison Henrich**, Seattle University

## *Board on Mathematical Sciences and Their Applications Special Presentation*

**3:00 PM – 4:00 PM** **Room 10, Upper Level, San Diego Convention Center**

*The Mathematical Sciences in 2025 Study: Key findings and recommendations.*

Presenters: **Tom Everhart**, California Institute of Technology
**Mark Green**, University of California Los Angeles

### *AMS Invited Address*

**3:20 PM – 4:10 PM** **Room 6AB, Upper Level, San Diego Convention Center**

(1365) *Diophantine applications of the theory of expansion and spectral gaps in thin groups.*
**Jean Bourgain**, Institute for Advanced Study

### *Joint Prize Session*

**4:25 PM – 5:25 PM** **Room 6AB, Upper Level, San Diego Convention Center**

### *SIGMAA on Research in Undergraduate Mathematics Education Business Meeting*

**5:30 PM – 7:30 PM** **Room 3, Upper Level, San Diego Convention Center**

### *Joint Prize Session Reception*

**5:30 PM – 6:30 PM** **Lobby outside Room 6AB, Upper Level, San Diego Convention Center**

### *SIGMAA on Statistics Education Reception and Business Meeting*

**5:45 PM – 7:45 PM** **Room 7A, Upper Level, San Diego Convention Center**

### *MAA Two-Year College Reception*

**5:45 PM – 7:00 PM** **Cardiff/Carlsbad Room, 3rd Floor, Marriott**

### *AMS-MAA Special Film Presentation*

**6:00 PM – 7:30 PM** **Room 6AB, Upper Level, San Diego Convention Center**

*Taking the Long View: The Life of Shiing-shen Chern.*

### *Young Mathematicians' Network Open Forum*

**7:30 PM – 8:30 PM** **Leucadia Room, 1st Floor, Marriott**

Organizers: **Josh Laison**, Willamette University
**Elizabeth Moseman**, National Institute of Standards and Technology
**Thomas Wakefield**, Youngstown State University

# Friday, January 11

### *Joint Meetings Registration*

**7:30 AM – 4:00 PM** **Exhibit Hall B1, Ground Level, San Diego Convention Center**

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

**7:30 AM – 10:50 AM** **Room 8, Upper Level, San Diego Convention Center**

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

7:30AM (1366) *Polynomial sequences of binomial-type occurring in graph theory.*
**Jon Schneider**, MIT (1086-05-2998)

8:00AM (1367) *Gromov-Witten Theory of Blowups of Toric Threefolds.*
**Dhruv Ranganathan**, Yale University (1086-14-2997)

► 8:30AM (1368) *M.I.T.C.H - Medicinal Interaction 'Twixt' Cancer and Healthy Cells.*
**Robert R Ferdinand***, **Jayson Bucy**, **Jeff Spears**, **Tomas Tillery** and **Nick Nottingham**, East Central University, Ada, OK (1086-34-99)

► 9:00AM (1369) *Modeling Turbulence with Delay Equations.* Preliminary report.
**Joel E. Hedman*** and **Toby Hillman**, University of St. Thomas, St. Paul MN (1086-76-120)

► 9:30AM (1370) *Betti Tables of Reducible Algebraic Curves.*
**David J. Bruce***, University of Michigan, **Evan D. Nash**, University of Nebraska - Lincoln, **Ben Perez**, St Olaf College, and **Pete Vermeire**, Central Michigan University (1086-14-122)

► 10:00AM (1371) *Semiparametric Regression for Measurement of Parts Data.*
**Kristin C. Mara***, Winona State University, **Samantha Louise Meadows**, Central Michigan University, and **Rosemarie Roessel**, Lehigh University (1086-62-129)

► 10:30AM (1372) *Factor Posets and Dual Frames.* Preliminary report.
**Eric M Evert***, Virginia Polytechnic Institute, **Kileen A Berry**, Berry College, and **Son T Nghiem**, Berea College (1086-15-139)

### *ASL Invited Address*

**8:00 AM – 8:50 AM** **Room 7B, Upper Level, San Diego Convention Center**

(1373) *Nonassociative Ramsey Theory and the amenability of Thompson's group.*
**Justin Moore**, Cornell University (1086-03-134)

### *AMS-MAA Special Session on Mathematics and Education Reform, II*

**8:00 AM – 10:45 AM** **Room 17B, Mezzanine Level, San Diego Convention Center**

Organizers: **William Barker**, Bowdoin College
**Cathy Kessel**, Berkeley, California
**William McCallum**, University of Arizona
**Bonnie Saunders**, University of Illinois, Chicago

8:00AM (1374) *Mathematicians and Scientists working together in K-12 Education: Opportunities within the NSF Mathematics and Science Partnership (MSP) Program.*
**Ron Buckmire**, National Science Foundation (1086-97-2672)

8:30AM ► (1375) *N. J. Partnership for Excellence in Middle School Mathematics.* Preliminary report.
**Amy Cohen**, Rutgers University (1086-97-1222)

9:00AM ► (1376) *NebraskaMATH: Building partnerships to strengthen mathematics teaching and learning in Nebraska.* Preliminary report.
**W. James Lewis**, University of Nebraska-Lincoln (1086-97-1999)

9:30AM (1377) *Georgia's Partnership for Reform in Science and Mathematics: Phase I large scale implementation and Phase II rigorous research.*
**Sabrina A. Hessinger**, Armstrong Atlantic State University (1086-97-2458)

10:00AM (1378) *Mathematicians and Scientists working together in K-12 Education - a Discussion.*
**Dan Maki***, Indiana University, and **Lee L. Zia**, National Science Foundation (1086-97-2935)

### *AMS-SIAM Special Session on Mathematics of Computation: Algebra and Number Theory, I*

**8:00 AM – 10:50 AM** **Room 31A, Upper Level, San Diego Convention Center**

Organizers: **Michael Mossinghoff**, Davidson College
**Cheryl Praeger**, University of Western Australia
**Igor Shparlinksi**, Macquarie University

8:00AM ► (1379) *Computational Discovery of Number Theory Identities for Mathematical Physics Integrals.*
**David H Bailey**, Lawrence Berkeley National Laboratory (1086-11-1342)

8:30AM ► (1380) *Breaking Symmetry In the Computer Age.*
**Anton Betten**, Colorado State University (1086-05-253)

9:00AM ► (1381) *Rigidity in CAD software: from algebra to combinatorics.* Preliminary report.
**Linnea LaMon**, Carnegie Mellon University, **Audrey Lee-St.John** and **Jessica Sidman***, Mount Holyoke College (1086-05-1116)

9:30AM (1382) *Constructing a ten-billion factor Carmichael number.*
**Andrew Shallue***, Illinois Wesleyan University, and **Steven Hayman**, Clemson University (1086-11-943)

10:00AM (1383) *Primality Test with Singular Hyperelliptic Curves.*
**Enver Ozdemir**, Nanyang Technological University (1086-11-808)

10:30AM (1384) *Evaluating L-functions with few known coefficients.*
**Nathan C. Ryan***, Bucknell University, and **David W. Farmer**, American Institute of Mathematics (1086-11-386)

### *AMS Special Session on Algebraic Combinatorics and Representation Theory, I*

**8:00 AM – 10:50 AM** **Room 15A, Mezzanine Level, San Diego Convention Center**

Organizers: **Julie Beier**, Mercer University
**Gizem Karaali**, Pomona College

8:00AM (1385) *Promotion and rowmotion: Part 1/2.* Preliminary report.
**Jessica Striker*** and **Nathan Williams**, University of Minnesota (1086-05-2753)

8:30AM ► (1386) *Combinatorial Markov chains on linear extensions.*
**Arvind Ayyer**, **Steven Klee** and **Anne Schilling***, UC Davis (1086-05-804)

9:00AM (1387) *Generalized splines and GKM theory.*
**Julianna Tymoczko**, Smith College (1086-05-2856)

9:30AM (1388) *The Hopf Monoid of Generalized Permutahedra.*
**Federico Ardila***, San Francisco State University, and **Marcelo Aguiar**, Texas A+M University (1086-05-1379)

10:00AM (1389) *The quasi-partition algebra.*
**Zajj B. Daugherty** and **Rosa C. Orellana***, Dartmouth College (1086-16-1374)

10:30AM ► (1390) *Brane Tilings and Cluster Algebras.* Preliminary report.
**In-Jee Jeong**, Brown Univeristy, **Gregg Musiker***, University of Minnesota, and **Sicong Zhang**, Columbia University (1086-05-1826)

### *AMS Special Session on Continued Fractions, II*

**8:00 AM – 10:50 AM** **Room 31B, Upper Level, San Diego Convention Center**

Organizers: **James McLaughlin**, West Chester University
**Nancy J. Wyshinski**, Trinity College

8:00AM (1391) *Bernstein-Szegő theorem on algebraic S-contours.*
**Maxim L. Yattselev**, Department of Mathematics, University of Oregon (1086-41-177)

8:30AM ► (1392) *On computing solutions to* $fx^2 + gy^2 = m$.
**Kjell Wooding***, ISPIA, University of Calgary, and **H C Williams**, University of Calgary (1086-11-2809)

9:00AM ► (1393) *A Generalization of Continued Fractions.*
**Maxwell Anselm**, Odenton, MD, and **Steven H Weintraub***, Lehigh University (1086-11-22)

9:30AM ► (1394) *Moment Sequences.* Preliminary report.
**Saroj Aryal***, **Farhad Jafari**, University of Wyoming, Laramie, WY, and **Mihai Putinar**, University of California at Santa Barbara, CA (1086-28-291)

10:00AM ► (1395) *Sparse Moment Sequences.* Preliminary report.
**Saroj Aryal**, **Farhad Jafari***, University of Wyoming, Laramie, WY, and **Mihai Putinar**, University of California at Santa Barbara (1086-28-219)

10:30AM ► (1396) *On the fractional parts of roots of positive real numbers.*
**Melvyn B. Nathanson**, Lehman College (CUNY) (1086-11-1905)

### *AMS Special Session on Discrete Geometry and Algebraic Combinatorics, I*

**8:00 AM – 10:50 AM** **Room 16A, Mezzanine Level, San Diego Convention Center**

Organizers: **Alexander Barg**, University of Maryland
**Oleg Musin**, University of Texas, Brownsville

8:00AM (1397) *On the locality of codeword symbols.*
**Sergey Yekhanin**, Microsoft Research (1086-05-591)

8:30AM (1398) *On list decoding of polar codes.*
**Ido Tal** and **Alexander Vardy***, University of California San Diego (1086-94-1294)

9:00AM (1399) *Connector families of graphs.*
**Gerard D. Cohen***, ENST/CNRS, **Emanuela Fachini** and **Janos Korner**, La Sapienza (1086-05-1043)

9:30AM Discussion

10:00AM (1400) *Evaluating Boolean polynomials on Hamming spheres.*
**Ilya Dumer*** and **Olga Kapralova**, University of California at Riverside (1086-05-2155)

10:30AM Discussion

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

**8:00 AM – 10:50 AM** **Room 30E, Upper Level, San Diego Convention Center**

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

8:00AM (1401) *Existence of a positive solution to a three point $\phi$-Laplacian boundary value problem via homotopic deformation.*
**Nadir Ali Benkaci**, University M'Hmed Bouguerra, **Abdelhamid Benmezaï**, Dynamical Systems Laboratory, and **Johnny Henderson***, Baylor University (1086-34-181)

8:30AM (1402) *Applications of Contractive Mappings to Fractional Differential Equations with Periodic Boundary Conditions.*
**J Diego Ramirez***, Lamar University, and **Aghalaya S. Vatsala**, University of Louisiana at Lafayette (1086-34-908)

9:00AM (1403) *Convergence and Stability Analysis of Stochastic Large-Scale Approximation Scheme.* Preliminary report.
**G. S. Ladde**, University of South Florida, and **M. Sambandham***, Morehouse College (1086-60-1283)

9:30AM (1404) *Uniqueness and parameter dependence of positive solutions to a higher order boundary value problem with fractional $q$-derivatives.*
**John R. Graef***, **Lingju Kong**, University of Tennessee at Chattanooga, **Qingkai Kong**, Northern Illinois University, and **Min Wang**, University of Tennessee at Chattanooga (1086-34-213)

10:00AM ► (1405) *Energy Function Method and Stochastic Variational Comparison Theorems.* Preliminary report.
**Tadesse G Zerihun*** and **Gangaram S Ladde**, University of South Florida at Tampa (1086-34-1350)

10:30AM (1406) *Iterative Technique for Nonlinear Riemann-Liouville Fractional Differential Equations.* Preliminary report.
**Zachary Denton***, North Carolina A&T State University, and **Aghalaya Vatsala**, University of Louisiana at Lafayette (1086-34-1674)

### *AMS Special Session on Frontiers in Geomathematics, I*

**8:00 AM – 10:50 AM** **Room 30D, Upper Level, San Diego Convention Center**

Organizers: **Willi Freeden**, University of Kaiserlautern

**Volker Michel**, University of Siegen

**M. Zuhair Nashed**, University of Central Florida

8:00AM (1407) *Iterative Sparse Approximation of Extremely Scattered Data on the Sphere.* **Roger Telschow**, Geomathematics Group, University of Siegen (1086-65-1209)

8:30AM (1408) *A Family of Differential Approximations of the Radiative Transport Equation.* **Weimin Han**, University of Iowa (1086-65-831)

9:00AM (1409) *Solving geodesic problems on a sphere with spherical splines.* **Thanh Tran**, The University of New South Wales, Australia (1086-65-749)

9:30AM (1410) *Generalized Sensitivity Analysis for Managing Uncertainty in Complex Earth Systems.* **Jef K Caers**, Stanford University (1086-60-1066)

10:00AM (1411) *The GRACE de-striping problem. What does GRACE really see?* **Wolfgang Keller**, University Stuttgart (1086-31-1017)

10:30AM (1412) *The Finite Pointset Method (FPM) and an Application in Soil Mechanics.* Preliminary report. **Joerg Kuhnert** and **Isabel Ostermann***, Fraunhofer ITWM (1086-86-1200)

### *AMS Special Session on Generalized Symmetric Spaces, I*

**8:00 AM – 10:50 AM** **Room 15B, Mezzanine Level, San Diego Convention Center**

Organizers: **Catherine Buell**, Bates College

**Aloysius G. Helminck**, North Carolina State University

8:00AM (1413) *$k$-involutions of Exceptional Linear Algebraic Groups.* Preliminary report. **John D Hutchens**, North Carolina State University (1086-20-1400)

8:30AM (1414) *Hilbert series of determinantal varieties and strongly orthogonal roots.* Preliminary report. **Jordan Alexander***, **Markus Hunziker**, Baylor University, and **Jeb F. Willenbring**, University of Wisconsin - Milwaukee (1086-22-2474)

9:00AM (1415) *Using a $(\sigma, \theta)$-basis for the $KAK$ decomposition in Quantum Computation.* **Jennifer R. Daniel*** and **Alys M. Rodriguez**, Lamar University (1086-22-2538)

9:30AM (1416) *Submanifolds and Riemannian foliations of symmetric spaces.* **Tommy Murphy**, Universite Libre de Bruxelles (1086-53-1454)

10:00AM (1417) *Homogeneous Poisson Structures on Symmetric Spaces.* **J. Arlo Caine***, California State Polytechnic University, Pomona, and **Doug Pickrell**, University of Arizona (1086-53-1486)

10:30AM (1418) *Orbits of parabolic $k$-subgroups on symmetric $k$-varieties.* **Gerard F. Helminck***, KdV Institute University of Amsterdam, and **Aloysius G. Helminck**, NCSU Raleigh NC (1086-20-1760)

### *AMS Special Session on Groups, Representations, and Applications, I*

**8:00 AM – 10:50 AM** **Room 14A, Mezzanine Level, San Diego Convention Center**

Organizers: **Robert Guralnick**, University of Southern California

**Pham Huu Tiep**, University of Arizona

8:00AM (1419) *Stable Schur functions.* **Sami Assaf***, University of Southern California, and **David Speyer**, University of Michigan (1086-05-2378)

► 8:30AM (1420) *McKay Centralizer Algebras.* **Georgia Benkart***, University of Wisconsin-Madison, and **Tom Halverson**, Macalester College (1086-05-1319)

9:00AM (1421) *The GAP package Basic 1.0.* Preliminary report. **Klaus M. Lux**, University of Arizona (1086-20-1696)

9:30AM (1422) *The Heisenberg algebra and $GL(n, q)$.* Preliminary report. **Bhama Srinivasan**, University of Illinois at Chicago (1086-20-1238)

10:00AM (1423) *Odd structures arising from categorified quantum groups.* **Aaron D Lauda**, University of Southern California (1086-16-583)

10:30AM (1424) *Representations of the affine BMW algebra.* Preliminary report. **Monica Vazirani***, UC Davis, and **Kevin Walker**, Microsoft Station Q (1086-05-1883)

### *AMS Special Session on Homotopy Theory and Commutative Algebra, II*

**8:00 AM – 10:50 AM** **Room 16B, Mezzanine Level, San Diego Convention Center**

Organizers: **Julia Bergner**, University of California, Riverside
**Philip Hackney**, University of California, Riverside
**Inês Henriques**, University of California, Riverside

8:00AM (1425) *The homotopy theory of matrix factorizations.* Preliminary report. **Mark E Walker**, University of Nebraska-Lincoln (1086-13-2275)

8:30AM (1426) *Matrix factorizations over projective schemes.* **Jesse Burke***, UCLA, and **Mark E Walker**, University of Nebraska-Lincoln (1086-13-2014)

9:00AM (1427) *DG homological algebra and solution to a question of Vasconcelos.* **Saeed Nasseh*** and **Sean Sather-Wagstaff**, North Dakota State University (1086-13-1077)

9:30AM (1428) *Azumaya orders do not always exist.* **Thomas Benedict Williams**, University of Southern California (1086-16-2587)

10:00AM (1429) *Periodic modules over a Gorenstein local ring.* Preliminary report. **Amanda Croll**, University of Nebraska-Lincoln (1086-13-2739)

10:30AM (1430) *An application to the vanishing of $\eta(-,-)$ pairing.* Preliminary report. **Olgur Celikbas***, University of Missouri-Columbia, **Srikanth Iyengar**, University of Nebraska-Lincoln, **Greg Piepmeyer**, University of Missouri-Columbia, and **Roger Wiegand**, University of Nebraska-Lincoln (1086-13-1668)

### *AMS Special Session on Knots, Links, and Three-manifolds, I*

**8:00 AM – 10:50 AM** **Room 32B, Upper Level, San Diego Convention Center**

Organizers: **Christopher Herald**, University of Nevada, Reno
**Stanislav Jabuka**, University of Nevada, Reno
**Swatee Naik**, University of Nevada, Reno

8:00AM (1431) *Bordered Floer homology and splicing knot complements.* **Matthew Hedden**, Michigan State University, and **Adam Simon Levine***, Brandeis University (1086-57-2131)

8:30AM (1432) *A 4-dimensional interpretation of tightness?* **Matthew E Hedden**, Michigan State University (1086-57-2033)

9:00AM (1433) *Categorified invariants and braid conjugacy.* **Denis Auroux**, University of California, Berkeley, **John A. Baldwin**, **J. Elisenda Grigsby***, Boston College, and **Stephan M. Wehrli**, Syracuse University (1086-57-1711)

9:30AM (1434) *Heegaard Floer homology solid tori.* Preliminary report. **Liam Watson**, UCLA (1086-57-1678)

10:00AM (1435) *Bordered Floer homology and the Seifert form.* Preliminary report. **Jennifer Hom***, Columbia University, **Sam Lewallen**, Princeton University, **Tye Lidman**, University of Texas, Austin, and **Liam Watson**, UCLA (1086-57-1567)

10:30AM (1436) *Floer homology and the fractional Dehn twist coefficient.* **Matthew Hedden**, Michigan State University, and **Thomas E. Mark***, University of Virginia (1086-57-1656)

### *AMS Special Session on Mathematical Underpinnings of Multivariate Complexity Theory and Algorithm Design, and Its Frontiers and the Field of Incrementalization, I*

**8:00 AM – 10:50 AM** **Room 31C, Upper Level, San Diego Convention Center**

Organizers: **Rodney Downey**, Victoria University of Wellington, New Zealand
**Michael Fellows**, Charles Darwin University, Australia
**Anil Nerode**, Cornell University
**Frances Rosamond**, Charles Darwin University, Australia

8:00AM (1437) *Parameterized Complexity Overview.* **Rodney G Downey**, Victoria University (1086-68-518)

► 8:30AM (1438) *Incrementalization: From Clarity to Efficiency.* **Yanhong Annie Liu**, State University of New York at Stony Brook (1086-68-1571)

► 9:00AM (1439) *Database Queries - Logic and Complexity.* **Moshe Y. Vardi**, Rice University (1086-68-1136)

► 9:30AM (1440) *On the AND- and OR-Conjectures: Limits to Efficient Preprocessing.* **Andrew D Drucker**, Institute for Advanced Study (1086-68-1505)

► 10:00AM (1441) *Towards relating program transformation, incremental computation and parameterized complexity.* Preliminary report. **Neil D. Jones**, University of Copenhagen (1086-68-954)

10:30AM (1442) *On the Linear and Quais-Linear CPU Time for Most Relational Calculus and Data Mining Queries Using O(N) Space.*
**Dan E Willard**, University at Albany (Computer Science Department) (1086-68-1072)

### *AMS Special Session on Singularities in Geometry and Algebra, I*

**8:00 AM – 10:45 AM** **Room 14B, Mezzanine Level, San Diego Convention Center**

Organizers: **John Brevik**, California State University, Long Beach
**Scott Nollet**, Texas Christian University

8:00AM (1443) *Semi-Monotone Sets, Monotone Maps, and Triangulation of Monotone Families.* Preliminary report.
**Andrei Gabrielov***, **Saugata Basu**, Purdue University, and **Nicolai Vorobjov**, University of Bath, UK (1086-51-1147)

9:00AM (1444) *Characteristic numbers of singular complex varieties.*
**Laurentiu G Maxim**, University of Wisconsin-Madison (1086-14-1305)

10:00AM (1445) *The local structure of compactified Jacobians.*
**Sebastian Casalaina-Martin***, University of Colorado, **Jesse Kass**, University of Michigan, and **Filippo Viviani**, Universita Roma Tre (1086-14-974)

### *AMS Special Session on the Mathematics of Decisions, Elections, and Games, I*

**8:00 AM – 10:50 AM** **Room 17A, Mezzanine Level, San Diego Convention Center**

Organizers: **Karl-Dieter Crisman**, Gordon College
**Michael A. Jones**, Mathematical Reviews
**Michael Orrison**, Harvey Mudd College

8:00AM ► (1446) *Cost-sharing of continuous knapsacks.*
**Andreas Darmann** and **Christian Klamler***, University of Graz (1086-91-1205)

8:30AM ► (1447) *The Structure and Analysis of Games.*
**Daniel Jessie*** and **Donald Saari**, Institute for Mathematical Behavioral Sciences, UC Irvine (1086-91-760)

9:00AM ► (1448) *Exploring and Expanding the Robinson Goforth System for 2 by 2 Games.*
**Brian Hopkins**, Saint Peter's University (1086-91-1849)

9:30AM ► (1449) *Inducible Games: Using Tit-for-Tat to Stabilize Outcomes.* Preliminary report.
**Steven J. Brams***, New York University, and **D. Marc Kilgour**, Wilfrid Laurier University (1086-91-939)

10:00AM ► (1450) *Higher order Condorcet cycles.* Preliminary report.
**Davide Cervone**, **Christopher Hardin** and **William S. Zwicker***, Union College, Schenectady NY (1086-91-938)

10:30AM (1451) *Symmetry groups to connect/extend voting theory results.*
**Donald G. Saari**, University of California, Irvine (1086-91-769)

### *AMS Special Session on the Progress in Free Probability and Free Analysis, I*

**8:00 AM – 10:50 AM** **Room 30C, Upper Level, San Diego Convention Center**

Organizers: **Ken Dykema**, Texas A&M University
**Scott McCullough**, University of Florida

8:00AM (1452) *Free monotone transport.*
**Alice Guionnet**, ENS Lyon / MIT, and **Dimitri Shlyakhtenko***, UCLA (1086-46-1954)

8:30AM (1453) *Limit theorems for monotonic convolution and the Chernoff product formula.*
**John D Williams**, Texas A&M University, College Station, Texas. (1086-47-1407)

9:00AM (1454) *Free probability and planar algebras.*
**Stephen R Curran**, University of California, Los Angeles (1086-46-2159)

9:30AM (1455) *Second Order Freeness and Orthogonal Random Matrices.*
**James A Mingo***, **Mihai V Popa**, Queen's University at Kingston, and **C. Emily I. Redelmeier**, Université Paris-Sud (1086-46-2274)

10:00AM (1456) *On the Hopf algebra approach to the S-transform.*
**Alexandru Nica**, University of Waterloo, Ontario, Canada (1086-46-2422)

10:30AM (1457) *Analytic subordination for multiplicative free convolution of operator-valued distributions.*
**Serban Teodor Belinschi***, Queen's University, Kingston, Canada, **Roland Speicher**, Universität des Saarlandes, **John Treilhard**, Queen's University, and **Carlos Vargas**, Universität des Saarlandes (1086-47-1510)

### *AMS Session on Commutative Algebra*

**8:00 AM – 10:55 AM** **Room 13, Mezzanine Level, San Diego Convention Center**

8:00AM (1458) *p-Embeddings.*
**Michelle Knox***, Midwestern State University, **Papiya Bhattarcharjee**, Penn State Erie, and **Warren Wm. McGovern**, Florida Atlantic University (1086-13-1216)

8:15AM (1459) *NAK for Ext, Ascent of Module Structures and the Blindness of Extended Modules.* Preliminary report.
**Benjamin J Anderson**, University of Wisconsin-La Crosse (1086-13-1880)

8:30AM (1460) *I-Codualizing Modules.* Preliminary report.
**Sean Sather-Wagstaff** and **Richard Wicklein***, North Dakota State University (1086-13-2428)

8:45AM (1461) *Connections between the ideal completion and the $m$-adic completion of a Noetherian Local Domain.*
**Simplice Tchamna**, New Mexico State University, Las Cruces, NM. (1086-13-1258)

9:00AM (1462) *Betti Numbers of Infinite Free Resolutions.* Preliminary report.
**Gwyneth R Whieldon**, Hood College (1086-13-2532)

9:15AM (1463) *Modules over short Gorenstein rings.* Preliminary report.
**Courtney Gibbons**, University of Nebraska-Lincoln (1086-13-1879)

9:30AM (1464) *A Linear Formula For the Generalized Multiplicity Sequence.*
**Thomas Dunn**, North Dakota State University (1086-13-1759)

9:45AM (1465) *The Unimodality of Pure O-Sequences of Type Two in Four Variables.*
**Bernadette Boyle**, Sacred Heart University (1086-13-1397)

10:00AM ► (1466) *Resolutions of Sparse Determinantal Ideals.*
**Adam Boocher**, Berkeley (1086-13-1822)

10:15AM ► (1467) *Toric Ideals of Hypergraphs.*
**Elizabeth Gross***, University of Illinois at Chicago, and **Sonja Petrovic**, Pennsylvania State University (1086-13-117)

10:30AM (1468) *Tropical approach to the cyclic n-roots problem.*
**Danko Adrovic*** and **Jan Verschelde**, University of Illinois at Chicago (1086-14-208)

10:45AM (1469) *A method to calculate an invariant of Avella-Alaminos and Geiss using surface triangulations.*
**Lucas A David-Roesler***, Lebanon Valley College, and **Ralf A Schiffler**, University of Connecticut (1086-17-1314)

## *AMS Session on Elliptic Curves, L-Functions, and Number Fields*

**8:00 AM – 10:55 AM** **Room 12, Mezzanine Level, San Diego Convention Center**

8:00AM (1470) *Notes on the Principal Primes of Real Quadratic Number Fields.*
**Jeongho Park**, POSTECH (1086-11-374)

8:15AM (1471) *A Variation on Leopoldt's Conjecture for Galois Number Fields.*
**Dawn Nelson**, Bates College (1086-11-274)

8:30AM (1472) *Divisibility of the equivariant $L$-function value at zero for degree $2p$ extensions.* Preliminary report.
**Barry R Smith**, Lebanon Valley College (1086-11-2467)

8:45AM (1473) *Surpassing the Ratios Conjecture in the 1-level density of Dirichlet $L$-functions.*
**Daniel Fiorilli***, University of Michigan, and **Steven J Miller**, Williams College (1086-11-1836)

9:00AM (1474) *L-functions and functoriality for the quasi-split classical groups over function fields.* Preliminary report.
**Luis A. Lomelí**, The University of Oklahoma (1086-11-207)

9:15AM (1475) *Rmanujan-Hardy-Littlewodd-Riesz Phenomena for Hecke Forms.*
**Atul Dixit**, Tulane University, **Arindam Roy*** and **Alexandru Zaharescu**, University of Illinois at Urbana-Chapaign (1086-11-924)

9:30AM (1476) *Arithmeticity of Rankin-Selberg kernels.*
**Dominic Lanphier**, Western Kentucky University (1086-11-1762)

9:45AM (1477) *The Hecke stability method.*
**George J. Schaeffer**, UCLA (1086-11-1482)

10:00AM (1478) *Non-gaussian distribution in higher moments of matrix elements.* Preliminary report.
**Peng Zhao**, Yale University (1086-11-2859)

10:15AM (1479) *Fractional moments and density hypothesis of Hecke $L$-functions.*
**Yoonbok Lee**, University of Rochester (1086-11-2600)

10:30AM (1480) *TALK CANCELLED: Exceptional Units in Cubic Function Fields.*
**Jonathan Webster***, Butler University, and **Pieter Rozenhart**, University of Calgary (1086-11-2410)

10:45AM (1481) *Artin-Schreier Curves: From Improved Bounds For Rational Points To Relations Among Frobenius Angles.*
**Alexander Carl Mueller**, University of Michigan (1086-11-211)

## *AMS Session on Inequalities, Measures, and Functions*

**8:00 AM – 10:55 AM** **Room 30B, Upper Level, San Diego Convention Center**

8:00AM ► (1482) *On the Closure of the Space of Substantially Darboux-like Honorary Baire Two Functions on $\mathbb{R}^n$.* Preliminary report.
**M. J. Sanders**, University of South Carolina Beaufort (1086-26-2760)

8:15AM (1483) *Univariate Hardy type fractional inequalities.* Preliminary report.
**George A Anastassiou**, University of Memphis (1086-26-74)

8:30AM (1484) *Reverse and Forward Fractional Integral Inequalities.* Preliminary report. **George A Anastassiou**, University of Memphis, and **Razvan A. Mezei***, Lander University (1086-26-105)

8:45AM ► (1485) *The Theory of Fractional Derivatives.* **A Bathi Kasturiarachi**, Kent State University at Stark (1086-33-2169)

9:00AM (1486) *A Generalized Riesz transform.* **Javad Namazi**, Fairleigh Dickinson university (1086-26-1047)

9:15AM ► (1487) *Weakly symmetric functions and weakly symmetrically continuous functions.* Preliminary report. **Kandasamy Muthuvel**, University of Wisconsin Oshkosh (1086-26-2162)

9:30AM ► (1488) *Large convergent series and small divergent series.* **J. Marshall Ash**, DePaul University (1086-26-1344)

9:45AM (1489) *Moments of discrete measures with dense jumps induced by $\beta$-expansions.* **DoYong Kwon**, Chonnam National University (1086-26-1219)

10:00AM ► (1490) *Scaling zeta functions of partially-lattice weighted self-similar systems.* Preliminary report. **Robert Zbigniew Giza**, California State Polytechnic University, Pomona (1086-28-2180)

10:15AM (1491) *Scaling multifractal spectra of self-similar measures.* **Rolando de Santiago**, California State Polytechnic University, Pomona, **Michel L. Lapidus**, **Scott A. Roby**, University of California, Riverside, and **John A. Rock***, California State Polytechnic University, Pomona (1086-28-366)

10:30AM (1492) *The Plateau Problem for the $c$-Isoperimetric Mass of Currents.* **Leobardo Rosales**, Korea Institute for Advanced Study (1086-28-533)

10:45AM ► (1493) *Continued Radicals and Cantor Sets.* **Thomas Tyler Clark***, University of Central Florida, and **Tom Richmond**, Western Kentucky University (1086-26-436)

## *MAA Session on Adding Modern Ideas to an Introductory Statistics Course, I*

**8:00 AM – 10:55 AM** **Room 5B, Upper Level, San Diego Convention Center**

Organizers: **Brian T. Gill**, Seattle Pacific University
**Scott Alberts**, Truman State University
**Andrew Zieffler**, University of Minnesota

8:00AM ► (1494) *Technology in Achieving Course Objectives in an Introductory Statistics Course.* **Khairul Islam**, Eastern Michigan University (1086-B5-1583)

8:20AM (1495) *Journals and Wikis in Hybrid and Online Intro Statistics.* **Chris Oehrlein**, Oklahoma City Community College (1086-B5-2665)

8:40AM (1496) *A Hybrid of Online Assessment and Graded Homework: The Challenges and Impacts on Student Engagement and Learning.* **Michael A. Posner**, Villanova University (1086-B5-1555)

9:00AM ► (1497) *Simulation Illogic Repaired.* **Patricia B Humphrey**, Georgia Southern University (1086-B5-2338)

9:20AM ► (1498) *Simulating with StatKey.* **Kari Lock Morgan**, Duke University (1086-B5-2376)

9:40AM ► (1499) *Teaching using the Lock-5 book.* Preliminary report. **Iwan Praton**, Franklin & Marshall College (1086-B5-1755)

10:00AM ► (1500) *Teaching Introductory Statistics Concepts using Resampling Methods in R.* **Judith Canner*** and **Jon Detka**, California State University, Monterey Bay (1086-B5-2065)

10:20AM (1501) *A mosaic sampler: Using R and RStudio in the Intro Course with the mosaic package.* **Randall Pruim***, Calvin College, **Daniel Kaplan**, Macalester College, and **Nicholas J Horton**, Smith College (1086-B5-2927)

10:40AM ► (1502) *Using R for Data Analysis Assignments in an Introductory Statistics Course.* **Debra Hydorn**, University of Mary Washington (1086-B5-1975)

## *MAA Session on Communicating Mathematics, II*

**8:00 AM – 10:55 AM** **Room 33A, Upper Level, San Diego Convention Center**

Organizers: **Brian Katz**, Augustana College
**Elizabeth Thoren**, University of California Santa Barbara

8:00AM ► (1503) *Communication as a process skill in the POGIL classroom: Implementation techniques.* Preliminary report. **Catherine Beneteau**, University of South Florida, **Zdenka Guadarrama***, Rockhurst University, **Jill Guerra**, University of Arkansas Fort Smith, and **Laurie Lenz**, Marymount University (1086-D1-1617)

8:20AM ► (1504) *Enhancing Communication in Mathematics.* **Joyati Debnath**, Winona State University (1086-D1-2855)

8:40AM ► (1505) *Inquiry-Based Learning and the Moore Method Works: Giving Students the Opportunity to Effectively Communicate Mathematical Ideas.*
**Padraig M. McLoughlin** and **Perry Y. C. Lee***, Kutztown University of Pennsylvania (1086-D1-1059)

9:00AM ► (1506) *Using Modern Tools to Enhance Communication in Moore Method Courses.*
**W. Ted Mahavier**, Lamar University (1086-D1-1045)

9:20AM (1507) *Using a modified-Moore method to teach communication in mathematics.* Preliminary report.
**Susan H. Marshall**, Monmouth University (1086-D1-2330)

9:40AM ► (1508) *Using a Modified Moore Method to Improve Communication.* Preliminary report.
**Sarah E. Wright**, College of the Holy Cross (1086-D1-2546)

10:00AM ► (1509) *Reasoning and Communication through Axiomatic Geometry.*
**David M. Clark**, State University of New York at New Paltz (1086-D1-1212)

10:20AM ► (1510) *Doing, Presenting, Speaking, and Writing Mathematics in an IBL Freshman Research Initiative (FRI) Mathematics Class.* Preliminary report.
**Mark L. Daniels**, University of Texas at Austin (1086-D1-743)

10:40AM ► (1511) *Speaking and Thinking.* Preliminary report.
**Michael Starbird**, The Unversity of Texas at Austin (1086-D1-2370)

## *MAA Session on Innovative and Effective Ways to Teach Linear Algebra, II*

**8:00 AM – 10:55 AM** **Room 6E, Upper Level, San Diego Convention Center**

Organizer: **David M. Strong**, Pepperdine University

8:00AM ► (1512) *An Applied Project for Linear Algebra Students: Finite Element Methods.*
**Minah Oh**, James Madison University (1086-G5-2535)

8:20AM ► (1513) *The Flip Side of Linear Algebra.*
**Scott F Beaver**, Western Oregon University (1086-G5-2355)

8:40AM ► (1514) *From Videos to Vectors: What if Ax=b meant Ax=Me?* Preliminary report.
**Joshua J Thompson**, Northern Michigan University (1086-G5-1677)

9:00AM ► (1515) *A comparison between online and traditional delivery models for an undergraduate course in elementary linear algebra.*
**Ronald L Merritt**, Athens State University (1086-G5-20)

9:20AM ► (1516) *Creating a Blended Linear Algebra Course.*
**A Bathi Kasturiarachi**, Kent State University at Stark (1086-G5-2168)

9:40AM ► (1517) *Experimenting with Graded Group Work in Online Synchronous Math Recitations.* Preliminary report.
**Greg Mayer**, Georgia Institute of Technology (1086-G5-1323)

10:00AM ► (1518) *Projects in Linear Algebra.* Preliminary report.
**Annela R Kelly**, Bridgewater State University (1086-G5-1858)

10:20AM ► (1519) *Mapping Out the Invertible Matrix Theorem.*
**Shannon R Lockard**, Bridgewater State University (1086-G5-2872)

10:40AM ► (1520) *LINE: Linear Algebra in New Environments – Focusing on Students' Learning.*
**Draga Vidakovic***, Georgia State University, **Sergio Loch**, Grand View University, **William Martin**, North Dakota State University, **Jeff Suzuki**, **Laurel Cooley** and **Scott Dexter**, Brooklyn College, CUNY (1086-G5-911)

## *MAA Session on Touch It, Feel It, Learn It: Tactile Learning Activities in the Undergraduate Mathematics Classroom, I*

**8:00 AM – 10:55 AM** **Room 7A, Upper Level, San Diego Convention Center**

Organizers: **Jessica M. Libertini**, University of Rhode Island
**Julie Barnes**, Western Carolina University

8:00AM (1521) *Enticing Your Students to be Sweet on Equivalence Relations: A Tactile Approach to De-Mystifying an "Abstract" Concept.*
**Jenna Price Carpenter**, Louisiana Tech University (1086-P5-149)

8:20AM (1522) *True/False Edge-Notched Cards: A Hands-on Deductive Reasoning Calculator.*
**Robert D Franzosa**, University of Maine (1086-P5-2233)

8:40AM ► (1523) *Juggling Finite Mathematics.*
**Mary K. Flagg**, University of Houston (1086-P5-1500)

9:00AM ► (1524) *Activities for Creating and Classifying Tessellations of the Plane.* Preliminary report.
**Sharon Frechette**, College of the Holy Cross (1086-P5-2380)

9:20AM ► (1525) *Tactile Learning Tasks to Enhance the Content Knowledge of Mathematics Pre-service Teachers.*
**Sandra Richardson**, Virginia State University, and **Debbie Gochenaur***, Shippensburg University (1086-P5-1227)

9:40AM (1526) *Learn by Doing.*
**Ann C Hanson**, Columbia College, Chicago (1086-P5-2471)

10:00AM ► (1527) *Mathematics of Pop-up Books.*
**Jennifer Wilson**, Eugene Lang College the New School for Liberal Arts (1086-P5-2778)

10:20AM ► (1528) *Hands-On Activities in a College Geometry Course.*
**Stacy L. Hoehn**, Franklin College (1086-P5-1580)

10:40AM ► (1529) *Origami, volume, and dissections of the cube.*
**Thomas C. Hull**, Western New England University (1086-P5-1801)

### *MAA Session on Using Inquiry-Based Learning in Mathematics for Liberal Arts Courses, I*

**8:00 AM – 10:55 AM** **Room 2, Upper Level, San Diego Convention Center**

Organizers: **Julian F. Fleron**, Westfied State University
**Volker Ecke**, Westfield State University
**Philip K. Hotchkiss**, Westfield State University
**Christine von Renesse**, Westfield State University

8:00AM ► (1530) *Using Game Theory in a Math for Liberal Arts course.*
**Wayne Tarrant**, Wingate University (1086-R1-445)

8:20AM ► (1531) *Improved appreciation of mathematics through an IBL liberal arts mathematics course.* Preliminary report.
**Russell D. Blyth**, Saint Louis University (1086-R1-1881)

8:40AM ► (1532) *Moore Method in a Mathematics for Liberal Arts Course.*
**G. Edgar Parker**, Guilford College and Emeritus, James Madison University (1086-R1-677)

9:00AM ► (1533) *Tailoring IBL techniques to liberal arts mathematics classes without losing integrity or quality.* Preliminary report.
**T J Hitchman*** and **Doug Shaw**, University of Northern Iowa (1086-R1-1615)

9:20AM (1534) *Hybrid Inquiry Based Learning in Math for Elementary Teachers Courses.*
**Ali S. Shaqlaih**, University of North Texas at Dallas (1086-R1-1492)

9:40AM (1535) *A Math Circle as an MLA Course.*
**Yousuf George**, Nazareth College (1086-R1-2766)

10:00AM ► (1536) *Introduction to proof in an IBL setting for the liberal arts.* Preliminary report.
**Ryan P Dunning**, St. Mary's University (1086-R1-107)

10:20AM ► (1537) *Making the Abstract Concrete: Teaching Rings and Fields in a Liberal Arts Mathematics Course.*
**John Paul Cook**, Univ. of Science and Arts of Oklahoma (1086-R1-2038)

10:40AM ► (1538) *Using Dialogue Based Activities and Manipulatives in Inquiry Based Learning.*
**James C. Price**, University of Arkansas at Fort Smith (1086-R1-372)

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

**8:00 AM – 10:55 AM** **Room 3, Upper Level, San Diego Convention Center**

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

8:00AM ► (1539) *Peer Instruction via Learning Catalytics Compared to Active Learning.* Preliminary report.
**James S Rolf***, Yale University, **Bradley Warner** and **Lauren Scharff**, U.S. Air Force Academy (1086-N5-2514)

8:20AM ► (1540) *Better student learning in a large calculus classroom via higher engagement: a comparison of teaching methods.*
**Warren J Code***, **Costanza Piccolo**, **David Kohler** and **Mark MacLean**, University of British Columbia (1086-N5-2826)

8:40AM (1541) *TALK CANCELLED: Using the Equivalence Kernel of a Function to Strengthen the Teaching and Learning of One-to-One Functions and Equivalence Classes in Discrete Mathematics.*
**Donna Beers**, Simmons College (1086-N5-649)

9:00AM ► (1542) *To What Extent Does Visualization Improve Conceptual Understanding in Multivariable Calculus?* Preliminary report.
**Paul E Seeburger**, Monroe Community College (1086-N5-2123)

9:20AM ► (1543) *Insight on students' thinking as they solve related rates problems.* Preliminary report.
**Costanza Piccolo*** and **Warren Code**, University of British Columbia (1086-N5-2884)

9:40AM (1544) *Applications and Confidence Inventories for Assessing Curricular Change in Introductory Engineering Mathematics Instruction.*
**Maria Shea Terrell***, Cornell University, and **Lisa Schneider-Bentley**, Engineering Learning Initatives College of Engineering Cornell University (1086-N5-1280)

10:00AM (1545) *Mathematics Partnering with Computer Science to Improve Calculus Instruction and Learning.*
**Allen Guest***, **Marilyn Reba**, **Calvin Williams**, **Roy Pargas** and **Ellen Breazel**, Clemson University (1086-N5-2264)

10:20AM (1546) *Peer Led Team Learning in Calculus I: A five year study.*
**John C Merkel***, Oglethorpe University, and **Farouk Brania**, Morehouse College (1086-N5-2845)

10:40AM ► (1547) *Group Norms Establishment and Enculturation into a Calculus 2 Classroom using the Approximation Framework.* Preliminary report.
**Melissa L Goss*** and **Rebecca Anne Dibbs**, University of Northern Colorado (1086-N5-2489)

## *MAA General Contributed Paper Session: Modeling and Applications of Mathematics, III*

**8:00 AM – 10:55 AM** **Room 33B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University
Moderators: **Kyle Riley**, South Dakota School of Mines & Technology
**Mariah Birgen**, Wartburg College

8:00AM ► (1548) *A ball-and-urn system for understanding multilevel selection.*
**Shishi Z Luo**, Duke University (1086-VG-1537)

8:15AM (1549) *V-Optimal Experiment Designs for Non-Linear Models.* Preliminary report.
**Adam F Childers**, Roanoke College (1086-VG-230)

8:30AM ► (1550) *A Comprehensive Approach of Data Fusion based on Evidence Theory.* Preliminary report.
**Yanyan He*** and **Yousuff Hussaini**, Florida State University (1086-VG-1777)

8:45AM ► (1551) *A numerical method for generalized Fokker-Planck equations.*
**Qiwei Sheng**, The University of Iowa (1086-VG-1576)

9:00AM ► (1552) *TALK CANCELLED: Top Trading Cycle with Random Student Preferences.*
**Delong Meng**, Massachusetts Instittute of Technology (1086-VG-1589)

9:15AM ► (1553) *Singularity of Cubic Bézier Curves and Surfaces.*
**Edmond J. Nadler***, Ann Arbor, Michigan, and **Tae-wan Kim**, Seoul National University (1086-VG-2492)

9:30AM ► (1554) *The Influence of Evolutionary Psychology on Natural Selection.* Preliminary report.
**Andrew G. Borden**, Palo Alto College, San Antonio, Texas (1086-VG-269)

9:45AM ► (1555) *Mathematical modeling for image inpainting.*
**Mohamed Allali**, Chapman University (1086-VG-1543)

10:00AM ► (1556) *Stochastic Applications of Knots and Literature.* Preliminary report.
**Liliana Maritza Alvarez***, **Anne Maree French** and **Ramanjit K Sahi**, Austin Peay State University (1086-VG-581)

10:15AM ► (1557) *A Frozen Pattern in Time.* Preliminary report.
**Emarus Danielle Shay*** and **Ramanjit K Sahi**, Austin Peay State University (1086-VG-1605)

10:30AM ► (1558) *How Many Licks to the Tootsie Roll center to a Tootsie Pop?* Preliminary report.
**Cory C Heid**, Siena Heights University (1086-VG-2919)

10:45AM ► (1559) *Mathematical Modeling as a Means of Intentional Development of Intuition.*
**Eva M. Strawbridge***, James Madison University, **Yvonne Lai**, University of Michigan, and **Sarah Williams**, University of North Carolina (1086-VG-1811)

## *MAA General Contributed Paper Session: Research in Algebra and Topology, II*

**8:00 AM – 10:55 AM** **Room 33C, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University
Moderators: **Abdramane Serme**, CUNY
**Justin Peachey**, Davidson College

8:00AM ► (1560) *Magic Cayley-Sudoku Tables.* Preliminary report.
**Rosanna Mersereau** and **Michael B. Ward***, Western Oregon University (1086-VJ-738)

8:15AM (1561) *A generalization of the concept of essentiality for rings and module.* Preliminary report.
**Matthew J Lennon*** and **Gary F Birkenmeier**, University of Louisiana at Lafayette (1086-VJ-2613)

8:30AM ► (1562) *$\tau$-Factorization in Commutative Rings with Zero-Divisors.* Preliminary report.
**Christopher Park Mooney**, The University of Iowa (1086-VJ-1104)

8:45AM (1563) *Involutions of Linear Algebraic Groups over Fields of Characteristic 2.* Preliminary report.
**Nathaniel J Schwartz**, North Carolina State University (1086-VJ-927)

9:00AM (1564) *Computing the Fine Structure of Symmetric $k$-Varieties.* **Kathryn A Brenneman**, Raleigh (1086-VJ-674)

9:15AM (1565) *Classifying the Double Cosets $H_k \backslash G_k / H_k$ of SL$(2, k)$.* Preliminary report. **Emma M Norbrothen**, North Carolina State University (1086-VJ-1119)

9:30AM ► (1566) *Classification on irreducible representations of the quantum Weyl algebra at roots of unity given by matrices.* Preliminary report. **Linhong Wang*** and **Blaise Heider**, Southeastern Louisiana University (1086-VJ-2542)

9:45AM ► (1567) *Groups with Perfect Order Subsets.* Preliminary report. **Michael C Fulkerson**, University of Central Oklahoma (1086-VJ-2415)

10:00AM ► (1568) *A Geometric Proof of the Structure Theorem for Finite Abelian Groups.* **Joshua Evans Ducey**, James Madison University (1086-VJ-2396)

10:15AM ► (1569) *On properties preserved by interassociation.* Preliminary report. **Berit Nilsen Givens***, Cal Poly Pomona, and **Rebecca Starr**, UC Davis (1086-VJ-2352)

10:30AM (1570) *Algebraic Model of Morphisms between Infinity Group Stacks.* Preliminary report. **Ivan Dungan**, Florida State University (1086-VJ-2259)

10:45AM ► (1571) *Star operations on numerical semigroup rings.* **Bryan Charles White**, University of New Mexico (1086-VJ-1406)

## *MAA General Contributed Paper Session: Research in Applied Mathematics, II*

**8:00 AM – 10:55 AM** **Room 5A, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **David Torain**, Hampton University
**Douglas Norton**, Villanova University

8:00AM ► (1572) *Characteristics of Non-Symmetric Edge Flames in Micro-Channels.* Preliminary report. **Casey D. McGrath*** and **Joanna Bieri**, University of Redlands (1086-VL-2880)

8:15AM (1573) *Edge informed Fourier reconstruction from non-uniform spectral data.* **Rodrigo B. Platte**, **Alexander J. Gutierrez*** and **Anne Gelb**, Arizona State University (1086-VL-2539)

8:30AM ► (1574) *Modeling the curvature of a fluid interface using the height function method.* Preliminary report. **Holly Timme**, Virginia Tech (1086-VL-2776)

8:45AM ► (1575) *Construction of approximate analytical solution to the porous medium equation.* **Aleksey S. Telyakovskiy*** and **Jeffrey S. Olsen**, University of Nevada, Reno (1086-VL-2201)

9:00AM (1576) *A Viscosity Solution of the Dynamic Programming Equation for an Optimal Control Problem.* Preliminary report. **J. Pascal**, The American University of Afghanistan (1086-VL-1922)

9:15AM (1577) *Surface-Volume Reactions and Optical Biosensors with Arrays of Reacting Zones.* Preliminary report. **Matt Zumbrum**, University of Delaware (1086-VL-1786)

9:30AM (1578) *Comparison between two models for spreading on a thin liquid film.* **Ellen R. Swanson**, Centre College (1086-VL-1246)

9:45AM (1579) *Computation of Effective Free Surfaces in Two Phase Flows.* Preliminary report. **Ramesh Yapalparvi***, Dept of Mechanical Engineering/FAMU-FSU college of Engineering, Florida State University, and **Bartosz Protas**, McMaster University (1086-VL-346)

10:00AM (1580) *Greene's Criterion for the Breakup of Invariant Tori of Volume Preserving Maps.* **Adam M Fox**, University of Colorado, Boulder (1086-VL-2679)

10:15AM ► (1581) *Boole's summation formula and features of jump singularities.* Preliminary report. **Jean-Paul Berrut**, University of Fribourg, Switzerland (1086-VL-536)

10:30AM (1582) *Clustering in interfering models of binary mixtures.* **Sarah Miracle**, **Dana Randall**, Georgia Institute of Technology, and **Amanda Pascoe Streib***, National Institute of Standards and Technology (1086-VL-1719)

10:45AM (1583) *Numerical Simulation of Vortex Ring Instability and Collisions.* **Leon Kaganovskiy***, Touro College, and **Robert Krasny**, University of Michigan (1086-VL-1139)

## *SIAM Minisymposium on New Trends and Directions in Inverse Problems and Signal Processing*

**8:00 AM – 10:55 AM** **Room 11A, Upper Level, San Diego Convention Center**

Organizers: **Zuhair Nashed**, University of Central Florida
**Qiyu Sun**, University of Central Florida

8:00AM (1584) *Fusion Frames for Wireless Sensor Networks.*
**Peter G Casazza**, University of Missouri (1086-46-955)

8:30AM (1585) *Recent Progress in Duration and Bandwidth Limiting.*
**Joseph D. Lakey***, NMSU, Las Cruces, NM, and **Jeffrey A. Hogan**, University of Newcaste, Australia (1086-94-2970)

► 9:00AM (1586) *Gabor frame and rotated DFT matrices for transform-based image compression.* Preliminary report.
**John J. Benedetto**, Norbert Wiener Center, Mathematics Dept., U. Maryland, College Park (1086-42-1265)

9:30AM (1587) *Dynamical Sampling: Exact reconstruction From sensing Networks.*
**Akram Aldroubi***, Vanderbilt, **Jacqueline Davis**, Mathematics, Vanderbilt, and **Ilya Krishtal**, Nothern Illinois University, Dekalb (1086-37-1325)

10:00AM (1588) *PhaseLift: Exact Phase Retrieval via Convex Optimization.*
**Thomas Strohmer**, University of California, Davis (1086-65-1101)

10:30AM (1589) *Sampling with the Prolate Spheroidal Wave Functions: A New Perspective.*
**Ahmed I Zayed**, DePaul University (1086-42-1682)

### *Employment Center*

**8:00 AM – 6:00 PM** **Exhibit Hall A, Ground Level, San Diego Convention Center**

### *PME Council Meeting*

**8:00 AM – 11:00 AM** **Conference Suite 1, 3rd Floor, Marriott**

### *AMS Session on Noncommutative Algebra*

**8:15 AM – 10:55 AM** **Room 18, Mezzanine Level, San Diego Convention Center**

► 8:15AM (1590) *Decomposing Elements of a Right Self Injective Ring.*
**Feroz Siddique*** and **Ashish K. Srivastava**, Saint Louis University (1086-16-339)

8:30AM (1591) *Regualr Graded Skew Clifford Algebras that are Twists of Regular Graded Clifford Algebras.*
**Manizheh Nafari***, University of Toledo, and **Michaela Vancliff**, University of Texas at Arlington (1086-16-1499)

8:45AM (1592) *Point Modules over Graded Skew Clifford Algebras.* Preliminary report.
**Padmini Veerapen*** and **Michaela Vancliff**, University of Texas at Arlington (1086-16-666)

9:00AM (1593) *PBW deformations of Artin-Schelter regular algebras.*
**Jason D Gaddis**, University of Wisconsin - Milwaukee (1086-16-856)

9:15AM (1594) *A Poincaré polynomial governing Lie bialgebras.* Preliminary report.
**Gabriel C. Drummond-Cole**, Northwestern University (1086-17-2198)

9:30AM (1595) *Kostant map supealgebras.*
**Irfan Bagci**, Atlanta Metropolitan State College, and **Samuel H Chamberlin***, Park University (1086-17-1940)

9:45AM (1596) *TALK CANCELLED: Good Gradings of Incidence Rings.*
**Kenneth Lee Price**, University of Wisconsin Oshkosh (1086-16-762)

10:00AM (1597) *Orders containing a weak crossed product order over a discrete valuation ring.* Preliminary report.
**Christopher James Wilson**, Butler University (1086-16-1904)

10:15AM (1598) *Algebras Associated to Ranked Posets.*
**Susan J. Durst**, Rutgers University (1086-16-2574)

10:30AM (1599) *Using graph techniques to understand a nonsplit mixed $p$-adic module.* Preliminary report.
**Mary K. Flagg**, University of Houston (1086-05-2316)

10:45AM (1600) *Presentations of S-unit groups of quaternions algebras ramified at infinity and applications to the congruence subgroup problem.* Preliminary report.
**Sean Howe**, University of Chicago (1086-11-1572)

### *AMS Session on Numerical Analysis and Finite Element Methods*

**8:15 AM – 10:55 AM** **Room 19, Mezzanine Level, San Diego Convention Center**

8:15AM (1601) *Galerkin Finite Element Method for Semilinear Hyperbolic Equations.*
**Thinh T. Kieu**, Texas Tech University. (1086-65-828)

8:30AM (1602) *An Analysis of HDG Methods for the Helmholtz Equation.*
**Jintao Cui***, University of Arkansas at Little Rock, and **Wujun Zhang**, University of Maryland at College Park (1086-65-101)

8:45AM (1603) *Discrete maximum principle for the finite element solution of time-dependent anisotropic diffusion problems.*
**Xianping Li***, University of Central Arkansas, and **Weizhang Huang**, University of Kansas (1086-65-1042)

9:00AM (1604) *On the equations of quasistatic poroelasticity with dilatation dependent hydraulic conductivity: existence, uniqueness, and finite element approximation.*
**Song Chen***, **Yanzhao Cao** and **A.J. Meir**, Auburn University (1086-76-215)

9:15AM (1605) *Unisolvency in the finite element exterior calculus.*
**Douglas N. Arnold**, University of Minnesota (1086-65-2299)

9:30AM (1606) *A simple preconditioning strategy for a class of DG-H(div)-conforming methods for the Stokes problem.* **Blanca Ayuso de Dios***, Centre de Recerca Matemàtica, Barcelona, Spain, **Franco Brezzi**, IUSS-Pavia & IMATI-CNR,Pavia (Italy), **L. Donatella Marini**, Universita degli Studi di Pavia, Pavia (Italy), **Jinchao Xu** and **Ludmil T. Zikatanov**, The Pennsylvania State University (1086-65-2640)

9:45AM (1607) *Discretization using H(curl) element for the Biot model.* **L. Chen***, University of California at Irvine, **L.P. Chen**, Sun Yat-Sen University, **M. Wang**, Peking University, and **J. Xu**, Pennsylvania State University (1086-65-2877)

10:00AM (1608) *TALK CANCELLED: Structure preserving discretization of the Yang-Mills equation.* **T. G. Halvorsen***, **S. H. Christiansen** and **T. M. Sorensen**, University of Oslo (1086-65-2278)

10:15AM (1609) *Adaptive FEEC for Nonlinear Geometric PDEs.* Preliminary report. **Ryan Szypowski***, Cal Poly Pomona, **Mike Holst** and **Andrew Gillette**, UCSD (1086-35-2601)

10:30AM (1610) *A Multigrid Method for One-Dimensional Systems of Hyperbolic Conservation Laws.* Preliminary report. **Michael D Bice**, California State University, Stanislaus (1086-65-2659)

10:45AM ► (1611) *A Wavelet Multigrid Method Using Symmetric Biorthogonal Wavelets.* Preliminary report. **Doreen De Leon**, California State University, Fresno (1086-65-817)

## *AMS Special Session on Several Complex Variables Techniques in Operator Theory, I*

**8:30 AM – 10:50 AM** **Room 32A, Upper Level, San Diego Convention Center**

Organizers: **Zeljko Cuckovic**, University of Toledo

**Sonmez Sahutoglu**, University of Toledo

8:30AM (1612) *Hankel vector moment sequences and the asymptotics of two variable Pick functions.* **Jim Agler**, U.C. San Diego, and **John E. McCarthy***, Washington University (1086-32-511)

9:00AM (1613) *Spectral properties of the $\overline{\partial}$-Neumann operator.* **Friedrich Haslinger**, University of Vienna, Austria (1086-32-563)

9:30AM (1614) *Regularity of the complex Green operator on pseudoconvex CR–submanifolds of hypersurface type.* Preliminary report. **Emil J. Straube*** and **Yunus Zeytuncu**, Texas A&M University (1086-32-1787)

10:00AM (1615) *Understanding Projection Operators in Several Complex Variables through Harmonic Analysis.* **Jennifer Halfpap**, University of Montana (1086-32-1743)

10:30AM (1616) *The Szego Projection for domains with minimal smoothness.* Preliminary report. **Loredana Lanzani***, University of Arkansas, and **Elias M. Stein**, Princeton University (1086-32-427)

## *MAA Invited Paper Session on Thinking Linearly about Data in Research and Teaching*

**8:30 AM – 10:55 AM** **Room 6C, Upper Level, San Diego Convention Center**

Organizer: **Timothy Chartier**, Davidson College

8:30AM ► (1617) *Data Forensics on Your Social Fingerprint.* **Denise R. Koessler**, **Michael W. Berry***, University of Tennessee, and **Chris Groer**, Link Analytics, LLC (1086-AF-1140)

9:00AM ► (1618) *Ranking Individual Sports: Lessons from Tennis and Golf.* **Chuck Wessell**, Gettysburg College (1086-AF-470)

9:30AM ► (1619) *Sports Ratings by Linear Regression with $L^p$ norms.* **Kenneth Massey**, Carson-Newman College (1086-AF-1878)

10:00AM (1620) *Ranking with Optimization Techniques.* **Amy N. Langville**, College of Charleston (1086-AF-1542)

10:30AM (1621) *Spectral Methods for Finding Near-Bipartite Components in Large Scale-Free Graphs.* **Van Emden Henson**, Lawrence Livermore National Laboratory (1086-AF-1493)

## *AMS-MAA Graduate Student Fair*

**8:30 AM – 10:30 AM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

*Undergrads! Take this opportunity to meet representatives from mathematical science graduate programs.*

## *MAA Session on Mathematics and Sports, II*

**8:40 AM – 10:55 AM** **Room 1A, Upper Level, San Diego Convention Center**

Organizer: **R. Drew Pasteur**, College of Wooster

8:40AM ► (1622) *Numerically Approximating the Flight of Baseballs and Footballs.* Preliminary report. **Paul R. Bouthellier**, University of Pittsburgh-Titusville (1086-K5-1853)

9:00AM ► (1623) *Winning a Racquetball Match.* **Brian Pasko*** and **Tom Brown**, Eastern New Mexico University (1086-K5-708)

9:20AM ► (1624) *Applications of Basic Statistics in World Cup Soccer between 1930 and 1990.* Preliminary report.
**Eva G Sagan**, Manchester College (1086-K5-21)

9:40AM ► (1625) *A New Basketball Shooting Efficiency Metric.*
**Jeffrey W. Heath*** and **Sophie Han**, Centre College (1086-K5-2126)

10:00AM ► (1626) *Measuring and Predicting Performance in Hockey.*
**Brian A Macdonald**, United States Military Academy, West Point, NY (1086-K5-2711)

10:20AM ► (1627) *Google's PageRank Algorithm and its Application to Major League Baseball Transactions.*
**Daniel L Summers**, Adelphi University (1086-K5-1380)

10:40AM ► (1628) *Parsing the Relationship between Baserunning and Batting Abilities within Lineups.*
**Ben S. Baumer***, Smith College, **James Piette**, University of Pennsylvania, and **Brad Null**, Stanford University (1086-K5-1069)

### *MAA Retiring Presidential Address*

**9:00 AM – 9:50 AM** **Room 6AB, Upper Level, San Diego Convention Center**

(1629) *Communicating Mathematics.*
**Paul Zorn**, St. Olaf College (1086-A0-14)

### *ASL Invited Address*

**9:00 AM – 9:50 AM** **Room 7B, Upper Level, San Diego Convention Center**

(1630) *Interpreting the projective hierarchy in expansions of the real line.*
**Philipp Hieronymi**, University of Illinois at Urbana-Champaign (1086-03-131)

### *AMS Special Session on Water Waves, Tsunamis, and Extreme Waves, II*

**9:00 AM – 10:50 AM** **Room 9, Upper Level, San Diego Convention Center**

Organizers: **Walter Craig**, McMaster University, Canada
**Philippe Guyenne**, University of Delaware
**David Nicholls**, University of Illinois, Chicago

9:00AM TALK ADDED: Inhomogeneity and nonlinearity in random wave fields, Tim Janssen,San Francisco State University

9:00AM (1631) *TALK CANCELLED: An unstructured approach to ocean wave modelling.* Preliminary report.
**Adrean A Webb***, University of Colorado at Boulder, Department of Applied Mathematics, and **Baylor Fox-Kemper**, University of Colorado at Boulder, Cooperative Institute for Research in Environmental Sciences (1086-86-2073)

9:30AM ► (1632) *tsunami modeling and satellite observations for early warnings.* Preliminary report.
**Y. Tony Song**, Jet Propulsion Laboratory, Caltech (1086-76-2472)

10:00AM TALK ADDED: Adaptive mesh refinement for tsunamis and other hazardous flows, Randall J. LeVeque, University of Washington

10:30AM (1633) *Vortex generation by deep water breaking waves.*
**Nicholas E Pizzo*** and **W. Kendall Melville**, University of California San Diego (1086-76-1143)

### *MAA Minicourse #10: Part B*

**9:00 AM – 11:00 AM** **Room 30A, Upper Level, San Diego Convention Center**

*The mathematics of the Common Core.*

Presenters: **William McCallum**, University of Arizona
**Cody L. Patterson**, University of Arizona
**Ellen Whitesides**, University of Arizona
**Kristin Umland**, University of New Mexico

### *MAA Minicourse #6: Part B*

**9:00 AM – 11:00 AM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*Using randomization methods to build conceptual understanding of statistical inference.*

Presenter: **Robin H. Lock**, St. Lawrence University

### *MAA Minicourse #5: Part B*

**9:00 AM – 11:00 AM** **Room 29C, Mezzanine Level, San Diego Convention Center**

*Visualizing projective geometry through photographs and perspective drawings.*

Presenters: **Annalisa Crannell**, Franklin & Marshall College
**Marc Frantz**, Indiana University Bloomington
**Fumiko Futamura**, Southwestern University

### *MAA Panel Discussion*

**9:00 AM – 10:20 AM** **Room 1B, Upper Level, San Diego Convention Center**

*The invigorating experience of mathematical positions abroad.*

Organizers: **Deane Arganbright**, Divine Word University, Papua New Guinea
**Donald York**, Pennsylvania College of Technology
**Erich Neuwirth**, University of Vienna
**Carol Shubin**, California State University, Northridge

Panelists: **Deane Arganbright**
**Donald York**
**Erich Neuwirth**
**Carol Shubin**

### *AMS-MAA Joint Committee on Teaching Assistants and Part-Time Instructors Panel Discussion*

**9:00 AM – 10:20 AM** **Room 4, Upper Level, San Diego Convention Center**

*Training and professional development of teaching assistants.*

Organizers: **David Carothers**, James Madison University
**Delaram Kahrobaei**, CUNY Graduate Center

Panelists: **Solomon Friedberg**, Boston College
**Karen Rhea**, University of Michigan
**Nathan Ritchey**, Youngstown State University
**James Sellers**, Pennsylvania State University

### *SIGMAA on the History of Mathematics Panel Discussion*

**9:00 AM – 10:55 AM** **Room 6F, Upper Level, San Diego Convention Center**

*Using mathematical archives and special collections for research and teaching.*

Organizers: **Amy Shell-Gellasch**, Hood College
**Janet Beery**, University of Texas Austin

Panelists: **Carol Mead**, American Archives of Mathematics, University of Texas Austin
**Fred Rickey**, United States Military Academy
**Dominic Klyve**, Euler Archives, Central Washington University
**Victor Katz**, University of the District of Columbia
**Peggy Kidwell**, Smithsonian Museum of American History
**Shirley Gray**, National Curve Bank, California State University, Los Angeles

### *Student Hospitality/Information Center*

**9:00 AM – 5:00 PM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

### *AMS Special Presentation*

**9:30 AM – 11:00 AM** **Room 10, Upper Level, San Diego Convention Center**

*A conversation on nonacademic employment.*

Moderator: **C. Allen Butler**, Daniel H. Wagner Associates, Inc.

Panelists: **Erica Klampfl**, Ford Motor Company
**Kristin Lauter**, Microsoft Research
**Linda Ness**, Ericsson
**Dale Smith**, Fiserv, Inc.
**Charles Toll**, National Security Agency

### *Exhibits and Book Sales*

**9:30 AM – 5:30 PM** **Exhibit Hall B1, Ground Level, San Diego Convention Center**

### *ASL Invited Address*

**10:00 AM – 10:50 AM** **Room 7B, Upper Level, San Diego Convention Center**

(1634) *Grothendieck's cohomology founded on finite order arithmetic.*
**Colin McLarty**, Case Western Reserve University (1086-03-133)

### *AMS Invited Address*

**10:05 AM – 10:55 AM** **Room 6AB, Upper Level, San Diego Convention Center**

► (1635) *How to count with topology.*
**Jordan S. Ellenberg**, University of Wisconsin-Madison (1086-11-3)

### *AMS-MAA Invited Address*

**11:10 AM – NOON** **Room 6AB, Upper Level, San Diego Convention Center**

(1636) *Zeros of polynomials and their importance in combinatorics and probability.*
**Robin Pemantle**, David Rittenhouse Laboratories

### *AMS Colloquium Lectures: Lecture III*

**1:00 PM – 2:00 PM** **Room 6AB, Upper Level, San Diego Convention Center**

(1637) *Free probability, Random matrices, and map enumeration, III.*
**Alice Guionnet**, Ecole Normale Supérieure de Lyon (1086-47-17)

### *MAA Lecture for Students*

**1:00 PM – 1:50 PM** **Room 6C, Upper Level, San Diego Convention Center**

► (1638) *The game of SET and geometry.*
**Judith Covington**, Louisiana State University Shreveport (1086-A0-57)

### *AMS Current Events Bulletin*

**1:00 PM – 4:45 PM** **Room 6F, Upper Level, San Diego Convention Center**

Organizer: **David Eisenbud**, University of California, Berkeley

1:00PM ► (1639) *How many rational points does a random curve have?*
**Wei Ho**, Columbia University (1086-11-1224)

2:00PM (1640) *Topology of nonarchimedean analytic spaces.*
**Sam Payne**, Yale University (1086-14-1852)

3:00PM (1641) *Geometric group theory and 3-manifolds hand in hand: the fulfillment of Thurston's vision for three-manifolds.*
**Mladen Bestvina**, University of Utah (1086-57-1231)

4:00PM (1642) *Cluster Algebras.*
**Lauren K. Williams**, University of California, Berkeley (1086-05-941)

### *AMS-MAA Special Session on the History of Mathematics, I*

**1:00 PM – 6:20 PM** **Room 9, Upper Level, San Diego Convention Center**

Organizers: **Patti Hunter**, Westmont College
**Deborah Kent**, Drake University
**Adrian Rice**, Randolph-Macon College

1:00PM ► (1643) *Algebra in Words vs. Algebra in Symbols.* Preliminary report.
**Victor J Katz**, Silver Spring, MD (1086-01-461)

1:30PM ► (1644) *Riches from the Middle Ages.*
**Barnabas B. Hughes**, California State University, Northridge (1086-01-826)

2:00PM ► (1645) *Great minds think alike – when they share knowledge.* Preliminary report.
**Janet L. Beery**, University of Redlands (1086-01-1697)

2:30PM ► (1646) *What mathematics did George Washington know before he became a professional surveyor and how did he use it?* Preliminary report.
**V. Frederick Rickey***, West Point., and **Theodore J. Crackel**, The Papers of George Washington (1086-01-747)

3:00PM ► (1647) *Mathematics is a Plural Noun: The Case of Oliver Byrne, Esq.*
**Janet Heine Barnett**, Colorado State University - Pueblo (1086-01-919)

3:30PM ► (1648) *Mathematical questions: A convergence of practices in British mathematical journals, 1795-1901.*
**Sloan E Despeaux**, Western Carolina University (1086-01-473)

4:00PM ► (1649) *Mathematical Publication in Early Nineteenth-Century Germany: Venues, Careers and Publics.* Preliminary report.
**William Thomas Archibald**, Simon Fraser University (1086-01-886)

4:30PM ► (1650) *Why Natural Numbers Are Called Natural: The Impact of Social Context in Nineteenth-Century Mathematics.* Preliminary report.
**Andrea Arredondo**, Instituto de Investigaciones Filosóficas, UNAM, Mexico City (1086-01-173)

5:00PM ► (1651) *Analytic representation and the Mittag-Leffler "circle": Contrasting notions of generality in the late 19th century.* Preliminary report.
**Laura E. Turner**, University of Toronto (1086-01-1861)

5:30PM ► (1652) *Mathematical Notations as Identifiers of Epistemic Cultures.* Preliminary report.
**Bruce J. Petrie**, University of Toronto (1086-01-1149)

6:00PM (1653) *Using mathematical notation for programming computers.*
**Helena Durnova**, Masaryk University in Brno, Czech Republic (1086-01-933)

### *AMS-SIAM Special Session on Mathematics of Computation: Algebra and Number Theory, II*

**1:00 PM – 6:20 PM** **Room 31A, Upper Level, San Diego Convention Center**

Organizers: **Michael Mossinghoff**, Davidson College
**Cheryl Praeger**, University of Western Australia
**Igor Shparlinksi**, Macquarie University

1:00PM ► (1654) *Arithmetic progressions of squares in cubic fields.*
**Andrew Bremner**, Arizona State University (1086-11-296)

1:30PM ► (1655) *Sporadic Reinhardt polygons.*
**Kevin G Hare***, University of Waterloo, and **Michael J Mossinghoff**, Davidson College (1086-11-635)

2:00PM (1656) *Intersections of Multiplicative Translates of 3-adic Cantor sets.*
**William Abram** and **Jeffrey C. Lagarias***, University of Michigan, Ann Arbor (1086-11-468)

2:30PM (1657) *Computing the image of Galois representations attached to elliptic curves.*
**Andrew V. Sutherland**, Massachusetts Institute of Technology (1086-11-1903)

3:00PM (1658) *On the Images of Outer Galois Representations Associated to Elliptic Curves.* Preliminary report.
**Rachel M. Davis**, University of Wisconsin-Madison (1086-11-645)

3:30PM (1659) *Computing Galois groups of ramified 3-adic fields of degree 12.*
**Chad Awtrey**, Elon University (1086-11-205)

4:00PM (1660) *The Tame-Wild Principle.* Preliminary report.
**John Jones***, Arizona State University, and **David Roberts**, University of Minnesota-Morris (1086-11-79)

4:30PM (1661) *Lehmer's conjecture for Hermitian matrices over the Eisenstein and Gaussian integers.*
**Graeme Taylor***, Heilbronn Institute for Mathematical Research, and **Gary Greaves**, Royal Holloway (1086-11-77)

5:00PM (1662) *Computing algebraic numbers of bounded height.*
**David Krumm**, University of Georgia (1086-11-92)

5:30PM (1663) *Spaces of Modular forms and Algebraic Geometric codes.*
**Hiren Maharaj**, Rancho Cucamonga, CA (1086-11-302)

6:00PM (1664) *Counting Rational Points Modulo $p$ On Artin-Schreier Curves.*
**Alexander Carl Mueller**, University of Michigan (1086-11-214)

## *AMS-AWM Special Session on the Brauer Group in Algebra and Geometry, I*

**1:00 PM – 6:20 PM** **Room 15B, Mezzanine Level, San Diego Convention Center**

Organizers: **Asher Auel**, Emory University
**Kelly McKinnie**, University of Montana
**V. Suresh**, Emory University

1:00PM (1665) *Degree three cohomology of function field of surfaces.*
**Suresh Venapally**, GA (1086-11-2342)

1:30PM (1666) *Zero cycles on torsors under groups of low rank.*
**Jodi Black***, Bucknell University, and **R. Parimala**, Emory University (1086-11-1456)

2:00PM (1667) *Vertical Brauer groups and degree 4 del Pezzo surfaces.*
**Anthony Várilly-Alvarado**, Rice University, and **Bianca Viray***, Brown University (1086-14-1767)

2:30PM (1668) *Generalized Mordell curves, generalized Fermat curves, and the Hasse principle.*
**Dong Quan Ngoc Nguyen**, University of British Columbia (1086-11-1172)

3:00PM (1669) *Estimating torsion using the twisted gamma-filtration.*
**Caroline Junkins**, University of Ottawa (1086-14-1335)

3:30PM (1670) *Essential Dimension and the Brauer Group.*
**Anthony Ruozzi**, Emory University (1086-16-1830)

4:00PM (1671) *A Decomposition for Idempotents of the Brauer Monoid.*
**Holly E Attenborough**, Indiana University (1086-00-1008)

4:30PM (1672) *The Brauer monoid of quaternion rings.*
**John Voight**, University of Vermont (1086-16-1235)

5:00PM (1673) *Noncommutative surfaces and curves of finite representation type.* Preliminary report.
**Colin J Ingalls***, University of New Brunswick, and **Daniel Chan**, University of New South Wales (1086-16-1802)

5:30PM (1674) *Generically Trivial Azumaya Algebras on a Rational Surface with a Non-rational Singularity.*
**Drake M Harmon***, **Timothy J Ford** and **Djordje N Bulj**, Florida Atlantic University (1086-14-606)

6:00PM (1675) *Patching and local-global principles for Brauer groups.*
**David Harbater***, University of Pennsylvania, **Julia Hartmann**, RWTH Aachen University, and **Daniel Krashen**, University of Georgia (1086-16-2319)

## *AMS Special Session on Advances in General Optimization and Global Optimality Conditions for Multiobjective Fractional Programming Based on Generalized Invexity*

**1:00 PM – 5:50 PM** **Room 31B, Upper Level, San Diego Convention Center**

Organizers: **Roland Glowinski**, University of Houston
**R. N. Mohapatra**, University of Central Florida
**Ram U. Verma**, International Publications USA
**Alexander J. Zaslavski**, Technion-Israel Institute of Technology

1:00PM (1676) *Generalized Higher-Order Univexities and Applications to Strongly Parametric Duality Models for Discrete Minimax Fractional Programming.*
**R. N. Mohapatra***, University of Central Florida, and **R. U. Verma**, Kingsville, Texas (1086-49-1083)

1:30PM (1677) *Minimizers related to nonlinear Neumann boundary value problems.*
**Dumitru Motreanu**, University of Perpignan (1086-49-543)

2:00PM (1678) *Minimum Principle for Stochastic Differential Equations Subject to Continuous Diffusion and Lévy Process and Governed by Relaxed Controls.*
**N. U. Ahmed***, University of Ottawa, Canada, and **Charalambos Charalambos**, University of Cyprus (1086-49-32)

2:30PM (1679) *Constraint Handling for Local and Global Derivative-Free Optimization methods.*
**Ahmad R. Almomani*** and **Katie R. Fowler**, Clarkson University (1086-49-1153)

3:00PM (1680) *Fractional Integral Inequalities involving Convexity.* Preliminary report.
**George A Anastassiou**, University of Memphis (1086-26-75)

3:30PM (1681) *Delayed Functional Differential Equation Control Systems: A Spectral Optimization Approach.*
**Gamal N Elnagar**, University of South Carolina Upstate (1086-49-1328)

4:00PM ► (1682) *Best Reply Analysis in Two Person Games.*
**Aden O Ahmed**, Texas A&M University - Kingsville (1086-91-992)

4:30PM ► (1683) *The Epsilon-efficiency conditions for multiobjective fractional subset programming and generalized invex functions.* Preliminary report.
**Ram U. Verma**, International Publications USA (1086-90-1041)

5:00PM (1684) *Reverse Isoperimetric Inequalities in $\mathbb{R}^3$.*
**Andrew Gard**, Ohio Wesleyan University (1086-49-1558)

5:30PM (1685) *The extragradient method for solving variational inequalities.*
**Alexander J. Zaslavski**, The Technion-Israel Institute of Technology, Haifa (1086-49-1138)

## *AMS Special Session on Algebraic Combinatorics and Representation Theory, II*

**1:00 PM – 5:50 PM** **Room 15A, Mezzanine Level, San Diego Convention Center**

Organizers: **Julie Beier**, Mercer University
**Gizem Karaali**, Pomona College

1:00PM (1686) *Schubert times Schur.*
**Sami Assaf***, University of Southern California, **Nantel Bergeron**, York University, and **Frank Sottile**, Texas A&M (1086-05-1292)

1:30PM (1687) *Pieri operators on the affine nil Coxeter algebra.*
**Chris Berg***, **Franco Saliola** and **Luis Serrano**, Université du Québec à Montréal, LaCIM (1086-05-1215)

2:00PM (1688) *Deformations of permutation representations of Coxeter groups.*
**Eric Rains**, Caltech, and **Monica Vazirani***, UC Davis (1086-05-1939)

2:30PM (1689) *Global Weyl modules for equivariant map algebras.*
**Nathaniael J Manning***, University of Ottawa, **Ghislain Fourier**, University of Cologne, and **Alistair Savage**, University of Ottawa (1086-17-1168)

3:00PM (1690) *Representations and Combinatorics on the Weyl Side.*
**Georgia Benkart***, University of Wisconsin-Madison, **Samuel Lopes**, Universidade do Porto, and **Matthew Ondrus**, Weber State University (1086-16-1655)

3:30PM (1691) *Abacus models in affine Weyl groups.*
**Christopher R. H. Hanusa**, Queens College (CUNY), and **Brant C. Jones***, James Madison University (1086-05-2263)

4:00PM (1692) *Combinatorial Gelfand Models for Diagram Algebras.*
**Tom Halverson**, Macalester College (1086-05-276)

4:30PM (1693) *Centralizer properties of the affine Hecke algebra of type C.* Preliminary report.
**Zajj B Daugherty**, Dartmouth College (1086-16-2116)

5:00PM (1694) *The representation theory of unipotent groups and a family of q-analogues to binomial coefficients.* Preliminary report.
**Daniel Bragg** and **Nathaniel Thiem***, University of Colorado Boulder (1086-20-2002)

5:30PM (1695) *Level zero Littelmann paths, Kirillov-Reshetikhin crystals, parabolic quantum Bruhat graph, and Macdonald polynomials.*
**Cristian Lenart**, State University of New York, Albany, **Satoshi Naito**, Tokyo Institute of Technology, **Daisuke Sagaki**, University of Tsukuba, **Anne Schilling**, University of California, Davis, and **Mark Shimozono***, Virginia Tech (1086-05-335)

### *AMS Special Session on Challenges in Data Assimilation and the Mathematics of Planet Earth and Its Climate*

**1:00 PM – 5:50 PM** **Room 17A, Mezzanine Level, San Diego Convention Center**

Organizers: **Lewis Mitchell**, University of Vermont

**Thomas Bellsky**, Arizona State University

1:00PM (1696) *Lagrangian Data Assimilation as a Paradigm in Climate.* Preliminary report. **Christopher K.R.T. Jones**, University of North Carolina at Chapel Hill (1086-76-2580)

► 2:00PM (1697) *How Do You Determine Whether The Earth Is Warming Up?* Preliminary report. **Juan M. Restrepo***, University of Arizona, **Darin Comeau**, Program of Applied Mathematics, University of Arizona, and **Hermann Flaschka**, University of Arizona (1086-62-789)

2:30PM (1698) *Data assimilation and model error for an idealized 3D ocean eddy.* **Elaine T. Spiller***, Marquette University, and **D. W. Han**, University of Massachusettes Amherst (1086-00-2647)

3:00PM (1699) *Linear response closure approximation for slow dynamics of a multiscale system with linear coupling.* **Marc Kjerland*** and **Rafail Abramov**, University of Illinois at Chicago (1086-41-2332)

3:30PM Discussion

► 4:00PM (1700) *New Ensemble Kalman Filter Applications.* **Eugenia Kalnay**, University of Maryland (1086-37-2982)

5:00PM (1701) *Empirical correction of a toy climate model.* **Nicholas A. Allgaier***, **Christopher M. Danforth**, University of Vermont, VT Advanced Computing Core, VT Complex Systems Center, and **Kameron D Harris**, University of Washington (1086-37-1931)

► 5:30PM (1702) *Irrelevance based criterion for variable selection.* **Tanujit Dey** and **Daniel Vasiliu***, College of William and Mary (1086-62-2517)

### *AMS Special Session on Discrete Geometry and Algebraic Combinatorics, II*

**1:00 PM – 5:50 PM** **Room 16A, Mezzanine Level, San Diego Convention Center**

Organizers: **Alexander Barg**, University of Maryland

**Oleg Musin**, University of Texas, Brownsville

► 1:00PM (1703) *A Borsuk-Ulam equivalent that directly implies Sperner's Lemma.* **Kathryn L. Nyman**, Willamette University, and **Francis Edward Su***, Harvey Mudd College (1086-55-2833)

1:30PM (1704) *Asymptotics of discrete minimum energy problems.* **Sergiy V. Borodachov**, Towson University, **Douglas P Hardin*** and **Edward B Saff**, Vanderbilt University (1086-52-2347)

2:00PM (1705) *The physics of error-correcting codes.* **Henry Cohn***, Microsoft Research New England, and **Yufei Zhao**, Massachusetts Institute of Technology (1086-05-2620)

► 2:30PM (1706) *Top Ehrhart coefficients of integer partition problems.* Preliminary report. **Jesus De Loera**, University of California, Davis (1086-52-755)

3:00PM (1707) *On Rigidity of Ball-Polyhedra in Euclidean 3-Space.* **Karoly Bezdek**, University of Calgary (1086-52-2127)

3:30PM (1708) *Probabilistic existence of combinatorial and geometric t-designs.* **Greg Kuperberg***, UC Davis, **Shachar Lovett**, UC San Diego, and **Ron Peled**, Tel Aviv University (1086-05-358)

► 4:00PM (1709) *Tiling with rectangles.* **Igor Pak**, UCLA (1086-52-559)

4:30PM (1710) *Hard tiling problems with simple tiles.* **Igor Pak** and **Jed Yang***, UCLA (1086-05-1405)

5:00PM (1711) *Formally dual configurations in Euclidean space and in abelian groups.* **Abhinav Kumar***, Massachusetts Institute of Technology, **Henry Cohn**, Microsoft Research New England, **Christian Reiher**, University of Hamburg, and **Achill Schuermann**, University of Rostock (1086-11-2167)

► 5:30PM (1712) *On simplicial dissections of simplotopes.* Preliminary report. **Alexey Glazyrin**, University of Texas at Brownsville (1086-52-1513)

### *AMS Special Session on Finite Element Exterior Calculus and Applications, II*

**1:00 PM – 6:20 PM** **Room 16B, Mezzanine Level, San Diego Convention Center**

Organizers: **Douglas Arnold**, University of Minnesota

**Andrew Gillette**, University of California, San Diego

**Michael Holst**, University of California, San Diego

1:00PM (1713) *Finite element differential forms on cubical meshes.* **Gerard M. Awanou***, University of Illinois, Chicago, IL, and **Douglas N. Arnold**, University of Minnesota, Minneapolis (1086-65-175)

1:30PM (1714) *Geometric Decomposition of Serendipity Finite Element Spaces.*
**Andrew Gillette**, UC San Diego (1086-65-2035)

2:00PM (1715) *Conforming and divergence-free Stokes elements.*
**Michael Neilan***, University of Pittsburgh, **Richard S. Falk**, Rutgers University, and **Johnny Guzmán**, Brown University (1086-65-1727)

► 2:30PM (1716) *A simple construction of high-order Whitney forms.*
**Francesca Rapetti**, Laboratoire J.-A. Dieudonne, Universite de Nice (1086-68-1691)

3:00PM (1717) *Bernstein-Gelfand-Gelfand Complexes.*
**Michael Eastwood**, Australian National University (1086-53-897)

3:30PM (1718) *Computing analytic torsion.*
**Nathan Dunfield**, University of Illinois, and **Anil N. Hirani***, Department of Computer Science, University of Illinois (1086-65-2103)

4:00PM (1719) *On consistency of the discrete codifferential operators for Whitney forms.* Preliminary report.
**Douglas Arnold**, University of Minnesota, **Richard Falk**, Rutgers University, **Johnny Guzmán**, Brown University, and **Gantumur Tsogtgerel***, McGill University (1086-65-792)

4:30PM (1720) *The abstract Hodge–Dirac operator and its stable discretization.*
**Ari Stern***, Washington University in St. Louis, and **Paul C. Leopardi**, Australian National University (1086-65-1942)

5:00PM (1721) *A New Approach to the Finite Element Analysis of Axisymmetric Problems.*
**Minah Oh**, James Madison University (1086-65-1685)

5:30PM (1722) *Equations for the probabilistic moments of the solution of the stochastic Hodge Laplacian.*
**F. Bonizzoni***, CSQI - MATHICSE EPFL, Lausanne, Switzerland and MOX - Politecnico di Milano, Milano, Italy, **F. Nobile**, CSQI - MATHICSE EPFL, Lausanne, Switzerland, and **A. Buffa**, IMATI - CNR Pavia, Italy (1086-00-2541)

6:00PM (1723) *A posteriori error estimates in finite element exterior calculus.*
**Alan Demlow***, University of Kentucky, and **Anil Hirani**, University of Illinois (1086-65-564)

## *AMS Special Session on Frontiers in Geomathematics, II*

**1:00 PM – 5:50 PM** **Room 30D, Upper Level, San Diego Convention Center**

Organizers: **Willi Freeden**, University of Kaiserlautern
**Volker Michel**, University of Siegen
**M. Zuhair Nashed**, University of Central Florida

1:00PM (1724) *Spatiospectral concentration of vector fields on a sphere: Applications to satellite geomagnetism.*
**Alain Plattner**, Princeton University, Department of Geosciences, and **Frederik J Simons***, Princeton University, Department of Geosciences and Program in Applied and Computational Mathematics (1086-31-1190)

1:30PM (1725) *Sub-aerial and sub-glacial stream flow.*
**A. C. Fowler**, University of Limerick and University of Oxford (1086-86-1522)

2:00PM (1726) *Explicit current source modeling in global geomagnetic induction: forward and inverse problems.*
**Jin Sun***, **Gary D Egbert** and **Anna Kelbert**, College of Earth, Ocean and Atmospheric Sciences, Oregon State University, Corvallis OR 97330 (1086-86-2624)

► 2:30PM (1727) *Combining line-by-line and pre-frequency-averaged models in the radiative-transfer equation.*
**W. Van Snyder**, Caltech Jet Propulsion Laboratory (1086-86-1091)

3:00PM (1728) *From Fourier to Wavelets: A Geomathematical Course.*
**Willi Freeden**, Geomathematics Group, University of Kaiserslautern (1086-41-751)

3:30PM (1729) *How Mathematics can Help to Observe Climate Change — An Example.*
**Volker Michel**, Geomathematics Group, University of Siegen (1086-65-1210)

4:00PM (1730) *3D-Wavelet Postprocessing of Seismic Data.*
**Christian Blick**, University of Kaiserslautern (1086-86-1113)

4:30PM (1731) *Stress field simulations in geothermal reservoirs.* Preliminary report.
**Matthias Augustin**, University of Kaiserslautern (1086-74-1111)

5:00PM (1732) *Weakly Bounded Noise and Applications to Regularization of Ill-Posed Operator Equations and Moment Discretization.*
**M. Zuhair Nashed**, University of Central Florida (1086-65-2978)

5:30PM Discussion

## *AMS Special Session on Geometric and Analytic Methods in Teichmüller Theory and Hyperbolic Geometry, II*

**1:00 PM – 6:20 PM** **Room 32B, Upper Level, San Diego Convention Center**

Organizers: **Ren Guo**, Oregon State University
**Zheng Huang**, City University of New York, Staten Island

**Marcello Lucia**, City University of New York, Staten Island

1:00PM (1733) *Iterations on Techmuller Spaces and the Characterization of Holomorphic Maps.* **Yunping Jiang**, The City University of New York–Graduate Center and Queens College (1086-30-477)

1:30PM (1734) *Horowitz-Randol phenomenon for q-differential metrics.* **Anja Bankovic**, University of Illinois at Urbana-Champaign (1086-51-361)

2:00PM (1735) *Global Torelli Theorem For Projective Manifolds Of Calabi-Yau Type.* **Kefeng Liu**, **Feng Guan** and **Xiaojing Chen***, UCLA (1086-14-1232)

2:30PM (1736) *Prescribing the behavior of Weil-Petersson geodesics.* **Babak Modami**, Yale University (1086-51-467)

3:00PM (1737) *Teichmuller Space Is Totally Geodesic In Goldman Space.* Preliminary report. **Qiongling Li**, Rice University (1086-51-661)

3:30PM (1738) *Domains of discontinuity of almost-Fuchsian groups.* **Andrew M Sanders**, University of Maryland, College Park (1086-53-710)

4:00PM (1739) *Hyperbolic cone metrics on* 3*-manifolds with boundary.* **Feng Luo** and **Tian Yang***, Rutgers University (1086-49-594)

4:30PM (1740) *Geometry and dynamics in hyperbolic spaces.* **Tushar Das**, Oregon State University (1086-37-1612)

5:00PM (1741) *The Margulis region and screw parabolic elements of bounded type.* **Viveka Erlandsson**, City University of New York, Graduate Center (1086-51-328)

5:30PM (1742) *Holomorphic versus hyperbolic twisting.* **Christopher M Judge**, Indiana University (1086-30-809)

6:00PM (1743) *Conformal Ricci Flow on the Teichmüller Space of Conformal Structures on a compact $n$-dimensional manifold, $n \geq 3$.* **Arthur E Fischer**, University of California, Santa Cruz (1086-58-2704)

## *AMS Special Session on Groups, Representations, and Applications, II*

**1:00 PM – 6:20 PM** **Room 14A, Mezzanine Level, San Diego Convention Center**

Organizers: **Robert Guralnick**, University of Southern California

**Pham Huu Tiep**, University of Arizona

1:00PM Discussion.

1:30PM (1744) *Overgroup lattices of reducible subgroups of classical groups.* **Michael Aschbacher**, California Institute of Technology (1086-20-1552)

2:00PM (1745) *$Sp_6(2^a)$ is "Good" for the McKay, Alperin Weight, and Related Local-Global Conjectures.* **Amanda A. Schaeffer Fry**, University of Arizona (1086-20-848)

2:30PM (1746) *On the GK dimension of a $(\mathfrak{g}, K)$ module.* Preliminary report. **Nolan R Wallach**, University of California, San Diego (1086-22-1411)

3:00PM (1747) *Some cohomology of finite and algebraic groups.* **Leonard L. Scott**, The University of Virginia (1086-20-844)

3:30PM (1748) *Simple groups and commuting graphs.* **Ronald Solomon***, The Ohio State University, and **Andrew J. Woldar**, Villanova University (1086-20-835)

4:00PM (1749) *Involutions and the Steinberg module.* Preliminary report. **Stephen D Smith**, University of Illinois at Chicago (1086-20-866)

4:30PM (1750) *Normality and Zeros of Characters of Finite Groups.* **Gabriel Navarro**, University of Valencia (1086-20-850)

5:00PM (1751) *On choosing coset representatives.* Preliminary report. **Persi Diaconis**, Stanford University (1086-20-179)

5:30PM (1752) *Expansion properties of linear groups.* **Alireza Salehi Golsefidy**, University of California, San Diego (1086-22-1925)

6:00PM Discussion.

## *AMS Special Session on Set-Valued Optimization and Variational Problems with Applications*

**1:00 PM – 6:20 PM** **Room 31C, Upper Level, San Diego Convention Center**

Organizers: **Andreas H. Hamel**, Yeshiva University

**Akhtar Khan**, Rochester Institute of Technology

**Miguel Sama**, Universidad Nacional de Educacin a Distancia

**Christiane Tammer**, Martin Luther University of Halle-Wittenberg

1:00PM (1753) *Dennis-Moré theorem revisited.* **Asen L Dontchev**, Mathematical Reviews (1086-49-1528)

1:30PM (1754) *Scalarization in geometric and functional vector optimization revisited.* **M. Durea**, **R. Strugariu**, "Al. I. Cuza" University, and **Chr. Tammer***, Martin-Luther-University of Halle-Wittenberg (1086-49-2258)

2:00PM (1755) *Generalized Dini Derivatives of the Perturbation Map in Parametric Set-Valued Optimization.* Preliminary report.
**Douglas E. Ward**, Miami University (1086-49-2337)

► 2:30PM (1756) *Characterization and recognition of d.c. functions.*
**Ivan Ginchev Ivanov***, Illinois Institute of Technology, and **Denitza Gintcheva**, University of Rochester (1086-49-592)

3:00PM (1757) *Variational Analysis of Directional Minimal Time Functions and Applications.*
**Mau Nam Nguyen**, Portland State University (1086-49-1306)

3:30PM (1758) *Variational properties of spectral functions with an application to matrix preconditioning.* Preliminary report.
**Julia Eaton***, University of Washington Tacoma, and **James Burke**, University of Washington (1086-49-2804)

4:00PM (1759) *Second-order variational analysis and characterizations of tilt-stable optimal solutions in finite and infinite dimensions.*
**Boris Mordukhovich** and **Nghia Tran***, Wayne State University (1086-49-271)

4:30PM (1760) *Restricted Normal Cones: Basic Properties and Applications.*
**Heinz H. Bauschke**, University of British Columbia, Kelowna, BC, Canada, **Russell Luke**, Institut fur Numerische und Angewandte Mathematik, Universitat Gottingen, Gottingen, Germany, **Hung M. Phan***, Pacific Institute for the Mathematicals Sciences, Vancouver, BC, Canada, and **Xianfu Wang**, University of British Columbia, Kelowna, BC, Canada (1086-49-283)

5:00PM (1761) *Conical regularization of constrained optimization problems in Banach spaces.*
**Miguel Sama***, Universidad Nacional de Educacion a Distancia, **Baasansuren Jadamba** and **Akhtar Khan**, Rochester Institute of Technology (1086-49-1741)

5:30PM (1762) *Identification of a Variable Parameter in Fourth-Order Partial Differential Equations by an Equation Error Approach.*
**Nathan Bush***, **Akhtar A Khan**, Rochester Institute of Technology, **Fabio Raciti**, Facolt'a di Ingegneria dell'Universit'a di Catania, and **Baasansuren Jadamba**, Rochester Institute of Technology (1086-65-2441)

► 6:00PM (1763) *A Nonsmooth Convex Optimization Problem in the Inverse Problem of Tumor Identification.*
**B Jadamba**, **A A Khan***, Rochester Institute of Technology, **M. Sama**, Universidad Nacional de Educación a Distancia, and **B. Winkler**, Rochester Institute of Technology (1086-49-2254)

## *AMS Special Session on Several Complex Variables Techniques in Operator Theory, II*

**1:00 PM – 5:50 PM** **Room 32A, Upper Level, San Diego Convention Center**

Organizers: **Zeljko Cuckovic**, University of Toledo

**Sonmez Sahutoglu**, University of Toledo

1:00PM (1764) *Toeplitz operators and Carleson measures in strongly pseudoconvex domains.*
**Marco Abate***, Università di Pisa, **Jasmin Raissy**, Université Paul Sabatier, Institut de Mathématiques de Toulouse, and **Alberto Saracco**, Università di Parma (1086-32-891)

1:30PM (1765) *On Characterization of bounded composition operators.*
**Song-Ying Li***, University of California, Irvine, and **Hyungwoon Koo**, Korea University, Korea (1086-32-2029)

2:00PM (1766) *Asymptotic Toeplitzness of composition operators.* Preliminary report.
**Zeljko Cuckovic** and **Trieu Le***, University of Toledo (1086-47-1087)

2:30PM (1767) *Generating tuples associated with Reinhardt domains in $\mathbb{C}^n$.*
**Raul E. Curto**, University of Iowa (1086-47-1106)

3:00PM (1768) *Compactness of the $\overline{\partial}$-Neumann operator and of commutators of the Bergman projection with continuous functions.*
**Mehmet Çelik***, University of North Texas at Dallas, and **Sönmez Şahutoğlu**, University of Toledo, OH (1086-32-462)

3:30PM (1769) *Condition R and holomorphic maps of piecewise smooth domains.*
**Debraj Chakrabarti***, Tata Institute of Fundamental Research, and **Kaushal Verma**, Indian Institute of Science (1086-32-495)

► 4:00PM (1770) *Regularity of canonical operators and the Nebenhülle of Hartogs domains.*
**Yunus E Zeytuncu**, Texas A&M University (1086-32-1845)

4:30PM (1771) *Commutative algebras generated by Toeplitz operators on the unit ball.*
**Nikolai Vasilevski**, CINVESTAV, Mexico City (1086-47-1032)

5:00PM (1772) *Recent progress on complex symmetric operators.*
**Stephan Ramon Garcia**, Pomona College (1086-47-1435)

5:30PM (1773) *Function spaces on the complex sphere and regularity of solutions of dispersive equations.*
**Marco M. Peloso**, Università degli Studi di Milano (1086-32-1902)

### *AMS Special Session on Singularities in Geometry and Algebra, II*

**1:00 PM – 6:20 PM** **Room 14B, Mezzanine Level, San Diego Convention Center**

Organizers: **John Brevik**, California State University, Long Beach
**Scott Nollet**, Texas Christian University

► 1:00PM (1774) *Smooth curves specialize to extremal curves.* Preliminary report. **Robin Hartshorne***, University of California, Berkeley, **Paolo Lella**, Università di Torino, Italy, and **Enrico Schlesinger**, Politecnico di Milano, Italy (1086-14-574)

2:00PM (1775) *Linear series on a ribbon.* **Dawei Chen**, Boston College (1086-14-867)

3:00PM (1776) *Vector bundles with sections on algebraic curves.* Preliminary report. **Ivona Grzegorczyk**, California State University Channel Islands (1086-14-1673)

4:00PM (1777) *Special sections of locally free sheaves.* **Chris Peterson**, Colorado State University (1086-14-1758)

5:00PM (1778) *Toric Symmetry in Gromov-Witten Theory.* **Dagan Karp**, Harvey Mudd College (1086-14-1800)

6:00PM (1779) *A Construction of Homogeneous Gorenstein Ideals.* Preliminary report. **Sema Gunturkun*** and **Uwe Nagel**, University of Kentucky (1086-14-1780)

### *AMS Special Session on the Coverings of the Integers*

**1:00 PM – 6:20 PM** **Room 17B, Mezzanine Level, San Diego Convention Center**

Organizers: **Carrie E. Finch**, Washington and Lee University
**Lenny Jones**, Shippensburg University

1:00PM (1780) *An approach to odd covering systems.* **Pace P. Nielsen**, Brigham Young University (1086-11-341)

► 1:30PM (1781) *Erdős, van der Corput, and the birth of covering congruences.* Preliminary report. **Carl Pomerance**, Dartmouth College (1086-11-350)

► 2:00PM (1782) *A polynomial problem of Turán modulo primes.* **Michael Filaseta**, University of South Carolina (1086-11-2641)

► 2:30PM (1783) *Bounds on the largest modulus of a covering with a fixed smallest modulus.* Preliminary report. **Ognian Trifonov**, University of South Carolina (1086-11-1366)

► 3:00PM (1784) *Nonlinear Sierpiński and Riesel Numbers.* **Carrie Finch**, Washington and Lee University, **Joshua Harrington**, University of South Carolina, and **Lenny Jones***, Shippensburg University (1086-11-1799)

► 3:30PM (1785) *Variant of a theorem of Erdős on the sum-of-proper-divisors function.* **Carl B. Pomerance** and **Hee-Sung Yang***, Dartmouth College (1086-11-70)

► 4:00PM (1786) *A polynomial investigation inspired by work of Schinzel and Sierpiński.* **Joshua Harrington*** and **Michael Filaseta**, University of South Carolina (1086-11-553)

4:30PM (1787) *Strongly Coloring Pythagorean Triples using Covering Systems.* **Joshua Cooper**, **Joshua Harrington** and **Daniel White***, University of South Carolina (1086-11-838)

► 5:00PM (1788) *Recent undergraduate research on coverings.* Preliminary report. **Mark Kozek**, Whittier College (1086-11-1497)

► 5:30PM (1789) *Sierpiński numbers with special properties*. Preliminary report. **R. Scott Groth***, **Olivier Mahame**, **Jean Luc Mugabe**, **Braedon Suminski** and **Wenda Tu**, Washington and Lee University (1086-11-2581)

► 6:00PM (1790) *Generating Composites by Appending Digits to Certain Types of Integers.* Preliminary report. **Lenny Jones** and **Maria Elena Markovich***, Shippensburg University (1086-11-1784)

### *AMS Special Session on the Influence of Ramanujan on his 125th Birthday, II*

**1:00 PM – 5:50 PM** **Room 8, Upper Level, San Diego Convention Center**

Organizers: **George Andrews**, Pennsylvania State University
**Bruce Berndt**, University of Illinois Urbana-Champaign
**Ae Ja Yee**, Pennsylvania State University

1:00PM (1791) *Analysis of a generalized Lebesgue identity in Ramanujan's Lost Notebook.* **Krishnaswami Alladi**, University of Florida (1086-11-566)

1:30PM (1792) *Identities involving partial theta functions.* **Byungchan Kim**, Seoul National University of Science and Technology (1086-11-1707)

► 2:00PM (1793) *The asymptotic number of partitions without k-sequences.* **Daniel M Kane**, Stanford University (1086-11-1982)

2:30PM (1794) *On Certain Partition Inequalitities.* **Alexander Berkovich**, University of Florida, Gainesville (1086-11-2323)

3:00PM ► (1795) *Partitions with parity and part difference conditions, and Bressoud's conjecture.* **Sun Kim***, Ohio State University, and **Ae Ja Yee**, Penn State University (1086-05-1659)

3:30PM (1796) *Congruences Modulo Squares of Primes for Fu's k Dots Bracelet Partitions.* **James A. Sellers**, Penn State University (1086-11-322)

4:00PM (1797) *Certain general Double-Sum Identities and variations of WP-Bailey Chains.* **James McLaughlin**, West Chester (1086-33-540)

4:30PM ► (1798) *Quotient Diagrams of Partitions.* **Matt Katz**, Pennsylvania State University (1086-05-1651)

5:00PM (1799) *New formulas for special values of the Ramanujan zeta function.* **Mathew Rogers**, University of Montreal (1086-11-2283)

5:30PM ► (1800) *Supercharacter theory and Ramanujan's sum.* **Stephan Ramon Garcia**, Pomona College (1086-11-764)

### *AMS Special Session on the Progress in Free Probability and Free Analysis, II*

**1:00 PM – 6:20 PM** **Room 30C, Upper Level, San Diego Convention Center**

Organizers: **Ken Dykema**, Texas A&M University
**Scott McCullough**, University of Florida

1:00PM (1801) *Tracial moment problems related to Connes' embedding problem.* **Sabine Burgdorf**, Ecole polytechnique fédérale de Lausanne (1086-15-2260)

1:30PM (1802) *Locally compact quantum groups and amenability.* **Ami Viselter**, University of Alberta (1086-46-2186)

2:00PM (1803) *Hardy Algebras, Berezin Transforms, and Taylor's Taylor Series.* Preliminary report. **Paul S. Muhly***, University of Iowa, and **Baruch Solel**, Technion (1086-46-979)

2:30PM (1804) *Noncommutative Inequalities.* Preliminary report. **J William Helton***, UC San Diego, and **Scott A McCullough**, University of Florida (1086-46-1670)

3:00PM (1805) *Hardy classes on non-commutative unit ball.* **Mihai Popa**, Queen's University (1086-47-2032)

3:30PM (1806) *On a Notion of Exactness for Reduced Free Products of $C^*$-Algebras.* **Paul Daniel Skoufranis**, University of California - Los Angeles (1086-47-611)

4:00PM (1807) *Primitivity and unital full free products of residually finite dimensional $C^*$-algebras.* **Ken Dykema**, Texas A&M, and **Francisco J Torres-Ayala***, UNAM (1086-46-1230)

4:30PM (1808) *Two-parameter Non-commutative Central Limit Theorem.* **Natasha Blitvić**, Vanderbilt University (1086-60-1429)

5:00PM (1809) *The Free Unitary Segal-Bargmann-Hall Transform.* **Todd Kemp***, University of California, San Diego, and **Brian Hall**, University of Notre Dame (1086-46-1469)

5:30PM (1810) *Norm convergence of unitary random matrix models and quantum information theory.* **Benoit Collins**, University of Ottawa & CNRS (1086-46-1110)

6:00PM (1811) *Recent Results in Topological Free Entropy Dimension.* Preliminary report. **Don Hadwin***, University of New Hampshire, **Qihui Li**, East China University of Science and Technology, **Weihua Li**, Columbia College, Chicago, and **Junhao Shen**, University of New Hampshire (1086-46-1421)

### *MAA Minicourse #4: Part B*

**1:00 PM – 3:00 PM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*Experiments in circle packing.*

Presenters: **Ken Stephenson**, University of Tennessee

**G. Brock Williams**, Texas Tech University

### *MAA Minicourse #12: Part B*

**1:00 PM – 3:00 PM** **Room 30A, Upper Level, San Diego Convention Center**

*Teaching an applied topology course.*

Presenters: **Colin Adams**, Williams College

**Robert Franzosa**, University of Maine

### *MAA Minicourse #14: Part B*

**1:00 PM – 3:00 PM** **Room 29C, Mezzanine Level, San Diego Convention Center**

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

Presenters: **Michael Posner**, Villanova University

**Carolyn Cuff**, Westminster College

### *AMS Session on Differential Equations and Numerical Methods*

**1:00 PM – 5:10 PM** **Room 18, Mezzanine Level, San Diego Convention Center**

1:00PM (1812) *TALK CANCELLED: On the stability and accuracy of a fourth-order Rosenbrock method for semi-linear parabolic differential equation.*
**Wenyuan Liao**, University of Calgary (1086-65-1481)

1:00PM (1813) *On the Cauchy problem of a class of integrable equations.*
**Alex Himonas**, University of Notre dame (1086-35-1976)

1:15PM (1814) *Triangular modulation of downstream surface waves of water flows over a bump.*
**Jazlynn Q Ngo**, San Diego State University (1086-97-2174)

1:30PM (1815) *Fifth-order complex Korteweg-de Vries type equations.*
**Netra Khanal***, The University of Tampa, **Jiahong Wu**, Oklahoma State University, and **Juan-Ming Yuan**, Providence University (1086-35-2329)

1:45PM (1816) *Partial Differential Equations Practicum.*
**Steve M. Anglin**, Case Western Reserve University (1086-35-38)

2:00PM (1817) *A partition of unity radial basis function collocation method for partial differential equations.* Preliminary report.
**Alfa R.H. Heryudono***, University of Massachusetts Dartmouth, and **Elisabeth Larsson**, Dept of Information Technology, Scientific Computing, Uppsala University (1086-65-1240)

2:15PM (1818) *Symmetrization of Poisson's Equation with Neumann Boundary Conditions.*
**Jeffrey J Langford**, Drake University (1086-35-2189)

2:30PM (1819) *Convergence of A Particle Method and Global Weak Solutions of a Family of Evolutionary PDEs.*
**Terrance L Pendleton***, **Alina Chertock**, North Carolina State University, and **Jian-Guo Liu**, Duke University (1086-35-1303)

2:45PM (1820) *A Simple Construction of Nonstandard Finite Difference Schemes Applied to SIR Problems.*
**Katharine F Gurski**, Howard University (1086-65-2413)

3:00PM (1821) *Maximum Principle and Symmetry results for Viscosity Solution of Fully Nonlinear Equations.*
**Jiuyi Zhu*** and **Guozhen Lu**, Wayne State University (1086-35-423)

3:15PM (1822) *Time Asymptotics Of Non-Darcy Flows Controlled By Total Flux On The Boundary.*
**Lidia Bloshanskaya***, **Akif Ibragimov**, **Eugenio Aulisa** and **Luan Hoang**, Texas Tech University (1086-35-554)

3:30PM (1823) *Existence, Uniqueness, Analyticity, and Borel Summability of Boussinesq and Magnetic Benard Equations.*
**Heather Rosenblatt*** and **Saleh Tanveer**, The Ohio State University (1086-35-1959)

3:45PM (1824) *The EPS Method: A New Method for Constructing Pseudospectral Differential Operators.*
**Keith J Wojciechowski***, University of Wisconsin - Stout, and **Kristian Sandberg**, Computational Solutions Inc. (1086-65-1783)

4:00PM (1825) *Traveling Wave Solutions of the Porous Medium Equation.* Preliminary report.
**Laxmi P. Paudel***, University of North Texas, Denton, Tx, and **Joseph Iaia**, University of North Texas (1086-35-1917)

4:15PM (1826) *Nonlinear Fronts in the Swift-Hohenberg Equation as a Model for Phyllotaxis.*
**Matthew Pennybacker*** and **Alan C Newell**, University of Arizona (1086-35-2554)

4:30PM Discussion

4:45PM (1827) *Approximate Diagonalization of Variable-Coefficient Differential Operators Through Similarity Transformations.* Preliminary report.
**James V. Lambers**, University of Southern Mississippi (1086-65-1536)

5:00PM (1828) *On the Convergence of $\alpha$ Schemes.* Preliminary report.
**Nan Jiang**, University of South Dakota (1086-65-399)

### *AMS Session on Financial Mathematics and Winning Strategies*

**1:00 PM – 5:10 PM** **Room 12, Mezzanine Level, San Diego Convention Center**

1:00PM (1829) *Optimal Stopping for Markov Modulated Diffusions.* Preliminary report.
**Thomas W Seaquist**, University of Texas at Arlington (1086-60-1080)

1:15PM (1830) *Pricing of geometric Asian options under Heston's stochastic volatility model.*
**In-Suk Wee***, Korea University, and **Bara Kim**, Korea University (1086-60-805)

1:30PM (1831) *TALK CANCELLED: Option Valuation Using Fast Fourier Transform Method under the CAM Stochastic Volatility Model.* Preliminary report.
**Wanwan Huang**, Florida State University (1086-60-1166)

1:45PM (1832) *Option pricing under a coupled additive-multiplicative stochastic volatility model.* Preliminary report.
**Ibukun O Amusan**, Florida State University (1086-60-2882)

2:00PM (1833) *Non-parametric calibration of the local volatility surface for European options.* **Jian Geng***, Florida State University, **Michael I. Navon**, Florida State University/Scientific Computing Department, and **Xiao Chen**, Center for Applied Scientific Computing, Lawrence Livermore National Laboratory (1086-49-1568)

► 2:15PM (1834) *Asymptotic Bayesian Analysis of The Capital Asset Pricing Model.* **Salilesh Mukhopadhyay**, Feasible Solution LLC (1086-62-349)

► 2:30PM (1835) *Effects of Momentum Trading on Asset Prices.* **Neeraj T Vijay**, George Mason University (1086-91-2807)

2:45PM (1836) *Robust Maximization of Asymptotic Growth under Covariance Uncertainty.* **Yu-Jui Huang***, University of Michigan, and **Erhan Bayraktar**, University of Michigan (1086-60-756)

► 3:00PM (1837) *Valuing Callable Bonds Based on Monte Carlo Simulation Techniques with Least-Squares Approach.* **Qi Fu**, Faculty of Business Administration, University of Macau (1086-60-1112)

3:15PM (1838) *Mathematical Tools for Modeling Negative Interest Rates.* Preliminary report. **Mark Burgin**, UCLA, and **Gunter Meissner***, Shidler College of Business, University of Hawaii (1086-60-27)

► 3:30PM (1839) *The flat tax in post-communist Europe.* Preliminary report. **Wayne Tarrant**, Wingate University (1086-62-446)

3:45PM (1840) *Efficient Hedging For Guaranteed minimum death benefits.* Preliminary report. **Yumin Wang**, Southern Illinois University (1086-60-1124)

4:00PM (1841) *Jump in financial market and estimation of earthquake- a similar analysis.* **Indranil SenGupta**, North Dakota State University, Fargo (1086-60-318)

4:15PM (1842) *A Note on the Additive Seasonal Decomposition of Time Series.* Preliminary report. **Constantine Georgakis**, DePaul University (1086-62-2745)

► 4:30PM (1843) *Optimal strategy for casino blackjack: A Markov chain approach.* **Kevin Coltin**, Arizona State University (1086-60-1346)

► 4:45PM (1844) *Optimization in Baseball Lineups.* **Brandi A. Bailes*** and **Jennifer M. Switkes**, California State Polytechnic University, Pomona (1086-62-2712)

5:00PM (1845) *Economic Recession and Headache Related Hospital Admissions.* **Ravi Chinta**, Xavier University, Cincinnati, OH, **MB Rao**, University of Cincinnati, Cincinnati, OH, **Vivek Narendran**, Children's Hospital, Cincinnati, OH, **Ganesh Malla** and **Hem Joshi***, Xavier University, Cincinnati, OH (1086-00-2384)

## *AMS Session on Graph Theory I*

**1:00 PM – 5:55 PM** **Room 13, Mezzanine Level, San Diego Convention Center**

1:00PM (1846) *$r$-hued Coloring $K_4$-minor Free Graphs.* **Huimin Song**, Shandong University at Weihai, P.R.China, **Hong-Jian Lai**, West Virginia University, **Sun Lei**, Shandong Normal University, Jinan, P.R.China, and **Ye Chen***, West Virginia University (1086-05-741)

► 1:15PM (1847) *Construction of Digraphs With Arbitrarily Large Girth and Chromatic Number.* **Michael Severino**, University of Montana (1086-05-2039)

► 1:30PM (1848) *Some new additive and multiplicative Ramsey numbers.* **Neil Hindman** and **Dev Phulara***, Howard University (1086-05-576)

► 1:45PM (1849) *Seeking lower bounds to Ramsey numbers using Dirichlet Difference Graphs.* **Joshua C Ferrerra**, Armstrong Atlantic State University (1086-05-1817)

2:00PM (1850) *Ore's Conjecture on color-critical graphs is almost true.* **Alexandr Kostochka** and **Matthew Yancey***, University of Illinois at Urbana-Champaign (1086-05-490)

► 2:15PM (1851) *On the $c$-strong Chromatic Number of $t$-intersecting Hypergraphs.* Preliminary report. **Ping Ngai Chung**, Massachusetts Institute of Technology (1086-05-452)

► 2:30PM (1852) *An improved upper bound on the adjacent vertex distinguishing chromatic index of a graph.* **Lianzhu Zhang**, Xiamen University, **Weifan Wang**, Zhejiang Normal University, and **Ko-Wei Lih***, Academia Sinica (1086-05-239)

2:45PM (1853) *Reducts of the Generalized Random Bipartite Graph.* Preliminary report. **Yun Lu**, Kutztown University of PA (1086-03-1865)

► 3:00PM (1854) *The Total Coloring Game.* Preliminary report. **Tyler Hays***, University of California, Berkeley, and **Luke Naftz**, University of Colorado, Denver (1086-05-615)

► 3:15PM (1855) *An Arc-Weighted Second Neighborhood Conjecture.* **Tyler Seacrest**, The University of Montana Western (1086-05-1693)

3:30PM (1856) ► *Enumerating Distinct Chessboard Tilings.* **Daryl R DeFord**, Washington State University (1086-05-2133)

3:45PM (1857) *Perfect tilings in graphs and digraphs.* **Theodore Molla***, **H.A. Kierstead** and **Andrzej Czygrinow**, Arizona State University (1086-05-2801)

4:00PM (1858) ► *Degree asymptotics of the numerical semigroup tree.* **Evan M. O'Dorney**, Harvard University (1086-05-2762)

4:15PM (1859) *Packing Four Copies of a Tree into a Complete Graph.* **Sean P Haler**, University of Idaho (1086-05-2526)

4:30PM (1860) ► *The Number of Ways to Assemble a Graph.* **Andrew Vince*** and **Miklos Bona**, University of Florida (1086-05-35)

4:45PM (1861) *Hamiltonian sets of polygonal paths in a 4-valent spatial graphs.* Preliminary report. **Tilahun A Muche**, Savannah State University (1086-92-1641)

5:00PM (1862) *Hamiltonian decompositions of line graphs of regular graphs. Allen Schwenk, Western Michigan University, Kalamazoo, MI 49008.* **Allen J. Schwenk**, Western MIchigan University (1086-05-1810)

5:15PM (1863) ► *Embedding Cycles and Bipartite Graphs in PG(n,q).* Preliminary report. **Ashley Klahr***, University of San Diego, **Elaina Aceves** and **David Heywood**, California State University Fresno (1086-00-790)

5:30PM (1864) ► *The 1-Fixed-Endpoint Path Partition Problem on Interval Graphs.* **Breeanne Baker**, Lehigh University (1086-05-481)

5:45PM (1865) ► *Pancyclicity of 4-Connected, Claw-Free, $N(i,j,k)$-Free Graphs.* Preliminary report. **James Carraher**, University of Nebraska-Lincoln, **Michael Ferrara**, **Timothy Morris**, Univ. of Colorado Denver, and **Michael Santana***, Univ. of Illinois at Urbana-Champaign (1086-05-822)

## *AMS Session on Knot Theory and 3-Manifolds*

**1:00 PM – 5:10 PM** **Room 19, Mezzanine Level, San Diego Convention Center**

(1866) *TALK CANCELLED: On the Canonical Component of the Character Variety for a Family of Hyperbolic 2-Bridge Link Complements.* Preliminary report. **Emily R Landes**, Technion - Israel Istitute of Technology (1086-57-1705)

1:00PM (1867) *Classification of Flat Virtual Pure Tangles and Bases for their Infinitesimal Algebras.* **Karene Chu**, University of Toronto/ Fields Institute (1086-57-2343)

1:15PM (1868) ► *On Warping Degree of Virtual Knot Diagram.* **Noureen Khan**, University of North Texas at Dallas (1086-55-442)

1:30PM (1869) ► *A state model for the two-variable Kauffman polynomial.* Preliminary report. **David K. Heywood*** and **Dionne F. Ibarra**, California State University, Fresno (1086-57-217)

1:45PM (1870) *On the HOMFLY-PT invariant of links in $S^1 \times S^2$.* **Mikhail Lavrov**, Carnegie Mellon University, and **Dan Rutherford***, University of Arkansas (1086-57-1885)

2:00PM (1871) *Properties of the head and tail of the colored Jones polynomial.* **Cody W Armond***, University of Iowa, and **Oliver T Dasbach**, Louisiana State University (1086-57-2922)

2:15PM (1872) *Classification of 0-solvable links and results about 0.5-solvability.* **Taylor E Martin**, Rice University (1086-57-485)

2:30PM (1873) ► *TALK CANCELLED: A subexponential algorithm for computing the Kauffman bracket of a link or tangle.* Preliminary report. **Stephen F Sawin***, Fairfield Unversity, **Lauren Ellenberg**, Arcadia College, **Gabriella Newman**, Carleton College, and **Jonathan Shi**, University of Washington (1086-57-176)

2:45PM (1874) *An algebraic approach to knot Floer homology.* Preliminary report. **Allison L Gilmore**, University of California Los Angeles (1086-57-2781)

3:00PM (1875) *The total rank conjecture in knot Heegaard Floer homology.* Preliminary report. **Allison H Moore**, University of Texas at Austin (1086-57-2077)

3:15PM (1876) *Cosmetic generalized crossing changes in knots.* **Cheryl Balm**, Michigan State University (1086-53-1855)

3:30PM (1877) *On cutting fiber surfaces along arcs, and ramifications for DNA.* **Dorothy Buck**, Imperial College London, **Kai Ishihara**, Yamaguchi University, **Matt Rathbun***, Imperial College London, and **Koya Shimokawa**, Saitama University (1086-57-2325)

3:45PM (1878) ► *Tangle Solutions for Site-Specific Hin Recombinase on DNA.* **Jennifer Lazarus***, University of North Texas at Dallas, and **Noureen Khan**, University of North Texas Dallas Dallas (1086-55-798)

4:00PM Break

4:15PM (1879) *On knot complements that decompose into regular ideal dodecahedra.* **Neil R Hoffman**, Max Planck Institute for Mathematics (1086-57-506)

4:30PM (1880) *Bridge distance, Heegaard genus, and Exceptional Surgeries.*
**Ryan Blair**, University of Pennsylvania, **Marion Campisi***, University of Texas, Austin, **Jesse Johnson**, Oklahoma State University, **Scott Taylor**, Colby College, and **Maggy Tomova**, University of Iowa (1086-57-1791)

4:45PM (1881) *An algorithm to classify rational 3-tangles.* Preliminary report.
**Bo-hyun Kwon**, Oklahoma State University (1086-57-733)

5:00PM (1882) *3-manifolds of $S^1$-cat 3.*
**Dongxu Wang**, Florida State University (1086-57-2668)

### *AMS Session on Modeling Diseases, Populations, and Resources*

**1:00 PM – 5:55 PM** **Room 30B, Upper Level, San Diego Convention Center**

1:00PM (1883) *Non-exponential models of dynamics of biological communities and the Principle of minimal of Tsallis information gain.* Preliminary report.
**Georgiy P Karev**, National Center for Biotechnology Information, National Institute of Health (1086-92-1770)

1:15PM ► (1884) *The Evolution of Ecological Communities.*
**Carrie Diaz Eaton**, Unity College, Maine (1086-92-1381)

1:30PM ► (1885) *Optimal control of integrodifference equations in a host-pathogen system.* Preliminary report.
**Marco V Martinez*** and **Suzanne Lenhart**, The University of Tennessee / NIMBioS (1086-92-1604)

1:45PM (1886) *Modeling the nonlocal dispersal of invasive plant species in heterogeneous landscapes.*
**Christopher Strickland***, **Gerhard Dangelmayr** and **Patrick Shipman**, Colorado State University (1086-92-1365)

2:00PM ► (1887) *Analysis of the Trojan Y-Chromosome eradication strategy for an invasive species.*
**Xueying Wang***, **Jay R. Walton**, Texas A&M University, **Rana D. Parshad**, King Abdullah University of Science and Technology, Kingdom of Saudi Arabia, **Katie Storey**, Carleton College, and **May Boggess**, Texas A&M University (1086-34-83)

2:15PM (1888) *A Markov chain model for the forest stand dynamics.*
**Nikolay Strigul***, Washington State University Vancouver, and **Ionut Florescu**, Stevens Institute of Technology (1086-92-2814)

2:30PM ► (1889) *Evolutionary stability of movement strategies in a two-patch habitat selection model.* Preliminary report.
**Theodore E. Galanthay**, University of Colorado, Boulder (1086-92-2676)

2:45PM (1890) *Structured Two-Stage Population Model with Migration.* Preliminary report.
**Selenne H. Garcia - Torres**, University of Southern California (1086-92-2782)

3:00PM (1891) *Optimal resource allocation strategy for the fire ant (Solenopsis invicta) over multiple seasons.* Preliminary report.
**Erika Asano***, University of South Florida St.Petersburg, and **Suzanne Lenhart**, University of Tennessee, Knoxville (1086-49-2638)

3:15PM (1892) *The effect of information asymmetry in Producer-Scrounger games.*
**Jan Rychtar**, The University of North Carolina at Greensboro (1086-91-1079)

3:30PM (1893) *Analysis of a stochastic SIR model with parametric heterogeneity.* Preliminary report.
**Artem Novozhilov**, North Dakota State University (1086-92-238)

3:45PM (1894) *TALK CANCELLED: Qualitative Analysis of Stochastic SIR Model with Disease Deaths.*
**Kursad Tosun**, Southern Ilionis University Carbondale (1086-60-2945)

4:00PM (1895) *Modeling and analysis of intermittently shed pathogens capable of environmental persistence.* Preliminary report.
**Majid Bani-Yaghoub**, University of Missouri-Kansas City (1086-92-2447)

4:15PM (1896) *Study and Analysis of Aquatic Pathogenic Transmission.*
**Urmi Ghosh-Dastidar***, NYCCT, CUNY, and **Suzanne Lenhart**, NIMBioS, University of Tennessee (1086-92-2373)

4:30PM (1897) *Use of Lifespan-Shortening Wolbachia to Control Dengue Fever: Demographic Factors.*
**Yingyun Shen*** and **Mike Mesterton-Gibbons**, Florida State University (1086-92-1387)

4:45PM (1898) *Estimating biting rates of Trypanosoma cruzi infected triatomine vector species on preferred sylvatic hosts in Texas.*
**Kamuela E Yong***, Arizona State University, **Anuj Mubayi**, Northeastern Illinois University, and **Christopher Kribs-Zaleta**, University of Texas at Arlington (1086-92-2412)

5:00PM ► (1899) *Evolutionary pressures maintain consistently low parasitism rates in the parasitoid wasp Hyposoter horticola.* Preliminary report.
**Kathryn J Montovan***, **Laura E Jones**, Cornell University, **Saskya van Nouhuys**, University of Helsinki, and **Hudson Kern Reeve**, Cornell University (1086-92-2479)

5:15PM ► (1900) *TALK CANCELLED: Can Humanity Survive? Mathematical Modeling of the Zombie Apocalypse.* Preliminary report.
**Jean Marie Marie Linhart***, Texas A&M University, and **Frances G. Withrow**, College Station, TX (1086-34-206)

5:30PM (1901) *Dynamic threshold of patch disease model for migratory birds.* Preliminary report.
**Xiang-Sheng Wang**, Memorial University of Newfoundland (1086-37-2669)

► 5:45PM (1902) *A bioeconomic perspective on the Endangered Species Act.*
**Kehinde Rilwan Salau***, Arizona State University, and **Eli P Fenichel**, Yale University (1086-49-2658)

### *AMS Session on Undergraduate Research in Applied Mathematics*

**1:00 PM – 4:55 PM** **Room 30E, Upper Level, San Diego Convention Center**

► 1:00PM (1903) *A New High-Order Filter for Leapfrog Time Integration of Wave Problems.*
**Eric Van Buren***, **James Upton**, **Scott Van Buren** and **Mohamed Moustaoui**, Arizona State University CSUMS (1086-00-1929)

► 1:15PM (1904) *Do the Wave: Applying Group Finite Elements to the Shallow Water Equations.* Preliminary report.
**George H Lytle**, Asbury University (1086-76-241)

► 1:30PM (1905) *Optimizing Surface Plasmon Generation.*
**Kyle Shaw*** and **Dan Weingarten**, George Mason University (1086-78-2469)

► 1:45PM (1906) *A Computational Algorithm for Estimating Conductivities.* Preliminary report.
**Annika L Jersild***, College of William & Mary, and **Padmanabhan Seshaiyer**, George Mason University (1086-49-295)

► 2:00PM (1907) *Effects of wildfire smoke and fog on highway visibility as shown by a mathematical model.* Preliminary report.
**Andrew Getz***, **Yi Ding** and **Zhixiong Chen**, New Jersey City University (1086-35-1038)

► 2:15PM (1908) *Gravitational lensing by spiral galaxies.* Preliminary report.
**Abi Komanduru***, **Brett Ernst** and **Sean Fancher**, Purdue University (1086-30-2937)

► 2:30PM (1909) *Regional Coverage with Steerable Satellite Sensors.*
**Louis Bohorquez***, Cal Poly Pomona, and **Jason Xu**, University of Washington (1086-00-1388)

► 2:45PM (1910) *Assessing the Chaotic Nature of Interstellar Magnetic Fields.*
**Lindsay Grayson*** and **Kirk Wallace**, Northern Kentucky University (1086-85-1501)

► 3:00PM (1911) *Paleoclimatology.*
**Eric Cawi**, George Mason University, and **John Ensley***, Brown University (1086-15-2933)

► 3:15PM (1912) *Static Two-Dimensional Sponge Deformation.*
**Brianna Kathleen Lynn*** and **Mauro Wilfredo Rubio**, George Mason University, Fairfax, Virginia (1086-74-2160)

► 3:30PM (1913) *In search of universal scaling functions in a financial market model.*
**Alissa M. Stafford**, University of Maryland, College Park (1086-91-740)

► 3:45PM (1914) *Model-Implied Measures of Risk-Adjusted Returns in Stochastic Volatility Models.*
**Joshua Cape***, Rhodes College, **William Dearden**, Lehigh University, **William Gamber**, Pomona College, and **Linh Nguyen**, Lafayette College (1086-91-631)

4:00PM (1915) *Optimal Investment and Consumption Problem with Markovian Parameters.*
**Ruihua Liu**, University of Dayton (1086-91-2270)

► 4:15PM (1916) *The Effect of Experiment Design on Network Inference.* Preliminary report.
**Jacqueline Marie Yanchuck***, Seton Hill University, **Caleb Marc Brown**, University of Nebraska-Lincoln, **Camila Eugenia Reyes**, California State University, Stanislaus, **Eric Eager** and **Alan Veliz-Cuba**, University of Nebraska-Lincoln (1086-93-1466)

► 4:30PM (1917) *Improving Cross-lingual Search Quality.*
**Christie Quaranta***, Plymouth State University, **Imanol Arrieta Ibarra**, Instituto Tecnológico Autónomo de México, **Eric Schwartz**, Columbia University, and **Elena Sizikova**, University of Oxford (1086-68-742)

► 4:45PM (1918) *Support Vector Machines and the Exterior Point Method.*
**Anna-Rose G Wolff**, George Mason University (1086-00-1672)

### *MAA Session on Actuarial Education*

**1:00 PM – 4:15 PM** **Room 5B, Upper Level, San Diego Convention Center**

Organizers: **Robert Buck**, Slippery Rock University
**Thomas Wakefield**, Youngstown State University

► 1:00PM (1919) *TALK CANCELLED: Raising actuaries for fun and profit.*
**Len Asimow*** and **David Hudak**, Robert Morris University (1086-B1-917)

► 1:20PM (1920) *An Advanced Undergraduate Actuarial Science Program at One Four-year Comprehensive University.* Preliminary report.
**Kevin E. Charlwood**, Washburn University (1086-B1-644)

► 1:40PM (1921) *Starting an Actuarial Science Major at a Liberal Arts College.*
**Mark A Mills**, Central College (1086-B1-165)

2:00PM ► (1922) *An Actuarial Science Program at Salisbury University.* Preliminary report.
**Barbara A Wainwright**, Salisbury University (1086-B1-1159)

2:20PM ► (1923) *Building an Actuarial Science Option for Mathematics Majors.*
**Robert E. Buck*** and **Richard J. Marchand**, Slippery Rock University (1086-B1-1862)

2:40PM (1924) *Starting an actuarial program without creating new courses.*
**Paul T Taylor**, Shippensburg University (1086-B1-968)

3:00PM (1925) *Structuring an Exam P Prep Course.*
**Thomas P Wakefield**, Youngstown State University (1086-B1-279)

3:20PM ► (1926) *Preparing Students for Exam FM.* Preliminary report.
**Richard J. Marchand**, Slippery Rock University (1086-B1-2507)

3:40PM ► (1927) *The M349P Project: Motivating students to take responsibility and improve communication ability while studying for C/4.*
**Mark Matthew Maxwell**, University of Texas at Austin (1086-B1-1370)

4:00PM ► (1928) *An Example of Student/Faculty Summer Research in Actuarial Mathematics: Using Mathematica to do Demographic Modeling and the Surprising Relevance of Hypergeometric Functions.* Preliminary report.
**William M. Kinney*** and **Jake Smith**, Bethel University (1086-B1-839)

## *MAA Session on Adding Modern Ideas to an Introductory Statistics Course, II*

**1:00 PM – 5:35 PM** **Room 6E, Upper Level, San Diego Convention Center**

Organizers: **Brian T. Gill**, Seattle Pacific University
**Scott Alberts**, Truman State University
**Andrew Zieffler**, University of Minnesota

1:00PM ► (1929) *Projects to Engage Students in Introductory Statistics.* Preliminary report.
**Derek Habermas*** and **Cheryl Chute Miller**, SUNY Potsdam (1086-B5-2490)

1:20PM (1930) *Using The Island for Student Projects.*
**Sue B. Schou**, Idaho State University (1086-B5-433)

1:40PM ► (1931) *Use of data sets and projects in an Applied Statistics course.*
**K.L.D. Gunawardena**, University of Wisconsin Oshkosh (1086-B5-1829)

2:00PM ► (1932) *Introducing Big Data in an Introductory Applied Statistics Course.*
**William H Rybolt*** and **John D McKenzie**, Babson College (1086-B5-2705)

2:20PM ► (1933) *Adventures in Statistics: Encounters with Big Data.*
**Jeff Randell Knisley**, East Tennessee State University (1086-B5-2482)

2:40PM ► (1934) *Seasonality and Autocorrelation: The typical "problem" children in business statistics.* Preliminary report.
**Joseph P McCollum*** and **Arindam Mandal**, Siena College (1086-B5-650)

3:00PM ► (1935) *The New York Stock Exchange: A Real World Data Set.*
**Robert P. Webber**, Longwood University (1086-B5-619)

3:20PM ► (1936) *Real Data, Real Stakes: Introductory Statistics Students Predict the Wisconsin Recall Election.*
**Stephen D. Szydlik*** and **Jennifer E. Szydlik**, University of Wisconsin Oshkosh (1086-B5-730)

3:40PM ► (1937) *Fisher's Test and the Ubiquity of Small Samples.*
**Jeff Suzuki**, Brooklyn College (1086-B5-55)

4:00PM (1938) *Incorporating Real Data Sets and Writing into an Introductory Statistics Course Focused on Sports and Games.*
**Joe DeMaio*** and **Amy Hillen**, Kennesaw State University (1086-B5-106)

4:20PM ► (1939) *All the Statistics That's Fit to Print.*
**Penelope H. Dunham**, Muhlenberg College (1086-B5-852)

4:40PM (1940) *Combining Strategies to Promote Meaningful Learning in Statistics.*
**Dianna J. Spence*** and **Sherry L. Hix**, North Georgia College & State University (1086-B5-1322)

5:00PM ► (1941) *A Fiddler on the Roof: Tradition vs Modern Methods in Teaching Inference.*
**Patti Frazer Lock*** and **Robin H. Lock**, St. Lawrence University (1086-B5-2828)

5:20PM (1942) *The Other Intro Course: Combining Foundations, Applications, and Computation in the Math Stat Course.*
**Randall Pruim**, Calvin College (1086-B5-2926)

## *MAA Session on Effective Strategies and Programs for Mentoring Women and Minorities in Mathematics, II*

**1:00 PM – 2:55 PM** **Room 33B, Upper Level, San Diego Convention Center**

1:00PM (1943) *Two projects: An NSF ADVANCE mentoring program for female junior faculty members & curriculum changes to support female undergraduates in mathematics.*
**Jessica M Deshler**, West Virginia University (1086-E5-767)

1:20PM ► (1944) *TALK CANCELLED: Supporting Women in STEM fields: The Wi2STEM Club's Evolving Impact on Student Members at Clayton State University.*
**Sarah Minion***, **Catherine A Matos**, **Mary Hudachek-Buswell** and **Scott Bailey**, Clayton State University (1086-E5-2968)

1:40PM (1945) *Impact of the National Research Experience for Undergraduates Programs (NREUP).*
**Gulden Karakok*** and **Brian Arthur Christopher**, University of Northern Colorado (1086-E5-2627)

2:00PM ► (1946) *Faculty Perceptions of Mentoring Underrepresented Students.*
**Jerry Dwyer**, **Levi Johnson*** and **Sonya Sherrod**, Texas Tech University (1086-E5-2810)

2:20PM ► (1947) *Math 2 Excite: Creating Interest, Confidence and Awareness about Mathematics among Young Women.*
**Brian J Lindaman*** and **LeAnne Yenny**, Montana State University (1086-E5-2604)

2:40PM ► (1948) *Girls and Mathematics Summer Program.* Preliminary report.
**Maria Lorenz*** and **Irina Mitrea**, Temple University (1086-E5-2635)

## *MAA Session on Fostering Mathematical Habits of Mind, I*

**1:00 PM – 4:55 PM** **Room 33A, Upper Level, San Diego Convention Center**

Organizers: **Kien H. Lim**, University of Texas at El Paso
**Ayşe A. Şahin**, DePaul University
**Holly Hirst**, Appalachian State University

1:00PM ► (1949) *General and Mathematical Habits of Mind: An Overview.*
**Kien H Lim**, University of Texas at El Paso (1086-F1-914)

1:20PM ► (1950) *Developing Measures for Teachers' Mathematical Habits of Mind.* Preliminary report.
**Jennifer M. Lewis***, Wayne State University, Detroit, MI, and **Davida Fischman**, Calfiornia State University San Bernardino (1086-F1-2547)

1:40PM ► (1951) *Investigations in mathematics teacher education: the role of personal reflection as a learning instrument in mathematics classes for teachers.*
**Sarah E. Bell***, **Josh Bargiband** and **Tetyana Berezovski**, Saint Joseph's University (1086-F1-1621)

2:00PM ► (1952) *Conceptualizing and Measuring Mathematical Sophistication.*
**Jennifer Szydlik**, **Eric Kuennen**, **Jason Belnap**, **Amy Parrott***, University of Wisconsin Oshkosh, and **Carol Seaman**, University of North Carolina Greensboro (1086-F1-1399)

2:20PM (1953) *False Confidence.*
**Holly Zullo***, Carroll College, and **Christopher Storm**, Adelphi University (1086-F1-82)

2:40PM ► (1954) *Ways to Think About Mathematics: A Habits of Mind Approach for Teachers and other Mathematicians.* Preliminary report.
**Steven R Benson**, Lesley University (1086-F1-2465)

3:00PM (1955) *Mathematical Habits of Mind in the "Making the Transition from High School to College" Project.*
**Brian P. Beaudrie**, Northern Arizona University (1086-F1-2444)

3:20PM ► (1956) *Using the Standards for Mathematical Practice from the Common Core to Develop Mathematical Habits of Mind in Pre-service Teachers on the College Campus and in Secondary Field Experiences.* Preliminary report.
**Sherry L Hix*** and **Dianna J Spence**, North Georgia College & State University (1086-F1-2657)

3:40PM ► (1957) *Research Experiences for Teachers: Developing Mathematical Habits of Mind for Teaching.*
**David D Barker*** and **Saad El-Zanati**, Illinois State University (1086-F1-2618)

4:00PM ► (1958) *Teachers' Use of Core Mathematical Practices.* Preliminary report.
**Amy Cohen**, Rutgers University, and **Jennifer V. Jones***, Center for Math Science and Computer Education, Rutgers University (1086-F1-940)

4:20PM ► (1959) *Fostering mathematical habits of mind in the middle school math teacher.*
**Gary A. Harris*** and **Raegan Higgins**, Texas Tech University (1086-F1-833)

4:40PM (1960) *An Instructional Model for Learning Division of Fractions and Fostering Learner's Mathematical Habit of Mind.* Preliminary report.
**Hsing Wen Hu***, University of Alaska Anchorage, and **Cheng-Yao Lin**, Southern Illinois University (1086-F1-2670)

## *MAA Session on Innovative and Effective Ways to Teach Linear Algebra, III*

**1:00 PM – 1:55 PM** **Room 7A, Upper Level, San Diego Convention Center**

Organizer: **David M. Strong**, Pepperdine University

1:00PM ► (1961) *A Linear Algebraic Approach to An Old Calculus Standby.*
**Susan Eileen D'Agostino**, Southern New Hampshire University (1086-G5-1376)

1:20PM ► (1962) *Tracking the transit of Venus.*
**Andrew J Simoson**, King College (1086-G5-841)

1:40PM *Algebra in Call of Duty: Black Ops?*
► (1963) **Heidi Hulsizer**, Hampden-Sydney College (1086-G5-1912)

### *MAA Session on Philosophy, Mathematics, and Progress*

**1:00 PM – 4:55 PM** **Room 5A, Upper Level, San Diego Convention Center**

Organizers: **Thomas Drucker**, University of Wisconsin-Whitewater
**Dan Sloughter**, Furman University

1:00PM *From Intuition to Esoterica.*
► (1964) **Deborah C. Arangno**, University of Colorado Denver (1086-L5-459)

1:30PM *Mathematical Thinking - From Cacophony*
► (1965) *to Consensus.*
**Sean F Argyle**, Kent State University (1086-L5-71)

2:00PM *Mathematical Progress via Philosophy.*
► (1966) **Thomas Drucker**, University of Wisconsin–Whitewater (1086-L5-618)

2:30PM *Philosophical and mathematical*
► (1967) *considerations of continua.* Preliminary report.
**Daniel C. Sloughter**, Furman University (1086-L5-1597)

3:00PM *John Playfair, the Scottish Enlightenment,*
► (1968) *and "Progress" in the History and Philosophy of Mathematics.* Preliminary report.
**Amy Ackerberg-Hastings**, Smithsonian's National Museum of American History (1086-L5-45)

3:30PM *Mathematics vs Philosophy.*
► (1969) **Ruggero Ferro**, University of Verona, Italy (1086-L5-365)

4:00PM *Progress in Mathematics: The Importance*
► (1970) *of Not Assuming Too Much.*
**James R. Henderson**, University of Pittsburgh at Titusville (1086-L5-209)

4:30PM *Kalmár's Argument Against the*
(1971) *Plausibility of Church's Thesis.*
**Mate Szabo**, Carnegie Mellon University (1086-L5-874)

### *MAA Session on Using Mobile Communication Devices for Mathematics Education*

**1:00 PM – 3:35 PM** **Room 1B, Upper Level, San Diego Convention Center**

Organizers: **Lawrence Moore**, Duke University
**Lila Roberts**, Clayton State University

1:00PM *Mobile Math Modeling Labs.*
► (1972) **Ben Galluzzo**, Shippensburg University (1086-R5-2906)

1:20PM *Can my smart phone be a substitute to*
► (1973) *my office hours?* Preliminary report.
**Ahlam E Tannouri***, Morgan State University, and **Sam Tannouri**, Computer Science Department; Morgan State University (1086-R5-2868)

1:40PM *Using Mobile Communication Devices in*
► (1974) *Math Courses for Future Elementary School Teachers.* Preliminary report.
**Nora Franzova**, Langara College, Vancouver, Canada (1086-R5-1417)

2:00PM *Math Demos on the Go.*
(1975) **Lila F Roberts***, Clayton State University, and **David R Hill**, Temple University (1086-R5-2339)

2:20PM *Teaching College Algebra via the iPad.*
► (1976) **Cynthia M. Traub**, Southern Illinois University Edwardsville (1086-R5-2874)

2:40PM *iPads as a Collaborative Tool.* Preliminary
(1977) report.
**Larissa B Schroeder***, **Mako Haruta**, **Jean McGivney-Burelle**, **Fei Xue** and **John Williams**, University of Hartford (1086-R5-1352)

3:00PM *iCalculus for iPad.*
► (1978) **Ashok K Deb*** and **Kevin Blane**, U.S. Military Academy (1086-R5-1275)

3:20PM *Sage Interacts in an Online Calculus Text.*
► (1979) **Lawrence C. Moore*** and **David A. Smith**, Duke University (1086-R5-2485)

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

**1:00 PM – 4:15 PM** **Room 3, Upper Level, San Diego Convention Center**

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

1:00PM *Excursions on the Sphere: Investigation of*
► (1980) *the Effectiveness of Spherical Geometry to Deepen Understanding of Euclidean Geometry.* Preliminary report.
**Kristen Joy Schemmerhorn**, Dominican University (1086-N5-2890)

1:20PM *Teaching Mathematical Maturity through*
(1981) *Axiomatic Geometry.*
**Brian Katz**, Augustana College (1086-N5-1932)

1:40PM *I can't believe my instructor expects me*
► (1982) *to do this: Methods for your classroom to promote clarity related to hopes and expectations.*
**Laura J Schmidt**, University of Wisconsin-Stout (1086-N5-1498)

2:00PM ► (1983) *Students' Perceptions of Feedback and its Actual Impact on Students' Mathematical Modeling.* Preliminary report.
**Aladar K Horvath**, Purdue University (1086-N5-2466)

2:20PM ► (1984) *Improving Student Learning in Mathematics with Animations: WHYU vs. Khan Academy.* Preliminary report.
**Cynthia Y. Young*** and **Tammy M Muhs**, University of Central Florida (1086-N5-714)

2:40PM (1985) *Comparing Online and Traditional Textbook Homework in a College Algebra Class: A Second Generation SoTL Study.* Preliminary report.
**John C Nardo***, **J Lynn Gieger**, **Leah Zinner**, **Karen Schmeichel** and **Deborah Payne**, Oglethorpe University (1086-N5-1844)

3:00PM ► (1986) *Mathematical Word Problems: An Investigation of the Optimum Period of Teaching Word Problems in a College Algebra Course in Order to Maximize Learning Outcomes.*
**Jerry C Obiekwe**, The University of Akron Wayne College (1086-N5-166)

3:20PM ► (1987) *Algebra in real life: what do students choose ?*
**Kirthi Premadasa***, University of Wisconsin- Baraboo/Sauk County, and **Kavita Bhatia**, University of Wisconsin-Marshfield/Wood County (1086-N5-1534)

3:40PM ► (1988) *Engaging High School Math Students and Teachers Through a Proficiency-based Assessment and Reassessment of Learning Outcomes (PARLO) System.* Preliminary report.
**Michael A. Posner**, Villanova University (1086-N5-1553)

4:00PM (1989) *Learning about teaching through experimentation and reflection.*
**Mary Beisiegel**, Oregon State University (1086-N5-2151)

## *MAA General Contributed Paper Session: History and Philosophy of Mathematics*

**1:00 PM – 2:10 PM** **Room 33C, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University
Moderator: **J. Alan Alewine**, McKendree University

1:00PM ► (1990) *A Natural Philosophical Connexion Relating Mathematics, Science, and Progress.* Preliminary report.
**G. Arthur Mihram***, Princeton, NJ, and **Danielle Mihram**, University of Southern California (1086-VC-1875)

1:15PM ► (1991) *The work of Leonhard Euler related to Fermat's Last Theorem.*
**Lee Stemkoski**, Adelphi University (1086-VC-1371)

1:30PM ► (1992) *The Historical Roots of Math and Physics in the British Isles : A Tour.*
**Mariah Birgen**, Wartburg College (1086-VC-2301)

1:45PM ► (1993) *L'Hôpital's Geometric Exposition of the Calculus.*
**Robert E. Bradley**, Adelphi University (1086-VC-1768)

2:00PM ► (1994) *Reforming Mathematics at Cambridge: George Peacock and the Tripos Exam.*
**Richard Stout**, Gordon College (1086-VC-1913)

## *SIAM Minisymposium on Applied, Computational, and Discrete Mathematics at National Laboratories and Federal Research Agencies*

**1:00 PM – 6:50 PM** **Room 11A, Upper Level, San Diego Convention Center**

Organizers: **Rick Chartrand**, Los Alamos National Lab
**Gary Hewer**, Naval Air Warfare Center Weapons Division, China Lake
**Zuhair Nashed**, University of Central Florida
**Luminita Vese**, University of California, Los Angeles

1:00PM ► (1995) *Image and Video Processing with Nonconvex Splitting Algorithms.* Preliminary report.
**Rick Chartrand**, Los Alamos National Laboratory (1086-49-2080)

1:30PM ► (1996) *Applications of Graphs and Partial Orders at PNNL.* Preliminary report.
**Emilie Hogan**, Pacific Northwest National Laboratory (1086-05-1945)

2:00PM ► (1997) *Image Analysis in Remote Sensing Science.* Preliminary report.
**Igor Yanovsky**, Jet Propulsion Laboratory, California Institute of Technology (1086-35-1171)

2:30PM ► (1998) *Scalable adaptive function approximation and error estimation for stochastic simulations.*
**Richard K Archibald**, Oak Ridge National Laboratory (1086-65-2972)

3:00PM ► (1999) *Shape Reconstruction from Direct and Indirect Measurements.*
**Gunay Dogan**, Theiss Research, NIST (1086-65-1891)

3:30PM (2000) *The Error Transport and Adjoint Methods of Numerical Error Estimation.*
**Jeffrey W Banks**, **Jeffrey M Connors***, **Jeffrey A Hittinger** and **Carol S Woodward**, Lawrence Livermore National Laboratory (1086-65-2965)

4:00PM (2001) *Automatically Structuring Unstructured Data: A Probabilistic Approach and Open Questions.*
**Arjuna Flenner*** and **Gary Hewer**, NAVAIR (1086-60-1506)

► 4:30PM (2002) *Optimal Derivatives of Noisy Simulations.*
**Stefan M Wild**, Argonne National Laboratory, Mathematics and Computer Science Division (1086-65-2663)

5:00PM (2003) *Computational Harmonic Analysis and Cauchy Problems.* Preliminary report.
**George Fann**, Oak Ridge National Laboratory (1086-65-2994)

5:30PM (2004) *Optimization-based moment closures for kinetic equations.* Preliminary report.
**Cory Hauck**, Oak Ridge National Laboratory (1086-65-2989)

6:00PM TALK ADDED: Computing on Sequoia: Designing scalable algorithms, Matthew O'Brien, Lawrence Livermore National Laboratory.

6:00PM (2005) *TALK CANCELLED: Computing on Sequoia: The Search for Synergy Between Algorithms and Hardware.*
**Barna L Bihari**, Lawrence Livermore National Laboratory (1086-68-2981)

6:30PM (2006) *Fast Evaluating Matern Covariance Kernel by a Cartesian Treecode.*
**Lei Wang*** and **Jie Chen**, Argonne National Lab (1086-65-502)

## *NAM Granville-Brown-Haynes Session of Presentations by Recent Doctoral Recipients in the Mathematical Sciences*

**1:00 PM – 2:50 PM** **Room 11B, Upper Level, San Diego Convention Center**

► 1:00PM (2007) *Data Mining for Complex Biochemistry Spectroscopy Data.*
**T. Vance***, University of Maryland Eastern Shore, **D. Pokrajac**, Delaware State University Department of Computer and Information Sciences, **A. Lazarevic**, United Technologies Research Center, **N. Reljin**, Delaware State University Department of Mathematical Sciences, **N. Melikechi**, Delaware State University College of Mathematics, Natural Sciences, and Technology, **A. Marcano** and **Y. Markushin**, Delaware State University Department of Physics and Pre-Engineering (1086-62-246)

► 1:30PM (2008) *Biological Application for the Oriented Skein Relation.*
**Candice Renee Price**, United States Military Academy, West Point (1086-57-491)

► 2:00PM (2009) *Stochastic Gravitational Microlensing: Mathematical Theory and Applications.*
**Alberto Mokak Teguia**, Rice University (1086-83-1473)

2:30PM (2010) *Some representation theory of $Sl_*(2, \mathcal{O}/\mathfrak{p}^2)$ where $*$ is the identity and $Sl_*(2, M_2(\mathcal{O}/\mathfrak{p}^2))$ where $*$ equals transpose.*
**Carmen M. Wright**, Jackson State University (1086-11-2865)

## *MAA Committee on the Participation of Women in Mathematics-Joint Committee on the Participation of Women in the Mathematical Sciences Panel Discussion*

**1:00 PM – 2:20 PM** **Room 1A, Upper Level, San Diego Convention Center**

*Parental and family leave for graduate students and post docs: Policies and experiences.*

Organizers: **Patricia Hale**, California State Polytechnic University, Pomona
**Cathy Kessel**, Berkeley, California
**Tanya Leise**, Amherst College

Panelists: **Cathy Kessel**
**Sonja Mitchell Gallagher**, University of California, Santa Barbara
**Kathryn Murphy**, University of California, San Diego
**Mary Radcliffe**, University of Californa, San Diego
**Ami Radunskaya**, Pomona College
**Ruth Haas**, Smith College

## *SIGMAA on Math Circles for Students and Teachers Poster and Activity Session*

**1:00 PM – 5:00 PM** **Marina Ballroom FG, 3rd Floor, Marriott**

*Presentations on the Circle activities listed below will be given at the indicated times; complete programs will be available in the session room.*

Organizers: **Philip B. Yasskin**, Texas A&M University
**Sam Vandervelde**, St. Lawrence University
**Tatiana Shubin**, San Jose State University
**James Tanton**, St. Mark's School

1:00PM *Exploring Lill's Method for Finding Polynomial Roots; What Is in that Can of Soda?; Folding Polygons.*

1:30PM *Navajo-Related Math Circle Activities; Pool Table Geometry; Hyperbolic Soccer Ball.*

2:00PM *Research Update on Math Teachers' Circles; Exploring Lill's Method for Finding Polynomial Roots; What's Up With Spot It?; Hyperbolic Soccer Ball.*

2:30PM *Keeping Safe: Lessons Learned Working with SFMC Elementary Students; Navajo-Related Math Circle Activities; Operation Cookie Jar; Folding Polygons.*

3:00PM *Keeping Safe: Lessons Learned Working with SFMC Elementary Students; What Is in that Can of Soda?; What's Up With Spot It?*

3:30PM *Research Update on Math Teachers' Circles; Operation Cookie Jar; Pool Table Geometry.*

4:00PM **Reception.**

### *MAA-NSF-SIAM Panel Discussion*

**1:00 PM – 2:20 PM** **Room 4, Upper Level, San Diego Convention Center**

*Reporting progress: A minisymposium on mathematical modeling across the K–16 curriculum.*

Organizers: **Richard Alo**, NSF Division of Undergraduate Education
**Ron Buckmire**, NSF Division of Undergraduate Education
**Lee Zia**, NSF Division of Undergraduate Education
**Peter Turner**, Clarkson University and SIAM

Panelists: **Ron Buckmire**
**Peter Turner**
**Katherine Socha**, Math for America
**Jeffrey Humphreys**, Brigham Young University
**Rachel Levy**, Harvey Mudd College

### *ASL Invited Address*

**1:30 PM – 2:20 PM** **Room 7B, Upper Level, San Diego Convention Center**

(2011) *Three-type side conditions and forcing axioms.*
**Itay Neeman**, University of California, Los Angeles

### *MAA Invited Paper Session on Where Have All the Zeros Gone?*

**2:00 PM – 4:20 PM** **Room 2, Upper Level, San Diego Convention Center**

Organizer: **Stephanie Edwards**, Hope College

2:00PM (2012) *Extreme curvature of polynomials and level sets.* Preliminary report.
**Stephanie Edwards**, Hope College (1086-AG-535)

2:30PM ► (2013) *Non-real zeros of derivatives of a class of real entire functions.* Preliminary report.
**Jessalyn Bolkema**, University of Nebraska - Lincoln (1086-AG-598)

3:00PM ► (2014) *Where the Critical Numbers of a Polynomial Aren't.*
**Matt Boelkins**, Grand Valley State University (1086-AG-1317)

3:30PM (2015) *The Lee-Yang Theorem in probability and statistical physics.*
**Alexander Vandenberg-Rodes**, UC Irvine (1086-AG-2923)

4:00PM ► (2016) *The Zeros of Eulerian polynomials and their Multivariate Extensions.*
**Jim Haglund**, University of Pennsylvania (1086-AG-2036)

### *Rocky Mountain Mathematics Consortium Board of Directors Meeting*

**2:15 PM – 4:00 PM** **Malibu Room, 4th Floor, Marriott**

### *MAA General Contributed Paper Session: Mathematics Education, I*

**2:30 PM – 5:40 PM** **Room 33C, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Sandra Richardson**, Virginia State University
**Martha Byrne**, University of New Mexico

2:30PM ► (2017) *Math Transition into the Common Core Era.*
**Kathryn Ernie***, **Erick Brian Hofacker**, University of Wisconsin - River Falls, and **Sherrie Serros**, University of Wisconsin - Eau Claire (1086-VE-669)

2:45PM ► (2018) *Assessment of Pedagogical Content Knowledge Aligned with Common Core Standards for Pre-Student Teachers.*
**Erick Brian Hofacker***, University of Wisconsin - River Falls, **Sherrie Serros**, University of Wisconsin - Eau Claire, and **Kathryn Ernie**, University of Wisconsin - River Falls (1086-VE-668)

3:00PM ► (2019) *Using a Geometry Common Core State Standard to Teach Function Transformations.*
**Becky E Hall**, Western Connecticut State University (1086-VE-655)

3:15PM ► (2020) *IBL in redesign for introductory trigonometry classes.* Preliminary report.
**Edward D Smith** and **Vickey R Smith***, Pima Community College (1086-VE-224)

3:30PM (2021) *Writing and using a set of IBL course notes in differential calculus.* Preliminary report.
**Brian M Loft**, Sam Houston State University (1086-VE-975)

► 3:45PM (2022) *Explorations in Counting and Divisibility: An Example for Undergraduate Mathematics.* Preliminary report.
**Jathan W Austin**, Salisbury University (1086-VE-1217)

► 4:00PM (2023) *A Pilot Study on the Impact of Incorporating Problems with Incorrect Solutions into Exams on Students' Understanding of Mathematical Concepts.*
**Manyiu Tse**, Molloy College (1086-VE-1529)

► 4:15PM (2024) *The Passport Project for an Interactive Classroom.*
**Paul C Fonstad**, Franklin College (1086-VE-1660)

► 4:30PM (2025) *Investigating Undergraduate Students' Attitudes and Achievements through Writing in Blackboard Discussion Board in College Algebra Course.* Preliminary report.
**Soofia Malik*** and **Karen Traxler**, University of Northern Colorado, Greeley, CO (1086-VE-2322)

► 4:45PM (2026) *Logical Inference vis-a-vis Information Processing/linguistics.* Preliminary report.
**Homer W. Austin**, Salisbury University (1086-VE-2012)

► 5:00PM (2027) *Online Mathematics Tutoring at a Community College.* Preliminary report.
**C. Adam Feldhaus**, Columbus (1086-VE-1560)

► 5:15PM (2028) *Teacher educators' adoption of technology: Longitudinal findings from faculty teaching in a distance mathematics program.* Preliminary report.
**David M Glassmeyer** and **Reshmi Nair***, University of Northern Colorado (1086-VE-232)

► 5:30PM (2029) *Native American-based Mathematics Materials for Integration into Undergraduate Courses.*
**Charles Peter Funkhouser***, California State University Fullerton, California, and **Miles R Pfahl**, Turtle Mountain Community College, Belcourt, ND (1086-VE-726)

### *ASL Contributed Paper Session, I*

**2:30 PM – 5:20 PM** **Room 7B, Upper Level, San Diego Convention Center**

2:30PM (2030) *Constructing automorphisms of corona algebras.*
**Samuel Coskey**, Boise State University

2:55PM (2031) *Inverse limit reflection and the structure of $L(V_{\lambda+1})$.*
**Scott Cramer**, University of California, Berkeley

3:20PM (2032) *Maharam algebras.*
**Zikica Perovic***, Mira Costa College, and **Boban Velickovic**, Université Paris 7

3:45PM (2033) *Friedberg numbering in Fragments of Peano Arithmetic and $\alpha$-recursion theory.*
**Wei Li**, National University of Singapore

4:10PM (2034) *Truth-table degrees of Turing complete sets and random strings.*
**Rachel Epstein**, Harvard University

4:35PM (2035) *Domatic partitions of computable graphs.*
**Matthew Jura**, **Tyler Markkanen***, Manhattan College, and **Oscar Levin**, University of Northern Colorado

5:00PM (2036) *The computability of martingale convergence.*
**Jason Rute**, Carnegie Mellon University

### *Presentations by MAA Teaching Award Recipients*

**2:30 PM – 3:20 PM** **Room 6C, Upper Level, San Diego Convention Center**

Organizers: **Barbara Faires**, Westminster College
**Paul Zorn**, St. Olaf College

2:30PM (2037) *Weakness to wholeness: the struggle and the hope.*
**Francis Su**, Harvey Mudd College (1086-A0-2999)

3:00PM (2038) *Students into Mathematicians: Twenty-five years teaching at a liberal arts college for women.*
**Margaret Robinson**, Mount Holyoke College (1086-A0-3000)

### *AMS Committee on Science Policy Panel Discussion*

**2:30 PM – 4:00 PM** **Room 10, Upper Level, San Diego Convention Center**

*Who will pay for the papers we publish?*

Organizer: **Kenneth M. Golden**, University of Utah
Moderator: **Don McClure**, AMS
Panelists: **David Goss**, The Ohio State University
**Robion Kirby**, University of California, Berkeley
**Joachim Heinze**, Springer

### *MAA Session on Using Inquiry-Based Learning in Mathematics for Liberal Arts Courses, II*

**2:40 PM – 4:55 PM** **Room 1A, Upper Level, San Diego Convention Center**

Organizers: **Julian F. Fleron**, Westfied State University
**Volker Ecke**, Westfield State University

**Philip K. Hotchkiss**, Westfield State University
**Christine von Renesse**, Westfield State University

2:40PM (2039) *Oulipo: Applying Mathematical Constraints to Poetry, Prose, Art, Dance, and More in a Mathematics for Liberal Arts classroom.*
**Sloan E Despeaux**, Western Carolina University (1086-R1-375)

3:00PM (2040) *Exploring the Math of Celtic Knots.*
**Teresa E. Moore***, Ithaca College, and **L. Christine Kinsey**, Canisius College (1086-R1-2328)

3:20PM (2041) *Teaching Effective Thinking.*
**Michael Starbird**, The Unversity of Texas at Austin (1086-R1-2473)

3:40PM (2042) *Dance and ribbon patterns in maypole dancing.* Preliminary report.
**Volker Ecke*** and **Christine von Renesse**, Westfield State University (1086-R1-983)

4:00PM (2043) *"Statistics through Baseball": The Moore Method in Liberal-Arts Mathematics.*
**E Lee May**, Salisbury University (1086-R1-2934)

4:20PM (2044) *Interdisciplinary Math for Non-STEM Students: Curriculum Design to Facilitate Faculty Teaching Across Disciplines.* Preliminary report.
**Susan K Staats**, University of Minnesota (1086-R1-1495)

4:40PM (2045) *Engaging Operations Research Students with a Local Reservoir Management Problem.*
**Gregory Moore**, Wells College, Aurora, NY (1086-R1-1457)

### *MAA Panel Discussion*

**2:40 PM – 4:00 PM** **Room 4, Upper Level, San Diego Convention Center**

*Using technology to develop mathematical understanding.*

Organizer: **Gail Burrill**, Michigan State University

Panelists: **Tom Dick**, Oregon State University
**Wade Ellis**, West Valley Community College
**Al Cuoco**, Educational Development Center
**Gail Burrill**

### *MAA Minicourse #3: Part B*

**3:30 PM – 5:30 PM** **Room 29C, Mezzanine Level, San Diego Convention Center**

*How to run a successful Math Circle.*

Presenters: **Sam Vandervelde**, St. Lawrence University
**Japheth Wood**, Bard College
**Amanda Katharine Serenevy**, Riverbend Community Math Center

### *MAA Minicourse #7: Part B*

**3:30 PM – 5:30 PM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*Teaching and assessing writing and presentations: Collaborative development of pedagogy.*

Presenters: **Susan Ruff**, Massachusetts Institute of Technology
**Mia Minnes**, University of California, San Diego
**Joel Lewis**, University of Minnesota

### *MAA Minicourse #11: Part B*

**3:30 PM – 5:30 PM** **Room 30A, Upper Level, San Diego Convention Center**

*Teaching differential equations with modeling.*

Presenters: **Darryl Yong**, Harvey Mudd College
**Ami Radunskaya**, Pomona College
**Tom LoFaro**, Gustavus Adolphus College
**Dan Flath**, Macalester College
**Michael Huber**, Muhlenberg College

### *MAA Session on Mentoring Graduate Students: Pathways to Success*

**3:30 PM – 4:45 PM** **Room 33B, Upper Level, San Diego Convention Center**

Organizers: **Jenna Price Carpenter**, Louisiana Tech University
**Molly Fenn**, North Carolina State University

3:30PM (2046) *Future Mathematics Faculty Program at UC Irvine.* Preliminary report.
**Sarah E. Eichhorn**, University of California, Irvine (1086-L1-2903)

3:50PM (2047) *EDGE@ISU.*
**Leslie Hogben**, Iowa State University and American Institute of Mathematics (1086-L1-363)

4:10PM (2048) *Preparing STEM URM Postdoctoral Associates for Faculty Positions - A Replicable Model to Increase Diversity in Faculty Ranks.*
**Brooke Shipley*** and **Manorama Khare**, University of Illinois at Chicago (1086-L1-989)

4:30PM ► (2049) *How to Develop Your Mentoring Network: Critical Skills for a Life-Long Career.* **Donna J. Dean*** and **Cynthia L. Simpson**, Association for Women in Science (1086-L1-356)

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

**3:30 PM – 5:25 PM** **Room 7A, Upper Level, San Diego Convention Center**

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

3:30PM ► (2050) *Using Popular Culture to introduce Mathematical Ideas.* Preliminary report. **Steve Hilbert**, Ithaca College (1086-M5-2784)

3:50PM ► (2051) *A humanistic reading component for an introduction to proofs course.* **Gizem Karaali**, Pomona College (1086-M5-61)

4:10PM ► (2052) *An open-ended project for a liberal arts mathematics course.* **Ksenija Simic-Muller**, Pacific Lutheran University (1086-M5-716)

4:30PM ► (2053) *A spectrum of Values, Critical Thinking, Writing, and Social Justice activities used to engage students and to assist adjuncts in mathematics.* Preliminary report. **Jacci White*** and **Scott B. White**, Saint Leo University (1086-M5-903)

4:50PM ► (2054) *Service-Learning Projects and Activities that Engage Liberal Arts Mathematics Students: Implementation and Assessments.* **Morteza Shafii-Mousavi*** and **Paul Kochanowski**, Indiana University South Bend (1086-M5-575)

5:10PM ► (2055) *A Plaidoyer for Boolean Algebra.* **Helmut Knaust**, The University of Texas at El Paso (1086-M5-2685)

### *MAA Undergraduate Poster Session*

**3:30 PM – 5:30 PM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

Organizer: **Joyati Debnath**, Winona State University

### *AMS Congressional Fellowship Session*

**4:30 PM – 6:00 PM** **Room 10, Upper Level, San Diego Convention Center**

Organizer: **Samuel M. Rankin III**, American Mathematical Society

### *SIGMAA for Mathematicians in Business, Industry, and Government Business Meeting, Guest Lecture, and Reception*

**5:00 PM – 8:00 PM** **Room 4, Upper Level, San Diego Convention Center**

5:00PM Business meeting.

6:00PM (2056) *Is God a mathematician?* **Mario Livio**, Space Telescope Science Institute (1086-A0-68)

7:15PM Reception.

### *SIGMAA on Mathematics Instruction Using the Web Business Meeting, Reception, and Guest Lecture*

**5:00 PM – 6:30 PM** **Room 1B, Upper Level, San Diego Convention Center**

5:30PM (2057) *MathJax: The present and the future.* **Davide Cervone**, Union College (1086-A0-73)

### *MAA Special Presentation: Poetry Reading*

**5:00 PM – 7:00 PM** **Room 3, Upper Level, San Diego Convention Center**

*All mathematical poets and those interested in mathematical poetry are invited.*

### *MAA Panel Discussion*

**5:00 PM – 7:00 PM** **Room 5B, Upper Level, San Diego Convention Center**

*Current issues in actuarial science education.*

Organizers: **Robert Buck**, Slippery Rock University
**Bettye Anne Case**, Florida State University
**Steve Paris**, Lebanon Valley College
**Kevin Charlwood**, Washburn University

Panelists: **Robert Buck**
**Kevin Charlwood**
**Jim Daniel**, University of Texas at Austin

### *SIGMAA on the Philosophy of Mathematics Reception, Business Meeting, and Guest Lecture*

**5:30 PM – 7:30 PM** **Room 5A, Upper Level, San Diego Convention Center**

6:30PM ► (2058) *A guide for the perplexed: What mathematicians need to know to understand philosophers of mathematics.* Preliminary report. **Mark Balaguer**, California State University at Los Angeles (1086-A0-72)

### *SIGMAA on Mathematical and Computational Biology Reception, Business Meeting, and Guest Lecture*

**6:00 PM – 8:00 PM** **Room 1A, Upper Level, San Diego Convention Center**

6:00PM Reception and business meeting.

7:00PM (2059) *Modeling and calculus for the life sciences with WeBWorK computer labs.* **Joseph M. Mahaffy**, San Diego State University (1086-A0-67)

### *AWM Poster Session*

**6:00 PM – 7:15 PM** **Foyer, Mezzanine Level, San Diego Convention Center**

6:00PM (2060) *Bounds on the radius of the p-adic Mandelbrot set.* **Jacqueline Anderson**, Brown University (1086-11-84)

► 6:00PM (2061) *Constructing Graphs with No Immersion of Large Complete Graphs.* **Megan E. Heenehan*** and **Karen L. Collins**, Wesleyan University (1086-05-90)

6:00PM (2062) *Almost universal ternary sums of squares and* $(2p+2)$*-gonal numbers.* **Anna Haensch**, Wesleyan University (1086-11-124)

6:00PM (2063) *Cross-Characteristic Representations of* $Sp_6(2^a)$ *and Their Restrictions to Proper Subgroups.* **Amanda A. Schaeffer Fry**, University of Arizona (1086-20-147)

6:00PM (2064) *Explicit Uniform Bounds for Preperiodic Points in Families of Twists.* **Alon Levy**, Brown University, **Michelle Manes** and **Bianca Thompson***, University of Hawaii at Manoa (1086-11-154)

► 6:00PM (2065) *Effect of stretch-dependent proliferation on collective cell migration.* **Tracy L. Stepien*** and **David Swigon**, University of Pittsburgh (1086-92-161)

6:00PM (2066) *Affine pavings of Hessenberg varieties.* **Martha E Precup**, University of Notre Dame (1086-14-164)

► 6:00PM (2067) *Continuity Properties of Camassa–Holm Type Equations.* **Katelyn J Grayshan**, University of Notre Dame (1086-35-186)

6:00PM (2068) *A Fast Algorithm to solve the Biharmonic equation with application to slow viscous flow.* **Aditi Ghosh*** and **Prabir Daripa**, Texas A&M University, College Station (1086-35-196)

6:00PM (2069) *New Combinatorial Methods for Computing the Intersection Cohomology Poincaré Polynomial for Schubert Varieties.* **Jennifer A. Koonz**, University of Massachusetts, Amherst (1086-05-240)

6:00PM (2070) *Large gaps between zeros of Dedekind zeta-functions of quadratic number fields.* Preliminary report. **Caroline L. Turnage-Butterbaugh**, University of Mississippi (1086-11-243)

► 6:00PM (2071) *Rigidity in Topological Dynamics.* Preliminary report. **Kelly Brooke Yancey**, University of Illinois at Urbana-Champaign (1086-37-244)

6:00PM (2072) *Betti diagrams of modules over short graded Gorenstein rings.* **Courtney Gibbons**, University of Nebraska-Lincoln (1086-13-247)

6:00PM (2073) *A Diagrammatic Multivariate Alexander Invariant of Tangles.* **Kathleen Grace Kennedy**, University of California, Santa Barbara (1086-54-256)

6:00PM (2074) *Generalizing traces of Frobenius for metabelian Galois representations.* Preliminary report. **Rachel M. Davis**, University of Wisconsin-Madison (1086-11-259)

6:00PM (2075) *Twisted Weyl group multiple Dirichlet series over the rational function field.* Preliminary report. **Holley A Friedlander**, University of Massachusetts, Amherst (1086-11-266)

6:00PM (2076) *Knots in thick, self avoiding random walks in 3-space.* Preliminary report. **Laura Zirbel**, University of California, Santa Barbara (1086-54-297)

6:00PM (2077) *The cluster value problem in spaces of continuous functions.* **Sofia Ortega Castillo**, Texas A&M University (1086-32-298)

► 6:00PM (2078) *Unknotting Moves of Virtual Knots.* Preliminary report. **Melanie DeVries**, University of Nebraska - Lincoln (1086-54-299)

► 6:00PM (2079) *Closure Properties of Stackable Groups.* Preliminary report. **Ashley Johnson**, University of Nebraska - Lincoln (1086-20-300)

### *AMS-MAA Special Film Presentation*

**6:00 PM – 6:50 PM** **Room 6AB, Upper Level, San Diego Convention Center**

*Darwin's Extra Sense.*

### *MAA Dramatic Presentation*

**6:00 PM – 7:00 PM** **Room 6C, Upper Level, San Diego Convention Center**

*Mathematically Bent Theater.*

Presenter: **Colin Adams**, Mobiusbandaid Players

### *AMS Mathematical Reviews Reception*

**6:00 PM – 7:00 PM** **Mission Hills Room, 3rd Floor, Marriott**

### *NAM Cox-Talbot Address*

**7:45 PM – 8:35 PM** **Marina Ballroom E, 3rd Floor, Marriott**

► (2080) *The Rest of the Story.*
**Genevieve Madeline Knight**, Coppin State University/Baltimore Maryland (1086-97-1211)

### *MAA-Project NExT Reception*

**8:30 PM – 10:00 PM** **Marina Ballroom F, 3rd Floor, Marriott**

*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 12

### *MAA Minority Chairs Breakfast*

**7:00 AM – 8:45 AM** **La Costa Room, 4th Floor, Marriott**

### *Joint Meetings Registration*

**7:30 AM – 2:00 PM** **Exhibit Hall B1, Ground Level, San Diego Convention Center**

### *AMS Special Session on Stochastic and Functional Analysis, I*

**7:30 AM – 10:50 AM** **Room 31B, Upper Level, San Diego Convention Center**

Organizers: **Mark Burgin**, University of California Los Angles
**Alan Krinik**, California State Polytechnic University, Pomona
**Randall Swift**, California State Polytechnic University, Pomona

7:30AM (2081) *Commutants of multiplication operators and Michael selection theorem.*
**Arkady K Kitover**, Community College of Philadelphia (1086-47-306)

8:00AM (2082) *Logistic Regression Classifiers with Longitudinal Data.*
**Xin Zhang**, **Jun Li**, Department of Statistics, University of California, Riverside, CA, **Vance Wong**, **Brian Noland**, Alere Corporation, San Diego, CA, and **Daniel Jeske***, Department of Statistics, University of California, Riverside, CA (1086-62-2417)

8:30AM (2083) *Sharpness Results for Duality in Segal-Bargmann Spaces.* Preliminary report.
**William E Gryc***, Muhlenberg College, and **Todd Kemp**, University of California, San Diego (1086-46-1483)

9:00AM (2084) *Minkowski nonmeasurability of recursive strings.*
**Rolando de Santiago***, Cal Poly Pomona, **Michel L. Lapidus**, **Scott A. Roby**, University of California, Riverside, and **John A. Rock**, Cal Poly Pomona (1086-28-234)

9:30AM (2085) *Knot Invariants and Functional Integration.* Preliminary report.
**Louis Hirsch Kauffman**, University of Illinois at Chicago (1086-57-28)

10:00AM (2086) *The Spectral Operator and Its Applications:Quantized Riemann Zeta Function and Infinitesimal Shift of the Real Line.*
**Hafedh Herichi** and **Michel L. Lapidus***, University of California, Riverside (1086-46-639)

10:30AM (2087) *What to do with Random Variables that don't have Expectations.* Preliminary report.
**Mark Burgin***, University of California, Los Angeles, CA 90095, and **Alan C. Krinik**, California State Polytechnic University, Pomona, CA, 91768 (1086-60-273)

### *ASL Invited Address*

**8:00 AM – 8:50 AM** **Room 7B, Upper Level, San Diego Convention Center**

(2088) *Global and local boundedness properties in Polish groups.*
**Christian Rosendal**, University of Illinois at Chicago (1086-03-136)

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

**8:00 AM – 10:50 AM** **Room 8, Upper Level, San Diego Convention Center**

Organizers: **Bernard Brooks**, Rochester Institute of Technology
**Jobby Jacob**, Rochester Institute of Technology
**Jacqueline Jensen-Vallin**, Slippery Rock University

**Carl V. Lutzer**, Rochester Institute of Technology

**Darren Narayan**, Rochester Institute of Technology

**Tamas Wiandt**, Rochester Institute of Technology

8:00AM ► (2089) *Prisoner Reform Programs, and their Impact on Recidivism.*
**Brenda M. Jaurrieta**, Bryn Mawr College, **Wilson E. Alvarez**, University of Puerto Rico, **Itelhomme Fene**, University of Louisiana at Lafayette, **Kimberly Gutstein***, Humboldt State University, **Diego Chowell**, Arizona State University, **Anuj Mubayi**, Northeastern Illinois University, and **Luis Melara**, Shippensburg University (1086-34-1877)

8:30AM ► (2090) *Visualizing optimal transportation maps.* Preliminary report.
**Otis Chodosh**, **Vishesh Jain**, **Michael Lindsey***, **Lyuboslav Panchev**, Stanford University, and **Yanir A. Rubinstein**, University of Maryland (1086-28-496)

9:00AM (2091) *On the discontinuity of optimal transportation maps.*
**Otis Chodosh**, **Vishesh Jain**, **Michael Lindsey**, **Lyuboslav Panchev***, Stanford University, and **Yanir A. Rubinstein**, University of Maryland (1086-35-497)

9:30AM ► (2092) *Convex Inversion for Parameter Identification in Saddle Point Problems with an Application to the Inverse Problem of Predicting Tumor Location.* Preliminary report.
**B. Jadamba**, **A. A. Khan**, Rochester Institute of Technology, **M. Sama**, Universidad Nacional de Educacion a Distancia, and **B. Winkler***, Rochester Institute of Technology (1086-49-2315)

10:00AM ► (2093) *Equation Error Approach for the Inverse Problem of Tumor Identification.* Preliminary report.
**Erin R Crossen***, **Akhtar Khan** and **Baasansuren Jadamba**, Rochester Institute of Technology (1086-65-2435)

10:30AM ► (2094) *An Examination of Equilibria in the Multi-Site Iterated Prisoner's Dilemma.* Preliminary report.
**G. Alex McClain*** and **Carl V. Lutzer**, Rochester Institute of Technology (1086-91-2361)

## *AMS-AWM Special Session on the Brauer Group in Algebra and Geometry, II*

**8:00 AM – 10:50 AM** **Room 15B, Mezzanine Level, San Diego Convention Center**

Organizers: **Asher Auel**, Emory University

**Kelly McKinnie**, University of Montana

**V. Suresh**, Emory University

8:00AM (2095) *Generating the Brauer Group of the function field of a p-adic curve with cyclic algebras.* Preliminary report.
**Eric Brussel**, California Polytechnic State University, **Kelly McKinnie***, University of Montana, and **Eduardo Tengan**, Universidade de São Paulo, Inst. de Ciências Matemáticas e de Computação (1086-16-2667)

8:30AM (2096) *The Brauer group of the function field of a curve over a complete discrete valuation ring.*
**Eric Brussel**, California Polytechnic State University/Emory University (1086-16-1180)

9:00AM (2097) *Azumaya maximal orders do not always exist.*
**Benjamin Antieau***, UCLA, and **Ben Williams**, USC (1086-14-980)

9:30AM (2098) *Homogeneous Spaces over Function Fields of Dimension Two.*
**Yi Zhu**, University of Utah (1086-14-1177)

10:00AM (2099) *Splitting dimension and symbol length in Galois cohomology.*
**Daniel R Krashen**, University of Georgia (1086-12-2020)

10:30AM (2100) *Finite $u$ Invariant and Bounds on Cohomology Symbol Lengths.*
**David J Saltman**, CCR-Princeton (1086-12-761)

## *AMS Special Session on Computational Algebraic and Analytic Geometry for Low-dimensional Varieties, I*

**8:00 AM – 10:50 AM** **Room 15A, Mezzanine Level, San Diego Convention Center**

Organizers: **Mika Seppala**, Florida State University

**Emil Volcheck**, National Security Agency

8:00AM (2101) *Jacobians of limit Riemann surfaces and Kirchhoff's rules.*
**Peter Buser**, École Polytechnique Fédérale Lausanne, **Eran Makover**, Central Connecticut State University, **Bjoern Muetzel**, **Robert Silhol**, Université de Montpellier II, and **Mika Seppala***, University of Helsinki and Florida State University (1086-14-2605)

8:30AM (2102) *Conformal Automorphism Groups, Adapted Bases, and Generating Vectors.*
**Jane Gilman**, Rurtgers-Newark (1086-32-916)

9:00AM (2103) *Automorphisms Groups of Cyclic p-gonal Riemann Surfaces.*
**Milagros Izquierdo***, Linköping University, **Antonio F Costa**, UNED, and **Gabriel Bartolini**, Linköping University (1086-14-451)

9:30AM (2104) *Representations Varieties and Teichmüller Spaces of non-Orientable Surfaces.*
**Yahya Almalki**, Florida State University (1086-51-1785)

10:00AM (2105) *Efficient arithmetic on Jacobians of genus 2 curves.* Preliminary report.
**Craig Costello**, Microsoft Research (1086-14-1803)

10:30AM (2106) *Surface Singularities and Jacobian Problem.* Preliminary report.
**Shreeram S. Abhyankar**, Purdue University (1086-14-950)

### *AMS Special Session on Creating a Professional Community of Math Teachers K–20, II*

**8:00 AM – 10:50 AM** **Room 32B, Upper Level, San Diego Convention Center**

Organizers: **Patrick Callahan**, University of California Los Angeles
**William McCallum**, University of Arizona
**Kristin Umland**, University of New Mexico

8:00AM ► (2107) *A qualitative look at the co-instructional model of the Intel Math professional development program for K-8 teachers.* Preliminary report.
**Diana White**, University of Colorado Denver (1086-97-2736)

8:30AM (2108) *Opportunities for mathematicians to work with K-12 teachers.*
**Michael Nakamaye**, University of New Mexico (1086-97-449)

9:00AM (2109) *Communities of Problem Solvers.*
**J Brian Conrey**, American Institute of Mathematics (1086-97-1690)

9:30AM (2110) *Developing and Sustaining Professional Communities of Teachers around Mathematical Content and Student Intellectual Need.*
**Guershon Harel**, University of California, San Diego (1086-97-1679)

10:00AM (2111) *Mathematics Classroom Coaching in Grades K-8.*
**Elizabeth A. Burroughs**, Montana State University (1086-97-326)

10:30AM ► (2112) *The Louisiana Math and Science Teacher Community.* Preliminary report.
**James J Madden*** and **Frank Neubrander**, Louisiana State Univeristy (1086-97-167)

### *AMS Special Session on Dirac and Laplace Operators in Global Analysis and Geometry, I*

**8:00 AM – 10:50 AM** **Room 32A, Upper Level, San Diego Convention Center**

Organizers: **Ken Richardson**, Texas Christian University
**Igor Prokhorenkov**, Texas Christian University

8:00AM (2113) *Renormalized Integrals and a Path Integral Formula for the Heat Kernel on a Manifold.*
**Christian Bär**, Univ. of Potsdam, Germany (1086-58-1716)

9:00AM (2114) *Witten's perturbation on strata.*
**Jesús A. Álvarez López*** and **Manuel Calaza**, University of Santiago de Compostela (1086-58-498)

10:00AM (2115) *Transversal Witten deformations on Riemannian foliations.*
**Igor Prokhorenkov*** and **Ken Richardson**, Texas Christian University (1086-58-2850)

10:30AM (2116) *The essential spectrum of the Laplacian on open manifolds.* Preliminary report.
**Nelia Charalambous***, University of Cyprus, and **Zhiqin Lu**, University of California at Irvine (1086-58-1734)

### *AMS Special Session on Environmental Mathematics: Evaluate the Past Climate Changes and Model the Future Climate Variations, II*

**8:00 AM – 10:50 AM** **Room 9, Upper Level, San Diego Convention Center**

Organizers: **Philip Arkin**, University of Maryland
**Samuel Shen**, San Diego State University
**Thomas Smith**, University of Maryland
**Guang Zhang**, Scripps Institute of Oceanography, University of California, San Diego

8:00AM ► (2117) *Precipitation Reconstructions from Historical and Modern Data.*
**Thomas M. Smith***, NOAA/NESDIS/STAR/SCSB & CICS, ESSIC, College Park, **Samuel Shen**, San Diego State Univ., **Phillip Arkin** and **Li Ren**, CICS, ESSIC, U. Maryland, College Park (1086-00-1315)

8:30AM (2118) *Diagnosing Variabilities/Changes in Global Precipitation Patterns during 1979-2010 Using Satellite-Based Measurements.*
**Guojun Gu***, ESSIC, University of Maryland College Park, and **Robert F. Adler**, ESSIC, University of Maryland College park (1086-86-1377)

9:00AM ► (2119) *Advances and Opportunities for Mathematical Treatment of Paleoclimate Reconstructions.*
**Eugene R. Wahl**, NOAA/NESDIS/National Climatic Data Center/Paleoclimate Branch (1086-92-1197)

9:30AM ► (2120) *Forward and inverse modeling of the nonlinear relationship between tree-ring width and climate.*
**S. E. Tolwinski-Ward***, Institute for Mathematics Applied to Geosciences, National Center for Atmospheric Research, **M. P. Tingley**, Harvard University, **M. N. Evans**, University of Maryland, and **D. W. Nychka**, Institute for Mathematics Applied to Geosciences, National Center for Atmospheric Research (1086-62-123)

10:00AM ► (2121) *Deducing anthropogenic global warming trend.*
**Ka-Kit Tung**, University of Washington (1086-86-384)

10:30AM ► (2122) *Trends, hottest and coldest years, climate regimes, decadal variations, and uncertainties of the United States temperature and precipitation since 1895.*
**Samuel S Shen**, San Diego State University (1086-86-360)

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

**8:00 AM – 10:50 AM** **Room 30E, Upper Level, San Diego Convention Center**

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

8:00AM (2123) *Positive solutions of fractional differential equations with bounded linear functional boundary conditions.*
**Johnny Henderson** and **Xueyan (Sherry) Liu***, Department of Mathematics, Baylor University (1086-34-1055)

8:30AM (2124) *Matching Method for Nodal Solutions of Multi-Point Boundary Value Problems.*
**Qingkai Kong*** and **Thomas E. St. George**, Northern Illinois University (1086-34-1044)

9:00AM ► (2125) *Stochastic Models in Organ Transplantation.* Preliminary report.
**Kumer Pial Das**, Lamar University and SAMSI (1086-60-2265)

9:30AM ► (2126) *Energy Methods for Dynamic Stochastic Models of Social Networks.* Preliminary report.
**Jagdish Chandra***, The George Washington University, and **G.S. Ladde**, University of South Florida (1086-34-1859)

10:00AM (2127) *Numerical Methods for Fractional Differential Equations Via Generalized Monotone Method.* Preliminary report.
**Aghalaya S Vatsala***, **Sowmya Muniswamy**, University of Louisiana at Lafayette, and **Donna Sue Stutson**, Xavier University of Louisiana (1086-34-1007)

10:30AM (2128) *A Numerical Example for the One Dimensional Caputo Fractional Wave Equation using the Representative Solution and the Generalized Monotone Method.*
**Donna S. Stutson**, Xavier University of Louisiana (1086-35-2418)

## *AMS Special Session on Patterns in Permutations and Words, I*

**8:00 AM – 10:50 AM** **Room 14B, Mezzanine Level, San Diego Convention Center**

Organizers: **Jeffrey Liese**, California State Polytechnic University, San Luis Obispo
**Brian K. Miceli**, Trinity University
**Jeffrey Remmel**, University of California, San Diego

8:00AM (2129) *The most and the least avoided consecutive patterns.*
**Sergi Elizalde**, Dartmouth College (1086-05-541)

8:30AM (2130) *Upper bounds for the Stanley-Wilf limit of 1324.*
**Anders Claesson***, Department of Computer and Information Sciences, University of Strathclyde, **Vít Jelínek**, Computer Science Institute, Charles University, and **Einar Steingrímsson**, Department of Computer and Information Sciences, University of Strathclyde (1086-05-2049)

9:00AM ► (2131) *New upper bounds for permutations avoiding 1324 and other extremal patterns.*
**Miklos Bona**, University of Florida (1086-05-991)

9:30AM (2132) *The Permutation Poset, its Möbius Function and Topology.* Preliminary report.
**Einar Steingrimsson**, University of Strathclyde (1086-05-2040)

10:00AM (2133) *Subclasses of the separable permutations.*
**M. D. Atkinson**, **Michael H. Albert**, University of Otago, and **Vincent Vatter***, University of Florida (1086-05-1930)

10:30AM (2134) *Recent Progress on the Shuffle Conjecture.*
**Adriano M. Garsia**, University of California San Diego (1086-05-1455)

### *AMS Special Session on Topological Combinatorics, I*

**8:00 AM – 10:50 AM** **Room 16B, Mezzanine Level, San Diego Convention Center**

Organizers: **Alexander Engström**, Aalto University
**Steven Klee**, University of California, Davis
**Matthew Stamps**, Aalto University

8:00AM (2135) *The toppling ideal and its minimal free resolution.* Preliminary report.
**John Wilmes**, University of Chicago (1086-05-1579)

8:30AM (2136) *Colorful and Higher-Dimensional Extensions in Simplicial Complexes.* Preliminary report.
**Matthias Beck**, **Felix Breuer**, SFSU, and **Yvonne Suzanne Kemper***, UC Davis (1086-05-1630)

9:00AM (2137) *Enumerating cellular colorings, orientations, tensions and flows.* Preliminary report.
**Matthias Beck**, **Felix Breuer**, San Francisco State University, **Logan Godkin** and **Jeremy L. Martin***, University of Kansas (1086-05-1886)

9:30AM (2138) *Max flow min cut in higher dimensions.* Preliminary report.
**Art M. Duval***, University of Texas at El Paso, **Caroline J. Klivans**, Brown University, and **Jeremy L. Martin**, University of Kansas (1086-05-2353)

10:00AM (2139) *Conjectures on some vector bundles associated to matroids.*
**Andrew Berget**, University of Washington (1086-05-1565)

10:30AM (2140) *Homotopy type of a noncommutative analogue for Young's lattice.*
**Heather Dye**, McKendree University, **Patricia Hersh***, North Carolina State University, **Karola Meszaros**, Cornell University, and **Bridget Tenner**, Depaul University (1086-05-682)

### *AMS Special Session on Understanding Planet Earth via Reaction Diffusion Equations, I*

**8:00 AM – 10:50 AM** **Room 30C, Upper Level, San Diego Convention Center**

Organizers: **Jerome Goddard,II**, Auburn University, Montgomery
**Eun Kyung Lee**, Pusan National University, Korea
**Junping Shi**, College of William and Mary
**Ratnasingham Shivaji**, University of North Carolina, Greensboro

8:00AM (2141) *A uniqueness result for a singular nonlinear eigenvalue problem.*
**A Castro**, Harvey Mudd, **Eunkyung Ko**, Mississippi State University, and **R Shivaji***, University of North Carolina at Greensboro (1086-35-2561)

8:30AM (2142) *Resonance results on the Fucik Spectrum.*
**Stephen B Robinson***, Wake Forest University, **Pavel Drabek**, University of West Bohemia, and **Quinn Morris**, University of North Carolina at Greensboro (1086-35-2285)

9:00AM (2143) *Singular solutions for superlinear elliptic equations.*
**Jose Caicedo**, Universidad Nacional de Colombia, **Alfonso Castro***, Harvey Mudd College, and **Victor Ardila**, Universidad Nacional de Colombia (1086-35-1772)

9:30AM (2144) *Semipositone Problems on Exterior Domains.*
**Lakshmi S Kalappattil**, Mississippi State University (1086-35-321)

10:00AM (2145) *Three solutions theorem for radial solution of p-Laplacian problem on Exterior domain.*
**Eun Kyoung Lee***, Pusan National University, **Seong-Uk Kim**, University of Alabama at Birmingham, and **Yong-Hoon Lee**, Pusan National University (1086-35-1675)

10:30AM (2146) *Continua of local minimizers in a non smooth model of phase transitions.*
**Pavel Drabek**, NTIS, University of West Bohemia in Pilsen, Czech Republic (1086-35-982)

### *AMS Special Session on q-series in Mathematical Physics and Combinatorics, I*

**8:00 AM – 10:50 AM** **Room 14A, Mezzanine Level, San Diego Convention Center**

Organizer: **Mourad Ismail**, University of Central Florida

8:00AM (2147) *Cayley's partition identity.*
**Igor Pak**, Los Angeles (1086-05-562)

8:30AM ► (2148) *The smallest parts partition function.*
**F. G. Garvan**, University of Florida (1086-11-1776)

9:00AM (2149) *Euler's partition theorem with upper bounds on multiplicities.*
**William Y. C. Chen**, Nankai University, **Ae Ja Yee***, Penn State University, and **Albert J. W. Zhu**, Nankai University (1086-05-1445)

9:30AM ► (2150) *Towards a Complete Characterization of Prime Divisibility Properties of the Restricted Partition Function $p(n, m)$.*
**James Brandt Kronholm**, Juniata College (1086-11-1383)

10:00AM (2151) *Generators of the $q$-Brownian motion.*
**Michael Anshelevich**, Texas A&M University (1086-46-607)

10:30AM (2152) *Moments of Askey-Wilson polynomials.* **Jang Soo Kim**, University of Minnesota (1086-05-904)

### *AMS Special Session on the Mathematics of Natural Resource Modeling, II*

**8:00 AM – 10:50 AM** **Room 17B, Mezzanine Level, San Diego Convention Center**

Organizers: **Shandelle Henson**, Andrews University
**Catherine A. Roberts**, College of the Holy Cross

8:00AM ► (2153) *Role of time scales in the response of ecological populations to time varying resources.* **Alan Hastings**, University of California, Davis (1086-92-1253)

8:30AM ► (2154) *Pollen limitation in plants: Ecological and evolutionary perspectives.* **Sebastian J Schreiber***, **Jay Rosenheim**, University of California, Davis, **Lawrence Harder**, University of Calgary, and **Neal Williams**, University of California, Davis (1086-92-2423)

9:00AM (2155) *Towards model-free ecosystem management.* Preliminary report. **Stephan B Munch***, SWFSC, NOAA, **Ethan Deyle**, **Charles Perretti** and **George Sugihara**, SIO, UCSD (1086-92-1794)

9:30AM ► (2156) *Potential impact of climate change on dengue and its mosquito vector, Aedes albopictus: A mechanistic modeling approach.* **Richard A Erickson***, **Stephen B. Cox**, **Katharine Hayhoe**, **Linda J.S. Allen**, **Kevin R. Long** and **Steven M. Presley**, Texas Tech University, Lubbock, TX (1086-92-474)

10:00AM (2157) *A diamond food web model with one predator two preys and one nutrient resource.* Preliminary report. **Lih-Ing W Roeger***, Texas Tech University, and **Sze-Bi Hsu**, National Tsing-Hua University (1086-92-507)

10:30AM ► (2158) *Disease Dynamics with Behavioral Driven Contact Transmission Rates.* **Ben R. Morin**, School of Human Evolution and Social Change, Arizona State University, **Eli Fenichel**, School of Forestry & Environmental Studies, Yale University, and **Carlos Castillo-Chavez***, Mathematical and Computational Modeling Sciences Center, Arizona State University (1086-92-1977)

### *AMS Special Session on the Theory and Applications of Differential Equations on Graphs, I*

**8:00 AM – 10:50 AM** **Room 30D, Upper Level, San Diego Convention Center**

Organizers: **Sergei Avdonin**, University of Alaska, Fairbanks
**Jonathan Bell**, University of Maryland, Baltimore County

8:00AM (2159) *An application of Parabolic PDEs on graphs.* Preliminary report. **Suzanne Lenhart***, U of Tennessee, Knoxville and NIMBIoS, **Sergei Avdonin**, U of Tennessee at Chattanooga, and **Jason Bintz**, U of Tennessee, Knoxville (1086-35-961)

8:30AM (2160) *Population persistence in river networks.* **Robert Carlson***, University of Colorado at Colorado Springs, **Jonathan Sarhad** and **Kurt Anderson**, University of California Riverside (1086-35-673)

9:30AM ► (2161) *Nodal count of eigenfunctions as index of instability.* **Gregory Berkolaiko**, Texas A&M University (1086-52-1161)

10:30AM (2162) *Population Persistence In River Networks Using Quantum Graphs.* **Jonathan J. Sarhad***, Department of Biology, University of California, Riverside, **Robert C. Carlson**, University of Colorado, Colorado Springs, and **Kurt E. Anderson**, Department of Biology, University of California, Riverside (1086-92-2483)

### *MAA Invited Paper Session on Writing, Talking, and Sharing Mathematics*

**8:00 AM – 10:50 AM** **Room 2, Upper Level, San Diego Convention Center**

Organizer: **Paul Zorn**, St. Olaf College

8:00AM ► (2163) *Exposing and Expositing Math to the Public: Two Paths.* **Dana Mackenzie**, Freelance Writer (1086-AH-2481)

8:30AM ► (2164) *First Things First: The Art of the Opening.* **Barry Cipra**, Northfield, Minnesota (1086-AH-2368)

9:00AM ► (2165) *My Huffington Post Blog.* Preliminary report. **Frank Morgan**, Williams College (1086-AH-463)

9:30AM ► (2166) *Mathematics, Meaning, and Misunderstanding.* **Gerald B. Folland**, University of Washington (1086-AH-1058)

10:00AM ► (2167) *Can an Art Show Teach Mathematics?* **Frank A. Farris**, Santa Clara University (1086-AH-2363)

10:30AM Discussion.

### *AMS Session on Applied Mathematics and Modeling I*

**8:00 AM – 10:55 AM** **Room 31C, Upper Level, San Diego Convention Center**

8:00AM (2168) *A surface-tension-based approach to the elimination of crack-tip singularities in fracture mechanics.* **Anna Zemlyanova**, Texas A&M University (1086-74-314)

8:15AM (2169) *Dynamic buckling of elastic materials.* Preliminary report.
**Qichuan Bai***, **Andrew Belmonte** and **Qiang Du**, Penn State University (1086-74-2074)

► 8:30AM (2170) *Research on estimating the overall behavior of heterogeneous composites based on Hashin-Shtrikman variational principle and its applications.*
**Hyunsun Lee**, Hawaii Pacific University (1086-74-1084)

► 8:45AM (2171) *A Discrete, Compact, Matrix, Space-Time Representation – An Example.* Preliminary report.
**Michael G. Dombroski**, Los Angeles City College (1086-81-1848)

► 9:00AM (2172) *On the limitations of Kummer's function in heat transfer problems.*
**Antonio Mastroberardino**, Penn State Erie, The Behrend College (1086-76-2448)

9:15AM (2173) *A Markov chain approach to renormalization group transformations.*
**Mei Yin**, University of Texas at Austin (1086-82-294)

9:30AM (2174) *TALK CANCELLED: Localization for a Non-Monotone Anderson-Type Model.* Preliminary report.
**Jacob W Chapman*** and **Günter Stolz**, University of Alabama at Birmingham (1086-82-802)

► 9:45AM (2175) *Amplitude Death Solutions for Stabilization of DC Microgrids with Instantaneous Constant-Power Loads.*
**Stanley R Huddy*** and **Joseph D Skufca**, Clarkson University (1086-93-2280)

10:00AM (2176) *Robust Geometric Structure from High Dimensional Data using Sparse LLE.*
**Lori Beth Ziegelmeier***, **Michael Kirby** and **Chris Peterson**, Colorado State University (1086-58-1864)

10:15AM (2177) *Controllability of Second order Neutral Functional Differential Inclusion with Infinite Delay-A Theoritical and a Numerical Approach.*
**Dimplekumar N Chalishajar**, Virginia Military Institute, Mallory Hall, Lexington, VA 24450 (1086-93-288)

► 10:30AM (2178) *Trichotomous Markov Noise and Dynamic instability of microtubules in three states.* Preliminary report.
**Shantia Yarahmadian**, Mississippi State University (1086-92-1442)

► 10:45AM (2179) *Meshless Simulations of Space Charge Effect in Field Emission from a Nanowire.*
**Guangming Yao**, Department of Mathematics, Clarkson University, 8 Clarkson Ave, Potsdam, NY, 13699-5815, USA. (1086-35-1012)

## *AMS Session on Brownian Motion and Stochastic Processes*

**8:00 AM – 10:55 AM** **Room 31A, Upper Level, San Diego Convention Center**

8:00AM (2180) *Sharp estimates on the Green functions of perturbations of subordinate Brownian motions in bounded $\kappa$-fat open sets.*
**Hyunchul Park***, University of Illinois Urbana-Champaign, **Panki Kim**, Seoul National Universtiy - South Korea, and **Renming Song**, UIUC (1086-60-1127)

8:15AM (2181) *Smoothness Properties of the Law of Brownian Motion in Certain Infinite Dimensional Spaces.*
**Daniel Dobbs**, University of Virginia (1086-60-1816)

8:30AM (2182) *Limit Distributions of Random Walks on Stochastic Matrices.* Preliminary report.
**Santanu Chakraborty*** and **Arunava Mukherjea**, UTPA, Edinburg, Texas (1086-60-1341)

8:45AM (2183) *Using a dyadic decomposition of the time until diffusion densities overlap to define a new diffusion distance.* Preliminary report.
**Maxim J. Goldberg**, Ramapo College of NJ, and **Seonja Kim***, Montvale, NJ (1086-60-1476)

9:00AM (2184) *Fractional Pearson Diffusion.*
**Nikolai N. Leonenko**, Cardiff University, **Mark M. Meerschaert** and **Alla Sikorskii***, Michigan State University (1086-60-289)

► 9:15AM (2185) *Fast and Exact Simulation for the CIR processes.* Preliminary report.
**Liqing Yan**, Shanghai Jiao Tong University (1086-60-2105)

9:30AM (2186) *Path Properties of Jump Processes having Nondegenerate Jumping Kernals.*
**Brian M. Whitehead**, Eastern Connecticut State University (1086-60-539)

9:45AM (2187) *A Systematic Lyapunov Construction for Proving Noise-Induced Stabilization.*
**Tiffany Nicole Kolba**, Valparaiso University (1086-60-2064)

10:00AM (2188) *Denoising a long locally dependent binary signal sequence: multiple-testing with approximate posterior-likelihood.*
**Zhiyi Chi** and **Sairam Rayaprolu***, University of Connecticut (1086-62-2078)

10:15AM (2189) *Diffusivity in multiple scattering systems.*
**Timothy Chumley**, Washington University in St. Louis (1086-60-2697)

10:30AM (2190) *Widder's theorem for symmetric local Dirichlet forms.*
**Nathaniel Eldredge*** and **Laurent Saloff-Coste**, Cornell University (1086-60-1648)

10:45AM (2191) *Note on the almost periodic stochastic Beverton-Holt equation.*
**Paul H Bezandry**, Howard University (1086-60-1782)

### *AMS Session on Lie Algebras and Algebraic and Lie Groups*

**8:00 AM – 10:10 AM** **Room 13, Mezzanine Level, San Diego Convention Center**

(2192) *TALK CANCELLED: Regularity of Abelian Linear Action.* Preliminary report.
**Didier Arnal**, Universite de Bourgogne, **Béchir Dali**, King Saud University, **Bradley Currey**, Saint Louis University, and **Vignon S Oussa***, Department of Mathematics Bridgewater State University (1086-22-311)

8:00AM (2193) *Components of Springer Fibers for the Exceptional Groups $G_2$ and $F_4$.*
**Brandon Samples**, Georgia College & State University (1086-22-2536)

8:15AM (2194) *A combinatorial characterization of Severi varieties over arbitrary fields (joint work with H. Van Maldeghem).*
**Jeroen Schillewaert**, University of California San Diego (1086-51-2054)

8:30AM The talk by Tevian Dray was moved to the AMS Special Session on Lie Algebras, Algebraic Transformation Groups, and Representation Theory, II, at 11:00 a.m. on Thursday in slot #777.

8:45AM (2195) *Dade's Ordinary Conjecture (DOC) for the Finite Special Unitary Groups.*
**Katherine Anne Bird**, Northeastern Illinois University Chicago (1086-20-258)

9:00AM (2196) *Moufang sets of finite Morley rank with little projective groups of odd type.*
**Joshua Wiscons**, Universität Münster (1086-20-1022)

► 9:15AM (2197) *Homomorphisms of general linear groups.* Preliminary report.
**Marcos Zyman**, The City University of New York-BMCC (1086-20-2324)

9:30AM (2198) *Derived Symplectic Resolutions.*
**Jeremy Pecharich**, Mount Holyoke College (1086-14-2824)

► 9:45AM (2199) *Low dimension Lie algebra dimension reduction by modding by the center.* Preliminary report.
**Firas Y Hindeleh***, **Kermit L Sharp** and **Nick C Benthem**, Grand Valley State University (1086-22-1154)

10:00AM (2200) *Representation Growth Using a Constructive Method.*
**Shannon Ezzat**, Sydney, Nova Scotia (1086-20-2371)

### *AMS Session on Linear Algebra and Applications*

**8:00 AM – 10:55 AM** **Room 17A, Mezzanine Level, San Diego Convention Center**

8:00AM (2201) *A proof of Crouzeix's conjecture for a class of matrices.*
**Daeshik Choi**, University of Washington (1086-15-660)

► 8:15AM (2202) *On almost normal matrices.*
**Tyler J. Moran*** and **Ilya M. Spitkovsky**, The College of William and Mary (1086-15-1633)

8:30AM (2203) *Characterizations of Leonard Pairs.*
**Edward D. Hanson**, University of Wisconsin-Madison (1086-15-2304)

► 8:45AM (2204) *Traces of matrix products.*
**John R Greene**, University of Minnesota Duluth (1086-15-2366)

► 9:00AM (2205) *An Extension of Yang's Product Construction of Hadamard Matrices.*
**Michael T Zowada**, Northern Arizona University (1086-15-2835)

► 9:15AM (2206) *Non-unique Factorizations of Square Matrices.* Preliminary report.
**James E Gossell**, University of Central Missouri (1086-15-1936)

► 9:30AM (2207) *A Multiplicative Determinant for $2^m$-Dimensional Matrices.* Preliminary report.
**Paul Sundheim**, University of Wisconsin (1086-15-1629)

► 9:45AM (2208) *Pivoting Strategies in Sparse Gaussian Eliminations done mod p and their Impact upon Various Computer Algebra Tasks.* Preliminary report.
**Gregory V Bard*** and **Miles Crocker**, University of Wisconsin—Stout (1086-15-2905)

10:00AM (2209) *On Sharp Frame Diagonalization.*
**Fumiko Futamura***, **Kendall Richards** and **Rick Denman**, Southwestern University (1086-15-1372)

► 10:15AM (2210) *Maximum Robustness and Surgery of Frames in Finite Dimensions.*
**Martin S Copenhaver**, Georgia Institute of Technology, **Yeonhyang Kim**, Central Michigan University, **Cortney Logan**, Stonehill College, **Kyanne Mayfield**, University of Portland, **Sivaram K. Narayan***, Central Michigan University, and **Jonathan Sheperd**, University of Notre Dame (1086-15-1563)

► 10:30AM (2211) *A Multilinear Algebra Approach to Facial Recognition.* Preliminary report.
**Sarah K. Weissberger***, **Jacob J. Rhodes** and **Carla D. Martin**, James Madison University (1086-15-44)

10:45AM (2212) *Flag Mean of Generalized Grassmann Manifold Points.*
**Justin Dickinson Marks**, Air Force Institute of Technology (1086-15-2475)

### *AMS Session on Walks on Graphs and Networks*

**8:00 AM – 10:55 AM** **Room 12, Mezzanine Level, San Diego Convention Center**

► 8:00AM (2213) *The Chinese Postman Problem in regular graphs of odd degree.* Preliminary report.
**Suil O***, College of William and Mary, and **Douglas B West**, University of Illinois at Urbana-Champaign (1086-05-2452)

8:15AM *Hamiltonian Walks in Graphs.*
► (2214) **Ping Zhang**, Department of Mathematics, Western Michigan University (1086-05-1390)

8:30AM *Time-Inhomogeneous Quantum Walks.*
► (2215) **Angelica Rae Deibel***, Arizona State University, **Kevin Schwenkler**, Hampshire College, **Laura Veith**, University of Washington, and **Yevgeniy Kovchegov**, Oregon State University (1086-81-2528)

8:45AM *Inhomogeneous Quantum Walks.*
► (2216) Preliminary report.
**Kevin Schwenkler***, Hampshire College, **Angelica Deibel**, Arizona State University, **Laura Veith**, University of Washington, and **Yevgeniy Kovchegov**, Oregon State University (1086-60-1839)

9:00AM *Advances in edge Nim on graphs.*
► (2217) **Lindsay A Erickson***, Concordia College, and **Warren E Shreve**, North Dakota State University (1086-05-542)

9:15AM *On 1 - 2 Graph Achievement Games.*
► (2218) Preliminary report.
**Curtis Clark**, Morehouse College (1086-05-2589)

9:30AM *Collisions of Independent Random Walks*
(2219) *on Graphs.*
**Aaron M Montgomery**, University of Oregon (1086-60-2144)

9:45AM *Random Lights Out Processes on Graphs.*
► (2220) **Jacob T Hughes**, University of California, San Diego (1086-05-1130)

10:00AM *Deterministic Walks with Choice.*
► (2221) **Katy E Beeler*** and **Kenneth S Berenhaut**, Wake Forest University (1086-05-2090)

10:15AM *Counting Backtracking Path Searches in*
► (2222) *Network Graphs.*
**Andrew W. Harrell**, Vicksburg, MS (1086-05-551)

10:30AM *TALK CANCELLED: Approximation of*
(2223) *Multivariate Network Reliability.*
**Elizabeth Moseman**, National Institute of Standards and Technology (1086-05-1897)

10:45AM *Tenacity of cycle permutation graph.*
(2224) Preliminary report.
**Dara Moazzami***, University of Tehran, College of Engineering, Faculty of Engineering Science, and **Davoud Jelodar**, University of Tehran, Department of Algorithms and Computation (1086-05-1424)

## *MAA Session on Assessing the Effectiveness of Online Homework*

**8:00 AM – 10:55 AM** **Room 5B, Upper Level, San Diego Convention Center**

Organizers: **Jason Aubrey**, University of Missouri
**John Travis**, Mississippi College
**Joanne Peeples**, El Paso Community College

8:00AM *Using Online Homework and Data*
► (2225) *Mining to Assess Student Learning in Mathematics Courses.*
**Michael B. Scott**, Cal State Monterey Bay (1086-C1-2625)

8:20AM *The Impact of WebWork and Interleaving*
► (2226) *on Student Learning and Attitudes.* Preliminary report.
**James S Rolf**, Yale University (1086-C1-2621)

8:40AM *A preliminary report on using WeBWorK*
(2227) *in assessment of student learning outcomes.* Preliminary report.
**Anneke Bart**, Saint Louis University (1086-C1-920)

9:00AM *Using WebAssign for Homework and*
(2228) *Testing in Precalculus: Assessment of Student Performance.*
**Lisa Townsley**, University of Georgia (1086-C1-1590)

9:20AM *Experimenting with MyMathLab.*
► (2229) Preliminary report.
**Samer S Habre**, Lebanese American University (1086-C1-2240)

9:40AM *Leveraging Features of Online Homework*
(2230) *and Measuring Student Performance.*
**Dianna J. Spence*** and **Sherry L. Hix**, North Georgia College & State University (1086-C1-1988)

10:00AM *Using Online Homework to Track*
► (2231) *Students' Progress.* Preliminary report.
**Rodica Cazacu**, Georgia College (1086-C1-1798)

10:20AM *Integrating eText in online assessment*
(2232) *platforms.*
**Giorgi Shonia**, Ohio University Lancaster (1086-C1-1625)

10:40AM *Student Learning Outcomes in General*
(2233) *Studes Mathematics: A Comparison of Online and Face-to-Face.*
**Jennifer S. Hegeman**, Missouri Western State University (1086-C1-647)

## *MAA Session on Communicating Mathematics, III*

**8:00 AM – 10:55 AM** **Room 33A, Upper Level, San Diego Convention Center**

Organizers: **Brian Katz**, Augustana College
**Elizabeth Thoren**, University of California Santa Barbara

8:00AM *The Great Spline Mystery.*
► (2234) **Michelle L Ghrist***, U.S. Air Force Academy, and **James S Rolf**, Yale University (1086-D1-2498)

8:20AM *Examples on the use of communications*
(2235) *in teaching college algebra as an honors course.*
**A. S. Elkhader**, Northern State University (1086-D1-969)

8:40AM (2236) *How does giving oral presentations and typing up all assignments help students?* **Yu-Ju Kuo**, Indiana University of Pennsylviana (1086-D1-1523)

► 9:00AM (2237) *Using Large Surfaces to Enhance Students' Communication Skills.* **Patricia Hale**, Cal Poly Pomona (1086-D1-2908)

► 9:20AM (2238) *Improving communication skills through student-produced videos.* Preliminary report. **Vicky L Klima**, Appalachian State University (1086-D1-1614)

► 9:40AM (2239) *Videotaping as a Means to Improve Students' Oral Communication Skills.* **Lesley W. Wiglesworth**, Centre College (1086-D1-2495)

10:00AM (2240) *Using a Blog to Allow Proof Revisions.* **Hannah R Robbins**, Roanoke College (1086-D1-783)

► 10:20AM (2241) *Benefits of Collaborative Writing for Learning.* **Matthew Wright**, Huntington University (1086-D1-489)

► 10:40AM (2242) *Using Turing Machines to Level the Playing Field in a Math for Liberal Arts Course.* Preliminary report. **McKenzie Russell Lamb**, Ripon College (1086-D1-2677)

## *MAA Session on Mathematics Experiences in Business, Industry, and Government*

**8:00 AM – 10:55 AM** **Room 5A, Upper Level, San Diego Convention Center**

Organizers: **Carla D. Martin**, James Madison University
**Phil Gustafson**, Mesa State College
**Michael Monticino**, University of North Texas

► 8:00AM (2243) *Applying Mathematical Tools in Public Policy: Opportunities at the Intersection of Mathematics and Policy.* **Salaeha Shariff**, American Association for the Advancement of Science, **Eric Bone***, U.S. Department of State, and **Sonja Sandberg**, Framingham State College (1086-J5-2476)

► 8:20AM (2244) *The automated scoring of constructed-response mathematics test questions: Why humans sometimes disagree with the computer.* **James H Fife**, Educational Testing Service (1086-J5-577)

► 8:40AM (2245) *Bank Capital Models and Bivariate Normal Probability Calculations.* Preliminary report. **Dale T Smith**, Fiserv., Risk & Compliance (1086-J5-80)

► 9:00AM (2246) *Increasing efficiency is forward-picking in large-scale military warehouse.* **Ashok K Deb*** and **David Gohlich**, U.S. Military Academy (1086-J5-1792)

► 9:20AM (2247) *Balancing Research Interests with Project Goals at the National Institute of Standards and Technology.* **Bonita V Saunders**, National Institute of Standards & Technology (1086-J5-1946)

9:40AM (2248) *Making Mathematics "Real" for Students.* **Joy Lind***, University of Sioux Falls, and **Darren Narayan**, Rochester Institute of Technology (1086-J5-373)

► 10:00AM (2249) *The Greatest Scientific Achievements of The Hubble Space Telescope.* **Mario Livio**, Space Telescope Science Institute (1086-J5-378)

10:20AM (2250) *Modeling Terrorist Activities.* **William P. Fox**, Naval Postgraduate School, Monterey, CA 93943 (1086-J5-580)

10:40AM (2251) *Math in the City: Integrating the Classroom and Applications in the Local Community.* **Petronela Radu**, University of Nebraska-Lincoln, **Sandeep Holay**, Southeast Community College, and **Joe Geisbauer***, University of Nebraska-Lincoln (1086-J5-2594)

## *MAA Session on Touch It, Feel It, Learn It: Tactile Learning Activities in the Undergraduate Mathematics Classroom, II*

**8:00 AM – 10:55 AM** **Room 7A, Upper Level, San Diego Convention Center**

Organizers: **Jessica M. Libertini**, University of Rhode Island
**Julie Barnes**, Western Carolina University

► 8:00AM (2252) *Tactile Activities to Enhance Learning in Algebra and Trigonometry.* **Angela Hare**, Messiah College (1086-P5-795)

► 8:20AM (2253) *Functions at the Club.* **Mike Long**, Shippensburg University (1086-P5-2382)

► 8:40AM (2254) *Engaging Calculus Students with Tactile Learning Activities.* **Cayla D McBee**, Providence College (1086-P5-880)

9:00AM (2255) *Keychain Ziplines: A practical way to study velocity in the calculus classroom.* **Audrey Malagon***, Virginia Wesleyan College, and **Lisa Driskell**, Colorado Mesa University (1086-P5-2271)

► 9:20AM (2256) *Hands-on Calculus Using 3-D Paper Models.* Preliminary report. **Shelly Smith**, Grand Valley State University (1086-P5-1994)

► 9:40AM (2257) *Developing Riemann Sums via a Paper Shredder.* Preliminary report. **Carolyn Yackel**, Mercer University (1086-P5-571)

► 10:00AM (2258) *Modeling Bodies of Revolution in Calculus.* Preliminary report. **Zachary A. Kudlak**, Mount Saint Mary College (1086-P5-978)

10:20AM *Using the Pottery Wheel to Explore Topics*
► (2259) *in Calculus.*
**Elin R Smith*** and **Marie A Snipes**, Kenyon College (1086-P5-2425)

10:40AM *Visualizing Multivariable Calculus*
(2260) *with paper, Play-Doh®, blocks and CalcPlot3D-generated models.*
**Monica M VanDieren**, Robert Morris University (1086-P5-1867)

## *MAA Session on Trends in Undergraduate Mathematical Biology Education, I*

**8:00 AM – 10:55 AM** **Room 3, Upper Level, San Diego Convention Center**

Organizer: **Timothy D. Comar**, Benedictine University

8:00AM *Improving the quantitative skills of life*
► (2261) *science majors at California State University Los Angeles.*
**Silvia Heubach*** and **Elizabeth Torres**, California State University Los Angeles (1086-Q5-2003)

8:20AM *Developing a Calculus Course for*
► (2262) *the Natural and Physical Sciences.* Preliminary report.
**Lisa Rogers**, Courant Institute of Mathematical Sciences (1086-Q5-1963)

8:40AM *Integrated Quantitative Science at the*
► (2263) *University of Richmond.*
**Lester Caudill**, University of Richmond (1086-Q5-2523)

9:00AM *Pairing A First Year Modeling Course with*
► (2264) *Introductory Biology.*
**David Karl Ruch***, Metropolitan State University of Denver, and **Joanne Odden**, Dept of Biology, Metropolitan State University of Denver (1086-Q5-526)

9:20AM *Mathematical Modeling for Biology.*
► (2265) **Glenn Ledder**, University of Nebraska-Lincoln (1086-Q5-2276)

9:40AM *Capturing the Imagination of Freshmen*
(2266) *and Sophomore Math and Biology Majors Through Research Experiences.*
**Sophia Jang**, **Nancy McIntyre** and **G. Brock Williams***, Texas Tech University (1086-Q5-2843)

10:00AM *UBM Group Seminar Discussions:*
► (2267) *Grappling with Issues beyond the Curriculum.*
**D. Brian Walton**, James Madison University (1086-Q5-2512)

10:20AM *More Student Research Projects with*
► (2268) *Biological Models Using Impulsive Differential Equations.*
**Timothy D Comar**, Benedictine University (1086-Q5-712)

10:40AM *The ups and downs of interdisciplinary*
► (2269) *collaboration: undergraduate research experiences in math and biology.*
**Faun C. C. Doherty**, Washington and Jefferson College (1086-Q5-231)

## *MAA General Contributed Paper Session: Research in Applied Mathematics, III*

**8:00 AM – 10:40 AM** **Room 33B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Salam Khan**, Alabama A&M University
**Eric Ruggieri**, Duquesne University

8:00AM *Fitting and Analysis of the Distribution*
► (2270) *Function of Relaxation Times for the Polarization Estimation Inverse Problem for Solid Oxide Fuel Cells.*
**Robert Simpson Baker**, Arizona State University (1086-VL-2743)

8:15AM *Applying the Role of Differential Identities*
► (2271) *as an Efficient Tool for Understanding Symmetries and Conservation Laws in Dynamical Systems.* Preliminary report.
**Eugene S. Li***, Montgomery College, and **Gerald Katzin**, North Carolina State University (1086-VL-2356)

8:30AM *Reconstruction of Optical Coherence*
► (2272) *Tomography Images using Inpainting.* Preliminary report.
**Sridevi Pudipeddi***, Normandale College, Bloomington, MN, **Ravishankar Chityala**, Minnesota Supercomputing Institute, University of Minnesota, Minneapolis, MN, and **Robert Jones**, School of Dentistry, University of Minnesota, Minneapolis, MN (1086-VL-2335)

8:45AM *Differential Equations for the*
► (2273) *Construction of Novel Kernels in Machine Learning.*
**Alexandra V Pasi*** and **Richard Wellman**, Westminster College, Salt Lake City, UT (1086-VL-2196)

9:00AM *Rigorous Computation of Stokes Constant*
(2274) *in problems with parameters.*
**Heather Rosenblatt***, **Xing Liu**, **Hyejin Park** and **Saleh Tanveer**, The Ohio State University (1086-VL-1923)

9:15AM *Mean Exit Time as a Metric of Ecological*
(2275) *Stability in Stochastic Lotka-Volterra Models.* Preliminary report.
**Seth D. Haney***, **Matthew Cattivera** and **Adam Siepielski**, University of San Diego (1086-VL-1733)

9:30AM *Global Asymptotic Stability of*
(2276) *Density-Dependent Age-Structured Plant-Seed Bank Models.*
**Eric Alan Eager**, University of Wisconsin-La Crosse (1086-VL-957)

9:45AM (2277) *Direct numerical approach for solving Falkner-Scan Equations.* **Ramanjit K Sahi***, **Samuel Jator**, Austin Peay State University, and **Noureen Khan**, The University of North Texas at Dallas (1086-VL-588)

► 10:00AM (2278) *A Game Theoretic Approach to Communication Security.* Preliminary report. **Assane Gueye**, National Institute of Standards and Technology (1086-VL-2950)

10:15AM (2279) *Haar Wavelet-like Analysis with MRA Method Extended to Fractals.* **Myung-Sin Song**, Southern Illinois University Edwardsville (1086-VL-759)

10:30AM (2280) *Design of polyphase sequences with sparse disjoint support discrete Fourier transform.* Preliminary report. **Andrzej K Brodzik**, The MITRE Corporation (1086-VL-1467)

## *SIAM Minisymposium on Integer Programming and Combinatorial Optimization*

**8:00 AM – 11:00 AM** **Room 11A, Upper Level, San Diego Convention Center**

Organizer: **Jesus De Loera**, University of California, Davis

8:00AM (2281) *Mixed-Integer Nonlinear Programs with On-Off Constraints.* **Hongbo Dong**, Univertsity of Wisconsin-Madison, **Hyemin Jeon**, **Jeff Linderoth***, University of Wisconsin-Madison, and **Andrew Miller**, Universite Bordeaux 1 (1086-90-1550)

8:30AM (2282) *Markov Random Fields: Complexity, versatility and algorithms.* **Dorit S Hochbaum**, Department of IEOR, UC Berkeley (1086-05-1607)

9:00AM (2283) *Optimizing convex functions over non-convex sets.* **Daniel Bienstock*** and **Alexander Michalka**, Columbia University (1086-90-883)

9:30AM (2284) *The Gomory-Johnson infinite group problem: A 40-year update.* **Matthias Köppe***, **Amitabh Basu**, **Robert Hildebrand**, University of California, Davis, and **Marco Molinaro**, Carnegie Mellon University (1086-90-840)

► 10:00AM (2285) *The Triangulation Problem in Computer Vision.* **Chris Aholt**, University of Washington, **Sameer Agarwal**, Google Inc, and **Rekha R Thomas***, University of Washington (1086-90-359)

10:30AM Panel Discussion

## *AWM Workshop on Number Theory, I*

**8:00 AM – 10:55 AM** **Room 6F, Upper Level, San Diego Convention Center**

8:00AM (2286) *Zeta zeroes of Artin–Schreier curves.* **Chantal David***, Concordia University, **Alina Bucur**, UCSD, **Brooke Feigon**, CUNY, **Matilde Lalin**, University of Montreal, and **Kaneenika Sinha**, Indian Institute of Science Education and Research, Kolkata (1086-11-681)

8:30AM (2287) *How often is $\#E(\mathbb{F}_p)$ squarefree?* **Shabnam Akhtari**, University of Oregon, **Chantal David**, Concordia University, **Heekyoung Hahn**, Duke University, and **Lola Thompson***, University of Georgia (1086-11-284)

9:00AM (2288) *Parametrizing $D_4$ covers over finite fields.* **Alina Bucur***, UCSD, **Ling Hoeschler**, University of Illinois at Chicago, **Renate Scheidler**, University of Calgary, and **Melanie Matchett Wood**, University of Wisconsin-Madison (1086-11-775)

9:30AM (2289) *Enumerating abelian varieties using matrix groups.* Preliminary report. **Cassie L Williams**, James Madison University (1086-11-252)

10:00AM (2290) *Mahler measure of some singular $K3$-surfaces.* **Marie-Jose Bertin**, Universite Pierre et Marie Curie, **Amy Feaver**, University of Colorado at Boulder, **Jenny Fuselier**, High Point University, **Matilde Lalin**, University of Montreal, and **Michelle Manes***, University of Hawaii at Manoa (1086-11-1019)

► 10:30AM (2291) *Ramanujan-type Supercongruences and complex multiplications on elliptic curves.* **Sarah Chisholm**, University of Calgary, Canada, **Alyson Deines**, University of Washington, **Ling Long***, Cornell University/Iowa State University, **Gabriele Nebe**, RWTH Aachen University, Germany, and **Holly Swisher**, Oregon State University (1086-11-380)

## *Employment Center*

**8:00 AM – NOON** **Exhibit Hall A, Ground Level, San Diego Convention Center**

## *AMS Session on Analysis*

**8:15 AM – 10:55 AM** **Room 18, Mezzanine Level, San Diego Convention Center**

8:15AM (2292) *A nonreal local extremum for the Sendov conjecture.* Preliminary report. **Michael J Miller**, Le Moyne College (1086-30-1187)

8:30AM (2293) *An Extension of Bernstein's Inequality to Rational Functions.* **Mohammed A. Qazi***, Tuskegee University, and **Q. I. Rahman**, Universite de Montreal (1086-30-1566)

8:45AM (2294) *Schwarzian and Fuchsian equations on a Riemann surface.*
**David J Pinchbeck**, St. Joseph's College of Maine (1086-30-825)

9:00AM (2295) *A Family of Minimal Surfaces Constructed by Lifting Univalent Planar Harmonic Mappings.* Preliminary report.
**Stacey Muir***, University of Scranton, and **Michael Dorff**, Brigham Young University (1086-30-2698)

9:15AM (2296) *Analytic functions with real boundary values in Smirnov classes $E^p$.*
**Lisa De De Castro*** and **Dmitry Khavinson**, University of South Florida (1086-30-1001)

9:30AM (2297) *Formal Power Series and The Boundary Convergence of Power Series.*
**Xiao-Xiong Gan**, Morgan State University (1086-40-1363)

9:45AM (2298) *Bohr's phenomenon for analytic functions and the hyperbolic metric.*
**Rosihan M Ali***, Universiti Sains Malaysia, and **Yusuf Abu Muhanna**, American University of Sharjah (1086-30-65)

10:00AM ► (2299) *Periodic Decomposition of BMO.*
**Wael Abushammala**, University of Palestine (1086-43-1807)

10:15AM (2300) *Asymptotic Toeplitzness of Composition operators and their adjoints.*
**Mehdi Nikpour**, American University of Afghanistan (1086-47-2840)

10:30AM (2301) *$L^p$ inequality for entire functions of exponential type.*
**Tariq M Qazi**, Virginia State University (1086-41-2634)

10:45AM (2302) *On the continuity of the Luxemburg norm of the gradient in variable exponent Lebesgue spaces.*
**Marian Bocea***, Loyola University Chicago, and **Mihai Mihailescu**, University of Craiova, Romania (1086-49-2603)

## *AMS Session on Undergraduate Research in Geometry*

**8:15 AM – 10:55 AM** **Room 19, Mezzanine Level, San Diego Convention Center**

8:15AM ► (2303) *Differential Harnack Estimates for Fisher's Equation.*
**Xiaodong Cao**, Cornell University, **Bowei Liu**, Princeton University, **Ian Pendleton***, University of California, Berkeley, and **Abigail Ward**, University of Chicago (1086-35-2870)

8:30AM ► (2304) *Gaussian Lines and Circles.* Preliminary report.
**Nicholas R Pasko*** and **Casey J Douglas**, St. Mary's College of Maryland (1086-53-1840)

8:45AM ► (2305) *Global Dynamics of Pulse-Coupled Oscillators.* Preliminary report.
**Ryan Wayne Gryder**, College of William and Mary (1086-55-2085)

9:00AM (2306) *On the Folding of L-Shapes into Polyhedra.*
**Emily Dinan***, Fordham University, **Alice Nadeau**, Grinnell College, and **Issac Odegard**, University of North Dakota (1086-51-1204)

9:15AM ► (2307) *A Proof Related to the Projections of Polyhedra.*
**John Jacob Zanazzi**, Northern Arizona University (1086-51-946)

9:30AM ► (2308) *On Unit Triangle and Square Tilings in $\mathbb{R}^2$.*
**John Chiarelli**, New York University, **Robert Connelly**, Cornell Universtiy, and **Lisa Piccirillo***, Boston College (1086-52-2857)

9:45AM ► (2309) *Perimeter-minimizing Planar Tilings by Pentagons.*
**Whan Ghang**, MIT, **Zane Martin***, Williams College, and **Steven Waruhiu**, University of Chicago (1086-51-2461)

10:00AM (2310) *What Do Math and LEGOs Have in Common?*
**Emmanuel Daring**, Williams College, **Casey Douglas**, St. Mary's College of Maryland, **Isabel Guadarrama**, Bryn Mawr College, **Samantha Sprague**, Marist College, and **Carrie Winterer***, St. Mary's College of Maryland (1086-00-1981)

10:15AM ► (2311) *Hodge-deRham Theory of K-Forms on Carpet Type Fractals.* Preliminary report.
**Jason Bello***, University of California, Los Angeles, **Yiran Li** and **Robert Strichartz**, Cornell University (1086-53-2813)

10:30AM ► (2312) *Computational Implementation of Ernst's Tangle Equations Model.*
**Jonathan Kirkpatrick Sullivan*** and **Noureen Khan**, University of North Texas at Dallas (1086-55-846)

10:45AM (2313) *Discrete Folds of Tree Spaces.*
**Daoji Huang**, Carleton College (1086-52-1661)

## *MAA General Contributed Paper Session: Mathematics Education, II*

**8:15 AM – 10:55 AM** **Room 33C, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Rebecca Head**, Bakersfield College
**Agnes Rash**, St. Joseph's University

8:15AM ► (2314) *Elementary mathematics education: What has been, what is, and what might be normal.*
**Christopher C. Leary**, SUNY Geneseo (1086-VE-2242)

8:30AM (2315) *Train the Trainer with Technology in Mathematics Education.*
**Margo Alexander*** and **Iman Chahine**, Georgia State University, Atlanta, GA (1086-VE-1176)

8:45AM ► (2316) *Mathematics Teacher Development of Quantitative Reasoning Tasks for Students.* Preliminary report.
**David M Glassmeyer***, **Michael C Oehrtman** and **Jodie D Novak**, University of Northern Colorado (1086-VE-1105)

9:00AM (2317) *The TI-Nspire Navigator CAS system and pre-service teachers: Changing the communication in a mathematics classroom.*
**Tharanga Mahesh Kumara Wijetunge*** and **Dennis St. John**, Central Michigan University (1086-VE-994)

9:15AM ► (2318) *Happiness is receiving a Noyce Grant - but who knew it would be this hard to award scholarships?* Preliminary report.
**Janet Nichols**, Colorado State University - Pueblo (1086-VE-2365)

9:30AM ► (2319) *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 Sack** and **Michael L. Connell**, University of Houston-Downtown (1086-VE-503)

9:45AM (2320) *Mathematics Leadership Requires Growth and Responsibility.*
**Suzanne Mitchell**, National Council of Supervisors of Mathematics (1086-VE-1494)

10:00AM ► (2321) *Using Original Historical Sources in Teaching Mathematics for Preservice Elementary and Middle School Teachers.*
**Osama Taani**, Plymouth State University (1086-VE-1662)

10:15AM ► (2322) *The State of Mathematics Education in Africa:Building a strong foundation for global competitiveness.*
**Dickson S. Ondiek Owiti**, Kisii University College, Kenya (1086-VE-2218)

10:30AM ► (2323) *A New REU Program in Mathematics Education Research.*
**Fabiana Cardetti**, **Gabriel Feinberg***, University of Connecticut, and **Catherine Matta**, Cabrini College (1086-VE-2531)

10:45AM ► (2324) *Using Magic Squares To Design Assignments.*
**Brian P. Kelly**, Fisher College (1086-VE-963)

## *MAA Session on Developmental Mathematics Education, I*

**8:20 AM – 10:55 AM** **Room 6C, Upper Level, San Diego Convention Center**

Organizers: **J. Winston Crawley**, Shippensburg University
**Kimberly Presser**, Shippensburg University

8:20AM ► (2325) *Improving Student Success in Developmental Algebra through a Course Redesign: Lessons Learned.*
**Cheryl J. McAllister***, **Pradeep Singh** and **Laurie W. Overmann**, Southeast Missouri State University (1086-E1-1241)

8:40AM ► (2326) *The Use of Exam Wrappers to Motivate Student Learning.* Preliminary report.
**Peter Olszewski**, Penn State Erie, The Behrend College (1086-E1-873)

9:00AM ► (2327) *Accelerating Development: A Pilot Bridge Program.*
**John W Hoggard**, Edinboro University of Pennsylvania (1086-E1-1815)

9:20AM ► (2328) *Developmental Math Redesign - What's Been Working.* Preliminary report.
**Joan E Brown***, Eastern New Mexico University, Portales, NM, and **Tom R Brown**, Eastern New Mexico University (1086-E1-155)

9:40AM ► (2329) *Flexible Options to Prepare Students for University-Level Mathematics.* Preliminary report.
**Susan E Thompson**, Otterbein University (1086-E1-1416)

10:00AM (2330) *Math Skills, An Emporium Model Modified, What We Learned from the Pilot Year.* Preliminary report.
**Mary D Shepherd*** and **Cheryl G. Malm**, Northwest Missouri State University (1086-E1-1221)

10:20AM ► (2331) *Learning and Study Strategies Still Remain Relevant Factors in Predicting Academic Success in Developmental Mathematics.*
**Jerry C Obiekwe**, The University of Akron-Wayne College (1086-E1-479)

10:40AM (2332) *ACCESS (Accelerating College Completion by Enhancing Student Success) Mathematics: A Combined Developmental-College Algebra Course.* Preliminary report.
**Alvina J. Atkinson***, **Barry D. Biddlecomb** and **D. Natasha Brewley**, Georgia Gwinnett College (1086-E1-948)

## *MAA Session on Fostering Mathematical Habits of Mind, II*

**8:20 AM – 10:15 AM** **Room 6E, Upper Level, San Diego Convention Center**

Organizers: **Kien H. Lim**, University of Texas at El Paso
**Ayşe A. Şahin**, DePaul University
**Holly Hirst**, Appalachian State University

8:20AM ► (2333) *Finding Ways to Evaluate Students' Development of Mathematical Habits of Mind.*
**Erica Slate Young**, University of Alabama in Huntsville (1086-F1-2344)

8:40AM ► (2334) *Modeling the MHoM for math majors that want to teach.*
**Greisy Winicki Landman**, California State Polytechnic University, Pomona (1086-F1-794)

9:00AM ► (2335) *The Benefits of A Habit: Examining Evidence to Understand Statements and Proofs.* Preliminary report.
**Martin E Flashman**, Humboldt State University (1086-F1-1097)

9:20AM (2336) *Developing Mathematical Habits of Mind in a Problem Solving Course for Preservice Middle School Teachers.* Preliminary report.
**Tamas Szabo** and **Craig Snider***, University of Wisconsin Whitewater (1086-F1-2607)

9:40AM ► (2337) *The Open Math Lab: Building an IBL-Based Tutoring Center.*
**Randall E Cone**, Virginia Military Institute (1086-F1-1065)

10:00AM ► (2338) *Mathematical Habits of Mind (MHoM) Are Not Just for Math Class: Using Mathematical Ways of Thinking Outside the Mathematics Classroom to Create Artwork.*
**Charlene Morrow**, Mount Holyoke College (1086-F1-1594)

## *AMS Special Session on Financial Mathematics, I*

**8:30 AM – 10:50 AM** **Room 16A, Mezzanine Level, San Diego Convention Center**

Organizers: **Maxim Bichuch**, Princeton University
**Tim Siu-Tang Leung**, Columbia University

8:30AM (2339) *A No-Arbitrage Model of Liquidity in Financial Markets involving Brownian Sheets.*
**David German***, Claremont McKenna College, and **Henry Schellhorn**, Claremont Graduate University (1086-60-1425)

9:00AM (2340) *Absence of arbitrage in a general framework.*
**Hasanjan Sayit**, Worcester Polytechnic Institute (1086-60-622)

9:30AM (2341) *Optimal execution of a VWAP order: a stochastic control approach.*
**Christoph Frei***, University of Alberta, and **Nicholas Westray**, Deutsche Bank AG (1086-60-338)

10:00AM (2342) *Portfolio Optimization under Convex Incentive Schemes.*
**Maxim Bichuch***, Princeton University, and **Stephan Sturm**, Worcester Polytechnic Institute (1086-60-799)

10:30AM (2343) *Optimal Incentives for Delegated Portfolio Optimization.*
**Maxim Bichuch**, Princeton University, ORFE Department, and **Stephan Sturm***, Worcester Polytechnic Institute (1086-91-879)

## *AMS Session on Approximation Methods and Error Analysis*

**8:30 AM – 10:40 AM** **Room 30B, Upper Level, San Diego Convention Center**

8:30AM ► (2344) *Euler's Machin-like Formula Iterated, Maximal Dilation and Switch to Remainder.* Preliminary report.
**Iraj Kalantari** and **Mojtaba Moniri***, Western Illinois University (1086-68-2985)

8:45AM (2345) *Diophantine Approximation with Partial sums of power series.*
**Bruce C Berndt**, University of Illinois at Urbana-Champaign, **Sun Kim**, Ohio State University, **M Tip E Phaovibul*** and **Alexandru Zaharescu**, University of Illinois at Urbana Champaign (1086-41-2630)

9:00AM Discussion

9:00AM (2346) *TALK CANCELLED Characterization of Best Approximation in Generalized Haar Space of Tensor Product Type.*
**Mohammad A AlQudah***, Northwood University, and **James R Angelos**, Cenral Michigan University (1086-41-770)

9:15AM ► (2347) *Using Mathematica to Find the Exact or to Approximate the Analytical Solution of Volterra Equations.* Preliminary report.
**Javad Abdalkhani**, The Ohio State University-Lima (1086-45-1944)

9:30AM ► (2348) *Using asymptotics to obtain sharp size estimates for a class of exponential integrals.*
**Kevin Renna**, University of Montana (1086-32-2266)

9:45AM (2349) *Walsh Fourier Analysis and Grey Codes.* Preliminary report.
**Nasser Dastrange**, Buena Vista University (1086-42-1336)

10:00AM (2350) *A posteriori error estimates for explicit time integration methods.*
**James B Collins***, Colorado State Univsersity, **Don Estep** and **Simon Tavener**, Colorado State University (1086-65-2011)

10:15AM (2351) *Quantification of operator splitting effects in finite volume calculations of advection-diffusion.*
**Jeffrey M Connors**, Lawrence Livermore National Laboratory (1086-65-2375)

10:30AM (2352) *An a Posteriori Analysis of Iterative Technique for System of Odes.*
**Jehanzeb H Chaudhry***, **Don Estep**, **Simon Tavener**, Colorado State University, and **Victor Ginting**, University of Wyoming (1086-65-1271)

### *AMS Committee on Education Panel Discussion*

**8:30 AM – 10:00 AM** **Room 10, Upper Level, San Diego Convention Center**

*Mathematics serving students in other disciplines.*

Moderator: **Tara S. Holm**, Cornell University

Panelists: **Mark Kozek**, Whittier College

**William McCallum**, University of Arizona

**Tom Morley**, Georgia Tech

**Victoria Powers**, Emory University

**Tom Roby**, University of Connecticut

**Maria Terrell**, Cornell University

### *AMS Invited Address*

**9:00 AM – 9:50 AM** **Room 6AB, Upper Level, San Diego Convention Center**

► (2353) *Generators and Relations for Finite Groups*.
**Robert M. Guralnick**, University of Southern California (1086-20-4)

### *ASL Invited Address*

**9:00 AM – 9:50 AM** **Room 7B, Upper Level, San Diego Convention Center**

(2354) *John von Neumann, model theorist.*
**Bradd Hart**, McMaster University (1086-03-130)

### *MAA Minicourse #8: Part B*

**9:00 AM – 11:00 AM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*Getting students involved in undergraduate research.*

Presenters: **Aparna Higgins**, University of Dayton

**Joseph Gallian**, University of Minnesota Duluth

### *MAA Minicourse #1: Part B*

**9:00 AM – 11:00 AM** **Room 29C, Mezzanine Level, San Diego Convention Center**

*Heavenly mathematics: The forgotten art of spherical trigonometry.*

Presenters: **Glen Van Brummelen**, Quest University

**Joel Silverberg**, Roger Williams University

### *MAA Minicourse #13: Part B*

**9:00 AM – 11:00 AM** **Room 30A, Upper Level, San Diego Convention Center**

*Problem-based courses for teachers, future teachers, and math majors.*

Presenters: **Gail Burrill**, Michigan State University

**Darryl Yong**, Harvey Mudd College

**Bowen Kerins**, Education Development Center

**James King**, University of Washington

### *MAA Panel Discussion*

**9:00 AM – 10:20 AM** **Room 1A, Upper Level, San Diego Convention Center**

*Active learning in mathematics.*

Organizers: **David Taylor**, Roanoke College

**Lorena Bociu**, North Carolina State University

**Robert Allen**, University of Wisconsin-La Crosse

Panelists: **Alina Duca**, North Carolina State University

**Susan Hermiller**, University of Nebraska-Lincoln

**Jennifer Kosiak**, University of Wisconsin-La Crosse

**Kal Nanes**, University of Maryland, Baltimore County

**Charlotte Zales**, Moravian College

### *SIGMAA on Math Circles for Students and Teachers: Demonstration for Mathematicians*

**9:00 AM – 9:55 AM** **Room 1B, Upper Level, San Diego Convention Center**

*Come learn about and participate in this Math Circles experience.*

Organizers: **Sam Vandervelde**, St. Lawrence University

**Tatiana Shubin**, San Jose State University

### *SIGMAA on Statistics Education Panel Discussion*

**9:00 AM – 10:20 AM** **Room 4, Upper Level, San Diego Convention Center**

*Randomization and bootstrap methods in the introductory statistics course.*

Organizer: **Andrew Zieffler**, University of Minnesota

Panelists: **George Cobb**, Mount Holyoke College

**Jeff Hamrick**, Rhodes College

**John Holcomb**, Cleveland State University

**Karl Lock Morgan**, Duke University

**Rachel Dunwell**, Rhodes College

**Robert delMas**, University of Minnesota

**Robin Lock**, St. Lawrence University

**Soma Roy**, California Polytechnic State University, San Luis Obispo

**Laura Ziegler**, University of Minnesota

### *NAM Panel Discussion*

**9:00 AM – 9:50 AM** **Room 11B, Upper Level, San Diego Convention Center**

*Strategies for Winning Images, Lasting Impressions, and Brilliant Brands.*

### *Student Hospitality/Information Center*

**9:00 AM – 3:00 PM** **Exhibit Hall B2, Ground Level, San Diego Convention Center**

### *Exhibits and Book Sales*

**9:00 AM – NOON** **Exhibit Hall B1, Ground Level, San Diego Convention Center**

### *ASL Invited Address*

**10:00 AM – 10:50 AM** **Room 7B, Upper Level, San Diego Convention Center**

(2355) *Reason and evidence in mathematics.*
**Peter Koellner**, Harvard University (1086-03-132)

### *SIGMAA on Math Circles for Students and Teachers: Demonstration for Students*

**10:00 AM – 10:55 AM** **Room 1B, Upper Level, San Diego Convention Center**

*Come learn about and participate in this Math Circles experience.*

Organizers: **Sam Vandervelde**, St. Lawrence University

**Tatiana Shubin**, San Jose State University

### *NAM Business Meeting*

**10:00 AM – 10:50 AM** **Room 11B, Upper Level, San Diego Convention Center**

### *MAA Invited Address*

**10:05 AM – 10:55 AM** **Room 6AB, Upper Level, San Diego Convention Center**

(2356) *Who chooses not to persist in calculus and why?*
**Chris Rasmussen**, San Diego State University (1086-A0-12)

### *MAA Business Meeting*

**11:10 AM – 11:40 AM** **Room 6AB, Upper Level, San Diego Convention Center**

### *AMS Business Meeting*

**11:45 AM – 12:15 PM** **Room 6AB, Upper Level, San Diego Convention Center**

### *NAM Claytor-Woodard Lecture*

**1:00 PM – 1:50 PM** **Room 11B, Upper Level, San Diego Convention Center**

(2357) *Stability and dynamics of solitary waves in AlGaAs waveguide arrays and BEC spinor lattices.*
**Rudy Lee Horne**, Morehouse College (1086-37-796)

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

**1:00 PM – 5:50 PM** **Room 8, Upper Level, San Diego Convention Center**

Organizers: **Bernard Brooks**, Rochester Institute of Technology

**Jobby Jacob**, Rochester Institute of Technology

**Jacqueline Jensen-Vallin**, Slippery Rock University

**Carl V. Lutzer**, Rochester Institute of Technology

**Darren Narayan**, Rochester Institute of Technology

**Tamas Wiandt**, Rochester Institute of Technology

1:00PM ► (2358) *Puzzling Graphs I.* Preliminary report.
**Daphne Gold***, **Maneka Puligandla**, **Bayla Weick** and **Ruobing Zhang**, Smith College (1086-05-2138)

1:30PM ► (2359) *Puzzling Graphs II.* Preliminary report.
**Tia Pilaroscia***, **Jize Zhang** and **Jasmine Osorio**, Smith College (1086-05-2143)

2:00PM ► (2360) *On cyclic decompositions of $K_{n,n}$ minus a 1-factor into 2-regular graphs.*
**Ryan C Bunge**, **Saad I El-Zanati**, Illinois State University, **Daniel Gibson***, Concordia University, **Jackelyn Nagel**, Dominican University, **Benjamin Stanley**, New Mexico State University, and **Allison Zale**, Illinois State university (1086-05-2165)

2:30PM ► (2361) *The Structure of Consecutive Octic Residues.* Preliminary report.
**Nicolas Allen Smoot**, Armstrong Atlantic State University (1086-11-168)

3:00PM ► (2362) *Nim on Wheels.*
**Joseph Frank DiNatale**, Armstrong Atlantic State University (1086-05-170)

3:30PM ► (2363) *Multi-Dimensional Predator-Prey Models.*
**Clayton J Schuman*** and **Antonio Mastroberardino**, Penn State Erie, The Behrend College (1086-34-2796)

4:00PM ► (2364) *New partition algorithms for 1-D event data.* Preliminary report.
**Sarah Bass**, **Katarina Gagic**, **Tim Hsu**, **Anh Nguyen**, **Charles Petersen***, **Jim Quach**, **Jonathan Reyles**, **Cliff Sandwick** and **Karen Wu**, San Jose State Univ. (1086-90-184)

4:30PM ► (2365) *Fusing Images with Multiple Degradations Using Gaussian Mixture Models.* Preliminary report.
**Glenn Sidle***, Duquesne University, **Katie Heaps**, **Josh Koslosky**, University of Minnesota, and **Stacey Levine**, Duquesne University (1086-49-195)

5:00PM ► (2366) *Variations of Cops and Robber on Graphs.*
**Dalton Allan***, Massachusetts Institute of Technology, **Linda M. Dunklee**, Central Michigan University, and **Sofya Vorotnikova**, University of Massachusetts-Amherst (1086-00-199)

5:30PM (2367) *A Survival Analysis of the Duration of Olympic Records.*
**Adam J Zarn***, Wheaton College, Wheaton, IL, **Elliott Z Hollifield**, UNC-Asheville, Asheville, NC, and **Victoria A Trevino**, Utah Valley University, Orem, UT (1086-62-172)

## *AMS-MAA Special Session on Mathematics and Education Reform, III*

**1:00 PM – 5:20 PM** **Room 17B, Mezzanine Level, San Diego Convention Center**

Organizers: **William Barker**, Bowdoin College
**Cathy Kessel**, Berkeley, California
**William McCallum**, University of Arizona
**Bonnie Saunders**, University of Illinois, Chicago

1:00PM ► (2368) *Embracing the iPhone Generation: The Evolving Mathematics Curriculum at Liberal Arts Colleges.*
**Andrew J. Bernoff**, Harvey Mudd College (1086-97-1273)

1:30PM ► (2369) *Big Data Projects: Lessons Learned and To Be Learned.* Preliminary report.
**Daniel L Goroff**, Alfred P. Sloan Foundation (1086-97-2556)

2:00PM (2370) *New NSF initiative: "Expeditions in Training, Research, and Education for Mathematics and Statistics through Quantitative Explorations of Data" (EXTREEMS-QED).*
**Jennifer Slimowitz Pearl**, National Science Foundation (1086-97-1788)

2:30PM ► (2371) *Computational Sciences and Big Data: Implications for the Mathematics Curriculum — A Discussion.* Preliminary report.
**William Barker***, Bowdoin College, **Andrew Bernoff**, Harvey Mudd College, **Daniel Goroff**, Sloan Foundation, and **Jennifer Slimowitz Pearl**, National Science Foundation (1086-97-2792)

3:00PM ► (2372) *Mathematical sense and nonsense in the public conversation about the future of Planet Earth: How do we help our students tell the difference?* Preliminary report.
**Robert E. Megginson**, University of Michigan, Ann Arbor (1086-97-2599)

3:30PM ► (2373) *Conceptual Earth's Climate Models: Opportunities in Mathematics Classrooms.* Preliminary report.
**Esther R. Widiasih**, University of Arizona (1086-97-1146)

4:00PM ► (2374) *Using freeze and thaw data for lakes to study global warming.*
**Glenn Ledder**, University of Nebraska-Lincoln (1086-92-2018)

4:30PM ► (2375) *Opportunities and Challenges in Teaching Mathematical Modeling.* Preliminary report.
**Susan D. Nickerson**, San Diego State University (1086-97-2732)

5:00PM ► (2376) *Using Probability and Limits to Investigate Biodiversity.*
**Suzanne Lenhart***, U of Tennessee, Knoxville and NIMBIoS, and **Kelly Sturner**, NIMBIoS, U of Tennessee (1086-92-965)

## *AMS-MAA Special Session on the History of Mathematics, II*

**1:00 PM – 5:50 PM** **Room 9, Upper Level, San Diego Convention Center**

Organizers: **Patti Hunter**, Westmont College
**Deborah Kent**, Drake University
**Adrian Rice**, Randolph-Macon College

1:00PM ► (2377) *Deductive structure and mathematical tables in Ptolemy's Almagest.* Preliminary report.
**Nathan C Sidoli**, Waseda University, School of International Liberal Studies (1086-01-1199)

1:30PM ► (2378) *Theory versus tables in second-millennium applied mathematics in India.* Preliminary report. **Kim Plofker**, Union College (1086-01-956)

2:00PM ► (2379) *Elliptical Orbits and the Conflict over the Calculus.* Preliminary report. **Paul R Wolfson**, West Chester University (1086-01-935)

2:30PM ► (2380) *Your humble Servant, Is. Newton.* **William Dunham**, Muhlenberg College (1086-01-457)

3:00PM ► (2381) *A Reader's Guide to the Classification of Quadratic Forms in the Disquisitiones Arithmeticae.* Preliminary report. **Lawrence A. D'Antonio**, Ramapo College of New Jersey (1086-01-993)

3:30PM ► (2382) *The Reverend Thomas Hill (1818-1891): Educator, Administrator and Mathematician.* Preliminary report. **Eisso J. Atzema**, University of Maine (1086-01-1337)

4:00PM TALK ADDED: Promoting mathematics in the Greco-Roman world, Jacqueline Feke, University of Chicago

4:00PM (2383) *TALK CANCELLED: Von Mises and the Mathematical Theory of Plastic Deformation.* **Rolf Nossum**, University of Agder, Norway (1086-01-653)

4:30PM (2384) *Weyl's lecture courses on group theory at the Institute for Advanced Study (Princeton) before the Second World War.* **Christophe Eckes**, Institut de Mathématiques de Toulouse (1086-01-656)

5:00PM ► (2385) *Biogeometry, 1941.* **Marjorie Senechal**, Smith College (1086-01-482)

5:30PM (2386) *Creating a Life: Emil Artin in America.* **Della Dumbaugh***, University of Richmond, and **Joachim Schwermer**, University of Vienna (1086-01-932)

## *AMS Special Session on Computational Algebraic and Analytic Geometry for Low-dimensional Varieties, II*

**1:00 PM – 5:50 PM** **Room 15A, Mezzanine Level, San Diego Convention Center**

Organizers: **Mika Seppala**, Florida State University
**Emil Volcheck**, National Security Agency

1:00PM (2387) *The convex hull of a pair of circles.* Preliminary report. **Frank Sottile*** and **Tina Mai**, Texas A&M University (1086-14-1695)

1:30PM (2388) *Sparse Polynomial Interpolation with Errors: Power and Shifted Bases.* **Matthew T Comer***, **Erich L. Kaltofen**, North Carolina State University, and **Clément Pernet**, Université Joseph Fourier (1086-12-2170)

2:00PM (2389) *Fitting helices to data.* **Yves Nievergelt***, Eastern Washington University, **Theodore M. Cole** and **Caroline Rinaldi**, Dept of Basic Medical Science, School of Medicine, University of Missouri-Kansas City (1086-65-197)

2:30PM (2390) *Puiseux Series Expansions for Algebraic Sets.* **Danko Adrovic*** and **Jan Verschelde**, University of Illinois at Chicago (1086-14-2158)

3:00PM (2391) *Splitting Behavior of Primes in $S_n$ Extensions of $\mathbb{Q}$.* Preliminary report. **Benjamin L Weiss***, Bates College, and **Jeffrey C Lagarias**, University of Michigan (1086-12-2430)

3:30PM (2392) *Numerical Methods for Solving Schubert Problems.* Preliminary report. **Nickolas Hein**, Texas A&M University (1086-14-1108)

4:00PM (2393) *Zeta Functions of Artin Schreier Curves via Representations of $S_n$.* **Alexander Carl Mueller**, University of Michigan (1086-11-1818)

4:30PM ► (2394) *Polynomial Equations with Infinitely Many Solutions over an Algebraic Number Field.* Preliminary report. **Thao Do**, Stony Brook University, **Jared Hallet**, Williams Colllege, **Elliot Wells**, University of Michigan, **Susan Yuhou Xia***, Bryn Mawr College, and **Michael Zieve**, University of Michigan (1086-11-2901)

5:00PM (2395) *Constructing Global and Non-Global Cubic Function Fields.* **Colin J Weir**, University of Calgary (1086-11-2590)

5:30PM (2396) *A smaller set of invariants for genus 2 curves.* Preliminary report. **Kristin Lauter***, **Michael Naehrig**, Microsoft Research, and **Tonghai Yang**, University of Wisconsin (1086-14-2055)

## *AMS Special Session on Dirac and Laplace Operators in Global Analysis and Geometry, II*

**1:00 PM – 5:50 PM** **Room 32A, Upper Level, San Diego Convention Center**

Organizers: **Ken Richardson**, Texas Christian University
**Igor Prokhorenkov**, Texas Christian University

1:00PM (2397) *Sheaves of $C^*$-algebras and $K$-homology.* Preliminary report. **John Roe***, Penn State University, and **Paul Siegel**, Columbia University (1086-58-686)

2:00PM (2398) *Higher analytic indices and symbolic index pairing.* Preliminary report. **Alexander Gorokhovsky***, University of Colorado, Boulder, and **Henri Moscovici**, The Ohio State University (1086-58-2136)

3:00PM (2399) *Casimir's surgery problem.* Preliminary report.
**Paul Loya***, SUNY Binghamton, and **Klaus Kirsten**, Baylor University (1086-58-1236)

4:00PM (2400) *Some results on spectral geometry of Riemannian orbifolds.*
**Yuri A. Kordyukov**, Institute of Mathematics, Russian Academy of Sciences, Ufa, Russia (1086-58-1109)

5:00PM (2401) *Dirac-like operators on subbundles and Toeplitz structures on contact manifolds.* Preliminary report.
**D Sean Fitzpatrick**, University of California, Berkeley (1086-53-1496)

## *AMS Special Session on Financial Mathematics, II*

**1:00 PM – 5:20 PM** **Room 16A, Mezzanine Level, San Diego Convention Center**

Organizers: **Maxim Bichuch**, Princeton University
**Tim Siu-Tang Leung**, Columbia University

1:00PM (2402) *Two competing companies with rank based characteristics.*
**Tomoyuki Ichiba**, University of California Santa Barbara (1086-60-1708)

1:30PM (2403) *Brownian particle systems as models of large equity markets.*
**Mykhaylo Shkolnikov**, University of California, Berkeley (1086-60-947)

2:00PM (2404) *Interacting Particle Systems for Systemic Risk.* Preliminary report.
**Michael Ludkovski**, UC Santa Barbara (1086-60-2200)

2:30PM (2405) *Volatility-Stabilized Markets.* Preliminary report.
**Radka Pickova**, Columbia University (1086-60-483)

3:00PM (2406) *Asymptotic Expansion of Regime-Switching Models for Consistent Pricing of VIX and S&P500 Derivatives.*
**Andrew Papanicolaou**, Princeton University (1086-60-78)

3:30PM (2407) *Optimal Investment in the Presence of High-water Mark Fees.*
**Gerard Brunick***, UC, Santa Barbara, **Mihai Sirbu**, University of Texas at Austin, and **Karel Janecek**, RSJ Algorithmic Tradings and Charles University, Prague (1086-49-192)

4:00PM (2408) *Competitive Control of Market Goodwill and Strategic Exit.*
**Dharma Kwon**, University of Illinois at Urbana-Champaign, and **Hongzhong Zhang***, Columbia University (1086-91-2359)

4:30PM (2409) *On a dynamic extension of the method of the Distribution Builder.*
**Phillip J Monin**, The University of Texas at Austin (1086-60-102)

5:00PM (2410) *An Optimal Timing Approach to Mean-Reversion Trading.*
**Tim Leung*** and **Xin Li**, Columbia University (1086-60-435)

## *AMS Special Session on Generalized Symmetric Spaces, II*

**1:00 PM – 5:50 PM** **Room 15B, Mezzanine Level, San Diego Convention Center**

Organizers: **Catherine Buell**, Bates College
**Aloysius G. Helminck**, North Carolina State University

1:00PM (2411) *Howe duality and Multiplicity-free actions.*
**Tobias R Pecher**, University of Paderborn (1086-15-1699)

1:30PM (2412) *Representations with Small $K$ Types for Simply Connected, Simply Laced, Split Real Groups.*
**Seung Won Lee**, University of California, San Diego (1086-22-2044)

2:00PM (2413) *The (quantum) hidden subgroup problem for ax+b groups.* Preliminary report.
**Nolan R. Wallach*** and **David Meyer**, University of California, San Diego (1086-20-1413)

2:30PM (2414) *Local Converse Theorems for Distinguished Representations.* Preliminary report.
**Jeffrey Hakim***, American University, and **Omer Offen**, Technion (1086-22-2334)

3:00PM (2415) *Decompositions of compact symmetric spaces.*
**Derek Habermas**, SUNY Potsdam (1086-53-2502)

3:30PM (2416) *A hyperkähler structure on the cotangent bundle of a complex semisimple Lie group.* Preliminary report.
**Ralph J Bremigan**, Ball State University (1086-53-1478)

► 4:00PM (2417) *Invariants of Certain Elementary Abelian $p$-groups.*
**H.E.A. Campbell**, University of New Brunswick, **R. James Shank**, University of Kent, Canterbury, and **David L. Wehlau***, Royal Military College of Canada (1086-20-1644)

4:30PM (2418) *Explicit Plancherel measrue for* $\mathrm{PGL}_2(F)$ *over a p-adic field.*
**Carlos De la Mora**, Purdue University (1086-11-557)

5:00PM (2419) *On the weight monoids of smooth affine spherical varieties.*
**Guido Pezzini**, Universität Erlangen-Nürnberg, and **Bart Van Steirteghem***, Medgar Evers College (CUNY) (1086-14-1574)

5:30PM (2420) *Jordan decomposition and real-valued characters.*
**Bhama Srinivasan**, University of Illinois at Chicago, and **C. Ryan Vinroot***, College of William and Mary (1086-20-2094)

## *AMS Special Session on Knots, Links, and Three-manifolds, II*

**1:00 PM – 5:50 PM** **Room 32B, Upper Level, San Diego Convention Center**

Organizers: **Christopher Herald**, University of Nevada, Reno
**Stanislav Jabuka**, University of Nevada, Reno
**Swatee Naik**, University of Nevada, Reno

1:00PM (2421) *Constructions of 4-manifolds.*
**Ronald Fintushel**, Michigan State University (1086-57-1535)

1:30PM (2422) *Monopole Floer homology and covering spaces.*
**Tye Lidman**, University of Texas at Austin, and **Ciprian Manolescu***, University of California at Los Angeles (1086-57-596)

2:00PM (2423) *Proposed Property 2R counterexamples classified.*
**Martin Scharlemann**, University of California at Santa Barbara (1086-57-382)

2:30PM (2424) *On the Topology of Symplectic 4-Manifolds with K = 0.* Preliminary report.
**Stefan Friedl**, University of Cologne, Germany, and **Stefano Vidussi***, University of California, Riverside (1086-57-1793)

3:00PM (2425) *The $A$-polynomial of the $(-2, 3, 3 + 2n)$ pretzel knots.*
**Stavros Garoufalidis**, Georgia Institute of Technology, and **Thomas W Mattman***, California State University, Chico (1086-57-1868)

3:30PM ► (2426) *Lagrangian caps in $\mathbb{C}^2$.*
**Emmy Murphy**, MIT (1086-51-1926)

4:00PM (2427) *Heegaard Floer theory and finite surgeries.*
**Margaret Doig**, Indiana University, Bloomington (1086-57-2477)

4:30PM (2428) *Ribbon Complements.*
**Luke Williams**, Michigan State University (1086-57-2674)

5:00PM (2429) *Quasi-alternating Montesinos links.* Preliminary report.
**Abhijit Champanerkar**, College of Staten Island and Graduate Center, CUNY, and **Philip Ording***, Medgar Evers College, CUNY (1086-57-1158)

5:30PM ► (2430) *Knots in proteins and their implications.*
**Kenneth C Millett**, University of California, Santa Barbara (1086-57-614)

## *AMS Special Session on Mathematical Underpinnings of Multivariate Complexity Theory and Algorithm Design, and Its Frontiers and the Field of Incrementalization, II*

**1:00 PM – 5:50 PM** **Room 31C, Upper Level, San Diego Convention Center**

Organizers: **Rodney Downey**, Victoria University of Wellington, New Zealand
**Michael Fellows**, Charles Darwin University, Australia
**Anil Nerode**, Cornell University
**Frances Rosamond**, Charles Darwin University, Australia

1:00PM (2431) *Synthesis of Dynamic Algorithms.* Preliminary report.
**Neil Immerman**, Computer Science Dept., University of Massachusetts, Amherst (1086-68-2140)

1:30PM (2432) *How Fast Can We Compute Combinatorial Problems such as the Permanent and the Tutte Polynomial?*
**Holger Dell**, UW Madison (1086-05-1847)

2:00PM (2433) *Parameterized Algorithms and Circuit Lower Bounds.*
**Ryan Williams**, Stanford University (1086-68-1876)

2:30PM (2434) *On an odd case of an XP algorithm for graphs of bounded clique-width.*
**Petr Hliněný***, Faculty of Informatics, Masaryk University, Brno, Czech Republic, **Robert Ganian**, Goethe-Universität Frankfurt am Main, Germany, and **Jan Obdržálek**, Faculty of Informatics, Masaryk University, Brno, Czech Republic (1086-68-915)

3:00PM (2435) *Parameterized Complexity and Permutation Group Problems.*
**Vikraman Arvind**, Institute of Mathematical Sciences, Chennai 600113, India (1086-68-1517)

3:30PM ► (2436) *Applying Parameterized Complexity to Cognitive Science.*
**Ulrike Stege**, University of Victoria (1086-68-1681)

4:00PM (2437) *Incremental List Coloring of Graphs, Parameterized by Conservation.*
**Sepp Hartung** and **Rolf Niedermeier***, TU Berlin (1086-68-1804)

4:30PM ► (2438) *Algebraization in parameterized algorithms and complexity.*
**Ioannis Koutis**, University of Puerto Rico, Rio Piedras (1086-68-1680)

5:00PM (2439) *Formal Coalgebraic Specifications and their Refinement.*
**Douglas R Smith**, Kestrel Institute (1086-68-2907)

5:30PM (2440) *Summary and Future Directions Discussion.*
**Michael Fellows***, Charles Darwin University, Australia, **Rodney Downey**, Victoria University of Wellington, NZ, **Annie Liu**, State University of NY at Stonybrook, and **Anil Nerode**, Cornell University (1086-68-1291)

## *AMS Special Session on Patterns in Permutations and Words, II*

**1:00 PM – 5:50 PM** **Room 14B, Mezzanine Level, San Diego Convention Center**

Organizers: **Jeffrey Liese**, California State Polytechnic University, San Luis Obispo
**Brian K. Miceli**, Trinity University
**Jeffrey Remmel**, University of California, San Diego

1:00PM (2441) *Barred and vincular pattern avoidance.*
**Bridget Tenner**, DePaul University (1086-05-1144)

1:30PM (2442) *Crucial and bicrucial permutations with respect to arithmetic monotone patterns.*
**Sergey Avgustinovich**, Sobolev Institute of Mathematics, **Sergey Kitaev***, University of Strathclyde, and **Alexandr Valyuzhenich**, Novosibirsk State University (1086-05-1203)

2:00PM (2443) *GRIM: An algorithm for the discovery of generalized permutation patterns.*
**Henning Arnor Ulfarsson***, Reykjavik University, and **Anders Claesson**, University of Strathclyde (1086-05-1831)

2:30PM (2444) *Pattern Avoidance in Rook Monoids.* Preliminary report.
**Lara K. Pudwell***, Valparaiso University, and **Daniel A. Daly**, Southeast Missouri State University (1086-05-1724)

3:00PM (2445) *A Bijection with Derangements.* Preliminary report.
**Miles Eli Jones**, Univ. of California, San Diego (1086-05-1164)

3:30PM (2446) *Parallelogram polyominoes, the sandpile model on $K_{m,n}$ and a $q,t$-Narayana polynomial.*
**Mark Dukes***, University of Strathclyde, UK, and **Yvan Le Borgne**, CNRS, University Bordeaux 1 (1086-05-1409)

4:00PM (2447) *Permuted Basement Fillings, k-ary Trees, and Watermelons.* Preliminary report.
**Janine LoBue**, University of California, San Diego (1086-05-1624)

4:30PM (2448) *The Carlitz-Scoville-Vaughan theorem and its applications to permutation enumeration.* Preliminary report.
**Ira M. Gessel**, Brandeis University (1086-05-625)

5:00PM (2449) *A $q$-analog of generalized Eulerian numbers.*
**John Shareshian**, Washington University, and **Michelle L Wachs***, University of Miami (1086-05-2812)

5:30PM (2450) *Equidistribution of some Euler-Mahonian statistics.* Preliminary report.
**Alexander Burstein**, Howard University (1086-05-2802)

## *AMS Special Session on Stochastic and Functional Analysis, II*

**1:00 PM – 6:20 PM** **Room 31B, Upper Level, San Diego Convention Center**

Organizers: **Mark Burgin**, University of California Los Angles
**Alan Krinik**, California State Polytechnic University, Pomona
**Randall Swift**, California State Polytechnic University, Pomona

1:00PM (2451) *Stochastic modeling of the accumulation of somatic mutations in cancer.*
**Cristian Tomasetti***, Harvard University & Dana-Farber Cancer Institute, **Bert Vogelstein**, Ludwig Center for Cancer Genetics and Therapeutics & Howard Hughes Medical Institute, Johns Hopkins Kimmel Cancer Center, and **Giovanni Parmigiani**, Harvard School of Public Health & Dana-Farber Cancer Institute (1086-60-964)

1:30PM (2452) *Models for the spread of Chlamydia.*
**J Gani**, Australian National University, and **Randall Swift***, California State Polytechnic University, Pomona (1086-60-1556)

2:00PM (2453) *Stochastic fixed-point equations arising in the analysis of algorithms.*
**Mariana Olvera-Cravioto***, **Ningyuan Chen**, Columbia University, and **Nelly Litvak**, University of Twente (1086-60-1739)

2:30PM (2454) *Alternative Analysis of a Renewal Problem.*
**Percy H. Brill**, University of Windsor, Ontario, Canada (1086-60-1577)

3:00PM (2455) *In defense of the much maligned Bessel function formula for transition probabilities for the single server queue.*
**Barbara Margolius**, Cleveland State University (1086-60-810)

3:30PM (2456) *Quality of Monte Carlo rare event analyzers.*
**Gerardo Rubino**, INRIA (1086-60-312)

4:00PM (2457) *Stochastic Iteration for Probability Measures on Posets.* Preliminary report.
**William A Massey**, ORFE Department / Princeton University (1086-60-2883)

4:30PM (2458) *Winding,twisting and separation properties of exiting Brownian motion.* Preliminary report.
**Mike O'Neill**, Claremont McKenna College (1086-60-1860)

► 5:00PM (2459) *Averaging the Averages of Perceived Highway Speed.*
**Jennifer M Switkes**, California State Polytechnic University, Pomona (1086-60-1074)

► 5:30PM (2460) *Social Network Clustering of Sparse Data.*
**Blake A. Hunter**, UCLA (1086-15-2386)

6:00PM (2461) *On Slowly Oscillating Periodic Solutions of Delay Differential Equations with Non-negativity Constraints.*
**David Lipshutz*** and **Ruth J. Williams**, University of California, San Diego (1086-34-558)

## *AMS Special Session on The Present and Future of Mathematics on the Web*

**1:00 PM – 5:50 PM** **Room 31A, Upper Level, San Diego Convention Center**

Organizers: **Douglas Meade**, University of South Carolina
**Philip Yasskin**, Texas A&M University

► 1:00PM (2462) *MathLex: A Tool for Presenting and Doing Mathematics on the Web.*
**Douglas B Meade***, University of South Carolina, **Philip B Yasskin** and **Matthew Barry**, Texas A&M University (1086-00-2878)

1:30PM (2463) *MathJax from an Author's Point of View.*
**Davide P. Cervone**, Union College (1086-97-2273)

► 2:00PM (2464) *The Sage Cell Server: embedding live computations in web pages.*
**Jason Grout***, **Ira Hanson**, **Alex Kramer**, **Steven Johnson** and **Byron Varberg**, Drake University (1086-00-2238)

► 2:30PM (2465) *Developing strong mathematical concepts with multi-touch.* Preliminary report.
**Carlos Castillo-Garsow*** and **Andrew G Bennett**, Kansas State University (1086-97-1761)

3:00PM (2466) *Mobile Math Apps: The Smartphone Paradigm.*
**Barbara Kaskosz***, University of Rhode Island, and **Douglas E Ensley**, Shippensburg University (1086-97-1243)

► 3:30PM (2467) *An Online Calculus Text for the iPad.*
**David A. Smith*** and **Lawrence C. Moore**, Duke University (1086-97-1148)

► 4:00PM (2468) *Rethinking calculus of several variables in the era of computers.* Preliminary report.
**Mike May***, Saint Louis University, and **Tom Banchoff**, Brown University (1086-97-1487)

► 4:30PM (2469) *Interactive Mathematics in your Hand.*
**Lila F Roberts**, Clayton State University (1086-97-1063)

► 5:00PM (2470) *Online Mathematics Pedagogy: MathLynx.* Preliminary report.
**John A. Velling***, Brooklyn College, and **Terrence Richard Blackman**, Massachusetts Institute of Technology (1086-97-882)

► 5:30PM (2471) *Emerging Standards in Electronic Math Publishing.*
**Thomas E Leathrum**, Jacksonville State Univ. (1086-00-2008)

## *AMS Special Session on Topological Combinatorics, II*

**1:00 PM – 5:50 PM** **Room 16B, Mezzanine Level, San Diego Convention Center**

Organizers: **Alexander Engström**, Aalto University
**Steven Klee**, University of California, Davis
**Matthew Stamps**, Aalto University

1:00PM (2472) *Interlacing of $h$-vectors for Schlegel diagrams.* Preliminary report.
**Anders Björner**, Royal Institute of Technology, Stockholm (1086-05-1575)

2:00PM (2473) *The combinatorics of CAT(0) cubical complexes and robotic motion planning.*
**Federico Ardila**, San Francisco State University (1086-05-1385)

2:30PM (2474) *From flag complexes to banner complexes.* Preliminary report.
**Steven Klee**, Seattle University, and **Isabella Novik***, University of Washington (1086-05-793)

3:00PM (2475) *Face numbers of Buchsbaum simplicial posets.* Preliminary report.
**Jonathan Browder**, Aalto University (1086-05-1201)

3:30PM (2476) *Realization of polyhedral complexes.*
**Igor Pak**, UCLA (1086-52-561)

4:00PM (2477) *Subset partition graphs and an approach to the Linear Hirsch conjecture.*
**Edward D. Kim**, Pohang, South Korea (1086-05-1293)

► 4:30PM (2478) *Hom polytopes and cones.*
**Tristram Bogart***, Universidad de los Andes, **Mark Contois**, Research in Motion, and **Joseph Gubeladze**, San Francisco State University (1086-05-1151)

5:00PM (2479) *Compactifying String Topology.*
**Kate Poirier**, University of California, Berkeley (1086-55-1100)

5:30PM (2480) *Topological methods in combinatorial commutative algebra.*
**Anton Dochtermann**, University of Miami (1086-05-2682)

### *AMS Special Session on Understanding Planet Earth via Reaction Diffusion Equations, II*

**1:00 PM – 5:50 PM** **Room 30C, Upper Level, San Diego Convention Center**

Organizers: **Jerome Goddard,II**, Auburn University, Montgomery
**Eun Kyung Lee**, Pusan National University, Korea
**Junping Shi**, College of William and Mary
**Ratnasingham Shivaji**, University of North Carolina, Greensboro

1:00PM (2481) *A reaction-diffusion model of the ice-albedo feedback mechanism.* **Hans G. Kaper**, Mathematics and Climate Research Network (1086-35-1118)

1:30PM (2482) *Reaction-Diffusion Equations from Energy Balance Climate Models.* **Georg Hetzer**, Auburn University, Auburn, Alabama (1086-35-1582)

2:00PM (2483) *Diffusive logistic equation with negative density dependent emigration on the boundary.* **Jerome Goddard II***, Auburn University Montgomery, and **R. Shivaji**, University of North Carolina Greensboro (1086-35-1732)

2:30PM (2484) *Clines With Partial Panmixia: Environmental Pockets And Complete Dominance.* Preliminary report. **Thomas Nagylaki**, Department of Ecology and Evolution, The University of Chicago, **Linlin Su***, Worcester Polytechnic Institute, and **Kai Zeng**, Department of Animal and Plant Sciences, University of Sheffield, UK (1086-35-2030)

3:00PM (2485) *Positive solutions for a class of p-Laplacian superlinear semipositone problems.* **Maya Chhetri***, The University of North Carolina at Greensboro, **Pavel Drabek**, University of West Bohemia, Czech Republic, and **R. Shivaji**, The University of North Carolina at Greensboro (1086-35-2419)

3:30PM (2486) *Traveling Waves of Diffusive Predator-Prey Systems: Disease Outbreak Propagation.* Preliminary report. **Xiang-Sheng Wang**, Memorial University of Newfoundland (1086-35-2279)

4:00PM (2487) *Asymptotic self-similarity in semilinear elliptic equations.* **Soohyun Bae**, Hanbat National University (1086-35-2251)

► 4:30PM (2488) *Advection-Reaction-Diffusion System from Ecological Models.* **Junping Shi***, College of William and Mary, and **Jun Zhou**, Southwestern University, Chongqing, China (1086-35-1121)

5:00PM (2489) *Integrodifference Models for Persistence in Temporally Varying Habitats.* Preliminary report. **Jon Jacobsen***, Harvey Mudd College, **Mark Lewis**, University of Alberta, and **Yu Jin**, University of Nebraska (1086-45-2506)

5:30PM (2490) *Positive Stationary Solutions and Spreading Speeds of KPP Equations in Locally Spatially Inhomogeneous Media.* **Liang Kong*** and **Wenxian Shen**, Auburn University (1086-37-1967)

### *AMS Special Session on q-series in Mathematical Physics and Combinatorics, II*

**1:00 PM – 5:50 PM** **Room 14A, Mezzanine Level, San Diego Convention Center**

Organizer: **Mourad Ismail**, University of Central Florida

1:00PM (2491) *The Bannai-Ito Scheme.* **Luc Vinet**, Centre de Recherches Mathématiques, Université de Montréal (1086-33-753)

1:30PM (2492) *Multi-indexed q-Racah and Askey-Wilson polynomials.* **Ryu Sasaki**, Yukawa institute for Theoretical Physics, Kyoto University (1086-33-394)

2:00PM (2493) *Quicksilver solutions of a q-discrete Painlevé equation.* **Nalini Joshi**, The University of Sydney (1086-33-191)

2:30PM (2494) *Jackson integral solutions of reflection quantum Knizhnik-Zamolodchikov equations.* Preliminary report. **Jasper V. Stokman**, Korteweg-de Vries Institute for Mathematics, University of Amsterdam (1086-33-629)

3:00PM (2495) *$Q$-polynomial distance-regular graphs and the double affine Hecke algebra of type $(C_1^\vee, C_1)$.* **Jae-Ho Lee**, University of Wisconsin - Madison (1086-33-43)

3:30PM (2496) *The $(q,t)$-Gaussian Process.* **Natasha Blitvić**, Vanderbilt University (1086-60-836)

► 4:00PM (2497) *Transformations for multivariate basic hypergeometric series by linearization.* **Michael J Schlosser**, University of Vienna (1086-33-1645)

4:30PM (2498) *Uniform Asymptotics of Some $q$-Orthogonal Polynomials.* Preliminary report. **Xiang-Sheng Wang**, Memorial University of Newfoundland (1086-33-2288)

5:00PM (2499) *A Koornwinder-type addition formula for parameter-free q-Racah polynomials.* **Mizan Rahman**, Carleton University, Ottawa (1086-33-587)

5:30PM (2500) *On an iteration leading to a $q$-analogue of the Digamma function.* **Christian Berg**, University of Copenhagen (1086-33-388)

### *AMS Special Session on the Mathematics of Decisions, Elections, and Games, II*

**1:00 PM – 5:50 PM** **Room 17A, Mezzanine Level, San Diego Convention Center**

Organizers: **Karl-Dieter Crisman**, Gordon College
**Michael A. Jones**, Mathematical Reviews
**Michael Orrison**, Harvey Mudd College

1:00PM (2501) *Selecting Diverse Committees with Candidates from Multiple Categories.* **Thomas C Ratliff**, Wheaton College (1086-91-1737)

1:30PM (2502) *Voting for Committees.* **Matt Davis**, Muskingum University, **Michael Orrison** and **Francis Edward Su***, Harvey Mudd College (1086-05-2310)

2:00PM (2503) *Voting games with abstention: linking completeness, weightedness and power theories.* Preliminary report. **Josep Freixas**, Technical University of Catalonia, Spain (1086-91-1324)

2:30PM (2504) *The Influence Relation for Ternary Voting Games.* **Cameron Parker**, University of San Diego (1086-91-1092)

3:00PM (2505) *A Polytopal Interpretation of the Banzhaf Power Index.* Preliminary report. **Catherine Stenson**, Juniata College (1086-52-204)

3:30PM (2506) *The median rule in judgement aggregation.* **Marcus Pivato***, Trent University, and **Klaus Nehring**, Department of Economics, University of California, Davis (1086-91-1184)

4:00PM (2507) *When Does Approval Voting Make the "Right Choices"?* **D. Marc Kilgour***, Wilfrid Laurier University, and **Steven J. Brams**, New York University (1086-91-1472)

4:30PM (2508) *SAM and Jury Decisions: Should the Supreme Court Overturn* Williams v. Florida*?* **Jeff Suzuki*** and **Guillaume Jean**, Brooklyn College (1086-91-56)

5:00PM (2509) *How to outguess your opponents.* **Anthony Mendes***, California Polytechnic State University, San Luis Obispo, and **Kent E. Morrison**, American Institute of Mathematics (1086-91-768)

5:30PM (2510) *Positional Procedures and the Prevalence of Inconsistent Outcomes.* Preliminary report. **Mark A. Krines**, University of Iowa (1086-91-1181)

### *AMS Special Session on the Theory and Applications of Differential Equations on Graphs, II*

**1:00 PM – 5:10 PM** **Room 30D, Upper Level, San Diego Convention Center**

Organizers: **Sergei Avdonin**, University of Alaska, Fairbanks
**Jonathan Bell**, University of Maryland, Baltimore County

1:00PM (2511) *Determining a Distributed Parameter for a Neuronal Cable Model on a Metric Tree Graph.* **Jonathan G. Bell**, University of Maryland Baltimore County (UMBC) (1086-35-868)

1:30PM (2512) *Inverse problems for strings with attached masses.* Preliminary report. **Julian K. Edward**, Florida International University (1086-35-1729)

2:00PM (2513) *Inverse problems for differential equations on graphs with cycles.* **Sergei Avdonin**, University of Tennessee at Chattanooga (1086-35-1924)

3:00PM (2514) *Quantum graph models of graphyne structures.* Preliminary report. **Ngoc T. Do** and **Peter Kuchment***, Texas A&M University (1086-82-2992)

3:50PM (2515) *The inverse boundary problem for two-velocity elastic networks.* **Abdon Eddy Choque Rivero**, Universidad Michoacana de San Nicolas de Hidalgo (1086-12-1356)

4:20PM (2516) *p-Poisson Equations on Infinite Graphs and p-Capacity.* **Lucio Prado**, BMCC-TheCity University of New York (1086-31-2955)

4:50PM (2517) *Dynamical Inverse Problem on a Metric Tree.* Preliminary report. **B P Belinskiy** and **J V Matthews***, University of Tennessee at Chattanooga (1086-35-1064)

### *MAA Minicourse #2: Part B*

**1:00 PM – 3:00 PM** **Room 30A, Upper Level, San Diego Convention Center**

*A game theory path to quantitative literacy.*

Presenter: **David Housman**, Goshen College

### *MAA Minicourse #9: Part B*

**1:00 PM – 3:00 PM** **Room 29C, Mezzanine Level, San Diego Convention Center**

*Shortest, quickest, or best: An introduction to the calculus of variations.*

Presenter: **Jeffrey Ehme**, Spelman College

## *MAA Minicourse #15: Part B*

**1:00 PM – 3:00 PM** **Room 29D, Mezzanine Level, San Diego Convention Center**

*WeBWorK: An open source alternative for generating and delivering online homework problems.*

Presenters: **John Travis**, Mississippi College

**Jason Aubrey**, University of Missouri

## *AMS Session on Algebraic Varieties, Moduli Spaces, and Singularities*

**1:00 PM – 5:25 PM** **Room 13, Mezzanine Level, San Diego Convention Center**

1:00PM (2518) *Some Elementary Components of the Hilbert Scheme of Points.* Preliminary report.
**Mark E. Huibregtse**, Skidmore College (1086-14-438)

1:15PM (2519) *Endomorphism algebras of Kuga-Satake varieties.*
**Evgeny Mayanskiy**, Pennsylvania State University (1086-14-2163)

► 1:30PM (2520) *Nondefective secant varieties of split varieties.* Preliminary report.
**Douglas A Torrance**, University of Idaho (1086-14-995)

► 1:45PM (2521) *The Complement of Fermat Curves in the Plane.*
**Ariel Setniker***, Western Oregon University, and **Melissa Haire**, Gordon College (1086-14-1819)

2:00PM (2522) *Algebraic Cylces, Chow Varieties, and Symmetric Polynomials.* Preliminary report.
**Jeremy B. Jankans**, University of California, Irvine (1086-14-2092)

2:15PM (2523) *The Monoid of Effective Divisor Classes on an Algebraic Surface.*
**Jeff A Rosoff**, Gustavus Adolphus College (1086-14-1460)

2:30PM (2524) *On the Secant Defectivity and the Waring's Problems.*
**Jia Wan**, University of Idaho (1086-14-2212)

► 2:45PM (2525) *Rationality of some homogeneous spaces.*
**Michel van Garrel**, Caltech (1086-14-2831)

3:00PM (2526) *Tamagawa Torsors of an Abelian Variety.*
**Saikat Biswas**, Georgia Institute of Technology (1086-11-508)

3:15PM (2527) *Cohomology Theories with Supports.*
**Joseph A Ross**, University of Southern California (1086-14-2591)

3:30PM (2528) *chern classes of logarithmic vector fields for locally quasi-homogeneous free divisors.*
**Xia Liao**, Florida State University (1086-14-2725)

3:45PM (2529) *Affine Stratification Number and Compactified Moduli Space of Curves.*
**Chitrabhanu Chaudhuri**, Northwestern University (1086-14-2294)

4:00PM (2530) *A Wonderful Embedding of the Loop Group.*
**Pablo Solis**, UC Berkeley (1086-14-418)

4:15PM (2531) *Krichever Dynamics on a Ruled Surface.* Preliminary report.
**Joshua T. Wood**, University of Georgia (1086-14-1313)

4:30PM (2532) *Gromov-Witten invariants for relatively coherent log schemes.* Preliminary report.
**Michael P Kasa**, University of California, San Diego (1086-14-2721)

4:45PM (2533) *Rank-level duality for odd orthogonal Lie algebras.*
**Swarnava Mukhopadhyay**, University of North Carolina at Chapel Hill (1086-14-1757)

5:00PM (2534) *Psuedo Vertex Operator Algebras and Conformal Flows.* Preliminary report.
**Rob Laber*** and **Geoffrey Mason**, University of California, Santa Cruz (1086-08-2522)

► 5:15PM (2535) *Rates of polarization of polar codes constructed using algebraic geometry code kernels.*
**Sarah E. Anderson*** and **Gretchen L. Matthews**, Clemson University (1086-14-2709)

## *AMS Session on Applied Mathematics and Modeling II*

**1:00 PM – 5:25 PM** **Room 30B, Upper Level, San Diego Convention Center**

1:00PM (2536) *Index and Linear Stability of the Criss-Cross Orbit.*
**Duokui Yan***, Beihang University, **Tiancheng Ouyang**, Brigham Young University, and **Xiaojun Chang**, Jilin University (1086-37-30)

► 1:15PM (2537) *Rigorous Numerical Methods for Gravitational Orbits.*
**Gregory T Minton**, Massachusetts Institute of Technology (1086-65-1626)

► 1:30PM (2538) *Molecular Radiative Cooling in Astrophysical Jet Simulations.* Preliminary report.
**Carl Gardner** and **Brance Hudzietz***, Arizona State University (1086-81-2468)

1:45PM (2539) *TALK CANCELLED: On well-posed problems in adjustment of atmospheric data.*
**Ludmila Bourchtein*** and **Andrei Bourchtein**, Pelotas State University, Brazil (1086-86-2046)

2:00PM (2540) *TALK CANCELLED: Scale-adaptive numerical scheme for atmospheric modeling.*
**Andrei Bourchtein*** and **Ludmila Bourchtein**, Pelotas State University, Brazil (1086-86-2057)

2:15PM (2541) *Hyperspectral Band Selection Using Sparse Support Vector Machines.* **Sofya Chepushtanova*** and **Michael Kirby**, Colorado State University (1086-90-1870)

2:30PM (2542) *A model for submarine granular flow with erosion.* Preliminary report. **Long H Le*** and **Jonathan Taylor**, University of Central Arkansas (1086-76-1953)

2:45PM ► (2543) *Multiscale Representations of High-Dimensional Data in Music Comparison Tasks.* Preliminary report. **K. M. Kinnaird**, Dartmouth College (1086-62-2577)

3:00PM (2544) *Error Estimation of Global Historical Data Reconstruction.* **Nancy Tafolla**, San Diego State University (1086-62-1423)

3:15PM (2545) *A Generalized Aw-Rascle-Zhang Model Fitted with Historical Traffic Data.* **Shimao Fan**, Temple University (1086-35-1218)

3:45PM ► (2546) *Heuristics in the $p$-post Tower of Hanoi Problem.* **Andrey Rukhin**, Naval Surface Warfare Center - Dahlgren Division (1086-68-1532)

4:00PM ► (2547) *Modeling a building Evacuation.* **Olive N. Mbianda***, Southern Illinois University Carbondale, and **Henry Hexmoor**, Southern Illinois University Carbondale, Department of Computer Science (1086-68-304)

4:15PM (2548) *Shape Classification Using Diffeomorphic Deformation of Contours.* **Minh P. Nguyen*** and **Yan Cao**, University of Texas at Dallas (1086-68-1884)

4:30PM (2549) *3D Graphs With Augmented Perception.* **Sam F Tannouri***, Baltimore, and **Ahlam E. Tannouri**, Morgan State University (1086-68-2893)

4:45PM ► (2550) *Decomposition of diffusion operators and application in image analysis.* Preliminary report. **Yan Wang**, University of Pennsylvania (1086-35-2888)

5:00PM ► (2551) *On Generalized Perona–Malik Diffusion Equations in Image Processing.* **V. B. Surya Prasath***, University of Missouri-Columbia, **Jose Alberto Iglesias Martinez**, Universite Paris IX Dauphine, France, and **Dmitry Vorotnikov**, University of Coimbra, Portugal (1086-35-2916)

5:15PM (2552) *A generalized 1l greedy algorithm for image reconstruction in computed tomography.* **Jiehua Zhu*** and **Xiezhang Li**, Georgia Southern University (1086-92-2969)

## *AMS Session on Ergodic Theory, Dynamics, and Harmonic Analysis*

**1:00 PM – 4:40 PM** **Room 10, Upper Level, San Diego Convention Center**

1:00PM (2553) *Pseudo-Anosov flows on graph manifolds with periodic pieces.* Preliminary report. **Russell Waller**, Florida State University (1086-37-2427)

1:15PM (2554) *Entropy of Infinite Measure-Preserving Transformations.* Preliminary report. **Rachel Louise Bayless**, University of North Carolina, Chapel Hill (1086-37-1984)

1:30PM ► (2555) *Uniformly Rigid Homeomorphisms.* Preliminary report. **Kelly Brooke Yancey**, University of Illinois at Urbana-Champaign (1086-37-245)

1:45PM (2556) *On Maps Commuting with the Flip Map.* **Nicholas Long**, Stephen F. Austin State University (1086-37-509)

2:00PM (2557) *Continuous actions of the discrete Heisenberg group on surfaces.* **Kiran Parkhe**, Northwestern University (1086-37-2652)

2:15PM (2558) *Continued Exploration of Nearly Continuous Even Kakutani Equivalence.* Preliminary report. **Bethany Diane Springer**, Colorado State University (1086-37-1438)

2:30PM ► (2559) *Boundary Value Problems on a Half Sierpinski Gasket.* **Weilin Li*** and **Robert S Strichartz**, Cornell University (1086-33-2042)

2:45PM ► (2560) *Homogenization results for Stationary Ergodic Free Boundary Problems in $\mathbb{R}^2$: Elliptic Case in Layered Form.* **Luis Caffarelli**, University of Texas-Austin, and **Betul Orcan-Ekmekci***, Rice University (1086-35-1992)

3:00PM (2561) *Regularity Properties of Solutions of a Higher Order Free Boundary Problem.* Preliminary report. **Henok Mawi**, Howard University (1086-35-2320)

3:15PM (2562) *An improvement on eigenfunction restriction estimates for compact boundaryless Riemannian manifolds with nonpositive sectional curvature.* Preliminary report. **Xuehua Chen**, Johns Hopkins University (1086-35-64)

3:30PM (2563) *Analysis of the Lawrence-Doniach Model in Perpendicular Applied Fields.* Preliminary report. **Patricia E. Bauman** and **Guanying Peng***, Purdue University (1086-35-1907)

3:45PM (2564) *Separation of a Lower Dimensional Free Boundary in a Two Phase Problem.* **Mark A Allen**, Purdue University (1086-49-1384)

4:00PM ► (2565) *On a First-Order Semipositone Discrete Fractional Boundary Value Problem.* **Christopher S. Goodrich**, Creighton Preparatory School (1086-39-2881)

4:15PM (2566) *Positive radial solutions for a class of singular p-Laplacian system in a ball.* **Jahmario Williams*** and **Hai Dang**, Mississippi State University (1086-35-776)

4:30PM (2567) *Smallness and Comparison Properties in Certain Topological Dynamical Systems.* Preliminary report. **Julian M Buck**, Francis Marion University (1086-46-1540)

## *AMS Session on Graph Theory II*

**1:00 PM – 5:40 PM** **Room 19, Mezzanine Level, San Diego Convention Center**

1:00PM (2568) *Oriented Gain Graphs, Line Graphs and Eigenvalues.* Preliminary report. **Nathan H Reff**, Alfred University (1086-05-2345)

1:15PM (2569) *Edge-disjoint spanning trees and eigenvalues in graphs.* **Xiaofeng Gu**, West Virginia University (1086-05-1287)

1:30PM ► (2570) *A coil $G$ on $n$ vertices is four-colorable.* Preliminary report. **Nancy Eaton**, **Adam Gilbert** and **A. M. Heissan***, University of Rhode Island (1086-05-2101)

1:45PM (2571) *Threshold Digraphs.* **James Michael Shook***, **Brian Cloteaux**, **Elizabeth Moseman**, National Institute of Standards and Technology, and **M Drew LaMar**, The College of William and Mary (1086-05-2626)

2:00PM ► (2572) *TALK CANCELLED: A generalization of optimality of vertex rankings on infinite graphs.* **Bonnie C. Jacob**, National Technical Institute for the Deaf at Rochester Institute of Technology (1086-05-2684)

2:15PM ► (2573) *TALK CANCELLED: Rank number of some graph Cartesian products.* **Jobby Jacob**, Rochester Institute of Technology (1086-05-2691)

2:30PM ► (2574) *Graph decomposition and parity.* **Amanda Redlich**, Rutgers University (1086-05-2947)

2:45PM (2575) *The Logic of Graph Decompositions.* Preliminary report. **Stephen Flood**, Pennsylvania State University (1086-03-2063)

3:00PM (2576) *A Twisted Topological $k$-Graph and New Aperiodicity Conditions.* **Sarah E. Wright**, College of the Holy Cross (1086-46-2552)

3:15PM ► (2577) *The Cardinality of Minimal Not Near Planar Graphs.* Preliminary report. **Kwang Ju Choi*** and **Bogdan Oporowski**, Louisiana State University (1086-05-1874)

3:30PM ► (2578) *Path Decompositions of the Kneser Graph.* **T. R. Whitt*** and **C. A. Rodger**, Auburn University (1086-05-2975)

3:45PM ► (2579) *Identifying Codes in the Product of Cliques.* **Wayne Goddard**, Clemson University, **Douglas Rall**, Furman University, and **Kirsti Wash***, Clemson University (1086-05-1132)

4:00PM (2580) *Quest for Negative Dependency Graphs.* **Linyuan Lu**, **Austin Mohr*** and **László Székely**, University of South Carolina Columbia (1086-05-63)

4:15PM (2581) *Asymptotic Automorphism Groups of Circulant Graphs and Digraphs.* Preliminary report. **Soumya Bhoumik***, **Edward Dobson**, Mississippi State University, and **Joy Morris**, University of Lethbridge (1086-05-763)

4:30PM ► (2582) *Diameters of groups generated by transposition trees.* **Benjamin Jerome Kraft**, Massachusetts Institute of Technology (1086-05-1015)

4:45PM ► (2583) *Pancyclicity in Finite Projective Planes.* **Oscar Vega**, California State University, Fresno (1086-05-1808)

5:00PM (2584) *Group Connectivity of Ryjáček's closure of claw-free graphs.* **Senmei Yao**, Marian University in Fond du Lac (1086-05-2841)

5:15PM ► (2585) *Sharper Lower Bounds in the Maximum Degree and Diameter Bounded Subgraph Problem in the Mesh.* **Sachi Hashimoto**, University of Chicago (1086-05-1040)

5:30PM ► (2586) *Sunburst Graphs and Independent Sets.* **Leslie Horton**, AWM (1086-11-275)

## *AMS Session on Groups and Semigroups*

**1:00 PM – 4:55 PM** **Room 12, Mezzanine Level, San Diego Convention Center**

1:00PM ► (2587) *One Hundred Years of Infinite Group Theory: The Legacy of Max Dehn.* **David E. Peifer**, UNC Asheville (1086-20-1813)

1:15PM (2588) *Cannon–Thurston Maps and Subgroup Distortion.* **Owen Thomas Baker**, McMaster University (1086-20-2392)

1:30PM (2589) *The Automorphism Group of the Hyperelliptic Torelli Group.* **Leah Childers**, Pittsburg State University (1086-20-2007)

1:45PM (2590) *The dual groups of weakened group topologies for $\mathbb{R}^n$.* **T. Christine Stevens**, Saint Louis University (1086-22-2837)

2:00PM (2591) *Actions of Right Angled Coxeter Groups.* Preliminary report. **Yulan Qing**, Tufts University (1086-20-2048)

2:15PM (2592) *The word problem in the automorphism groups of right-angled Artin groups is in P.* Preliminary report.
**Carrie A. Whittle**, University of Arkansas (1086-20-2660)

2:30PM (2593) *TALK CANCELLED: Mackey functors and sharpness for fusion systems.* Preliminary report.
**Adam M Glesser**, California State University Fullerton (1086-20-2199)

2:45PM (2594) *Algebraically Determined Semidirect Products.*
**We'am M. Jasim***, Texas A&M International University, and **Robert R. Kallman**, University of North Texas (1086-22-8)

3:00PM (2595) *The free metabelian product of free nilpotent groups.* Preliminary report.
**Margaret H. Dean**, CUNY/BMCC (1086-20-2735)

3:15PM (2596) *A non-embedding result for Thompson's Group V.* Preliminary report.
**Nathan A Corwin**, University of Nebraska - Lincoln (1086-20-2583)

► 3:30PM (2597) *Length of Families of Elements in Thompson's Groups $F$ and $T$.*
**David C. McKlveen**, University of Wisconsin - Stout, and **Sharif Younes***, Bowdoin College (1086-20-2559)

3:45PM (2598) *Partial decomposition bases and Warfield groups.* Preliminary report.
**Carol Jacoby**, Jacoby Consulting, and **Peter Loth***, Sacred Heart University (1086-20-364)

4:00PM (2599) *Homology of Group Von Neumann Algebras.*
**Wade Mattox**, Salem College (1086-20-1051)

4:15PM (2600) *Longer chains of idempotents in $\beta G$.*
**Neil Hindman***, Howard University, **Dona Strauss**, University of Leeds, and **Yevhen Zelenyuk**, University of the Witwatersrand (1086-22-544)

4:30PM (2601) *More differences between the right and left topological extensions of a semigroup operation to $\beta S$.* Preliminary report.
**Monique A. Peters**, Howard University (1086-22-643)

4:45PM (2602) *Chains of idempotents in the Stone-Cech compactification of free semigroups.* Preliminary report.
**Kourtney Fulton**, Howard University (1086-22-780)

## *AMS Session on Undergraduate Research in Combinatorics and Number Theory*

**1:00 PM – 5:40 PM** **Room 18, Mezzanine Level, San Diego Convention Center**

► 1:00PM (2603) *The Edge Coloring Game on Extended Stars.*
**Luke F Naftz***, University of Colorado Denver, Linfield College, and **Tyler Hays**, University of California Berkeley, Linfield College (1086-05-324)

► 1:15PM (2604) *Relaxed Coloring Games on Complete Multipartite Graphs.*
**Alexander H. Sistko***, Bradley University, **Lawrence Barrett**, University of Rochester, **John Portin**, Linfield College, and **Susan Rufai**, McMinville School District (1086-05-405)

► 1:30PM (2605) *The Edge-balance Index Set of Halin Graph of Double Stars.*
**Andrea Monterotti*** and **Hsin-hao Su**, Stonehill College (1086-05-220)

► 1:45PM (2606) *The Edge-balance Index Set of Two and Three Level Wheels.*
**Ryan Sullivan*** and **Hsin-hao Su**, Stonehill College (1086-05-221)

2:00PM (2607) *A New Graceful Labeling for Pendant Graphs.*
**Alessandra K Graf**, Northern Arizona University (1086-05-2480)

► 2:15PM (2608) *On decomposing $\lambda$-fold complete graphs into Stanton 4-cycles.*
**Saad El-Zanati**, Illinois State University, **Adam Hakes***, Purdue University, **Joel Jeffries**, University of Central Missouri, **Elizabeth Mastalio**, University of Northern Iowa, and **Jordan Torf**, Illinois State University (1086-05-2183)

► 2:30PM (2609) *Tree decompositions of regular graphs and multigraphs.* Preliminary report.
**Saad I El-Zanati**, Illinois State University, **Marie Ermete***, Central Michigan Umiversity, and **James Hasty**, Bismarck-Henning High School (1086-05-2236)

► 2:45PM (2610) *Trees of Irreducible Numerical Semigroups.* Preliminary report.
**Jose Martinez**, Northern Arizona University (1086-11-2913)

► 3:00PM (2611) *The Deletion-Insertion Model Applied to the Genome Rearrangement Problem.* Preliminary report.
**Noah Williams**, University of Wisconsin-Eau Claire (1086-05-2681)

► 3:15PM (2612) *Extensions of Finite Distributive Lattices using $Min(L)$.* Preliminary report.
**Tanya Nichole Riston**, Penn State University-Erie, The Behrend College (1086-06-2759)

3:30PM (2613) *A New Proof of the Lecture Hall Theorem.*
**Alexander Mikhail Komarinski***, Arizona State University, and **Meredith Harris**, Clemson University (1086-05-2806)

► 3:45PM (2614) *New Results on the Coxeter Group Structure of Lecture Hall Partitions.* Preliminary report.
**Lara Bradford***, Bard College, and **Carly Matson**, University of Virginia (1086-05-1468)

► 4:00PM (2615) *Generalized Sum and Difference Sets and $d$-dimensional Modular Hyperbolas.*
**Victor D Luo***, Williams College, **Amanda Bower**, University of Michigan-Dearborn, and **Steven J Miller**, Williams College (1086-11-909)

4:15PM ► (2616) *Strings of Special Primes in Arithmetic Progressions.*
**Keenan Monks***, Harvard University, **Sarah Peluse**, University of Chicago, and **Lynnelle Ye**, Stanford University (1086-11-2749)

4:30PM ► (2617) *Galois 2-adic Fields of Degree 12.*
**Christopher R Shill*** and **Chad Awtrey**, Elon University (1086-11-1778)

4:45PM ► (2618) *Interval-Vector Polytopes.*
**Jessica C De Silva**, California State University, Stanislaus, **Gabriel D Dorfsman-Hopkins***, Dartmouth College, and **Joseph T Pruitt**, California State University, Long Beach (1086-05-1606)

5:00PM ► (2619) *An Infinite Family of Perfect Parallelepipeds.*
**Benjamin D. Sokolowsky***, Bucknell University, **Amy G. VanHooft**, The College at Brockport, State University of New York, **Rachel M. Volkert**, University of Northern Iowa, and **Clifford A. Reiter**, Lafayette College (1086-11-632)

5:15PM (2620) *Closed Formulas for Folding Some Cases of the Origami Miura Map Fold.*
**Jessica E Ginepro**, Western New England University (1086-05-1585)

5:30PM ► (2621) *On Mod(3) Edge-magic Cubic Graphs.*
**Matt Tardiff*** and **Hsin-hao Su**, Stonehill College (1086-05-222)

## *AMS Session on Undergraduate Research in Mathematical Biology and Modeling*

**1:00 PM – 5:10 PM** **Room 30E, Upper Level, San Diego Convention Center**

1:00PM ► (2622) *Stochastic Effects on the Outcome of Species in Competition.* Preliminary report.
**Matthew Cattivera***, **Seth Haney** and **Adam Siepielski**, University of San Diego (1086-92-2056)

1:15PM ► (2623) *Ducking Responsibility: How Laziness Pays Off in Arctic Duck Populations.* Preliminary report.
**Alexis Sparko*** and **Yu Jin**, Smith College (1086-92-2146)

1:30PM ► (2624) *Cost-Benefit Analysis of Kleptoparasitic Interactions.* Preliminary report.
**David Gamble Sykes*** and **Jan Rychtar**, University of North Carolina at Greensboro (1086-92-2252)

1:45PM (2625) *Modeling Fitness of Onthophagus taurus: The Effects of Density on Mating Success.*
**Theresa Marie Dalmut*** and **Emily Cate**, James Madison University (1086-92-2834)

2:00PM ► (2626) *Optimal Strategies for Arrival and Departure of Male Onthophagus taurus.* Preliminary report.
**Lauren M. Taylor*** and **Jennifer E. Roth**, James Madison University (1086-92-2596)

2:15PM ► (2627) *Accurately Modeling Zooplankton Mortality Rates.* Preliminary report.
**Catherine King*** and **Kate Shipman**, College of William and Mary (1086-92-2799)

2:30PM ► (2628) *Modeling Zebrafish Spinal Cord Development.* Preliminary report.
**Shalla Hanson*** and **Kelly Zaccheo**, Smith College (1086-92-2241)

2:45PM ► (2629) *Modeling the Effect of Alcohol on Glucose Regulation.* Preliminary report.
**Joseph Bulatowicz***, **Eric Ledesma**, **Zhixiong Chen** and **Yi Ding**, New Jersey City University (1086-34-1820)

3:00PM ► (2630) *Urban Lead and Its Health Consequences on Children: A Mathematical Model.* Preliminary report.
**Andrew Getz**, **Bernard R Lipat***, **Zhixiong Chen** and **Yi Ding**, New Jersey City University (1086-35-958)

3:15PM ► (2631) *Modeling Glioblastoma Growth Using a Poisson Process.* Preliminary report.
**Michael Clare Manning**, Arizona State University (1086-03-2791)

3:30PM ► (2632) *The Mathematical Modeling of Multifocal Tumors.*
**Ashley L Webber**, Arizona State University (1086-60-1920)

3:45PM ► (2633) *A multi-scale approach to investigate invasion characteristics of heterogeneous glial cells and its implications on the overall growth kinetics of glioma progression.* Preliminary report.
**Joseph Juliano***, College of Liberal Arts and Sciences, Arizona State University, **Andrea Hawkins-Daarud**, **Russ Rockne**, Department of Pathology, University of Washington, **Peter Canoll**, Department of Pathology and Cell Biology, Columbia University, and **Kristin Swanson**, Department of Pathology, University of Washington (1086-92-2863)

4:00PM The talk by Alison Margolskee has been moved to the AMS Session on Mathematical Biology at 8:00 a.m. on Thursday in slot #822.

4:15PM (2634) *Secondary Aneurysm Formation Due to the Effects of a Primary Aneurysm.*
**Bruno Gabriel Beltran***, Louisiana State University, **Daniel Burkow**, Arizona State University, **Courtney Bruce**, Department of Biological Sciences, Arizona State University, and **Sarah Erickson**, Western Washington University (1086-76-2215)

4:30PM ► (2635) *Salmonella Outbreaks: Assessing Causes and Trends.*
**Sarah Rachell Salter***, Kean University, **Amanda Luby**, College of St.Benedict, and **Kevin Torres**, University of Puerto Rico (1086-62-949)

4:45PM ► (2636) *Survival Analysis on Patients with Chronic Hepatitis B.*
**Lin Han**, Stony Brook University, and **James R. Stinecipher***, California State University, Fresno (1086-62-202)

5:00PM ► (2637) *A Stochastic, Spatially-Structured Model for Metapopulation Dynamics with Applications to the American Pika (Ochotona princeps).*
**Easton R. White***, Arizona State University/ Scottsdale Community College, and **John D. Nagy**, Scottsdale Community College/Arizona State University (1086-92-2887)

### *MAA Session on Communicating Mathematics, IV*

**1:00 PM – 4:55 PM** **Room 33A, Upper Level, San Diego Convention Center**

Organizers: **Brian Katz**, Augustana College
**Elizabeth Thoren**, University of California Santa Barbara

1:00PM (2638) *Capstone Communication Strategies.*
**Jeffery T. McLean**, University of St. Thomas (1086-D1-1257)

1:20PM ► (2639) *Writing Mathematics: Creating an MCM-Based Capstone Course.*
**Randall E Cone**, Virginia Military Institute (1086-D1-1062)

1:40PM (2640) *$R^4S$: Reading, 'Riting, Rewriting, Rehearsing and Speaking.*
**Thomas Q Sibley**, St. John's University/College of St. Benedict (1086-D1-959)

2:00PM ► (2641) *Calculus for Dummies: A Student Writing Project.* Preliminary report.
**Audrey Malagon**, Virginia Wesleyan College (1086-D1-315)

2:20PM (2642) *Let Students Talk and Write Their Mathematics Ideas.*
**Su Liang**, California State University (San Bernardino) (1086-D1-605)

2:40PM ► (2643) *Improving Proof Writing Through Peer Review.* Preliminary report.
**Rebecca L. Jayne**, Washington College (1086-D1-2496)

3:00PM (2644) *Intensive Experiences for Undergraduate Mathematics.*
**Suzanne Sumner**, University of Mary Washington (1086-D1-1947)

3:20PM (2645) *From "A Letter Home" to Senior Capstone: Writing Across the Major at Hood College.*
**Ann C. Stewart*** and **Jill Bigley Dunham**, Hood College (1086-D1-2451)

3:40PM (2646) *Writing and Mathematics.*
**Hayden Schaeffer**, University of California, Los Angeles (1086-D1-1901)

4:00PM ► (2647) *How can we help students "do" mathematics? Writing activities to challenge thought and elicit mathematical understanding.* Preliminary report.
**Yelena Baishanski*** and **Reem Jaafar**, City University of New York - LaGuardia Community College (1086-D1-2847)

4:20PM ► (2648) *Writing in Calculus I: Is It Derivative or Integral?*
**Rebekah B. Johnson Yates**, Houghton College (1086-D1-2510)

4:40PM ► (2649) *Communicating Criticism: Helping students learn to critique mathematical writing and to improve their writing with criticism received.* Preliminary report.
**Kimberly J Presser**, Shippensburg University (1086-D1-754)

### *MAA Session on Developmental Mathematics Education, II*

**1:00 PM – 3:35 PM** **Room 4, Upper Level, San Diego Convention Center**

Organizers: **J. Winston Crawley**, Shippensburg University
**Kimberly Presser**, Shippensburg University

1:00PM ► (2650) *Course Redesign: Rethinking Instruction and Assessment in Developemental Mathematics by Taking Advantage of Computer Technology.*
**Ward E. Canfield**, National Louis University (1086-E1-397)

1:20PM ► (2651) *FastTrack: A Developmental Mathematics Summer Hybrid Program.* Preliminary report.
**Maggie Lee McHugh*** and **Jennifer J. Kosiak**, University of Wisconsin-La Crosse (1086-E1-460)

1:40PM ► (2652) *Inquiry-Based Learning in a Developmental Mathematics Course.* Preliminary report.
**Victor I. Piercey**, Ferris State University (1086-E1-727)

2:00PM (2653) *Redesign for Non-Stop Learning.*
**Mary Kay Abbey**, Montgomery College, MD (1086-E1-548)

2:20PM (2654) *New Strategies in Teaching Developmental Mathematics.* Preliminary report.
**Zhixiong Chen*** and **Yi Ding**, New Jersey City University (1086-E1-987)

2:40PM ► (2655) *Statway: What worked well and how we're improving.*
**Mary R Parker**, Austin Community College (1086-E1-2442)

3:00PM (2656) *Understanding and Addressing Mathematical Shame.*
**Angela G Vierling-Claassen**, Lesley University (1086-E1-2309)

3:20PM ► (2657) *Shortening the Path: Condensing the Developmental Sequence into a Single Semester.*
**Paul M Musial**, Chicago State University (1086-E1-2121)

### *MAA Session on Preparing Elementary School Mathematics Specialists*

**1:00 PM – 3:35 PM** **Room 6C, Upper Level, San Diego Convention Center**

Organizers: **Steve Morics**, University of Redlands

**Klay T. Kruczek**, Southern Connecticut State University

► 1:00PM (2658) *Using the Intel Math Course to Train and Support K-8 Mathematics Specialists.* Preliminary report.
**Cynthia Anhalt*** and **Taliesin Sutton**, University of Arizona (1086-M1-480)

► 1:20PM (2659) *Elementary Mathematics Specialist Program at the University of Louisiana at Lafayette – Part I.* Preliminary report.
**Kathleen D. Lopez***, **Peter A. Sheppard**, **Patricia W. Beaulieu** and **Christina Eubanks-Turner**, University of Louisiana at Lafayette (1086-M1-2808)

► 1:40PM (2660) *Elementary Mathematics Specialist Program at the University of Louisiana at Lafayette – Part II.* Preliminary report.
**Patricia W. Beaulieu***, **Peter A. Sheppard**, **Christina Eubanks-Turner** and **Kathleen D. Lopez**, University of Louisiana at Lafayette (1086-M1-2817)

2:00PM (2661) *Big Ideas in Mathematics: An Inquiry-Based Program to Prepare Elementary Math Specialists.*
**Jennifer E. Szydlik**, University of Wisconsin Oshkosh (1086-M1-731)

► 2:20PM (2662) *North Carolina Elementary Mathematics Add-On License Program.* Preliminary report.
**Carol E. Seaman***, UNC Greensboro, and **David K. Pugalee**, UNC Charlotte (1086-M1-719)

2:40PM (2663) *Filling in the Gaps: Increasing Content Knowledge and Pedagogy of Elementary Teachers of Mathematics.* Preliminary report.
**Rebecca Ortiz***, **Carol Williams** and **Magdalena Pando**, Texas Tech University (1086-M1-2949)

► 3:00PM (2664) *Upper division math courses designed specifically for the undergraduate per-service middle school mathematics specialists.*
**Gary A. Harris**, Texas Tech University (1086-M1-589)

► 3:20PM (2665) *Understanding Changes in Teaching Practice After Content-Based Professional Development.* Preliminary report.
**Priya Vinata Prasad**, University of Arizona (1086-M1-2009)

### *MAA Session on Touch It, Feel It, Learn It: Tactile Learning Activities in the Undergraduate Mathematics Classroom, III*

**1:00 PM – 3:35 PM** **Room 7A, Upper Level, San Diego Convention Center**

Organizers: **Jessica M. Libertini**, University of Rhode Island

**Julie Barnes**, Western Carolina University

► 1:00PM (2666) *Ball toss, crackers & cheese, and line dancing: Concrete ways to help students understand functions in precalculus.* Preliminary report.
**Julie Barnes**, Western Carolina University (1086-P5-1943)

► 1:20PM (2667) *An Open-Ended Problem: Hexagon Numbers.*
**John C Mayer**, University of Alabama at Birmingham (1086-P5-902)

► 1:40PM (2668) *Graph (no longer just) Theory.*
**Jill Bigley Dunham**, Hood College (1086-P5-2740)

2:00PM (2669) *A Hands-On Introduction to Knot Theory.*
**Hannah R Robbins**, Roanoke College (1086-P5-782)

► 2:20PM (2670) *Finding Groups in a (New) Color Cube Puzzle.* Preliminary report.
**Justin A. Brown*** and **Dale K. Hathaway**, Olivet Nazarene University (1086-P5-261)

► 2:40PM (2671) *Hand-on coding theory: Can you hear me now?*
**David Clark**, University of Minnesota (1086-P5-2045)

► 3:00PM (2672) *Building and Feeling Confidence Intervals.*
**Therese Shelton**, Southwestern University, Georgetown, TX (1086-P5-2272)

3:20PM (2673) *Painting with light: visualizing mathematical concepts using long-exposure photography.* Preliminary report.
**Johann A. Thiel**, United States Military Academy (1086-P5-2125)

### *MAA Session on Transition from High School to College: Alternative Pathways*

**1:00 PM – 5:50 PM** **Room 2, Upper Level, San Diego Convention Center**

Organizer: **Gail Burrill**, Michigan State University

► 1:00PM (2674) *Selected Results from the MAA Calculus Study.* Preliminary report.
**David Bressoud**, Macalester College (1086-Q1-962)

► 1:30PM (2675) *Physics Education Research: tools for educational transformation at a critical time.*
**Noah D Finkelstein**, Department of Physics/University of Colorado Boulder (1086-Q1-2122)

2:00PM (2676) *The New Mathways Project: A Statewide Initiative to redesign the pathways to and through gateway college mathematics courses in Texas.* Preliminary report.
**Uri Treisman**, University of Texas at Austin (1086-Q1-2072)

► 2:30PM (2677) *Quantway and Statway: Successful Pathways To and Through a College Level Math Course.*
**Karon Klipple*** and **Cinnamon Hillyard**, Carnegie Foundation for the Advancement of Teaching (1086-Q1-2084)

3:00PM (2678) *Abstract Algebra for High School Teachers.*
**Al Cuoco***, Center for Mathematics Education, EDC, and **Joseph Rotman**, University of Illinois at Urbana-Champaign (1086-Q1-1054)

3:30PM (2679) *Alternative Pathways–Entry Level Mathematics Options.*
**Roxy Peck**, Cal Poly, San Luis Obispo (1086-Q1-2586)

► 4:00PM (2680) *Math Jam! Building Community and Improving Math Placement at Cañada College.*
**Michael Hoffman*** and **Amanda Pitts**, Cañada College (1086-Q1-2898)

► 4:30PM (2681) *Calculus is Hard, Change is Harder.*
**Daniel T Kaplan**, Macalester College (1086-Q1-2004)

5:00PM (2682) *Transition to College Mathematics and Statistics for Non-STEM Students.*
**Christian Hirsch**, Western Michigan University (1086-Q1-777)

► 5:30PM (2683) *Advanced Quantitative Reasoning: Mathematics, Statistics, and Modeling for College Readiness and Informed Citizenship.*
**Gregory D. Foley**, Ohio University (1086-Q1-1173)

## *MAA Session on Trends in Undergraduate Mathematical Biology Education, II*

**1:00 PM – 2:35 PM** **Room 3, Upper Level, San Diego Convention Center**

Organizer: **Timothy D. Comar**, Benedictine University

1:00PM (2684) *Rosalind: Free Bioinformatics Education via Online Introductory Programming.*
**Phillip E. C. Compeau***, University of California-San Diego, and **Nikolay Vyahhi**, St. Petersburg Academic University (1086-Q5-2842)

► 1:20PM (2685) *"Mathematical Concepts and Methods in Modern Biology: Using Modern Discrete Models" - A Collection of Undergraduate Mathematical Biology Modules.*
**Raina Robeva**, Sweet Briar College (1086-Q5-2793)

► 1:40PM (2686) *Undergraduate Research in Gene Regulatory Networks.*
**Dan Hrozencik**, Chicago State University (1086-Q5-1986)

► 2:00PM (2687) *Turn down the volume, turn up the noise: a course module in discrete stochastic modeling and simulation.*
**Kevin R. Sanft**, Dept. of Mathematics, Statistics, and Computer Science and Center for Interdisciplinary Research, St. Olaf College (1086-Q5-2191)

2:20PM (2688) *Help, my student doesn't want to code! Two biomath research projects that gently introduce programming concepts in a GUI-based modeling environment.*
**Robert J Rovetti**, Loyola Marymount University (1086-Q5-2192)

## *MAA General Contributed Paper Session: Assorted Topics, I*

**1:00 PM – 5:25 PM** **Room 5B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College

**Gizem Karaali**, Pomona College

**Douglas Norton**, Villanova University

Moderators: **Abdramane Serme**, CUNY

**Zhanbo Yang**, University of the Incarnate Word

► 1:00PM (2689) *Publishing math texts directly to the web–some fantastic open source tools.*
**Albert W Schueller**, Whitman College (1086-VR-821)

1:15PM (2690) *Communicating Mathematically Through Podcasts.*
**Sherrie Serros***, University of Wisconsin - Eau Claire, **Rebecca Ledocq**, University of Wisconsin - LaCrosse, and **Erick Hofacker**, University of Wisconsin - River Falls (1086-VR-667)

► 1:30PM (2691) *Does the Ability to Purchase a Week's Worth of Groceries for less than One Dollar Influence the Chance that a Student will make an "Innumeracy Type" Statistical Error?*
**Larry Wayne Lewis**, Mid-Continent University (1086-VR-2141)

► 1:45PM (2692) *What do you think of .999...? Inviting discussion with open ended questions.* Preliminary report.
**Brie A. Finegold**, University of Arizona (1086-VR-739)

► 2:00PM (2693) *Students communicating mathematics to a broader audience: using vertical connections in mathematics and school district partnerships as a vehicle.*
**Minerva Cordero**, **James Epperson** and **Theresa Jorgensen***, University of Texas at Arlington (1086-VR-2584)

2:15PM ► (2694) *Teaching a Course in Mathematical Communication for Prospective High School Mathematics Teachers, Preliminary Report.* Preliminary report. **Michael D Bice*** and **Heather A Coughlin**, California State University, Stanislaus (1086-VR-2629)

2:30PM ► (2695) *Dynamical Systems in the Sixth Grade Science Classroom.* Preliminary report. **Scott R Kaschner**, Indiana University Purdue University Indianapolis (1086-VR-1264)

2:45PM ► (2696) *Can you have a Math Club at a small community college? Yes you can, but....* **Christina L Arenas***, **Jose J Covarrubias** and **Michael Hoffman**, Cañada College, Redwood City, CA (1086-VR-1296)

3:00PM ► (2697) *Students Mentoring (by faculty) Programs in a Community College.* **Abdramane Serme**, The City University of New York (CUNY/BMCC) (1086-VR-2917)

3:15PM ► (2698) *Learning To Cooperate - one researcher's experiences building effective cooperative groups with students.* Preliminary report. **Martha H. Byrne**, University of New Mexico (1086-VR-1195)

3:30PM ► (2699) *Using Undergraduate Learning Assistants in Mathematics and Statistics.* **Sandra G Johnson***, **Melissa B Hanzsek-Brill** and **Sonja Goerdt**, St. Cloud State University (1086-VR-1160)

3:45PM ► (2700) *A Mathematical Tour in South America.* Preliminary report. **Paul A Loomis**, Bloomsburg University (1086-VR-1403)

4:00PM ► (2701) *Comparative Study of the National Math Curriculum with Curricula from Four Nations.* **Ulrich Wilms**, Piedmont College (1086-VR-2377)

4:15PM Break.

4:30PM ► (2702) *What can I do with a Bachelor's degree in math? Five basic career fields for mathematics majors.* Preliminary report. **Paul Bialek**, Trinity International University (1086-VR-2491)

4:45PM ► (2703) *Effects of the Top Ten Percent Law in Texas.* **Bryan Nankervis**, Texas State University-San Marcos (1086-VR-718)

5:00PM (2704) *The Support of the International Mathematics Community to Hua Loo-keng.* **Jean W. Richard*** and **Abdramane Serme**, The City University of New York (CUNY/BMCC) (1086-VR-2723)

5:15PM (2705) *Mathematics, Music and Biology: the "We" of Empathy.* **Rosanna Iembo***, University of Calabria, Italy, **Irene Iaccarino**, Music School, Italy, and **Michele Bernasconi**, University of Zurich, Switzerland (1086-VR-829)

## *MAA General Contributed Paper Session: Mathematics Education, III*

**1:00 PM – 5:10 PM** **Room 33C, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Lipika Deka**, California State University, Monterrey Bay
**Benjamin Atchison**, Framingham State University

1:00PM ► (2706) *Relearning algebra: Transitioning to learning mathematics with meaning.* Preliminary report. **Kirsty Eisenhart**, Western Michigan University (1086-VE-2800)

1:15PM (2707) *Adapt or Die: A 1.5 Year Quest for an Engaging Course in College Algebra.* **Benjamin Atchison**, Framingham State University (1086-VE-2414)

1:30PM ► (2708) *Just enough algebra – a new approach to preparing college students.* **Suzanne I Doree**, Augsburg College (1086-VE-1640)

1:45PM ► (2709) *Preparing Students for Success in Algebra.* **Steven R. Lay**, Lee University (1086-VE-1035)

2:00PM ► (2710) *New Educational Program in Mathematics for STEM Majors, Part II.* Preliminary report. **Andrew Bucki**, Langston University, and **Abebaw Tadesse***, Langston University (1086-VE-1745)

2:15PM ► (2711) *Fostering habits of mind for students in developmental mathematics courses through Early Alert System.* Preliminary report. **Lipika Deka**, California State University-Monterey Bay (1086-VE-2920)

2:30PM ► (2712) *HR-PAL: A partnership to enhance Algebra performance.* **Jale F. Akyurtlu***, **Otsebele Nare**, **Shari Wiley**, **Anne Pierce** and **Gertrude Henry**, Hampton University (1086-VE-2655)

2:45PM ► (2713) *Students' difficulties for studying undergraduate mathematics.* Preliminary report. **Jacob Sloujitel**, Globe Institute of Technology, New York (1086-VE-2436)

3:00PM (2714) *Engaging Undergraduate Nursing and Health Science Students in Advanced Statistics.* **Darlene M Olsen**, Norwich University (1086-VE-2267)

3:15PM ► (2715) *Sandlot Stats:Learning Statistics with Baseball.* **Stanley Rothman**, Quinnipiac University (1086-VE-89)

3:30PM (2716) *Course Redesign in Elementary Statistics at Lincoln University.*
**Qingxia Li*** and **Mara Aruguete**, Lincoln University (1086-VE-292)

3:45PM ► (2717) *The Geometric Analysis of Shark Teeth.* Preliminary report.
**Daniel Huber**, **Leslie Jones*** and **Rebecca Waggett**, University of Tampa (1086-VE-33)

4:00PM ► (2718) *Math Education of Deaf and Hard-of-Hearing Students - A Silent Crisis?* Preliminary report.
**Suriza Van der Sandt***, **Cathy Liebars** and **Shilpa Nandwani**, The College of New Jersey (1086-VE-2429)

4:15PM ► (2719) *Data-mining to track student attitudes.*
**Andrew J Cousino**, Kansas State University (1086-VE-2520)

4:30PM ► (2720) *Survey on College Students Experience in their first College Mathematics Course.*
**Kevin J. Haertzen**, University of Wisconsin-Platteville (1086-VE-2540)

4:45PM ► (2721) *How Can Cardiovascular Exercise Change the Brain and Improve the Learning of Mathematics?* Preliminary report.
**Alexander G. Atwood**, SUNY Suffolk County Community College (1086-VE-2771)

5:00PM (2722) *Technology in Math Classes.*
**Ping Wang*** and **Mike Gallis**, Penn State University (1086-VE-2964)

## *SIAM Minisymposium on Perspectives from Industry*

**1:00 PM – 6:00 PM** **Room 11A, Upper Level, San Diego Convention Center**

Organizers: **Luminita Vese**, University of California, Los Angeles
**Li-Tien Cheng**, University of California, San Diego
**Zuhair Nashed**, University of Central Florida

1:00PM ► (2723) *Two-dimensional shape analysis: Case studies from industry.*
**Kathryn Leonard**, Cal State Channel Islands (1086-52-1602)

1:30PM (2724) *Hydration Free Energy from a Variational Implicit Solvent Model.*
**J. Che***, **Z. Guo**, Genomics Institute of the Novartis Research Foundation, **B. Li**, **L. Cheng**, Univ. of California, San Diego, and **J. Dzubiella**, Humboldt University of Berlin (1086-92-1937)

2:00PM ► (2725) *Computational image analysis methods for modern cardiac imaging data.*
**Piotr Slomka**, Artificial Intelligence In Medicine Program/Department of Imaging Cedars-Sinai Medical Center (1086-92-2984)

2:30PM (2726) *The Future of Math in Biology: Solving Disease, Creating Life.* Preliminary report.
**Barry Merriman**, Life Technologies, Inc. (1086-92-2988)

3:00PM (2727) *Optimal measurement kernel for wide-area compressive imaging.* Preliminary report.
**Robert R. Muise**, Lockheed Martin Missiles and Fire Control (1086-65-2990)

3:30PM ► (2728) *State of the Art in Multiphysics Simulation.*
**David Kan**, Comsol, Inc. (1086-65-2973)

4:00PM (2729) *Computer Vision for Robotics in the Home, Factories, and Space.*
**Jason Meltzer**, Evolution Robotics/iRobot (1086-68-2727)

4:30PM (2730) *Towards Personalized Medicine.* Preliminary report.
**Dorin Comaniciu**, Siemens Corporate Technology (1086-00-2995)

5:00PM (2731) *Role of mathematics in solving industrial problems: semiconductor materials & chemistry.* Preliminary report.
**Sadasivan Shankar**, Intel Corporation (1086-65-2996)

5:30PM Panel Discussion

## *AWM Workshop on Number Theory, II*

**1:00 PM – 5:55 PM** **Room 6F, Upper Level, San Diego Convention Center**

1:00PM (2732) *Newton polygons for a variant of the Kloosterman family.*
**Rebecca Bellovin**, Stanford University, **Sharon Anne Garthwaite**, Bucknell University, **Ekin Ozman**, University of Texas - Austin, **Rachel Pries***, Colorado State University, **Cassandra Williams**, James Madison University, and **Hui June Zhu**, SUNY - Buffalo (1086-11-913)

1:30PM (2733) *Newton and Hodge Polygons for a Variant of the Kloosterman Family.*
**Rebecca Bellovin**, Stanford University, **Sharon Anne Garthwaite**, Bucknell University, **Ekin Ozman***, University of Texas-Austin, **Rachel Pries**, **Cassandra Williams**, Colorado State University, and **Hui June Zhu**, State University of New York (1086-11-907)

2:00PM (2734) *The $a$-numbers of Jacobians of Suzuki Curves.*
**Holley Friedlander**, University of Massachusetts, Amherst, **Derek Garton**, Northwestern University, **Beth Malmskog***, Colorado College, **Rachel Pries**, Colorado State University, and **Colin Weir**, University of Calgary (1086-11-309)

2:30PM (2735) *Simultaneous Prime Values of Pairs of Quadratic Forms.*
**D. R. Heath-Brown** and **Lillian B. Pierce***, University of Oxford (1086-11-248)

3:00PM ► (2736) *Arithmetic of thin groups.*
**Elena Fuchs**, University of California, Berkeley (1086-11-1014)

3:30PM (2737) *Weierstrass points on the Drinfeld modular curve $X_0(\mathfrak{p})$.*
**Christelle Vincent**, Stanford University (1086-11-343)

4:00PM (2738) *Local global compatibility and monodromy.*
**Ana Caraiani**, University of Chicago (1086-11-889)

4:30PM (2739) *Comparing the arithmetic intersection formulas of Bruinier-Yang and Lauter-Viray.*
**Jacqueline Anderson**, Brown University, **Jennifer S. Balakrishnan***, Harvard University, **Kristin Lauter**, Microsoft Research, **Jennifer Park**, MIT, and **Bianca Viray**, Brown University (1086-11-1103)

5:00PM (2740) *On the Independence of Heegner Points.*
**Hatice Sahinoglu**, Max Planck Institute for Mathematics (1086-11-842)

5:30PM (2741) *The computation of anticyclotomic $\Lambda$-adic regulators of elliptic curves.*
**Mirela Ciperiani**, The University of Texas at Austin (1086-11-1183)

### *MAA Panel Discussion*

**1:00 PM – 2:20 PM** **Room 1A, Upper Level, San Diego Convention Center**

*How a placement program can increase success rates in preparatory courses and the calculus sequence.*

Organizers: **Alison Ahlgren**, University of Illinois
**Marc Harper**, University of California Los Angeles

Panelists: **Karen Rhea**, University of Michigan
**Pavel Sikorski**, Michigan State University
**Andrew Tonge**, Kent State University

### *MAA General Contributed Paper Session: Assorted Topics, II*

**1:15 PM – 4:25 PM** **Room 6E, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderators: **Kumar Pial Das**, Lamar University
**Hideo Nagahshi**, University of Guam

1:00PM ► (2742) *A report on the Mathematics S-STEM project at UIW.*
**Zhanbo Yang**, University of the Incarnate Word (1086-VR-862)

1:15PM ► (2743) *The Many Faces of a Pythagorean Triple.*
**Donald A. Sokol**, Burr Ridge, IL (1086-VR-1239)

1:30PM ► (2744) *More Blips and Blops: Reciprocal Even and Reciprocal Odd Functions.* Preliminary report.
**Gerald M. Higdon**, Fitchburg State University (1086-VR-876)

1:45PM ► (2745) *Integrating Calculus with Elementary Mathematics: Activities to Connect.*
**Karen Allen Keene**, **Alina Duca*** and **Nadia Monrose**, North Carolina State University (1086-VR-2661)

2:00PM ► (2746) *Bit-player Calcudoku.*
**David Nacin**, William Paterson University (1086-VR-1666)

2:15PM ► (2747) *Equal Labelings for $pq$-sided dice and the Inevitability of Stupid Dice.*
**Amber Rosin**, Cal Poly Pomona (1086-VR-2763)

2:30PM ► (2748) *Balanced Ternary and Quinary Numbers Magic Tricks.*
**Hideo Nagahashi**, University of Guam (1086-VR-2533)

2:45PM ► (2749) *Gilbreath Shuffle Variations.* Preliminary report.
**Colm Mulcahy**, Spelman College (1086-VR-1093)

3:00PM ► (2750) *Undergraduate Research Opportunities in Systems of Difference Equations.*
**Chris D Lynd**, University of Rhode Island (1086-VR-636)

3:15PM ► (2751) *Polynomial approximations of parameterized knots.* Preliminary report.
**Christopher Mandell**, Queens College (1086-VR-854)

3:30PM (2752) *A new context in which to apply geometry to: math, quantum physics, and the solar system, etc.*
**Martin Concoyle**, Tucson, Arizona (1086-VR-413)

3:45PM ► (2753) *An Eigenvalue Search Method using the Orr-Sommerfeld Equation for Shear Flow.*
**Ira Waker**, **David S. Torain, II*** and **Morris Morgan**, Hampton University (1086-VR-2135)

4:00PM (2754) *The Consistency Strength of Refl$(\omega_3, \omega, \omega_1)$.*
**Cynthia Northrup**, University of California, Irvine (1086-VR-1440)

4:15PM ► (2755) *Matemorphosis, an alternative tool for sharing mathematics.* Preliminary report.
**Alejandro R. Garciadiego**, Universidad Nacional Autonoma de Mexico (UNAM) (1086-VR-97)

### *MAA General Contributed Paper Session: Research in Analysis*

**1:15 PM – 4:10 PM** **Room 33B, Upper Level, San Diego Convention Center**

Organizers: **Stephen Davis**, Davidson College
**Gizem Karaali**, Pomona College
**Douglas Norton**, Villanova University

Moderator: **Wei-Kai Lai**, University of South Carolina Salkehatchie

1:15PM (2756) *Fractal Strings and Complex Dimensions of Step Functions.* Preliminary report. **Kate E Ellis**, California State Polytechnic University, Pomona (1086-VK-2176)

1:30PM (2757) *Non-uniqueness of Solutions to the Conformal Formulation of the Einstein Constraint Equations.* **Caleb Andrew Meier*** and **Michael Holst**, University of California, San Diego (1086-VK-2816)

1:45PM (2758) *Ground State of Interacting Boson Systems in Random Potentials.* **Michael A. Bishop**, University of Arizona (1086-VK-1362)

2:00PM (2759) *Geometric Properties for the Fremlin and Wittstock Tensor Products of Banach Lattices.* **Michelle Craddock**, United States Military Academy (1086-VK-1167)

2:15PM (2760) *Rearragement Inequality on Positive Tensor Products.* Preliminary report. **Wei-Kai Lai**, University of South Carolina Salkehatchie (1086-VK-2179)

2:30PM (2761) *Spectral Analysis of the $X_1$-Laguerre Polynomials.* Preliminary report. **Jessica Stewart*** and **Lance Littlejohn**, Baylor University (1086-VK-2815)

2:45PM ► (2762) *Generalized expansions and definite integrals for classical orthogonal polynomials.* Preliminary report. **Howard S. Cohl**, Information Technology Laboratory, National Institute of Standards and Technology, Gaithersburg, Maryland (1086-VK-2622)

3:00PM ► (2763) *A Nonlinear Variation of Constants Formula for Integral Equations with Kurzweil-Henstock Integral.* **Ekaterina Nathanson*** and **Laurent Jay**, The University of Iowa (1086-VK-734)

3:15PM ► (2764) *Polarizations of Real Hypersurfaces in $\mathbb{C}^n$.* **Camilo Montoya***, Florida International University, **Lukas Owens**, Whitman College, and **Alexander Basyrov**, University of Wisconsin-Stout (1086-VK-434)

3:30PM (2765) *Deddens Algebras for Weighted Shifts.* **Daniel Sievewright**, Western Michigan University (1086-VK-156)

3:45PM (2766) *A Characterization of Submodules via Beurling-Lax-Halmos Theorem.* **Yueshi Qin*** and **Rongwei Yang**, SUNY at Albany (1086-VK-2764)

(2767) *Determinant Solutions for a (3+1)-Dimensional Generallized KP Equation with Variable Coefficients.* **Alrazi M Abdeljabbar**, Savannah State University (1086-VK-1636)

## *ASL Contributed Paper Session, II*

**1:30 PM – 6:25 PM** **Room 7B, Upper Level, San Diego Convention Center**

1:30PM (2768) *Stable, $\aleph_0$-categorical nonassociative rings.* **Paul Baginski**, Smith College

1:55PM (2769) *Tree indiscernibles and a Ramsey class of trees.* **Lynn Scow**, University of Illinois at Chicago

2:20PM (2770) *Dimension theory in some dense regular groups.* **Brett Townsend**, Wesleyan University

2:45PM (2771) *Universal subgroups of Polish groups.* **Konstantinos A Beros**, University of Wisconsin-Madison

3:10PM (2772) *On automorphisms groups of uncountable structures of countable cofinality.* **Ioannis Souldatos**, University of Detroit Mercy

3:35PM (2773) *Solving the Dirichlet problem constructively.* **Maarten McKubre-Jordens*** and **Douglas Bridges**, University of Canterbury

4:00PM (2774) *Maxima for the $\leq_{tc}$ ordering with respect to $\sim^c_\alpha$.* **Steven VanDenDriessche**, University of Notre Dame

4:25PM (2775) *Symbolic dynamics in the arithmetic hierarchy.* **Sebastian Wyman*** and **Douglas Cenzer**, University of Florida

4:50PM (2776) *Anomalous vacillatory learning.* **Achilles A Beros**, University of Wisconsin-Madison

5:15PM (2777) *Canonical proof objects for classical sequent proofs.* **Richard McKinley**, University of Bern

5:40PM (2778) *Reducibilities associated with Kolmogorov complexity.* **William C Calhoun**, Bloomsburg University

6:05PM (2779) *On the significance of axiom systems that can recognize their own consistency.* **Dan E Willard**, University at Albany

## *SIGMAA on Math Circles for Students and Teachers Math Wrangle Demonstration*

**1:30 PM – 2:30 PM** **Room 1B, Upper Level, San Diego Convention Center**

*Come see how everyone can get involved in this exciting combination of mathematical problem solving, public speaking, strategy, and rebuttal.*

Organizers: **Steve Dunbar**, American Mathematics Competitions

**Tatiana Shubin**, San Jose State University

### *MAA Committee on Minority Participation and the MAA Office of Minority Participation Panel Discussion*

**2:40 PM – 4:00 PM** **Room 1A, Upper Level, San Diego Convention Center**

*SUMMA session for prospective REU mentors.*

### *MAA-AMS-SIAM Gerald and Judith Porter Public Lecture*

**3:00 PM – 4:00 PM** **Room 6AB, Upper Level, San Diego Convention Center**

► (2780) *Mathematics and the melting polar ice caps.*
**Kenneth M. Golden**, University of Utah (1086-86-58)

### *AMS 125th Gala Reception*

**6:00 PM – 7:00 PM** **Marina Ballroom Foyer, 3rd Floor, Marriott**

### *AMS 125th Gala*

**7:00 PM – 10:00 PM** **Marina Ballroom DE, 3rd Floor, Marriott**

**Georgia Benkart**
AMS Associate Secretary
Madison, Wisconsin

**Gerard A. Venema**
MAA Associate Secretary
Grand Rapids, Michigan