
Program of the Sessions

San Francisco, California, January 13–16, 2010

Monday, January 11

MAA Short Course on Exploring the Great Books of Mathematics, Part I

9:00 AM – 4:30 PM

Organizers: **Amy Shell-Gellasch**, Beloit College
Glen Van Brummelen, Quest University

8:00AM Registration (outside Room 2002, Moscone).

9:00AM *Ptolemy's Almagest: Greek mathematics and the heavenly bodies.*

(1) **Alex Jones**, New York University

1:30PM *Newton's Principia.*

(2) **George Smith**, Tufts University

AMS Tutorial on Modeling, Part I: Introduction to Numerical Modeling

9:00 AM – 4:30 PM

Presenter: **Chi-Wang Shu**, Brown University

8:00AM Registration (outside Room 2002, Moscone).

AMS Short Course on Markov Chains and Mixing Times, Part I

9:30 AM – 5:00 PM

Organizers: **David A. Levin**, University of Oregon
Yuval Peres, University of California, Berkeley and Microsoft
Elizabeth L. Wilmer, Oberlin College

8:00AM Registration (outside Room 2002, Moscone).

9:30AM *Simulation and Markov Chain Monte Carlo.*

(3) **Elizabeth Wilmer***, Oberlin College, and **Yuval Peres***, University of California, Berkeley

10:30AM Break

11:00AM *Coupling and Variations.*

(4) **David Levin**, University of Oregon

NOON Problem Session

2:00PM Problem Session: Solutions

2:30PM *Shuffling and Strong Stationary Times.*

(5) **Elizabeth Wilmer**, Oberlin College

3:30PM Break

4:00PM *Mixing Times and Hitting Times.*

(6) **David Aldous**, University of California Berkeley

Tuesday, January 12

AMS Department Chairs Workshop

8:00 AM – 6:00 PM

Organizers: **Lawrence F. Gray**, University of Minnesota

Stephen B. Robinson, Wake Forest University

MAA Ancillary Workshop on Statistics: Teaching Introductory Statistics

8:30 AM – 5:00 PM

Presenters: **Carolyn K. Cuff**, Westminster College

Michael A. Posner, Villanova University

MAA Ancillary Workshop on Statistics: Become a Catalyst for Change in Statistics Education

8:30 AM – 5:00 PM

Presenters: **Joan Garfield**, University of Minnesota

Bob delMas, University of Minnesota

Andy Zieffler, University of Minnesota

Allan Rossman, California Polytechnic Institute

Beth Chance, California Polytechnic Institute

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 31, Issue 1 of *Abstracts of papers presented to the American Mathematical Society*, ordered according to the numbers in parentheses following the listings.

AMS Short Course on Markov Chains and Mixing Times, Part II

9:00 AM – 4:30 PM

Organizers: **David A. Levin**, University of Oregon
Yuval Peres, University of California, Berkeley and Microsoft
Elizabeth L. Wilmer, Oberlin College

- 9:00AM *Lower Bounds.*
(7) **Elizabeth Wilmer**, Oberlin College
- 10:00AM Break
- 10:30AM *The Cut-off Phenomenon and the Ising Model.*
(8) **Yuval Peres**, University of California Berkeley
- 11:30AM *Markov chain mixing—examples and applications.*
(9) **Alistair Sinclair**, University of California Berkeley
- 2:00PM *Dynamics for the Ising Model, and Its Mixing Time.*
(10) **David Levin***, University of Oregon, and **Yuval Peres***, University of California, Berkeley
- 3:00PM Break
- 3:30PM Panel Discussion: Open Problems

MAA Short Course on Exploring the Great Books of Mathematics, Part II

9:00 AM – 5:00 PM

Organizers: **Amy Shell-Gellasch**, Beloit College
Glen Van Brummelen, Quest University

- 9:00AM *Cauchy and the Cours d'analyse.*
(11) **Robert E. Bradley***, Adelphi University, and **Ed Sandifer**, Western Connecticut State College
- 1:15PM *How algebra became modern.*
(12) **Fernando Q. Gouvêa**, Colby College
- 4:20PM *Tracking the great writings of mathematics.*
(13) **Ivor Grattan-Guinness**, Middlesex University Business School

AMS Tutorial on Modeling, Part II: Introduction to Statistical Modeling

9:00 AM – 4:30 PM

Presenter: **Wei Zhu**, State University of New York, Stony Brook

MAA Board of Governors

9:00 AM – 5:00 PM

AMS Council

1:30 PM – 10:00 PM

Joint Meetings Registration

3:00 PM – 7:00 PM

MAA New Committee Chairs Workshop

7:00 PM – 9:00 PM

Organizers: **Barbara T. Faires**, Westminster College
Martha J. Siegel, Towson University

Wednesday, January 13

Joint Meetings Registration

7:30 AM – 6:00 PM

AMS-SIAM Special Session on Mathematics of Computation, I

8:00 AM – 10:50 AM

Organizers: **Susanne Brenner**, Louisiana State University
Chi-Wang Shu, Brown University

- 8:00AM *A Coarsening Algorithm on Adaptive Grids by Newest Vertex Bisection and its Applications.*
(14) **Chensong Zhang***, PA, and **Long Chen**, CA (1056-65-1959)
- 8:30AM *Convergence of Adaptive Finite Element Methods for Nonlinear Partial Differential Equations.* Preliminary report.
(15) **Michael Holst**, **Gantumur Tsogtgerel** and **Yunrong Zhu***, University of California San Diego (1056-65-2033)
- 9:00AM *Coordinate Descent for L1 Optimization.* Preliminary report.
▶ (16) **Yingying Li*** and **Stanley Osher**, University of California, Los Angeles (1056-49-345)
- 9:30AM *Parallel computation with the weakly over-penalized symmetric interior penalty method.*
(17) **Andrew T. Barker*** and **Susanne C. Brenner**, Louisiana State University (1056-65-1193)
- 10:00AM *Approximation of kernel matrices with multilevel circulant matrices.*
▶ (18) **Guohui Song***, Illinois Institute of Technology, and **Yuesheng Xu**, Syracuse University (1056-65-454)
- 10:30AM *Very fast methods and preconditioners for banded matrices and PDEs on irregular domains.*
(19) **Martin Gander**, **Sébastien Loisel**, Université de Genève, and **Daniel B Szyld***, Temple University (1056-65-1445)

AMS-ASL Special Session on Surreal Numbers, I

8:00 AM – 10:40 AM

Organizers: **Lou van den Dries**, University of Illinois
Philip Ehrlich, Ohio University

- 8:00AM *Surreal Numbers, Conway Names, and the Simplicity Hierarchy.*
(20) **Philip Ehrlich**, Ohio University (1056-03-262)
- 9:00AM *Surreal numbers and real analysis.*
(21) **Ovidiu Costin**, The Ohio State University (1056-03-1098)
- 10:00AM *Recent work on H-fields.*
(22) **Lou van den Dries**, University of Illinois-Urbana/Champaign (1056-03-987)

AMS Special Session on Degenerate and Singular Elliptic Partial Differential Equations, I

8:00 AM – 10:50 AM

Organizers: **Marian Bocea**, North Dakota State University
Cristina Popovici, North Dakota State University

- 8:00AM *Multiple solutions for superlinear p -Laplacian Neumann problems.* (23)
Vasile Staicu, University of Aveiro, Portugal (1056-35-2120)
- 8:30AM Γ -convergence of power-law functionals with variable exponents. (24)
Marian Bocea, NDSU (1056-35-1108)
- 9:00AM *Statistics of p -harmonic functions.* Preliminary report. (25)
Matthew Rudd, University of Idaho (1056-35-1492)
- 9:30AM *Multiple and sign-changing solutions for nonlinear elliptic problems with p -Laplacian.* (26)
Dumitru Motreanu, University of Perpignan, France (1056-35-878)
- 10:00AM *Subelliptic regularity in non-nilpotent cases.* (27)
Andras Domokos, California State University at Sacramento (1056-35-661)
- 10:30AM *Near cloaking defeats the anti-cloak.* (28)
Daniel T. Onofrei, University Of Utah (1056-35-1438)

AMS Special Session on Difference Equations and Applications, I

8:00 AM – 10:50 AM

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

- 8:00AM *Open Problems and Conjectures in Difference Equations.* Preliminary report. (29)
Gerasimos E Ladas, University of Rhode Island (1056-39-320)
- 8:30AM *Applications of number theory to asymptotic behavior of solutions of difference equations.* (30)
Richard T Guy*, **Kenneth S Berenhaut** and **Katherine M Donadio**, Wake Forest University (1056-39-1865)
- 9:00AM *Global convergence of max-type equations.* (31)
Timothy Sauer, George Mason University (1056-39-232)
- 9:30AM *The Z-transform of queuing systems.* Preliminary report. (32)
Mostafa Ghandehari* and **Shahrzad Sheibani**, University of Texas at Arlington (1056-39-34)
- 10:00AM *Boundary Data Smoothness for Solutions of Nonlocal Boundary Value Problems for n th Order Difference Equations.* Preliminary report. (33)
Jeffrey W Lyons, Baylor University (1056-39-28)
- 10:30AM *On The Global Behavior Of a System Of Rational Difference Equations.* Preliminary report. (34)
E. A. Grove, University of Rhode Island, **Y. Kostorv***, Xavier University of Louisiana, **M. Radin**, Rochester Institute of Technology, and **S. Schultz**, Providence College (1056-39-1290)

AMS Special Session on Harmonic Analysis (Mathematics Research Communities session), I

8:00 AM – 10:50 AM

Organizers: **Kabe Moen**, Washington University
Richard Oberlin, University of California Los Angeles
Betsy Stovall, University of California Los Angeles

- 8:00AM *On an interesting singular integral operator.* Preliminary report. (35)
Camil Muscalu, Cornell University (1056-42-1207)
- 8:30AM *Maximal averages along one-variable vector fields.* (36)
Michael Bateman, UCLA (1056-42-1455)

- 9:00AM *Bilinear Hilbert transforms along curves.* (37)
Xiaochun Li, University of Illinois at Urbana-Champaign (1056-42-1632)
- 9:30AM *A nonlinear stationary phase method for oscillatory Riemann-Hilbert problems.* Preliminary report. (38)
Q. Yen Do, UCLA (1056-42-1360)
- 10:00AM *Weak Convergence in multiparameter Hardy spaces.* (39)
Jill Pipher, Brown University (1056-42-280)
- 10:30AM *An index formula in connection with meromorphic approximation.* Preliminary report. (40)
Alberto A. Condori, Rose-Hulman Institute of Technology (1056-42-1657)

AMS Special Session on Inverse Problems: Analysis and Computations (Mathematics Research Communities session), I

8:00 AM – 10:50 AM

Organizers: **Gaik Ambartsoumian**, University of Texas at Arlington
Raluca Felea, Rochester Institute of Technology
Hongyu Liu, University of Washington
Kui Ren, University of Texas at Austin
Michael VanValkenburgh, University of California Berkeley

- 8:00AM *Inverse Source Problems for Electromagnetics.* Preliminary report. (41)
Gang Bao*, **Junshan Lin**, Michigan State University, and **Faouzi Triki**, University of Fourier, France (1056-35-1238)
- 8:30AM *Active exterior cloaking.* (42)
Daniel T Onofrei, University Of Utah (1056-35-1487)
- 9:00AM *Diffraction at corners for the wave equation on differential forms.* (43)
Andras Vasy, Stanford University (1056-35-798)
- 9:30AM *Interior Transmission Eigenvalue Problem and its Application in Inverse Scattering Theory.* (44)
Fioralba Cakoni, University of Delaware (1056-35-256)
- 10:00AM *Local Singularity Reconstruction from Integrals over Curves in \mathbb{R}^3 and electron microscopy.* Preliminary report. (45)
Eric Todd Quinto*, Tufts University, and **Hans Rullgard**, University of Stockholm (1056-92-491)
- 10:30AM *Ultrasound modulated electrical impedance and optical tomography.* Preliminary report. (46)
Peter Kuchment*, Texas A&M University, **Leonid Kunyansky**, University of Arizona, **Moritz Allmaras** and **Wolfgang Bangerth**, Texas A&M University (1056-35-1024)

AMS Special Session on the Mathematical Challenges of Relativity (Mathematics Research Communities session), I

8:00 AM – 10:50 AM

Organizers: **Paul T. Allen**, Lewis & Clark College
Michael Eichmair, M.I.T. and Monash University
Gustav Holzegel, Princeton University
Jared Speck, Princeton University
Willie W. Wong, University of Cambridge

- 8:00AM *Decay Rate for the Linear Wave Equation on a Schwarzschild Black Hole.*
(47) **Jonathan Luk**, Princeton University (1056-35-1449)
- 8:30AM *Strichartz estimates for Kerr backgrounds.*
(48) **Mihai H Tohaneanu**, Purdue University (1056-83-1296)
- 9:00AM *Strichartz estimates on asymptotically de Sitter spaces.*
(49) **Dean R. Baskin**, Stanford University (1056-35-1071)
- 9:30AM *Breakdown Criteria for Nonvacuum Einstein Equations.*
(50) **Arick Shao**, Princeton University (1056-83-921)
- 10:00AM *Control of local null geometry by rough CMC initial data.*
(51) **Qian Wang**, SUNY Stony Brook (1056-83-1910)
- 10:30AM *Shock Waves in General Relativity.*
(52) **Moritz Andreas Reintjes**, University of California in Davis (1056-83-633)

AMS Special Session on Algebraic Aspects of Cryptology, I

8:00 AM – 10:50 AM

Organizers: **Jintai Ding**, University of Cincinnati
Chris Christensen, Northern Kentucky

- 8:00AM *Algebraic Attacks on Bivium and Trivium, Accelerated by Cutting the Variable-Sharing Graph.*
▶ (53) **Gregory V. Bard**, Fordham University (1056-12-1496)
- 8:30AM *The Effect of Projection on the Symmetry of the SFLASH Attack.*
(54) **Daniel C. Smith**, Indiana University (1056-12-942)
- 9:00AM *Multivariate Public Key Cryptography.*
▶ (55) **Bo-Yin Yang**, Academia Sinica (1056-13-1203)
- 10:00AM *Multivariate Public Key Cryptosystems from Diophantine Equations.*
(56) **Raymond A. Heindl**, Clemson University (1056-14-982)
- 10:30AM *Square Encryption Schemes: New Directions in Multivariate Public-Key Cryptography.*
(57) **Crystal Lee Clough**, Nanyang Technological University, Singapore (1056-12-493)

AMS Special Session on Markov Chains and Their Statistical Applications (Mathematics Research Communities session), I

8:00 AM – 10:50 AM

Organizers: **James Flegal**, University of California Riverside
Radu Herbei, Ohio State University
Jessica Zuniga, Stanford University

- 8:00AM *Markov Chains, Generalized Wishart distributions and Applications to High Dimensional Statistical Inference.*
(58) **Bala Rajaratnam**, Stanford University (1056-60-1253)
- 9:00AM *Improved mixing time bounds for the Thorp shuffle.*
(59) Preliminary report.
Ben J Morris, UC Davis (1056-60-1395)
- 10:00AM *Applicability of drift and minorization condition for finding rate of convergence of finite state space Markov chains.*
(60) **Partha Sarathi Dey**, UC Berkeley (1056-60-1836)

- 10:30AM *Using Reversible Markov Chains for Distributional Approximation.* Preliminary report.
(61) **Nathan F. Ross**, University of California, Berkeley (1056-60-1408)

AMS Special Session on Zonotopal Algebra and Its Applications, I

8:00 AM – 10:40 AM

Organizers: **Olga Holtz**, University of California Berkeley and Technical University Berlin

Amos Ron, University of Wisconsin

- 8:00AM *Geometry of the Restricted Boltzmann Machine.*
(62) **Maria Angelica Cueto**, UC Berkeley, **Jason Morton**, Stanford University, and **Bernd Sturmfels***, UC Berkeley (1056-62-423)
- 9:00AM *Piecewise polynomials and equivariant Chow cohomology of nonsimplicial toric varieties.*
(63) Preliminary report.
Hal Schenck, University of Illinois (1056-14-1166)
- 10:00AM *Spectral Properties of the Transition Operators Associated with Box Splines.* Preliminary report.
(64) **Rong-Qing Jia**, University of Alberta (1056-41-1114)

AMS Special Session on Applications of Graph Theory, I

8:00 AM – 10:50 AM

Organizers: **Richard Low**, San Jose State University
Raluca M. Gera, Naval Postgraduate School

- 8:00AM *The Link Graph: a Tool for Word Sense Disambiguation.*
▶ (65) **Raluca M. Gera***, Naval Postgraduate School, **Henry Escudro**, Juniata College, **Pranav Anand**, Linguistics Department, University of California Santa Cruz, and **Craig Martell**, Computer Science Department, Naval Postgraduate School (1056-05-226)
- 8:30AM *A Generalization of Kundu's k-Factor Theorem.*
▶ (66) Preliminary report.
Arthur H. Busch, University of Dayton, **Michael J. Ferrara**, University of Colorado Denver, **Stephen G. Hartke***, University of Nebraska-Lincoln, **Michael S. Jacobson**, University of Colorado Denver, **Hemanshu Kaul**, Illinois Institute of Technology, and **Douglas B. West**, University of Illinois (1056-05-344)
- 9:00AM *Graph invariants from self-assembling nanostructures.*
▶ (67) **Joanna Anthony Ellis-Monaghan*** and **Greta Pangborn**, Saint Michael's College (1056-05-287)
- 9:30AM *On k-circuit distance in graphs.*
(68) **Raluca Gera**, Naval Postgraduate School, **Grady Bullington**, **Linda Eroh*** and **Steven J Winters**, University of Wisconsin Oshkosh (1056-05-1731)
- 10:00AM *Coding Sequences and Their Applications.*
▶ (69) Preliminary report.
Eunjeong Yi, Texas A&M University at Galveston (1056-05-1075)
- 10:30AM *Bonding Tree Models of RNA Structures.* Preliminary report.
▶ (70) **Teresa Haynes**, **Debra Knisley** and **Denise Koessler***, East Tennessee State University (1056-05-2014)

AMS Special Session on Arithmetic and Nonarchimedean Dynamics, I

8:00 AM – 10:50 AM

Organizers: **Joseph Silverman**, Brown University
Michelle Manes, University of Hawaii
Raphael Jones, College of the Holy Cross

- 8:00AM *Discriminants and Galois groups for iterated rational functions.* Preliminary report.
 (71) **Rafe Jones***, College of the Holy Cross, and **Michelle Manes**, University of Hawaii-Manoa (1056-11-1117)
- 8:30AM *The dynamical Manin-Mumford problem.*
 (72) **Thomas J Tucker***, University of Rochester, **Dragos Ghioca**, University of Lethbridge, and **Shouwu Zhang**, Columbia University (1056-11-563)
- 9:00AM *The dynamical Manin-Mumford problem.*
 (73) **Dragos Ghioca**, University of Lethbridge (1056-11-292)
- 9:30AM *Towards Dynamical Uniform Boundedness for Rational Functions.* Preliminary report.
 (74) **Robert L. Benedetto**, Amherst College (1056-11-658)
- 10:00AM *Preperiodic points: from algebraic to complex.*
 (75) **Laura DeMarco***, University of Illinois at Chicago, and **Matt Baker**, Georgia Institute of Technology (1056-37-1206)
- 10:30AM *Critical Points of Non-Archimedean Dynamical Systems on the Projective Line.* Preliminary report.
 (76) **Xander Faber**, McGill University (1056-11-664)

AMS Session on Group Theory, I

8:00 AM – 10:55 AM

- 8:00AM *Subgroups of S_{n+1} normalized by and coprime to a regular subgroup of order n .* Preliminary report.
 (77) **Stephen M. Gagola, Jr.**, Kent State University (1056-20-122)
- 8:15AM *The nilpotent product and the nonabelian tensor square of groups.* Preliminary report.
 (78) **Arturo Magidin**, University of Louisiana at Lafayette (1056-20-272)
- 8:30AM *Finite Groups with Permutable Supplemented Subgroups.* Preliminary report.
 (79) **Joseph Kirtland**, Marist College (1056-20-277)
- 8:45AM *Open Questions and Conjectures Regarding Near Frattini Subgroups of Generalized Free Products of Groups.* Preliminary report.
 (80) **Mohammad K. Azarian**, University of Evansville (1056-20-371)
- 9:00AM *A relationship between the property R_∞ and the geometric invariants Ω^n .*
 (81) **Nic Koban***, University of Maine Farmington, and **Peter Wong**, Bates College (1056-20-474)
- 9:15AM Break
- 9:30AM *The Probability that Two Semigroup Elements Commute Can Be Anything.*
 (82) **Vadim Ponomarenko*** and **Natalie Selinski**, San Diego State University (1056-20-497)
- 9:45AM *Finite Phase Transitions in Countable Abelian Groups.*
 (83) **Hannah Alpert**, University of Chicago (1056-20-499)

- 10:00AM *L_δ -equivalence of p -local abelian groups with nice decomposition bases.*
 (84) **Ruediger Goebel**, **Katrin Leistner**, University of Duisburg-Essen, Germany, **Peter Loth***, Sacred Heart University, and **Lutz Struengmann**, University of Duisburg-Essen, Germany (1056-20-503)
- 10:15AM *An interpretation of the LLT algorithm.*
 (85) **Alexander Kleshchev** and **David Nash***, University of Oregon (1056-20-579)
- 10:30AM *Simply intersecting pairs in the mapping class group.*
 (86) **Leah Childers**, Louisiana State University (1056-20-645)
- 10:45AM *Zariski closures of linear differential algebraic groups.*
 (87) **Andrei Minchenko***, Cornell University, and **Alexey Ovchinnikov**, City University of New York (1056-22-1028)

AMS Session on Probability and Statistics, I

8:00 AM – 10:40 AM

- 8:00AM *MCMC methods for spatial random permutations.* Preliminary report.
 (88) **John R Kerl**, University of Arizona (1056-60-38)
- 8:15AM *Extracting multiscale information from time series characterizing nanoscale systems.*
 (89) **Christopher P Calderon**, Lawrence Berkeley National Lab (1056-60-91)
- 8:30AM *Abstract Measure-Dependent Stochastic Evolution Equations in a Hilbert Space with Applications to Nonlinear Diffusion.* Preliminary report.
 (90) **Mark A McKibben**, Goucher College (1056-60-135)
- 8:45AM *Self-dual planar hypergraphs and exact bond percolation thresholds.* Preliminary report.
 (91) **John C. Wierman**, Johns Hopkins University (1056-60-452)
- 9:00AM *Characterizing departure count moments from queueing nodes fed by nonstationary, non-Poisson arrival processes.*
 (92) **Ira Gerhardt***, Manhattan College, and **Barry L. Nelson**, Northwestern University (1056-60-471)
- 9:15AM Break
- 9:30AM *Lanchester SDEs and the probability of the target destruction — a stochastic model of terrorism risk.* Preliminary report.
 (93) **Michael Powers**, Temple University, Department of Risk Management and Insurance, **Wei-Shi Yang** and **Sheng Xiong***, Temple University (1056-60-549)
- 9:45AM *Completely Simple Semigroups of Real $d \times d$ Matrices and Recurrent Random Walks.*
 (94) **Santanu Chakraborty**, University of Texas - Pan American, Edinburg, Texas (1056-60-581)
- 10:00AM *A Stochastic Approximation Algorithm for Option Pricing Model Calibration with a Switchable Market.*
 (95) **George Yin**, Wayne State University, **Jie Yu***, Roosevelt University, and **Qing Zhang**, University of Georgia, Athens (1056-60-590)
- 10:15AM *Quantile Hedging for Guaranteed Minimum Death Benefits.* Preliminary report.
 (96) **Yumin Wang**, Wayne State University (1056-60-670)
- 10:30AM *On Sojourn Times in the Finite Capacity $M/M/1$ Queue with Processor Sharing.*
 (97) **Qiang Zhen*** and **Charles Knessl**, University of Illinois at Chicago (1056-60-758)

AMS Session on Mathematics in the Social Sciences

8:00 AM – 9:40 AM

- 8:00AM *Continuous Time Model of Bifurcations and Related Phenomena in Agent-Based Models.*
▶ (98) **Andrew Clark**, Thomson Reuters (1056-91-251)
- 8:15AM *Addiction and Treatment in a rational framework—can lowering health care costs have adverse effects?* Preliminary report.
▶ (99) **Tamas Forgacs***, California State University, Fresno, **Attila Cseh**, Valdosta State University, and **Adnan Sabuwala**, California State University, Fresno (1056-91-909)
- 8:30AM *Dynamical Analysis in Lucas Framework with Heterogeneous Agents.* Preliminary report.
▶ (100) **Yuanying Guan**, Florida State University (1056-91-1129)
- 8:45AM Break.
- 9:00AM *Two-player envy-free multi-cake division using a polytopal Sperner's lemma.*
▶ (101) **John Cloutier**, University of California at Santa Barbara, **Kathryn L. Nyman***, Willamette University, and **Francis Edward Su**, Harvey Mudd College (1056-91-1642)
- 9:15AM *Option pricing for biomedical firms with predictable price jumps.* Preliminary report.
(102) **Jin-Chuan Duan**, Risk Management Institute, National University of Singapore, **Anirban Dutta*** and **Qiji J. Zhu**, Western Michigan University (1056-91-1983)
- 9:30AM *Statistical Modeling of Gang Violence in Los Angeles.*
▶ (103) **Kym C Louie***, Harvey Mudd College, **Mike Egesdal**, **Jeremy Neuman**, University of California, Los Angeles, and **Chris Fathauer**, Harvey Mudd College (1056-91-1923)

AMS Session on Complex Analysis

8:00 AM – 9:55 AM

- 8:00AM *Strong and Weak LFCDs: Local Fractional Complex Derivatives.* Preliminary report.
▶ (104) **Steve M. Anglin**, Case Western Reserve University (fmr), Mountain View, CA (1056-30-23)
- 8:15AM *On Janowski starlike functions.*
(105) **Rosihan M. Ali**, Universiti Sains Malaysia (1056-30-175)
- 8:30AM *Subclasses of Meromorphic Functions Associated with Convolution.*
(106) **See Keong Lee**, Universiti Sains Malaysia (1056-30-514)
- 8:45AM *L^p Rational Approximation in the Complex Plane.* Preliminary report.
(107) **Erin R Militzer**, University of Kentucky (1056-30-601)
- 9:00AM *On minimal Rolle's domains for complex polynomials.*
(108) **Michael J Miller**, Le Moyne College (1056-30-957)
- 9:15AM *Poisson Equation with the Robin/Third Boundary Condition.*
(109) **Alip Alifu**, **Maimaiti Mohammed**, York University (1056-30-2128)
- 9:30AM *Mean Value Theorem for Functions on the Complex Plane.* Preliminary report.
(110) **Nasser Dastrange**, Buena Vista University (1056-26-1044)
- 9:45AM *A residual radial limit zero set.*
(111) **Michael C Fulkerson**, University of Central Oklahoma (1056-32-1285)

AMS Session on Geometry and Topology, I

8:00 AM – 10:10 AM

- 8:00AM *The writhe of oriented polygonal graphs.*
(112) **Christian Laing***, Courant Institute of Mathematical Sciences, NYU, and **De Witt Sumners**, Florida State University (1056-54-131)
- 8:15AM *One-sided Heegaard splittings of 3-manifolds.*
(113) **Loretta Bartolini**, Oklahoma State University (1056-57-1255)
- 8:30AM *Defining Khovanov Homology in 3-Manifolds Using a Diagramless Theory.*
(114) **Adam C. McDougall**, The University of Iowa (1056-54-1055)
- 8:45AM *Unstable Vassiliev Theory.*
(115) **Chad D Giusti**, University of Oregon (1056-55-611)
- 9:00AM *Identifying the Canonical Component for the Whitehead Link.* Preliminary report.
(116) **Emily R Landes**, University of Texas, Austin (1056-54-2096)
- 9:15AM *The Kauffman bracket skein module of T^3 .*
(117) **Jeffrey Boerner**, University of Iowa (1056-57-1944)
- 9:30AM *The Moduli space of singular Euclidean structures on a sphere with 4 cone points whose cone angles are integer multiples of $\frac{2\pi}{3}$ but less than 2π .* Preliminary report.
(118) **Aldo-Hilario Cruz-Cota**, Grand Valley State University (1056-54-1389)
- 9:45AM *Lagrangian representations of the (p, q, r) - triangle group.* Preliminary report.
(119) **Paul W Lewis**, University of Tennessee, Knoxville (1056-51-284)
- 10:00AM *Relationships between Bundle Forms in Laguerre Planes.*
▶ (120) **Robert D. Knight**, Ohio University-Chillicothe (1056-51-574)

AMS Session on Discrete Mathematics, I

8:00 AM – 10:55 AM

- 8:00AM *Combinatorial Proofs of Certain Identities.*
▶ (121) **Akalu Tefera***, Grand Valley State University, **Aklilu Zeleke**, Michigan State University, and **George Grossman**, Central Michigan University (1056-05-912)
- 8:15AM *Playing with Paths: An Introduction to Bijective Combinatorics.*
▶ (122) **Paul W.T. Fijn**, University of Melbourne, Australia (1056-05-1424)
- 8:30AM *Some Remarks On Self-Avoiding Walks.*
▶ (123) **Shanzhen Gao**, Florida Atlantic University (1056-05-690)
- 8:45AM *On the Non-existence of $(160, 54, 18)$ Difference Sets.*
(124) **Adegoke S Osifodunrin***, Georgia Southern University, and **Ken. W Smith**, Sam Houston State University (1056-05-1921)
- 9:00AM *Alternating Permutations and the m th Descents.*
▶ (125) **Ae Ja Yee** and **Kagan Kursungoz***, The Pennsylvania State University (1056-05-628)
- 9:15AM Break
- 9:30AM *The lattice of finite vector space partitions and its Möbius function.*
▶ (126) **Fusun Akman*** and **Papa Amar Sissokho**, Illinois State University (1056-06-89)
- 9:45AM *Generating functions for box-counting problems.*
▶ (127) **Benjamin J Young**, Centre de Recherches Mathematiques / McGill University (1056-05-1961)

- 10:00AM (128) *Multi-restrained Stirling numbers.* Preliminary report.
Ji Young Choi, Sippensburg University of PA (1056-05-1813)
- 10:15AM (129) *A map from chains in the noncrossing partition lattice to polygon dissections.*
Hillary Einziger, The George Washington University (1056-05-1950)
- 10:30AM (130) *Regular completions of lattices.*
John Harding and **Qin Yang***, New Mexico State University (1056-06-739)
- 10:45AM (131) *How much does a Hamiltonian cycle weigh?* Preliminary report.
Hurlee Gonchigdanzan, University of Wisconsin - Stevens Point (1056-51-323)

MAA Session on General Contributed Papers, I

8:00 AM – 10:55 AM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- 8:00AM (132) *Analysis of the secondary Flow effects on an open channel with cross stream variation of the bottom roughness.*
Ahmed Kaffel*, Virginia Tech, **Amel Soualmia**, LMHE, and **Masbernat Lucien**, imft (1056-Z1-1423)
- 8:15AM (133) *A Biexponential Model of Electroosmotic Flow.* Preliminary report.
Rachel R Roe-Dale*, **Emese Lipcsey-Magyar** and **Kimberly Frederick**, Skidmore College (1056-Z1-1422)
- 8:30AM (134) *Building on Nature's Inspiration: A NAKFI Synthetic Biology Report.* Preliminary report.
Jeffrey L Poet, Missouri Western State University (1056-Z1-1168)
- 8:45AM (135) *Using Neural Networks for Near-Interpolation of Scattered Data.*
Laurene V Fausett, Texas A&M University-Commerce (1056-Z1-260)
- 9:00AM (136) *Chromatic Methods For Creating A Secure Identification Procurement.*
Timothy Grant Hall, PQI Consulting (1056-Z1-418)
- 9:15AM (137) *Foot to the Pedal: Generalizing Euler's work on constant pedal curves to constant pedal surfaces.* Preliminary report.
Hieu D Nguyen, Rowan University (1056-Z1-653)
- 9:30AM (138) *Turtles, and Lizards, and Snakes, Oh My!* Preliminary report.
Leon Brin, Southern CT State University (1056-Z1-879)
- 9:45AM (139) *Adapting the Feynman Path Integral for use in a discrete spacetime.*
Douglas B Mathews*, **Jake Askeland**, **Cheuk Wong**, **Miranda Braselton**, **David Von Gunten**, **Jonathan Baptist**, **Duncan McElfresh** and **Slobodan Simic**, San Jose State University (1056-Z1-1670)
- 10:00AM (140) *Path elongation and r-reduced cutting numbers of cycles.*
Brad Bailey* and **Dianna J. Spence**, North Georgia College & State University (1056-Z1-735)
- 10:15AM (141) *Arcs in the plane.*
Joan E Hart*, University of Wisconsin Oshkosh, and **Kenneth Kunen**, University of Wisconsin – Madison (1056-Z1-52)

- 10:30AM (142) *On the theory of mixed convex functions.*
Emre Tokgoz, University of Oklahoma (1056-Z1-402)
- 10:45AM (143) *Some Nonlinear Delay Integral Inequalities On Time Scales.* Preliminary report.
Shiojenn Tseng*, **Jen-Chienh Lo**, Tamkang University, and **Wing-Sum Cheung**, The University of Hong Kong (1056-Z1-1516)

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

8:00 AM – 10:55 AM

Organizers: **Edwin P. Herman**, University of Wisconsin - Stevens Point
Nathan M. Wodarz, University of Wisconsin - Stevens Point

- 8:00AM (144) *Creating Student Centered, Active Learning Classrooms in a Multi-Section Precalculus Course.*
Paula A. Shorter* and **Mairead K. Greene**, Rockhurst University (1056-Q1-2046)
- 8:20AM (145) *Anatomy of a multi-section calculus semester: A students-eye view.* Preliminary report.
Fabiana Cardetti* and **P. Joseph McKenna**, University of Connecticut (1056-Q1-1594)
- 8:40AM (146) *Calculus Acquisition through a Problem and Activity Based Learning Experience (CAPABLE).* Preliminary report.
Gary Fowler, **Sommer Gentry***, **Amy Ksir** and **Will Traves**, United States Naval Academy (1056-Q1-1773)
- 9:00AM (147) *Peer Led Team Learning in Calculus I: A four-year study.*
John C. Merkel, Morehouse College (1056-Q1-2015)
- 9:20AM (148) *Success in Calculus I: Oral Reviews.*
Mary A Nelson*, University of Colorado, Boulder, and **Monica R Geist**, Front Range Community College (1056-Q1-648)
- 9:40AM (149) *Results of the use of guided notes and lab work in introductory college courses.*
Ellen F Hill, Minnesota State University Moorhead (1056-Q1-1052)
- 10:00AM (150) *Student-Generated Note Cards: Sound Pedagogy?* Preliminary report.
Kenneth Horton, U. S. Air Force Academy (1056-Q1-1695)
- 10:20AM (151) *A Modified Moore Method in Real Analysis: Hearing the Students' Voices.* Preliminary report.
Joy Moore* and **Bernd Rossa**, Xavier University (1056-Q1-1629)
- 10:40AM (152) *Teaching Abstract Algebra using Technology.* Preliminary report.
Claus Schubert* and **Mary Gfeller**, SUNY Cortland (1056-Q1-342)

MAA Session on Improving a Second Course in Statistics

8:00 AM – 10:55 AM

- Organizers: **Nancy J. Boynton**, SUNY Fredonia
Patricia B. Humphrey, Georgia Southern University
Michael A. Posner, Villanova University
- 8:00AM (153) *Teaching Undergraduate Statistics in R.* Preliminary report.
Salil Kumar Das, Prince Georges' Community College (1056-F5-1919)

- 8:20AM *Interdisciplinary Case Studies for an Intermediate Statistics Course.*
 ► (154) **Terje Hoim**, Wilkes Honors College, Florida Atlantic University (1056-F5-1447)
- 8:40AM *Finding and Working with Real-World Clients in a Second Statistics Course.*
 (155) **Cora Neal**, Sonoma State University (1056-F5-437)
- 9:00AM *Experiential Learning of Non-parametric Statistics through a campus-client led survey project.*
 (156) **K. Scott Alberts**, Truman State University (1056-F5-617)
- 9:20AM *Some More Lab Experiences in Introductory Statistics.*
 (157) **Patricia B Humphrey**, Georgia Southern University (1056-F5-1294)
- 9:40AM *A Second Course for Non-Majors – Relevance is the Key!*
 ► (158) **Murray H Siegel**, Arizona State University, Polytechnic (1056-F5-264)
- 10:00AM *Stat2 - What Should We Do?* Preliminary report.
 ► (159) **Robin H Lock**, St. Lawrence University (1056-F5-2031)
- 10:20AM *An Innovative Second Half-Course in Applied Statistics.*
 (160) **John D McKenzie**, Babson College (1056-F5-1904)
- 10:40AM *A Successful Second Course in Business Statistics.*
 ► (161) Preliminary report.
Sue B Schou, Idaho State University (1056-F5-552)

Employment Center

8:00 AM – 7:00 PM

SIAM Minisymposium on Economics and Sustainability

8:05 AM – 11:00 AM

Organizer: **Christian Traeger**, University of California, Berkeley

- 8:05AM *Preferences Yielding the Precautionary Effect.*
 (162) **Michel De Lara**, Université Paris-Est (1056-91-1065)
- 8:30AM *Mathematical Analysis of Smart Grids Using Randomized Algorithms.*
 ► (163) **Kourosh Modarresi**, Stanford University (1056-90-2067)
- 8:55AM *Exact Calibration of Programming Models of Agricultural Supply against Exogenous Sets of Supply Elasticities.*
 (164) **Pierre R. Merel*** and **Santiago Bucaram**, Agricultural and Resource Economics, University of California, Davis (1056-90-1181)
- 9:20AM Break.
- 9:35AM *Closing the gap between risk estimation and decision-making: efficient management of trade-related invasive species risk.* Preliminary report.
 ► (165) **Michael R Springborn***, University of California, Davis, and **Robert Lieli**, University of Texas, Austin (1056-91-1274)
- 10:00AM *Time perspective and climate change policy.*
 (166) **Larry S Karp***, Agricultural and Resource Economics, University of California, Berkeley, and **Yacov Tsur**, Hebrew University (1056-91-1196)
- 10:25AM *Risk, Uncertainty and Climate Change Evaluation.*
 (167) Preliminary report.
Christian P Traeger, UC Berkeley (ARE) (1056-91-2030)
- 10:50AM Final discussion.

MAA Session on Mathematical Texts: Famous, Infamous, and Influential, I

8:55 AM – 10:55 AM

Organizers: **Fernando Q. Gouvêa**, Colby College
Amy Shell-Gellasch, Beloit College

- 8:55AM Welcome.
- 9:00AM *Geometry and Algebra in Ancient Civilizations by B. L. van der Waerden: A Text Exploring the Origin and Development of Ancient Mathematics.*
 ► (168) **Toke L Knudsen**, SUNY Oneonta (1056-H1-1420)
- 9:20AM *The Elements, its evil influence.* Preliminary report.
 ► (169) **Alejandro R. Garcíadiego**, Universidad Nacional Autónoma de México (UNAM) (1056-H1-836)
- 9:40AM *Rip-off or Reverence? Hypsicles of Alexandria and the fourteenth book of the Euclid's Elements.*
 (170) **Clemency J Montelle**, University of Canterbury (1056-H1-1140)
- 10:00AM *Conjugate Diameters: Apollonius of Perga and Eutocius of Ascalon.* Preliminary report.
 ► (171) **Colin Bryan Powell McKinney**, University of Iowa (1056-H1-580)
- 10:20AM *Newton's Principia : What is in it and why should we care?*
 ► (172) **Herbert E Kasube**, Bradley University (1056-H1-818)
- 10:40AM *Eric Temple Bell's Men of Mathematics: From Influential to Infamous.*
 ► (173) **V. Frederick Rickey**, West Point (1056-H1-1323)

MAA Minicourse #13: Part A

9:00 AM – 11:00 AM

Taking symbols seriously: Teaching form and function in college algebra.

Organizers: **William G. McCallum**, University of Arizona
Deborah Hughes Hallett, University of Arizona and Harvard University
Pat Shure, University of Michigan

MAA Minicourse #4: Part A

9:00 AM – 11:00 AM

Using video-case studies in teaching a proof-based gateway course to the mathematics major.

Organizers: **James T. Sandefur**, Georgetown University
Connie M. Campbell, Millsaps College
Kay B. Somers, Moravian College

MAA Minicourse #7: Part A

9:00 AM – 11:00 AM

Teaching with clickers in the classroom.

Organizers: **Derek Bruff**, Vanderbilt University
Adam Lucas, Saint Mary's College of California

MAA Session on My Most Successful Math Club Activity

9:00 AM – 10:35 AM

Organizers: **Jacqueline A. Jensen**, Sam Houston State University

Deanna B. Haunsperger, Carlton College

Robert W. Vallin, Slippery Rock University and the MAA

9:00AM *The most engaging activity in Mathematics/Computer Science Club.* Preliminary report.
▶ (174) **Ryo Ohashi**, King's College (1056-K5-1587)

9:20AM *Lawrence Tech's best Math Club events.*
▶ (175) **Ruth Favro**, Lawrence Technological University (1056-K5-684)

9:40AM *A Revamped Problem-Solving Competition.* Preliminary report.
▶ (176) **Pamela A Richardson*** and **Natacha C Fontes-Merz**, Westminster College (1056-K5-639)

10:00AM *Digital Scavenger Hunts.*
▶ (177) **Tom Thompson**, Walla Walla University (1056-K5-455)

10:20AM *Math Extravaganza!*
▶ (178) **Tracii Friedman**, Mesa State College (1056-K5-1627)

10:30AM *Leavitt Algebras and Categories of Modules for Nonunital Rings.* Preliminary report.
(181) **Leandro Marin**, Universidad de Murcia (Spain) (1056-18-1036)

10:45AM *The First of the Three Homotopy Exact Sequences of a Fibration in Module Theory.*
(182) **C. Joanna Su**, Providence College (1056-18-1937)

AMS Invited Address

10:05 AM – 10:55 AM

(183) *Chaos and symmetry in partially hyperbolic systems.*
Amie Wilkinson, Northwestern University (1056-37-8)

AMS Session on Matrices and Tensors

10:15 AM – 10:55 AM

10:15AM *On Constructibility Results for a Class of Non-Selfadjoint Analytic Perturbations of Matrices with Degenerate Eigenvalues.*
(184) **Aaron Welters**, UCI (1056-15-1076)

10:30AM *Factorization Strategies for Tensors.*
(185) **Misha Kilmer**, Tufts University, and **Carla D Martin***, James Madison University (1056-15-2082)

10:45AM *Spectrally arbitrary patterns of matrices over finite fields.*
(186) **Elizabeth J. Bodine*** and **Judith J. McDonald**, Washington State University (1056-15-935)

Student Hospitality Center

9:00 AM – 5:00 PM

MAA CUPM Subcommittee on Mathematics Across the Disciplines Panel Discussion

9:00 AM – 10:20 AM

Mathematical collaborations with other disciplines: Research partnerships and interdisciplinary programs.

Organizer: **Joseph Malkevitch**, York College (CUNY)

Panelists: **Steven Brams**, New York University
Susan L. Ganter, Clemson University
James G. Glimm, SUNY at Stony Brook
Suzanne M. Lenhart, University of Tennessee

MAA Panel Discussion

9:00 AM – 10:20 AM

National Science Foundation's programs supporting learning and teaching in the mathematical sciences.

Organizers: **Henry Warchall**, NSF/DMS
Karen A. Marrongelle, NSF/DRL
Dennis E. Davenport, NSF/DUE
Daniel P. Maki, NSF/DUE
Lee L. Zia, NSF/DUE

MAA Department Liaisons Meeting

9:30 AM – 11:00 AM

AMS Session on Category Theory

10:00 AM – 10:55 AM

10:00AM *A finiteness property for braided fusion categories.*
(179) **Deepak Naidu*** and **Eric Rowell**, Texas A&M University (1056-18-316)

10:15AM *Blocks in Deligne's $Rep(S_t)$.*
(180) **Jonny Comes**, University of Oregon (1056-18-983)

AMS-MAA Invited Address

11:10 AM – NOON

▶ (187) *The interpolation problem.*
Joseph Harris, Harvard University (1056-14-41)

Exhibits and Book Sales

12:15 PM – 5:30 PM

Come to the Grand Opening at 12:15!

AMS Colloquium Lectures: Lecture I

1:00 PM – 2:00 PM

(188) *Increasing and decreasing subsequences.*
Richard P. Stanley, M.I.T. (1056-05-16)

MAA Invited Address

2:15 PM – 3:05 PM

(189) *The real computation controversy: Is it real?*
Lenore Blum, Carnegie Mellon University (1056-A0-4)

AMS-SIAM Special Session on Mathematics of Computation, II

2:15 PM – 6:05 PM

Organizers: **Susanne Brenner**, Louisiana State University
Chi-Wang Shu, Brown University

2:15PM *Bayesian Scientific Computing.*
▶ (190) **Daniela Calvetti*** and **Erkki J. Somersalo**, Case Western Reserve University (1056-65-2138)

- 2:45PM *Global Minimization of Markov Random Fields with Applications to Optical Flow.*
 ▶ (191) **Tom Goldstein***, **Xavier Bresson** and **Stanley Osher**, UCLA (1056-49-1648)
- 3:15PM *Evaluating expectations of functionals of Brownian motions: a multilevel idea.*
 (192) **Ben Niu***, **Fred Hickernell**, Illinois Institute of Technology, **Thomas Müller-Gronbach**, Universität Passau, and **Klaus Ritter**, Technische Universität Darmstadt (1056-65-453)
- 3:45PM *A Dual Iterative Substructuring Method with a Penalty Term in Three Dimensions.*
 ▶ (193) **Eun-Hee Park***, Louisiana State University, and **Chang-Ock Lee**, KAIST (1056-65-616)
- 4:15PM *A higher order WENO algorithm to solve radiative transfer of photons in the ‘early universe’.*
 ▶ (194) **Ishani Roy***, Brown University, **Wen Xu**, University of Arizona, **Jing-Mei Qiu**, Colorado School of Mines, **Chi-Wang Shu**, Brown University, and **Li-Zhi Fang**, University of Arizona (1056-65-691)
- 4:45PM *Simulation of Surfactant Dynamics using Spectral Method.* Preliminary report.
 (195) **Yuen Yick Kwan**, Tulane University (1056-65-1963)
- 5:15PM *The Multiscale Discontinuous Galerkin Method for Solving a Class of Second Order Elliptic Problems with Rough Coefficients.*
 (196) **Wei Wang***, Center for Turbulence Research, Stanford University, **Johnny Guzmán** and **Chi-Wang Shu**, Brown University (1056-65-1623)
- 5:45PM *Efficient High-Order Methods Using Bandlimited Basis Functions.*
 (197) **Li-Lian Wang**, Nanyang Technological University (1056-65-1507)
- 2:45PM *Complex Dynamics and Symbolic Dynamics.*
 (204) **Elizabeth D Russell**, United States Military Academy (1056-37-1039)
- 3:15PM *Competition Models with Allee effects.* Preliminary report.
 ▶ (205) **N Saber Elaydi**, Trinity University (1056-39-1017)
- 3:45PM *Stability and complexity of small random systems of stochastic linear difference equations.*
 (206) **Harold M Hastings***, **Michael Bantegui**, **Michael Palmer** and **Thomas Savino**, Hofstra University (1056-39-1070)
- 4:15PM *The Dynamics of the Periodically Forced Sigmoid Beverton-Holt Model, part I.* Preliminary report.
 ▶ (207) **April Harry**, Xavier University of Louisiana, **Candace M Kent**, Virginia Commonwealth University, and **Vlajko L Kocic***, Xavier University of Louisiana (1056-39-916)
- 4:45PM *The Dynamics of the Periodically Forced Sigmoid Beverton-Holt Model, part II.* Preliminary report.
 (208) **April Harry**, Xavier University of Louisiana, **Candace M Kent***, Virginia Commonwealth University, and **Vlajko L Kocic**, Xavier University of Louisiana (1056-39-917)
- 5:15PM *The Aging Heart and the Loss of Complexity—a Difference Equation Model.* Preliminary report.
 ▶ (209) **Tamara Eugenia Awerbuch-Friedlander*** and **Richard Levins**, Harvard School of Public Health (1056-39-2059)
- 5:45PM *A difference equation model to measure the length of Latency of HSV1 infections in differential cells.*
 ▶ (210) **Youssef M Dib*** and **Mariette Maroun**, University of Louisiana, Monroe (1056-39-1846)

AMS-ASL Special Session on Surreal Numbers, II

2:15 PM – 6:05 PM

Organizers: **Lou van den Dries**, University of Illinois
Philip Ehrlich, Ohio University

- 2:15PM *Transseries, a survey.*
 ▶ (198) **Joris van der Hoeven**, University of Paris-Sud, (1056-06-612)
- 3:15PM *The exponential logarithmic power series fields.*
 (199) **Salma Kuhlmann***, Universitaet Konstanz, and **Saharon Shelah**, Hebrew University (1056-06-1940)
- 4:15PM *Surreal numbers as transseries.*
 (200) **Joris van der Hoeven**, University of Paris-Sud, **Salma Kuhlmann** and **Mickaël Matusinski***, University of Konstanz (1056-06-594)
- 5:15PM *Generalized power series and real closed fields, Part I.*
 (201) **Julia Knight** and **Karen Lange***, University of Notre Dame (1056-03-678)
- 5:45PM *Generalized power series and real closed fields: Part II.*
 ▶ (202) **Julia F. Knight*** and **Karen Lange**, University of Notre Dame (1056-03-649)

AMS Special Session on Difference Equations and Applications, II

2:15 PM – 6:05 PM

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

- 2:15PM *Global Behavior of Solutions to a Planar System of First-Order Rational Difference Equations.*
 (203) **Sukanya Basu**, Midwestern State University (1056-39-764)

AMS Special Session on Geometric Aspects of Link and 3-manifold Invariants, I

2:15 PM – 6:05 PM

Organizers: **Oliver Dasbach**, Louisiana State University
Effie Kalfagianni, Michigan State University

- 2:15PM *Heegaard genus, cut number, weak p-congruence, and quantum invariants.*
 (211) **Patrick M Gilmer**, Louisiana State University (1056-57-619)
- 2:45PM *A dimer model for the twisted Alexander polynomial.*
 (212) **Moshe Cohen**, **Oliver Dasbach** and **Heather M. Russell***, Louisiana State University (1056-57-1827)
- 3:15PM *Graph-based methods establishing nontriviality of state cycle Khovanov homology classes.*
 (213) **Andrew Elliott**, Rice University (1056-57-47)
- 3:45PM *On Khovanov homology and Heegaard Floer homology.*
 (214) **J. Elisenda Grigsby***, Boston College, and **Stephan M. Wehrli**, Institut de Mathematiques de Jussieu; Université Paris 7 (1056-51-1342)
- 4:15PM *Topologically slice knots with non-trivial Alexander polynomial.*
 (215) **Matthew E Hedden***, Michigan State University, **Charles Livingston**, Indiana University, and **Daniel Ruberman**, Brandeis University (1056-57-1085)
- 4:45PM *Walks Along Braids and the Colored Jones Polynomial.* Preliminary report.
 (216) **Cody Armond**, Louisiana State University (1056-57-1329)

- 5:15PM *On Jones polynomials of closed braids with a full twist*. Preliminary report.
(217) **Abhijit Champanerkar*** and **Ilya Kofman**, College of Staten Island, CUNY (1056-57-1373)
- 5:45PM *Ribbon-graph tensor products, relative polynomial invariants and applications to links*. Preliminary report.
(218) **Neal W. Stoltzfus***, Louisiana State University, and **Brittan Farmer**, University of Michigan (1056-57-1436)

AMS Special Session on Harmonic Analysis (Mathematics Research Communities session), II

2:15 PM – 5:05 PM

Organizers: **Kabe Moen**, Washington University
Richard Oberlin, University of California Los Angeles
Betsy Stovall, University of California Los Angeles

- 2:15PM *Regularization for Slightly Super Critical Surface Quasi-geostrophic Equation*.
(219) **Michael Dabkowski**, University of Wisconsin (1056-42-1651)
- 2:45PM *Sobolev space estimates for a class of bilinear pseudodifferential operators unbounded on Lebesgue spaces*.
(220) **Frederic Bernicot**, CNRS & Universite Lille 1, Laboratoire de Mathematiques Paul Painleve, France, and **Rodolfo H. Torres***, University of Kansas (1056-42-953)
- 3:15PM *Sobolev Inequalities for $(0, q)$ forms on CR manifolds of finite type*.
(221) **Po Lam Yung**, Princeton University (1056-42-291)
- 3:45PM *Multi-linear integrals associated to sparse subsets of \mathbb{R}* .
(222) **Izabella Laba** and **Malabika Pramanik***, University of British Columbia, Vancouver (1056-42-1003)
- 4:15PM *Pointwise Divergence of L^1 Ergodic Averages Along the Nth Powers*.
(223) **Patrick R. LaVictoire**, UC Berkeley (1056-37-1257)
- 4:45PM *Upper Bounds for Multilinear Sublevel Sets*.
(224) **Michael Christ**, University of California, Berkeley (1056-42-1513)

AMS Special Session on Inverse Problems: Analysis and Computations (Mathematics Research Communities session), II

2:15 PM – 5:35 PM

Organizers: **Gaik Ambartsoumian**, University of Texas at Arlington
Raluca Felea, Rochester Institute of Technology
Hongyu Liu, University of Washington
Kui Ren, University of Texas at Austin
Michael VanValkenburgh, University of California Berkeley

- 2:15PM *Reconstruction of the Stefan-Boltzmann coefficients in the heat transfer process*.
(225) **Jin Cheng***, Fudan University, Shanghai, China, **Shuai Lu**, Johann Radon Institute for Computational and Applied Mathematics, Austria, and **Masahiro Yamamoto**, University of Tokyo (1056-35-550)
- 2:45PM *Imaging from Bistatic and Multiply Scattered Waves*.
(226) **Clifford J Nolan*** and **Thomas Dowling**, University of Limerick (1056-42-1526)

- 3:15PM *Inverse transport theory and optical tomography for media with varying index of refraction*.
(227) **Stephen McDowall**, Western Washington University (1056-35-902)
- 3:45PM *Inverse Spectral Problems for Analytic Domains in \mathbb{R}^n* .
(228) **Hamid Hezari***, MIT, and **Steve Zelditch**, Johns Hopkins University (1056-35-1009)
- 4:15PM *A Multilevel, Modified Regularized Total Least Norm Approach to Signal Deblurring*.
(229) **Malena Espanol***, California Institute of Technology, and **Misha Kilmer**, Tufts University (1056-65-1021)
- 4:45PM *On a minimization problem for conductivity imaging*.
(230) **Alexandru Tamasan**, University of Central Florida (1056-49-938)
- 5:15PM *Inverse diffusion with internal measurements*.
(231) **Guillaume Bal**, Columbia University (1056-35-1970)

AMS Special Session on the Mathematical Challenges of Relativity (Mathematics Research Communities session), II

2:15 PM – 5:05 PM

Organizers: **Paul T. Allen**, Lewis & Clark College
Michael Eichmair, M.I.T. and Monash University
Gustav Holzegel, Princeton University
Jared Speck, Princeton University
Willie W. Wong, University of Cambridge

- 2:15PM *Hypersurfaces in Hyperbolic Poincaré Manifolds and Conformally Invariant PDEs*.
(232) **Vincent Bonini***, California Polytechnic State University, **Jie Qing**, University of California, Santa Cruz, and **Jose Espinar**, Universidad de Granada (1056-53-1316)
- 2:45PM *Global geometry of T^2 symmetric spacetimes with weak regularity*.
(233) **Jacques Smulevici***, Max-Planck-Institute for Gravitational Physics, and **Philippe G. LeFloch**, Laboratoire Jacques-Louis Lions and CNRS (1056-83-1198)
- 3:15PM *On Hamilton's Ricci flow and Bartnik's construction of metrics of prescribed scalar curvature*.
(234) **Chen-Yun Lin**, Columbia University (1056-83-349)
- 3:45PM *Optimization problems within a harmonic conformal class*.
(235) **Jeffrey L Jauregui**, Duke University (1056-53-366)
- 4:15PM *A gluing construction regarding point particles in general relativity*. Preliminary report.
(236) **Iva Stavrov**, Lewis and Clark College (1056-83-694)
- 4:45PM *A Model Problem for Conformal Parameterizations of the Einstein Constraint Equations*.
(237) **David Maxwell**, University of Alaska Fairbanks (1056-35-663)

AMS Special Session on Algebraic Aspects of Cryptology, II

2:15 PM – 5:35 PM

Organizers: **Jintai Ding**, University of Cincinnati
Chris Christensen, Northern Kentucky

2:15PM *Solving multivariate polynomial equations over finite fields*. Preliminary report.
▶ (238) **Ding Jintai**, University of Cincinnati (1056-12-1621)

- 3:15PM *Growth of the ideal generated by a quadratic Boolean function.* Preliminary report.
(239) **Jintai Ding**, **Timothy J Hodges*** and **Victoria Kruglov**, University of Cincinnati (1056-13-1539)
- 3:45PM *MutantXL: An Efficient Algorithm for Solving Multivariate Polynomial Equations.*
(240) **Johannes Buchmann**, TU Darmstadt, **Jintai Ding**, University of Cincinnati, **Mohamed Saied Emam Mohamed***, **Wael Said Abd Elmageed Mohamed**, TU Darmstadt, and **Daniel Cabarcas**, University of Cincinnati (1056-14-477)
- 4:15PM *New Algorithm for Computing Grobner bases.*
(241) **Shuhong Gao*** and **Yinhua Guan**, Clemson University (1056-13-1705)
- 4:45PM *Analysis of a Multivariate Internal Perturbation Scheme.*
(242) **Lei Hu**, Graduate School of Chinese Academy of Sciences (1056-94-1122)
- 5:15PM *A Signature Scheme over Non-commutative Groups*
▶ (243) *Secure Against Existential Forgery.* Preliminary report.
Yesem Kurt-Peker, Randolph College (1056-94-1566)

AMS Special Session on Markov Chains and Their Statistical Applications (Mathematics Research Communities session), II

2:15 PM – 4:55 PM

Organizers: **James Flegal**, University of California Riverside
Radu Herbei, Ohio State University
Jessica Zuniga, Stanford University

- 2:15PM *Hitting-time Distributions for Markov Chains.*
(244) Preliminary report.
James Allen Fill, The Johns Hopkins University (1056-60-1746)
- 3:15PM *Evaluation of Formal posterior distributions via Markov chain arguments.*
(245) **Galin Jones**, University of Minnesota (1056-62-1158)
- 4:15PM *Finding Sparse Cuts Locally Using Evolving Sets.*
(246) **Reid Andersen**, Microsoft, and **Yuval Peres***, Microsoft Research (1056-60-1993)

AMS Special Session on Zonotopal Algebra and Its Applications, II

2:15 PM – 5:55 PM

Organizers: **Olga Holtz**, University of California Berkeley and Technical University Berlin
Amos Ron, University of Wisconsin

- 2:15PM *Jump formulae for Multiple Bernoulli polynomials and Verlinde sums.* Preliminary report.
(247) **Michele Vergne**, Paris, France (1056-52-886)
- 3:15PM *Hierarchical zonotopal spaces.*
(248) **Olga Holtz**, University of California-Berkeley, Technische Universitaet Berlin, Institute for Advanced Study, **Amos Ron***, University of Wisconsin-Madison, and **Zhiqiang Xu**, Chinese Academy of Sciences (1056-13-1949)
- 4:15PM *Multiparking Functions, Graph Search, and Tutte Polynomial.*
(249) **Catherine Yan*** and **Dimitrije Kostic**, Texas A&M University (1056-05-674)

- 4:45PM *Double Hurwitz numbers as splines.* Preliminary report.
▶ (250) **Federico Ardila**, San Francisco State University (1056-05-1856)
- 5:15PM *Power Ideals.*
(251) **Alexander Postnikov***, MIT, and **Federico Ardila**, SFSU (1056-05-1785)

AMS Special Session on Applications of Graph Theory, II

2:15 PM – 6:05 PM

Organizers: **Richard Low**, San Jose State University
Raluca M. Gera, Naval Postgraduate School

- 2:15PM *An Effective Upperbound on Treewidth Using Partial Fill-in of Separators.*
(252) **Martin Charles Golumbic***, Caesarea Rothschild Institute and Department of Computer Science, University of Haifa, and **Boi Faltings**, Artificial Intelligence Laboratory (LIA), Ecole Polytechnique Fédérale de Lausanne (EPFL) (1056-05-576)
- 2:45PM *A new proof of the four-color theorem.*
▶ (253) **John Paul Steinberger**, Tsinghua University, Beijing (1056-05-253)
- 3:15PM *On Graham's Tree Reconstruction Conjecture.*
(254) **Bill Kay*** and **Joshua Cooper**, University of South Carolina (1056-05-326)
- 3:45PM *Non-existence of circulant expander family.*
▶ (255) Preliminary report.
Wasin So, San Jose State University (1056-05-313)
- 4:15PM *Detecting a Machine Failure in a Network: Vertex Identifying Codes.*
▶ (256) **Daniel W Cranston***, Virginia Commonwealth University, and **Gexin Yu**, College of William & Mary (1056-05-281)
- 4:45PM *Best Monotone Degree Conditions for the Integrity and Tenacity of Graphs.*
(257) **Michael Robert Yatauro**, Research Fellow/Stevens Institute of Technology (1056-00-1674)
- 5:15PM *Toughness and Degree Sequence Conditions.*
(258) Preliminary report.
Nathan Kahl*, Seton Hall University, **Douglas Bauer**, Stevens Institute of Technology, **Hajo Broersma**, Durham University, **Ed Schmeichel**, San Jose State University, and **Jan van den Heuvel**, London School of Economics (1056-05-760)
- 5:45PM *The $L(2, 1)$ channel-assignment problem on trees.*
(259) Preliminary report.
Patrick Bahls, University of North Carolina, Asheville (1056-05-60)

AMS Special Session on Arithmetic and Nonarchimedean Dynamics, II

2:15 PM – 6:05 PM

Organizers: **Joseph Silverman**, Brown University
Michelle Manes, University of Hawaii
Raphael Jones, College of the Holy Cross

- 2:15PM *Multipliers of periodic cycles for cubic polynomials.*
(260) **Patrick Ingram**, University of Waterloo (1056-37-669)
- 2:45PM *Local and global canonical height functions for affine space regular automorphisms.*
(261) **Shu Kawaguchi**, Osaka University (1056-11-973)
- 3:15PM *Rationality of the Space of Morphisms on \mathbb{P}^1 .*
(262) **Alon Levy**, Columbia University (1056-37-565)

- 3:45PM *Torsion points of higher order in the Nottingham group*. Preliminary report.
(263) **Jonathan Lubin**, Brown University (1056-11-361)
- 4:15PM *A Dynamical Pairing Between Two Rational Maps*.
(264) **Clayton Petsche***, Hunter College, **Lucien Szpiro**, CUNY Graduate Center, and **Thomas J. Tucker**, University of Rochester (1056-11-555)
- 4:45PM *A Local-Global Criterion for Dynamics on \mathbb{P}^1* .
(265) **Joseph H. Silverman**, Brown University, and **J. Felipe Voloch***, University of Texas at Austin (1056-11-154)
- 5:15PM *On dynamical zeta functions for polynomial maps over p -adic fields*. Preliminary report.
(266) **Liang-Chung Hsia**, National Central University, Taiwan (1056-11-568)
- 5:45PM *On the Number of Rational Pre-Images Under Quadratic Dynamical Systems*.
▶ (267) **Benjamin Hutz**, Amherst College (1056-11-575)

MAA Invited Paper Session on Online Delivery of Mathematics

2:15 PM – 5:35 PM

Organizer: **Bernd S. W. Schroeder**, Louisiana Tech University

- 2:15PM *On-Line Delivery of Differential Equations: (How) Does It Work?*
▶ (268) **Bernd S. W. Schroeder**, Louisiana Tech University (1056-BD-248)
- 2:45PM *Electronic Study Guide – Maplelets for Calculus*.
▶ (269) **Philip B Yasskin***, Texas A&M University, and **Douglas B Meade**, University of South Carolina (1056-BD-1115)
- 3:15PM *Successful on-line Math course: myth or reality?*
▶ (270) **Larissa Williamson**, University of Florida (1056-BD-270)
- 3:45PM *Online Delivery and the Use of Technology in the Classroom*.
(271) **Michael Speed*** and **Simon Sheather**, Texas A&M University College Station (1056-BD-96)
- 4:15PM *Computational Discrete Mathematics: Computation versus Bourbaki*.
(272) **Klaus Sutner**, Computer Science Department, Carnegie Mellon University (1056-BD-1252)
- 4:45PM *WeBWork: Open source on-line homework system for mathematics*.
▶ (273) **Michael E. Gage**, University of Rochester (1056-BD-584)
- 5:15PM *Evidence Based Course Design – The Open Learning Initiative at Carnegie Mellon*.
▶ (274) **Candace M Thille**, Carnegie Mellon University (1056-BD-1824)

MAA Minicourse #11: Part A

2:15 PM – 4:15 PM

The mathematics of Islam and its use in the teaching of mathematics.

Organizer: **Victor J. Katz**, University of the District of Columbia

MAA Minicourse #12: Part A

2:15 PM – 4:15 PM

Learning discrete mathematics via historical projects.

Organizers: **Jerry M. Lodder**, New Mexico State University

Guram Bezhaniashvili, New Mexico State University
David Pengelley, New Mexico State University

MAA Minicourse #6: Part A

2:15 PM – 4:15 PM

Developing departmental self-studies.

Organizers: **Donna L. Beers**, Simmons College
Nancy Baxter Hastings, Dickinson College

AMS Session on Group Theory, II

2:15 PM – 5:55 PM

- 2:15PM *Complete Groups: The Automorphism Tower and Some Characterizations*.
(275) **Elizabeth Wilcox**, Binghamton University (1056-20-733)
- 2:30PM *Representations of the Iwahori-Hecke algebra of the symmetric group*.
▶ (276) **Charles E Buehrle**, Lehigh University (1056-20-1061)
- 2:45PM *On the nonabelian tensor product of finite groups of relatively prime order*. Preliminary report.
(277) **Luise-Charlotte Kappe** and **Viji Thomas***, Binghamton University (1056-20-1265)
- 3:00PM *On Z -Structures of Groups*. Preliminary report.
(278) **Carrie Jean Tirel**, University of Wisconsin - Milwaukee (1056-20-1376)
- 3:15PM *Some Coxeter groups of CAT(0) dimension three*.
(279) **Cody L Patterson**, University of Texas at Austin (1056-20-1381)
- 3:30PM Break.
- 3:45PM *Central Extensions of Divisible Groups*.
(280) **Jason Elliot**, University of Illinois at Urbana-Champaign (1056-20-1461)
- 4:00PM *Stable Commutator Length in Braid Groups*. Preliminary report.
(281) **Joel Louwsma**, California Institute of Technology (1056-20-1483)
- 4:15PM *Enumerating Nilpotent Loops*.
(282) **Daniel A Daly***, Southeast Missouri State University, and **Petr Vojtechovsky**, University of Denver (1056-20-1598)
- 4:30PM *The free metabelian product of a free nilpotent group with a free abelian group*.
(283) **Margaret H. Dean**, Borough of Manhattan Community College of CUNY (1056-20-1655)
- 4:45PM *Localization and extraction of roots in nilpotent R -powered groups*. Preliminary report.
(284) **Marcos Zyman***, Borough of Manhattan Community College, CUNY, and **Stephen Majewicz**, Kingsborough Community College, CUNY (1056-20-1659)
- 5:00PM Break.
- 5:15PM *An introduction to the Bieri-Neumann-Strebel Invariant for finitely generated groups*.
(285) **Keith Michael Jones**, Binghamton University (SUNY) (1056-20-1740)
- 5:30PM *On Some Conjectures Concerning Groups With Perfect Order Subsets*. Preliminary report.
▶ (286) **Lenny Jones** and **Kelly Toppin***, Shippensburg University (1056-20-1782)
- 5:45PM *Computing the Projective Indecomposable Modules of large Finite Groups*.
(287) **Selin Kalaycioglu**, Kenyon College (1056-20-2114)

AMS Session on Probability and Statistics, II

2:15 PM – 5:55 PM

- 2:15PM *The Density Function of the First Occurrence of a Binary Pattern.* (288)
Michael J.J. Barry, Allegheny College (1056-60-785)
- 2:30PM *Central Limit Theorems for Hilbert-space Valued Random Fields Satisfying a Strong Mixing Condition.* (289)
Cristina Tone, Indiana University (1056-60-981)
- 2:45PM *A method for finding exact site percolation critical thresholds for a class of lattices.* Preliminary report. (290)
Matthew R. A. Sedlock* and **John C. Wierman**, Johns Hopkins University (1056-60-1080)
- 3:00PM *On Dynamic Scheduling of a Parallel Server System with Certain Graph Structure.* Preliminary report. (291)
Vladimir Pesic* and **Ruth Williams**, UCSD (1056-60-1367)
- 3:15PM *Asymptotic behavior of the finite-size magnetization as a function of the speed of approach to criticality.* (292)
Richard S Ellis, **Jonathan Machta**, University of Massachusetts, Amherst, and **Peter T Otto***, Willamette University (1056-60-1379)
- 3:30PM Break
- 3:45PM *Two related integrals over spaces of continuous functions, revisited.* Preliminary report. (293)
Ian Pierce, University of Nebraska - Lincoln (1056-60-1744)
- 4:00PM *Phases in the Mixing of Gases via the Ehrenfest Urn Model.* (294)
Srinivasan Balaji* and **Hosam M Mahmoud**, George Washington University (1056-60-1920)
- 4:15PM *Further results on statistical significance of ranking paradoxes.* Preliminary report. (295)
Anna E. Bargagliotti, University of Memphis, and **Raymond N. Greenwell***, Hofstra University (1056-62-59)
- 4:30PM *Statistical Inference for Computer Models with Multidimensional Output.* Preliminary report. (296)
Dorin Drignei, Oakland University (1056-62-329)
- 4:45PM *The Use of Skew-Normal Distribution for Dose-Response Modeling in Toxicological Experiments.* (297)
Mehdi Razzaghi, Bloomsburg University (1056-62-521)
- 5:00PM Break
- 5:15PM *Graph ranking on gene network.* (298)
Cuilan Gao*, **Xin Dang**, **Yixin Chen** and **Dawn Wilkins**, University of Mississippi (1056-62-711)
- 5:30PM *Estimation of the Convolution of Distributions Under Different Censoring Models of Survival Data.* (299)
Ke Wu, California State University, Fresno (1056-62-738)
- 5:45PM *Improving an existing estimator of the unknown input function.* (300)
Eun-Joo Lee*, Millikin University, and **Frits Ruymgaart**, Texas Tech University (1056-62-931)

AMS Session on Geometry and Topology, II

2:15 PM – 5:55 PM

- 2:15PM *Another look at Euler's parallel oblique-angled diameters.* (301)
Thomas J Osler, Rowan University (1056-51-863)
- 2:30PM *Translation planes admitting a linear Abelian group of order $(q+1)^2$.* (302)
Oscar E Vega*, California State University, Fresno., and **Esteban M Diaz**, University of Connecticut (1056-51-1119)

- 2:45PM *A Characterization Of the Finite Affine Translation Planes Of Odd Order.* Preliminary report. (303)
Ricardo Enrique Rojas, Northern State University (1056-51-1305)
- 3:00PM *A proof of the Kauffman-Harary Conjecture.* (304)
Thomas W Mattman*, California State University, Chico, and **Pablo Solis**, UC, Berkeley (1056-57-358)
- 3:15PM *Representations of arrangement groups.* (305)
Daniel C. Cohen, Louisiana State University, **Michael J. Falk***, Northern Arizona University, and **Richard Randell**, University of Iowa (1056-57-556)
- 3:30PM Break
- 3:45PM *Rigidity of Hyperbolic Orbifolds.* (306)
Philip C Huling, Saint Louis University (1056-57-615)
- 4:00PM *Alpha-Sloped Thin Position for 3-manifolds.* (307)
Marion Moore, UC Davis (1056-57-918)
- 4:15PM *A dictionary for defining key concepts in plasma Physics in terms of Clebsch charts in contact geometry.* Preliminary report. (308)
P. Robert Kotiuga, Boston University, ECE Dept. (1056-57-1313)
- 4:30PM *New twisted dimer model for the twisted Alexander polynomial.* Preliminary report. (309)
Moshe Cohen*, **Oliver Dasbach** and **Heather M. Russell**, Louisiana State University (1056-57-1573)
- 4:45PM *Fundamental Groups of Solenoid Complements.* (310)
Mark H. Meilstrup*, **Gregory Conner**, Brigham Young University, and **Dusan Repovs**, University of Ljubljana (1056-57-1652)
- 5:00PM Break
- 5:15PM *The Structure of Combinatorial Geodesics in CAT(0) Simplicial 3-Complexes.* (311)
Rena M. H. Levitt, Pomona College (1056-57-1875)
- 5:30PM *Shifts on compact metric o-dimensional spaces.* Preliminary report. (312)
Rajagopalan Minakshisundaram, Tennessee State University (1056-54-1264)
- 5:45PM *Generalizations to Coarse Geometry.* Preliminary report. (313)
Jared R. Bunn, University of Tennessee (1056-51-275)

AMS Session on Discrete Mathematics, II

2:15 PM – 5:40 PM

- 2:15PM *The Strength of the Grätzer-Schmidt Theorem.* (314)
Paul Steven Brodhead*, Virginia State University, and **Bjørn Kjos-Hanssen**, University of Hawaii at Manoa (1056-06-768)
- 2:30PM *Results on the Order Between Orbits in the Conjugacy Decomposition of a Canonical Monoid.* (315)
Ryan K Therkelsen, North Carolina State University (1056-06-1000)
- 2:45PM *A gap theorem for the poset of sequential degrees.* Preliminary report. (316)
Benjamin Wells, University of San Francisco (1056-06-1283)
- 3:00PM *The Toothpick Sequence and Other Sequences from Cellular Automata.* Preliminary report. (317)
Neil J. A. Sloane, AT&T Shannon Labs (1056-05-230)
- 3:15PM *Symmetry and Log-Concavity Results for the Fibmaj Statistic.* Preliminary report. (318)
Kendra Killpatrick, Pepperdine University (1056-05-428)
- 3:30PM Break

- 3:45PM Lower Bounds for Balanced Simplicial Complexes.
▶ (319) **Steven Klee**, University of Washington (1056-05-467)
- 4:00PM Packing Degree Sequences. Preliminary report.
▶ (320) **Tyler Seacrest**, University of Nebraska – Lincoln (1056-05-506)
- 4:15PM Thin Lehman Matrices and Their Graphs.
(321) **Jonathan Wang**, Harvard University (1056-05-533)
- 4:30PM Break
- 4:45PM Extremal 2-supereulerian graphs. Preliminary report.
(322) **Hong-Jian Lai**, West Virginia University, and **Huiya Yan***, University of Wisconsin-La Crosse (1056-05-536)
- 5:00PM The optimal t -rubbling number of the complete m -ary tree. Preliminary report.
(323) **Lisa Danz**, Massachusetts Institute of Technology (1056-05-586)
- 5:15PM Simultaneous and non-simultaneous Bulgarian Exchange. Preliminary report.
▶ (324) **Suzanne I Doree**, Augsburg College, Minneapolis (1056-05-651)
- 5:30PM Supereulerian Graphs and Hamiltonian Line Graphs.
(325) **Yanting Liang**, West Virginia University (1056-05-731)
- 4:30PM An Action Research Proposal: Does the Ability to Purchase a Week's Worth of Groceries for under One Dollar Influence the Chance that a Student will make an "Innumeracy Type" Statistical Error? Preliminary report.
▶ (335) **Larry Wayne Lewis**, Spalding University (1056-Z1-1605)
- 4:45PM Using Proofs without Words to Explore Rules of Differentiation.
(336) **Tom McMillan** and **Jim Fulmer***, University of Arkansas at Little Rock (1056-Z1-1601)
- 5:00PM The Blip of the Blop: A Successful Mathematics Major Seminar. Preliminary report.
▶ (337) **Gerald M. Higdon**, Fitchburg State College (1056-Z1-1311)
- 5:15PM Statistics-Based Calculus?
▶ (338) **Patti Frazer Lock**, St. Lawrence University (1056-Z1-1241)
- 5:30PM Mathematics across the Curriculum: A Twenty-year Retrospective.
▶ (339) **Frank Anthony Cerreto**, The Richard Stockton College of NJ (1056-Z1-1309)
- 5:45PM Visualizing and Utilizing the Symmetry Method for Differential Equations.
▶ (340) **S. L. Yap**, California State University East Bay (1056-Z1-1443)

MAA Session on General Contributed Papers, II

2:15 PM – 5:55 PM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- 2:15PM Huppert's Conjecture and $\text{PSp}_4(q)$.
(326) **Thomas Philip Wakefield**, Youngstown State University (1056-Z1-336)
- 2:30PM Lobb's Generalization of Catalan's Parenthesization Problem and Forder's Catalan Triangle.
▶ (327) **Thomas Koshy**, Framingham State College (1056-Z1-974)
- 2:45PM Why is $\text{PSL}(2, 7) \cong \text{GL}(3, 2)$?
▶ (328) **Ezra Brown*** and **Nicholas A. Loehr**, Virginia Tech (1056-Z1-379)
- 3:00PM The Harmonic Series and Biconvergence: One step forward, two steps back.
▶ (329) **Christopher M Davis**, George Mason University, and **David G Taylor***, Roanoke College (1056-Z1-387)
- 3:15PM Polynomial Root Motion.
▶ (330) **Christopher S Frayer**, University of Wisconsin-Platteville (1056-Z1-636)
- 3:30PM Mathematics in Signal Processing.
▶ (331) **Mohamed Allali**, Chapman University (1056-Z1-646)
- 3:45PM A Two-Course Sequence on Mathematical Programming for Undergraduates.
▶ (332) **Paul E. Fishback**, Grand Valley State University (1056-Z1-604)
- 4:00PM Bridging Policy and Practice Through Ethnomathematics in the Pacific.
▶ (333) **Linda Furuto**, University of Hawai'i (1056-Z1-39)
- 4:15PM Just-in-Time Calculus. Preliminary report.
▶ (334) **Katherine S. Kelm**, California State University, Fresno (1056-Z1-1805)

MAA Session on Developmental Mathematics Education: Helping Under-Prepared Students Transition to College-Level Mathematics, I

2:15 PM – 4:10 PM

Organizers: **Kimberly J. Presser**, Shippensburg University
J. Winston Crawley, Shippensburg University

- 2:15PM College Mathematical Readiness of the Senior High School Students of the Public Schools in District I of Davao City, Philippines.
(341) **Melanie Joyno Orig**, University of Mindanao, Davao City, Philippines (1056-D1-223)
- 2:35PM Developmental Mathematics and Assessment: Where have we come from? Where are we now? Where are we going? Preliminary report.
(342) **Kimberly J Presser**, Shippensburg University (1056-D1-809)
- 2:55PM "Rock Math" a Successful Implementation of a Curriculum Designed to Help Under-prepared Students make the Transition to College Mathematics.
▶ (343) **Robert E Burks*** and **Eric W. Drake**, United States Military Academy (1056-D1-233)
- 3:15PM Online Interdisciplinary Mathematics: Project MESH.
(344) **Suzanne Galayda*** and **Kathleen Berver**, New Mexico State University (1056-D1-1413)
- 3:35PM Beginning Behind: The Effect of Background Knowledge and Mathematical Self Image on University Precalculus Students' Success.
▶ (345) **Christine L. Ebert**, **Donna A. Mark*** and **Rachael M. Todd**, University of Delaware (1056-D1-881)
- 3:55PM Understanding and addressing the social/emotional needs of learners with histories of difficulty in mathematics.
(346) **Michael H Davis**, UC Berkeley Lawrence Hall of Science (1056-D1-794)

MAA Session on Experiences that Enrich the Education of Mathematics Majors, I

2:15 PM – 5:50 PM

Organizers: **Suzanne M. Lenhart**, University of Tennessee
Steven J. Schlicker, Grand Valley State University
J. Douglas Faires, Youngstown State University
Michael J. Dorff, Brigham Young University

- ▶ 2:15PM (347) *REU and REV program at the new institute, NIMBioS.* Preliminary report.
Suzanne Lenhart*, University of Tennessee, and **Sarah Duncan**, National Institute for Mathematical and Biological Synthesis (1056-E5-263)
- ▶ 2:35PM (348) *Enhancing teaching and learning of undergraduate mathematics majors through transformative research and training in biological and bio-inspired systems.* Preliminary report.
Kris Kappmeyer, H-B Woodlawn, Arlington Public Schools, VA, **Sarah Minerva Venuti**, George Mason University, VA, **Courtney Marie Chancellor**, Southern Methodist University, TX, and **Padmanabhan Seshaiyer***, George Mason University, VA (1056-E5-246)
- ▶ 2:55PM (349) *Collaborative Synthetic Biology Research for Undergraduates.*
Jeffrey L Poet*, Missouri Western State University, and **Laurie J Heyer**, Davidson College (1056-E5-1164)
- ▶ 3:15PM (350) *Enriching the Major through a Comprehensive Scholarship Program.* Preliminary report.
Deborah Lawrence* and **Tina Alves Mancuso**, The Sage Colleges (1056-E5-1603)
- ▶ 3:35PM (351) *Integrating Civic Engagement in an Integral Calculus Course.* Preliminary report.
Barbara P. Gonzalez-Arevalo* and **Melanie Pivarski**, Roosevelt University (1056-E5-480)
- ▶ 3:55PM (352) *Undergraduate Research as Resource.* Preliminary report.
Michael E McDaniel, Aquinas College (1056-E5-266)
- ▶ 4:15PM (353) *From Inquiry to Research—Fostering Research with Undergraduates.*
David A. Brown, Ithaca College (1056-E5-211)
- ▶ 4:35PM (354) *An undergraduate original research experience: Mathematical modeling with graph theory.*
Faun C. Doherty, Washington and Jefferson College (1056-E5-97)
- ▶ 4:55PM (355) *“Introduction to Being a Math Major” seminar.*
Michael Dorff, Brigham Young University (1056-E5-1200)
- ▶ 5:15PM (356) *Bio-Math Connection in Undergraduate Mathematics.* Preliminary report.
Urmi Ghosh-Dastidar, New York City College of Technology, CUNY (1056-E5-2016)
- ▶ 5:35PM (357) *Expanding Opportunities in Mathematics across the Curriculum.*
Joyati Debnath, Winona State University, Winona, MN (1056-E5-763)

MAA Session on Preparing K-12 Teachers to Teach Algebra, I

2:15 PM – 6:10 PM

Organizers: **Elizabeth Burroughs**, Montana State University
Angela M. Hodge, North Dakota State University
William G. McCallum, University of Arizona

- ▶ 2:15PM (358) *Developing a Comprehensive and Balanced Perspective on School Algebra Among Practicing Secondary School Mathematics Teachers.*
Xuhui Li, California State University - Long Beach (1056-N1-2062)
- ▶ 2:35PM (359) *Helping teachers develop algebraic reasoning skills through investigation of algebraic proofs and mathematical discourse experiences.*
Tina Louise Johnston*, **Henry Gillow-Wiles** and **Margaret L. Niess**, Oregon State University (1056-N1-2058)
- ▶ 2:55PM (360) *Extending from Multiplication of Two-Digit Numbers to Multiplication of Binomials and Beyond: Understanding the Learning Trajectory.* Preliminary report.
Trisha A. Bergthold, San Jose State University (1056-N1-2057)
- ▶ 3:15PM (361) *Guiding Teachers to See Opportunities for Algebraic Reasoning in the Curriculum.* Preliminary report.
Dale R Oliver, Humboldt State University (1056-N1-1927)
- ▶ 3:35PM (362) *Connecting Mathematics and Pedagogy in Courses for Future Algebra Teachers.*
Rebecca H McGraw* and **William McCallum**, University of Arizona (1056-N1-1804)
- ▶ 3:55PM (363) *The Concept of Variable and the Logic of Solving Equations and Inequalities.*
Susanna Epp, DePaul University (1056-N1-1800)
- ▶ 4:15PM (364) *Measuring the World: Preparing Elementary Teachers to Prepare Students for Algebra.*
Susan L. Addington, California State University, San Bernardino (1056-N1-1786)
- ▶ 4:35PM (365) *A course in Mathematical Knowledge for Teaching for pre-service secondary teachers.*
Diana White, University of Colorado Denver (1056-N1-1699)
- ▶ 4:55PM (366) *An Innovative Course in Elementary Number Theory for Preservice Teachers.* Preliminary report.
Agnes M Rash, Saint Joseph’s University, Philadelphia, PA (1056-N1-1643)
- ▶ 5:15PM (367) *On Line Number and Algebra for In-Service Middle School Math Teachers.*
Michael Mays* and **David Miller**, West Virginia University (1056-N1-1477)
- ▶ 5:35PM (368) *Dihedral Groups for Preservice Elementary Teachers.*
Leah Bridgers, SUNY Oneonta (1056-N1-1475)
- ▶ 5:55PM (369) *Place Value—the Link Between Arithmetic and Success in Algebra.*
Murray H Siegel, Arizona State University, Polytechnic (1056-N1-265)

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

2:15 PM – 5:10 PM

Organizers: **Edwin P. Herman**, University of Wisconsin - Stevens Point

- Nathan M. Wodarz**, University of Wisconsin - Stevens Point
- 2:15PM *Retention Benefits of Refocused College Algebra.*
▶ (370) **Bernadette F. Turner*** and **Donna Stallings**, Lincoln University Jefferson City, MO (1056-Q1-1748)
- 2:35PM *Teaching Reform in College Algebra.* Preliminary report.
▶ (371) **Jinfeng Wei***, **Guangwei Fan** and **Min Deng**, Maryville University of St. Louis (1056-Q1-1177)
- 2:55PM *Beliefs of Liberal Arts Mathematics Students Regarding the Nature of Mathematics.* Preliminary report.
▶ (372) **Stephen D. Szydluk**, University of Wisconsin-Oshkosh (1056-Q1-1549)
- 3:15PM *Mathematics Teachers' Circles.* Preliminary report.
▶ (373) **Harold B Reiter*** and **Anthony Fernandes**, University of North Carolina Charlotte (1056-Q1-1267)
- 3:35PM *Helping Pre-Service Teachers Address their Tendency of Overgeneralizing Proportionality: Using Non-proportional Situations and Focusing on Quantities and Relationships.*
(374) **Kien H. Lim**, University of Texas at El Paso (1056-Q1-243)
- 3:55PM *How Prospective Mathematics Teachers Define Mathematical Definitions.*
▶ (375) **Nermin Tosmur-Bayazit**, Georgia State University (1056-Q1-1803)
- 4:15PM *What Do Students Hear in Statistics Classes: Empirical Results from a Study of Lexical Ambiguity.* Preliminary report.
▶ (376) **Diane Fisher***, University of Louisiana at Lafayette, **Jennifer Kaplan**, Michigan State University, and **Neal Rogness**, Grand Valley State University (1056-Q1-1060)
- 4:35PM *Do discussion boards improve statistical reasoning skills?* Preliminary report.
▶ (377) **Edwin Prine Herman**, University of Wisconsin-Stevens Point (1056-Q1-1732)
- 4:55PM *Strategies that worked for me in Teaching and Learning Undergraduate Mathematics.*
(378) **Joyati Debnath**, Winona State University, Winona, MN (1056-Q1-2007)

MAA Session on The MAA SUMMA Program Turns 20—A Retrospective

2:15 PM – 5:30 PM

Organizers: **William A. Hawkins Jr**, MAA and the University of the District of Columbia
Efraim Armendariz, University of Texas at Austin
Camille A. McKayle, University of the Virgin Islands
Robert E. Megginson, University of Michigan, Ann Arbor

- 2:15PM *The San Antonio Prefreshman Engineering Program Turns 30—A Retrospective.*
▶ (379) **Manuel P. Berriozábal**, University of Texas at San Antonio (1056-G5-438)
- 2:35PM *Minorities and the MAA, Initial Steps.*
▶ (380) **Lida K. Barrett**, Knoxville, TN (1056-G5-282)
- 2:55PM *Strengthening Underrepresented Minority Mathematics Achievement Intervention Programs.*
▶ (381) **Florence Fasanelli**, AAAS (1056-G5-87)

- 3:15PM *Starting and Running an REU for Minorities and Women.*
▶ (382) **Dennis Davenport***, National Science Foundation, and **Bonita Porter**, Miami University (1056-G5-2139)
- 3:35PM *Successful Intervention Programs in Mathematics for Undergraduates Historically Underrepresented in the Mathematics-based Disciplines.*
▶ (383) **James A. Mendoza Epperson**, The University of Texas at Arlington (1056-G5-1938)
- 3:55PM *Some Challenges to Broadening Participation in Mathematics at the Undergraduate Level.*
▶ (384) **Sylvia T. Bozeman**, Spelman College (1056-G5-1054)
- 4:15PM *Speed Bumps and Potholes in the Road to Strengthening Underrepresented Minority Mathematics Achievement, Past, Present, and Future.*
▶ (385) **Robert E. Megginson**, University of Michigan (1056-G5-1176)
- 4:35PM *Exploration of a Mathematics Enrichment Summer Camp for Underrepresented High School Students.*
(386) **Sandra L. Richardson***, Lamar University, and **David S. Torain**, Hampton University (1056-G5-1647)
- 4:55PM *AIM Math Teachers' Circle Immersion Workshop.*
▶ (387) **Wade Ellis***, West Valley College, and **Tatiana Shubin**, San Jose State University (1056-G5-1653)
- 5:15PM *The Director of SUMMA looks at SUMMA past, present, and future.*
▶ (388) **William A. Hawkins**, MAA/University of the District of Columbia (1056-G5-1324)

MAA Session on Mathematical Texts: Famous, Infamous, and Influential, II

2:15 PM – 4:30 PM

Organizers: **Fernando Q. Gouvêa**, Colby College
Amy Shell-Gellasch, Beloit College

- 2:15PM *For the good-hearted reader: Joost Bürgi, the history of logarithms, and a work that should have been famous.*
▶ (389) **Kathleen M Clark**, Florida State University (1056-H1-1401)
- 2:35PM *Parallel Insight, Priority, and Pre-eminence: John Napier, Joost Bürgi, and Famous Works on Logarithms.*
▶ (390) **Clemency J Montelle**, University of Canterbury (1056-H1-1018)
- 2:55PM *Bougainville's *Tratie du Calcul-Integral*.* Preliminary report.
▶ (391) **James J Tattersall**, Providence College (1056-H1-495)
- 3:15PM *Warren Colburn's "First Lessons in Arithmetic".*
(392) **Andrew B. Perry**, Springfield College (1056-H1-1095)
- 3:35PM *"The Method of Rates": The Books of Rice and Johnson.*
▶ (393) **George M. Rosenstein**, Franklin & Marshall College (1056-H1-553)
- 3:55PM *Osgood's Theory of Functions.*
▶ (394) **Lawrence A. D'Antonio**, Ramapo College of New Jersey (1056-H1-234)
- 4:15PM *The Historian and the Mathematician: The Reception of the Biography by Michael Sean Mahoney of Pierre de Fermat.*
▶ (395) **Thomas Drucker**, University of Wisconsin-Whitewater (1056-H1-1842)

SIAM Minisymposium on Frontiers in Geomathematics

2:15 PM – 6:30 PM

Organizers: **Willi Freeden**, University of Kaiserslautern
M. Zuhair Nashed, University of Central Florida
Thomas H. Sonar, Technical University of Braunschweig

- 2:15PM (396) *Geomathematics—Role, Aims, and Potential.*
Willi Freeden, University of Kaiserslautern, Geomathematics Group (1056-86-1128)
- ▶ 3:15PM (397) *Modeling the Geomagnetic Field by Locally Supported Wavelets.* Preliminary report.
Christian Gerhards, TU Kaiserslautern (1056-86-1134)
- ▶ 3:45PM (398) *Modeling of Geothermal Flow.* Preliminary report.
Isabel Ostermann, TU Kaiserslautern (1056-86-1135)
- 4:15PM (399) *Slepian Functions for Signal Estimation and Spectral Analysis.*
Frederik J Simons, Princeton University (1056-86-1546)
- 4:45PM (400) *Spherical Harmonics, Splines and Wavelets — What Comes Next?*
Michel Volker, Geomathematics Group Siegen (1056-65-1132)
- 5:15PM (401) *Eulerian-Lagrangian methods for multiphase multicomponent transport.*
Thomas F. Russell, National Science Foundation (1056-65-1849)
- 5:45PM (402) *Randomizing the time in the heat equation and blind deconvolution of galaxy images.*
Alfred S. Carasso, National Institute of Standards and Technology, Gaithersburg, MD
- 6:10PM (403) *Moment Problems in Reproducing Kernel Hilbert Spaces.*
M. Zuhair Nashed, University of Central Florida (1056-65-2123)

MAA-Young Mathematicians' Network Poster Session

2:15 PM – 4:15 PM

Organizers: **Kim Roth**, Juniata College
Michael C. Axtell, University of St. Thomas

MAA Panel Discussion

2:15 PM – 3:25 PM

Cultivating mathematical interest and talent of precollege students: Outreach through summer math camps and academies.

Organizer: **Michelle L. Ghrist**, U.S. Air Force Academy
 Panelists: **David Boliver**, University of Central Oklahoma
Peter Kuchment, Texas A&M University
Lisa Rezac, University of St. Thomas
Hortensia Soto-Johnson, University of Northern Colorado
Max L. Warshauer, Texas State University

AWM Panel Discussion

2:15 PM – 3:40 PM

Dual careers or dueling careers? Jobs and the two-body problem.

Moderator: **Georgia Benkart**, University of Wisconsin-Madison
 Panelists: **Christine Min Wotipka**, Stanford University
Ellen Spertus, Mills College and Google
David C. Manderscheid, University of Nebraska-Lincoln
Maia Averett, Mills College

MAA Session on General Contributed Papers, III

2:30 PM – 4:25 PM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- 2:30PM (404) *Proving in the Right Circles.*
Linda McGuire, Muhlenberg College (1056-Z1-315)
- ▶ 2:45PM (405) *Algebra in the K-5 Mathematics Curriculum: Keeping the Promise of Algebra for Every Age.*
Judith Lynn Gieger, Oglethorpe University (1056-Z1-1538)
- ▶ 3:00PM (406) *Uncovering Buffon's Essai d'Arithmetique Morale.* Preliminary report.
Dominic W Klyve*, Carthage College, and **Anna Lauren**, Abbot Laboratories (1056-Z1-1613)
- 3:15PM Break.
- ▶ 3:30PM (407) *Comparison of Inquiry-Based Class Sessions and Lecture in the Context of Computer-Assisted Algebra Instruction.* Preliminary report.
John C. Mayer, University of Alabama at Birmingham (1056-Z1-1739)
- ▶ 3:45PM (408) *Open, online, homework help forums: Fostering a culture in which communication reflects a conceptual orientation toward the attainment of quantitative reasoning and literacy skills.* Preliminary report.
Carla Currin van de Sande* and **Frank S. Marfai**, Arizona State University (1056-Z1-1362)
- 4:00PM (409) *Teaching For Transfer And High Cognitive Demand Through The Use Of Discourse In Algebra.*
Kimberly M Vincent, Washington State University (1056-Z1-1892)
- ▶ 4:15PM (410) *Closing the Gap: How Can Mathematics Instructors Empower Students for Academic Success in Future Mathematics Courses—Insights From the Developmental Psychology of Personal Mathematical Comprehension*
Clyde L. Greeno, MAEI Mathematics Institute (1056-Z1-2012)

MAA Section Officers

2:30 PM – 5:00 PM

MAA Invited Address

3:20 PM – 4:10 PM

- (411) *The factorial function, integer-valued polynomials, and p-adic calculus.*
Manjul Bhargava, Princeton University

AWM Business Meeting

3:45 PM – 4:15 PM

MAA Committee on Graduate Students-Young Mathematicians' Network Panel Discussion

3:50 PM – 5:10 PM

How to interview for a job in the mathematical sciences.

Organizer: **David C. Manderscheid**, University of Nebraska-Lincoln

Panelists: **Allen Butler**, Daniel H. Wagner Associates, Inc.

James Freeman, Cornell College

David C. Manderscheid

Sharon Mosgrove, Concordia University

Sarah Ann Stewart, Belmont University

Reception for Undergraduate Students

4:00 PM – 5:00 PM

MAA Session on General Contributed Papers, IV

4:30 PM – 5:40 PM

Organizers: **Eric S. Marland**, Appalachian State University

Daniel J. Curtin, Northern Kentucky University

4:30PM *Using Clickers in a Refocused College Algebra Course – Part II.*

(412) **Kathryn T Ernie*** and **Maren Gebhard**, University of Wisconsin - River Falls (1056-Z1-1990)

4:45PM *Click and Tell.*

(413) **Benjamin J Galluzzo**, Shippensburg University (1056-Z1-915)

5:00PM *Promoting Clickers in Mathematics Courses at Virginia Military Institute.*

(414) **Aprillya Lanz***, **Vonda K Walsh** and **Daniel Joseph**, Virginia Military Institute (1056-Z1-1893)

5:15PM *Overcoming Pre-Calculus Misconceptions in*

► (415) *Calculus Using Clickers.*
Daniel Joseph*, **Aprillya Lanz** and **Vonda Walsh**, Virginia Military Institute (1056-Z1-540)

5:30PM *Improving Mathematical Practices to Prepare K-12 Teachers on Algebraic Connections and Technology.*

► (416) Preliminary report.
Seshaiyer Padmanabhan*, George Mason University, Fairfax, VA, and **Suh Jennifer**, George Mason University, VA (1056-Z1-1286)

AMS-MAA Special Presentation

4:30 PM – 6:00 PM

4:30PM *Elementary school teachers as mathematicians: As the twig is bent the tree grows.*

(417) **Kenneth I. Gross**, University of Vermont

SIGMAA on the History of Mathematics Business Meeting, Reception, and Guest Lecture

5:30 PM – 7:30 PM

6:30PM *The Archimedes Palimpsest and its infinite possibilities.*

(418) **Reviel Netz**, Classics Department, Stanford University (1056-A0-68)

SIGMAA on Math Circles for Students and Teachers Business Meeting

5:30 PM – 6:30 PM

Reception for Graduate Students and First-Time Participants

5:30 PM – 6:30 PM

AMS Josiah Willard Gibbs Lecture

8:30 PM – 9:30 PM

(419) *Quantum channels and their capacities.*

Peter W. Shor, Massachusetts Institute of Technology (1056-81-12)

Thursday, January 14

Joint Meetings Registration

7:30 AM – 4:00 PM

AMS Special Session on Arithmetic of Function Fields, I

8:00 AM – 11:50 AM

Organizers: **Allison Pacelli**, Williams College
Michael Rosen, Brown University

8:00AM *Fourier Coefficients, Relations, and Ranks in the Space of Eisenstein Series of a Function Field of a Finite Field.*

(420) **Michael J. Daniel**, Drexel University (1056-11-538)

8:30AM *Ramification in iterated towers for rational functions.*

(421) **John T Cullinan**, Bard College (1056-11-365)

9:00AM *Tate sequences and applications.* Preliminary report.

(422) **Cristian D Popescu**, University of California, San Diego (1056-11-373)

9:30AM *Explicit points on elliptic curves over function fields.* Preliminary report.

(423) **Douglas Ulmer**, Georgia Institute of Technology (1056-11-1161)

10:00AM *On generators of arithmetic groups over function fields.*

(424) **Mihran Papikian**, Pennsylvania State University (1056-11-1014)

10:30AM *Ramification Groups and Differents in Artin-Schreier Composita.*

(425) **Renate Scheidler*** and **Qingquan Wu**, University of Calgary (1056-11-757)

11:00AM *Symmetries of characteristic p L -series.*

► (426) **David Goss**, The Ohio State University (1056-11-668)

- 11:30AM *Values of Goss L-functions for Dirichlet characters at positive integers.* Preliminary report.
(427) **Matthew Papanikolas**, Texas A&M University (1056-11-431)

AMS Special Session on Commutative Algebra, I

8:00 AM – 11:50 AM

Organizers: **Susan Cooper**, University of Nebraska-Lincoln
Graham Leuschke, Syracuse University
Sean M. Sather-Wagstaff, North Dakota State University

- 8:00AM *What is a system of parameters?* Preliminary report.
(428) **Craig Huneke***, University of Kansas, and **Louiza Fouli**, New Mexico St. University (1056-13-721)
- 8:30AM *Szyzygy Theorem via Comparison of Order Ideals.*
(429) **Phillip A. Griffith** and **Alexandra Seceleanu***, University of Illinois at Urbana-Champaign (1056-13-1439)
- 9:00AM *Hochster's Theta invariant and the Hodge-Riemann bilinear relations.*
(430) **W. Frank Moore**, Cornell Univ., **Greg Piepmeyer***, Univ. of Missouri-Columbia, **Sandra Sprioff**, Univ. of Mississippi, and **Mark E Walker**, Univ. of Nebraska, Lincoln (1056-13-1484)
- 9:30AM *Test ideals in non-Q-Gorenstein rings.*
(431) **Karl Schwede**, University of Michigan (1056-13-774)
- 10:00AM *On the Behavior of Test Ideals Under Generically Separable Finite Morphisms.*
(432) **Kevin Tucker*** and **Karl Schwede**, University of Michigan (1056-13-1480)
- 10:30AM *A numerical condition for equisingularity.* Preliminary report.
(433) **Steven Kleiman**, MIT, **Bernd Ulrich**, Purdue University, and **Javid Validashti***, University of Kansas (1056-13-835)
- 11:00AM *Beyond Numerics in Boij-Soederberg Theory.*
(434) **Daniel Erman**, University of California, Berkeley (1056-13-599)
- 11:30AM *Sheaves on $P^1 \times P^1$.*
(435) **David Eisenbud***, University of California, Berkeley, and **Frank-Olaf Schreyer**, Universitaet des Saarlandes (1056-14-1743)

AMS Special Session on Geometric Aspects of Link and 3-manifold Invariants, II

8:00 AM – 11:50 AM

Organizers: **Oliver Dasbach**, Louisiana State University
Effie Kalfagianni, Michigan State University

- 8:00AM *Reidemeister Torsion and the A-polynomial.*
(436) **Charles Frohman***, The University of Iowa, and **Joanna Kania-Bartoszyńska**, National Science Foundation (1056-57-999)
- 8:30AM *Quantum form of the Reidemeister torsion of a knot complement.*
(437) **Charles D Frohman**, The University of Iowa, and **Joanna Kania-Bartoszyńska***, National Science Foundation (1056-57-1173)
- 9:00AM *Higher Mahler measures.*
(438) **Matilde N Lalin**, University of Alberta (1056-11-442)

- 9:30AM *First coefficient of the Conway polynomial of virtual links.* Preliminary report.
▶ (439) **Sergei Chmutov**, Ohio State University, Mansfield (1056-57-705)

- 10:00AM *Turaev genus, knot signature, and the knot homology concordance invariants.*
(440) **Oliver Dasbach**, Louisiana State University, and **Adam Lowrance***, University of Iowa (1056-57-427)
- 10:30AM *Geometry of Lorenz knots.*
(441) **Ilya Kofman**, College of Staten Island, City University of New York (1056-57-1710)
- 11:00AM *Adequate knots, guts, and volumes I: surfaces and polyhedra.*
(442) **David Futер**, Temple University, **Efstratia Kalfagianni**, Michigan State University, and **Jessica S Purcell***, Brigham Young University (1056-57-1825)
- 11:30AM *Adequate knots, guts, and volumes II: volume and Jones polynomial.*
(443) **David Futер***, Temple University, **Efstratia Kalfagianni**, Michigan State University, and **Jessica S Purcell**, Brigham Young University (1056-57-1913)

AMS Special Session on Graph Algebras in Analysis and Algebra, I

8:00 AM – 11:50 AM

Organizers: **Gene Abrams**, University of Colorado at Colorado Springs
Mark Tomforde, University of Houston

- 8:00AM *Isomorphism and Morita equivalence of graph algebras I.*
(444) **Gene Abrams**, University of Colorado at Colorado Springs, and **Mark Tomforde***, University of Houston (1056-46-959)
- 8:30AM *Isomorphism and Morita equivalence of graph algebras II.* Preliminary report.
(445) **Gene Abrams***, University of Colorado at Colorado Springs, and **Mark Tomforde**, University of Houston (1056-16-943)
- 9:00AM *Leavitt path algebras and graph C*-algebras of separated graphs, I.* Preliminary report.
(446) **Pere Ara***, Universitat Autònoma de Barcelona, and **Kenneth R. Goodearl**, University of California at Santa Barbara (1056-16-787)
- 10:00AM *Leavitt path algebras and graph C*-algebras of separated graphs, II.* Preliminary report.
(447) **P. Ara**, Universitat Autònoma de Barcelona, and **K. R. Goodearl***, University of California at Santa Barbara (1056-16-828)
- 10:30AM *Nevanlinna-Pick interpolation for the Schur class associated with a directed graph.*
(448) **Joseph A. Ball***, Virginia Tech, and **Sanne ter Horst**, Utrecht University (1056-47-328)
- 11:00AM *Leavitt Path Algebras with Coefficients in a Noncommutative Ring.*
(449) **Jennifer Firkins Nordstrom**, Linfield College (1056-16-1106)
- 11:30AM *Explicit isomorphisms of purely infinite simple Leavitt path algebras.* Preliminary report.
(450) **Chris Smith*** and **Gene Abrams**, University of Colorado, Colorado Springs (1056-16-866)

AMS Special Session on Interactions of Inverse Problems, Signal Processing, and Imaging, I

8:00 AM – 11:40 AM

Organizer: **M. Zuhair Nashed**, University of Central Florida

- 8:00AM (451) *Cramer-Rao Bound for Estimating Non-linear Parameters in a Model for Chemical Species Separation using Magnetic Resonance Imaging.*
Emily K. Bice*, California State University, Fullerton, **Venkata V. Chebrolu**, Department of Biomedical Engineering, University of Wisconsin, Madison, **Huanzhou Yu**, Global MR Applied Science Laboratory, GE Healthcare, Menlo Park, CA, **Jean H Brittain**, Global MR Applied Science Laboratory, GE Healthcare, Madison, WI, **Scott B. Reeder**, Department of Radiology, University of Wisconsin, Madison, and **Angel R. Pineda**, California State University, Fullerton (1056-62-1387)
- 8:30AM (452) *Sequential Lower Semi-Continuity of Non-Local Functionals.*
Peter Elbau, Johann Radon Institute for Computational and Applied Mathematics (1056-49-1514)
- 9:00AM (453) *On detection of small low emission sources.*
Peter Kuchment*, Texas A&M University, **David Darrow**, UT Medical Branch at Galveston, **Yulia Hristova** and **Guido Kanschat**, Texas A&M University (1056-35-1029)
- 9:30AM (454) *Compressed sensing via information theoretic methods.*
Akram Aldroubi* and **Haichao Wang**, Vanderbilt University (1056-94-843)
- 10:00AM (455) *Multiscale elasticity imaging.*
Pierre Garapon*, Stanford University, **Habib Ammari**, Ecole Polytechnique, and **François Jouve**, University Denis Diderot, PARIS VII (1056-35-1378)
- 10:30AM (456) *Reconstruction of Piecewise Constant Images Using Nonsmooth Nonconvex Minimization.*
Mila Nikolova, Centre de Mathematiques et de Leurs Applications (1056-49-2145)
- 11:00AM (457) *Beyond the Shannon-Nyquist Theorem.*
Yves Meyer, Centre de Mathematiques et de Leurs Applications (1056-41-2143)

AMS Special Session on Algebraic Methods in Signal Processing, I

8:00 AM – 11:50 AM

Organizers: **Shamgar Gurevich**, University of California Berkeley
Ronny Hadani, University of Chicago
Olga Holtz, University of California Berkeley and Technical University Berlin
Oded Schwartz, Technical University Berlin
Nir Sochen, Tel Aviv University

- 8:00AM (458) *Desired properties of identity codes.* Preliminary report.
Anant Sahai* and **Kristen Ann Woyach**, UC Berkeley (1056-94-1688)
- 9:00AM (459) *Group-Theoretic Algorithms for Matrix Multiplication.*
Chris Umans, Caltech (1056-68-1303)

- 9:30AM (460) *Polyphase Sequence Families with Low Correlation from the Bounds of Character Sums.* Preliminary report.
Gong Guang*, Department of Electrical and Computer Engineering, University of Waterloo, and **Zilong Wang**, Beijing University (1056-94-1550)
- 10:00AM (461) *Near Shannon limit low Peak to Average Power Ratio Turbo Block Coded OFDM.*
Vahid Tarokh*, **Maryam Sabbaghian**, Harvard University, **Besma Smida**, Purdue University, and **Yongjun Kwak**, Harvard University (1056-05-1043)
- 11:00AM (462) *Algebra and Multi-Camera Networks.*
Nigel Boston, University of Wisconsin - Madison (1056-94-1747)
- 11:30AM (463) *On applications of non-commutative Fourier analysis in computational science.*
Hans Z Munthe-Kaas, University of Bergen, Norway (1056-65-1148)

AMS Special Session on The Mathematics of Information and Knowledge, I

8:00 AM – 11:40 AM

- Organizers: **Naoki Saito**, University of California Davis
Ronald R. Coifman, Yale University
James G. Glimm, SUNY at Stony Brook
Peter W. Jones, Yale University
Mauro Maggioni, Duke University
Jared Tanner, University of Edinburgh
- 8:00AM (464) *Harmonic Analysis and Geometries of Digital Data Bases.*
Ronald R. Coifman*, Yale, and **Matan Gavish**, Stanford University (1056-65-1160)
 - 9:00AM (465) *Nonparametric Manifold Learning and Compressive Sensing.*
Lawrence Carin, Duke University (1056-41-1525)
 - 10:00AM (466) *Affine-invariant Principal Components.*
Santosh S Vempala*, Georgia Tech, and **S Charles Brubaker**, Pace Academy (1056-68-853)
 - 11:00AM (467) *Construction of a Large Class of Deterministic Sensing Matrices that Satisfy a Statistical Isometry Property.*
Robert Calderbank*, Princeton University, **Stephen D Howard**, Defence Science and Technology Organisation, and **Sina Jafarpour**, Princeton University (1056-41-852)

AMS Special Session on Voting Theory, I

8:00 AM – 11:50 AM

- Organizers: **Michael Jones**, Mathematical Reviews
Brian Hopkins, Saint Peter's College
Tommy Ratliff, Wheaton College
- 8:00AM (468) *Minimal Requirements for Representation in the Democratic Primary.*
Jennifer M Wilson*, Eugene Lang College the New School for Liberal Arts, and **Michael A Jones**, Mathematical Reviews (1056-91-732)
 - 8:30AM (469) *The Evaluation and Comparison of Thresholds for Divisor Methods.*
Michael A Jones*, Mathematical Reviews, and **Jennifer M. Wilson**, Eugene Lang College of the New School University (1056-91-714)
 - 9:00AM (470) *Analysis of Cumulative Voting's Potential to Yield Fair Representation.*
Duane Cooper, Morehouse College (1056-91-2017)

- 9:30AM *Algebraic Voting Theory.*
(471) **Michael E. Orrison**, Harvey Mudd College (1056-20-756)
- 10:00AM *Statistical Inconsistencies of Ranked Data.*
(472) **Anna E Bargagliotti***, The University of Memphis, and **Michael Orrison**, Harvey Mudd College (1056-91-780)
- 10:30AM *Manipulating Profiles in Nonparametric Statistics: Stacking and Switching.* Preliminary report.
▶ (473) **Sarah Berube** and **Karl-Dieter Crisman***, Gordon College (1056-91-84)
- 11:00AM *Frequency of violations of monotonicity.*
(474) **Robert Z. Norman**, Dartmouth College (1056-91-1858)
- 11:30AM *Concensus among Concensus Methods.* Preliminary report.
▶ (475) **Anna Popova*** and **Michel Regenwetter**, University of Illinois at Urbana-Champaign, Psychology (1056-91-620)

Billur Kaymakcalan, Georgia Southern University-Statesboro
Allan Peterson, University of Nebraska-Lincoln

- 8:00AM *Eigenvalue intervals for a system of generalized second order three point nonlinear boundary value problems on a time scale.*
(484) **Johnny Henderson**, Baylor University (1056-34-27)
- 8:30AM *Higher order singular multi-point boundary value problems on time scales.*
(485) **Abdulkadir Dogan**, University of Nigde, Nigde, Turkey, **John R Graef*** and **Lingju Kong**, The University of Tennessee at Chattanooga (1056-39-746)
- 9:00AM *The Existence of Multiple Nontrivial Solutions of Boundary Value Problems of Second-Order Dynamic Equations on a Time Scale.* Preliminary report.
(486) **Heidi A Berger**, Simpson College (1056-39-1540)
- 9:30AM *Positive periodic solutions of functional differential equations on time scales and population models.*
(487) **Youssef Naim Raffoul***, University of Dayton, and **Joan Hoffacker**, Clemson University (1056-37-806)
- 10:00AM *Implications of time scales to spraying mosquitoes for West Nile prevention.*
(488) **Joan Hoffacker**, Clemson University (1056-34-1269)
- 10:30AM *A predator-prey system on a time scale.* Preliminary report.
(489) **Nickolai Kosmatov**, University of Arkansas at Little Rock (1056-39-1491)
- 11:00AM *A Ratio Dependent Predator-Prey System on a Time Scale.* Preliminary report.
▶ (490) **Eric R. Kaufmann**, University of Arkansas at Little Rock (1056-92-1325)
- 11:30AM *Model for antibiotic resistant bacteria in a river.* Preliminary report.
▶ (491) **Bonita A Lawrence*** and **Anna Mummert**, Marshall University (1056-34-1456)

AMS Special Session on Analysis and Control Under Uncertainty, I

8:00 AM – 11:50 AM

Organizers: **Xioaming Wang**, Florida State University
Yanzhao Cao, Auburn University
Catalin Trenchea, University of Pittsburgh

- 8:00AM *The Estimation of functional uncertainty using Polynomial Chaos and adjoint equations.*
(476) **Ionel Michael Navon***, Dept of Scientific Computing/ Florida State University, **K Alekseev Aleksey** and **M E Zelentsov**, Moscow Institute of Physics and Technology (1056-93-1622)
- 8:30AM *Long Time Behavior of Stochastically Forced PDEs.*
(477) **Jonathan C. Mattingly**, Duke University (1056-37-1929)
- 9:00AM *Stochastic Analysis, Control and Nonlinear Filtering of Fluid Dynamic Models.*
(478) **S. S. Sritharan**, Naval Postgraduate School (1056-60-507)
- 9:30AM *Optimal Parameter Tuning for Stability under Uncertainty.*
(479) **Wolfgang Kliemann**, Iowa State University (1056-93-741)
- 10:00AM *A Non-Stochastic Talk on Stochastic Optimization / Control.*
▶ (480) **Ana-Maria Croicu**, Kennesaw State University (1056-49-1724)
- 10:30AM *Groundwater Reactive Transport Modeling under Uncertainty.*
▶ (481) **Ming Ye**, Department of Scientific Computing, Florida State University (1056-62-1564)
- 11:00AM *An Efficient Spectral Method for Acoustic Scattering from Rough Surfaces.*
(482) **Jie Shen**, Purdue University (1056-65-1716)
- 11:30AM *Approximating long time statistical properties of large chaotic systems.*
(483) **Xiaoming Wang**, Florida State University (1056-76-1971)

AMS Special Session on Applications of Time Scales to Biology, Economics, and Engineering, I

8:00 AM – 11:50 AM

Organizers: **Martin Bohner**, Missouri University of Science and Technology

AMS Special Session on Arithmetic Geometry, I

8:00 AM – 11:50 AM

Organizers: **Bo-Hae Im**, Chung-Ang University
Jennifer Johnson-Leung, University of Idaho
Jennifer Paulhus, Kansas State University

- 8:00AM *Generalizing a Theorem of Richard Brauer.*
(492) **Bo-Hae Im***, Chung-Ang University, Seoul, and **Michael Larsen**, Indiana University (1056-11-1179)
- 8:30AM *Numerical evidence for Bruinier-Yang conjecture and comparison with denominators of Igusa class polynomials.*
(493) **Kristin E. Lauter***, Microsoft Research, **Bianca Viray**, University of California at Berkeley, **Jennifer Johnson-Leung**, University of Idaho, **Adriana Salerno**, Bates College, **Erika Frugoni**, University of Colorado, and **Helen Grundman**, Bryn Mawr College (1056-11-1633)
- 9:00AM *Bounds for the torsion subgroup of elliptic curves over fields with bounded ramification.*
(494) **Álvaro Lozano-Robledo***, University of Connecticut - Storrs, and **Benjamin Lundell**, Cornell University (1056-11-1092)
- 9:30AM *The growth of Mordell-Weil ranks on tower of Jacobians.* Preliminary report.
(495) **Guillermo Mantilla**, University of Wisconsin, Madison (1056-11-1083)

- 10:00AM *Points on Quadratic Twists of $X_0(N)$.*
(496) **Ekin Ozman**, University of Wisconsin-Madison (1056-11-1529)
- 10:30AM *Anti-Hasse Principles for Algebraic Curves.*
(497) **Pete L. Clark**, University of Georgia (1056-11-470)
- 11:00AM *Cox rings of big rational surfaces.*
(498) **Damiano Testa**, University of Oxford, **Anthony Varilly-Alvarado***, Rice University, and **Mauricio Velasco**, University of California at Berkeley (1056-14-1723)
- 11:30AM *Equations of curves with automorphisms.*
▶ (499) Preliminary report.
David J Swinarski, University of Georgia (1056-14-642)

MAA Invited Paper Session on Environmental Modeling

8:00 AM – 9:50 AM

Organizers: **Karen D. Bolinger**, Clarion University
Ben Fusaro, Florida State University

- 8:00AM *Warming, Non-linearity & Civilization's Decline.*
▶ (500) **Courtney Brown**, Dept of Political Science Emory University (1056-BA-1672)
- 8:30AM *Evolution of Competitive Co-existence.*
▶ (501) **Jim M. Cushing**, University of Arizona (1056-BA-1678)
- 9:00AM *Environmental Modeling & Big Projects: Lessons from Everglades Restoration Planning.*
(502) **Louis J. Gross**, Natl. Inst. for Math. & Biol. Synthesis University of Tennessee Knoxville (1056-BA-2121)
- 9:30AM *Endangered Salmon in the Columbia River Basin.*
▶ (503) **Roland H. Lamberson**, Humboldt State University (1056-BA-1714)

MAA Minicourse #3: Part A

8:00 AM – 10:00 AM

Educating about the state of the planet and sustainability while enhancing calculus.

Organizer: **Thomas J. Pfaff**, Ithaca College

MAA Minicourse #8: Part A

8:00 AM – 10:00 AM

The Fibonacci and Catalan numbers.

Organizer: **Ralph Grimaldi**, Rose-Hulman Institute of Technology

AMS Session on Biomathematics, I

8:00 AM – 11:55 AM

- 8:00AM *Enhancement of cargo processivity by cooperating molecular motors.*
(504) **Filippo Posta***, UCLA, **Maria R. D'Orsogna**, Cal State Northridge, and **Tom Chou**, UCLA (1056-92-58)
- 8:15AM *Influence of inhalation injury on mortality of burn patients.*
▶ (505) **Fatemeh Emdad***, The University of Texas Medical Branch, **Clarisse Djukom**, The University of Texas Medical Branch, **David N. Herndon**, UTMB, and **Marc G. Jeschke**, UTMB (1056-92-170)
- 8:30AM *A fixed point theorem for a general epidemic model.*
(506) **Adam R. Lucas**, Saint Mary's College of California (1056-92-227)

- 8:45AM *Additive damage model for anti-cancer drug combinations.*
(507) **Ardith W El-Kareh**, Arizona Research Laboratories-Microcirculation, University of Arizona, **Leslie B. Jones***, University of Arizona, and **Timothy W Secomb**, Department of Physiology, University of Arizona (1056-92-244)
- 9:00AM *Two-Layer Human Right Ventricle Models with Patch and Anisotropic Material Properties for Ventricle Remodeling and Pulmonary Valve Replacement Surgical Optimization: Flow and Stress Analysis.*
(508) **Dalin Tang***, Worcester Polytechnic Institute, **Chun Yang**, Beijing Normal University, **Tal Geva** and **Pedro del Nido**, Harvard Medical School, Children's Hospital, Boston (1056-92-409)
- 9:15AM *Human Carotid Plaque Progression Correlated Positively with Flow Shear Stress and Negatively with Plaque Wall Stress: 3D FSI Models Using Multi-Year Patient-Tracking In Vivo MRI.*
(509) **Chun Yang***, Beijing Normal University, **Dalin Tang**, Worcester Polytechnic Institute, **Gador Canton**, **Thomas S. Hatsukami** and **Chun Yuan**, University of Washington, Seattle (1056-92-417)
- 9:30AM *Existence and stability of steady states of a reaction convection diffusion equation modeling microtubule formation.* Preliminary report.
(510) **Shantia Yarahmadian***, Mississippi State University, **Sidney L. Shaw**, **Kevin Zumbun** and **Blake Barker**, Indiana University (1056-92-531)
- 9:45AM *Stochastic Modeling of The Loss of Telomere Sequences.*
(511) **V Arunachalam**, University of Los Andes (1056-92-627)
- 10:00AM *Numerical Modeling of Intracranial Aneurysms.*
▶ (512) Preliminary report.
Lisa M Melanson, Northwestern University (1056-76-1703)
- 10:15AM *The effects of boundary transport and anti-oxidants on stability of a model of atherogenesis.*
(513) **L. R. Ritter***, Southern Polytechnic State University, **A. I. Ibragimov**, Texas Tech University, and **J. R. Walton**, Texas A&M University (1056-92-701)
- 10:30AM *A Reaction-Diffusion Model of Cartilage Regeneration in Cell-Seeded Scaffolds.* Preliminary report.
(514) **Janine M. Haugh*** and **Mansoor A. Haider**, North Carolina State University (1056-92-817)
- 10:45AM *An algorithm for predicting minimal paths between genomes.* Preliminary report.
▶ (515) **Elinor Velasquez**, University of California, Santa Cruz (1056-92-933)
- 11:00AM *The consequences of ant behavior for the spatial population dynamics of a southern wildflower.*
(516) **Judith E Canner***, **Robert R Dunn**, North Carolina State University, **Itamar Giladi**, Ben-Gurion University, Israel, and **Kevin Gross**, North Carolina State University (1056-92-985)
- 11:15AM *Replicator equations and the principle of minimal production of information: some applications to biological models.*
(517) **Georgiy P. Karev**, Lockheed Martin MSD; National Institute of Health (1056-92-1153)
- 11:30AM *Geometry and Dynamics of Activity-Dependent Homeostatic Regulation in Neurons.*
▶ (518) **Andrey V. Olypher*** and **Astrid A. Prinz**, Emory University (1056-92-1180)

- 11:45AM *Coexistence of Ecotypes in a Quasilinear Size-Structured Population Model*. Preliminary report.
 ► (519) **Azmy S Ackleh, Paul Leonard Salceanu*** and **Baoling Ma**, University of Louisiana at Lafayette (1056-92-1197)

AMS Session on Differential and Difference Equations, I

8:00 AM – 11:55 AM

- 8:00AM *Correctors and Field Fluctuations for the $p_\epsilon(x)$ -Laplacian with Rough Exponents*.
 (520) **Silvia Jimenez*** and **Robert Lipton**, Louisiana State University (1056-35-93)
- 8:15AM *Maximizing distinguishability in optical tomography through selection of an optimal source: Function spaces and inner products*.
 (521) **Bonnie C Jacob**, Clemson University (1056-35-190)
- 8:30AM Break.
- 8:45AM *A variational principle associated with a certain class of boundary value problems*.
 (522) **Abbas Momeni**, Queen's University (1056-35-436)
- 9:00AM *Solutions for 2-Dimensional Coupled Kuramoto-Sivashinsky-KdV Equations*.
 (523) **Maomao Cai***, Weber State University, **Dening Li**, West Virginia University, and **Chontita Rattanakul**, Mahidol University, Thailand (1056-35-490)
- 9:15AM *On Nonlinear Evolution of Convective Flow in an Active Mushy Layer*.
 (524) **Dambaru Bhatta***, The University of Texas-Pan American, **Mallikarjunaiah S. Muddamallappa**, Texas A&M University, and **Daniel N. Riahi**, The University of Texas-Pan American (1056-35-1213)
- 9:30AM *A Finite Difference Approximation for an Amphibian Juvenile-adult Migration System*.
 (525) **Azmy S. Ackleh, Keng Deng*** and **Qihua Huang**, University of Louisiana at Lafayette (1056-35-667)
- 9:45AM *Stratified steady water waves*.
 (526) **Samuel Walsh**, Division of Applied Mathematics, Brown University (1056-35-681)
- 10:00AM *Stability of spherically propagating thermal frontal polymerization waves*. Preliminary report.
 (527) **Vladimir A. Volpert** and **Esteban Urdiales***, Northwestern University (1056-35-685)
- 10:15AM *Fractional differential equations for modeling anomalous diffusion in porous medium*.
 ► (528) **Sergei Fomin***, Khalifa University of Science, Technology and Research, and **Vladimir Chugunov**, Kazan State University (1056-35-807)
- 10:30AM *Asymptotic analysis for the 3D primitive equations in a channel*.
 (529) **Chang-Yeol Jung***, Ulsan National Institute of Science and Technology, **Roger Temam**, Indiana University, and **Makram Hamouda**, Dept. of Mathematics, Bizerte, Tunisia (1056-35-842)
- 10:45AM *The refractor problem with loss of energy and Monge - Ampère type of Equation*.
 (530) **Cristian E Gutierrez** and **Henok Z Mawi***, Temple University (1056-35-920)
- 11:00AM *Norm Estimates for Composite Operators Applied to Harmonic Forms*. Preliminary report.
 (531) **Shusen Ding**, Seattle University (1056-35-978)
- 11:15AM *Symbolic Computation of Conservation Laws of Nonlinear Partial Differential Equations*.
 (532) **L. Douglas Poole*** and **Willy Hereman**, Colorado School of Mines (1056-35-1414)

- 11:30AM *The Kawahara equation in weighted Sobolev spaces*.
 (533) **Netra P. Khanal***, University of Wisconsin - Washington County, **Jiahong Wu**, Oklahoma State University, and **Juan-Ming Yuan**, Providence University, Taiwan (1056-35-1100)
- 11:45AM *The Generation and Propagation of Water Waves on a Running Stream*.
 (534) **Lokenath Debnath**, University of Texas-Pan American (1056-35-1191)

AMS Session on Geometry and Topology, III

8:00 AM – 9:40 AM

- 8:00AM *Surfaces in generic toroidal 3-manifolds*.
 (535) **Ryan Derby-Talbot**, Quest University Canada (1056-57-1742)
- 8:15AM *A_∞ -Bialgebras of Type (m, n)* .
 (536) **Ainhoa Berciano**, Universidad del País Vasco-Euskal Herriko Unibertsitatea, **Sean Evans**, University of Pittsburgh, and **Ronald Umble***, Millersville University of Pennsylvania (1056-55-161)
- 8:30AM *Homomorphisms of L_∞ Modules*.
 (537) **Michael P. Allocca**, North Carolina State University (1056-55-544)
- 8:45AM *A Metric for Homotopy Types*. Preliminary report.
 (538) **Nicholas A Scoville**, Dartmouth College (1056-55-923)
- 9:00AM *Stabilization of Homotopy Limits*.
 (539) **Eric L Finster**, University of Virginia (1056-55-1616)
- 9:15AM *The Third Torus Complex is Simply Connected*.
 ► (540) **Brie A Finegold**, University of California at Santa Barbara (1056-55-1666)
- 9:30AM *Location of Zeros of Polynomials*.
 (541) **C. Affane-Aji***, Tuskegee University, **N. Agarwal** and **N. K. Govil**, Auburn University, AL (1056-32-1230)

AMS Session on Number Theory, I

8:00 AM – 11:55 AM

- 8:00AM *Triangular arrays induced from trigonometric functions*.
 ► (542) **Hung-ping Tsao**, Novato, CA (1056-11-10)
- 8:15AM *Cross-Zagier subgroups of elliptic curves over \mathbb{Q}* .
 (543) **William A Stein**, University of Washington (1056-11-22)
- 8:30AM *Construction of Even Length Binary Sequences with High Asymptotic Merit Factor*. Preliminary report.
 (544) **Tingyao Xiong*** and **Hall I. Jonathan**, Michigan State University (1056-94-537)
- 8:45AM *The Value of the Zeta Function at an Odd Argument*.
 (545) **Badih N. Ghusayni**, Lebanese University (1056-11-133)
- 9:00AM *Arithmetic Progressions on Curves of Degree Five*.
 ► (546) **Alejandra Alvarado**, University of Arizona (1056-11-171)
- 9:15AM *On Generalization of Lambert Series*.
 ► (547) **Tom Osler**, Rowan University, and **Abdul Hassen***, Rowan University (1056-11-1400)
- 9:30AM *The fluctuations in the number of points on a family of curves over a finite field*.
 (548) **Maosheng Xiong**, Pennsylvania State University (1056-11-200)
- 9:45AM *More Sums than Differences Sets and Beyond*.
 (549) **Yufei Zhao**, Massachusetts Institute of Technology (1056-11-343)

- 10:00AM *Minimal product sets sizes in nonabelian groups.*
(550) **Yakov I Berchenko-Kogan**, California Institute of Technology (1056-11-360)
- 10:15AM *An Infinite Family of Recursive Formulas Generating Power Moments of Kloosterman Sums with Trace One Arguments: $O(2n + 1, 2^r)$ Case.*
(551) **Dae San Kim**, Sogang University (1056-11-430)
- 10:30AM *Perfect Parallelepipeds Exist.*
▶ (552) **Jorge F Sawyer*** and **Clifford A Reiter**, Lafayette College (1056-11-500)
- 10:45AM *On the Convergence of Maximum Roots of a Fibonacci Type Polynomial Sequence.*
▶ (553) **Robert Molina**, Alma College, and **Aklilu Zeleke***, Michigan State University (1056-40-1660)
- 11:00AM *On the zeros of Epstein zeta functions.*
(554) **Yoonbok Lee**, Yonsei University (1056-11-570)
- 11:15AM *Galois theory for tame dodecic local fields.*
▶ (555) **Chad Awtrey**, Arizona State University (1056-11-631)
- 11:30AM *Arithmetic of Curves and Error-Correction.*
(556) **Radoslav M Kirov*** and **Iwan M Duursma**, University of Illinois at Urbana-Champaign (1056-11-697)
- 11:45AM *Two Identities Involving Generalized Fibonacci Numbers.*
(557) **Curtis N. Cooper**, University of Central Missouri (1056-11-1210)

MAA Session on Mathematics Experiences in Business, Industry, and Government

8:00 AM – 11:55 AM

Organizers: **Philip Gustafson**, Mesa State College
Michael Monticino, University of North Texas

- 8:00AM *A Robust, Multi-Criteria Modeling Approach for Optimizing Aeromedical Evacuation Asset Emplacement.*
▶ (558) **Nathaniel D Bastian**, United States Army (1056-J5-113)
- 8:20AM *The U.S. blood supply, bioterrorism and mathematics.*
(559) **Sonja Sandberg**, Framingham State College (1056-J5-1600)
- 8:40AM *Using Radar to Identify Persons Carrying Wires.*
(560) **William P Fox***, Naval Postgraduate School, **John Vesecky**, University of CA-Santa Cruz, and **Kip Laws**, University of CA, Santa Cruz (1056-J5-750)
- 9:00AM *Probability in Solutions for Assembly in Earth Orbit of a NASA Spacecraft for Travel to Mars.*
▶ (561) **Richard D Jarvinen**, Winona State University (1056-J5-583)
- 9:20AM *A Green's Function Technique for Radiation Transport in Three Dimensions.*
(562) **Candice Rockell*** and **John Tweed**, Old Dominion University (1056-J5-788)
- 9:40AM *Why companies need mathematicians even during rough times.*
▶ (563) **Carla D Martin**, James Madison University (1056-J5-2085)
- 10:00AM *Movie Recommendation Systems.*
(564) **Erich Kreutzer**, Davidson College (1056-J5-1711)
- 10:20AM *Searching for the home base of a serial criminal.*
▶ (565) **Mike O'Leary**, Towson University (1056-J5-811)
- 10:40AM *Statistical Inconsistency in the Audit Risk Model.*
▶ (566) Preliminary report.
Richard J Cleary, Bentley University (1056-J5-1736)

- 11:00AM *Scoring line of best fit test questions.*
▶ (567) **James H Fife**, Educational Testing Service (1056-J5-783)
- 11:20AM *An Alternative Distributional Model for Control of Process Particle Counts in the Semiconductor Industry.*
▶ (568) **Robert K. Henderson**, Stephen F. Austin State University, Nacogdoches, TX (1056-J5-1384)
- 11:40AM *Calculating the Greeks via Malliavin Calculus for Variance Gamma Process in Poisson-Wiener Space.*
(569) **Dervis Bayazit*** and **Craig A Nolder**, Florida State University (1056-J5-1727)

MAA Session on General Contributed Papers, V

8:00 AM – 11:55 AM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- 8:00AM *When uniformity must be replaced by non-uniformity: on finite difference approximations of the Black-Scholes equation on non-uniform grids.*
▶ (570) Preliminary report.
Daniel D. Sheng*, Westwood High School, and **Myles D. Baker**, Baylor University (1056-Z1-1094)
- 8:15AM *A Lagrange Interpolation Mean Convergence.*
(571) **Javad Namazi**, FDU (1056-Z1-332)
- 8:30AM *L_∞ Algebras and Symmetric Braces.*
(572) **Mindy Beth Capaldi**, North Carolina State University (1056-Z1-610)
- 8:45AM *Fibonacci Numbers and Collections of Mutually Disjoint Convex Subsets of a Totally Ordered Set.*
▶ (573) **Tyler Clark***, Western Kentucky University Honors College, and **Tom Richmond**, Western Kentucky University (1056-Z1-1279)
- 9:00AM *Generating Pythagorean Triples.*
▶ (574) **Constance C Edwards**, California University of Pennsylvania (1056-Z1-1307)
- 9:15AM *A New Characterization of Dimension Zero.*
▶ (575) Preliminary report.
Jay Stine, Misericordia University (1056-Z1-451)
- 9:30AM *A Lesson Study in Real Analysis.* Preliminary report.
▶ (576) **Brigitte Lahme***, **Jerry Morris** and **Elaine Newman**, Sonoma State University (1056-Z1-1762)
- 9:45AM *Inquiry-Based Learning for Middle and High School Mathematics Teachers - Part I.* Preliminary report.
▶ (577) **Shing S. So*** and **Mahmoud Yousef**, University of Central Missouri (1056-Z1-1214)
- 10:00AM *Inquiry-Based Learning for Middle and High School Mathematics Teachers—Part II.* Preliminary report.
▶ (578) **Mahmoud Yousef*** and **Shing S. So**, University of Central Missouri (1056-Z1-1217)
- 10:15AM *A model for high-school teacher professional development and student learning.*
(579) **Galen E. Turner***, **James D. Nelson**, **Kelly B. Crittenden** and **Jane A. Petrus**, Louisiana Tech University (1056-Z1-1152)
- 10:30AM *Middle Mathematics Mobilization Program for Middle School Teachers.*
(580) **Aaron K Trautwein**, Carthage College, Kenosha Wisconsin (1056-Z1-1292)
- 10:45AM *Being a Student Again: My Summer in a Research Experience for K-12 Teachers.*
▶ (581) **Erin Elizabeth Pitney**, Beaverton School District (1056-Z1-1941)

- 11:00AM *How Might We Prepare Pre-Service High School Teachers to Teach Using Computer Algebra Systems?*
 (582) **Tom Fox**, University of Houston-Clear Lake (1056-Z1-2080)
- 11:15AM *Mathematics workshops for parents and children as hybrid spaces.*
 (583) **Jose Maria Menendez**, Radford University (1056-Z1-827)
- 11:30AM *Projects to Enhance Revised Algebra and Functions.*
 ▶ (584) **Kenneth J Bernard**, Virginia State University (1056-Z1-1192)
- 11:45AM *A Classroom Project on Protecting Social Security Numbers from Identity Theft.*
 ▶ (585) **Yajun Yang***, Farmingdale State College, State University of New York, and **Katherine Zhu**, Massachusetts Institute of Technology (1056-Z1-1458)

MAA Session on Mathematics, Equity, Diversity, and Social Justice, I

8:00 AM – 11:55 AM

Organizers: **Patricia Hale**, California State Polytechnic University Pomona
Shandy Hauk, University of Northern Colorado
Dave Kung, St. Mary's College, Maryland

- 8:00AM *A First Year Seminar on Exploring Data for Social Change.* Preliminary report.
 ▶ (586) **Maria G Fung**, Worcester State College (1056-H7-2081)
- 8:20AM *Teaching Mathematics and Democracy.* Preliminary report.
 ▶ (587) **Maura Mast**, University of Massachusetts Boston (1056-H7-1989)
- 8:40AM *Gender Inequity in the National Merit Scholarship Program.*
 ▶ (588) **Bryan Nankervis**, Texas State University-San Marcos (1056-H7-940)
- 9:00AM *Keeping the Doors Open: A Summer Algebra Camp for Under-represented Minority Middle School Students.*
 ▶ (589) **J B Fink*** and **E D Nordmoe**, Kalamazoo College (1056-H7-300)
- 9:20AM *Changing Teachers' Concept of Mathematics with the Goal of Providing Equal Opportunity for All Students to Succeed in Learning Algebra.*
 ▶ (590) **Judith M. Kysh*** and **Diane Resek**, San Francisco State University (1056-H7-991)
- 9:40AM *Creative Mathematics for All? A Survey of Preservice Teachers' Attitudes about Students' Capabilities.* Preliminary report.
 ▶ (591) **Deborah E Berg**, University of Nebraska-Lincoln (1056-H7-1558)
- 10:00AM *Service Learning in Support of Financial Literacy.*
 ▶ (592) **Andrew Miller**, Belmont University (1056-H7-885)
- 10:20AM *Mathematics as a Subversive Activity—Questioning Authority and Promoting Independent Thinking.*
 ▶ (593) **Jack Bookman**, Duke University (1056-H7-486)
- 10:40AM *Math and Social Issues.* Preliminary report.
 ▶ (594) **Mouchumi Bhattacharyya**, **Christopher Goff** and **Larry J Langley***, University of the Pacific (1056-H7-1696)
- 11:00AM *Social justice in the classroom through real-world examples.*
 (595) **Lily S. Khadjavi**, Loyola Marymount University (1056-H7-1450)

- 11:20AM *A Pan-African Model for Developing Mathematical Talent in Africa.*
 ▶ (596) **Josephine Davis Davis***, Quality Education for Minorities/Fort Valley State University, and **Monica Mitchell**, Quality Education for Minorities (1056-H7-1932)
- 11:40AM *Teaching Numerical Analysis in Cambodia.*
 ▶ (597) **Angel R. Pineda**, California State University, Fullerton (1056-H7-1663)

MAA Session on Experiences that Enrich the Education of Mathematics Majors, II

8:00 AM – 9:15 AM

Organizers: **Suzanne M. Lenhart**, University of Tennessee
Steven J. Schlicker, Grand Valley State University
J. Douglas Faies, Youngstown State University
Michael J. Dorff, Brigham Young University

- 8:00AM *Creating a Departmental Culture of Enriching Experiences.*
 ▶ (598) **G. Daniel Callon**, Franklin College (1056-E5-1979)
- 8:20AM *Engaging math majors in education research.*
 ▶ (599) **Diana White**, University of Colorado Denver (1056-E5-1708)
- 8:40AM *Enriching the education of mathematics majors with career seminars, undergraduate student research, and student events at MAA sectional meetings.* Preliminary report.
 ▶ (600) **Katarzyna Potocka**, Ramapo College of New Jersey (1056-E5-561)
- 9:00AM *Combining Mathematics History with a Greece Tour.* Preliminary report.
 ▶ (601) **Sharon S. Emerson-Stonnell**, Longwood University (1056-E5-573)

MAA Session on Mathematics Courses for the Liberal Arts Students, I

8:00 AM – 11:35 AM

- Organizer: **Reva Kasman**, Salem State College
- 8:00AM *Using CLA in the Classroom Performance Tasks for Assessment in a Quantitative Reasoning Course.* Preliminary report.
 ▶ (602) **Gerald W. Kruse**, Juniata College (1056-J1-1118)
- 8:20AM *Egyptian Fractions.* Preliminary report.
 ▶ (603) **Bill Linderman**, King College (1056-J1-1907)
- 8:40AM *Ethnomathematics as an Interdisciplinary Outreach Course.*
 ▶ (604) **Darrah Chavey**, Beloit College (1056-J1-1481)
- 9:00AM *The Mystical Math Room.*
 ▶ (605) **Mairead K Greene**, Rockhurst University (1056-J1-2040)
- 9:20AM *The Mathematics of Powered Flight. The airplane course revisited.*
 ▶ (606) **George Rublein**, College of William and Mary (1056-J1-1756)
- 9:40AM *How to Include More of the Arts in Mathematics for Liberal Arts.*
 (607) **Julian F Fleron***, **Volker Ecke**, **Christine von Renesse** and **Philip K Hotchkiss**, Westfield State College (1056-J1-2008)

- 10:00AM *The Whole Truth about Whole Numbers*. Preliminary report. (608)
 ▶ **Agnes M Rash**, Saint Joseph's University, Philadelphia, PA (1056-J1-1584)
- 10:20AM *Liberal Arts Math—An Activity Based Class*. (609)
 ▶ **Ann C Hanson**, Columbia College Chicago (1056-J1-1618)
- 10:40AM *Borrowing literary structures for mathematics lessons*. Preliminary report. (610)
 ▶ **Teresa E. Moore***, Ithaca College, and **L. Christine Kinsey**, Canisius College (1056-J1-1630)
- 11:00AM *Geometry and Renaissance Paintings*. (611)
 ▶ **Daniel F Pinzon**, University of Arkansas at Fort Smith (1056-J1-2055)
- 11:20AM *Applications of Mathematics: Using Multi-Media Curriculum to Teach Mathematics to Liberal Arts Majors*. Preliminary report. (612)
 ▶ **Barbara L Hess**, California University of Pennsylvania (1056-J1-964)

MAA Session on Using Computer Algebra Systems in the Calculus Sequence

8:00 AM – 10:35 AM

- Organizer: **William Marion**, Valparaiso University
- 8:00AM *Related Rates*. (613)
 ▶ **Leon Brin**, Southern CT State University (1056-R1-880)
- 8:20AM *Interactive Chaos Mathlets for Calculus I*. Preliminary report. (614)
 ▶ **Karl-Dieter Crisman**, Gordon College (1056-R1-1288)
- 8:40AM *Exploratory Labs in Multivariable Calculus*. Preliminary report. (615)
 ▶ **William E Fenton**, Bellarmine University (1056-R1-1382)
- 9:00AM *Why do we need intervals for the First Derivative Test?* Preliminary report. (616)
 ▶ **Daniel Maxin**, Valparaiso University (1056-R1-317)
- 9:20AM *Gabriel's Other Equipment*. Preliminary report. (617)
 ▶ **Melvin G. Royer**, Indiana Wesleyan University (1056-R1-255)
- 9:40AM *Exploring Velocity and Acceleration Vectors Visually*. Preliminary report. (618)
 ▶ **Paul E. Seeburger**, Monroe Community College (1056-R1-1779)
- 10:00AM *In search of the big bubble*. (619)
 ▶ **Andrew J Simoson**, King College (1056-R1-410)
- 10:20AM *Illustrating Gradients*. (620)
 ▶ **Robert P. Webber**, Longwood University (1056-R1-488)

MAA Session on Engaging Students with Classroom Voting

8:00 AM – 11:55 AM

- Organizers: **Derek Bruff**, Vanderbilt University
Kien Lim, University of Texas at El Paso
Kelly Cline, Carroll College
- 8:00AM *Use of Classroom Voting In Liberal Arts College Classes (Small and Large)*. Preliminary report. (621)
 ▶ **Ron Buckmire**, Occidental College (1056-E1-279)
- 8:20AM *Clickers in the Classroom*. (622)
 ▶ **Kimberly Jordan Burch**, Indiana University of Pennsylvania (1056-E1-268)

- 8:40AM *Classroom Voting: Using Students' Responses to Write Better Questions*. (623)
 ▶ **M. McGivney-Burelle Jean**, University of Hartford (1056-E1-1619)
- 9:00AM *Utilizing Personal Response Systems (Clickers) in Liberal Arts Mathematics Courses to Support a Lecture Format*. Preliminary report. (624)
 ▶ **Janet A White**, Millersville University of PA (1056-E1-1348)
- 9:20AM *Using Clickers in a Refocused College Algebra Course—Part I*. (625)
 ▶ **Erick B Hofacker*** and **Kay Shager**, University of Wisconsin - River Falls (1056-E1-1985)
- 9:40AM *Preservice Elementary Teachers' Perceptions of Clicker Use in their College Mathematics Course*. (626)
 ▶ **Travis K Miller**, Millersville University of Pennsylvania (1056-E1-682)
- 10:00AM *Using Classroom Response Systems in Mathematics to Facilitate Discourse, Reasoning, and Representations in the Development of Mathematical Content Teacher Knowledge*. (627)
 ▶ **Sherrie J Serros***, University of Wisconsin - Eau Claire, **Kathryn T Ernie** and **Erick B Hofacker**, University of Wisconsin - River Falls (1056-E1-2009)
- 10:20AM *Using Classroom Voting to Address Students' Probability Misconceptions*. (628)
 ▶ **Tami K. Dashley**, University of Texas at El Paso (1056-E1-618)
- 10:40AM *A randomized experiment exploring features of clicker use and their impact on undergraduate students' engagement and learning in statistics*. (629)
 ▶ **Herle M. McGowan***, North Carolina State University, **Brenda K. Gunderson** and **Vijay N. Nair**, University of Michigan (1056-E1-414)
- 11:00AM *Classroom voting in an introductory real analysis course*. (630)
 ▶ **L Pedro Poitevin**, Salem State College (1056-E1-1053)
- 11:20AM *Clicker examples versus board examples in Calculus: how are they different?* (631)
 ▶ **Kim Roth***, Juniata College, and **Lynn Cockett**, Juniata College, Communications Department (1056-E1-1759)
- 11:40AM *Using Clickers in Advanced Undergraduate Mathematics Courses*. (632)
 ▶ **Patti Frazer Lock**, St. Lawrence University (1056-E1-1248)

SIAM Minisymposium on High School Outreach to Introduce Students to Applied Mathematics

8:00 AM – 10:55 AM

- Organizer: **Peter Turner**, Clarkson University
- 8:00AM *Applied Mathematics for High School Outreach*. (633)
 ▶ **Peter R Turner**, Clarkson University (1056-97-386)
- 8:35AM *Soap and Slope: Exploration of gradients through hands-on experiments with surfactants (outreach module for grades 7-12)*. (634)
 ▶ **Rachel Levy**, Harvey Mudd College (1056-97-840)
- 9:25AM *Probability and Determinism at the Battle of Trafalgar*. (635)
 ▶ **Daniel J Teague**, NC School of Science and Mathematics (1056-97-606)
- 10:10AM *K-12 Outreach with Integrated Math and Physics for Roller Coaster Design*. (636)
 ▶ **Kathleen R Fowler***, **Peter Turner**, **David Wick** and **Michael Ramsdell**, Clarkson University (1056-97-871)

MAA-Project NExT Panel Discussion

8:00 AM – 9:15 AM

Teaching calculus to students who have had AP calc: Challenges and solutions.

Organizers: **Timothy P. Chartier**, Davidson College
Stephanie Salomone, University of Portland

Panelists: **Michael E. Boardman**, Pacific University
David M. Bressoud, Macalester College
Stephen L. Davis, Davidson College
Deborah Hughes-Hallett, University of Arizona
Francis E. Su, Harvey Mudd College

Employment Center

8:00 AM – 7:00 PM

MAA Invited Address

9:00 AM – 9:50 AM

(637) *Reasonable effectiveness: Trigonometry, ancient astronomy, and the birth of applied mathematics.*
Glen Van Brummelen, Quest University (1056-A0-2)

MAA Minicourse #10: Part A

9:00 AM – 11:00 AM

The hitchhiker's guide to mathematics.

Organizers: **Dan Kalman**, American University
Bruce F. Torrence, Randolph Macon College

Student Hospitality Center

9:00 AM – 5:00 PM

MAA Committee on Technology in Mathematics Education Panel Discussion

9:00 AM – 10:20 AM

Online articles from JOMA to Loci.

Organizers: **Thomas E. Leathrum**, Jacksonville State University

Panelists: **Lawrence Moore**, Duke University
Nathaniel Miller, University of Northern Colorado
Kady Schneider, Utah State University
Lee Stemkoski, Adelphi University

MAA Session for Department Chairs

9:00 AM – 10:20 AM

Assessment of student learning outcomes: Opportunity and challenge.

Organizers: **Daniel P. Maki**, Indiana University
Catherine M. Murphy, Purdue University Calumet

Panelists: **Jay A. Malmstrom**, Oklahoma City Community College
Catherine M. Murphy
Nalsey B. Tinberg, Occidental College

MAA Committee on the Participation of Women/Women in Mathematics Network Poster Session

9:00 AM – 11:00 AM

Mathematical outreach programs for underrepresented populations.

Organizer: **Elizabeth G. Yanik**, Emporia State University

AMS Special Presentation

9:30 AM – 11:00 AM

Who Wants to Be a Mathematician—National Contest.

Organizers: **Michael A. Breen**, AMS
William T. Butterworth, DePaul University

MAA-Project NExT Panel Discussion

9:30 AM – 10:50 AM

How one can become a referee/reviewer.

Organizers: **Joseph A. Gallian**, University of Minnesota-Duluth

Aparna W. Higgins, University of Dayton

T. Christine Stevens, Saint Louis University

Panelists: **Matthias Beck**, San Francisco State University

Frederick Hoffman, Florida Atlantic University

Carl Pomerance, Dartmouth College

Brigitte Servatius, Worcester Polytechnic Institute

Exhibits and Book Sales

9:30 AM – 5:30 PM

MAA Invited Paper Session on Gems of Number Theory

10:00 AM – 11:55 AM

Organizers: **Thomas Koshy**, Framingham University

Shannon Lockard, Bridgewater State College

10:00AM *Ramanujan Reaches His Hand from His Grave to Snatch Your Theorems From You.*
▶ (638) **Bruce C Berndt**, University of Illinois (1056-BB-530)

10:30AM *Combinatorial Proofs of Congruences.*
(639) **Ira M. Gessel**, Brandeis University (1056-BB-632)

11:00AM *Counting points on elliptic curves, from Gauss to the present.*
▶ (640) **Alice Silverberg**, University of California, Irvine (1056-BB-607)

11:30AM *Sage: Creating a Viable Free Open Source Alternative to Magma, Maple, and Mathematica for Number Theory.*
▶ (641) **William A Stein**, University of Washington (1056-BB-510)

AMS Session on Probability and Statistics, III

10:00 AM – 11:55 PM

- 10:00AM *Coherent risk measure for multivariate Pareto distributed losses.* Preliminary report.
Li Zhu* and **Haijun Li**, Washington State University (1056-62-2147)
- 10:15AM *Spatial Birth-Death-Swap Chains.*
Mark L Huber, Claremont McKenna College (1056-60-1068)
- 10:30AM *A Stochastic Approach to the Bonus-Malus System.* Preliminary report.
Kumer Pial Das, Lamar University (1056-60-980)
- 10:45AM *Proper quantization of multiplexer circuits, history dependent Parrondo games, and certain Markov processes.*
Steven A. Bleiler and **Faisal Shah Khan***, Portland State University (1056-81-766)
- 11:00AM *Quantum Walks with Decoherence on the N-Cycle.* Preliminary report.
Chaobin Liu* and **Nelson Petulante**, Bowie State University (1056-81-968)
- 11:15AM *Computing a Penalized Maximum Quasi-Likelihood Estimator of the Diffusion Coefficient.*
Jeff Hamrick*, Rhodes College, **Yifei Huang**, **Kostas Kardaras** and **Murad S Taqqu**, Boston University (1056-62-1452)
- 11:30AM *Underrecording in Domestic Violence Data Using Count Data Regression Models.*
Mavis Pararai, Indiana University of Pennsylvania (1056-62-1848)
- 11:45AM *Statistical Sampling in High Dimensional Inverse Problems.*
Jean Marie Linhart* and **Wolfgang Bangerth**, Texas A&M University (1056-62-1851)

AMS-ASL-MAA Panel Discussion

10:00 AM – NOON

Hilbert's Tenth Problem.
 Organizers: **Jeremy Avigad**, Carnegie Mellon University
Penelope Maddy, University of California Irvine
Charles Steinhorn, Vassar College

AWM Emmy Noether Lecture

10:05 AM – 10:55 AM

(650) *You can't hear the shape of a manifold.*
Carolyn S. Gordon, Dartmouth College (1056-58-49)

MAA Minicourse #1: Part A

10:30 AM – 12:30 PM

Remodeling data analysis.
 Organizers: **Daniel Kaplan**, Macalester College
Vittorio Addona, Macalester College

MAA Minicourse #5: Part A

10:30 AM – 12:30 PM

Active learning approaches for the foundational mathematics for elementary teachers courses.
 Organizers: **Laurie J. Burton**, Western Oregon University

Cheryl Beaver, Western Oregon University
Klay Thomas Kruczek, Western Oregon University

SIGMAA Officers Meeting

10:30 AM – NOON

MAA-YMN Panel Discussion

10:40 AM – NOON

Graduate school: Choosing one, getting in, staying in.

Organizers: **Kristi Meyer**, Wisconsin Lutheran College

Aaron Luttmann, Clarkson University

Panelists: **Richard McGehee**, University of Minnesota

Scott A. Lambert, Colby College

MAA Workshop

10:40 AM – NOON

Proposal writing workshop for grant applications to the NSF Division of Undergraduate Education.

Organizers: **Dennis E. Davenport**, NSF/DUE

Daniel P. Maki, NSF/DUE

Lee L. Zia, NSF/DUE

SIAM Invited Address

11:10 AM – NOON

(651) *Optimization Inside: The use of mathematical methods in business processes.*

Brenda Dietrich, IBM (1056-90-33)

AMS Colloquium Lectures: Lecture II

1:00 PM – 2:00 PM

(652) *Alternating permutations.*

Richard P. Stanley, M.I.T. (1056-05-17)

AMS Special Session on Nonlinear Hyperbolic Equations and Control Systems in Physics and Engineering, I

1:00 PM – 3:50 PM

Organizers: **Petronela Radu**, University of Nebraska-Lincoln

Daniel Toundykov, University of Nebraska-Lincoln

1:00PM (653) *Well-posedness of weak and strong solutions in nonlinear flow of gas and structure interactions.*
Irena Lasiecka, University of Virginia (1056-35-960)

1:30PM (654) *Boundary regularity for Maxwell's equation with applications to shape optimization.*
Matthias Eller, Georgetown University (1056-35-640)

2:00PM (655) *Stability and stabilization of a multilayer beam system.*
Scott W. Hansen, Iowa State University (1056-93-675)

- 2:30PM *Bolza boundary control problem for a fluid-structure interaction model.* (656) **Irena Lasiecka**, University of Virginia, and **Amjad Tuffaha***, University of Southern California (1056-35-1327)
- 3:00PM *L^1 Well Posedness of Euler Equations With Dynamic Phase Boundaries.* (657) **Chunguang Chen*** and **Harumi Hattori**, West Virginia University (1056-35-403)
- 3:30PM *Boundary stabilization of nonlinear structural acoustic interactions with interface on a Reissner-Mindlin plate.* (658) **George Avalos** and **Daniel Toundykov***, University of Nebraska-Lincoln (1056-35-1089)

AMS Special Session on Degenerate and Singular Elliptic Partial Differential Equations, II

1:00 PM – 3:50 PM

Organizers: **Marian Bocea**, North Dakota State University
Cristina Popovici, North Dakota State University

- 1:00PM Δ_∞ is well defined—a new proof. (659) **Robert R Jensen**, Loyola University Chicago (1056-35-837)
- 1:30PM *Studying the infinity Laplace equation via a finite difference approximation.* (660) **Scott N Armstrong**, Louisiana State University (1056-35-1575)
- 2:00PM *Numerical methods for the infinity Laplace equation.* (661) **Charles K Smart**, University of California, Berkeley (1056-35-1626)
- 2:30PM *A remark on C^2 infinity harmonic functions.* (662) **Yifeng Yu**, University of California at Irvine (1056-35-2005)
- 3:00PM *Limits as $p(x) \rightarrow \infty$ of $p(x)$ -harmonic functions.* (663) **Jose Miguel Urbano**, University of Coimbra (1056-35-1228)
- 3:30PM *Homogenization in L^∞ . Preliminary report.* (664) **Changyou Wang**, University of Kentucky (1056-35-1031)

AMS Special Session on Graph Algebras in Analysis and Algebra, II

1:00 PM – 3:50 PM

Organizers: **Gene Abrams**, University of Colorado at Colorado Springs
Mark Tomforde, University of Houston

- 1:00PM *Structure theory for k -graph C^* -algebras.* (665) **Aidan Sims**, University of Wollongong (1056-46-515)
- 2:00PM *Desingularization technique for higher-rank graphs.* (666) **Cynthia Farthing**, Creighton University (1056-46-911)
- 2:30PM *Labeled Graph C^* -algebras with Group Actions.* (667) **Teresa Bates**, University of New South Wales, **David Pask**, University of Wollongong, and **Paulette N. Willis***, The University of Iowa (1056-47-1062)
- 3:00PM *The role of the socle in the classification of Leavitt path algebras.* (668) **Mercedes Siles Molina**, University of Malaga (Spain) (1056-16-1023)

- 3:30PM *Weakly regular and self-injective Leavitt path algebras.* (669) **Gonzalo Aranda Pino***, University of Málaga, Spain, **Kulumani Rangaswamy**, University of Colorado at Colorado Springs, and **Mercedes Siles Molina**, University of Málaga, Spain (1056-16-339)

AMS Special Session on Algebraic Methods in Signal Processing, II

1:00 PM – 3:40 PM

Organizers: **Shamgar Gurevich**, University of California Berkeley
Ronny Hadani, University of Chicago
Olga Holtz, University of California Berkeley and Technical University Berlin
Oded Schwartz, Technical University Berlin
Nir Sochen, Tel Aviv University

- 1:00PM *Algebraic Constructions for Communication Sequences.* (670) **Solomon W Golomb**, University of Southern California (1056-00-1867)
- 1:30PM *Multilinear Algebra in Signal Processing.* (671) **Lek-Heng Lim**, University of California, Berkeley (1056-15-1823)
- 2:00PM *Group representation patterns in digital signal processing.* (672) **Ronny Hadani***, UTexas at Austin, **Shamgar Gurevich**, IAS, and **Nir Sochen** (1056-42-1758)
- 2:30PM *Spectral Methods and Semidefinite Programming for Cryo-EM, NMR Spectroscopy, Low-Rank Matrix Completion and Computer Vision.* (673) **Amit Singer**, Princeton University and PACM (1056-00-1037)
- 3:00PM *Group theoretical aspects of Gabor Analysis. Preliminary report.* (674) **Hans G. Feichtinger**, University of Vienna (1056-43-1059)

AMS Special Session on Representation Theory and Nonassociative Algebras, I

1:00 PM – 4:20 PM

Organizer: **Andrew Douglas**, City University of New York

- 1:00PM *The quasi-jordan algebras. Preliminary report.* (675) **Raul Felipe**, CIMAT (1056-17-672)
- 1:30PM *Special identities for quasi-Jordan algebras.* (676) **Murray R Bremner***, University of Saskatchewan, Canada, and **Luiz A Peresi**, University of Sao Paulo, Brazil (1056-17-229)
- 2:00PM *Lie-Yamaguti algebras and related structures. Preliminary report.* (677) **Pilar Benito**, Universidad de La Rioja (1056-17-1147)
- 2:30PM *Locally Nilpotency in Commutative Right Nilalgebras.* (678) **Alicia Labra**, Universidad de Chile (1056-17-489)
- 3:00PM *Special Bol Identities. Preliminary report.* (679) **Murray Bremner**, University of Saskatchewan, **Ivan Correa**, Universidad Metropolitana of Santiago, Chile, **Irvin Hentzel***, Iowa State University, and **Luiz Peresi**, Universidade de Sao Paulo, Brazil (1056-17-1172)

Program of the Sessions – Thursday, January 14 (cont'd.)

- 3:30PM *Gradings on exceptional Lie superalgebras.*
(680) **Cristina Draper***, Universidad de Málaga (Spain),
Alberto Elduque, Universidad de Zaragoza (Spain),
and **Cándido Martín**, Universidad de Málaga (Spain)
(1056-17-1130)
- 4:00PM *Group gradings on Lie algebras in positive
characteristic.*
(681) **Mikhail V Kotchetov**, Memorial University of
Newfoundland (1056-17-1333)

- 2:30PM *Selecting Diverse Committees.*
(691) **Thomas C. Ratliff***, Wheaton College, and
Donald G. Saari, University of California, Irvine
(1056-91-1533)
- 3:00PM *Approval Balloting for Multi-Winner Elections.*
▶ (692) **D. Marc Kilgour**, Wilfrid Laurier University
(1056-91-710)
- 3:30PM *Satisfaction Approval Voting.*
(693) **Steven J. Brams***, New York University, and **D. Marc
Kilgour**, Wilfrid Laurier University (1056-91-752)

AMS Special Session on Use of Technology in Modern Complex Analysis Research, I

1:00 PM – 3:50 PM

Organizers: **Beth Schaubroeck**, U.S. Air Force
Academy
Michael Dorff, Brigham Young
University
James Rolf, U.S. Air Force Academy

- 1:00PM *Applets to Explore Research Topics in Complex
Variables.* Preliminary report.
▶ (682) **James S Rolf***, United States Air Force Academy,
and **Michael Dorff**, Brigham Young University
(1056-30-1625)
- 1:30PM *Research in Complex Dynamics using Java Applets.*
▶ (683) **Rich L Stankewitz**, Ball State University
(1056-30-1048)
- 2:00PM *Julia Sets and Graphing Iterates of Quadratic
Polynomials.* Preliminary report.
▶ (684) **Julia A Barnes***, Western Carolina University,
Clinton Curry, Stony Brook University, and
Beth Schaubroeck, U.S. Air Force Academy
(1056-37-1685)
- 2:30PM *Modeling Fluid Flow in the Complex Plane.*
▶ (685) **Michael A. Brilleslyper**, U.S. Air Force Academy
(1056-30-1352)
- 3:00PM *Experimental Complex Function Theory via Circle
Packing.* Preliminary report.
▶ (686) **Ken Stephenson**, University of Tennessee,
Knoxville (1056-30-1968)
- 3:30PM *Use of computer technology for insight and proof.*
(687) **Roger W. Barnard**, Texas Tech University.
(1056-30-810)

AMS Special Session on Voting Theory, II

1:00 PM – 3:50 PM

Organizers: **Michael Jones**, Mathematical Reviews
Brian Hopkins, Saint Peter's College
Tommy Ratliff, Wheaton College

- 1:00PM *On the ordinal equivalence of power indices.*
▶ (688) **Josep Freixas***, **Xavier Molinero**, **Montserrat
Pons**, Technical University of Catalonia (Campus
Manresa), and **Dorota Marciniak**, Polish Academy
of Sciences and National Institute of
Telecommunications (1056-91-1202)
- 1:30PM *A Smallest Tournament Not Realizable by
 $\frac{2}{3}$ -Majority Voting, and Some Open Problems in
Spatial Voting Theory.*
▶ (689) **Craig A. Tovey***, Georgia Institute of Technology,
and **Dylan Shepardson**, Mt. Holyoke College
(1056-91-2025)
- 2:00PM *The agreement number of tree societies.*
(690) **Sarah Fletcher**, Georgia Institute of Technology,
Christopher S. Hardin, Union College, and **Francis
Edward Su***, Harvey Mudd College (1056-52-1416)

AMS Special Session on Analysis and Control Under Uncertainty, II

1:00 PM – 3:20 PM

Organizers: **Xioaming Wang**, Florida State
University
Yanzhao Cao, Auburn University
Catalin Trenchea, University of
Pittsburgh

- 1:00PM *Balancing a dissipative linear SDE with uncertain
parameters.*
(694) **Sundeep Samson*** and **James A Reneke**, Clemson
University (1056-90-597)
- 1:30PM *Frequency-Domain Criteria for Robust Stability for
a Class of Linear Time-Periodic Systems.*
(695) **Dmitry Altshuller**, Crane Aerospace & Electronics
(1056-34-720)
- 2:00PM *Coderivatives in Parametric Optimization in
Asplund Spaces.*
(696) **Yen-Nhi Nguyen-thi***, **Boris Mordukhovich**, Wayne
State University, and **Nam Mau Nguyen**, The
University of Texas-Pan American (1056-49-1335)
- 2:30PM *Weighted Composition Operators on Bergman
Spaces in the Unit Ball.*
(697) **Waleed Khaled Al-Rawashdeh**, Central Michigan
University (1056-47-1417)
- 3:00PM *Gibbs measure and the quantization dimension
function.*
(698) **Mrinal Kanti Roychowdhury**, The University of
Texas-Pan American (1056-37-656)

AMS Special Session on Applications of Time Scales to Biology, Economics, and Engineering, II

1:00 PM – 4:20 PM

Organizers: **Martin Bohner**, Missouri University of
Science and Technology
Billur Kaymakcalan, Georgia Southern
University-Statesboro
Allan Peterson, University of
Nebraska-Lincoln

- 1:00PM *Lyapunov-Based Methods for Designing Stable
Switched Systems.* Preliminary report.
(699) **John M Davis**, Baylor University (1056-93-1258)
- 1:30PM *An exploration of the numerical approximations of
dynamic derivatives for adaptive computations.*
(700) Preliminary report.
Qin Sheng* and **Anzhong Wang**, Baylor University
(1056-65-545)
- 2:00PM *Global Stability of Complex-Valued Neural Networks
on Time Scales.*
▶ (701) **Suman Sanyal**, Marshall University (1056-60-1167)
- 2:30PM *Linear and nonlinear cobweb models on time scales.*
(702) **Julius Heim*** and **Martin Bohner**, Missouri
University of Science and Technology
(1056-00-1928)

- 3:00PM *Probability on time scales.*
(703) **Thomas Matthews*** and **Dr. Martin J. Bohner**,
Missouri University of Science and Technology
(1056-00-1370)
- 3:30PM *Asymptotic Behavior of Linear Dynamic Systems on
Time Scales.* Preliminary report.
▶ (704) **Gro Hovhannisyán**, Kent State University
(1056-34-405)
- 4:00PM *On second order nonoscillatory scalar linear
dynamic equations on time scales.* Preliminary
report.
▶ (705) **Sigrun Bodine***, University of Puget Sound, and **D.
A. Lutz**, San Diego State University (1056-34-1721)

AMS Special Session on Arithmetic Geometry, II

1:00 PM – 3:50 PM

Organizers: **Bo-Hae Im**, Chung-Ang University
Jennifer Johnson-Leung, University of
Idaho
Jennifer Paulhus, Kansas State
University

- 1:00PM *Non-optimal levels of reducible two-dimensional
mod ℓ representations of the Galois group of \mathbf{Q} .*
(706) **Kenneth A. Ribet**, University of California, Berkeley
(1056-11-1219)
- 1:30PM *Reduction of crystalline representations and
generalized Serre weights.*
(707) **Hui June Zhu**, SUNY at Buffalo (1056-11-1237)
- 2:00PM *Mod 7 and 7-adic Galois representations of elliptic
curves.*
(708) **Ralph Greenberg**, University of Washington, **Karl
Rubin** and **Alice Silverberg***, University of
California, Irvine (1056-11-1004)
- 2:30PM *A formula for the special L-value of a modular
abelian variety.*
(709) **Amod Agashe**, Florida State University
(1056-11-1109)
- 3:00PM *Siegel modular forms of degree two attached to
Hilbert modular forms.*
(710) **Jennifer Johnson-Leung*** and **Brooks Roberts**,
University of Idaho (1056-11-1111)
- 3:30PM *The Gauss higher relative class number problem.*
(711) **John Voight**, University of Vermont (1056-11-346)

MAA-AMS-MER Invited Paper Session on Mathematics and Education Reform, I: Guided Discovery Learning

1:00 PM – 3:50 PM

Organizers: **William H. Barker**, Bowdoin College
William G. McCallum, University of
Arizona
Bonnie S. Saunders, University of
Illinois at Chicago
Michael Starbird, University of Texas
at Austin

- ▶ 1:00PM *The Power of Guided Discovery Analysis.*
(712) Preliminary report.
William Barker, Bowdoin College (1056-BC-1121)
- 1:30PM *Guided Discovery: Matters Mathematical and
Beyond.* Preliminary report.
(713) **Michael Starbird**, The University of Texas at Austin
(1056-BC-1250)

- 2:00PM *The Development of Pedagogical Content
Knowledge about Early Algebra: A Comparative
Study.* Preliminary report.
(714) **Bill Jacob***, **Sarah Hough**, **Kyunghee Moon** and
Monica Guzman, University of California, Santa
Barbara (1056-BC-1427)
- ▶ 2:30PM *A comparison of Inquiry-Based Learning at the
Undergraduate and Secondary Levels.* Preliminary
report.
(715) **Stephanie R Nichols**, Washington-Lee High School;
Arlington, VA (1056-BC-1693)
- 3:00PM *Inquiry Based Learning at Chicago.* Preliminary
report.
(716) **Paul J Sally**, University of Chicago (1056-BC-826)
- ▶ 3:30PM *Panel Session: Guided Discovery Learning.*
Preliminary report.
(717) **Michael Starbird***, The University of Texas at
Austin, and **William Barker**, Bowdoin College
(1056-BC-1356)

MAA Minicourse #2: Part A

1:00 PM – 3:00 PM

*Using GeoGebra to create activities and applets for
visualization and exploration.*

Organizer: **Michael K. May**, Saint Louis University

MAA Minicourse #9: Part A

1:00 PM – 3:00 PM

*Getting students involved in undergraduate
research.*

Organizers: **Aparna W. Higgins**, University of
Dayton
Joseph A. Gallian, University of
Minnesota Duluth

AMS Session on Number Theory, II

1:00 PM – 3:55 PM

- 1:00PM *Solutions to $xyz = x + y + z = 1$ in algebraic
integers of bounded degrees.* Preliminary report.
(718) **Helen G Grundman**, Bryn Mawr College
(1056-11-823)
- ▶ 1:15PM *An elementary Proof of a Ramanujan's Congruence
Identity.*
(719) **Syrous Marivani**, LSUA (1056-11-844)
- ▶ 1:30PM *Explicit construction of integral bases of radical
function fields.*
(720) **Qingquan Wu*** and **Renate Scheidler**, University of
Calgary (1056-11-858)
- 1:45PM *Flat Cyclotomic Polynomials: A New Approach.*
(721) **Sam Elder**, California Institute of Technology
(1056-11-936)
- 2:00PM *Bounds on the order function of certain p -adic
numbers.*
(722) **Brian C. Dietel**, Oregon State University
(1056-11-939)
- 2:15PM Break
- ▶ 2:30PM *The number of nonzero binomial coefficients
modulo p^α .*
(723) **Eric S. Rowland**, Tulane University (1056-11-956)
- 2:45PM *On the density of discriminants of abelian
extensions of a number field.*
(724) **Behailu Mammo**, Hofstra University
(1056-11-1035)

- 3:00PM *The Erdos-Moser equation*
 ▶ (725) $1^n + 2^n + \dots + (m-1)^n = m^n$, related congruences, and primary pseudoperfect numbers.
Jonathan Sondow*, New York, NY, and **Kieren MacMillan**, Toronto, Ontario (1056-11-1047)
- 3:15PM *Prime Tuples.*
 (726) **David C. Torney**, Round Ideas Institute (1056-11-1056)
- 3:30PM *On the Structure of Witt-Burnside rings over pro-p groups.*
 (727) **Lance Edward Miller**, University of Connecticut (1056-11-1154)
- 3:45PM *Tetranomial Thue Equations.* Preliminary report.
 (728) **Daniel P. Wisniewski**, Bryn Mawr College (1056-11-1169)

- 3:15PM *Development of a Model of Erythropoiesis in Patients with Chronic Kidney Disease.*
 ▶ (738) **Karen Bliss***, **H T Tran**, North Carolina State University, **H T Banks**, North Carolina State University, and **Peter Kotanko**, Renal Research Institute, New York (1056-92-1583)
- 3:30PM *Asymptotic formulas for the equilibria in a model of suppression of pest resistance to insecticidal genetically modified crops.*
 ▶ (739) **Prasanth George**, Michigan Technological University, and **John Ringland***, University at Buffalo (1056-92-1649)
- 3:45PM *Biological Neronal Networks on Nvidia Cuda Graphics Processors.* Preliminary report.
 ▶ (740) **Joseph A. Rhoads***, Florida State University, **Richard Bertram**, Florida State University, **Joel Tabak**, Florida State University, Department of Biology, **Michael Mascagni**, Florida State University, Department of Computer Science, and **Gordon Erlebacher**, Florida State University, Department of Scientific Computing (1056-92-1667)
- 4:00PM *An integrated muscle mechanic-fluid dynamic model of lamprey swimming.*
 (741) **Chia Yu Hsu***, Center for Computational Science, Dept. of Math. Tulane University, **Eric Tytell**, Dept. of Biology, Univ. of Maryland, College Park, and **Lisa Fauci**, Tulane University (1056-76-1105)

AMS Session on Biomathematics, II

1:00 PM – 4:10 PM

- 1:00PM *Synchronous versus Asynchronous Oscillations for an Antigenically Varying Plasmodium falciparum Infection with Host Immune Response.* Preliminary report.
 (729) **Jonathan L. Mitchell**, Southern Methodist University (1056-92-1215)
- 1:15PM *Evolutionary dynamics on undirected graphs—the effect of graph structure and initial placement on mutant spread.*
 ▶ (730) **Jan Rychtar**, University of North Carolina at Greensboro (1056-92-1240)
- 1:30PM *Combining immunological and epidemiological models.* Preliminary report.
 (731) **Laurentiu Mircea Segă***, Purdue University, and **Fabio Augusto Milner**, Arizona State University (1056-92-1295)
- 1:45PM *Outbreak control through voluntary first-order and second-order ring vaccination.* Preliminary report.
 (732) **Michel Tchuente***, University of Guelph, **A. P. Galvani**, Yale University School of Medicine, **L. Ancel-Meyers**, The University of Texas at Austin, and **Chris Bauch**, University of Guelph (1056-92-1411)
- 2:00PM *A moment closure method for stochastic biochemical networks.*
 (733) **Chang Hyeong Lee**, Ulsan National Institute of Science and Technology (UNIST) (1056-92-1412)
- 2:15PM *Simulation of flagellar motion near a rigid surface.*
 ▶ (734) **Ricardo Ortiz***, Center for Computational Science at Tulane University, and **Ricardo Cortez**, Tulane University (1056-76-1493)
- 2:30PM *A Statistical Method for Environmental Prediction in Metagenomic Samples.* Preliminary report.
 ▶ (735) **Katherine Isaacs**, San Jose State University (1056-92-1415)
- 2:45PM *Estimating Vital Coral Population Parameters.*
 ▶ (736) Preliminary report.
Kristie Llera*, Florida Institute of Technology, and **Elif Demirci**, University of Ankara (1056-92-1567)
- 3:00PM *A Systems Biology Approach to Modeling Alzheimer's Disease.* Preliminary report.
 ▶ (737) **Christina Rose Kyrtos***, Fischel Dept. of Bioengineering, University of Maryland, and **John S Baras**, Professor, A James Clark School of Engineering, University of Maryland (1056-92-1570)

AMS Session on Differential and Difference Equations, II

1:00 PM – 4:10 PM

- 1:00PM *On the symmetry and existence of solutions of some floating drop problems.*
 (742) **Ray Treinen**, Kansas State University (1056-35-1233)
- 1:15PM *Scattering Due to a Medium Density Change.*
 (743) Preliminary report.
Nezam Iraniparast, Western Kentucky University (1056-35-1300)
- 1:30PM *Fundamental solutions of the wave equation in the Einstein-de Sitter spacetime.*
 (744) **Anahit Galstyan***, University of Texas-Pan American, **Tamotu Kinoshita**, University of Tsukuba, Tsukuba, Japan, and **Karen Yagdjian**, University of Texas-Pan American (1056-35-1337)
- 1:45PM *Corrector analysis for homogenization of stationary linear transport equations in random media.*
 (745) **Guillaume Bal** and **Wenjia Jing***, Columbia University (1056-35-1388)
- 2:00PM *The 2D Boussinesq Equations with vertical viscosity and vertical diffusivity.* Preliminary report.
 (746) **Dhanapati Adhikari***, Oklahoma State University, **Chongsheng Cao**, Florida International University, and **Jiahong Wu**, Oklahoma State University (1056-35-1390)
- 2:15PM *Optimality Conditions for Control Systems of Neutral Type.*
 (747) **Lianwen Wang**, University of Central Missouri (1056-93-1006)
- 2:30PM *Mechanisms of the Instabilities of Ideal Diffusion Flames.*
 (748) **Joseph E Hibdon, Jr***, Northwestern University, and **Moshe Matalon**, University of Illinois Urbana-Champaign (1056-35-1442)

- 2:45PM *An Analytical and Numerical Study of Optical Soliton Propagation through Photorefractive Media governed by Logarithmic Law Nonlinearity.*
 ▶ (749) **Dawn A. Lott***, Delaware State University, **Auris Henriquez-Fernandez**, University of Puerto Rico, Rio Piedras, PR, **Bryan Moore**, Michigan State University, **Benjamin Sturdevant**, University of Wisconsin, Madison, and **Anjan Biswas**, Delaware State University (1056-35-1559)
- 3:00PM *On the solution of the coupled Navier-Stokes and Darcy equations.*
 ▶ (750) **Prince Chidyagwai*** and **Beatrice Riviere**, Rice University (1056-35-1576)
- 3:15PM *Sub-Wavelength Plasmonic Crystals: Dispersion Relations and Effective Properties.*
 (751) **Santiago P. Fortes***, **Robert P. Lipton** and **Stephen P. Shipman**, Louisiana State University (1056-35-1579)
- 3:30PM *Multiple positive solutions for a class of p - q -Laplacian systems with multiple parameters and combined nonlinear effects.*
 (752) **Jaffar Ali***, Florida Gulf Coast University, and **Ratnasingham Shivaji**, Mississippi State University (1056-35-1615)
- 3:45PM *The blowup for the semilinear Klein-Gordon equation in de Sitter spacetime.*
 (753) **Karen Yagdjian**, University of Texas-Pan American (1056-35-1628)
- 4:00PM *Lyapunov Functionals vs Lyapunov Functions in Stability Analysis for Stochastic Parabolic Differential Equations of Ito Type.* Preliminary report.
 (754) **J Mahmoud Anabtawi**, American University of Sharjah (1056-35-1681)

AMS Session on Computational Mathematics, I

1:00 PM – 4:10 PM

- 1:00PM *Numerical techniques for 3-D Vortex Rings Motion and Collision.*
 (755) **Leon Kaganovskiy***, New College of Florida, **Robert Krasny**, University of Michigan, Ann Arbor, and **Feng Hualong**, Nanjing University of Science and Technology (1056-65-30)
- 1:15PM *Local Numerical Representation of Algebraic Sets.*
 (756) **Yun Guan*** and **Jan Verschelde**, University of Illinois at Chicago (1056-65-123)
- 1:30PM *Chemotaxis and Numerical Methods for Chemotaxis Models.*
 ▶ (757) **Yekaterina Epshteyn**, Carnegie Mellon University (1056-65-151)
- 1:45PM *A stability study of a new explicit numerical scheme for a system of differential equations with a large skew-symmetric component.*
 (758) **Katharine F. Gurski***, Howard University, and **Stephen O'Sullivan**, Dublin City University (1056-65-504)
- 2:00PM *C^0 interior penalty methods for fully nonlinear Monge-Ampère type equations.*
 (759) **Michael Joseph Neilan***, **Susanne C. Brenner**, **Thirupathi Gudi** and **Li-yeng Sung**, Louisiana State University (1056-65-518)
- 2:15PM *On the convergence of a generalized modified Newton scheme.* Preliminary report.
 ▶ (760) **Livinus U Uko**, Johnson C. Smith University (1056-65-1280)

- 2:30PM *On the Convergence of Fully-discrete High-Resolution Schemes with van Leer's flux limiter for Conservation laws.* Preliminary report.
 (761) **Nan Jiang**, University of South Dakota (1056-65-554)
- 2:45PM *The Domain Decomposition Method Applied to Hyperbolic Network Problems.*
 ▶ (762) **James B Collins**, North Carolina State University (1056-65-796)
- 3:00PM *Kernel Based Function Approximation in High Dimensions.*
 (763) **Fred J. Hickernell**, Illinois Institute of Technology (1056-65-845)
- 3:15PM *Analysis and simulation of a multiphysics and a multiphase problem.*
 (764) **Aycil Cesmelioglu**, Rice University (1056-65-925)
- 3:30PM *Retrieving Economic Parameters in Asset-Flow Equations.*
 (765) **Marlene Willie-Aymone Ouayoro**, George Mason University (1056-65-951)
- 3:45PM *A comparison of algorithms for subset selection.* Preliminary report.
 ▶ (766) **Martin Brown***, University of California - Berkeley, **Mary Broadbent**, Amherst College, and **Kevin Penner**, University of Pittsburgh (1056-65-986)
- 4:00PM *A High Accuracy Algorithm for 3D Periodic Electromagnetic Scattering.*
 (767) **Michael J Nicholas**, Tulane University (1056-78-1760)

AMS Session on Fields and Commutative Algebra

1:00 PM – 4:10 PM

- 1:00PM *On the Irreducibility of Cauchy-Mirimanoff Polynomials.* Preliminary report.
 (768) **Brian C Irick**, University of Tennessee (1056-12-271)
- 1:15PM *Forcing the appearance of Galois groups: new automatic realization results for p -groups.*
 (769) **Andrew C Schultz**, University of Illinois, Urbana-Champaign (1056-12-850)
- 1:30PM *Observations on Primitive, Normal, and Subnormal Elements of Field Extensions.*
 (770) **Steven H. Weintraub**, Lehigh Univ. (1056-12-257)
- 1:45PM *Prime Ideals in Birational Extensions of Two-Dimensional Power Series Rings.*
 (771) **Christina Eubanks-Turner***, University of Louisiana at Lafayette, **Melissa Luckas**, Madison, Wisconsin, and **Serpil Saydam**, University of Louisiana at Monroe (1056-13-370)
- 2:00PM *Irreducible Divisor Graphs.* Preliminary report.
 ▶ (772) **M Axtell**, University of Saint Thomas, **N Baeth***, University of Central Missouri, and **J Stickles**, Milikin University (1056-13-655)
- 2:15PM *Abstract Factorization into Relatively Prime Elements.* Preliminary report.
 (773) **Jeremiah N. Reinkoester**, University of Iowa (1056-13-896)
- 2:30PM *Krull dimension of a power series ring over a one-dimensional nondiscrete valuation domain.* Preliminary report.
 (774) **Byung Gyun Kang*** and **Toan**, POSTECH (1056-13-1515)
- 2:45PM *A general theory of almost splitting sets.*
 (775) **Byung Gyun Kang** and **Jung Wook Lim***, POSTECH (1056-13-1522)

- 3:00PM *The Linear Strand of Path Ideals of Trees.*
(776) Preliminary report.
Rachelle R. Bouchat*, Slippery Rock University, **Tài Hà** and **Augustine O’Keefe**, Tulane University (1056-13-1730)
- 3:15PM *Comparing the Sizes of the Lower Bass Numbers of a Cohen Macaulay Local Ring.* Preliminary report.
Jared L Painter, University of Texas at Arlington (1056-13-1830)
- 3:30PM *Characterizing rings which admit non-trivial totally reflexive modules.* Preliminary report.
Kristen A Beck, The University of Texas at Arlington (1056-13-1984)
- 3:45PM *Building Indecomposable Modules.* Preliminary report.
Andrew Crabbe, Syracuse University (1056-13-2054)
- 4:00PM *On the Integral Closure of an Antimatter Domain.*
▶ (780) **William Travis Trentham**, North Dakota State University (1056-13-1857)

AMS Session on Discrete Mathematics, III

1:00 PM – 3:55 PM

- 1:00PM *Enumeration Of Bipartite Graphs.*
▶ (781) **Shanzen Gao**, Florida Atlantic University (1056-05-715)
- 1:15PM *Graphs in which each independent dominating set intersects each minimum dominating set.*
David R. Prier* and **Peter D. Johnson**, Auburn University (1056-05-706)
- 1:30PM *C_4 -Factorizations with Two Associate Classes.*
▶ (783) **Chris Rodger** and **Michael Tiemeyer***, Auburn University (1056-05-629)
- 1:45PM *Deletion relations of graphs.* Preliminary report.
▶ (784) **Stephen G Hartke**, University of Nebraska-Lincoln, **Hannah Kolb**, Illinois Institute of Technology, **Jared Nishikawa**, Willamette University, and **Derrick Stolee***, University of Nebraska-Lincoln (1056-05-498)
- 2:00PM *Star-Avoiding Ramsey Numbers.*
(785) **Jonelle Hook**, Lehigh University (1056-05-485)
- 2:15PM *p-Capacity \mathbb{Z}^n and Zeta function.*
(786) **Lucio M. G. Prado**, BMCC - The City University of New York (1056-31-1798)
- 2:30PM *Promotion acting on Standard Young Tableaux of staircase shape.* Preliminary report.
▶ (787) **Qiang Wang*** and **Steven Pon**, UC Davis (1056-05-2141)
- 2:45PM *On extremal cycle-free subgraphs of the hypercube.*
▶ (788) **Lale Özkahya**, University of Illinois at Urbana-Champaign (1056-05-838)
- 3:00PM *Group Colorability of Graphs.*
(789) **Hao Li**, West Virginia University (1056-05-898)
- 3:15PM *Oriented Incidence and a Generalization of Hypergraphs.*
(790) **Lucas J. Rusnak**, Binghamton University (1056-05-1465)
- 3:30PM *Irreducible No-Hole $L(2, 1)$ labelings of some classes of graphs.*
▶ (791) **Jobby Jacob***, Rochester Institute of Technology, and **Renu Laskar**, Clemson University (1056-05-1466)
- 3:45PM *A Parallel Algorithm for finding Maximum Critical Independent Sets in Graphs.*
(792) **Ermelinda Delavina**, University of Houston-Downtown, and **Craig Eric Larson***, Virginia Commonwealth University (1056-05-1774)

MAA Session on Developmental Mathematics Education: Helping Under-Prepared Students Transition to College-Level Mathematics, II

1:00 PM – 4:15 PM

- Organizers: **Kimberly J. Presser**, Shippensburg University
J. Winston Crawley, Shippensburg University
- 1:00PM *Transition Mathematics: A Professional Learning Community Approach.*
▶ (793) **Stuart Boersma*** and **Aaron Montgomery**, Central Washington University (1056-D1-567)
- 1:20PM *How ideas from therapy can help developmental mathematics students with anxiety, motivation, and performance: Successes from two pilot tests.* Preliminary report.
▶ (794) **K. Scott Alberts***, Truman State University, and **Jane Roads**, Moberly Area Community College (1056-D1-602)
- 1:40PM *An alternative to intermediate algebra for liberal arts majors.* Preliminary report.
▶ (795) **Jeffery D. Sykes**, Ouachita Baptist University (1056-D1-941)
- 2:00PM *Preparing students for Elementary Statistics or Math for Liberal Arts.* Preliminary report.
▶ (796) **Mary R Parker**, Austin Community College (1056-D1-1821)
- 2:20PM *A successful model for teaching developmental math at CSU-Monterey bay.*
▶ (797) **Lipika Deka**, California State University, Monterey Bay (1056-D1-1332)
- 2:40PM *Blending Inquiry-Based Class Sessions with Computer-Assisted Instruction.* Preliminary report.
▶ (798) **William O. Bond*** and **John C. Mayer**, University of Alabama at Birmingham (1056-D1-1778)
- 3:00PM *The Quantitative Learning Center at UConn, and the effects of online homework in the study habits of students.* Preliminary report.
▶ (799) **Álvaro Lozano-Robledo*** and **Tom Roby**, University of Connecticut - Storrs (1056-D1-1150)
- 3:20PM *Developmental Mathematics Program Assessment: A Case Study.* Preliminary report.
▶ (800) **Frank Anthony Cerreto**, The Richard Stockton College of NJ (1056-D1-1321)
- 3:40PM *Proportional Reasoning Models in Developmental Mathematics Education: Enhancing Under-Prepared Students’ Transition at the College-Level.* Preliminary report.
▶ (801) **Jack A Carter***, California State University East Bay, **Beverly J Ferrucci**, Keene State College, and **Ngan Hoe Lee**, National Institute of Education, Singapore (1056-D1-224)
- 4:00PM *Transitions: Helping Under-Prepared Students Find Success at Dominican University.*
▶ (802) **Paul R. Coe**, Dominican University (1056-D1-2061)

MAA Session on Mathematics Courses for the Liberal Arts Students, II

1:00 PM – 3:55 PM

- Organizer: **Reva Kasman**, Salem State College
- 1:00PM *Your Financial Future.*
▶ (803) **Yu-Ju Kuo**, Indiana University of Pennsylvania (1056-J1-816)

- 1:20PM (804) *Games and Critical Thinking.*
Volker Ecke*, **Christine von Renesse**, **Julian Fleron** and **Philip Hotchkiss**, Westfield State College (1056-J1-1866)
- 1:40PM (805) *Teaching Non-Mathematics Majors using 'Group Topic Books'.* Preliminary report.
Caroline P Lubert, James Madison University (1056-J1-1034)
- 2:00PM (806) *Quantitative Approaches to Problems in Democracy.*
Karen Saxe, Macalester College (1056-J1-247)
- 2:20PM (807) *Symmetry and Design Portfolios Showcase Mathematics for Liberal Arts Students.*
Penny H. Dunham, Muhlenberg College (1056-J1-391)
- 2:40PM (808) *Service-based learning projects in statistics courses.*
Brad Bailey* and **A. Robb Sinn**, North Georgia College & State University (1056-J1-736)
- 3:00PM (809) *A New Course for Liberal Arts Math: The Mathematics of Calendars and Timekeeping.*
Daniel E. Otero, Xavier University (1056-J1-830)
- 3:20PM (810) *Mathematical ways of reasoning and knowing through geometry.*
James Morrow, Mount Holyoke College (1056-J1-174)
- 3:40PM (811) *Fun Projects and Activities for Poets and Mathematicians Alike.*
Ioana Mihaila, Cal Poly Pomona (1056-J1-946)

MAA Session on Online Homework—Innovation and Assessment, I

1:00 PM – 4:15 PM

Organizers: **Michael E. Gage**, University of Rochester
Arnold K. Pizer, University of Rochester
Vicki Roth, University of Rochester

- 1:00PM (812) *An Interactive Approach to Discrete Math Using WeBWork and Flash Applets.* Preliminary report.
Nathan M. Wodarz, University of Wisconsin - Stevens Point (1056-M1-35)
- 1:20PM (813) *Using WeBWork, A Web-Based Homework Delivery And Grading System, To Help Prepare Students For Peer Instruction.*
Adam R. Lucas, Saint Mary's College of California (1056-M1-228)
- 1:40PM (814) *Geometry on a wiki.* Preliminary report.
Michael E McDaniel, Aquinas College (1056-M1-267)
- 2:00PM (815) *The relationship between online homework, test grades, and persistence in calculus.*
H Smith Risser, Montana Tech (1056-M1-298)
- 2:20PM (816) *The Effect of an Online Homework System on Student Outcomes in a First-Year Mathematics Course.*
Laurie Lenz, Marymount University (1056-M1-324)
- 2:40PM (817) *WebAssign: "It's How Math Homework is Done!".* Preliminary report.
Denise J LeGrand, University of Arkansas at Little Rock (1056-M1-367)
- 3:00PM (818) *Communicating through Online Assessment.* Preliminary report.
Edward D Smith, Pima Community College (1056-M1-539)

- 3:20PM (819) *Embedding applets into WeBWork questions.* Preliminary report.
Michael E. Gage, University of Rochester (1056-M1-585)
- 3:40PM (820) *The Impact of Implementing Web Homework in Calculus II.*
P. Gavin LaRose, University of Michigan (1056-M1-703)
- 4:00PM (821) *A Successful Approach in Designing Online Courses for Freshman Mathematics Courses.* Preliminary report.
A. Serpil Saydam*, **A. Dale Magoun** and **Charlotte H. Owens**, University of Louisiana at Monroe (1056-M1-832)

MAA Session on Preparing K-12 Teachers to Teach Algebra, II

1:00 PM – 3:55 PM

Organizers: **Elizabeth Burroughs**, Montana State University
Angela M. Hodge, North Dakota State University
William G. McCallum, University of Arizona

- 1:00PM (822) *An algebra course for middle school teachers.*
Ji Li* and **Virginia Bohme**, The University of Arizona (1056-N1-1338)
- 1:20PM (823) *Visualizing Algebraic Relationships: Solving Combined Rate Problems with Pattern Blocks.* Preliminary report.
Dianna Spence* and **A. Robb Sinn**, North Georgia College & State University (1056-N1-865)
- 1:40PM (824) *Inquiry as an Outcome of Algebra.* Preliminary report.
David Fowler, University of Nebraska-Lincoln (1056-N1-803)
- 2:00PM (825) *Big Ideas in Algebra: Materials to Foster Mathematical Thinking.*
Carol E Seaman*, University of North Carolina Greensboro, and **Jennifer Earles Szydlak**, University of Wisconsin Oshkosh (1056-N1-481)
- 2:20PM (826) *Calculus: A Gateway to Algebra?!* Preliminary report.
Steve Benson, Lesley University (1056-N1-478)
- 2:40PM (827) *Using modified materials from The Algebra Project with pre-service K-8 mathematics teachers.* Preliminary report.
Steve Blair, Eastern Michigan University (1056-N1-383)
- 3:00PM (828) *Teachers, Mathematicians, and Educators Making Sense of Algebra Content.*
Joshua D Chesler, California State University, Long Beach (1056-N1-954)
- 3:20PM (829) *Bridging Proportional Reasoning and Algebraic Reasoning: A Focus on Co-variation and Invariance Using Contextualized Problems.*
Kien H. Lim, University of Texas at El Paso (1056-N1-242)
- 3:40PM (830) *Algebra for Algebra Teachers.* Preliminary report.
Ira J Papick* and **Jim Lewis**, University of Nebraska-Lincoln (1056-N1-36)

MAA Session on How Assessment Results Changed Our Program

1:00 PM – 3:35 PM

Organizers: **Dick Jardine**, Keene State College

Barbara Edwards, Oregon State University

- 1:00PM ▶ (831) *Faculty Development Through Assessment.* Preliminary report.
Dick Jardine, Keene State College (1056-F1-1175)
- 1:20PM ▶ (832) *Assessment of Mathematical Reasoning Courses for Business Students and Liberal Arts Students.*
Vesna Kilbarda, Indiana University Northwest (1056-F1-557)
- 1:40PM ▶ (833) *Assessing Critical Thinking Throughout the Mathematics Curriculum.* Preliminary report.
Miriam Harris-Botzum, Lehigh Carbon Community College (1056-F1-1308)
- 2:00PM ▶ (834) *Readiness Assessment and Course Placement through Introductory Calculus.*
Alison Ahlgren*, University of Illinois, and **Marc Harper**, UCLA (1056-F1-1349)
- 2:20PM (835) *Assessment: If It Ain't Useful, Don't Do It.* Preliminary report.
J. Winston Crawley, Shippensburg University of Pennsylvania (1056-F1-1033)
- 2:40PM ▶ (836) *Using a knowledge survey for course and program level assessment in mathematics.*
Jacqueline M Dewar, Loyola Marymount University (1056-F1-443)
- 3:00PM ▶ (837) *An Assessment Loop (or How I Learned to Stop Worrying and Love the Rubric).* Preliminary report.
Jenn D Berg, Fitchburg State College (1056-F1-900)
- 3:20PM ▶ (838) *The Impact of Pair Quizzes on Mathematics Achievement and Mathematics Attitude.*
Harrison W. Straley* and **Lauren Dupee**, Wheaton College (1056-F1-637)

MAA Session on Wavelets in Undergraduate Education

1:00 PM – 4:15 PM

Organizers: **Caroline Haddad**, SUNY Geneseo
Catherine Beneteau, University of South Florida
David Ruch, Metropolitan State College of Denver
Patrick Van Fleet, University of St. Thomas

- 1:00PM (839) *Teaching a Wavelets Course at a Liberal Arts College.*
Beth M. Campbell Hetrick, Gettysburg College (1056-S1-1998)
- 1:20PM ▶ (840) *Teaching a Wavelets course in May term.*
Janine Wittwer, Westminster College, UT (1056-S1-231)
- 1:40PM ▶ (841) *Portable Haar Wavelet Projects with MATLAB.* Preliminary report.
Phil Gustafson, Mesa State College (1056-S1-1334)
- 2:00PM ▶ (842) *A Wavelet-Based Unsupervised Learning Algorithm to Cluster Diabetics Based on Continuous Glucose Monitoring Data.* Preliminary report.
Edward Aboufadel*, Grand Valley State University, **Robert Castellano**, Stony Brook University, and **Derek Olson**, Drake University (1056-S1-528)
- 2:20PM ▶ (843) *Authentication Using Wavelets, part I.*
Jill E. Guerra*, University of Arkansas - Fort Smith, **John C. Merkel, III**, Morehouse College, **Eric A. Bickerton**, University of Arkansas - Fort Smith, and **Warren Chancellor**, Morehouse College (1056-S1-1263)

- 2:40PM ▶ (844) *Authentication Using Wavelets, part II.*
John C. Merkel, III*, Morehouse College, **Jill E. Guerra**, University of Arkansas - Fort Smith, **Warren Chancellor**, Morehouse College, and **Eric A. Bickerton**, University of Arkansas - Fort Smith (1056-S1-1270)
- 3:00PM (845) *A Module for the Construction of Scaling Functions using the Cascade Algorithm.*
John A Rock*, California State University, Stanislaus, **David Ruch**, Metropolitan State College of Denver, **Kenneth Hoover**, California State University, Stanislaus, **Helmut Knaust**, University of Texas, El Paso, and **Roger Zarnowski**, Angelo State University (1056-S1-1479)
- 3:20PM ▶ (846) *Fourier Series and the Discrete Wavelet Transformation.* Preliminary report.
Patrick J Van Fleet, University of St. Thomas (1056-S1-1535)
- 3:40PM ▶ (847) *Wavelet Packets and Image Compression.* Preliminary report.
Cristen M Bonz and **Elizabeth A Motz***, University of St Thomas (1056-S1-1691)
- 4:00PM ▶ (848) *A Sufficient Condition for the Optimality of Huffman Encoding.* Preliminary report.
William David Hall*, California State University, Stanislaus, and **Jonathan Brown**, California State University, Stanislaus (1056-S1-1784)

General Contributed Papers, VI

1:00 PM – 4:10 PM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- 1:00PM (849) *Mathematics and the Internet: The Impact of New Media on a Discipline.* Preliminary report.
Samuel M Hansen, University of Nevada Las Vegas (1056-Z1-1205)
- 1:15PM ▶ (850) *Utilizing Web-based Statistical Resources in Teaching Nontraditional Undergraduate Students in Online Learning Environments.*
Michael D. Miner, American Public University System (1056-Z1-1898)
- 1:30PM ▶ (851) *What can your students do with an iPhone or iPod Touch in Math Class?*
Erick B Hofacker, University of Wisconsin - River Falls (1056-Z1-1976)
- 1:45PM (852) *Using Wikis to Enhance Mathematical Communication and Develop Students' Investment in Mathematical Community.* Preliminary report.
Donna LaLonde and **Jennifer D. Wagner***, Washburn University (1056-Z1-707)
- 2:00PM (853) *The Use of Spreadsheets to Illustrate Statistical and Mathematical Concepts.*
Morteza Shafii-Mousavi* and **Kochanowski Paul**, Indiana University South Bend (1056-Z1-86)
- 2:15PM ▶ (854) *Impact of Technology on Mathematics Teaching.*
Mohammad Khadivi, Jackson State University (1056-Z1-967)
- 2:30PM ▶ (855) *Fun and Motivational Activities for Exam Review Day.*
Min-Lin Lo, California State University San Bernardino (1056-Z1-676)
- 2:45PM ▶ (856) *Euler-Cauchy Using Undetermined Coefficients.*
Doreen De Leon, California State University, Fresno (1056-Z1-542)

- 3:00PM *Visualization Projects in Multivariable Calculus.*
 ► (857) **Jason J Moliterno**, Sacred Heart University (1056-Z1-541)
- 3:15PM *Using an Opening Quiz to set the Tone for a College Algebra Course.*
 (858) **Gerald Agbegha*** and **Nailong Guo**, Johnson C. Smith University (1056-Z1-1876)
- 3:30PM *Strategies of Designing College Algebra with Modular Approach.* Preliminary report.
 (859) **A. Serpil Saydam***, **A. Dale Magoun** and **Charlotte H. Owens**, University of Louisiana at Monroe (1056-Z1-834)
- 3:45PM *Issues and Obstacles in Preparing Mathematics Graduate Students for Teaching.*
 (860) **Mary Beisiegel**, Western Oregon University (1056-Z1-1768)
- 4:00PM *fUNCO!—A Mathematical Card Game.*
 ► (861) **Mairead K Greene*** and **Paula Shorter**, Rockhurst University (1056-Z1-2034)

Maura B. Mast, University of Massachusetts, Boston
Judy L. Walker, University of Nebraska

MAA Committee on Graduate Students-YMN Panel Discussion

1:00 PM – 2:20 PM

Finding a research topic and thesis advisor.
 Organizers: **David C. Manderscheid**, University of Nebraska-Lincoln
Aaron Luttmann, Clarkson University
 Panelists: **Raegan J. Higgins**, Texas Tech University
Franziska Hinckelmann, Virginia Polytechnic Institute and State University
Steven G. Krantz, Washington University
Jennifer McNulty, University of Montana

SIAM Minisymposium on Mathematics and a Smart Planet

1:00 PM – 4:06 PM

Organizer: **Brenda Dietrich**, IBM T. J. Watson Research
 Chair: **Lior Horesh**, IBM TJ Watson Research Center

- 1:00PM *Managing the Earth: Modeling Data into Decisions under Geological and Engineering Uncertainty.*
 ► (862) **Jef Caers**, Stanford University (1056-60-804)
- 1:39PM *Design in inverse problems.*
 (863) **Eldad Haber***, UBC, **Lior Horesh**, IBM, and **Luis Tenorio**, Colorado School of Mines (1056-49-2102)
- 2:18PM *Inversion—Taking one step backwards.*
 (864) **Lior Horesh***, IBM TJ Watson Research Center, **Eldad Haber**, University of British Columbia, and **Luis Tenorio**, Colorado School of Mines (1056-49-2148)
- 2:57PM *On the probabilistic validation of models for interacting agents.*
 (865) **Roger Ghanem***, Civil and Environmental Engineering, University of Southern California, and **Sonjoy Das**, Department of Aerospace and Mechanical Engineering, University of Southern California
- 3:36PM *Global optimization with response surfaces for computationally expensive functions with environmental applications.*
 (866) **Rommel Regis**, St. Joseph's University, **Christine Shoemaker***, School of Operations Research and Information Engineering, Cornell University, and **Yilun Wang**, Cornell University

SIGMAA on Statistics Education Panel Discussion

1:00 PM – 2:20 PM

Statistics ≠ mathematics: What a first- (or second-) time teacher of statistics should know.
 Organizer: **Michael A. Posner**, Villanova University
 Panelists: **Robin Lock**, St. Lawrence University
Elaine Newman, Sonoma State University
Leigh Lunsford, Longwood University
Ken Torre, Cotati-Rohnert Park Unified School District

SIGMAA on Math Circles for Students and Teachers, Part I

1:00 PM – 4:15 PM

Fostering, supporting, and propogating Math Circles (Part II is Saturday at 1:00 p.m.).
 Organizers: **James S. Tanton**, St. Mark's Institute of Mathematics
Tatiana Shubin, San Jose State University

Joint Committee on Women in the Mathematical Sciences Panel Discussion

1:00 PM – 2:30 PM

Hard problems, approximate solutions: Finding balance between math and family demands.
 Organizer: **Kathleen M. O'Hara**, Mathematical Sciences Research Institute
 Panelists: **Mary Ann Mason**, University of California, Berkeley
Marc Goulden, University of California, Berkeley
Carol Hollenshead, University of Michigan

Summer Program for Women in Mathematics (SPWM) Reunion

1:00 PM – 4:00 PM

AMS Special Session on Arithmetic of Function Fields, II

1:30 PM – 4:20 PM

Organizers: **Allison Pacelli**, Williams College
Michael Rosen, Brown University
 1:30PM *A Gross-Zagier formula for quaternion algebras over totally real fields.* Preliminary report.
 (867) **Kristin E. Lauter***, Microsoft Research, and **Eyal Z. Goren**, McGill University (1056-11-1669)
 2:00PM *An N-point version of the Mason-Stothers abc Theorem.*
 (868) **Robert L. Benedetto**, Amherst College (1056-11-659)

- 2:30PM *The Reflection Theorem for class groups of global function fields and its applications.*
(869) **Yoonjin Lee**, Ewha Womans University (1056-11-377)
- 3:00PM *Prime polynomials.*
(870) **Paul Pollack**, University of Illinois at Urbana-Champaign (1056-11-1082)
- 3:30PM *Function Fields with Class Number Indivisible by a Prime ℓ .*
▶ (871) **Michael W Daub***, University of California, Berkeley, **Allison Pacelli**, Williams College, **Michael Rosen**, Brown University, **Jaelyn Lang**, Bryn Mawr College, **Mona Merling**, Bard College, and **Natee Pitiwan**, Williams College (1056-11-1110)
- 4:00PM *Class numbers of function fields. Preliminary report.*
(872) **Jing Long Hoelscher**, University of Arizona (1056-11-994)
- 2:00PM *CCL12: Colorado Momentum.*
(883) **Mary Nelson***, **Harvey Segur**, **Anne Dougherty** and **James Curry**, University of Colorado, Boulder
- 2:00PM *Investigating the Mathematical Biology of Metabolic Scaling using Manduca InSTaRs (Interdisciplinary Science Training and Research).*
(884) **Jennifer Garbett**, **Judy Holdener***, **Chris Gillen**, **Brad Hartlaub**, **Harry Itagaki** and **Drew Kerkhoff**, Kenyon College
- 2:00PM *STEM Real World Application Modules.*
(885) **Darren Narayan***, **William Basener**, **Matthew Coppenbarger**, **Paul Tymann** and **Moises Sudit**, Rochester Institute of Technology
- 2:00PM *Paradigms in Physics: Multiple Entry Points.*
(886) **Tevian Dray***, **Corinne A Manogue**, **Barbara Edwards**, **David McIntyre** and **Emily van Zee**, Oregon State University
- 2:00PM *Quantitative Reasoning in the Contemporary World (QRCW).*
(887) **Bernard L. Madison**, University of Arkansas, **Stuart Boersma**, Central Washington University, **Caren L. Diefenderfer***, Hollins University, and **Shannon W. Dingman**, University of Arkansas

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

2:00 PM – 4:00 PM

- Organizer: **Jon W. Scott**, Montgomery Community College
- 2:00PM *Lurch: Software for Teaching Mathematical Proof.*
(873) **Nathan Carter***, Bentley University, and **Kenneth G. Monks**, University of Scranton
- 2:00PM *DIYModeling—Do It Yourself Modeling and Simulation for STEM Learning.*
(874) **Frank Wattenberg***, U.S. Military Academy, **William C Bauldry**, Appalachian State University, **Joe Yanik**, Emporia State University, **Keith Erickson**, Georgia Gwinnett College, and **Marion Smith**, Texas Southern University
- 2:00PM *MAA's Online Calculus Text.*
(875) **Lawrence Moore*** and **David Smith**, Duke University
- 2:00PM *MAA's Mathematical Sciences Digital Library (MathDL).*
(876) **Lawrence Moore***, Duke University, and **Tom Leathrum**, Jacksonville State University
- 2:00PM *Maplets for Calculus.*
(877) **Philip B. Yasskin**, Texas A&M University, and **Douglas B. Meade***, University of South Carolina
- 2:00PM *The design of a research-based curriculum for real analysis.*
(878) **Kyeong Hah Roh**, Arizona State University
- 2:00PM *Research-Based Video for Teaching Undergraduate Proof.*
(879) **James Sandefur***, Georgetown University, **Connie Campbell**, Millsaps College, **Kay Somers**, Moravian College, and **Geoffrey Birky**, Georgetown University
- 2:00PM *WeBWork, a Web-based Interactive Homework System.*
(880) **Arnold Pizer***, **Vicki Roth** and **Michael Gage**, University of Rochester
- 2:00PM *Change Agents for Teaching and Learning Statistics (CATALST).*
(881) **Joan Garfield***, **Bob delMas**, **Andy Zieffler**, University of Minnesota, **Allan Rossman**, **Beth Chance**, California Polytechnic State University, San Luis Obispo, **George Cobb**, Mount Holyoke College, and **John Holcomb**, Cleveland State University
- 2:00PM *Multidisciplinary Sustainability Modules: Integrating STEM Courses.*
(882) **Thomas J. Pfaff***, **Ali S. Erkan**, **Jason G. Hamilton** and **Michael Rogers**, Ithaca College
- 2:00PM *College Ready in Mathematics and Physics Partnership.*
(888) **Gay Stewart**, **Bernard L. Madison***, **Shannon W. Dingman**, University of Arkansas, **Pete Joenks**, Springdale High School, and **John Jones**, University of Arkansas, Fort Smith
- 2:00PM *Undergraduate Biology and Mathematics Training Program at NJIT: The effect of neuronal morphology on passive properties of neurons.*
(889) **Farzan Nadim***, **Krutanjali Shah**, **Yamin Noor** and **A. Farzad Sheibanie**, New Jersey Institute of Technology
- 2:00PM *Authentic Discovery Projects for Introductory Statistics.*
(890) **Robb Sinn***, **Dianna Spence** and **Brad Bailey**, North Georgia College
- 2:00PM *Empowering Student Learning in Mathematical Analysis.*
(891) **Barbara Shipman*** and **James Epperson**, The University of Texas at Arlington
- 2:00PM *Modern Biology, Modern Mathematics, and Modern Solutions: Moving Biomathematics Education Beyond Calculus.*
(892) **Raina Robeva***, **Robin Davies**, Sweet Briar College, **Terrell Hodge** and **Alexander Enyedi**, Western Michigan University
- 2:00PM *Quantitative Literacy Across the Curriculum in a Liberal Arts Setting.*
(893) **Semra Kilic-Bahi***, **Ben Steele** and **Peter White**, Colby-Sawyer College
- 2:00PM *HBCU Retreat and Follow-On Program.*
(894) **Don Small***, United States Military Academy, and **Laurette Foster**, Prairie View A&M University
- 2:00PM *Explorations in Complex Variables with Accompanying Applets: Undergraduate Research.*
(895) **Michael Dorff***, Brigham Young University, **Jim Rolf**, U.S. Air Force Academy, **Rich Stankewitz**, Ball State University, **Mike Brilleslyper**, **Beth Schaubroeck**, U.S. Air Force Academy, **Jane McDougall**, Colorado College, and **Ken Stephenson**, University of Tennessee
- 2:00PM *Mathematical Biology Projects at UNCG.*
(896) **Jan Rychtar***, **Maya Chhetri**, **Mary Crowe**, **David Remington** and **Olav Rueppell**, The University of North Carolina at Greensboro

- 2:00PM *Development and Dissemination of Computational Science Educational Materials and Curricula at the Undergraduate Level.*
Paula Federico*, Terry Lahm, Andrea Karkowski, Capital University, **Sheryl Hemkin**, Kenyon College, **Gerald Mueller**, Columbus State Community College, and **Ignatios Vakalis**, California State Polytechnic Institute
- 2:00PM *Learning Discrete Mathematics and Computer Science via Primary Historical Sources.*
Jerry Lodder*, **David Pengelley** and **Guram Bezhaniashvili**, New Mexico State University
- 2:00PM *MBUR (Mathematical Biology & Undergraduate Research): Modeling Growth and Biochemical Pathways in Selenite Resistant Bacteria.*
George Yates*, **Jon Caguiat**, **Carl Sims**, **Jozsi Jalics** and **Mark Womble**, Youngstown State University
- 2:00PM *SyBR-U: Synthetic Biology Research for Undergraduates.*
Laurie J. Heyer*, **A. Malcolm Campbell**, Davidson College, **Jeffrey L. Poet** and **Todd T. Eckdahl**, Missouri Western State University
- 2:00PM *The Center for Women in Mathematics at Smith College.*
Ruth Haas* and **James Henle**, Smith College
- 2:00PM *Studying Cell Response to Input Signals as the Basis for Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences.*
Ovidiu Lipan, **Kathy Hoke**, **Lester Caudill, Jr.**, **Laura Runyen-Janecky** and **Garrett Graham***, University of Richmond
- 2:00PM *Research and Education Program in Mathematical and Biological Sciences.*
Semen Koksal*, **Rob van Woesik**, **Dave Carroll**, **Richard Sinden**, **Eugene Dshalalow** and **Kristie Llera**, Florida Institute of Technology
- 2:00PM *Quantitative Skills in Biology through Scientific Inquiry at James Madison University.*
D. Brian Walton*, **Anthony Tongen**, **Nusrat Jahan** and **Reid Harris**, James Madison University
- 2:00PM *Research and Education in Computational Mathematics for Undergraduates in the Mathematical Sciences at NJIT.*
Zoi-Heleni Michalopoulou*, **Roy Goodman**, **David Hornthrop**, **Jonathan Luke**, **Michael Siegel** and **Yuan-Nan Young**, New Jersey Institute of Technology
- 2:00PM *Interactive Online Modules and Take-Home Assignments for Inquiry-Learning to Provide First-Hand Experience in Matrix Algebra Course.*
Hamide Dogan-Dunlap* and **Piotr Wojciechowski**, University of Texas at El Paso
- 2:00PM *Experimental Mathematics.*
Marc Chamberland, Grinnell College
- 2:00PM *Undergraduate Training in Bioinformatics.*
Ming-Ying Leung*, **Steve Aley**, **Vladik Kreinovich** and **Elizabeth Walsh**, The University of Texas at El Paso
- 2:00PM *PREP: MAA's Professional Enhancement Program.*
J. Michael Pearson, Mathematical Association of America, **Nancy Baxter Hastings**, Dickinson College, **Nathaniel Dean**, Texas State University, San Marcos, **Virginia Buchanan**, Hiram College, and **Jon Scott***, Montgomery College

AMS Invited Address

2:15 PM – 3:05 PM

- (910) *Laplacians on vector bundles on graphs.*
Richard W. Kenyon, Brown University (1056-60-14)

MAA-Project NExT Panel Discussion

2:30 PM – 3:45 PM

Mathematics and social justice.

- Organizers: **Lily S. Khadjavi**, Loyola Marymount University
David T. Kung, St. Mary's College of Maryland
- Panelists: **Shandy Hauk**, University of Northern Colorado
Eric Hsu, San Francisco State University
Lisa Marano, West Chester University

MAA CRAFTY Panel Discussion

2:35 PM – 3:50 PM

More voices from the partner disciplines: The second round of curriculum foundations workshops.

- Organizer: **Sheldon P. Gordon**, Farmingdale State College
- Panelists: **Andrew G. Bennett**, Kansas State University
Susan L. Ganter, Clemson University
Sheldon P. Gordon
William E. Haver, Virginia Commonwealth University
William Marion, Valparaiso University

SIGMAA on Statistics Education and SIGMAA on Research in Undergraduate Mathematics Education Panel Discussion

2:35 PM – 3:50 PM

Excuse me; where is the department of statistics education?

- Organizer: **Michael A. Posner**, Villanova University
- Panelists: **Dennis Pearl**, Ohio State University
Mike Shaugnessy, Portland State University
Bob DelMas, University of Minnesota
Andrew Zieffler, University of Minnesota

AMS Committee on the Profession Panel Discussion

2:45 PM – 4:15 PM

What I wish I had known when applying for a job.

- Moderator: **Christopher K. McCord**, Northern Illinois University
- Panelists: **Elizabeth T. Beazley**, University of Michigan and Williams College
Julie Bergner, University of California, Riverside
Karl Kempf, Intel and Arizona State University
Bryna Kra, Northwestern University
Ken Ono, University of Wisconsin-Madison

Tony DeRose, Pixar Animation Studios

AMS Retiring Presidential Address

3:20 PM – 4:10 PM

(911) *Reflections and perspectives.*
James G. Glimm, Stony Brook University

Joint Prize Session

4:25 PM – 5:25 PM

SIGMAA on Environmental Mathematics Guest Lecture

5:30 PM – 6:30 PM

Speaker and title to be announced.

Joint Prize Session Reception

5:30 PM – 6:30 PM

SIGMAA on Business, Industry, and Government Guest Lecture

5:45 PM – 6:45 PM

5:45PM *From Netflix to Gerrymanders: A Sample of BIG Applications of Mathematics.*
(912) Barry A Cipra, Northfield, MN (1056-A0-1541)

SIGMAA on Statistics Education Business Meeting and Reception

5:45 PM – 7:15 PM

SIGMAA on Mathematics Instruction Using the Web Reception and Business Meeting

5:45 PM – 6:30 PM

Presenter: Bruce W. Yoshiwara, Pierce College

MAA Two-Year College Reception

5:45 PM – 7:30 PM

MAA Special Presentation for Students

6:00 PM – 7:00 PM

6:00PM *Low dimensional topology for fun and profit, or, how to extract money from the R4 space.*
▶ (913) Cliff Stoll, Acme Klein Bottle Company

SIGMAA on Research in Undergraduate Mathematics Education Business Meeting

6:00 PM – 7:30 PM

SIGMAA on Environmental Mathematics Business Meeting

6:30 PM – 7:00 PM

SIGMAA on Mathematics Instruction Using the Web Presentation and Discussion

6:30 PM – 7:30 PM

Life after Wolfram Alpha.
Presenter: Bruce W. Yoshiwara, Pierce College

SIGMAA on Mathematics and the Arts Special Presentation

7:00 PM – 9:00 PM

Open mike mathematical poetry reading.
Organizer: Douglas Norton, Villanova University

SIGMAA on Business, Industry, and Government Reception

7:15 PM – 8:00 PM

Young Mathematicians' Network Open Forum

7:30 PM – 8:30 PM

Friday, January 15

Joint Meetings Registration

7:30 AM – 4:00 PM

AMS Special Session on Mathematics and Physical Experiment, I

7:30 AM – 10:50 AM

Organizers: Roger Thelwell, James Madison University
Anthony Tongen, James Madison University
Paul Warne, James Madison University

7:30AM *Shock Wave Formation on Turbulent Coanda Surfaces.*

▶ (914) Thomas Dowd, James Madison University (1056-76-1537)

8:00AM *The Applied Mathematics Laboratory: translating what you see into what you do.*

▶ (915) Michael Tabor, University of Arizona (1056-97-1045)

8:30AM *GPS Tracking of a Roller Coaster.* Preliminary report.

▶ (916) Michael C. Sostarecz, Monmouth College (1056-00-1096)

9:00AM *Experiments from a Capstone Laboratory at New Jersey Institute of Technology.*

▶ (917) Michael Booty, New Jersey Institute of Technology (1056-00-1733)

9:30AM *Notes from the MEC Lab at the University of Delaware.*

▶ (918) John A Pelesko, University of Delaware (1056-74-699)

10:00AM *Experiments in the Classroom.*

(919) Jon Jacobsen, Harvey Mudd College (1056-37-1030)

10:30AM *Reinventing the Wheel!*

(920) Roger Thelwell, James Madison University (1056-35-1634)

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates, I

8:00 AM – 10:50 AM

Organizers: Darren Narayan, Rochester Institute of Technology
Bernard Brooks, Rochester Institute of Technology

Jacqueline Jensen, Sam Houston State University

Carl V. Lutzer, Rochester Institute of Technology

Vadim Ponomarenko, San Diego State University

Tamas Wiandt, Rochester Institute of Technology

- 8:00AM (921) *Configurations of extremal type II lattices and codes.*
Scott Kominers, Harvard University (1056-06-2154)
- 8:30AM (922) *Modular forms arising from $Q(n)$ and Dyson's rank.*
Maria Monks, Massachusetts Institute of Technology (1056-11-2153)
- 9:00AM (923) *Efficient simulation of fluid flow.* Preliminary report.
David Alexander Hannasch* and **Monika Neda**, University of Nevada, Las Vegas (1056-65-165)
- 9:30AM (924) *Image Denoising Via Feature-Based Sparse and Redundant Dictionaries.* Preliminary report.
Josh Koslosky* and **Stacey Levine**, Duquesne University (1056-49-173)
- 10:00AM (925) *Analytic Properties of Unitary Equivalence to Constant Diagonal Matrices.* Preliminary report.
Daniel E Poore, Pomona College (1056-15-185)
- 10:30AM (926) *Complete Growth and Graph Products of Groups.*
Daniel Allen, University of Maine at Farmington, **Meghan Cream**, Wake Forest University, **Kate Finlay**, Lafayette College, and **Ranjan Rohatgi***, Northwestern University (1056-20-274)

AMS-AWM Special Session on Spectral Problems on Compact Riemannian Manifolds, I

8:00 AM – 10:50 AM

Organizers: **Carolyn Gordon**, Dartmouth College
Ruth Gornet, University of Texas at Arlington
Craig Sutton, Dartmouth College

- 8:00AM (927) *Spectral bounds on 2-orbifold diffeomorphism type.*
Emily Proctor, Middlebury College, and **Elizabeth Stanhope***, Lewis & Clark College (1056-53-1590)
- 8:30AM (928) *Spectral and geometric bounds on orbifold homotopy type.* Preliminary report.
Emily Proctor*, Middlebury College, and **Elizabeth Stanhope**, Lewis & Clark College (1056-58-919)
- 9:00AM (929) *Some applications of the trace formula on orbifolds to the inverse spectral problem.* Preliminary report.
Alejandro Uribe, University of Michigan, Ann Arbor (1056-58-1289)
- 9:30AM (930) *On the singularities of the exponential map.*
Benjamin Schmidt*, Michigan State University, and **Keith Burns**, Northwestern University (1056-51-1041)
- 10:00AM (931) *Quantum ergodic restriction theorems.*
Steve Zelditch, Johns Hopkins Univ and Northwestern Univ (1056-35-748)
- 10:30AM (932) *Spectral rigidity of analytic plane domains with one mirror symmetry.*
Hamid Hezari*, MIT, and **Steve Zelditch**, Johns Hopkins University (1056-35-1012)

AMS Special Session on Nonlinear Hyperbolic Equations and Control Systems in Physics and Engineering, II

8:00 AM – 10:50 AM

Organizers: **Petronela Radu**, University of Nebraska-Lincoln
Daniel Toundykov, University of Nebraska-Lincoln

- 8:00AM (933) *Uniform stabilization of the system of dynamic elasticity by non-linear boundary dissipation.*
Roberto Triggiani, University of Virginia (1056-35-532)
- 8:30AM (934) *Concerning the Qualitative of a Coupled Fluid-Structure Semigroup.*
George Avalos, University of Nebraska-Lincoln (1056-35-569)
- 9:00AM (935) *Optimal control of a thermoelastic structural acoustic model.*
Catherine Lebiedzik, Wayne State University (1056-35-2037)
- 9:30AM (936) *Analysis and Simulation of a One-dimensional Plasma Model.*
Stephen Pankavich, University of Texas at Arlington (1056-35-560)
- 10:00AM (937) *Existence of time periodic solutions of non-linear wave equations.*
Jintae Kim, Tuskegee University (1056-35-1631)
- 10:30AM (938) *Bridging the asymptotic behavior of solutions to hyperbolic equations with parabolic equations.*
Petronela Radu*, University of Nebraska-Lincoln, **Grozdena Todorova** and **Borislav Yordanov**, University of Tennessee-Knoxville (1056-35-1074)

AMS Special Session on Biomathematics: Modeling in Biology, Ecology, and Epidemiology, I

8:00 AM – 10:50 AM

Organizers: **Olcay Akman**, Illinois State University
Linda Allen, Texas Tech University
Timothy D. Comar, Benedictine University
Sophia Jang, Texas Tech University
Lih-Ing Roeger, Texas Tech University

- 8:00AM (939) *The fundamental bifurcation theorem for Darwinian matrix models.* Preliminary report.
Jim M. Cushing, University of Arizona (1056-92-603)
- 8:30AM (940) *Bifurcation analysis of a model for hormonal regulation of the menstrual cycle.*
James F. Selgrade, North Carolina State University (1056-92-786)
- 9:00AM (941) *Darwinian Dynamics of Avian Populations with Reproductive Synchrony.* Preliminary report.
Shandelle M. Henson*, Andrews University, **J. M. Cushing**, University of Arizona, and **James L Hayward**, Department of Biology, Andrews University (1056-92-1807)
- 9:30AM (942) *Competitive Exclusion in a Juvenile-Adult Model with Continuous and Seasonal Reproduction.*
Azmy S. Ackleh* and **Ross A. Chiquet**, University of Louisiana at Lafayette (1056-92-1016)

- 10:00AM (943) *Modeling the Movements of a Thermoregulating Timber Rattlesnake*. Preliminary report.
John G. Alford*, Sam Houston State University, and **Bill Lutterschmidt**, Department of Biological Sciences and Texas Research Institute for Environmental Studies/Sam Houston State University (1056-92-114)
- 10:30AM (944) *Discrete host-parasitoid models with Allee effects and age structure in the host*.
Sophia R-J Jang, Texas Tech University (1056-92-740)

AMS Special Session on Enumerative Combinatorics, I

8:00 AM – 10:50 AM

Organizers: **Brian Miceli**, Trinity University
Jeff Remmel, University of California San Diego

- 8:00AM (945) *SL_k-Tilings of Lattices*. Preliminary report.
Francois Bergeron, Universite du Quebec a Montreal (1056-05-704)
- 8:30AM (946) *A basis for the coinvariant space for quasisymmetric polynomials*. Preliminary report.
Sarah K Mason*, UCSD/Wake Forest University, and **Aaron Lauve**, Texas A&M (1056-05-1361)
- 9:00AM (947) *Experimental Investigations into the Zeros of Rook Polynomials and Analytic Functions*. Preliminary report.
Jim Haglund, University of Pennsylvania (1056-05-1586)
- 9:30AM (948) *A Pieri rule for skew Schur functiond*.
Sami H Assaf*, MIT, and **Peter R. W. McNamara**, Bucknell University (1056-05-1578)
- 10:00AM (949) *Some enumerative and order theoretic aspects of the rook monoid*.
Mahir Bilen Can, Tulane University (1056-05-1371)
- 10:30AM (950) *Partitions, Orthogonal Polynomials and q-Series*. Preliminary report.
George E. Andrews, The Pennsylvania State University (1056-05-475)

AMS Special Session on L-Functions and Analytic Number Theory, I

8:00 AM – 10:50 AM

Organizers: **Alina Bucur**, Institute for Advanced Study
Chantal David, Concordia University
Matilde Lalin, University of Alberta

- 8:00AM (951) *Recent progress on QUE*.
Soundararajan Kannan, Stanford University (1056-11-1609)
- 8:30AM (952) *Ranks of Jacobians of modular curves*.
Kaneenika Sinha, PIMS/Alberta (1056-11-666)
- 9:00AM (953) *Schur polynomials, metaplectic Whittaker functions and the Yang-Baxter equation*.
Daniel W Bump, Stanford (1056-11-1403)
- 9:30AM (954) *Lennon's work on relations between traces of Frobenius and hypergeometric functions*. Preliminary report.
Ben Brubaker* and **Catherine Lennon**, MIT (1056-11-1463)
- 10:00AM (955) *Weyl Group Multiple Dirichlet Series*. Preliminary report.
Jennifer Beineke, Western New England College, **Ben Brubaker**, Massachusetts Institute of Technology, and **Sharon Frechette***, College of the Holy Cross (1056-11-802)

- 10:30AM (956) *Explicit Upper Bounds for L-functions on the critical line*.
Vorrapan Chandee, Stanford University (1056-11-376)

AMS Special Session on Representation Theory and Nonassociative Algebras, II

8:00 AM – 10:50 AM

Organizer: **Andrew Douglas**, City University of New York

- 8:00AM (957) *On coverings of the smallest Paige loop*.
Stephen M Gagola III, University of Arizona (1056-20-130)
- 8:30AM (958) *Associative Geometry*.
Michael Kinyon*, University of Denver, and **Wolfgang Bertram**, Institut Élie Cartan Nancy (1056-20-1766)
- 9:00AM (959) *Enveloping algebras of Malcev algebras*.
Marina Tvalavadze, University of Saskatchewan (1056-17-718)
- 9:30AM (960) *Equivariant map algebras*.
Erhard Neher, **Alistair Savage***, University of Ottawa, and **Prasad Senesi**, Catholic University of America (1056-17-415)
- 10:00AM (961) *E8 Theory*. Preliminary report.
A Garrett Lisi, Makawao, HI (1056-83-1051)
- 10:30AM (962) *The Structure of E₆*.
Tevian Dray*, Oregon State University, and **Aaron Wangberg**, Winona State University (1056-17-1224)

AMS Special Session on Arithmetic and Nonarchimedean Dynamics, III

8:00 AM – 9:50 AM

Organizers: **Joseph Silverman**, Brown University
Michelle Manes, University of Hawaii
Raphael Jones, College of the Holy Cross

- 8:00AM (963) *Dynamics of $f(x) = x+1/x$ via Elliptic Curves*.
Jang-Woo Park* and **Shuhong Gao**, Clemson University (1056-11-1794)
- 8:30AM (964) *Some fractals associated to K3 surfaces*.
Arthur Baragar, University of Nevada Las Vegas (1056-11-1751)
- 9:00AM (965) *Dynamical Mordell-Lang results via Euclidean uniformizations*.
Thomas Scanlon, University of California, Berkeley (1056-12-841)
- 9:30AM (966) *Galois theory of quadratic rational functions with a non-trivial automorphism*. Preliminary report.
Michelle Manes*, University of Hawaii at Manoa, and **Rafe Jones**, College of the Holy Cross (1056-11-831)

MAA-AMS-MER Invited Paper Session on Mathematics and Education Reform, II: Climate, Sustainability, and the Curriculum

8:00 AM – 10:50 AM

Organizers: **William H. Barker**, Bowdoin College
William G. McCallum, University of Arizona
Bonnie S. Saunders, University of Illinois at Chicago
Mary Lou Zeeman, Bowdoin College

Deborah Hughes Hallett, University of Arizona

- 8:00AM *Climate and Sustainability in the Mathematics Curriculum*. Preliminary report.
▶ (967) **Mary Lou Zeeman**, Bowdoin College (1056-BC-1444)
- 8:30AM *Climate Change: Impact and Opportunities*.
▶ (968) **Deborah Hughes Hallett**, University of Arizona, Harvard Kennedy School (1056-BC-1753)
- 9:00AM *Mathematics Concepts Needed in the Global Systems Science Course*.
(969) **Alan D Gould**, University of California Berkeley – Lawrence Hall of Science (1056-BC-1266)
- 9:30AM *Introducing Students and Teachers to the Connections Between Science and Mathematics using NASA Space Science Discoveries as a Vehicle for Mathematics Education*.
▶ (970) **Sten F Odenwald**, Catholic University of America/ADNET/NASA (1056-BC-1251)
- 10:00AM *How Calculus can Participate in Multidisciplinary Sustainability Modules*. Preliminary report.
▶ (971) **Thomas J Pfaff***, **Ali S Erkan**, **Jason G Hamilton** and **Michael Rogers**, Ithaca College (1056-BC-1314)
- 10:30AM Audience discussion about the ideas generated in this session on Climate and Sustainability in the Curriculum.

MAA Invited Paper Session on The Mathematics of Origami

8:00 AM – 10:55 AM

Organizers: **Tamara Veenstra**, University of Redlands
Thomas C. Hull, Western New England College

- 8:00AM *Paper Folding, Orders of Elements, and Binary Representations of Fractions*.
(972) **Tamara B Veenstra**, University of Redlands (1056-BF-1225)
- 8:30AM *Combinatorial Methods in Flat Origami*.
▶ (973) **Thomas C. Hull**, Western New England College (1056-BF-1057)
- 9:00AM *Mathematical Methods in Origami Design*.
(974) **Robert J. Lang**, Langorigami.com (1056-BF-1497)
- 9:30AM *Bisections, Trisections and Quintisections by Origami*. Preliminary report.
▶ (975) **Roger C. Alperin**, San Jose State University (1056-BF-1242)
- 10:00AM *Rigid origami*.
▶ (976) **Ileana Streinu**, Smith College (1056-BF-1996)
- 10:30AM *Computational Origami from Science to Sculpture*.
(977) **Erik D. Demaine*** and **Martin L. Demaine**, Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology (1056-BF-1946)

AMS Session on Differential and Difference Equations, III

8:00 AM – 10:55 AM

- 8:00AM *Computation of Green's functions via successive image theory*.
(978) **D. Palaniappan**, Texas A&M University (1056-35-1783)

- 8:15AM *Homogenization of The Laplace Equation with Oscillating Stationary Ergodic Free Boundary*. Preliminary report.
(979) **Betul Orcan**, University of Texas at Austin (1056-35-1793)
- 8:30AM *Micromirror Method For Catadioptric Sensor Design*.
(980) **Emek Kose Can***, Loyola Marymount University, and **Ronald Perline**, Drexel University (1056-35-1828)
- 8:45AM *Analysis of nonlinear Darcy-Forchheimer flows in porous media*.
(981) **Adem Cakmak**, Ohio University, Lancaster (1056-35-1845)
- 9:00AM *Uniqueness of solutions to linear wave equations*. Preliminary report.
(982) **Phillip D Whitman**, Princeton University (1056-35-1972)
- 9:15AM *Approximating Convection Dominated Diffusion PDEs Using an Adaptively Weighted Least Squares Finite Element Approach*. Preliminary report.
▶ (983) **Myles D Baker***, Baylor University and Wabash College, and **Sarah R Farrell**, Bard College and Wabash College (1056-35-241)
- 9:30AM *An inverse Sturm-Liouville problem using three spectra*. Preliminary report.
▶ (984) **Mihaela Cristina Drignei**, Allegheny College (1056-34-330)
- 9:45AM *On the existence of a double S-shaped bifurcation curve*.
(985) **Jerome Goddard II***, Mississippi State University, **EunKyoung Lee**, Pusan National University, and **Ratnasingham Shivaji**, Mississippi State University (1056-34-350)
- 10:00AM *Particular Solution to the Euler-Cauchy Equation: A Novel Approach*. Preliminary report.
▶ (986) **Adnan H Sabuwala**, California State University, Fresno (1056-34-388)
- 10:15AM *Analysis of a Truly Nonlinear Oscillator*.
(987) **Dorian Wilkerson**, Clark Atlanta University (1056-34-420)
- 10:30AM *First Integrals for Systems via Complex Partial Lagrangians*.
(988) **Imran Naeem***, LUMS, Lahore, Pakistan, **Fazal Mahomed**, University of the Witwatersrand, and **R Naz**, IIU, Islamabad (1056-34-425)
- 10:45AM *Nonautonomous fractional integrodifferential equations with nonlocal initial conditions*.
(989) **Haewon Lee*** and **Peter Frempong-Mireku**, Dillard University (1056-35-2032)

AMS Session on Biomathematics, III

8:00 AM – 10:55 AM

- 8:00AM *Modeling Stochastic Cardiac Caveolae: a potential source of arrhythmogenic persistent sodium current in cardiomyocytes*.
▶ (990) **Ian M. Besse***, **Colleen C. Mitchell**, University of Iowa, **Erwin F. Shibata**, Molecular Physiology and Biophysics, University of Iowa, and **Thomas Hund**, Cardiovascular Medicine, University of Iowa (1056-92-1833)
- 8:15AM *A Mathematical Model for the MAPK Pathway in Starfish Oocytes*. Preliminary report.
(991) **Semen Koksals***, **Ioana Policeanu** and **David Carroll**, Florida Institute of Technology (1056-92-1844)
- 8:30AM *A piecewise-defined two-variable model for cardiac tissue*.
▶ (992) **Lisa Driskell**, Purdue University (1056-92-1859)

- 8:45AM *Effect of the Diffusion Coefficient on Noise Sensitivity in the Stochastic Chemostat.*
(993) **Suzanne Galayda*** and **Ernest Barany**, New Mexico State University (1056-92-1869)
- 9:00AM *Identifying Effective Age-Based Mammogram Screening Schedules Using a Stochastic Population Model of Breast Cancer.*
(994) **Sarah Geneser***, Stanford University, **Stephanie L. Rutledge**, San Diego State University Research Foundation, and **Sylvia K. Plevritis**, Stanford University (1056-92-1899)
- 9:15AM Break
- 9:30AM *Poisson Approximations for Palindrome Distributions in DNA Viral Genomes.*
▶ (995) **Ming-Ying Leung**, University of Texas at El Paso (1056-92-1902)
- 9:45AM *On the Expectation and Variance of the Reversal Distance.*
(996) **Yiting Yang***, University of South Carolina, and **Laszlo Szekely**, University of South Carolina (1056-92-2146)
- 10:00AM *Predicting Flexibility and Motions of Proteins Using Rigidity.*
(997) **Adnan Sijoka** and **Walter Whiteley***, York University (1056-52-51)
- 10:15AM *Fibonacci Hexagon and Genetic Tableau.*
(998) **Okan Gurel***, IBM, and **Demet Gurel**, Touro College (1056-54-109)
- 10:30AM *2-D Biharmonic Equation for the Displacement of an Isotropic Kelvin-Voigt Viscoelastic Plate.*
(999) Preliminary report.
Robert J Ronkese, United States Military Academy at West Point (1056-74-650)
- 10:45AM *Optimal vaccine distribution in a spatiotemporal epidemic model with an application to rabies and raccoons.*
(1000) **Rachael Miller Neilan***, Louisiana State University, and **Suzanne Lenhart**, NIMBioS, University of Tennessee (1056-93-407)

AMS Session on Difference Equations and Time Scales

8:00 AM – 10:25 AM

- ▶ 8:00AM *Qualitative Behaviour of Dynamic Equations on Time Scales.* Preliminary report.
(1001) **Allan Peterson*** and **Lynn Erbe**, University of Nebraska-Lincoln (1056-39-372)
- 8:15AM *Positive solutions of even order periodic boundary value problems.*
(1002) **Qingkai Kong** and **Min Wang***, Northern Illinois University (1056-39-390)
- 8:30AM *Modeling of Groundwater Level of a Specified Cut Slope.*
(1003) **Adam B Baharum**, **AlQahtani Hessah***, **Zalila B Ali**, **Habibah B Latih** and **Swee Peng Koay**, Universiti Sains Malaysia (1056-39-398)
- 8:45AM *Oscillation and nonoscillation for nonlinear dynamic equations.*
(1004) **Lynn H. Erbe***, **Allan C. Peterson**, University of Nebraska, Lincoln, and **Baoguo Jia**, Zhongshan University, Guangzhou, China (1056-39-439)
- 9:00AM *Some Properties of the Generalized Laplace Transform on Time Scales.*
(1005) **Chris Ahrendt**, University of Nebraska-Lincoln (1056-39-505)
- 9:15AM Break

- 9:30AM *Differential-difference Equations in Entire Functions.*
(1006) **Vadim Tkachenko**, Ben-Gurion University of the Negev, Israel (1056-39-771)
- 9:45AM *A model of an SIR disease on time scales.*
(1007) Preliminary report.
Raegan Higgins, Texas Tech University (1056-39-1322)
- 10:00AM *Unitary Operators Associated to Hyperbolic Reflection Groups.* Preliminary report.
(1008) **Mihai Stoiciu***, Williams College, and **Norbert Peyerimhoff**, Durham University, UK (1056-39-1470)
- 10:15AM *Strong Approximation for Markov Modulated Random Sequences with Two-Time Scales.*
(1009) **Son Luu Nguyen*** and **George Gang Yin**, Wayne State University (1056-60-1123)

AMS Session on Approximations

8:00 AM – 10:55 AM

- 8:00AM *Linear Dependence of Translates.* Preliminary report.
(1010) **Ashley N Moses**, Saint Louis University (1056-00-318)
- 8:15AM *Greedy Approximation with regard to Non-greedy Bases.*
(1011) **Vladimir Temlyakov**, **Mingrui Yang***, University of South Carolina, and **Peixin Ye**, Nankai University (1056-41-331)
- 8:30AM *Ratio Boundary Extension for Empirical Mode Decomposition.*
(1012) **Qin Wu*** and **Sherman Riemenschneider**, West Virginia University (1056-41-426)
- 8:45AM Break
- 9:00AM *Extensions of Bernstein's Inequality to Rational Functions.*
(1013) **Mohammed A. Qazi***, Tuskegee University, and **Q. I. Rahman**, Université de Montréal (1056-41-729)
- 9:15AM *Cesáro Summability of Expansions in Orthogonal Polynomials on a Cylinder.*
(1014) **Jeremy Wade**, Pittsburg State University (1056-41-812)
- 9:30AM Break
- 9:45AM *Optimal Learning of Bandlimited Functions from Localized Sampling.*
(1015) **Charles Micchelli**, State University of New York, The University at Albany, **Yuesheng Xu**, Syracuse University, and **Haizhang Zhang***, University of Michigan (1056-41-926)
- ▶ 10:00AM *The second derivatives of the Chebyshev polynomials as M-matrices.* Preliminary report.
(1016) **Joseph Kolibal**, The University of Southern Mississippi (1056-41-962)
- 10:15AM *Local Lipschitz Constant for Vector Valued Approximation.* Preliminary report.
(1017) **Mohammad A AlQudah*** and **James R Angelos**, Central Michigan University (1056-41-1310)
- 10:30AM *On Even and Odd Variation-Diminishing Convolution Transforms.*
(1018) **Terence G Hanchin**, Kent State University (1056-41-1903)
- 10:45AM *Approximation by Bivariate Linear Splines on Triangulations.*
(1019) **Edmond J. Nadler**, Eastern Michigan University (1056-41-2050)

AMS Session on Functional Analysis and Operator Theory, I

8:00 AM – 10:55 AM

- 8:00AM *Weak compactness in the space of Operator Valued Measures $M_{ba}(\Sigma, \mathcal{L}(X, Y))$ with an Application.* Preliminary report.
NasirUddin Ahmed, University of Ottawa (1056-46-21)
- 8:15AM *A Generalized Ston-Wierstrass theorem for Cz-vector lattices and Cz-algebras.* Preliminary report.
Hueytzen J Wu*, Texas A&M University - Kingsville, and **Wan-Hong Wu**, UT Health Science Center - San Antonio (1056-46-258)
- 8:30AM *Path-connectedness of the space of norm-attaining functionals on certain Banach spaces.*
Antonia E Cardwell, Millersville University of Pennsylvania (1056-46-726)
- 8:45AM *Dominated Ergodic Theorem for isometries of non-commutative L_p -spaces, $1 \leq p < \infty$.* Preliminary report.
Shukhrat M Usmanov, Ashford University (1056-46-924)
- 9:00AM *Aperiodicity in Topological k -Graphs.* Preliminary report.
▶ (1024) **Sarah E. Wright**, Dartmouth College (1056-47-217)
- 9:15AM *On real, Jordan and Lie structures in locally W^* -algebras.*
Alexander A. Katz, St. John's University, NY, **Roman Kushnir** and **Mark Ustayev***, University of South Africa, Pretoria, South Africa (1056-46-1032)
- 9:30AM *Crossed product C^* -algebras by finite group actions with the projection free tracial Rokhlin property.*
Dawn Archey, Ben Gurion University (1056-46-1211)
- 9:45AM *Continuous Dependence Results for Ill-posed Evolution Problems in a Banach Space.*
Matthew A. Fury, Bryn Mawr College (1056-46-1261)
- 10:00AM *Operator spaces with an ideal structure.*
Sonia Sharma, University of Houston (1056-46-1291)
- 10:15AM *Exponential integrability: a unified approach.*
Carlo Morpurgo*, University of Missouri, Columbia, and **Luigi Fontana**, Universita' di Milano - Bicocca, Italy (1056-46-1302)
- 10:30AM *On a reduction method for nonassociative L_p -spaces.*
▶ (1030) **Genady Ya. Grabarnik**, York College, CUNY, **Alexander A. Katz***, St. John's University, and **Laura Schwartz**, IBM T. J. Watson Research Center, Hawthorne, NY (1056-46-1552)
- 10:45AM *Traces of operator derivatives.* Preliminary report.
Anna Skripka, Texas A&M University (1056-47-110)

AMS Session on Algebraic Geometry

8:00 AM – 10:40 AM

- 8:00AM *The Converse of Abel's theorem ('polynomial' and 'rational').* Preliminary report.
Veniamin Kisunko, University of Toronto (1056-14-57)
- 8:15AM *The geometry of multipartite quantum systems.*
Carl A. Miller* and **Eric Chitambar**, University of Michigan, Ann Arbor (1056-14-153)
- 8:30AM *Rational Fibrations of $\overline{M}_{g,1}$.*
David Jensen, University of Texas (1056-14-447)

- 8:45AM *Space Curve Singularities and the Semple Tower.* Preliminary report.
Alex L Castro*, **Richard Montgomery**, UCSC, and **Michail Zhitomirskii**, Technion - Haifa - IL (1056-14-624)
- 9:00AM *GIT Compactification of the Quintic Threefolds.*
Chirag M Lakhani, North Carolina State University (1056-14-971)
- 9:15AM Break
- 9:30AM *The Laplace transform of the cut-and-join equation and the Bouchard-Marino conjecture on Hurwitz numbers.*
Bertrand Eynard, Service de Physique Theorique de Saclay, **Motohico Mulase**, University of California, Davis, and **Brad Safnuk***, Central Michigan University (1056-14-1317)
- 9:45AM *Tensor Product of Picard Stacks.*
Ahmet Emin Tatar, Florida State University (1056-14-1473)
- 10:00AM *Algebraic cycles and degenerations for a class of surfaces of general type.*
Christopher Lyons, California Institute of Technology (1056-14-1933)
- 10:15AM *Representations of polynomials non-negative on non-compact subsets of \mathbb{R}^2 .*
▶ (1040) **Ha N Nguyen*** and **Victoria Powers**, Emory University (1056-12-688)
- 10:30AM *Fan Cohomology and Equivariant Chow Rings of Toric Varieties.*
Mu-wan Huang, Southwest Minnesota State University (1056-19-1689)

MAA Session on Undergraduate Mathematical Biology, I

8:00 AM – 10:55 AM

- Organizers: **Timothy D. Comar**, Benedictine University
Raina S. Robeva, Sweet Briar College
- 8:00AM *Interdisciplinary curricular innovations at the University of the Virgin Islands.*
Robert C Stolz and **Camille A. McKay***, University of the Virgin Islands (1056-Q5-1676)
- 8:20AM *Developing Computational Skills in Biocalculus Courses.* Preliminary report.
Timothy Comar, Benedictine University (1056-Q5-459)
- 8:40AM *The Growth of Interdisciplinary Math-Biology Courses at James Madison University.* Preliminary report.
▶ (1044) **D. Brian Walton***, **Anthony Tongen**, **Nusrat Jahan** and **Reid Harris**, James Madison University (1056-Q5-1755)
- 9:00AM *Introductory Mathematical Biology through Finite Dynamical Systems.*
▶ (1045) **Raina S Robeva***, Sweet Briar College, and **Terrell Hodge**, Western Michigan University (1056-Q5-1402)
- 9:20AM *Research in Mathematical Biology at UNCC.*
▶ (1046) **Jan Rychtar**, The University of North Carolina at Greensboro (1056-Q5-1777)
- 9:40AM *UBM Research and Training Activities in BioMath.* Preliminary report.
▶ (1047) **Semen Koksal**, Florida Institute of Technology (1056-Q5-1969)
- 10:00AM *Bio-Surveillance in Undergraduate Mathematics Classroom.* Preliminary report.
▶ (1048) **Urmi Ghosh-Dastidar**, New York City College of Technology, CUNY (1056-Q5-2023)

- 10:20AM *Mathematical Biology and Undergraduate Research (MBUR) at Youngstown State University.*
 ► (1049) **George T Yates**, Youngstown State University (1056-Q5-1882)
- 10:40AM *Viscoelastic Effects in Biological Soft Tissues.*
 ► (1050) **S. Minerva Venuti*** and **Padmanabhan Seshaiyer**, George Mason University (1056-Q5-1530)

MAA Session on General Contributed Papers, VII

8:00 AM – 10:55 AM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- 8:00AM *The Role of Permutation Matrices in Magic Squares.* Preliminary report.
 ► (1051) **Peter Staab*** and **Michael Andrade**, Fitchburg State College (1056-Z1-874)
- 8:15AM *Rolling Archimedean Dice.*
 ► (1052) **Dylan W Helliwell***, Seattle University, and **Peter Littig**, University of Washington, Bothell (1056-Z1-2039)
- 8:30AM *Chess, Church, and Knots: Statistics Through Service and Research.*
 ► (1053) **Neil Nicholson**, William Jewell College (1056-Z1-102)
- 8:45AM *Making Sense of Sampling Distributions: Activities for an Introductory Statistics Course.* Preliminary report.
 ► (1054) **Kate G McGivney**, Shippensburg University (1056-Z1-1697)
- 9:00AM *Some Results, Problems and Conjectures On Generalized Markoff Numbers.*
 ► (1055) **Shanzhen Gao**, Florida Atlantic University (1056-Z1-689)
- 9:15AM *Effect of noise in Canonical Correlation Analysis with application to Ozone Pollution.*
 (1056) **Katerina G. Tsakiri*** and **Igor G. Zurbenko**, State University of New York at Albany (1056-Z1-683)
- 9:30AM *Set Difference and Jump Sequences.*
 ► (1057) **Chelsea Cerini***, **Sommer Sprowls** and **Roman Wong**, Washington & Jefferson College (1056-Z1-484)
- 9:45AM *The Mystery of the M&m Sequences.*
 ► (1058) **Sommer L Sprowls***, **Chelsea Cerini** and **Roman Wong**, Washington & Jefferson College (1056-Z1-483)
- 10:00AM *What a higher q -skew τ -derivation can do for you.*
 ► (1059) **Heidi A. Haynal**, Walla Walla University (1056-Z1-294)
- 10:15AM *Likelihood Inference for Nonlinear Regression Models.*
 (1060) **Harshini Fernando**, Purdue University North Central (1056-Z1-791)
- 10:30AM *Trilivable Points of Curves.*
 (1061) **Michael S McClendon*** and **Charles L Cooper**, University of Central Oklahoma (1056-Z1-2088)
- 10:45AM *Level curves of the angle function of a positive definite symmetric matrix.*
 ► (1062) **Neeraj Bajracharya**, University of North Texas (1056-Z1-609)

MAA Session on Mathematics, Equity, Diversity, and Social Justice, II

8:00 AM – 10:50 AM

Organizers: **Patricia Hale**, California State Polytechnic University Pomona
Shandy Hauk, University of Northern Colorado
Dave Kung, St. Mary's College, Maryland

- 8:00AM *The history, impact, and current efforts of Emerging Scholars Programs.*
 (1063) **Natasha M Speer**, University of Maine (1056-H7-1930)
- 8:30AM *Challenging Eurocentric Mathematics History to Encourage Understanding of Cultural Diversity in Mathematics Classrooms.*
 ► (1064) **Elizabeth C Rogers**, Piedmont College (1056-H7-2127)
- 9:00AM *Increasing the Participation of Girls in Mathematics and other STEM Fields in Higher Education.*
 ► (1065) **Tina Alves Mancuso*** and **Deborah Lawrence**, The Sage Colleges (1056-H7-1608)
- 9:30AM *From research to mathematics curriculum development: Social Justice for African Americans in Chester Heights.*
 ► (1066) **Julius Davis**, University of Maryland, College Park (1056-H7-1518)
- 10:00AM *Algebra Project Curricula – Mathematics meaning through experience and dialogue.* Preliminary report.
 ► (1067) **David W. Henderson***, Cornell University, and **Kelly Gaddis**, Bard College (1056-H7-1908)
- 10:30AM *The Algebra Project: Building Math Literacy.*
 ► (1068) **Marcus Hung**, San Francisco Unified School District (1056-H7-406)

MAA Session on Mathematics Courses for the Liberal Arts Students, III

8:00 AM – 10:55 AM

Organizer: **Reva Kasman**, Salem State College

8:00AM *Mathematics and General Education: Exposing Students to Mathematics and its Tools in the 21st Century.* Preliminary report.
 ► (1069) **Manuel J. Sanders**, University of South Carolina Beaufort (1056-J1-1668)

8:20AM *Designing a "Math for Liberal Studies" Course.*
 (1070) **James E. Hamblin**, Shippensburg University (1056-J1-870)

8:40AM *Including Presentations as a Component in a Liberal Arts Math History Course.*
 ► (1071) **Sean D Simpson**, Westchester Community College (1056-J1-747)

9:00AM *Great Ideas of Modern Mathematics: An Approach to a Rigorous Mathematics Course for the Liberal Arts Student.* Preliminary report.
 ► (1072) **Robert A. Blumenthal**, Georgia College & State University (1056-J1-95)

9:20AM *Teaching the Nature of Applied Mathematics.*
 ► (1073) Preliminary report.
G. Edgar Parker, James Madison University (1056-J1-458)

9:40AM *Evolution of the Mathematical Sampler.*
 ► (1074) **Jeffery Thomas McLean**, University of St. Thomas (1056-J1-855)

- 10:00AM *Teaching Quantitative Reasoning with the News.*
 ▶ (1075) Preliminary report.
Stuart Boersma*, Central Washington University,
Caren L Diefenderfer, Hollins University, **Shannon
 W Dingman** and **Bernard L Madison**, University of
 Arkansas (1056-J1-508)
- 10:20AM *Projects & Portfolios Motivate Most.*
 (1076) **Rich West**, Francis Marion University
 (1056-J1-1769)
- 10:40AM *Reaching the Unreachable: Pulling Students Kicking
 and Screaming into a Mathematical Vortex Where
 They Transform to Develop Mathematical Eyes
 through Innovative Approaches and Activities.*
 ▶ (1077) **Deborah L. Gochenaur**, Shippensburg University
 (1056-J1-1974)

MAA Session on Quantitative Reasoning and the Environment

8:00 AM – 10:55 AM

Organizers: **Maura B. Mast**, University of
 Massachusetts Boston
Karen D. Bolinger, Clarion University
Cinnamon Hillyard, University of
 Washington Bothell

- 8:00AM *An Across-the-Curriculum Approach to Quantitative
 Literacy in Environmental Studies.*
 (1078) **Ben Steele***, **Semra Kilic-Bahi**, **Nick Baer**, **Leon
 Malan**, **Laura Alexander** and **Harvey Pine**,
 Colby-Sawyer College (1056-P1-1639)
- 8:20AM *Water, Water, Everywhere—Even in Statistics.*
 (1079) **John C. Nardo*** and **Judith Lynn Gieger**,
 Oglethorpe University (1056-P1-1948)
- 8:40AM *Raising Awareness of Environmental Issues in
 Statistics Course.* Preliminary report.
 ▶ (1080) **Thomas J Pfaff**, Ithaca College (1056-P1-1610)
- 9:00AM *Sustainability as a Focus for an Introductory
 Calculus Course.*
 (1081) **Michael Olinick**, Middlebury College
 (1056-P1-1093)
- 9:20AM *Could i-Tree Software Have Helped the Lorax?*
 ▶ (1082) **Jan O. Case*** and **Scott W. Beckett**, Jacksonville
 State University (1056-P1-1312)
- 9:40AM *The Environment, Mathematics and Our Community
 Role.*
 (1083) **Ben Fusaro**, Florida State University (1056-P1-1997)
- 10:00AM *Using QL Modules to Analyze and Present Large
 Data Sets in a Winter Ecology Course.* Preliminary
 report.
 ▶ (1084) **Judith Moran**, Trinity College (1056-P1-1276)
- 10:20AM *Modeling Radon in Pennsylvania.* Preliminary report.
 ▶ (1085) **Michael Huber**, Muhlenberg College (1056-P1-276)
- 10:40AM *Necessary Environmental Numeracy for a
 Successful Society.* Preliminary report.
 ▶ (1086) **Martin E. Walter**, University of Colorado, Boulder
 (1056-P1-847)

SIAM Minisymposium on Graph Theory, I

8:00 AM – 10:55 AM

Organizers: **Andre Kundgen**, California State
 University San Marcos
Hal Kierstead, Arizona State University

- 8:00AM *The thickness and chromatic number of r-inflated
 graphs.*
 (1087) **Michael Albertson**, Smith College, **Debra Boutin***,
 Hamilton College, and **Ellen Gethner**, University of
 Colorado Denver (1056-05-1063)

- 8:30AM *The Canonical Coloring Graph.*
 (1088) **Ruth Haas**, Smith College (1056-05-963)
- 9:00AM *Distinguishing with Mike Albertson.*
 ▶ (1089) **Karen L. Collins**, Wesleyan University
 (1056-05-1245)
- 9:30AM *Looking for a new proof of the Four Color Theorem.*
 (1090) Preliminary report.
Walter Stromquist, Swarthmore College
 (1056-05-1551)
- 10:00AM *Finding minors in graphs with a given path
 structure.*
 (1091) **Radhika Ramamurthi***, **Andre Kundgen**, California
 State University San Marcos, and **Michael
 Pelsmayer**, Illinois Institute of Technology
 (1056-05-2048)
- 10:30AM *Maximum Induced Forests in Graphs of Bounded
 Treewidth.*
 ▶ (1092) **Glenn G Chappell**, Department of Computer
 Science, University of Alaska Fairbanks, and
Michael J. Pelsmayer*, Illinois Institute of
 Technology (1056-05-1715)

PME Council Meeting

8:00 AM – 11:00 AM

Employment Center

8:00 AM – 7:00 PM

AMS Session on History of Mathematics

8:15 AM – 10:55 AM

- 8:15AM *Ancient Numeral System And The Great Pyramid.*
 (1093) Preliminary report.
Ricie Dimatatac Bulanhagui, Alalum, San Pascual,
 Batangas (1056-01-399)
- 8:30AM *French and English Influences On Early American
 Mathematics.*
 (1094) **Andrew B Perry**, Springfield College (1056-01-692)
- 8:45AM *Nasir-al-din Tusi: A True Scholar in Many
 Disciplines.* Preliminary report.
 ▶ (1095) **Mohammad Moazzam**, Salisbury University
 (1056-01-937)
- 9:00AM *Benjamin Gompertz: Pioneer of Actuarial Science.*
 ▶ (1096) Preliminary report.
Charlotte K. Simmons* and **Jesse W. Byrne**,
 University of Central Oklahoma (1056-01-1027)
- 9:15AM Break
- 9:30AM *Max Dehn.*
 ▶ (1097) **David Peifer**, UNC Asheville (1056-01-1042)
- 9:45AM *Teaching Mathematics at the 19th century Virginia
 Military Institute.* Preliminary report.
 ▶ (1098) **Maryam Vulis**, USMA Prep School (1056-01-1734)
- 10:00AM *On Avicenna's Arithmetic.*
 ▶ (1099) **Mahmoud H Annaby**, Qatar University
 (1056-01-1860)
- 10:15AM *Euler's work on the prime divisors of numbers of
 the form $mx^2 + ny^2$.*
 (1100) **Paul R Bialek***, Trinity International University,
 and **Dominic W Klyve**, Carthage College
 (1056-11-1819)
- 10:30AM *Origin and Extensions of the Secant Method and
 Characterizations of the BFGS Secant Method.*
 ▶ (1101) Preliminary report.
Joanna M. Papakonstantinou, Rice University
 (1056-49-673)

Program of the Sessions – Friday, January 15 (cont'd.)

- 10:45AM *Algebraic cryptology from an historical viewpoint.*
▶ (1102) Preliminary report.
Chris Christensen, Northern Kentucky University
(1056-01-1790)

AMS Session on Discrete Mathematics, IV

8:15 AM – 10:40 AM

- 8:15AM *Ramsey Core Numbers.* Preliminary report.
▶ (1103) **Allan Edward Bickle**, Western Michigan University
(1056-05-1273)
- 8:30AM *On the enumeration of the cyclically fully commutative elements in Coxeter groups.*
▶ (1104) **Tom Boothby**, University of Washington, **Jeffrey Burkert***, Harvey Mudd College, **Morgan Eichwald**, University of Montana, **Dana C. Ernst**, Plymouth State University, **Richard M. Green**, University of Colorado at Boulder, and **Matthew Macauley**, Clemson University (1056-05-1861)
- 8:45AM *On the cyclically fully commutative elements of Coxeter groups.*
(1105) **Tom Boothby**, University of Washington, **Jeffrey Burkert**, Harvey Mudd, **Morgan Eichwald**, University of Montana, **Dana C. Ernst***, Plymouth State University, **Richard M. Green**, University of Colorado at Boulder, and **Matthew Macauley**, Clemson University (1056-05-1831)
- 9:00AM *An explicit derivation of the Möbius function for Bruhat order.*
▶ (1106) **Brant C. Jones**, University of California, Davis
(1056-05-914)
- 9:15AM Break
- 9:30AM *Projections of Ocneanu traces are Kazhdan-Lusztig R-polynomials.*
▶ (1107) **W. Andrew Pruitt**, Baylor University (1056-05-476)
- 9:45AM *Symmetric Permutations with No Long Decreasing Subsequences.*
(1108) **Eric S Egge**, Carleton College (1056-05-249)
- 10:00AM *Fragility in Matroids.* Preliminary report.
▶ (1109) **Carolyn B. Chun***, **Dillon Mayhew**, Victoria University, **Stefan van Zwam**, University of Waterloo, and **Geoff Whittle**, Victoria University
(1056-05-1494)
- 10:15AM *Edge Coverings of Bipartite Graphs and the Geometry of the Hausdorff Metric.*
▶ (1110) **Steven Schlicker***, Grand Valley State University, and **Katrina Honigs**, University of California, Berkeley (1056-51-116)
- 10:30AM *Hypergraphic subspace arrangements.*
(1111) **Matthew S. Miller***, Bucknell University, and **Max Wakefield**, United States Naval Academy
(1056-55-289)

AMS Special Session on Interactions of Inverse Problems, Signal Processing, and Imaging, II

8:30 AM – 10:50 AM

- Organizer: **M. Zuhair Nashed**, University of Central Florida
- 8:30AM *A Perturbed Whittaker-Kotel'nikov-Shannon Sampling theorem.*
▶ (1112) **Mahmoud H Annaby***, Qatar University, **Hassan A Hassan**, Cairo University, and **Omar H El-Haddad**, Beni Suef University (1056-94-1840)
- 9:00AM *Convergence and Rate of Approximation for Generalized Sampling-type Operators in Orlicz Spaces.*
(1113) **Laura Angeloni**, Università degli Studi di Perugia
(1056-41-1726)

- 9:30AM *Non-uniform sampling expansions and local reconstruction on subspaces of $L_2(\mathbb{R})$.*
(1114) **Nikolaos Dimitrios Atreas**, Aristotle University of Thessaloniki, Polytechnic School (1056-94-1137)
- 10:00AM *Color Image Restoration Using Nonlocal Mumford-Shah Regularizers.*
(1115) **Miyoun Jung**, **Xavier Bresson**, UCLA, **Tony F Chan**, NSF and UCLA, and **Luminita A. Vese***, UCLA
(1056-35-1136)
- 10:30AM *Approximation Theory in Signal and Image Processing. Applications to Endovascular Surgery.*
(1116) **Gianluca Vinti**, University of Perugia
(1056-94-1602)

AMS-MAA Graduate Student Fair

8:30 AM – 10:30 AM

Undergrads! Take this opportunity to meet representatives from mathematical sciences graduate programs.

MAA Session on Online Homework—Innovation and Assessment, II

8:40 AM – 10:55 AM

- Organizers: **Michael E. Gage**, University of Rochester
Arnold K. Pizer, University of Rochester
Vicki Roth, University of Rochester
- 8:40AM *Assessing the Impact on Student Learning and Behavior in a First Applied Statistics Course by Innovative Use of Three Delivery Types Including Online Homework: Experimental Design and Implementation.*
(1117) **William H Rybolt*** and **John D McKenzie**, Babson College (1056-M1-975)
- 9:00AM *Assessing the Impact on Student Learning and Behavior in a First Applied Statistics Course by Innovative Use of Three Delivery Types Including Online Homework: Initial Results.*
(1118) **John D McKenzie*** and **William H Rybolt**, Babson College (1056-M1-976)
- 9:20AM *Using Multiple Technologies to Engage Students in Math Learning.* Preliminary report.
▶ (1119) **Gerald Agbegha*** and **Nailong Guo**, Johnson C. Smith University (1056-M1-1843)
- 9:40AM *Online Assessment of Homework in College Algebra and Math Concepts For Teachers Courses.*
▶ (1120) **A. S. Elkhader**, Northern State University
(1056-M1-1571)
- 10:00AM *Using WebAssign for Uniform Assessment in Precalculus, 1300 Students at a Time.*
(1121) **Lisa Townsley*** and **Edward Azoff**, University of Georgia (1056-M1-1066)
- 10:20AM *MathNerds and Webwork: a free, supervised tutoring system for online homework.* Preliminary report.
▶ (1122) **W. Ted Mahavier***, Lamar University & MathNerds, **Valerio De Angelis**, Xavier University of Louisiana & MathNerds, and **Kyehong Kang**, Lamar University
(1056-M1-1141)
- 10:40AM *Using Public Domain Software for Online Homework and Tutorials at the University of Puerto Rico.*
▶ (1123) **Daniel L McGee*** and **J Maider Marin**, University of Puerto Rico - Mayaguez (1056-M1-1542)

MAA Invited Address

9:00 AM – 9:50 AM

- ▶ (1124) *Motion Planning and Graph Layout: at the Crossroads of Geometry, Discrete Mathematics, and Algorithm Design.* Preliminary report.
Sue Whitesides, University of Victoria (1056-A0-11)

ASL Invited Address

9:00 AM – 9:50 AM

- (1125) *Expansions of o-minimal structures by trajectories of definable vector fields.*
Chris Miller, Ohio State University (1056-03-72)

MAA Minicourse #13: Part B

9:00 AM – 11:00 AM

Taking symbols seriously: Teaching form and function in college algebra.

- Organizers: **William G. McCallum**, University of Arizona
Deborah Hughes Hallett, University of Arizona and Harvard University
Pat Shure, University of Michigan

MAA Minicourse #4: Part B

9:00 AM – 11:00 AM

Using video-case studies in teaching a proof-based gateway course to the mathematics major.

- Organizers: **James T. Sandefur**, Georgetown University
Connie M. Campbell, Millsaps College
Kay B. Somers, Moravian College

MAA Minicourse #7: Part B

9:00 AM – 11:00 AM

Teaching with clickers in the classroom.

- Organizers: **Derek Bruff**, Vanderbilt University
Adam Lucas, Saint Mary's College of California

Student Hospitality Center

9:00 AM – 5:00 PM

MAA-Young Mathematicians' Network Panel Discussion

9:00 AM – 10:20 AM

Promotion and tenure: You know you want it.

- Organizers: **Barry A. Balof**, Whitman College
Joshua D. Laison, Willamette College
- Panelists: **Jason D. Rosenhouse**, James Madison University
Francis E. Su, Harvey Mudd College
Matthew P. Richey, St. Olaf College
Jacqueline A. Jensen, Sam Houston State University

AMS Special Presentation

9:30 AM – 11:00 AM

- A conversation on nonacademic employment.*
 Moderator: **James G. Glimm**, SUNY at Stony Brook

Exhibits and Book Sales

9:30 AM – 5:00 PM

ASL Invited Address

10:00 AM – 10:50 AM

- (1126) *Ramsey theory for finite structures.*
Slawomir J. Solecki, University of Illinois at Urbana-Champaign (1056-03-74)

AMS Special Session on Use of Technology in Modern Complex Analysis Research, II

10:00 AM – 10:50 AM

- Organizers: **Beth Schaubroeck**, U.S. Air Force Academy
Michael Dorff, Brigham Young University
James Rolf, U.S. Air Force Academy

- 10:00AM ▶ (1127) *An Introduction to Metacalibration and its Application to Multiple Bubble Problems.*
Donald C. Sampson, **Rebecca Dorff*** and **James P Dilts**, Brigham Young University (1056-49-468)
- 10:30AM ▶ (1128) *Convex Combinations of Harmonic Mappings to Regular Polygons.*
Jessica A Spicer*, University of Arkansas, and **Samuel J Ferguson**, University of North Carolina (1056-43-1347)

AMS Invited Address

10:05 AM – 10:55 AM

- (1129) *Zonotopal algebra, analysis, and combinatorics.*
Olga Holtz*, University of California-Berkeley, Technische Universitaet Berlin, Institute for Advanced Study, and **Amos Ron**, University of Wisconsin-Madison (1056-13-6)

AMS-MAA Invited Address

11:10 AM – NOON

- (1130) *Evolving curves and surfaces.*
Brian White, Stanford University (1056-51-42)

MAA Poster Session on Research by Undergraduate Students

NOON – 1:00 PM

Students must set up their posters during this hour.

AMS Colloquium Lectures: Lecture III

1:00 PM – 2:00 PM

- (1131) *Reduced decompositions.*
Richard P. Stanley, M.I.T. (1056-05-18)

MAA Lecture for Students

1:00 PM – 1:50 PM

- ▶ (1132) *How math made modern music ~~mad~~ Irrational!*
David T. Kung, Saint Mary's College of Maryland (1056-A0-15)

AMS Current Events Bulletin

1:00 PM – 4:45 PM

- 1:00PM *Approximate groups and their applications: work of Bourgain, Gamburd, Helfgott and Sarnak.*
(1133) **Ben J Green**, University of Cambridge, UK (1056-11-1569)
- 2:00PM *Multivariate stable polynomials: theory and applications.*
(1134) **David G. Wagner**, University of Waterloo (1056-32-2100)
- 3:00PM *The conformal geometry of billiards.*
(1135) **Laura DeMarco**, University of Illinois at Chicago (1056-37-1737)
- 4:00PM *On the Kervaire Invariant Problem.*
(1136) **Michael Hopkins**, Harvard University (1056-55-1879)

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates, II

1:00 PM – 5:20 PM

Organizers: **Darren Narayan**, Rochester Institute of Technology
Bernard Brooks, Rochester Institute of Technology
Jacqueline Jensen, Sam Houston State University
Carl V. Lutzer, Rochester Institute of Technology
Vadim Ponomarenko, San Diego State University
Tamas Wiandt, Rochester Institute of Technology

- ▶ (1137) 1:00PM *Analyzing Hyperspectral Images.*
Brian Allen*, Messiah College, and **Kristen Bretney**, Loyola Marymount University (1056-94-145)
- ▶ (1138) 1:30PM *Coexistence of Stable ECM Solutions in the Lang-Kobayashi System.*
Erica Mochan*, Western New England College, and **C. Davis Buenger**, Rice University (1056-34-144)
- ▶ (1139) 2:00PM *Greedy Algorithms for Generalized k-rankings of graphs.*
Sandra James*, Concordia University - St. Paul, and **Andrew Zemke**, Rochester Institute of Technology (1056-05-142)
- ▶ (1140) 2:30PM *Finding Ramsey Numbers.*
Kevin Black*, Harvey Mudd College, and **Daniel Leven**, Rutgers University (1056-05-143)
- (1141) 3:00PM *Mathematics Models of Mancala.*
Reginald Ford*, **M. Vergara**, **J. C. Ortega**, **D. Melendez** and **Z. Pena**, James Madison University (1056-91-2094)
- ▶ (1142) 3:30PM *Comparison of Homogenous cyclic expressions.*
B. Sriram, Indian Institute of Technology, Kanpur (1056-08-26)
- ▶ (1143) 4:00PM *The Strong Symmetric Genus of Small D-type Generalized Symmetric Groups.* Preliminary report.
Michelle Bowser*, **Trevor Partridge** and **Kirsten Rodgers**, Grove City College (1056-20-77)

- (1144) 4:30PM *The Energy of Graphs and Matrices.*
Duy D Nguyen*, Texas Christian University, **Katelyn L McCall**, University of Rochester, **Laura J Buggy**, College of St. Benedict, **Amalia V Culiuc**, Mount Holyoke College, and **Sivaram K Narayan**, Central Michigan University (1056-15-78)
- ▶ (1145) 5:00PM *Subgraph Summability Number.* Preliminary report.
Kassandra A Johnston*, University of New Mexico, **Philip R Zerull**, **Sivaram K Narayan** and **Jordan D Webster**, Central Michigan University (1056-05-79)

AMS-MAA Special Session on History of Mathematics, I

1:00 PM – 6:20 PM

Organizers: **Craig Fraser**, University of Toronto
Deborah Kent, Hillsdale College
Sloan Despeaux, Western Carolina University

- ▶ (1146) 1:00PM *The Mathematics of the Antikythera Mechanism.*
James Evans, University of Puget Sound (1056-01-929)
- ▶ (1147) 1:30PM *The various "Indian rules" in medieval and early modern Western mathematics.* Preliminary report.
Kim Plofker, Union College (1056-01-1189)
- (1148) 2:00PM *Descartes, Van Schooten, and algebraic extensions of fields.*
Michel Pierre Serfati, Université Paris VII/ Denis Diderot (1056-01-56)
- (1149) 2:30PM *Curvature and symmetry in Newton's early computations of orbital dynamics.*
Michael Nauenberg, UCSC (1056-01-1560)
- ▶ (1150) 3:00PM *Johann Bernoulli's lost lecture on differential calculus and its sequels.*
Ruediger Thiele, Hall, Germany (1056-01-1572)
- ▶ (1151) 3:30PM *From cascades to calculus: episodes in the history of Rolle's theorem.*
June Barrow-Green, The Open University, Milton Keynes, UK (1056-01-273)
- (1152) 4:00PM *D company: the rise and fall of differential operator theory in Britain, 1810s-1870s.*
Ivor O. Grattan-Guinness, Middlesex University, UK (1056-01-1877)
- ▶ (1153) 4:30PM *Pasch and Klein on intuition and proofs.*
Dirk Schlimm, McGill University (1056-01-1156)
- ▶ (1154) 5:00PM *Why was Wantzel Overlooked for a Century? The Changing Importance of an Impossibility Result.*
Jesper Lützen, University of Copenhagen (1056-01-808)
- (1155) 5:30PM *From idea to mathematical object: Herman Minkowski's introduction of general convex sets.*
Tinne Hoff Kjeldsen, IMFUFA, Roskilde University (1056-01-304)
- (1156) 6:00PM *Building a Nation: The Evolution of a Mathematical Research Community from the Italian States to the Kingdom of Italy.*
Laura Martini, Siena, Italy (1056-01-1331)

AMS-AWM Special Session on Spectral Problems on Compact Riemannian Manifolds, II

1:00 PM – 5:50 PM

Organizers: **Carolyn Gordon**, Dartmouth College
Ruth Gornet, University of Texas at Arlington
Craig Sutton, Dartmouth College

- 1:00PM *Inverse scattering results for manifolds hyperbolic at infinity.*
(1157) **David Borthwick**, Emory University, and **Peter A. Perry***, University of Kentucky (1056-58-1112)
- 1:30PM *The genus spectrum of a hyperbolic 3-manifold.*
(1158) **D. B. McReynolds***, University of Chicago, and **Alan W. Reid**, University of Texas in Austin (1056-53-1227)
- 2:00PM *Length-spectral rigidity for flat metrics.*
(1159) **Moon Duchin***, University of Michigan, **Christopher J Leininger**, University of Illinois, and **Kasra Rafi**, University of Oklahoma (1056-51-1425)
- 2:30PM *The Cut-off Covering Spectrum.*
(1160) **Christina Sormani**, CUNY Graduate Center and Lehman College, and **Guofang Wei***, UC Santa Barbara (1056-53-529)
- 3:00PM *Spectral problems for polygons.*
(1161) **Julie Rowlett**, Hausdorff Center for Mathematics (1056-58-869)
- 3:30PM Break
- 4:00PM *Eigenvalues and Isoperimetric Inequalities.*
(1162) **Jesse Ratzkin**, University College Cork (1056-35-283)
- 4:30PM *Hearing Delzant polygons from the equivariant spectrum.*
(1163) **Emily B. Dryden***, Bucknell University, **Victor Guillemin**, Massachusetts Institute of Technology, and **Rosa Sena-Dias**, Instituto Superior Técnico, Lisbon (1056-58-1299)
- 5:00PM *The fundamental domain of Random Riemann surfaces.*
(1164) **Eran Makover*** and **Jeff McGowan**, Central Connecticut State University (1056-58-527)
- 5:30PM *The fundamental domain of Random Riemann surfaces.*
(1165) **Jeffrey McGowan*** and **Eran Makover**, Central Connecticut State University (1056-58-525)

AMS Special Session on Commutative Algebra, II

1:00 PM – 5:50 PM

Organizers: **Susan Cooper**, University of Nebraska-Lincoln
Graham Leuschke, Syracuse University
Sean M. Sather-Wagstaff, North Dakota State University

- 1:00PM *Ascent and descent modulo exact zero divisors.*
(1166) Preliminary report.
Luchezar L. Avramov, **Inês Bonacho dos Anjos Henriques***, University of Nebraska-Lincoln, and **Liana M. Sega**, University of Missouri, Kansas City (1056-13-1604)
- 1:30PM *Vanishing of Tor over complete intersections.*
(1167) **Olgur Celikbas**, University of Nebraska, Lincoln (1056-13-901)
- 2:00PM *Infinite Cohen-Macaulay posets and non-Noetherian Stanley-Reisner rings.*
(1168) **Erin Chamberlain**, Brigham Young University (1056-13-813)
- 2:30PM *The rank of a hypergeometric system.*
(1169) **Christine Berkesch**, Purdue University (1056-14-944)
- 3:00PM *Asymptotic behavior of value semi-groups.*
(1170) **S. D. Cutkosky**, **K. Dalili***, University of Missouri - Columbia, and **O. Kashcheyeva**, University of Illinois at Chicago (1056-13-2019)

- 3:30PM *A New Elementwise Criterion for Weak Subintegrality.*
(1171) **Marie A Vitulli**, University of Oregon (1056-13-1581)
- 4:00PM Discussion
- 4:30PM *Modules over one-dimensional local rings of infinite Cohen-Macaulay type.* Preliminary report.
(1172) **Silvia Saccon**, University of Nebraska-Lincoln (1056-13-621)
- 5:00PM *Local rings and high syzygies.* Preliminary report.
(1173) **Hamid Rahmati***, Texas Tech university, and **Janet Striuli**, Fairfield University (1056-13-2028)
- 5:30PM *Constructing Algebras from Witt vectors.*
(1174) **Paul C Roberts**, University of Utah (1056-13-800)

AMS Special Session on Enumerative Combinatorics, II

1:00 PM – 5:50 PM

Organizers: **Brian Miceli**, Trinity University
Jeff Rempel, University of California San Diego

- 1:00PM *Major Index for 01-Fillings of Moon Polyominoes.*
(1175) **William Chen**, Center for Combinatorics, Nankai University, **Svetlana Poznanović***, **Catherine Yan**, Texas A&M University, and **Arthur Yang**, Center for Combinatorics, Nankai University (1056-05-1212)
- 1:30PM *Matrix Bijections.*
▶ (1176) **Anthony A. Mendes**, California Polytechnic State University, San Luis Obispo (1056-05-166)
- 2:00PM *Probabilistic proofs of hook length formulas involving trees.*
▶ (1177) **Bruce E Sagan**, Michigan State U. and NSF (1056-05-519)
- 2:30PM *Invariants, Kronecker products and combinatorics of some remarkable diophantine systems.*
(1178) **Adriano Garsia**, UC, San Diego (1056-05-1881)
- 3:00PM *Enumerating (2+2)-free posets by the number of minimal elements and other statistics.*
(1179) **Sergey Kitaev**, Reykjavik University (1056-05-473)
- 3:30PM *The distributions of k-drops and k-excedences in permutations.*
▶ (1180) **Jeffrey E Liese**, California Polytechnic State University, San Luis Obispo (1056-05-949)
- 4:00PM *Wilf equivalence for generalized factor order modulo k.*
(1181) **Thomas Langley***, Rose-Hulman Institute of Technology, **Jeffrey Liese**, California Polytechnic State University, San Luis Obispo, and **Jeffrey Rempel**, University of California, San Diego (1056-05-1275)
- 4:30PM *A hierarchy of generalized pattern avoidance and $\beta(0, 1)$ -trees.*
(1182) **Einar Steingrímsson**, Reykjavik University (1056-05-1886)
- 5:00PM *Avoiding Colored Partitions.* Preliminary report.
▶ (1183) **Adam Goyt**, Minnesota State University, and **Lara Pudwell***, Valparaiso University (1056-05-1359)
- 5:30PM *A Continuum of Partition Statistics.*
▶ (1184) **Nicholas A. Loehr***, Virginia Tech, and **Gregory S. Warrington**, University of Vermont (1056-05-487)

AMS Special Session on Differential Galois Theory and Group Representations: A Tribute to Andy Magid, I

1:00 PM – 6:20 PM

Organizers: **James Carrell**, University of British Columbia

Lourdes Juan, Texas Tech University
Alex Lubotzky, Hebrew University
Brian Parshall, University of Virginia
Marius van der Put, University of Groningen

- 1:00PM *Differential ‘Galois’ extensions with new constants.*
 (1185) **Lourdes Juan***, Texas Tech University, and **Andy R. Magid**, University of Oklahoma (1056-20-1991)
- 1:30PM *Differential Groups and Factorization of Partial Differential Operators.*
 (1186) **Phyllis J Cassidy**, The City College of New York, and **Michael F Singer***, North Carolina State University (1056-12-605)
- 2:00PM *Infinitesimal differential Galois groups from jet spaces.*
 (1187) **Thomas Scanlon**, University of California, Berkeley (1056-13-839)
- 2:30PM *The Galois group of monodromy evolving deformations.*
 (1188) **Claude Mitschi***, Université de Strasbourg, France, and **Michael F. Singer**, North Carolina State University, Raleigh (1056-34-1144)
- 3:00PM *Spin groups as differential Galois groups.*
 (1189) **Arne Ledet*** and **Lourdes Juan**, Texas Tech University (1056-12-1040)
- 3:30PM *Geometry of differential Tannakian categories.*
 (1190) **Henri Gillet**, University of Illinois at Chicago, **Sergey Gorchinskiy**, Steklov Mathematical Institute, and **Alexey Ovchinnikov***, City University of New York (1056-14-1407)
- 4:00PM *Symmetries of Standard Equations.*
 (1191) **Camilo Sanabria**, The CUNY Graduate Center (1056-34-433)
- 4:30PM *Differential Galois Theory and Darboux Transformations.* Preliminary report.
 (1192) **Primitivo B. Acosta-Humánez**, Universidad Sergio Arboleda (1056-34-638)
- 5:00PM *What can Mathematicians Contribute to Research in Education?*
 (1193) **Hyman Bass*** and **Deborah Loewenberg Ball**, University of Michigan (1056-97-1520)
- 6:00PM *Galois theory of difference equations with difference parameters.*
 (1194) **Benjamin Antieau***, University of Illinois at Chicago, and **Alexey Ovchinnikov**, City University of New York (1056-13-1328)

AMS Special Session on L-Functions and Analytic Number Theory, II

1:00 PM – 5:50 PM

- Organizers: **Alina Bucur**, Institute for Advanced Study
Chantal David, Concordia University
Matilde Lalin, University of Alberta
- 1:00PM *Real quadratic analogues of traces of singular moduli.*
 (1195) **W Duke***, UCLA, **O Imamoglu**, ETH, and **A Toth**, Eotvos Lorand University (1056-11-1067)
- 1:30PM *Periods and L-functions.*
 (1196) **Brooke Feigon**, University of Toronto (1056-11-1086)
- 2:00PM *Periods and central values of quadratic base change L-functions.*
 (1197) **David Whitehouse**, Massachusetts Institute of Technology (1056-11-522)

- 2:30PM *The relative trace formula and average values of L-functions.*
 (1198) **Andrew H. Knightly***, University of Maine, and **Charles Li**, Chinese University of Hong Kong (1056-11-641)
- 3:00PM *Average Frobenius distribution for elliptic curves defined over number fields.*
 (1199) **Ethan C. Smith***, Michigan Technological University, and **Kevin James**, Clemson University (1056-11-789)
- 3:30PM *Nonvanishing of canonical Hecke L-functions for CM number fields.*
 (1200) **Riad Masri*** and **Tonghai Yang**, University of Wisconsin at Madison (1056-11-1363)
- 4:00PM *Higher weight Heegner points.*
 (1201) **Kimberly Hopkins**, University of Texas at Austin (1056-11-824)
- 4:30PM *Euclidean Prime Degree Galois Number Fields.* Preliminary report.
 (1202) **Kevin J McGown**, University of California, San Diego (1056-11-308)
- 5:00PM *Divisibility properties of values of partial zeta functions at non-positive integers.* Preliminary report.
 (1203) **Barry R. Smith**, University of California, Irvine (1056-11-751)
- 5:30PM *Critical zeros of Dirichlet L-functions.* Preliminary report.
 (1204) **J. Brian Conrey**, American Institute of Mathematics (1056-11-677)

AMS Special Session on Recent Advances in Evolution Equations and Applications

1:00 PM – 6:50 PM

- Organizers: **Guoping Zhang**, Morgan State University
Gaston N’Guerekata, Morgan State University
Yi Li, University of Iowa
Wen-Xiu Ma, University of South Florida
- 1:00PM *Circular spectrum and bounded solutions of periodic evolution equations in Banach spaces.*
 (1205) **Gaston M. N’guerekata**, Morgan State University (1056-34-995)
- 1:30PM *Existence and uniqueness of mild solutions to impulsive fractional differential equations.*
 (1206) **Gisèle Mophou**, Université des Antilles et de la Guyane (1056-35-984)
- 2:00PM *Existence of pseudo almost automorphic solutions to some classes of nonautonomous partial evolution equations.* Preliminary report.
 (1207) **Toka Diagana**, Howard University (1056-34-1149)
- 2:30PM *Analytical approaches for solving nonlinear equations.*
 (1208) **Wen-Xiu Ma**, University of South Florida (1056-35-1397)
- 3:00PM *Standing wave solutions of the discrete nonlinear Schrödinger equations with site-dependent nonlinearity.* Preliminary report.
 (1209) **Guoping Zhang**, Morgan State University (1056-35-1341)
- 3:30PM *On Solvability of Initial-Boundary Value Problems for Multi-Weighted Parabolic Systems.* Preliminary report.
 (1210) **Alexander Kozhevnikov**, Univ. of Haifa, Israel (1056-35-24)

- 4:00PM *Front Behavior for Traveling Wave Solutions of a Modified Fisher PDE.*
(1211) **Ronald E Mickens**, Clark Atlanta University (1056-35-400)
- 4:30PM *Blow-up phenomena due to concentrated nonlinear sources in \mathbb{R}^N .*
(1212) **Patcharin Tragoonsirisak**, Fort Valley State University (1056-35-312)
- 5:00PM *Well-posedness and regularity of one phase Hele-Shaw bubble problem.* Preliminary report.
(1213) **Xuming Xie**, Morgan State University (1056-35-85)
- 5:30PM *Multiple Solutions to an Elliptic Problem Related to Vortex Pairs.*
(1214) **Yi Li***, University of Iowa, Xian Jiaotong University, and **Shuangjie Peng**, Central China Normal University (1056-35-1977)
- 6:00PM *L_p Convergence with Rates of Smooth Poisson-Cauchy Type Singular Operators.*
(1215) **George A. Anastassiou*** and **Razvan A Mezei**, University of Memphis (1056-41-37)
- 6:30PM *Operator Valued Measures as Feedback Control for Stochastic Systems on Hilbert Space.*
(1216) **Nasiruddin U Ahmed**, University of Ottawa (1056-49-44)

AMS Special Session on The Mathematics of Information and Knowledge, II

1:00 PM – 5:40 PM

Organizers: **Naoki Saito**, University of California Davis
Ronald R. Coifman, Yale University
James G. Glimm, SUNY at Stony Brook
Peter W. Jones, Yale University
Mauro Maggioni, Duke University
Jared Tanner, University of Edinburgh

- 1:00PM *The Power of Convex Relaxation: Near-optimal Matrix Completion.*
(1217) **Emmanuel Candes***, Stanford University, and **Terence Tao**, University of California, Los Angeles (1056-90-1503)
- ▶ 2:00PM *Challenges in Computational Medicine and Biology.*
(1218) **Donald Geman**, Johns Hopkins University (1056-92-993)
- 3:00PM *A Geometric Perspective on Learning Theory and Algorithms.*
(1219) **Partha Niyogi**, The University of Chicago (1056-68-1536)
- 4:00PM *A multiscale approach to characterize macromolecular dynamics and functions.*
(1220) **Cecilia Clementi**, Department of Chemistry, Rice University (1056-92-1980)
- ▶ 5:00PM *Virtual Surgery: Scientific Computing in Real Time.*
(1221) **Joseph M Teran**, University of California, Los Angeles (1056-65-1802)

MAA-AMS-MER Invited Paper Session on Mathematics and Education Reform, III: Refocusing Algebra: From Middle School to College

1:00 PM – 5:50 PM

Organizers: **William H. Barker**, Bowdoin College
William G. McCallum, University of Arizona
Bonnie S. Saunders, University of Illinois at Chicago

William Haver, Virginia Commonwealth University
Donald B. Small, U.S.M.A.

- 1:00PM *The Chicago Algebra Initiative: A Multi-University Collaboration with the Chicago Public Schools.*
(1222) **Lynn Narasimhan***, DePaul University, and **Paul Sally**, University of Chicago (1056-BC-1346)
- 1:30PM *The Chicago Algebra Initiative: Data and Results.*
(1223) **David C Jabon***, DePaul University, and **Paul J. Sally, Jr.**, University of Chicago (1056-BC-1357)
- 2:00PM *Making the Transition from High School Algebra to College Algebra.*
(1224) **Erick B Hofacker**, University of Wisconsin - River Falls (1056-BC-2053)
- ▶ 2:30PM *MAA/CRAFTY College Algebra Guidelines.*
(1225) **Don Small**, United States Military Academy (1056-BC-1183)
- ▶ 3:00PM *Modeling Based College Algebra at Virginia Commonwealth University.*
(1226) **Bill Haver*** and **Aimee Ellington**, Virginia Commonwealth University (1056-BC-868)
- ▶ 3:30PM *Traversing Bumps Along the Road to a Contemporary College Algebra Curriculum.* Preliminary report.
(1227) **Irene M Haskins**, Husson University, Bangor, Maine (1056-BC-1772)
- 4:00PM *Refocusing and reMODELING College Algebra - A Team Activity.*
(1228) **Erick B Hofacker**, University of Wisconsin - River Falls (1056-BC-2052)
- 4:30PM *Retention Benefits of Refocused College Algebra.*
(1229) **Bernadette F. Turner*** and **Donna Stallings**, Lincoln University, Jefferson City, MO (1056-BC-1761)
- ▶ 5:00PM *Studio College Algebra at Kansas State University.*
(1230) **Andrew G Bennett***, **Rachel B Manspeaker**, **Rekha Natarajan** and **Jennifer Paulhus**, Kansas State University (1056-BC-815)
- 5:30PM *Revitalizing Algebra for First-Year College Students: An Attempt to Change Students' Beliefs and Attitudes.*
(1231) **Barbara E. Edwards**, Oregon State University (1056-BC-1501)

AMS Session on Differential and Difference Equations, IV

1:00 PM – 6:10 PM

- 1:00PM *On Stability of Solutions of Fractional Order SEIR Epidemic Model with Vertical Transmission.* Preliminary report.
(1232) **Elif Demirci*** and **Nuri Ozalp**, Ankara University (1056-34-448)
- 1:15PM *Oscillation of Impulsive Partial Difference Equations with Continuous Variables.*
(1233) **Ravi P. Agarwal**, Florida Institute of Technology, and **Fatma Karakoc***, Ankara University, Turkey (1056-34-492)
- 1:30PM *Analysis and Numerical Solution of a Non-local ODE Motivated by Flutter.*
(1234) **John V. Matthews*** and **Boris P. Belinskiy**, University of Tennessee at Chattanooga (1056-34-496)
- ▶ 1:45PM *Bounded Error Parameter Identification and the Design of Experiments for Models Described by Ordinary Differential Equations.* Preliminary report.
(1235) **Adam Fletcher Childers**, Roanoke College (1056-34-777)

- 2:00PM *Integral inequalities for certain nonlinear systems on time scales.*
(1236) **Mehmet Unal**, Bahcesehir University (1056-34-851)
- 2:15PM *Cyclic Central Configurations in the Four-Body Problem.* Preliminary report.
▶ (1237) **Josep Cors**, Universitat Politècnica de Catalunya, **Glen R. Hall**, Boston University, and **Gareth E. Roberts***, College of the Holy Cross (1056-70-972)
- 2:30PM *Asymptotically Autonomous Differential Inclusions.* Preliminary report.
(1238) **Zhivko S. Athanassov**, Bulgarian Academy of Sciences (1056-34-862)
- 2:45PM *Dynamics of a segmentation clock model with discrete and distributed delays.*
(1239) **Peng Feng**, Florida Gulf Coast University (1056-34-873)
- 3:00PM *Modeling of Electrostatic-Elastic Membrane Systems Motivated by MEMS Devices.*
(1240) **J. Regan Beckham**, University of Texas at Tyler (1056-34-1174)
- 3:15PM *Oscillation criteria for some types of second order nonlinear dynamic equations.*
(1241) **Billur Kaymakalan***, Georgia Southern University, **Ravi P. Agarwal**, Florida Institute of Technology, **Said R. Grace**, Cairo University, and **Wichuta Sae-jie**, Mahidol University, Bangkok (1056-34-1221)
- 3:30PM *Solutions of the Nonlinear Schrödinger Equation with Prescribed Asymptotics at Infinity.* Preliminary report.
▶ (1242) **John Bernard Gonzalez**, Northeastern University (1056-35-1987)
- 3:45PM *Dirichlet forms on Laakso Spaces.*
(1243) **Benjamin Steinhurst**, University of Connecticut (1056-34-1368)
- 4:00PM *Existence of solutions for impulsive integral boundary value problems of fractional order.*
(1244) **Seenith Sivasundaram**, ERAU (1056-34-1434)
- 4:15PM *Models of two-patch predator-prey community dynamics.*
(1245) **Faina Berezovskaya**, Howard University (1056-34-1665)
- 4:30PM *Oscillation criteria for second order dynamic inclusions.*
▶ (1246) **Elvan Akin-Bohner**, Missouri University of Science and Technology (1056-34-1838)
- 4:45PM Break.
- 5:00PM *Mathematical analysis of synchronization of pacemaker cells in mammals.*
▶ (1247) **Menaka B Navaratna***, Florida Gulf Coast University, and **Channa N Navaratna**, Indiana University of Pennsylvania (1056-34-1229)
- 5:15PM *Analysis of radial stagnation flow toward a stretching cylinder.*
(1248) **Antonio Mastroberardino*** and **Joseph E Paultet**, Penn State Erie, The Behrend College (1056-34-1852)
- 5:30PM *Parameter Dependency on the Period of the Solutions for the Duffing Equation with Double-well Potential.* Preliminary report.
▶ (1249) **Ben T Nohara*** and **A Arimoto**, Tokyo City University (1056-34-2043)
- 5:45PM *Conditions for the Existence of a Steady State Solution for a Competition System of Plankton Population.*
(1250) **Chihchien Yu**, University of Arkansas - Fort Smith (1056-37-261)
- 6:00PM *The Change in Electric Potential due to Lightning.*
(1251) **Beyza Aslan***, University of North Florida, and **William Hager**, University of Florida (1056-35-381)

AMS Session on Mathematics Education

1:00 PM – 3:55 PM

- 1:00PM *Why should humanities majors have all the fun?*
▶ (1252) **Jane W Hartsfield**, American University (1056-00-160)
- 1:15PM *What are they thinking? Examining the mathematical disposition of preservice elementary teachers.*
▶ (1253) **Charles Adam Feldhaus**, Ohio University (1056-97-13)
- 1:30PM *Why do children in public and rural primary schools perform worse in mathematics: unresolved questions on equitable access to early childhood education?*
(1254) **A. N. Meremikwu**, University of Calabar Nigeria (1056-97-209)
- 1:45PM *Local Research Experience for Undergraduates YSU in the summer of 2008.* Preliminary report.
▶ (1255) **Jacek Fabrykowski**, Youngstown State University (1056-97-305)
- 2:00PM *Examples of a Mathematical Habit of the Mind and its effect on Students.*
▶ (1256) **Richard Millman**, Georgia Institute of Technology (1056-97-465)
- 2:15PM *Undergraduate Research and Service Learning Projects Developed from Institutional Research Questions.*
▶ (1257) **Maria Zack*** and **Greg Crow**, Point Loma Nazarene University (1056-97-846)
- 2:30PM *Use of ConcepTests and Voting in Upper Division Math Courses.*
▶ (1258) **David O Lomen**, University of Arizona (1056-97-1889)
- 2:45PM *Social Network Surveys in Math and Science Education.*
▶ (1259) **Carole Basile**, **Steve Culpepper**, **Steven Di Lisio***, **Adam Ruff** and **Diana White**, University of Colorado at Denver (1056-97-1914)
- 3:00PM *Mathematics majors' belief about mathematics after taking a methods of proof class and professors' belief about the effectiveness of such a class.*
(1260) **Elsa Medina**, Cal Poly San Luis Obispo (1056-97-2070)
- 3:15PM *Trends in Statistics PhD Graduates.*
(1261) **Pam Arroya*** and **Ashley Swandby**, Department of Statistics, North Carolina State University (1056-00-1595)
- 3:30PM *Unshackling Linear Algebra from Linear Notation.*
▶ (1262) **Elisha Peterson**, United States Military Academy (1056-15-1231)
- 3:45PM *Disruption of Symmetry Creates New Symmetries.* Preliminary report.
▶ (1263) **Robert M. Sulman**, Central Methodist University (1056-00-1232)

AMS Session on Dynamical Systems

1:00 PM – 5:25 PM

- 1:00PM *Computation of Heteroclinic Arcs for Diffeomorphisms of \mathbb{R}^3 .*
▶ (1264) **J. D. Mireles-James***, University of Texas, at Austin, and **Hector Lomeli**, ITAM, Mexico City, Mexico (1056-37-45)

- 1:15PM *Scattering of solitary waves in the Fermi-Pasta-Ulam lattice.* Preliminary report.
(1265) **Aaron Hoffman**, Boston University (1056-37-103)
- ▶ 1:30PM *Semigroups of matrices with dense orbits.*
(1266) Preliminary report.
Mohammad Javaheri, Trinity College (1056-37-137)
- 1:45PM *Mathematical Analysis of Dengue Treatment Model with Variable Viral Load.*
(1267) **Salisu Mohammed Garba**, University of Manitoba (1056-37-293)
- 2:00PM *Model of The Drosophila Circadian Clock: Loop Regulation and Transcriptional Integration.*
(1268) **Hassan M Fathallah-Shaykh***, University of Alabama at Birmingham, and **Jerry L Bona**, University of Illinois at Chicago (1056-37-693)
- 2:15PM Break
- ▶ 2:30PM *Dynamics of semigroups of Moebius transformations.* Preliminary report.
(1269) **Sebastian M Marotta***, University of the Pacific, **David Fried**, Boston University, and **Rich Stankewitz**, Ball State University (1056-37-793)
- ▶ 2:45PM *Towards billiards of the Koch snowflake.*
(1270) Preliminary report.
Robert G. Niemeyer* and **Michel L. Lapidus**, UC Riverside (1056-37-820)
- 3:00PM *Asymptotics of Grow-Up Solutions and Global Attractors for Slowly Non-Dissipative PDEs.*
(1271) Preliminary report.
Nitsan Ben-Gal, Brown University (1056-37-1073)
- 3:15PM *One-parameter interval exchange actions.*
(1272) **Christopher F Novak**, University of Michigan-Dearborn (1056-37-1187)
- 3:30PM *Extreme value theory for some dynamical systems.*
(1273) Preliminary report.
Chinmaya Gupta*, University of Houston, **Mark Holland**, University of Exeter, and **Matthew Nicol**, University of Houston (1056-37-1243)
- 3:45PM *Evolving a Smooth Curve of Initial Conditions Under a Time-Dependent Two-Dimensional ODE.*
(1274) **Paul von Dohlen***, William Paterson University, and **Patrick Miller**, Stevens Institute of Technology (1056-37-1460)
- 4:00PM *Newton diagram methods for analysis of the replicator equation.*
(1275) **Faina Berezovskaya***, Howard University, **Artem Novozhilov** and **Georgy Karev**, National Institutes of Health, Bethesda, MD (1056-37-1686)
- 4:15PM *Speedups of Ergodic Group Extensions.*
(1276) **Andrey Babichev***, California State University, Fresno, and **Adam Fieldsteel**, Wesleyan University (1056-37-1847)
- 4:30PM *Combinatorial Classification of Cubic Polynomials with a fixed Siegel Disk.* Preliminary report.
(1277) **Ross M Ptacek*** and **John C Mayer**, University of Alabama at Birmingham (1056-37-1942)
- 4:45PM *The Maximal Inequality and the Ergodic Theorem for Discrete Hausdorff Means.* Preliminary report.
(1278) **Constantine Georgakis**, DePaul University (1056-37-1994)
- 5:00PM *Renormalization and lower-dimensional Brjuno invariant tori of Hamiltonian systems.*
(1279) **Sasa Kocic***, University of Toronto, and **Hans Koch**, University of Texas at Austin (1056-37-2021)
- 5:15PM *Symbolic Dynamics for Nonhyperbolic Systems.*
(1280) **David Richeson***, Dickinson College, and **Jim Wiseman**, Agnes Scott College (1056-58-1811)

AMS Session on Computational Mathematics, II

1:00 PM – 5:40 PM

- 1:00PM *Reconstructing physical parameters in systems of reaction-diffusion equations in electrocardiology.*
(1281) **Yuan He*** and **David E Keyes**, Department of Applied Physics and Applied Mathematics, Columbia University (1056-65-1058)
- ▶ 1:15PM *Truncated Incomplete Hessian Newton Minimization with Application to Biomolecular Potential Energy Function.*
(1282) **Mazen George Zarrouk*** and **Dexuan Xie**, University of Wisconsin - Milwaukee (1056-65-1125)
- ▶ 1:30PM *Fast Solvers for Models of Steady Fluid Flow.*
(1283) **P. A. Lott***, National Institute of Standards & Technology, and **H. C. Elman**, University of Maryland, College Park (1056-65-1182)
- ▶ 1:45PM *Fighting Gibbs' phenomenon through quotienting.*
(1284) Preliminary report.
Jean-Paul Berrut, University of Fribourg, Switzerland (1056-65-1185)
- ▶ 2:00PM *Numerical solutions of fourth order boundary value problems using Bernoulli polynomials.* Preliminary report.
(1285) **Md Shafiqul Islam**, University of Dhaka (1056-65-1223)
- ▶ 2:15PM *Solving two-dimensional linear and nonlinear Volterra integral equations by the differential transform method.*
(1286) **Jang Bongsoo**, Ulsan National Institute of Science and Technology (UNIST) (1056-45-1025)
- 2:30PM *Signal Fraction Analysis with Constraints and Extensions.*
(1287) **Fatemeh Emdad***, The University of Texas Medical Branch, and **Michael Kirby**, Colorado State University (1056-00-1188)
- 2:45PM *Reduced Basis Element Method for 2D Maxwell's Problem.*
(1288) **Yanlai Chen***, **Jan S. Hesthaven**, Brown University, and **Yvon Maday**, Brown University and Paris 6 (1056-65-1298)
- ▶ 3:00PM *Model and Optimization of Organic Photovoltaic Cells.*
(1289) **Amelia McNamara***, Macalester College, **Jordan Seering**, University of Minnesota-Twin Cities, and **Yi Zeng**, University of Illinois at Urbana-Champaign (1056-65-1301)
- 3:15PM *Higher order Strang split integral deferred correction methods for Vlasov equations.*
(1290) Preliminary report.
Andrew Christlieb, **Maureen Morton***, Michigan State University, and **Jing-Mei Qiu**, Colorado School of Mines (1056-65-1345)
- 3:30PM *Computing Laser Ablation by a Finite-Volume Method.*
(1291) **Sean Cohen***, **Alina Chertock**, North Carolina State University, **V. A. Trofimov** and **I. A. Shirokov**, Moscow State University (1056-65-1418)
- 3:45PM Break
- 4:00PM *A Discontinuous Galerkin Solver for Full-Band Boltzmann-Poisson Models.*
(1292) **Yingda Cheng***, **Irene M Gamba**, University of Texas at Austin, **Armando Majorana**, Università di Catania, and **Chi-Wang Shu**, Brown University (1056-65-1490)

- 4:15PM *Reconstruction of thin tubular inclusions in three-dimensional domains using electrical impedance tomography.*
Roland Griesmaier, University of Delaware (1056-65-1548)
- 4:30PM *Delaunay refinement methods for FSI systems undergoing changes in topological properties.* Preliminary report.
Edward W. Swim, United States Military Academy (1056-65-1713)
- 4:45PM *Resilient Modulus Modeling with information theory approach.*
Ali S. Shaqlaih*, **Luther White** and **Musharraf Zaman**, University of Oklahoma (1056-65-1780)
- ▶ 5:00PM *Numerical Study of a Quantum Memory Model.* Preliminary report.
Charles N. Cook*, Alma College, and **Maria Emelianenko**, George Mason University (1056-65-1781)
- ▶ 5:15PM *Domain decomposition method for solving three-dimensional parabolic partial differential equations.*
Younbae Jun, University of West Alabama (1056-65-1873)
- 5:30PM *The Rapid Advance and Slow Retreat of a Mushy Zone.* Preliminary report.
Nicholas Gewecke* and **Tim Schulze**, University of Tennessee, Knoxville (1056-86-269)

AMS Session on Functional Analysis and Operator Theory, II

1:00 PM – 5:40 PM

- 1:00PM *Weighted Composition Operators from H^∞ to the Bloch Space of a Bounded Homogeneous Domain.* Preliminary report.
Robert F. Allen*, University of Wisconsin – La Crosse, and **Flavia Colonna**, George Mason University (1056-47-309)
- 1:15PM *Eigenvalues for Perturbations of Densely Defined Linear Maximal Monotone Operators.* Preliminary report.
Dhruba R Adhikari*, Mississippi University for Women, and **Athanassios G Kartsatos**, University of South Florida (1056-47-577)
- 1:30PM *An induced diffusion distance.* Preliminary report.
Maxim J. Goldberg, Ramapo College of NJ, and **Seonja Kim***, SUNY Rockland Community College (1056-47-1005)
- 1:45PM *The Generalized Degree for Multifunctions Perturbations of Maximal Monotone Operators and Applications.*
Boubakari Ibrahimou, Murray State University (1056-47-1008)
- ▶ 2:00PM *Spectral Analysis of Conjugate Self-Adjoint Operators.* Preliminary report.
Zhong Wang*, Zhaoqing University, and **Hongyou Wu**, NIU (1056-47-1099)
- 2:15PM Break.
- 2:30PM *Kinds of pseudomonotonicity in study of variational inequalities.*
Dan D. Pascali, Courant Institute, New York University (1056-47-1142)
- 2:45PM *Fixed Point Composition C^* -algebras.*
Katie Spurrier Quertermous, University of Virginia (1056-47-1165)
- 3:00PM *Function theory on a quantum domain.*
Meghna Mittal, University of Houston (1056-47-1375)

- 3:15PM *Topology of invariant subspace lattice of shift operators in higher dimensions.*
Shonia Giorgi, Ohio University Lancaster (1056-47-1399)
- 3:30PM *Quantum analog of Donoho-Stark Uncertainty Principle.*
Genady Grabarnik, York College, CUNY, NY (1056-47-1451)
- 3:45PM *Convex and Nonsmooth Analysis of Minimal Time Functions in Banach Spaces.*
Mau Nam Nguyen, University of Texas-Pan American (1056-49-421)
- 4:00PM *Crossed Products by Automorphisms with the Tracial Quasi-Rokhlin Property.*
Julian Michael Buck, University of Oregon (1056-47-1754)
- 4:15PM *n -symmetric Linear Transformations and von Neumann algebras.* Preliminary report.
Mark Stankus, California Polytechnic State University Of San Luis Obispo (1056-47-1853)
- 4:30PM *Computing the C^* -algebra of an inverse semigroup with the Munn representation.*
David Milan, University of Texas at Tyler (1056-47-2107)
- 4:45PM *Recursive Decomposition of a C^* -subalgebra of $C^*(R, X)$.* Preliminary report.
Hutian Liang, University of Oregon (1056-47-2124)
- 5:00PM *On the Nonpositive Solution of the Nonlinear Inverse Autoconvolution Problem.*
Z Dai*, Alma College, and **P K Lamm**, Michigan State University (1056-45-1010)
- ▶ 5:15PM *Good Lambda Inequality and Riesz potentials for Non Doubling Measures in \mathbb{R}^n .* Preliminary report.
Mukta B. Bhandari, Kansas State University (1056-42-709)
- 5:30PM *Generalized Convolution Systems: Axioms and Properties.*
Adam W Parr, University of the Virgin Islands (1056-43-1816)

MAA Session on Arts and Mathematics, I

1:00 PM – 5:55 PM

- Organizer: **Douglas E. Norton**, Villanova University
- ▶ 1:00PM *A Brief Study of Modularity in Mosaic Designs.*
Reza Sarhangi, Towson University (1056-C1-301)
- ▶ 1:20PM *Conformal Models of Hyperbolic Geometry.* Preliminary report.
Vladimir L. Bulatov, Corvallis, OR (1056-C1-950)
- ▶ 1:40PM *Exploring Chaotic Patterns in Chinese Landscape Paintings by Structural Cloning Method.* Preliminary report.
Mingjang Chen, Center for General Education, National Chiao-Tung University (1056-C1-177)
- ▶ 2:00PM *The Joy of the Curve.*
Susan A. McBurney, Western Springs, Illinois (1056-C1-299)
- ▶ 2:20PM *Empirical Origin of the Design Concepts and the Euclidean Geometry.*
Fatma Mete*, Department of Fiber Science and Apparel Design, Cornell University, and **Osman Yurekli**, Ithaca College (1056-C1-1580)
- ▶ 2:40PM *Projective Geometry and The Art of The Renaissance.*
Meighan I. Dillon, Southern Polytechnic State University (1056-C1-461)

- 3:00PM *Modular Perspective in The Music Lesson by Vermeer*. Preliminary report.
▶ (1323) **Helmer Aslaksen**, National University of Singapore (1056-C1-591)
- 3:20PM *Digital roots, Vedic multiplication and Fibonacci numbers*.
(1324) **Fatma Mete**, Cornell University, and **Yurekli Osman***, Ithaca College (1056-C1-1457)
- 3:40PM *Dancing in Mathematical Circles*.
▶ (1325) **Karl H. Schaffer**, De Anza College, Dr. Schaffer and Mr. Stern Dance Ensemble (1056-C1-2010)
- 4:00PM *Dancing and Groups: An Active Activity*. Preliminary report.
▶ (1326) **Melanie Anne Pivarski**, Roosevelt University (1056-C1-749)
- 4:20PM *The Great Calculus II Art Contest*.
(1327) **Pedro Teixeira**, Knox College (1056-C1-2011)
- 4:40PM *Measuring Complexity of d-Note Pitch Collections Within a c-Note Chromatic Universe*.
▶ (1328) **Joshua P. Case**, University of Maine at Farmington (1056-C1-1246)
- 5:00PM *A Mathematical Tour of Baltimore*.
▶ (1329) **Robert Edward Lewand**, Goucher College (1056-C1-157)
- 5:20PM *The topology of Jorge Luis Borges' Library of Babel*.
(1330) **William Goldbloom Bloch**, Wheaton College (1056-C1-872)
- 5:40PM *Once upon a time there was ... A epistemological "fable" of music and mathematics*.
▶ (1331) **Rosanna Iembo***, International Institute of Informatics and Systems, Orlando, Florida, USA; University of Calabria, Italy, and **Irene Iaccarino**, Crotone, Italy (1056-C1-1020)
- 1:45PM *Can Instructors Award Partial Credit on Multiple Choice Questions?*
(1337) **Janet L. Braunstein*** and **Edward W. Swim**, United States Military Academy at West Point (1056-Z1-1992)
- 2:00PM *Refocused College Algebra at Harris-Stowe State University*. Preliminary report.
▶ (1338) **Ann Podleski**, Harris-Stowe State University (1056-Z1-2042)
- 2:15PM *The Impact of Additional Mathematics Support on Student Performance*.
(1339) **Ciarán Mac an Bhaird*** and **Ann O'Shea**, National University of Ireland Maynooth (1056-Z1-2119)
- 2:30PM *History of The Return of Applications in Undergraduate Mathematics in the United States*.
▶ (1340) **Walter Meyer**, Adelphi University (1056-Z1-357)
- 2:45PM *50 years of College Math. Have I learned anything?*
▶ (1341) Preliminary report.
Bryan V. Hearsey, Lebanon Valley College (1056-Z1-368)
- 3:00PM *One of the first mathematical texts of the Jewish Bookcase*.
(1342) **Greisy Winicki Landman**, Cal Poly Pomona (1056-Z1-288)
- 3:15PM *New Materials on History of Mathematics*.
▶ (1343) **Satish C. Bhatnagar**, University of Nevada Las Vegas (1056-Z1-1712)
- 3:30PM *Mathematicians Card and Poster*. Preliminary report.
▶ (1344) **Sang-Gu Lee** and **Kyung-Won Kim***, Sungkyunkwan University (1056-Z1-1517)
- 3:45PM *The Elements of Euclid*.
▶ (1345) **Meighan I. Dillon**, Southern Polytechnic State University (1056-Z1-456)
- 4:00PM *British Royal Society: A Fraternity of Experimentalists*.
▶ (1346) **Donna M Pierce**, Whitworth University (1056-Z1-354)
- 4:15PM *History as a meaning-making tool: Illuminating prospective mathematics teachers' knowledge of algebra*.
(1347) **Kathleen M Clark**, Florida State University (1056-Z1-1440)
- 4:30PM *Winifred Edgerton Merrill—She Opened Doors*.
▶ (1348) **Susan E. Kelly***, University of Wisconsin- La Crosse, and **Sarah Rozner**, University of Northern Colorado (1056-Z1-1817)
- 4:45PM *Mihailo Petrovic and his interval mathematics*.
▶ (1349) Preliminary report.
Radoslav M. Dimitric, Pittsburgh (1056-Z1-127)
- 5:00PM *The Orthogonal Tower for $\Sigma^\infty \text{Emb}(\coprod_m D^n, V)$* .
(1350) Preliminary report.
Nicholas Hamblet, University of Virginia (1056-Z1-1597)
- 5:15PM *Well Behaved Rotation About Planar Non-linear Curves: An analysis of the volume and uniqueness of a solid swept out by rotation about a non-linear axis*. Preliminary report.
▶ (1351) **Adam V Lewicki*** and **Robert Whitton**, Davidson College (1056-Z1-1543)
- 5:30PM *Three Simple Questions about Tetrahedra*.
▶ (1352) Preliminary report.
Charles Waiveris, Central Connecticut State University (1056-Z1-1081)
- 5:45PM *Why Automobile Sunshades Fold Oddly: An Intruiging Application of Topology*.
▶ (1353) **Curtis Feist***, Southern Oregon University, and **Ramin Naimi**, Occidental College (1056-Z1-1355)

MAA Session on Undergraduate Mathematical Biology, II

1:00 PM – 1:35 PM

Organizers: **Timothy D. Comar**, Benedictine University
Raina S. Robeva, Sweet Briar College

- 1:00PM *Predictive Modeling in Quantitative Biology*.
▶ (1332) **Jeff R Knisley**, East Tennessee State University (1056-Q5-1531)
- 1:20PM *Modeling the Spread of Disease in Undergraduate Microbiology*.
▶ (1333) **Angela B. Shiflet*** and **George W Shiflet**, Wofford College (1056-Q5-1988)

MAA Session on General Contributed Papers, VIII

1:00 PM – 5:55 PM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- 1:00PM *SIGMAA-QL 2009 Quantitative Literacy Survey: Preliminary Results*. Preliminary report.
▶ (1334) **Milo Schield**, Augsburg College (1056-Z1-1088)
- 1:15PM *Teaching a Senior Seminar in Humanistic Mathematics*.
(1335) **Sarah J Greenwald*** and **Eric Marland**, Appalachian State University (1056-Z1-182)
- 1:30PM *Reflection Papers on the Big Ideas*.
▶ (1336) **Jeremy Case**, Taylor University (1056-Z1-1448)

MAA Session on Philosophy of Mathematics for Working Mathematicians

1:00 PM – 4:45 PM

Organizers: **Bonnie Gold**, Monmouth University
Carl Behrens, Alexandria, Virginia

- ▶ 1:00PM (1354) *What Is the Character of Mathematical Law?*
James R Henderson, University of Pittsburgh at Titusville (1056-M5-259)
- ▶ 1:30PM (1355) *John Stuart Mill's "Pebble Arithmetic" and the Nature of Mathematical Objects.*
Carl E. Behrens, Alexandria, VA (1056-M5-596)
- ▶ 2:00PM (1356) *Dummett Down: Intuitionism and Mathematical Existence.* Preliminary report.
Thomas Drucker, University of Wisconsin-Whitewater (1056-M5-1635)
- ▶ 2:30PM (1357) *The Articulation of Mathematics—A Pragmatic/Constructive Approach to The Philosophy of Mathematics.* Preliminary report.
Martin E Flashman, Humboldt State University (1056-M5-1771)
- ▶ 3:00PM (1358) *Molyneux's Problem.* Preliminary report.
Lawrence A. D'Antonio, Ramapo College of New Jersey (1056-M5-445)
- ▶ 3:30PM (1359) *Mathematical practice and the philosophy of mathematics.* Preliminary report.
Jeff Buechner, Dept. Philosophy; Rutgers University-Newark and The Saul Kripke Center, CUNY, The Graduate Center (1056-M5-1015)
- ▶ 4:00PM (1360) *Being a Realist Without Being a Platonist.* Preliminary report.
Daniel C. Sloughter, Furman University (1056-M5-444)
- ▶ 4:30PM (1361) *An analysis of the notion of natural number.*
Ruggero Ferro, University of Verona, Italy (1056-M5-1918)

MAA Session on Publishing Mathematics on the Web

1:00 PM – 5:15 PM

Organizers: **Thomas E. Leathrum**, Jacksonville State University
William F. Hammond, The University at Albany
Kyle T. Siegrist, University of Alabama in Huntsville

- ▶ 1:00PM (1362) *A multimedia document workflow using docutils.* Preliminary report.
Matthew Leingang, New York University (1056-N5-630)
- ▶ 1:20PM (1363) *Displaying Mathematics with Plain HTML.*
Claus Schubert, SUNY Cortland (1056-N5-341)
- ▶ 1:40PM (1364) *The Importance of Good Source Markup.*
William F. Hammond, University at Albany (SUNY) (1056-N5-712)
- ▶ 2:00PM (1365) *Customizing and Extending Content MathML.* Preliminary report.
Kyle T Siegrist, University of Alabama in Huntsville (1056-N5-1662)
- ▶ 2:20PM (1366) *Math Authoring for the Web Made Easier.*
Thomas E Leathrum, Jacksonville State University (1056-N5-547)
- ▶ 2:40PM (1367) *An RIA Approach to Web Mathematics.*
Donald W. DeLand, Integre Technical Publishing (1056-N5-1809)

- ▶ 3:00PM (1368) *Textbooks as Sage Notebooks.*
Robert A Beezer, University of Puget Sound (1056-N5-1050)
- ▶ 3:20PM (1369) *MathJax: a JavaScript-based engine for including TeX and MathML in HTML.*
Davide P Cervone, Union College (1056-N5-1947)
- ▶ 3:40PM (1370) *WebKit + MathML.*
R. Alexander Milowski, San Francisco, CA (1056-N5-1505)
- ▶ 4:00PM (1371) *MathType, Math Markup, and the Goal of Cut and Paste.*
Robert R Miner, Design Science, Inc. (1056-N5-1504)
- ▶ 4:20PM (1372) *MathML 3.0.*
Patrick D. F. Ion, Mathematical Reviews / AMS (1056-N5-1271)
- ▶ 4:40PM (1373) *Revising the MSC (Mathematics Subject Classification).*
Patrick D. F. Ion, Mathematical Reviews / AMS (1056-N5-1278)
- ▶ 5:00PM (1374) *Tiddly Geometry.* Preliminary report.
Patrick D. F. Ion, Mathematical Reviews / AMS (1056-N5-1262)

MAA Session on Research on the Teaching and Learning of Undergraduate Mathematics, I

1:00 PM – 4:55 PM

Organizers: **Keith Weber**, Rutgers University
Stacy Brown, Pitzer College
Natasha A. Speer, University of Maine
Karen A. Marrongelle, Portland State University

- ▶ 1:00PM (1375) *Appropriating New Definitions: The Case of Lipschitz Functions.*
Jessica L Knapp, Pima Community College (1056-P5-1952)
- ▶ 1:40PM (1376) *Undergraduate students' assessment of the persuasiveness of mathematical arguments: Beyond private and public senses of conviction.*
Juan Pablo Mejia Ramos*, Rutgers University, and **Matthew Inglis**, Loughborough University (1056-P5-1350)
- ▶ 2:20PM (1377) *A design of instructional interventions for the resolution of cognitive dissonance in an advanced calculus class.*
Kyeong Hah Roh, Arizona State University (1056-P5-2068)
- ▶ 2:40PM (1378) *Between construction and communication: What goes into revising a proof?* Preliminary report.
Yvonne Lai*, University of Michigan, and **Keith H Weber**, Rutgers University (1056-P5-1343)
- ▶ 3:00PM (1379) *Examples, Uncertainty, & Skepticism: An Examination of the Underpinnings of An Intellectual Need for Proof.*
Stacy A. Brown, Pitzer College (1056-P5-1488)
- ▶ 3:20PM (1380) *Understanding mathematical proofs: What does it mean and how can it be assessed?* Preliminary report.
Evan Fuller*, Montclair State University, **Keith Weber**, **Pablo Mejia-Ramos**, **Kathryn Rhoads**, Rutgers, **Robert Search**, Centenary College, and **Aron Samkoff**, Rutgers (1056-P5-753)
- ▶ 3:40PM (1381) *Clarifying the Stages of Mathematical Defining: Gestation and Presentation.*
Paul Christian Dawkins, University of Texas at Arlington (1056-P5-1151)

- 4:00PM *Examining Undergraduate Students' Reading and Use of Mathematics Textbooks.*
 ► (1382) **Angie Hodge*** and **Ryan Hiltner**, North Dakota State University (1056-P5-2022)
- 4:20PM *An Example of a Non-traditional Pedagogy in an Abstract Algebra Class: What is the effect on student motivation?*
 ► (1383) **Tim Fukawa-Connelly**, University of New Hampshire (1056-P5-184)
- 4:40PM *The role of e-assessment in student learning in mathematics.* Preliminary report.
 ► (1384) **Douglas Quinney**, University of Keele, UK (1056-P5-32)

SIAM Minisymposium on Graph Theory, II

1:00 PM – 5:55 PM

Organizers: **Andre Kundgen**, California State University San Marcos

Hal Kierstead, Arizona State University

- 1:00PM *Equitable list coloring of graphs with low maximum degree.* Preliminary report.
 (1385) **H. A. Kierstead**, Arizona State University, and **A. V. Kostochka***, University of Illinois at Urbana-Champaign (1056-05-723)
- 1:30PM *Hamiltonian Square Cycle in Ore-type Graphs.*
 (1386) **Phong Q Chau**, Arizona State University (1056-05-1511)
- 2:00PM *Tiling in Multipartite Graphs.*
 (1387) **Ryan Martin**, Iowa State University (1056-05-333)
- 2:30PM *Decompositions of graphs and hypergraphs.*
 ► (1388) **Sebastian M Cioabă**, University of Delaware (1056-05-1146)
- 3:00PM *Distributed algorithms and graph theory.*
 (1389) **Andrzej Czygrinow**, Arizona State University (1056-68-908)
- 3:30PM *Adjacency Posets of Planar Graphs.*
 (1390) **Stefan Felsner**, **Chingman Li**, Institut für Mathematik, Technische Universität Berlin, and **William T. Trotter***, Georgia Institute of Technology (1056-05-1582)
- 4:00PM *On extremal problems in a Boolean lattice.* Preliminary report.
 (1391) **Maria Axenovich***, **Jacob Manske** and **Ryan Martin**, Iowa State University (1056-05-1254)
- 4:30PM *Maker-Breaker Games: Building a Big Chain in a Poset.*
 (1392) **Daniel Cranston***, Virginia Commonwealth University, **Bill Kinnarsley**, **Kevin Milans**, **Greg Puleo** and **Douglas West**, University of Illinois, Urbana-Champaign (1056-05-441)
- 5:00PM *Degree Ramsey Numbers of Graphs.* Preliminary report.
 ► (1393) **Tao Jiang**, Miami University, Ohio, **Bill Kinnarsley**, **Kevin G. Milans*** and **Douglas B. West**, University of Illinois at Urbana-Champaign (1056-05-558)
- 5:30PM *Spanning cycles through specified edges in bipartite graphs.*
 (1394) **Reza Zamani** and **Douglas B. West***, University of Illinois (1056-05-955)

NAM Granville-Brown-Hayes Session of Presentations by Recent Doctoral Recipients in the Mathematical Sciences

1:00 PM – 3:25 PM

Organizer: **Dawn Lott**, Delaware State University

- 1:00PM *Liquidation of a large block of stock with regime switching.*
 (1395) **Moustapha N. Pemy***, Towson University, **Q Zhang**, University of Georgia, and **G Yin**, Wayne State University (1056-49-469)
- 1:30PM *Third Graders' Strategies and Preferences for Solving Arithmetic Problems: A Gender Difference Study.*
 ► (1396) **Nicola D. Edwards-Omolewa**, Delaware State University (1056-97-702)
- 2:00PM *Parametric Copula Models for Markovian Processes, for African-American Male Career Heuristics.*
 (1397) **Kobi A. Abayomi***, Georgia Institute of Technology, School of Industrial Engineering - Statistics Group, **Lee Hawkins**, Wall Street Journal/CNBC, and **Kenneth Land**, Duke University (1056-62-1026)
- 2:30PM *Calculating target Cataract Surgical Rates for Africa.*
 ► (1398) **Talithia D Williams**, Harvey Mudd College (1056-62-1374)
- 3:00PM *Brownian motion indexed by a time scale and its applications.*
 (1399) **Suman Sanyal**, Marshall University (1056-60-1340)

AMS-MAA Committee on Teaching Assistants and Part-Time Instructors Panel Discussion

1:00 PM – 3:00 PM

Becoming a teacher of college mathematics: Video cases for novice college mathematics instructor professional development.

Organizers: **John D. Eggers**, University of California San Diego

Shandy Hauk, University of Northern Colorado

Mark K. Davis, University of Northern Colorado

Eric Hsu, San Francisco State University

Natasha M. Speer, University of Maine

Panelists: **Eric Hsu**

David E. Meel, Bowling Green State University

Natasha M. Speer

AMS Session on Algebras, I

1:15 PM – 5:55 PM

- 1:15PM *Idempotents and Annihilators in Endomorphism Rings of Modules.* Preliminary report.
 (1400) **Gangyong Lee***, The Ohio State University, **S. Tariq Rizvi** and **Cosmin S. Roman**, The Ohio State University at Lima (1056-16-112)
- 1:30PM *On dualizing the notion of slenderness.* Preliminary report.
 (1401) **Radoslav M. Dimitric**, Pittsburgh (1056-16-129)
- 1:45PM *Rings and Covered Groups.* Preliminary report.
 (1402) **G. Alan Cannon**, Southeastern Louisiana University, **C. J. Maxson**, Texas A&M University, and **Kent M. Neuerburg***, Southeastern Louisiana University (1056-16-412)
- 2:00PM *Indecomposable division algebras over function fields of smooth p-adic curves.*
 ► (1403) **Feng Chen**, Emory University (1056-16-998)
- 2:15PM Break
- 2:30PM *On skew power series rings.* Preliminary report.
 (1404) **Linhong Wang**, Southeastern Louisiana University (1056-16-1353)

- 2:45PM *A decomposition of the Dynkin idempotent in the Hopf algebra of graphs.* Preliminary report.
(1405) **Forest Fisher*** and **William Schmitt**, The George Washington University (1056-16-1369)
- 3:00PM *Unit-regular Skew Group Rings.*
(1406) **Kathi Crow**, American University in Cairo (1056-16-1563)
- 3:15PM *A combinatorial approach to the description of endomorphism rings.* Preliminary report.
▶ (1407) **Jose A. Velez-Marulanda**, University of Iowa (1056-16-1656)
- 3:30PM *Action of the symmetry group of the n -dimensional hypercube on the algebra associated to the Hasse graph of the n -cube.* Preliminary report.
(1408) **Colleen Duffy**, University of Wisconsin - Eau Claire (1056-16-1814)
- 3:45PM Break
- 4:00PM *Periodicity of quadratic differential equations in nonassociative algebras and dimensions of subalgebras.*
(1409) **Nora C. Hopkins**, Indiana State University (1056-17-120)
- 4:15PM *On Demazure Crystals of $U_q(\widehat{\mathfrak{sl}}(n))$.*
(1410) **Julie C Beier**, Mercer University (1056-17-183)
- 4:30PM *Nilpotent Orbit Theory and Infinitesimal Blocks of Parabolic Category \mathcal{O} .* Preliminary report.
(1411) **Kenyon J Platt***, Brigham Young University, and **Bobbe J Cooper**, University of Minnesota (1056-17-245)
- 4:45PM *Properties of the Frattini Subalgebra in a Lie algebra.* Preliminary report.
(1412) **Kristen Stagg**, North Carolina State University (1056-17-363)
- 5:00PM *Multipliers of Lie Algebras of Maximal Class.* Preliminary report.
(1413) **Lindsey R Bosko**, North Carolina State University (1056-17-364)
- 5:15PM *Blocked and Group-Graded Matrix Constructions from Directed Graphs.* Preliminary report.
(1414) **Kenneth L Price*** and **Stephen Szydlík**, University of Wisconsin Oshkosh (1056-17-801)
- 5:30PM *Multipliers for the Nilpotent Series of Strictly Upper Triangular Matrices.* Preliminary report.
(1415) **Louis A. Levy**, Millersville University (1056-17-1729)
- 5:45PM *Tiling spaces and the Baum Connes Conjecture.* Preliminary report.
(1416) **Semai Ulgen Yildirim**, Northwestern University (1056-19-559)
- 2:00PM *What I Learned about Using Online Homeworks from Student Feedback.*
▶ (1418) **Laura A. McSweeney**, Fairfield University (1056-M1-1170)
- 2:20PM *Increasing Student Success Using Online Homework.* Preliminary report.
▶ (1419) **Tina Alves Mancuso**, The Sage Colleges (1056-M1-1611)
- 2:40PM *Using WeBWork in Linear Algebra.*
(1420) **Thomas R Hagedorn*** and **Karen Clark**, The College of New Jersey (1056-M1-1706)
- 3:00PM *Using Online Homework and Data Mining to Assess Student Learning in Mathematics Courses.* Preliminary report.
▶ (1421) **Michael B Scott**, California State University, Monterey Bay (1056-M1-2044)
- 3:20PM *Online Homework—Does It Work?* Preliminary report.
▶ (1422) **Ronnie P Crane**, Hawaii Pacific University (1056-M1-2071)
- 3:40PM *The Utilization of Discussion Boards for Homework in an Interactive Delivery Course: Linear Algebra and Differential Equations.*
▶ (1423) **Stephanie A. Swainston*** and **Brynja R. Kohler**, Utah State University (1056-M1-1862)
- 4:00PM *Implementing Online Homework and Quizzes in a Pre-Calculus Course: Challenges and Rewards.* Preliminary report.
(1424) **Ann E Moskol**, Rhode Island College (1056-M1-2029)
- 4:20PM *Common Innovative Uses of Online Homework Systems WeBassign, MyMathLab, and WebWork.* Preliminary report.
▶ (1425) **Semai Ulgen Yildirim**, Northwestern University (1056-M1-1841)
- 4:40PM *The “Third Wave” of WeBWork Assessment.* Preliminary report.
▶ (1426) **Vicki J Roth***, University of Rochester, and **Flora McMartin**, Broad-Based Knowledge, LLC (1056-M1-1163)

MAA Minicourse #11: Part B

2:15 PM – 4:15 PM

The mathematics of Islam and its use in the teaching of mathematics.

Organizer: **Victor J. Katz**, University of the District of Columbia

MAA Minicourse #12: Part B

2:15 PM – 4:15 PM

Learning discrete mathematics via historical projects.

Organizers: **Jerry M. Lodder**, New Mexico State University
Guram Bezhaniashvili, New Mexico State University
David Pengelley, New Mexico State University

MAA Minicourse #6: Part B

2:15 PM – 4:15 PM

Developing departmental self-studies.

Organizers: **Donna L. Beers**, Simmons College
Nancy Baxter Hastings, Dickinson College

ASL Invited Address

2:00 PM – 2:50 PM

- (1417) *Randomness and computational strength.*
Joseph S. Miller, University of Wisconsin-Madison (1056-03-71)

MAA Session on Online Homework—Innovation and Assessment, III

2:00 PM – 4:55 PM

Organizers: **Michael E. Gage**, University of Rochester
Arnold K. Pizer, University of Rochester
Vicki Roth, University of Rochester

Rocky Mountain Mathematics Consortium Board of Directors Meeting

2:15 PM – 4:10 PM

MAA Presentations by Teaching Award Recipients

2:30 PM – 4:00 PM

Organizers: **Martha J. Siegel**, Towson University
David M. Bressoud, Macalester College

- ▶ 2:30PM (1427) *What we are doing at BYU to increase the number of students taking mathematics courses and becoming math majors.*
Michael Dorff, Brigham Young University (1056-A0-623)
- ▶ 2:30PM (1428) *Ask Good Questions.*
Allan J. Rossman, California Polytechnic State University - San Luis Obispo (1056-A0-767)
- ▶ 2:30PM (1429) *Lessons learned in the teaching and learning of mathematics.*
Curtis D. Bennett, Loyola Marymount University (1056-A0-1339)

AMS Committee on Science Policy Panel Discussion

2:30 PM – 4:00 PM

Evaluation of the NSF's VIGRE program.

MAA Poster Session on Research by Undergraduate Students

2:30 PM – 4:00 PM

Judging of all posters will take place during this time.

ASL Invited Address

3:00 PM – 3:50 PM

- (1430) *Bar-recursive interpretations of classical analysis.*
Fernando J. Ferreira, Universidade de Lisboa (1056-03-69)

MAA Session on Mathematics and Sports, I

3:20 PM – 3:55 PM

Organizer: **Howard L. Penn**, U.S. Naval Academy

- ▶ 3:20PM (1431) *How Game Players Get Ranked—The Mathematics of Elo Ratings.* Preliminary report.
Maryam Vulis, USMA Prep School (1056-H5-996)
- 3:40PM Discussion

AMS Session on Discrete Mathematics, V

3:45 PM – 6:25 PM

- 3:45PM (1432) *Lower bounds in minimum rank problems.*
Lon H Mitchell*, Virginia Commonwealth University, **Sivaram K Narayan**, Central Michigan University, and **Andy Zimmer**, University of Illinois (1056-05-903)
- 4:00PM (1433) *C-sets in an uncountable semigroup.* Preliminary report.
John H. Johnson, Howard University (1056-05-905)
- 4:15PM (1434) *The Rees Product with a Poset or its Dual Poset.*
Tricia Muldoon Brown*, Armstrong Atlantic State University, and **Margaret Readdy**, University of Kentucky (1056-05-910)

- 4:30PM (1435) *Permutations with Ascending and Descending Blocks.*
Jacob N Steinhardt, Massachusetts Institute of Technology (1056-05-979)
- 4:45PM (1436) *Generalized Oval Derivation.*
Timothy L Vis, University of Colorado Denver (1056-05-997)
- ▶ 5:00PM (1437) *Potential-Based Strategies for Breaker for Maker-Breaker Tic-Tac-Toe on the Integer Lattice with Numerous Directions.*
Klay Kruczek*, Western Oregon University, and **Eric Sundberg**, Occidental College (1056-91-1917)
- 5:15PM (1438) *A winning strategy for Maker in the Maker-Breaker version of Tic-Tac-Toe on the integer lattice with numerous winning line directions.*
Eric Sundberg*, Occidental College, and **Klay Kruczek**, Western Oregon University (1056-05-1951)
- 5:30PM (1439) *Extremal functions of excluded block permutation matrices.*
Adam C Hesterberg, Princeton University (1056-05-1113)
- 5:45PM (1440) *The (1, 2)-step competition graph of a tournament.*
Sarah K. Merz*, University of the Pacific, and **Kim A. S. Factor**, Marquette University (1056-05-795)
- ▶ 6:00PM (1441) *Elements in unavoidable minors of 3-connected binary matroids.* Preliminary report.
Deborah A Chun, Louisiana State University (1056-05-1277)
- ▶ 6:15PM (1442) *A degree condition for spanning cycles in bipartite graphs.*
Louis DeBiasio*, **Andrzej Czygrinow** and **H. A. Kierstead**, Arizona State University (1056-05-1097)

MAA Poster Session on Research by Undergraduate Students

4:00 PM – 5:30 PM

All participants are invited to view the posters and speak with the presenters.

Organizer: **Diana M. Thomas**, Montclair State University

ASL Session for Contributed Papers

4:10 PM – 5:45 PM

- 4:10PM (1443) *"Universal" Schnorr tests.*
Nicholas Rupprecht, University of Michigan
- 4:35PM (1444) *The computability of conditional probability distributions.*
Nathanael L Ackerman, University of California, Berkeley, **Cameron E Freer*** and **Daniel M Roy**, Massachusetts Institute of Technology
- 5:00PM (1445) *Probabilistic computation and stochastic processes.*
Wesley Calvert, Murray State University
- 5:25PM (1446) *Computable dimension of Heyting algebras.*
Amy Turlington, University of Connecticut

AMS Congressional Fellowship Session

4:30 PM – 6:30 PM

Organizer: **Samuel M. Rankin, III**, AMS

MAA Panel Discussion

5:00 PM – 7:00 PM

Current issues in actuarial science education.

Organizers: **Robert E. Buck**, Slippery Rock University
Betty Anne Case, Florida State University
Kevin E. Charlwood, Washburn University
Steve Paris, Florida State University

Moderator: **Robert E. Buck**

Panelists: **James W. Daniel**, University of Texas Austin
Bryan V. Hearsey, Lebanon Valley College

SIGMAA on Quantitative Literacy Business Meeting

5:00 PM – 6:00 PM

SIGMAA on the Philosophy of Mathematics Business Meeting, Reception, and Guest Lecture

5:15 PM – 7:15 PM

6:15PM *What is Philosophy of Mathematics? A Case Study of Fictionalism.*
▶ (1447) **Charles Chihara**, University of California, Berkeley (1056-A0-1220)

SIGMAA on Mathematical and Computational Biology Business Meeting and Guest Lecture

6:00 PM – 8:00 PM

7:00PM *Using mathematical approaches to understand and manage spatially distributed populations: From invasive species to fisheries.*
(1448) **Alan Hastings**, University of California Davis

MAA Special Theatrical Presentation

6:00 PM – 7:00 PM

The theater of the mathematically absurd.

Presenter: **Colin Adams**, and the Mobiusbandaid Players

AMS Mathematical Reviews Reception

6:00 PM – 7:00 PM

SIGMAA on Mathematics and the Arts Business Meeting

7:00 PM – 8:00 PM

NAM Cox-Talbot Address

7:30 PM – 8:15 PM

▶ (1449) *The Number Zero: Its Origin and Use.*
Abdulim Abdullah Shabazz, Grambling University (1056-01-307)

SIGMAA on Mathematics and the Arts Special Presentation

8:00 PM – 9:00 PM

Bruce Beasley will discuss his sculptures which consist of intersecting forms that are developed using a computer program.

MAA-Project NExT Reception

8:30 PM – 10:30 PM

All Project NExT Fellows, consultants, and other friends of Project NExT are invited.

Organizers: **Judith Covington**, Louisiana State University Shreveport
Joseph A. Gallian, University of Minnesota-Duluth
Aparna W. Higgins, University of Dayton
Gavin LaRose, University of Michigan

Saturday, January 16

MAA Minority Chairs Breakfast Meeting

7:00 AM – 8:45 AM

Joint Meetings Registration

7:30 AM – 2:00 PM

AMS Special Session on Biomathematics: Modeling in Biology, Ecology, and Epidemiology, II

7:30 AM – 10:50 AM

Organizers: **Olcay Akman**, Illinois State University
Linda Allen, Texas Tech University
Timothy D. Comar, Benedictine University
Sophia Jang, Texas Tech University
Lih-Ing Roeger, Texas Tech University

7:30AM *Integrin Dynamics in Motile Cells: A Stochastic Approach.* Preliminary report.
▶ (1450) **Hannah L Callender***, University of Portland, and **Hans G Othmer**, University of Minnesota (1056-92-614)

8:00AM *Organism-Associated and Mat-Forming Metagenome Statistical Analysis using Random Forests Algorithms.* Preliminary report.
▶ (1451) **Mayra Hernandez***, San Diego State University, **Isaacs Kate**, San Jose State University, **Naneh Apkarian**, Pomona College, **Michelle Creek**, Chapman University, **Eric Guan**, Torrey Pines High School, **Chris Peterson**, Pomona College, and **Todd Regh**, Southern Oregon University (1056-92-1958)

8:30AM *Optimal Seasonal Plant Reproduction.* Preliminary report.
(1452) **Anthony DeLegge*** and **Steven Dunbar**, University of Nebraska-Lincoln (1056-92-54)

9:00AM *Super-spreading events in infectious diseases.*
(1453) Preliminary report.
Anna Mummert* and **Sydney Mkhathsha**, Marshall University (1056-92-466)

- 9:30AM *The Dynamics of One-Predator Two-Prey Systems for Integrated Pest Management*. Preliminary report. (1454) **Timothy D Comar*** and **Pinal Shah**, Benedictine University (1056-92-460)
- 10:00AM *Seeking Optimal Treatment Strategies for Malaria Infection*. Preliminary report. (1455) **Jeremy J Thibodeaux**, University of Central Oklahoma (1056-92-385)
- 10:30AM *Qualitative Analysis of Models for Anaerobic Digestion including Syntrophic Interactions*. Preliminary report. (1456) **Marion Weederemann**, Dominican University (1056-34-125)

AMS Special Session on Mathematics and Physical Experiment, II

7:30 AM – 10:50 AM

Organizers: **Roger Thelwell**, James Madison University
Anthony Tongen, James Madison University
Paul Warne, James Madison University

- 7:30AM *Spreading Surfactant on a Thin Liquid Layer*. (1457) **Ellen Peterson*** and **Michael Shearer**, North Carolina State University (1056-76-472)
- 8:00AM *Particle size segregation in granular flow*. (1458) **Michael Shearer***, North Carolina State University, **Laura Golick**, Emory University, Georgia, **Lindsay H May**, Baltimore, MD, and **Karen E Daniels**, North Carolina State University (1056-76-1284)
- 8:30AM *Simulation and validation of 3-dimensional fatigue cracks*. (1459) **David L Chopp**, Northwestern University (1056-74-2101)
- 9:00AM *Mathematical theory of particle laden flow*. (1460) **Andrea Bertozzi**, UCLA (1056-76-178)
- 9:30AM *Dynamics of Free Surface Perturbations Along an Annular Viscous Film Flowing Down a Vertical Fiber*. (1461) **Linda B. Smolka***, **Dennis Fillebrown**, Bucknell University, **Bree Guerra**, University of Texas at Austin, and **Justin North**, Ohio State University (1056-76-1561)
- 10:00AM *Symmetry and locomotion in theory and experiment*. (1462) **Stephen Childress**, New York University, Courant Institute of Mathematical Sciences (1056-76-737)
- 10:30AM *Inverse boundary value problems arising in the diagnosis and treatment of heart disease and breast cancer*. (1463) **David Isaacson***, Rensselaer Polytechnic Institute, **J. C. Newell** and **G. C. Saulnier**, RPI (1056-92-310)

AMS Session on Probability and Statistics, IV

7:45 AM – 8:55 AM

- 7:45AM *The minimum measure of concordance in a multivariate version of Spearman's rank correlation*. Preliminary report. (1464) **Raymond E. Molzon**, Michigan Technological University (1056-62-2020)
- 8:00AM *The Mid-Pleistocene Transition: From Forcing to Pacing of Glaciers*. Preliminary report. (1465) **Eric R Ruggieri*** and **C. Lawrence**, Brown University (1056-62-2095)
- 8:15AM *Characterization and Dispersive Ordering of the Cauchy, Gauss and Logistic Laws*. (1466) **Broderick Oluyede**, Georgia Southern University (1056-62-1351)

- 8:30AM *Compound Covariate Predictor (CCP) Classification Technique Applied on More Than Two Groups Gene Expression data*. Preliminary report. (1467) **Akram M. Almohalwas**, Central Michigan University (1056-62-1426)
- 8:45AM *Schroedinger-Type Eigenmaps for the Analysis and Classification of Multispectral Data in Bio-Medical Imaging*. (1468) **Martin Ehler***, Norbert Wiener Center, University of Maryland, and **Wojciech Czaja**, University of Maryland (1056-58-2036)

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates, III

8:00 AM – 10:50 AM

Organizers: **Darren Narayan**, Rochester Institute of Technology
Bernard Brooks, Rochester Institute of Technology
Jacqueline Jensen, Sam Houston State University
Carl V. Lutzer, Rochester Institute of Technology
Vadim Ponomarenko, San Diego State University
Tamas Wiandt, Rochester Institute of Technology

- 8:00AM *Knots, Sticks, and Indicatrix*. Preliminary report. (1469) **Bena Tshishiku***, Washington and Lee University, **Dan Collins**, Cornell University, **Charmaine Sia**, MIT, **Rob Silversmith**, **Katherine Hawkins** and **Colin Adams**, Williams College (1056-57-966)
- 8:30AM *Planar and Spherical Stick Indices of Torus Knots*. (1470) **Colin Adams**, Williams College, **Dan Collins**, Cornell University, **Katherine Hawkins**, Williams College, **Charmaine Sia**, Massachusetts Institute of Technology, **Rob Silversmith***, Williams College, and **Bena Tshishiku**, Washington and Lee University (1056-57-422)
- 9:00AM *Symplectic Volumes and Ribbon Graphs*. (1471) **Julia C Bennett***, Bard College, **David V Cochran**, Virginia Commonwealth University, and **Kaitlin Woskoff**, Hartwick College (1056-53-82)
- 9:30AM *Modulation Frames and Infinite Symmetric Matrices*. (1472) **Robert G. Fraser***, Case Western Reserve University, **Andrew Dugowson**, Pomona College, and **Yeonhyang Kim**, Central Michigan University (1056-46-88)
- 10:00AM *Continuous Frames on Manifolds*. Preliminary report. (1473) **Daniel Freeman**, Texas A&M University, **Daniel Poore**, Pomona College, **A. Rebecca Wei***, Case Western Reserve University, and **Madeline Wyse**, Pomona College (1056-58-92)
- 10:30AM *The Isoperimetric Problem in Sectors with Disk Density*. (1474) **Alexander Diaz***, Universidad de Puerto Rico Mayaguez Campus, **Nate Harman**, University of Massachusetts, Amherst, **Sean Howe**, University of Arizona, Tucson, and **David Thompson**, Williams College (1056-53-99)

AMS-MAA Special Session on History of Mathematics, II

8:00 AM – 10:50 AM

Organizers: **Craig Fraser**, University of Toronto

Deborah Kent, Hillsdale College
Sloan Despeaux, Western Carolina University

Julia Pevtsova, University of Washington
Eric Friedlander, University of Southern California

- 8:00AM *"Ad Calculum Sinuum": Thomas Harriot's Sine Table Interpolation Formulas.*
 ▶ (1475) **Janet L Beery**, University of Redlands (1056-01-1116)
- 8:30AM *Newton's Proof of Heron's Formula.*
 ▶ (1476) **William Dunham**, Muhlenberg College (1056-01-335)
- 9:00AM *Mathematics as imperialism? The role of mathematicians in the political expansion of British mathematical practices.*
 ▶ (1477) **Josipa G Petrunic**, University College London (1056-01-1249)
- 9:30AM *A comparison of Edwin Abbott Abbott and Lewis Carroll.* Preliminary report.
 ▶ (1478) **William F. Lindgren***, Slippery Rock University, and **Thomas F. Banchoff**, Brown University (1056-01-1184)
- 10:00AM *The Early Years of G. H. Hardy's career.*
 ▶ (1479) **Brenda Davison**, Simon Fraser University (1056-01-482)
- 10:30AM *Joel E. Hendricks and the Analyst.* Preliminary report.
 ▶ (1480) **James J Tattersall**, Providence College (1056-01-494)

- 8:00AM *Morita Equivalence Revisited.*
 (1487) **Paul Frank Baum**, Pennsylvania State University (1056-16-520)
- 8:30AM *A combinatorial approach to Specht module cohomology.*
 (1488) **David J Hemmer**, University at Buffalo, State University of New York (1056-20-860)
- 9:00AM *Vanishing ranges for the cohomology of finite groups of Lie type.*
 (1489) **Christopher P. Bendel***, University of Wisconsin-Stout, **Daniel K. Nakano**, University of Georgia, and **Cornelius Pillen**, University of South Alabama (1056-20-434)
- 9:30AM *Low Degree Cohomology for Finite Simple Groups.*
 (1490) **Robert M Guralnick***, University of Southern California, and **Pham Huu Tiep**, University of Arizona (1056-20-450)
- 10:00AM *Support varieties and representation type.*
 (1491) **Joerg Feldvoss**, University of South Alabama, and **Sarah Witherspoon***, Texas A&M University (1056-16-598)
- 10:30AM *Bundles and submodule functors.* Preliminary report.
 (1492) **Jon F Carlson***, University of Georgia, **Eric M Friedlander**, University of Southern California, and **Julia Pevtsova**, University of Washington (1056-20-867)

AMS-SIAM Special Session on Applications of Algebraic Geometry, I

8:00 AM – 10:50 AM

Organizers: **Frank Sottile**, Texas A&M University
Luis Garcia-Puente, Sam Houston State University

- 8:00AM *Algebraic aspects of persistence.*
 (1481) **Gunnar Erik Carlsson**, Stanford University (1056-55-1638)
- 8:30AM *From Isomap to Persistence: nonlinear dimensionality reduction with circular coordinates.*
 (1482) **Vin de Silva**, Pomona College (1056-68-2149)
- 9:00AM *Topological data analysis and the nudged elastic band method.* Preliminary report.
 ▶ (1483) **Henry Adams***, **Gunnar Carlsson**, Stanford University, and **Atanas Atanasov**, Columbia University (1056-55-2063)
- 9:30AM *Recovering exact results from numerical computation in algebraic geometry.*
 (1484) **Daniel J. Bates***, Colorado State University, **Jonathan D. Hauenstein**, Fields Institute/Texas A&M, **Tim McCoy**, University of Notre Dame, **Chris Peterson**, Colorado State University, and **Andrew J. Sommese**, University of Notre Dame (1056-14-1120)
- 10:00AM *Computing Hilbert functions using dual bases.*
 ▶ (1485) Preliminary report.
Jonathan D Hauenstein, Fields Institute/Texas A&M (1056-14-1178)
- 10:30AM *Zebra Fish, Tumor Growth, and Algebraic Geometry.*
 (1486) **Andrew Sommese**, University of Notre Dame (1056-14-2079)

AMS Special Session on Categorical and Algebraic Methods in Representation Theory, I

8:00 AM – 10:50 AM

Organizers: **Jon Brundan**, University of Oregon

AMS Special Session on Harmonic Analysis and Representations of Reductive p-adic Groups, I

8:00 AM – 10:40 AM

Organizers: **Robert Doran**, Texas Christian University
Paul Sally, University of Chicago
Loren Spice, Texas Christian University

- 8:00AM *Characters Tell All: The Plancherel Formula Done Right.* Preliminary report.
 (1493) **Paul J Sally***, University of Chicago, and **Loren Spice**, Texas Christian University (1056-22-825)
- 8:50AM *Invariant distributions supported on compact elements.*
 (1494) **Stephen M DeBacker**, University of Michigan (1056-22-2035)
- 9:20AM *Parametrizing Nilpotent Orbits in Symmetric Spaces Using Bruhat-Tits Theory.*
 (1495) **Ricardo Portilla**, University of Michigan-Ann Arbor (1056-20-1365)
- 9:50AM *Geometric Structure in the Representation Theory of Reductive p-adic Groups.*
 (1496) **Paul Frank Baum**, Pennsylvania State University (1056-22-136)
- 10:20AM *On some local L-packets and character sheaves.*
 (1497) **Clifton Cunningham**, University of Calgary (1056-11-1038)

AMS Special Session on Integrability of Dynamical Systems and Solitons Equations, I

8:00 AM – 10:50 AM

Organizers: **Zhijun Qiao**, University of Texas-Pan American

Taixi Xu, Southern Polytechnic State University

Wenxiu Ma, University of South Florida

- 8:00AM (1498) *On meromorphic solutions to the Korteweg-de Vries equation with non-decaying initial data supported on a left half line.*
Alexei Rybkin, University of Alaska Fairbanks (1056-35-1218)
- 8:30AM (1499) *Integrable systems and invariant geometric flows in similarity and projective geometries.*
Changzheng Qu, Northwest University, P. R. China (1056-35-2086)
- 9:00AM (1500) *On the Long-Time H2-Stability of the Implicit Euler Scheme for the 2D Magnetohydrodynamics Equations.*
Florentina Tone, University of West Florida (1056-35-913)
- 9:30AM (1501) *Stability of the Positive Steady States for a Nonhomogeneous Semilinear Parabolic Problem.*
Yi Li*, University of Iowa, Xian Jiaotong University, and **Baishun Lai**, Hunan Normal University and Henan University (1056-35-1982)
- 10:00AM (1502) *Quantizations of differential operator modules.*
Charles H Conley, University of North Texas (1056-17-665)
- 10:30AM (1503) *Component-trace identities and Hamiltonian structures of integrable couplings.*
Wen-Xiu Ma, University of South Florida (1056-37-1393)

AMS Special Session on Interactions of Inverse Problems, Signal Processing, and Imaging, III

8:00 AM – 10:50 AM

Organizer: **M. Zuhair Nashed**, University of Central Florida

- 8:00AM (1504) *An analysis of the singular values from the binary information with its preserver and patternization.*
► **Duk-Sun Kim*** and **Sang-Gu Lee**, Sungkyunkwan University (1056-15-1162)
- 8:30AM (1505) *A novel kernel correlation model with correspondence estimation.*
Pengwen Chen, University of Connecticut (1056-49-644)
- 9:00AM (1506) *Multiscale Registration of Planning CT and Daily Cone Beam CT Images for Adaptive Radiation Therapy.*
Dana Paquin*, California Polytechnic State University, **Doron Levy**, Department of Mathematics and CSCAMM, University of Maryland, and **Lei Xing**, Stanford University (1056-92-432)
- 9:30AM (1507) *Regularization of Inverse Magnetoencephalography by a Spline Method.*
Michel Volker, Geomathematics Group, University of Siegen, Germany (1056-65-513)
- 10:00AM (1508) *Stack filter classifiers with an application to change detection in images.*
G. Beate Zimmer*, Texas A&M University-Corpus Christi, **Reid Porter** and **Don Hush**, Los Alamos National Laboratory (1056-68-121)
- 10:30AM (1509) *On Weakly Bounded Noise in Ill-Posed Problems.*
P. P. B. Eggermont*, **V. N. LaRiccia**, Food and Resource Economics, University of Delaware, and **M. Z. Nashed**, University of Central Florida (1056-47-1818)

AMS Special Session on Optimal Frames and Operator Algebras, I

8:00 AM – 10:50 AM

Organizers: **David Larson**, Texas A&M University
Deguang Han, University of Central Florida
Shidong Li, San Francisco State University

- 8:00AM (1510) *Sparse approximations and the minimum subspace approximation property.*
Akram Aldroubi*, Vanderbilt University, and **Romain Tessera**, CNRS, Ecole Normal Sup., Lyon (1056-47-322)
- 8:30AM (1511) *Filter bank fusion frames.*
Matthew Fickus*, Air Force Institute of Technology, **Amina Chebira**, Swiss Federal Institute of Technology Lausanne, and **Dustin G. Mixon**, Princeton University (1056-42-523)
- 9:00AM (1512) *Distance estimates and a flow converging to equal-norm Parseval frames.*
► **Bernhard G Bodmann***, University of Houston, and **Peter G Casazza**, University of Missouri (1056-46-535)
- 9:30AM (1513) *A frame theoretic construction for spectral imaging data.* Preliminary report.
John J. Benedetto, Norbert Wiener Center, University of Maryland (1056-42-564)
- 10:00AM (1514) *Spanning Properties of Frames.*
Peter G. Casazza*, University of Missouri, **Bernhard G. Bodmann**, **Vern I. Paulsen**, University of Houston, and **Darrin Speegle**, St. Louis University (1056-46-635)
- 10:30AM (1515) *Frames for L^2 of measures with scale self-similarity.* Preliminary report.
Palle E. T. Jorgensen, University of Iowa (1056-46-761)

AMS Special Session on Parabolic Geometries, Integrable Systems, and Twistor Theory, I

8:00 AM – 10:40 AM

Organizers: **Dana Mihai**, Carnegie Mellon University
Jonathan Holland, University of Pittsburgh
George Sparling, University of Pittsburgh

- 8:00AM (1516) *Weyl and the foundations (1918, 1929) of gauge theory.*
Alexander Afriat, Université de Bretagne Occidentale (PaHST & REHSEIS) (1056-83-1022)
- 8:30AM (1517) *Affine sphere equation, Hitchin system and Painleve III.*
Prim Plansangkate, Centre de recherches mathématiques (1056-51-634)
- 9:00AM (1518) *Invariants of projective structures on surfaces and some applications.*
Robert L Bryant, University of California at Berkeley and MSRI (1056-53-31)
- 10:00AM (1519) *Four-dimensional metrics conformal to Kahler.*
M. Dunajski, University of Cambridge (1056-53-562)

MAA-AMS Invited Paper Session on the Scholarship of Teaching and Learning in Mathematics

8:00 AM – 10:50 AM

Organizers: **Jacqueline M. Dewar**, Loyola Marymount University
Thomas F. Banchoff, Brown University
Pam Crawford, Jacksonville University

- 8:00AM (1520) *SoTL in the Mathematics Content Preparation of Teachers: Infusing K-12 Exemplars in the Undergraduate Mathematics Curriculum.*
Kathryn T Ernie, University of Wisconsin - River Falls (1056-BE-1719)
- 8:30AM (1521) *Research Experiences for Pre-service and In-service Secondary Mathematics Teachers.*
Saad El-Zanati*, **David Barker** and **Wendy O'Hanlon**, Illinois State University (1056-BE-462)
- 9:00AM (1522) *Assessing Student Learning in an Introductory-Level Mathematics Course with a Sustainability Emphasis.*
Rikki B Wagstrom, Metropolitan State University (1056-BE-1306)
- 9:30AM (1523) *Preliminary Thoughts on Quantitative Literacy.*
Preliminary report.
Michael C Burke, College of San Mateo (1056-BE-1510)
- 10:00AM (1524) *What is inquiry? What is evidence?*
Rose Asera, Carnegie Foundation for the Advancement of Teaching (1056-BE-1832)
- 10:30AM (1525) *Differentiating Instruction in a Large Lecture Class.*
Preliminary report.
Andrew G Bennett*, **Rachel Manspeaker**, **Danielle McNaney** and **Ala Alnaser**, Kansas State University (1056-BE-1454)

AMS Session on Computational Mathematics, III

8:00 AM – 10:55 AM

- 8:00AM (1526) *Mathematical Modeling of Tail Movement.*
Glenn Steven Young*, **Anthony L. Tongen**, James Madison University, **Nina Bence** and **Corey Cleland**, Department of Biology, James Madison University (1056-65-1916)
- 8:15AM (1527) *Analysis of 3D Potts Model Monte Carlo Simulation of Crystalline Grain Growth.*
Joshua D. Snyder, George Mason University (1056-65-1962)
- 8:30AM (1528) *An optimization-based approach to discretizing the eikonal equation.*
Christopher M Kuster, Carroll University (1056-65-1973)
- 8:45AM (1529) *HSS preconditioning techniques for the Navier-Stokes equations.* Preliminary report.
Jia Liu, University of West Florida (1056-65-2069)
- 9:00AM (1530) *A Spectral Time-Domain Method for Computational Electrodynamics.* Preliminary report.
James V Lambers, University of Southern Mississippi (1056-65-2073)
- 9:15AM (1531) *Interpolation error estimates for hexahedral finite elements: geometrical approach.*
Kanagaratnam Arunakirinathar, University of Kwa-Zulu Natal (1056-65-2078)
- 9:30AM (1532) *Decomposition Method for Henry's Problem.*
Julia Petereit, University of Nevada, Reno (1056-41-679)
- 9:45AM (1533) *Parallel Performance of Some SHA-3 Second Round Candidates.* Preliminary report.
Jason Worth Martin, James Madison University (1056-12-2077)

- 10:00AM (1534) *Multistep Kinetic Monte Carlo.* Preliminary report.
Holly N. Clark* and **Tim P. Schulze**, University of Tennessee, Knoxville (1056-76-285)
- 10:15AM (1535) *Application of the Riemann-Hilbert technique to a problem of a supercavitating wedge.*
Anna Zemlyanova* and **Yuri Antipov**, Louisiana State University (1056-76-338)
- 10:30AM (1536) *Comparisons of Different Groove Structures in a Steady-Liquid Flow for Designing Efficient Micro Heat Pipes.*
Mulugeta Markos, North Carolina Wesleyan College (1056-76-742)
- 10:45AM (1537) *Flow structure of a sphere or spheroid immersed in shear flows in the Stoke's regime.*
Longhua Zhao*, **Roberto Camassa** and **Richard M. McLaughlin**, University of North Carolina at Chapel Hill (1056-76-961)

AMS Session on Research by Undergraduates, I

8:00 AM – 10:55 AM

- 8:00AM (1538) *Efficient computation of failure probabilities in optical fiber communication systems.*
Zachary Marzec*, **Jonathan Schuster**, SUNY at Buffalo, **Lucas Bunt** and **Benjamin Kanouse**, Buffalo State College (1056-78-1698)
- 8:15AM (1539) *Computer Model of Gravitational Lensing Systems.*
Philip S Naudus, George Mason University (1056-85-1646)
- 8:30AM (1540) *On Property P_1 and Spaces of Operators.*
Preliminary report.
Junsheng Fang, **David Larson**, Texas A&M University, and **Stephen Rowe***, Florida Atlantic University Harriet L. Wilkes Honors College (1056-15-394)
- 8:45AM (1541) *m -Refinably Extendable Functions.* Preliminary report.
John R Meuser, Illinois Wesleyan University (1056-00-359)
- 9:00AM (1542) *What Moves You: Using Legs for Vehicular Transportation.*
Jonathan Graf*, Towson University, **Olga Stulov**, SUNY New Paltz, and **Jim Sochacki**, James Madison University (1056-34-334)
- 9:15AM (1543) *Modeling, Analysis and Computation of Fluid Structure Interaction Models for Biological Systems.*
S. Minerva Venuti* and **Padmanabhan Seshaiyer**, George Mason University (1056-35-1523)
- 9:30AM (1544) *Nucleation and Spinodal Decomposition in Ternary-component Alloys.* Preliminary report.
Colleen T Ackermann*, Virginia Polytechnic Institute and State University, and **William D Hardesty**, University of Maryland Baltimore County (1056-35-321)
- 9:45AM (1545) *Modeling Phase Separation in Ternary Alloys.*
James O'Beirne, George Mason University (1056-35-1186)
- 10:00AM (1546) *Parameter Estimation in a System of Differential Equations.*
Franz William Hamilton, George Mason University (1056-35-1260)
- 10:15AM (1547) *Numerical Modeling and Analysis of Fluid Structure Interaction in Biological Systems.* Preliminary report.
Avis A Foster*, **Daniel M Anderson**, **S. Minerva Venuti** and **Padmanabhan Seshaiyer**, George Mason University (1056-35-1617)

10:30AM *Prolonging the effectiveness of transgenic insecticidal crops.*
▶ (1548) **John Bantle***, **Aaron Festinger**, **Hee-Joon Jo** and **Ryan Klafehn**, University at Buffalo (1056-92-1791)

10:45AM *Complex dynamics of a single nephron model with tubuloglomerular feedback and a myogenic mechanism.*
▶ (1549) **John Dambra***, University at Buffalo, and **Steven Leuthe**, Buffalo State College (1056-92-1799)

AMS Session on Number Theory, III

8:00 AM – 10:40 AM

8:00AM *Poincaré Series of Diagonal Polynomials.*
▶ (1550) Preliminary report.
Dibyajyoti Deb, University of Kentucky, USA (1056-11-1199)

8:15AM *Special Sierpiński Numbers.* Preliminary report.
▶ (1551) **Gregory P. Dresden**, **Carrie E. Finch***, Washington & Lee University, **Josh Harrington**, University of South Carolina, **Lenny K. Jones**, Shippensburg University, and **Mark R. Kozek**, Whittier College (1056-11-1297)

8:30AM *Explicit bounds for the number of p -core partitions of n .*
(1552) **Byungchan Kim** and **Jeremy Rouse***, University of Illinois, Urbana-Champaign (1056-11-1235)

8:45AM *Sifting Limits for Selberg's $\Lambda^2\Lambda^-$ Sieve.* Preliminary report.
(1553) **C S Franze**, Central Michigan University (1056-11-1244)

9:00AM Break
9:15AM *On the sum of the reciprocals of the amicable numbers.* Preliminary report.
▶ (1554) **Jonathan W. Bayless***, Husson University, and **Dominic Klyve**, Carthage College (1056-11-790)

9:30AM *D. Stanton's conjecture on t -core partitions.*
(1555) **Byungchan Kim***, University of Illinois at Urbana-Champaign, and **Jeremy Rouse**, University of Illinois at Urbana-Champaign (1056-11-1336)

9:45AM *Generalizing a Theorem of Sierpiński Using Lucas Sequences.* Preliminary report.
▶ (1556) **Lenny Jones**, Shippensburg University (1056-11-859)

10:00AM *Diophantine Questions and the Adeles.*
(1557) **Thomas J Wright**, Johns Hopkins University (1056-11-1383)

10:15AM *Diophantine Approximation for Alternate Forms of Continued Fractions.*
▶ (1558) **David E. Molnar**, Ridgewood, NJ (1056-37-1508)

10:30AM *The Riemann Hypothesis and the Roots of the Riemann Zeta Function.*
(1559) **Samuel W Gilbert**, Vienna, VA (1056-11-48)

MAA Session on Innovative and Effective Ways to Teach Linear Algebra, I

8:00 AM – 10:55 AM

Organizers: **David M. Strong**, Pepperdine University
Gilbert Strang, Massachusetts Institute of Technology
David C. Lay, University of Maryland

8:00AM *Eigenvalues and eigenvectors—helping students see what they do.*
▶ (1560)

Melvin A Nyman*, Alma College, **John Berry**, University of Plymouth (England), **Douglas A Lapp** and **Dennis St. John**, Central Michigan University (1056-G1-1640)

8:20AM *Student-centered linear algebra activities.*
▶ (1561) **Gulden Karakok***, UMERC, Umea University, Sweden, and **Corinne A. Manogue**, Department of Physics, Oregon State University (1056-G1-1868)

8:40AM *Introducing Linear Algebra to Middle School Students.* Preliminary report.
▶ (1562) **Pamela G Coxson**, University of California San Francisco (1056-G1-534)

9:00AM *Interesting projects while teaching Linear Algebra course.*
(1563) **Yun Lu**, Kutztown University of PA (1056-G1-822)

9:20AM *Learning the Language of Linear Algebra: Using Reading Assignments to Immerse Students in Terminology and Ideas.*
(1564) **Matt Boelkins**, Grand Valley State University (1056-G1-856)

9:40AM *Three tested ways to empower students to engage in linear algebra.*
(1565) **Peg Howland*** and **Brynja R. Kohler**, Utah State University (1056-G1-2000)

10:00AM *Matrices of Sequences: Recurrence and Computation.*
▶ (1566) **Mark Anderson Miller**, Marietta College (1056-G1-198)

10:20AM *Transitioning to a Laguerre Basis.*
▶ (1567) **Elyn Rykken***, Muhlenberg College, and **Maureen Carroll**, University of Scranton (1056-G1-2002)

10:40AM *Using Quaternions and Rotations Matrices for Rotations in R^3 .*
▶ (1568) **Paul Raymond Bouthellier**, University of Pittsburgh-Titusville (1056-G1-237)

MAA Session on General Contributed Papers, IX

8:00 AM – 10:55 AM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

8:00AM *A Summer of Knots.*
(1569) **Alan Alewine**, McKendree University (1056-Z1-543)

8:15AM *Calculus Laboratory: A Companion Course to the Lecture.* Preliminary report.
(1570) **Michael P Saclolo**, St. Edward's University (1056-Z1-1612)

8:30AM *Science in the Mathematics Classroom.*
▶ (1571) **George Rublein**, College of William and Mary (1056-Z1-1750)

8:45AM *A 21st century makeover of a classic introductory differential equations course.*
▶ (1572) **Anand L. Pardhanani**, Earlham College (1056-Z1-1007)

9:00AM *Recruitment and Retention: Flip Sides of the Same Coin.* Preliminary report.
▶ (1573) **Lisa A Lister**, Bloomsburg University (1056-Z1-1385)

9:15AM Break.
9:30AM *Redesigning a Mathematics Course to Meet the Needs of Business Majors.* Preliminary report.
▶ (1574) **Kathleen D. Lopez***, **Diane G. Fisher**, **Michael W. Totaro** and **Lee E. Price**, University of Louisiana at Lafayette (1056-Z1-947)

- 9:45AM *Changes in Students' Perceptions about Learning Mathematics in a Redesigned Mathematics Course for Business Majors.* Preliminary report.
▶ (1575) **Diane G Fisher***, **Kathleen Lopez**, **Michael Totaro** and **Lee Price**, University of Louisiana at Lafayette (1056-Z1-888)
- 10:00AM *Grading Done Right.* Preliminary report.
▶ (1576) **Dustin D. Keck*** and **Michael A. Brilleslyper**, U.S. Air Force Academy (1056-Z1-1680)
- 10:15AM *Wii™ Derivatives: Learning Derivatives Through Competition.* Preliminary report.
▶ (1577) **Keith W. DeGregory***, **Aaron C. Elliott**, **William L. Fehlman II** and **Alex A. Heidenberg**, United States Military Academy at West Point (1056-Z1-904)
- 10:30AM *Survivor Math: Using Pop Culture to Enhance Learning Mathematics.*
(1578) **Robert E Burks**, United States Military Academy (1056-Z1-55)
- 10:45AM *Composition Operators on $S^2(\mathbb{D})$.*
(1579) **Katherine Heller**, University of Virginia (1056-Z1-643)

MAA Session on Mathematics and Sports, II

8:00 AM – 10:55 AM

- Organizer: **Howard L. Penn**, U.S. Naval Academy
- 8:00AM *Did Humidifying the Baseball Decrease the Number of Homers at Coor's Field?*
▶ (1580) **Howard L. Penn**, U.S. Naval Academy (1056-H5-380)
- 8:20AM *A nonlinear approach to modeling success in baseball.*
▶ (1581) **Jeff Hamrick***, Rhodes College, and **John M. Rasp**, Stetson University (1056-H5-762)
- 8:40AM *Biomechanics of Running and Walking.*
(1582) **Anthony Tongen**, James Madison University (1056-H5-1975)
- 9:00AM *Mathematics Awareness Month 2010: Mathematics and Sports.*
▶ (1583) **Douglas Ensley**, Shippensburg University, **Joseph A. Gallian***, University of Minnesota Duluth, and **Howard Penn**, United States Naval Academy. (1056-H5-374)
- 9:20AM *Tigermetrics: Statistical Analysis of the PGA Tour.* Preliminary report.
▶ (1584) **Roland Minton**, Roanoke College (1056-H5-314)
- 9:40AM *Creating a Sports Video Game using Mathematical Modeling.*
▶ (1585) **Paul Raymond Bouthellier**, University of Pittsburgh-Titusville (1056-H5-236)
- 10:00AM *Introducing some new and already existing statistical studies related to a sports mostly popular in the eastern hemispheres.*
(1586) **Santanu Chakraborty**, University of Texas - Pan American, Edinburg, Texas (1056-H5-81)
- 10:20AM *Analysis of a Table Tennis Game: A Teaching Tool.*
▶ (1587) **Reza D. Noubary**, Bloomsburg University (1056-H5-928)
- 10:40AM *Exploring NFL Data to Determine "Who is the Greatest of Them All?".* Preliminary report.
▶ (1588) **Jacqueline Brannon Giles**, (1) HCC Central College (2) Texas Southern University (1056-H5-512)

MAA Session on Visualization in Mathematics, I

8:00 AM – 9:35 AM

Organizers: **Sarah J. Greenwald**, Appalachian State University

- Walter Whiteley**, York University
- 8:00AM *Spatial Visualization for Pre-Service Teachers.*
▶ (1589) **Lily Moshe**, York University, **Margaret Sinclair**, Faculty of Education, York University, and **Walter Whiteley***, York University (1056-R5-1562)
- 8:20AM *Picture This: Making Connections in 3-Space.*
▶ (1590) **Sarah L Mabrouk**, Framingham State College (1056-R5-2001)
- 8:40AM *Drawing by hand and machine: Visualizing solids of revolution.*
▶ (1591) **John W Hoggard**, Edinboro University of Pennsylvania (1056-R5-1482)
- 9:00AM *Visualizing the Popcorn Box.*
(1592) **Ami Mamolo***, York University, Toronto, and **Walter Whiteley**, York University (1056-R5-1268)
- 9:20AM *Spatial Visualization: Is There a Gender Difference?*
▶ (1593) **Terri L. Bennett**, Southern CT State University (1056-R5-1256)

SIAM Minisymposium on New Trends in Mathematical Biology

8:00 AM – 10:55 AM

- Organizers: **Mariel Vazquez**, San Francisco State University
Javier Arsuaga, San Francisco State University
- 8:00AM *Strings, Trees, and RNA Folding.*
(1594) **Christine E Heitsch**, Georgia Institute of Technology (1056-92-1911)
- 8:30AM *The Other Half of Our Genome.*
(1595) **Jun S Song**, UC San Francisco (1056-92-1133)
- 9:00AM *Topological methods for mapping biological data sets.*
(1596) **Gunnar Erik Carlsson**, Stanford University (1056-92-1701)
- 9:30AM *A Multi-type Branching Process Model of Tumor Expansion.*
(1597) **Jasmine Foo***, **Kevin Leder** and **Franziska Michor**, Sloan Kettering Institute (1056-92-1728)
- 10:00AM *Analysis of difference topology experiments on a Protein-DNA complex.*
▶ (1598) **John Luecke***, University of Texas at Austin, **Isabel Darcy**, University of Iowa, and **Mariel Vazquez**, San Francisco State University (1056-58-1965)
- 10:30AM *Fast Protein Dynamics Simulations: Dominant Pathways for Protein Conformational Transitions.* Preliminary report.
▶ (1599) **Patrice Koehl***, University of California, Davis, **Joel Franklin**, Reed College, **Sebastian Doniach**, Stanford University, and **Marc Delarue**, Institut Pasteur, Paris, France (1056-65-1945)

AMS Session on Group Theory, III

8:15 AM – 10:55 AM

- 8:15AM *Fundamental domains for congruence subgroups of SL_2 in positive characteristic.*
(1600) **Lisa Carbone**, Rutgers University, **Leigh Cobbs***, Lebanon Valley College, and **Scott Murray**, University of Sydney (1056-22-203)
- 8:30AM *Homomorphisms on compact subsets of βS .*
(1601) **Neil Hindman***, Howard University, and **Dona Strauss**, University of Leeds (1056-22-311)
- 8:45AM *Whittaker Modules for a Lie Algebra of Block Type.*
(1602) **Bin Wang**, Changshu Institute of Technology, Changshu, China, and **Xinyun Zhu***, University of Texas of Permian Basin (1056-22-348)

- 9:00AM *Members of sums of idempotents in $\beta\mathbb{N}$.* Preliminary report.
(1603) **Kendall Williams**, Howard University (1056-22-724)
- 9:15AM *Hyperreflection groups.*
(1604) **David G Radcliffe**, Century College (1056-20-1895)
- 9:30AM *Zeta Functions of Complexes Arising from PGL_n .*
(1605) **Ming-Hsuan Kang**, Pennsylvania State University (1056-20-139)
- 9:45AM *On solvable minimal non- p -closed and non- p -exponent closed groups.*
(1606) **Luise-Charlotte Kappe**, **Marcin Mazur**, Binghamton University, **Gabriela Mendoza**, Riverside Community College, and **Michael B. Ward***, Western Oregon University (1056-20-877)
- 10:00AM *On simple minimal non- p -closed and non- p -exponent closed groups.*
(1607) **Luise-Charlotte Kappe***, **Marcin Mazur**, Binghamton University, **Gabriela Mendoza**, Riverside Community College, and **Michael B Ward**, Western Oregon University (1056-20-1247)
- 10:15AM *The Hausdorff dimension of limit sets of subgroups of Kleinian groups.*
(1608) **Andrew Lazowski**, Wesleyan University (1056-00-1171)
- 10:30AM *The descent spectral sequence for SL_2 and PSL_2 .*
(1609) **Rebecca E Field**, James Madison University (1056-55-2135)
- 10:45AM *The Generalized Burnside and Representation Rings.*
(1610) **Eric B. Kahn**, Bloomsburg University (1056-55-727)

AWM Workshop

8:20 AM – 4:30 PM

This session has several parts that will be listed separately by time in this program. All presentations are open to all JMM participants.

AMS Special Session on Permutations, I

8:30 AM – 10:50 AM

Organizers: **Persi Diaconis**, Stanford University
Ira M. Gessel, Brandeis University
Richard P. Stanley, Massachusetts Institute of Technology

- 8:30AM *Flag descents and P -partitions.*
(1611) **Ira M. Gessel**, Brandeis University (1056-05-1512)
- 9:00AM *Descents and drops of permutations.* Preliminary report.
▶ (1612) **Fan Chung**, UC San Diego, **Anders Claesson**, Reykjavik Univ., **Mark Dukes**, Univ. of Iceland, and **Ron Graham***, UC San Diego (1056-05-1787)
- 9:30AM *Eulerian quasisymmetric functions.*
(1613) **John Shareshian***, Washington University, and **Michelle L Wachs**, University of Miami (1056-05-1607)
- 10:00AM *Eulerian quasisymmetric functions and cyclic sieving.*
(1614) **Bruce Sagan**, Michigan State University, **John Shareshian**, Washington University, and **Michelle L Wachs***, University of Miami (1056-05-1888)
- 10:30AM *Combinatorial interpretations for γ -vectors.*
(1615) **T. Kyle Petersen***, DePaul University, and **Eran Nevo**, Cornell University (1056-05-457)

MAA Session on General Contributed Papers, XI

8:30 AM – 10:25 AM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- 8:30AM *Mathematics and English: A Joint Venture.*
(1616) **Amanda I Beecher***, **Hilary DeRemigio** and **Gerald Kobylski**, United States Military Academy at West Point (1056-Z1-876)
- 8:45AM *Geometric Transformations in Design and Their Self-assembling and Self-organizing Structures.*
(1617) **Fatma Mete**, Cornell University (1056-Z1-1837)
- 9:00AM *An investigation of attribution theory with College Algebra students via Mathematics Attribution Scale (MAS): Implications to Teaching and Learning Undergraduate Mathematics.*
▶ (1618) **Jerry C. Obiekwe***, The university of Akron-Wayne College (1056-Z1-948)
- 9:15AM *Getting pumped for math: An investigation of student motivations.*
(1619) **Fabiana Cardetti*** and **P. Joseph McKenna**, University of Connecticut (1056-Z1-1574)
- 9:30AM *The Mathematicians Roll With GEAR-UP.* Preliminary report.
▶ (1620) **Edward D Smith**, Pima Community College (1056-Z1-1304)
- 9:45AM *Mentoring Underrepresented Students in Science and Mathematics.* Preliminary report.
▶ (1621) **Rebekah Dupont**, Augsburg College (1056-Z1-1687)
- 10:00AM *Over 20 Years of Success in the Emerging Ethnic Engineers Program at the University of Cincinnati.*
▶ (1622) **Joy Moore*** and **Kenneth Simonson**, University of Cincinnati (1056-Z1-1986)
- 10:15AM *A Comparative Study of Online and Traditional Classroom Learning of College Algebra for Non-Traditional Students in Non-Traditional Higher Education Programs.*
▶ (1623) **Darcel H Ford**, Strayer University (1056-Z1-1924)

AWM Workshop: Research Presentations by Recent Ph.D.s, I

8:30 AM – 10:20 AM

- 8:30AM *Families over special base manifolds and a conjecture of Campana.*
(1624) **Kelly Jabbusch*** and **Stefan Kebekus**, University of Freiburg (1056-14-169)
- 9:00AM *Shift Automorphism Varieties Are Not Residually Finite.*
(1625) **Kate S Owens**, College Station, TX (1056-08-213)
- 9:30AM *Oscillation Criteria for Second Order Linear Delay Dynamic Equations.* Preliminary report.
(1626) **Raegan Higgins**, Texas Tech University (1056-39-118)
- 10:00AM *An obstruction to slicing iterated Bing doubles.*
(1627) **Cornelia A. Van Cott**, University of San Francisco (1056-57-216)

AMS Committee on Education Panel Discussion

8:30 AM – 10:00 AM

The common core State Standards: Will they become our national K-12 math curriculum?
Moderator: **Lawrence Gray**, University of Minnesota

MAA Session on General Contributed Papers, X

8:45 AM – 10:40 AM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- 8:45AM *A Matrix Approach to Linear Statistical Models.* Preliminary report.
▶ (1628) **David R Gurney**, Southeastern Louisiana University (1056-Z1-578)
- 9:00AM *Utilizing Web-based Statistical Resources in Teaching Nontraditional Undergraduate Students in Online Learning Environments.*
▶ (1629) **Michael D. Miner**, American Public University System (1056-Z1-1896)
- 9:15AM *Using Authentic Discovery Projects to Improve Student Outcomes in Statistics.* Preliminary report.
▶ (1630) **Dianna J Spence***, **A. Robb Sinn** and **Brad Bailey**, North Georgia College & State University (1056-Z1-734)
- 9:30AM *The Extended Law of Total Probability.* Preliminary report.
▶ (1631) **Zengxiang Tong*** and **Zhen Huang**, Otterbein College (1056-Z1-351)
- 9:45AM *Integrating Mathematical Modeling into Science and Mathematics Curricula in Challenged School Districts.*
▶ (1632) **Molli R. Jones**, Immaculata University (1056-Z1-797)
- 10:00AM *A Transition Course From Advanced Placement to College Calculus.*
▶ (1633) **Timothy A Lucas***, Pepperdine University, and **Joseph Spivey**, Wofford College (1056-Z1-1107)
- 10:15AM *Does Peer Assessment Help Improve Mathematical Writing for Pre-Service Elementary and Middle School Teachers?*
▶ (1634) **Cheryl Beaver** and **Scott Beaver***, Western Oregon University (1056-Z1-1502)
- 10:30AM *A Taxonomic Analysis of Standard Calculus Tasks: Bloom in Calculus Education.* Preliminary report.
(1635) **Gizem Karaali**, Pomona College (1056-Z1-25)

AMS Invited Address

9:00 AM – 9:50 AM

- (1636) *Evolution problem in General Relativity.*
Igor Y. Rodnianski, Princeton University (1056-83-7)

ASL Invited Address

9:00 AM – 9:50 AM

- (1637) *Decidability and Undecidability in Theories of Real Vector Spaces.*
John Harrison, Intel Corporation, JF1-13 (1056-03-75)

MAA Minicourse #10: Part B

9:00 AM – 11:00 AM

The hitchhiker's guide to mathematics.
Organizers: **Dan Kalman**, American University
Bruce F. Torrence, Randolph Macon College

MAA Minicourse #3: Part B

9:00 AM – 11:00 AM

Educating about the state of the planet and sustainability while enhancing calculus.
Organizer: **Thomas J. Pfaff**, Ithaca College

MAA Minicourse #8: Part B

9:00 AM – 11:00 AM

The Fibonacci and Catalan numbers.
Organizer: **Ralph Grimaldi**, Rose-Hulman Institute of Technology

Student Hospitality Center

9:00 AM – 2:00 PM

MAA Committee for the Teaching of Undergraduate Mathematics Panel Discussion

9:00 AM – 10:20 AM

Beyond grading and tutoring: New approaches to students helping students.
Organizers: **Daniel E. Flath**, Macalester College
Lewis D. Ludwig, Denison University
Steven R. Benson, Lesley University
Panelists: **Sonny Painter**, University of Missouri-Kansas City
Karen Saxe, Macalester College
Catherine A. Beneteau, University of South Florida

NAM Panel Discussion

9:00 AM – 9:50 AM

Exhibits and Book Sales

9:00 AM – NOON

Employment Center

9:00 AM – NOON

AMS Session on Real and Special Functions

9:15 AM – 10:55 AM

- 9:15AM *Solution for nonlinear initial-value problems via orthogonal functions.*
(1638) **Mohsen Razzaghi**, Mississippi State University (1056-33-369)
- 9:30AM *Resultants of Chebyshev Polynomials.*
(1639) **Jemal Emina Gische***, Western Kentucky University, and **Mourad E. H. Ismail**, University of Central Florida (1056-33-899)
- 9:45AM *Representations of quantum group $U_q(\mathfrak{so}(n))$ and q -orthogonal polynomials.*
(1640) **Alexander Rozenblyum**, New York City College of Technology, CUNY (1056-33-922)
- 10:00AM *Subpolynomial and Subexponential Functions.*
▶ (1641) Preliminary report.
Houshang H. Sohrab, Towson University (1056-26-46)
- 10:15AM *On the Hilbert Transform of a Measure.*
(1642) **Maxim Zinchenko**, Caltech (1056-26-104)

- 10:30AM *Aspects of Stochastic Quasi-Cantoresque Sets.*
 ▶ (1643) Preliminary report.
Padraig M. McLoughlin*, Kutztown University of Pennsylvania, and **Christopher R. Krizan**, Auburn University (1056-26-613)
- 10:45AM *An analogue of L'Hospital's rule.*
 ▶ (1644) **J Marshall Ash**, DePaul University (1056-26-1354)

ASL Invited Address

10:00 AM – 10:50 AM

- (1645) *Tukey Reducibility as a Setup for Classifying Mathematical Structures.*
Stevo Todorčević, Universite Paris 7 - C.N.R.S., and University of Toronto (1056-03-73)

NAM Business Meeting

10:00 AM – 10:50 AM

MAA Invited Address

10:05 AM – 10:55 AM

- (1646) *Symplectic embeddings and continued fractions.*
Dusa McDuff, Barnard College, Columbia University (1056-A0-5)

AWM Workshop: Poster Session with Presentations from Women Graduate Students

10:30 AM – 11:00 AM

- 10:30AM *Siphons in biochemical reaction systems: an algebraist's point of view.*
 (1647) **Anne Shiu*** and **Bernd Sturmfels**, University of California Berkeley (1056-13-98)
- 10:30AM *Backward-iteration sequences and boundary repelling fixed points in higher dimension.*
 (1648) Preliminary report.
Olena Ostapyuk, Kansas State University (1056-30-147)
- 10:30AM *Invariance and Automorphisms of the Computably Enumerable Sets.*
 (1649) **Rachel Epstein**, University of Chicago (1056-03-159)
- 10:30AM *A bijection between partially directed paths in the symmetric wedge and matchings.*
 ▶ (1650) **Svetlana Poznanović**, Texas A&M University (1056-05-162)
- 10:30AM *Point Parameter Rings.*
 (1651) **Chelsea M Walton**, University of Michigan (1056-00-164)
- 10:30AM *Direct-sum decompositions of modules over rings of infinite Cohen-Macaulay type.*
 (1652) **Silvia Saccon**, University of Nebraska-Lincoln (1056-13-180)
- 10:30AM *A partial generalization of the Gross-Kohnen-Zagier theorem to higher weight modular forms.*
 (1653) **Kimberly Hopkins**, University of Texas at Austin (1056-11-193)
- 10:30AM *The core and the adjoint: a condition for equality.*
 (1654) **Angela L Kohlhaas**, University of Notre Dame (1056-13-196)
- 10:30AM *What is a \mathbb{Q} curve?*
 (1655) **Ekin Ozman**, University of Wisconsin-Madison (1056-11-197)

- 10:30AM *Ihara Zeta Functions and Some Ramified Covers of Graphs.*
 (1656) **Beth Malmskog***, Colorado State University, and **Michelle Manes**, University of Hawaii (1056-05-199)
- 10:30AM *The Abelian-Nonabelian Correspondence in Gromov-Witten Theory.*
 (1657) **Kaisa E Taipale**, University of Minnesota (1056-14-212)
- 10:30AM *Computable distributive lattices and Heyting algebras.*
 (1658) **Amy Turlington**, University of Connecticut (1056-03-214)
- 10:30AM *The most interesting surface homeomorphisms.*
 ▶ (1659) **Chia-Yen Tsai**, University of Illinois at Urbana-Champaign (1056-57-218)
- 10:30AM *Toric models of graphs.*
 (1660) **Weronika J Buczynska**, Texas A&M University (1056-14-220)
- 10:30AM *On stable states in a coupled energetic model for incompressible nematic elastomers.*
 (1661) **Andrea Catalina Rubiano**, Purdue University (1056-35-235)
- 10:30AM *Approximating invariant densities of metastable systems.*
 (1662) **Cecilia Gonzalez Tokman**, University of Maryland (1056-37-977)

MAA Business Meeting

11:10 AM – 11:40 AM

- Organizer: **Martha J. Siegel**, Towson University
 Moderator: **David M. Bressoud**, Macalester College

AMS Business Meeting

11:45 AM – 12:15 PM

NAM Claytor-Woodard Lecture

1:00 PM – 2:00 PM

- (1663) *The Impact of Periodic Proportional Harvesting Policies on TAC-Regulated Fishery Systems.*
Abdul-Aziz Yakubu, Howard University (1056-92-1763)

AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates, IV

1:00 PM – 5:50 PM

- Organizers: **Darren Narayan**, Rochester Institute of Technology
Bernard Brooks, Rochester Institute of Technology
Jacqueline Jensen, Sam Houston State University
Carl V. Lutzer, Rochester Institute of Technology
Vadim Ponomarenko, San Diego State University
Tamas Wiandt, Rochester Institute of Technology
- 1:00PM *Computer-Created Human-Comprehensible Logic Games.* Preliminary report.
 ▶ (1664) **Cornelius A. Bodea**, **Arthur Charlesworth**, **Diana A. Iovan** and **Andrew D. Jones***, University of Richmond (1056-03-105)

- 1:30PM *The Spread of A Rumor*. Preliminary report.
 ▶ (1665) **Nick C Fedewa***, **Emily E Krause**, **Alexandra M Sisson** and **James R Angelos**, Central Michigan University (1056-00-106)
- 2:00PM *Structural Adaptation of Microvascular Networks*. Preliminary report.
 ▶ (1666) **Rachel S Nancollas*** and **Benjamin Y Small**, Franklin W. Olin College of Engineering (1056-92-132)
- 2:30PM *The Relative Gain Array of Cayley Graphs*.
 ▶ (1667) **Sara D. Townsend***, **Suzi Gearheart** and **John Owen**, Sam Houston State University (1056-05-134)
- 3:00PM *Analysis of the Repackaging of Risk in the Sub-Prime Mortgage Crisis*. Preliminary report.
 ▶ (1668) **Angela King***, McGill University, **Adam Biesenbach**, University of Rochester, and **Kuni Natsuki**, Brown University (1056-91-138)
- 3:30PM *Matroids, Geometry, Symmetry and the 4th Dimension*.
 (1669) **Chencong Bao**, Lafayette College, **Camila Friedman-Gerlicz**, Claremont McKenna, **Peter McGrath***, Lafayette College, and **Jessica Vega**, Loyola Marymount (1056-05-146)
- 4:00PM *Classical and Virtual Pseudodiagram Theory and New Bounds on the Unknotting Numbers and Genus of Knots*.
 ▶ (1670) **Allison Henrich**, Seattle University, **Noël MacNaughton**, Williams College, **Sneha Narayan**, **Oliver Pechenik**, Oberlin College, and **Jennifer Townsend***, Scripps College (1056-57-148)
- 4:30PM *Excellent Local Rings with Semi-Local Formal Fibers*.
 (1671) **R. Karpman***, Scripps College, **N. Arnosti**, Williams College, **C. Leverson**, Wellesley College, **J. Levinson** and **S. Loepf**, Williams College (1056-13-179)
- 5:00PM *Time to Failure: A Stochastic Model of the Formation and Development of Abdominal Aortic Aneurysms*. Preliminary report.
 ▶ (1672) **Jeremy E Brooks**, East Tennessee State University (1056-92-325)
- 5:30PM *A Knot or Not a Knot?* Preliminary report.
 ▶ (1673) **Karleigh Frederick**, **Samantha Hilker** and **Megan Savage***, Sam Houston State University (1056-55-1201)

AMS-MAA Special Session on History of Mathematics, III

1:00 PM – 5:50 PM

Organizers: **Craig Fraser**, University of Toronto
Deborah Kent, Hillsdale College
Sloan Despeaux, Western Carolina University

- 1:00PM *Euler, Dilog, and Zeta(2)*.
 ▶ (1674) **Dan Kalman***, American University, and **Mark McKinzie**, St. John Fisher College (1056-01-849)
- 1:30PM *The Genesis of Generating Functions in Abraham De Moivre's Work*.
 (1675) **David R Bellhouse**, University of Western Ontario (1056-01-278)
- 2:00PM *What is a Great Book? A Case Study of Legendre's Éléments de Géométrie (1794) and Playfair's Elements of Geometry (1795)*.
 ▶ (1676) **Amy Ackerberg-Hastings**, University of Maryland University College (1056-01-625)
- 2:30PM *Understanding Early Laplacian Simplifications*. Preliminary report.
 ▶ (1677) **Menolly Lysne**, Simon Fraser University (1056-01-1072)

- 3:00PM *Maxwell, Poincaré and the Rings of Saturn*. Preliminary report.
 ▶ (1678) **Tom Archibald**, Simon Fraser University (1056-01-254)
- 3:30PM *The n-body problem in spaces of constant curvature*.
 (1679) **Florin N. Diacu**, University of Victoria (1056-01-393)
- 4:00PM *Italian Mathematics and Mechanics Between the 18th and 19th Centuries*.
 ▶ (1680) **Sandro Caparrini**, Institute for the History and Philosophy of Science and Technology, Toronto ON, Canada (1056-01-1596)
- 4:30PM *Federigo Enriques' Obsession: A Tale from Italian Algebraic Geometry*. Preliminary report.
 (1681) **Donald Babbitt***, UCLA, and **Judith Goodstein**, Einstein Papers Project, Cal Tech (1056-01-306)
- 5:00PM *Pinning Down Outliers: 19th Century Stabs at Exact Probabilities for Rare Events*. Preliminary report.
 ▶ (1682) **Byron E. Wall**, York University (1056-01-548)
- 5:30PM *If Brute Force Does Not Work You Are Not Using Enough: the rise of Numerical Integration in 20th Century Astronomy*.
 ▶ (1683) **Allan D. G. Olley**, University of Toronto - IHPST (1056-01-1124)

AMS-SIAM Special Session on Applications of Algebraic Geometry, II

1:00 PM – 5:50 PM

Organizers: **Frank Sottile**, Texas A&M University
Luis Garcia-Puente, Sam Houston State University

- 1:00PM *ArtinProver: a truly hybrid symbolic/numeric global optimization algorithm*. Preliminary report.
 ▶ (1684) **Erich Leo Kaltofen***, North Carolina State University, **Zhengfeng Yang**, East China Normal University, Shanghai, China, and **Lihong Zhi**, Academy of Mathematics and Systems Science, Beijing, China (1056-14-1157)
- 1:30PM *Experimentation at the Frontiers of Reality in Schubert Calculus*.
 ▶ (1685) **Chris Hillar**, MSRI, **Luis Garcia-Puente**, Sam Houston State University, **Abraham Martín del Campo**, Texas A&M University, **James Ruffo**, SUNY Oneonta, **Stephen L. Johnson**, **Zach Teitler*** and **Frank Sottile**, Texas A&M University (1056-14-396)
- 2:00PM *Nested canalizing polynomial dynamical systems*. Preliminary report.
 ▶ (1686) **Reinhard Laubenbacher***, Virginia Bioinformatics Institute, and **David Murrugarra**, Virginia Polytechnic Institute and State University (1056-92-1524)
- 2:30PM *Computing siphons in biochemical reaction systems*.
 (1687) **Anne Shiu*** and **Bernd Sturmfels**, University of California Berkeley (1056-13-2006)
- 3:00PM *A persistence tree-based method for calling peaks in ChIP-seq protein binding analysis*.
 (1688) **Valerie Hower*** and **Lior Pachter**, University of California, Berkeley (1056-92-1506)
- 3:30PM *Algebraic geometry of Gaussian graphical models*.
 (1689) **Seth Sullivant**, North Carolina State University (1056-14-1155)
- 4:00PM *On a parametrization of positive semidefinite matrices with zeros*.
 (1690) **Mathias Drton***, University of Chicago, and **Josephine Yu**, MSRI, Berkeley, CA (1056-15-1159)
- 4:30PM Discussion

- 5:00PM *The convex algebraic geometry of rank minimization.*
 ▶ (1691) **Pablo A Parrilo**, Massachusetts Institute of Technology (1056-90-2136)
- 5:30PM *Orbitopes.*
 (1692) **Raman Sanyal**, UC Berkeley, **Frank Sottile**, Texas A&M University, and **Bernd Sturmfels***, UC Berkeley (1056-14-424)

AMS Special Session on Biomathematics: Modeling in Biology, Ecology, and Epidemiology, III

1:00 PM – 5:50 PM

Organizers: **Olcay Akman**, Illinois State University
Linda Allen, Texas Tech University
Timothy D. Comar, Benedictine University
Sophia Jang, Texas Tech University
Lih-Ing Roeger, Texas Tech University

- 1:00PM *Effect of host heterogeneity on the coevolution of parasite and host.*
 (1693) **Yiding Yang***, **Zhilan Feng**, Purdue University, **Dashun Xu**, Southern Illinois University, Carbondale, and **Dennis Minchella**, Department of Biological Sciences, Purdue University (1056-92-1396)
- 1:30PM *Is the resurgence of syphilis a backward bifurcation?*
 ▶ (1694) **Ruijun Zhao***, Purdue University, and **Fabio A. Milner**, Arizona State University (1056-92-1239)
- 2:00PM *A comparison of spatial interactions at different scales.*
 (1695) **Andrew L Nevai***, University of Central Florida, and **Benjamin M Bolker**, University of Florida (1056-92-1839)
- 2:30PM *Construction and Analysis of a New SIR Model.*
 (1696) **Ronald E. Mickens*** and **Sandra Rucker**, Clark Atlanta University (1056-92-416)
- 3:00PM *Dynamically consistent discrete-time Lotka-Volterra models.* Preliminary report.
 (1697) **Lih-Ing W Roeger**, Texas Tech University (1056-39-347)
- 3:30PM *Infectious diseases in amphibians: adults as reservoir for epidemics in larvae.*
 (1698) **Thanate Dhirasakdanon*** and **Horst R. Thieme**, Arizona State University (1056-92-413)
- 4:00PM *Mathematical Modeling of Data describing Worker Bee Aggression towards a Foreign Queen.*
 ▶ (1699) **Suzanne Sumner*** and **Wyatt A. Mangum**, University of Mary Washington (1056-92-501)
- 4:30PM *Discrete hierarchical competition with reward and cost of dispersion.*
 ▶ (1700) **Jemal S. Mohammed-Awel***, Valdosta State University, **Kbenesh W. Blayneh**, Florida A&M University, and **Abdul-Aziz Yakubu**, Howard University (1056-92-43)
- 5:00PM *Biological Data Mining and Analysis.* Preliminary report.
 ▶ (1701) **Alice L. Loth**, University of Massachusetts, Dartmouth (1056-92-1834)
- 5:30PM *Parameter Estimation and Uncertainty Quantification for an Epidemic Model.*
 (1702) **Alex Capaldi***, Center for Quantitative Sciences in Biomedicine and Department of Mathematics North Carolina State University, and **A. L. Lloyd**, Graduate Program in Biomathematics and Department of Mathematics North Carolina State University (1056-92-730)

AMS Special Session on Categorical and Algebraic Methods in Representation Theory, II

1:00 PM – 5:50 PM

Organizers: **Jon Brundan**, University of Oregon
Julia Pevtsova, University of Washington
Eric Friedlander, University of Southern California

- 1:00PM *A problem of Kollár and Larsen on finite linear groups and crepant resolutions.* Preliminary report.
 (1703) **Robert M. Guralnick**, University of Southern California, and **Pham Huu Tiep***, University of Arizona (1056-20-722)
- 1:30PM *Associated variety of simple finite-dimensional modules over classical Lie superalgebras and Kac-Wakimoto conjecture.* Preliminary report.
 (1704) **Vera Serganova**, UC Berkeley (1056-16-927)
- 2:00PM *Categorifying quantum groups.*
 (1705) **Aaron D Lauda**, Columbia University (1056-16-857)
- 2:30PM *On Khovanov-Lauda algebras.*
 (1706) **Aaron Lauda**, Columbia University, and **Monica Vazirani***, UC Davis (1056-05-479)
- 3:00PM *Representations of Khovanov-Lauda-Rouquier algebras and combinatorics of Lyndon words.*
 (1707) **Alexander Kleshchev***, University of Oregon, and **Arun Ram**, University of Melbourne (1056-17-464)
- 3:30PM *Categorification via Quiver Varieties.*
 (1708) **Anthony Licata***, Stanford, **Sabin Cautis**, Columbia, and **Joel Kamnitzer**, University of Toronto (1056-14-524)
- 4:00PM *Blocks in Deligne's category $Rep(S_t)$.*
 (1709) **Victor Ostrik**, University of Oregon (1056-20-502)
- 4:30PM *Generalized Trace and Dimension Functions in Ribbon Categories.*
 (1710) **Nathan Geer**, Utah State University, **Jonathan Kujawa***, University of Oklahoma, and **Bertrand Patureau-Mirand**, Université de Bretagne-Sud (1056-17-238)
- 5:00PM *On quantum foldings.* Preliminary report.
 (1711) **Arkady Berenstein**, University of Oregon, Eugene, and **Jacob Greenstein***, University of California, Riverside (1056-17-1394)
- 5:30PM *Colored tangle invariants and quantum $sl(2)$ categorification.*
 (1712) **Joshua Sussan**, University of California Berkeley (1056-16-1509)

AMS Special Session on Differential Galois Theory and Group Representations: A Tribute to Andy Magid, II

1:00 PM – 5:50 PM

Organizers: **James Carrell**, University of British Columbia
Lourdes Juan, Texas Tech University
Alex Lubotzky, Hebrew University
Brian Parshall, University of Virginia
Marius van der Put, University of Groningen

- 1:00PM *Iterated Antiderivative Extensions.* Preliminary report.
 (1713) **V. Ravi Srinivasan**, Rutgers University-Newark (1056-12-429)

- 1:30PM *Some 1- and n -cohomology results for finite and algebraic groups.* (1714)
Leonard L Scott, The University of Virginia (1056-20-1001)
- 2:00PM *Support varieties and complexity for algebraic, finite, and quantum groups.* Preliminary report. (1715)
Brian Parshall, University of Virginia (1056-20-861)
- 2:30PM *A Survey On Representation Zeta Functions.* (1716)
Nir Avni, Harvard University (1056-20-782)
- 3:00PM *Analogies between differential Galois theory and additive Galois structure theory.* Preliminary report. (1717)
Ted Chinburg*, University of Pennsylvania, **Lourdes Juan**, Texas Tech University, and **Andy Magid**, University of Oklahoma (1056-16-1103)
- 3:30PM *On a remarkable formula of Kostant and Macdonald, pattern avoidance and smoothness of Schubert varieties in a generalized flag variety.* (1718)
Jim Carrell, University of British Columbia (1056-14-1126)
- 4:00PM *Groups defined by arithmetic differential equations.* (1719)
Alexandru Buium, University of New Mexico (1056-11-384)
- 4:30PM *On subgroup induction in group representation and group cohomology.* (1720)
Eli Aljadeff* and **Ehud Meir**, Technion-Israel Institute of Technology (1056-20-592)
- 5:00PM *The Hall index of a subgroup of a free group.* (1721)
Shmuel Rosset, Mathematics, Tel Aviv University, Israel. (1056-20-1204)
- 5:30PM *Some Problems in Galois Theory and Representation Theory.* Preliminary report. (1722)
Andy R. Magid, University of Oklahoma (1056-13-1259)

AMS Special Session on Harmonic Analysis and Representations of Reductive p -adic Groups, II

1:00 PM – 5:50 PM

Organizers: **Robert Doran**, Texas Christian University
Paul Sally, University of Chicago
Loren Spice, Texas Christian University

- 1:00PM *Tame supercuspidal representations of $GL(n)$ distinguished by orthogonal groups.* (1723)
Joshua M Lansky* and **Jeffrey L Hakim**, American University (1056-22-1764)
- 1:30PM *Tamely ramified tori.* Preliminary report. (1724)
Jeffrey D Adler*, American University, and **Stephen M. DeBacker**, University of Michigan (1056-22-1820)
- 2:00PM *On the Heisenberg groups and Weil representations in characteristic 2.* Preliminary report. (1725)
Jiu-Kang Yu, Purdue University (1056-22-2018)
- 2:30PM *Revisiting the Local Langlands Correspondence for $GL(n, F)$, n a prime.* (1726)
Moshe Adrian, University of Maryland (1056-11-337)
- 3:00PM *Some irreducible representations of $SL(2, O)$, where O is the integer ring of a p -adic field.* Preliminary report. (1727)
Monica Nevins, University of Ottawa, Canada (1056-22-1293)
- 3:30PM *An application of Gamma asymptotic expansions.* Preliminary report. (1728)
Ju-Lee Kim, MIT (1056-22-1435)

- 4:00PM *Motivic integration and Harish-Chandra characters.* Preliminary report. (1729)
Raf Cluckers, University of Lille, **Clifton Cunningham**, University of Calgary, **Julia Gordon***, University of British Columbia, and **Loren Spice**, Texas Christian University (1056-22-1046)
- 4:30PM *Distinguished representations of reductive p -adic groups.* Preliminary report. (1730)
Fiona Murnaghan, University of Toronto (1056-22-463)
- 5:00PM *An Integral Formula of Shahidi.* (1731)
Steven T Spallone, University of Oklahoma (1056-22-829)
- 5:30PM *On the Langlands-Shahidi method for the classical groups in non-zero characteristic and applications.* Preliminary report. (1732)
Luis Alberto Lomeli, The University of Iowa (1056-22-117)

AMS Special Session on Integrability of Dynamical Systems and Solitons Equations, II

1:00 PM – 5:50 PM

Organizers: **Zhijun Qiao**, University of Texas-Pan American
Taixi Xu, Southern Polytechnic State University
Wenxiu Ma, University of South Florida

- 1:00PM *Solitons, boundary value problems and a nonlinear method of images.* (1733)
Gino Biondini*, SUNY at Buffalo, and **Guenbo Hwang**, University of Vermont (1056-35-1722)
- 1:30PM *The exact solutions of Lund-Regge equation and its soliton surfaces.* (1734)
Chunli Chen, Shanghai Jiao Tong University (1056-35-1498)
- 2:00PM *A Detailed Bifurcation Diagram and Semi-Analytic Solutions of the Forced Korteweg-de Vries Equation.* (1735)
Aaron S. Donahue and **Samuel S. P. Shen***, San Diego State University (1056-35-725)
- 2:30PM *Peakons of b -family and Qiao Equations.* Preliminary report. (1736)
Taixi Xu, Southern Polytechnic State University (1056-35-1606)
- 3:00PM *On the Lagrangian Description of Discrete Integrable Systems.* Preliminary report. (1737)
Anton Dzhamay, University of Northern Colorado (1056-39-1943)
- 3:30PM *Symmetries and algebras for a MKdV-type equation in $(2+1)$ -dimension.* Preliminary report. (1738)
Jun Yu, Institute of Nonlinear Science, Shaoxing University (1056-35-686)
- 4:00PM *Optical soliton perturbation by He's variational principle.* (1739)
Anjan Biswas, Delaware State University (1056-78-582)
- 4:30PM *A Novel Adaptive Method for SAR Jamming Suppression.* Preliminary report. (1740)
Feng Zhou*, **Guangcai Sun**, **Xueru Bai** and **Mengdao Xing**, National Key Laboratory for Radar Signal Processing (1056-78-864)
- 5:00PM *Study on ISAR imaging of steadily moving targets with large observation angles.* Preliminary report. (1741)
Xueru Bai*, **Mengdao Xing**, **Feng Zhou** and **Zheng Bao**, National Key lab. for radar signal processing (1056-78-708)

- 5:30PM *PDE Analysis and Cross-Range Imaging of Synthetic Aperture Radar*. Preliminary report.
 ▶ (1742) **Zhijun Qiao***, **Jaime Lopez** and **Guillermo Garza**, Univ Texas - Panam (1056-35-765)

AMS Special Session on Optimal Frames and Operator Algebras, II

1:00 PM – 5:50 PM

Organizers: **David Larson**, Texas A&M University
Deguang Han, University of Central Florida
Shidong Li, San Francisco State University

- 1:00PM *Dual Gramian Analysis and its development*.
 (1743) **Zuowei Shen**, National University of Singapore (1056-41-770)
- 1:30PM *Can one hear the shape of a fractal?*
 (1744) **Dorin Dutkay**, University of Central Florida (1056-46-781)
- 2:00PM *Irregular Gabor tight frames associated with rough windows*. Preliminary report.
 (1745) **Jean-Pierre Gabardo**, McMaster University (1056-42-819)
- 2:30PM *A Quantitative Notion of Redundancy*.
 (1746) **Peter Casazza**, University of Missouri, and **Gitta Kutyniok***, University of Osnabrueck (1056-42-854)
- 3:00PM *Gabor frames and Strichartz estimates*. Preliminary report.
 (1747) **Kasso A. Okoudjou**, University of Maryland (1056-41-906)
- 3:30PM *Function spaces and representations*.
 (1748) **Gestur Olafsson***, Louisiana State University, and **Jens Christensen**, University of Maryland and the Norbert Wiener Center (1056-46-1079)
- 4:00PM *Perturbations of finite frames and projections*.
 (1749) **Victor Kaftal***, University of Cincinnati, and **David R. Larson**, Texas A&M University (1056-47-1084)
- 4:30PM *Classification of filter systems giving rise to generalized multiresolution analyses*. Preliminary report.
 (1750) **Judith A Packer**, University of Colorado at Boulder (1056-42-1087)
- 5:00PM *Spectral sets for $\frac{1}{2^n}$ -Bernoulli convolutions*.
 (1751) **Keri Kornelson***, University of Oklahoma, **Palle Jorgensen**, University of Iowa, and **Karen Shuman**, Grinnell College (1056-47-1091)
- 5:30PM *Regularity for exact Gabor systems on a lattice*.
 (1752) **Alexander Powell***, Vanderbilt University, and **Christopher Heil**, Georgia Institute of Technology (1056-42-1145)

AMS Special Session on Parabolic Geometries, Integrable Systems, and Twistor Theory, II

1:00 PM – 5:50 PM

Organizers: **Dana Mihai**, Carnegie Mellon University
Jonathan Holland, University of Pittsburgh
George Sparling, University of Pittsburgh

- 1:00PM *Generic rank two distributions on five-manifolds and associated conformal structures*.
 (1753) **Katja Sagerschnig**, University of Vienna, Austria (1056-53-792)

- 1:30PM *Symplectification, Generalized Tanaka Prolongations, and Geometry of Distributions*. Preliminary report.
 (1754) **Igor Zelenko**, Texas A&M University (1056-53-805)
- 2:00PM *Local twistors and the conformal field equations*.
 (1755) **Jörg Frauendiener**, University of Otago (1056-53-375)
- 3:00PM *Third order odes and conformal Finsler geometries*.
 (1756) **Jonathan E Holland**, University of Pittsburgh (1056-53-593)
- 3:30PM *Variational calculus in non-commutative frames*. Preliminary report.
 (1757) **Irina A Kogan**, North Carolina State University (1056-53-551)
- 4:00PM *Non-compact Hopf Maps, Quantum Hall Effect, and Twistor Theory*. Preliminary report.
 ▶ (1758) **Kazuki Hasebe**, Takuma National College of Technology (1056-51-696)
- 4:30PM *Integrable models and the gauge/string duality*.
 (1759) **Radu S Roiban**, Pennsylvania State University (1056-00-2004)
- 5:00PM *The Chern-Moser chains of left-invariant CR structures on $SU(2)$ via Fefferman approach*.
 (1760) **Alex L Castro*** and **Richard Montgomery**, UCSC (1056-32-654)
- 5:30PM *The exceptional Lie group G_2 and gravity*.
 (1761) **George Arthur Sparling**, Laboratory of Axiomatics, University of Pittsburgh (1056-53-1661)

AMS Special Session on Permutations, II

1:00 PM – 5:50 PM

Organizers: **Persi Diaconis**, Stanford University
Ira M. Gessel, Brandeis University
Richard P. Stanley, Massachusetts Institute of Technology

- 1:00PM *Permutations associated with random interval partitions*. Preliminary report.
 ▶ (1762) **Jim Pitman**, University of California, Berkeley (1056-05-1620)
- 1:30PM *$n!$ matchings, $n!$ posets*.
 (1763) **Anders Claesson***, The Mathematics Institute, School of Computer Science, Reykjavik University, and **Svante Linusson**, KTH-Royal Institute of Technology (1056-05-1939)
- 2:00PM *The absence of a given pattern and the number of occurrences of another*.
 ▶ (1764) **Miklos Bona**, University of Florida (1056-05-932)
- 2:30PM *Extension of the d -divisible partition lattice*.
 (1765) **Richard Ehrenborg*** and **JiYoon Jung**, University of Kentucky (1056-05-1585)
- 3:00PM *Bijjective enumeration of permutations starting with a longest increasing subsequence*.
 (1766) **Greta Panova**, Harvard University (1056-05-1077)
- 3:30PM *From random permutations to random matrices — an alternative for RSK*.
 (1767) **Alexei Borodin**, California Institute of Technology (1056-05-2152)
- 4:00PM *Carries and shuffling*.
 ▶ (1768) **Persi Diaconis**, Stanford University, and **Jason Fulman***, University of Southern California (1056-05-1709)
- 4:30PM *Distribution of Segment Lengths in Genome Rearrangements*.
 (1769) **Glenn P Tesler**, University of California, San Diego (1056-05-2013)

- 5:00PM *Permutation problems.*
 ▶ (1770) **Donald E. Knuth**, Stanford University (1056-05-168)
- 5:30PM *How to encipher small messages: Encryption using the Thorp shuffle.*
 (1771) **Ben J Morris***, **Phillip Rogaway** and **Till Stegers**, UC Davis (1056-60-1404)

MAA Minicourse #1: Part B

1:00 PM – 3:00 PM

Remodeling data analysis.
 Organizers: **Daniel Kaplan**, Macalester College
Vittorio Addona, Macalester College

MAA Minicourse #5: Part B

1:00 PM – 3:00 PM

Active learning approaches for the foundational mathematics for elementary teachers courses.
 Organizers: **Laurie J. Burton**, Western Oregon University
Cheryl Beaver, Western Oregon University
Klay Thomas Kruczek, Western Oregon University

AMS Session on Geometry and Topology, IV

1:00 PM – 5:25 PM

- 1:00PM *Weak Solutions to a Degenerate Monge-Ampère Type Equation on Kähler Surfaces.*
 (1772) **Arvind S. Rao**, University of Iowa (1056-53-187)
- 1:15PM *Low dimensional cohomogeneity one manifolds.*
 (1773) **Corey A. Hoelscher**, Rutgers University (1056-53-509)
- ▶ 1:30PM *Duality Properties of Indicatrices of Knots.*
 (1774) **Charmaine Sia**, Massachusetts Institute of Technology (1056-53-566)
- 1:45PM *Volume of Meromorphic Vector fields on Flat Tori.*
 (1775) Preliminary report.
Amine Fawaz, The University of Texas of the Permian Basin (1056-53-728)
- 2:00PM *Symmetric Almost r -Paracontact Connections.*
 (1776) Preliminary report.
Andrew Bucki, Langston University (1056-53-1127)
- 2:15PM Break
- 2:30PM *Singular reduction of generalized complex manifolds.*
 (1777) **Timothy E Goldberg**, Cornell University (1056-53-1467)
- 2:45PM *Behavior of the Chern-Simons forms under the Ricci flow.*
 (1778) **Christopher R Godbout**, Lehigh University (1056-53-1720)
- 3:00PM *Curvature-adapted hypersurfaces of 2-type in quaternion space forms.*
 (1779) **Ivko M Dimitric**, Penn State University Fayette (1056-53-1752)
- 3:15PM *Uniqueness of folded symplectic toric manifolds.*
 (1780) Preliminary report.
Christopher R Lee, University of Portland (1056-53-2066)

- 3:30PM *Characteristics of a Classical and Quantum Two-Sphere Singularity.*
 (1781) **Deborah A. Konkowski***, U.S. Naval Academy, and **Thomas M. Helliwell**, Harvey Mudd College (1056-83-884)
- 3:45PM Break
- 4:00PM *Local uniqueness of Minkowski space.*
 (1782) **Didier A. Solis*** and **Luis A. Farfan**, Universidad Autonoma de Yucatan (1056-83-1577)
- 4:15PM *A spectral notion of Gromov-Wasserstein distances.*
 (1783) **Facundo Memoli**, Stanford University, Mathematics (1056-68-440)
- 4:30PM *A Mathematical Theory of Stochastic Microensing.*
 (1784) **Alberto M Tegui***, **Archie O. Petters**, Duke University, and **Brian Rider**, University of Colorado (1056-83-1767)
- 4:45PM *Geometric properties of continued fractions.*
 (1785) **Avraham Bourla**, University of Connecticut at Storrs (1056-52-595)
- 5:00PM *A new argument for the exactness at the $(n+1)$ -thickening term in the C.T.C Wall's exact sequence for thickenings.*
 (1786) **Mokhtar B. Aouina**, Jackson State University (1056-55-1671)
- ▶ 5:15PM *Resolvable maps preserve complete metrizability.*
 (1787) **Su Gao** and **Vincent Kieftenbeld***, University of North Texas (1056-54-408)

AMS Session on Research by Undergraduates, II

1:00 PM – 5:55 PM

- 1:00PM *The Fractal Beauty of Byzantine Music.*
 (1788) **Firas Y Hindeleh** and **Jessica R Sears***, Grand Valley State University (1056-37-717)
- ▶ 1:15PM *Manifolds with Density as Quotients of Riemannian Manifolds.*
 (1789) **Alexander Diaz**, Universidad de Puerto Rico, Mayaguez, **Nathan Harman***, University of Massachusetts, Amherst, **Sean Howe**, University of Arizona, and **David Thompson**, Williams College (1056-53-101)
- ▶ 1:30PM *Isoperimetric Regions in Planar Sectors with Density r^p .*
 (1790) **Alexander Diaz**, University of Puerto Rico, **Nate Harman**, University of Massachusetts - Amherst, **Sean P Howe***, University of Arizona, and **David Thompson**, Williams College (1056-53-100)
- ▶ 1:45PM *The Spherical Stick Index and Compositions of Trefoils.*
 (1791) **Colin Adams**, Williams College, **Dan Collins***, Cornell University, **Katherine Hawkins**, Williams College, **Charmaine Sia**, Massachusetts Institute of Technology, **Rob Silversmith**, Williams College, and **Bena Tshishiku**, Washington and Lee University (1056-57-546)
- ▶ 2:00PM *The game chromatic index of trees.*
 (1792) **Charles Dunn**, Linfield College, **David Morawski***, University of California, Berkeley, and **Jennifer Nordstrom**, Linfield College (1056-00-435)
- 2:15PM *Moduli spaces of low dimensional associative algebras and their deformations.*
 (1793) **Daniel Joseph Wackwitz*** and **Michael Robert Penkava**, University of Wisconsin-Eau Claire (1056-16-1344)
- ▶ 2:30PM *Proving Summation Identities: The WZ Method versus Counting.*
 (1794) **Timothy D. Ferdinandis**, Calvin College & Grand Valley State University REU (1056-05-1545)

- 2:45PM *An elementary proof of Touchard's Congruence.*
▶ (1795) **Gregory B Hurst**, University of Illinois at Urbana (1056-05-992)
- 3:00PM *Competitive Graph Coloring on Outerplanar Graphs.* Preliminary report.
▶ (1796) **Cassandra Naymie***, University of Waterloo, **Charlie Suer**, University of Dayton, and **Erin Pitney**, Beaverton School District (1056-05-1330)
- 3:15PM *On λ -fold Rosa-type Labelings.*
(1797) **Jeffrey Mudrock***, University of Illinois, Champaign-Urbana, **Lucas Allen**, Morton High School, **Ryan Bunge**, Normal Community High School, **Saad El-Zanati**, **Daniel Gannon**, **Kyle Knee**, Illinois State University, and **Jessica Smith**, Morehead State University (1056-05-1749)
- 3:30PM *On Cyclic Cycle Plus a Chord Designs.*
▶ (1798) **Desiree Masters***, Dunlap High School, **Ryan Bunge**, Normal Community High School, **Saad El-Zanati**, Illinois State University, **Theresa Kamykowski**, Loyola University, Chicago, and **Isai Almeida-Arrieta**, Western Michigan University (1056-05-1775)
- 3:45PM *Minimal Sufficient Sets and the Commutativity of Patterns.*
▶ (1799) **Zhexiu Tu***, Bard College, and **Olivia Walch**, College of William and Mary (1056-15-1428)
- 4:00PM *Inverse Inertia Problem for Graphs.*
▶ (1800) **Emily McHenry***, Xavier University, and **Robert Lang**, Florida Atlantic University (1056-15-355)
- 4:15PM *Sudoku, Shidoku, and . . . Gröbner Bases? An Algebraic and Computer Systems Approach to Counting Equivalent Puzzles.* Preliminary report.
▶ (1801) **Matthew J. Menickelly*** and **Katharina M. Carella**, James Madison University (1056-14-1419)
- 4:30PM *Galois groups via Galois modules in Artin-Schreier theory.* Preliminary report.
▶ (1802) **Jennifer S Berg**, University of Illinois at Urbana-Champaign (1056-12-1534)
- 4:45PM Break
- 5:00PM *Some Remarks on Diophantine Triples.* Preliminary report.
▶ (1803) **Xuemei Ye*** and **Aklilu Zeleke**, Michigan State University (1056-11-1637)
- 5:15PM *Rubric-scored Assessments: A Study of Inter-rater Reliability.* Preliminary report.
▶ (1804) **Loree Kim Killebrew*** and **Xinyan Yan**, Birmingham-Southern College (1056-62-814)
- 5:30PM *Steady State Rimming Flow of non-Newtonian Fluid.*
▶ (1805) **Jared Debrunner***, California State University, Chico, **Anton Mazurenko**, Massachusetts Institute of Technology, **Brent Nelson**, University of Illinois at Urbana-Champaign, and **Sergei Fomin**, California State University, Chico (1056-76-773)
- 5:45PM *A study of a two species battle between an intelligent army and insurgent defenders.*
▶ (1806) **Nicholas De Meglio**, **Rebecca Hager***, **Jorge Wu Mok**, **Matthew Westley**, University at Buffalo, and **Surajit Sen**, Physics Department, University at Buffalo (1056-91-1704)
- 1:15PM *Forbidden Subgraphs in Oriented Line Graphs.*
(1808) **Elizabeth Moseman***, USMA at West Point, and **Chris Storm**, Adelphi University (1056-05-1315)
- 1:30PM *Some Results On λ -Designs With Two Block Sizes.* Preliminary report.
(1809) **Tariq Akef Alraqad***, Northern State University, and **Mohan Shrikhande**, Central Michigan University (1056-05-1319)
- 1:45PM *Using Analysis of Algorithms to Derive Combinatorial Equalities.*
▶ (1810) **Amy Mihnea**, Florida Atlantic University (1056-05-1377)
- 2:00PM *Minimal Percolating Sets in Trees.*
(1811) **Eric Riedl**, University of Notre Dame (1056-05-1386)
- 2:15PM *Intermediate Ordered Colorings of Graphs.*
▶ (1812) **Darren A Narayan**, Rochester Institute of Technology (1056-05-1139)
- 2:30PM *Spectra of Coronae.*
▶ (1813) **C McLeman** and **E M McNicholas***, Willamette University (1056-05-1391)
- 2:45PM *The Excess Range of Factorizations of Regular Graphs.* Preliminary report.
(1814) **Sarah-Marie Belcastro*** and **Michael Young**, Smith College (1056-05-1478)
- 3:00PM Break
- 3:15PM *A graph-theoretic generalization of the Erdős-Ko-Rado theorem.*
(1815) **Vikram M. Kamat*** and **Glenn Hurlbert**, Arizona State University (1056-05-1519)
- 3:30PM *First-Fit coloring of p -tolerance graphs.*
(1816) **Karin R. Saoub***, Roanoke College, and **H. A. Kierstead**, Arizona State University (1056-05-1636)
- 3:45PM *Spectral Properties of Abelian Gain Graphs.* Preliminary report.
(1817) **Nathan H Reff**, Binghamton University (1056-05-1796)
- 4:00PM *Multigraph Detachments, Hamiltonian Decompositions and Graph Embeddings.*
(1818) **M Amin Bahmanian*** and **C A Rodger**, Auburn University (1056-05-1806)
- 4:15PM *A probability method to prove combinatorial identities.*
▶ (1819) **Tong Zhu**, University of Pennsylvania (1056-05-1863)
- 4:30PM *The Hamiltonian decomposition problem for Cayley graphs on abelian groups.*
▶ (1820) **Erik E Westlund**, Michigan Technological University (1056-05-1999)
- 4:45PM *Vertex coloring of graphs by total 2-weightings.*
(1821) **Jonathan Darren Hulgán***, The University of Memphis, **Jeno Lehel**, The University of Memphis; Computer and Automation Research Institute, Hungarian Academy of Sciences, **Kenta Ozeki**, Keio University, and **Kiyoshi Yoshimoto**, Nihon University (1056-05-2083)

AMS Session on Optimization and Control

1:00 PM – 5:25 PM

- 1:00PM *Generalized Steiner and Schwarz Symmetrization.*
(1822) **Frank Morgan***, Williams College, **Alexander Diaz**, University of Puerto Rico, **Nate Harman**, University of Massachusetts, Amherst, **Sean Howe**, University of Arizona, and **David Thompson**, Williams College (1056-49-401)

AMS Session on Discrete Mathematics, VI

1:00 PM – 4:55 PM

- 1:00PM *Characterizing linear programming pseudocodewords using graphical methods.*
(1807) **Nathan Axvig**, University of Nebraska-Lincoln (1056-05-1281)

- 1:15PM *Higher Order Sufficient Conditions for Strict Minimality in Smooth Scalar Optimization.*
(1823) **Elena Constantin**, University of Pittsburgh at Johnstown (1056-49-1049)
- 1:30PM *The asymptotic behavior of power-law functionals and applications.*
(1824) **Cristina Popovici**, NDSU (1056-49-1104)
- 1:45PM *On the Principle of Smooth Fit for Some Convex Optimal Control Problems.*
(1825) **Jesus A. Pascal**, American University of Nigeria (1056-49-1194)
- ▶ 2:00PM *Optimal Control and its Application to Hepatitis C Treatment.*
(1826) **Siddhartha P. Chakrabarty**, Indian Institute of Technology Guwahati, India, and **Hem R Joshi***, Xavier University, Cincinnati OH (1056-49-1645)
- 2:15PM Break
- ▶ 2:30PM *Application of Nonlinear Optimization in the Design of a Doubly Convergent Multiple-Beam Electron Gun.*
(1827) **Adam Attarian***, **Tallis J William**, **Hien T Tran**, North Carolina State University, and **Lawrence Ives**, Calabazas Creek Research, Inc. (1056-49-1654)
- 2:45PM *The Minimal Time Problem On Stratified Domains.*
(1828) **Richard C Barnard*** and **Peter R Wolenski**, Louisiana State University (1056-49-1675)
- 3:00PM *Analysis of Tendon-Reinforced Piecewise-Isotropic Pressurized Membranes.*
(1829) **Michael C. Barg***, Niagara University, **Jieun Lee** and **Frank Baginski**, The George Washington University (1056-49-1690)
- ▶ 3:15PM *Sensitivity-Based Optimization Applied to Equations Modeling Film Casting.*
(1830) **David C Szurley**, Francis Marion University (1056-49-1702)
- 3:30PM *Morrey Regularity for Asymptotically Convex Variational Problems with (p, q) Growth.*
(1831) **Kyle Fey*** and **Mikil Foss**, University of Nebraska - Lincoln (1056-49-1850)
- 3:45PM *A Modified Piecewise Constant Mumford-Shah Model Based Simultaneous Image Segmentation and Registration.* Preliminary report.
(1832) **Jung-Ha An***, California State University Stanislaus, and **Yunmei Chen**, University of Florida (1056-49-1967)
- 4:00PM Break
- 4:15PM *Generalized shearlets and the extended metaplectic group.*
(1833) **Emily J King***, National Institutes of Health / Norbert Wiener Center UMD, and **Wojciech Czaja**, University of Maryland (1056-43-1718)
- ▶ 4:30PM *Remarks on the Apportionment of the U. S. House of Representatives.* Preliminary report.
(1834) **Daniel D Sheng***, Westwood High School, and **Edwin Oxford**, Baylor University (1056-00-511)
- 4:45PM *An Estimate of The Radius of an Attraction Ball for TV-Minimization Problems in Image Denoising.*
(1835) **L. A. Melara***, Shippensburg University, and **A. J. Kearsley**, NIST (1056-90-1776)
- 5:00PM *Production Inventory Planning in a Stochastic Manufacturing System with Discounted Cost.*
(1836) **Anton Abdulbasah Kamil*** and **Md Azizul Baten**, Universiti Sains Malaysia (1056-90-176)
- 5:15PM *Relaxed Matching for the Method of Controlled Lagrangians.*
(1837) **David A Long***, North Carolina State University, **Anthony M Bloch**, University of Michigan, **Jerrold E Marsden**, California Institute of Technology, and **Dmitry V Zenkov**, North Carolina State University (1056-70-1372)

AMS Session on Computational Math, IV

1:00 PM – 2:40 PM

- 1:00PM *Optimization in Developing Prediction Scoring Function for Mutagenesis Solubility.*
(1838) **Ye (Alice) Tian**, Washington State University (1056-90-2129)
- ▶ 1:15PM *Applications of Ensemble based Simulated Annealing to Intensity Modulated Radiation Therapy Planning (IMRTP).* Preliminary report.
(1839) **Abebaw Tadesse*** and **Franklin Fondjo Fotou**, Langston University (1056-90-608)
- 1:30PM *Multiresolution Shannon-type wavelet on the Heisenberg group.*
(1840) **Azita Mayeli**, City University of New York (1056-43-755)
- 1:45PM *Equivalence of Curves Under Generalized Weak Perspective Projection.*
(1841) **Joseph M Burdis*** and **Irina A Kogan**, North Carolina State University (1056-00-626)
- ▶ 2:00PM *Extraction of Transport Coefficients in Stochastic Production Systems.*
(1842) **Ali Kemal Unver**, Coral Academy of Science Las Vegas (1056-90-1745)
- 2:15PM *Closure of a Saint Venant model for free surface flows on an open channel with cross stream variation of the bottom roughness.*
(1843) **Ahmed Kaffel***, Virginia Tech, **Amel Soualmia**, LMHE, and **Masbernat Lucien**, IMFT (1056-70-1432)
- ▶ 2:30PM *Modeling Network Traffic as a Filtered Semi-Markov-Process.* Preliminary report.
(1844) **Ahlam E Tannouri*** and **Sam F Tannouri**, Morgan State University (1056-90-2041)

MAA Session on Innovative and Effective Ways to Teach Linear Algebra, II

1:00 PM – 5:15 PM

- Organizers: **David M. Strong**, Pepperdine University
Gilbert Strang, Massachusetts Institute of Technology
David C. Lay, University of Maryland
- 1:00PM *Linear Algebra Done Right! Back to Grassmann.*
(1845) **K. Rohan Attele***, **Dan Hrozencik** and **Victor Akatsa**, Chicago State University (1056-G1-2056)
- 1:20PM *One course to serve them all: mathematicians, computer scientists, and engineers.*
(1846) **David Mazur**, Western New England College (1056-G1-1707)
- ▶ 1:40PM *Learning technology to teach mathematics.*
(1847) **Josep Ferrer***, Universitat Politècnica de Catalunya, **Carmen Ortiz**, Universidad de Extremadura, and **Marta Pena**, Universitat Politècnica de Catalunya (1056-G1-600)
- ▶ 2:00PM *Use of Technology in Teaching the Mathematics of Linear Algebra.* Preliminary report.
(1848) **Carl C. Cowen**, IUPUI (1056-G1-587)
- ▶ 2:20PM *ICT Linear algebra class model with Sage-math.*
(1849) **Sang-Gu Lee*** and **Duk-Sun Kim**, Sungkyunkwan University (1056-G1-1131)
- ▶ 2:40PM *Enhancing Students' Attitudes towards Linear Algebra with Technology.*
(1850) **Karsten Schmidt**, Schmalkalden University of Applied Sciences, Germany (1056-G1-378)

- ▶ 3:00PM *Programming Linear Algebra.*
(1851) **Daniel R. Jordan**, Columbia College Chicago (1056-G1-1380)
- ▶ 3:20PM *Looking at Conceptual Online Linear Algebra applets.*
(1852) **David E. Meel**, Bowling Green State University (1056-G1-1931)
- ▶ 3:40PM *Matrix Multiplication and Applications: A Chicken and Egg Problem.*
(1853) **Murphy Waggoner**, Simpson College (1056-G1-411)
- ▶ 4:00PM *Inverses for Matrices that Don't Have Inverses.*
(1854) **Jeffrey L. Stuart**, Pacific Lutheran University (1056-G1-958)
- ▶ 4:20PM *Inclusion of new applications in a Linear Algebra course, without compromising the coverage of the traditional topics.*
(1855) **Mohammad Khadivi**, Jackson State University (1056-G1-970)
- ▶ 4:40PM *Using Linear Algebra to Measure Power.*
(1856) **Jennifer Wilson***, Eugene Lang College the New School for Liberal Arts, **Karolyne Fogel**, California Lutheran University, **Kay Somers**, Moravian College, and **Angela Spalsbury**, Youngstown State University (1056-G1-1528)
- ▶ 5:00PM *Applying Image Processing Techniques to Promote Conceptual Understanding in Linear Algebra Classes.* Preliminary report.
(1857) **Jen-Mei Chang*** and **Xuhui Li**, California State University, Long Beach (1056-G1-111)

MAA Session on Arts and Mathematics, II

1:00 PM – 5:35 PM

Organizer: **Douglas E. Norton**, Villanova University

- ▶ 1:00PM *Material Properties of hyperbolic space in relation to history of clothing.* Preliminary report.
(1858) **Rebecca E. Field**, James Madison University (1056-C1-2131)
- ▶ 1:20PM *Symmetry Preference and Meaning in Tibetan Sand Mandalas.*
(1859) **Valerie Ng** and **Darrah Chavey***, Beloit College (1056-C1-1887)
- ▶ 1:40PM *Modeling Heraldic Design Using Shape Grammars.* Preliminary report.
(1860) **Barbara A. Ashton**, BMCC - City University of New York (1056-C1-1547)
- ▶ 2:00PM *Hyperbolic Conic Section through Kinetic Sculpture.*
(1861) **Jeff Chyatte**, Montgomery College (1056-C1-1410)
- ▶ 2:20PM *Mathematics, art, and the Fusion Project.* Preliminary report.
(1862) **Benjamin Wells**, University of San Francisco (1056-C1-1320)
- ▶ 2:40PM *The Mathematical Development of Music.*
(1863) **Alan Levine**, Franklin and Marshall College (1056-C1-1236)
- ▶ 3:00PM *Group explorations and art projects in a mathematics of art course for first-year students.*
(1864) **Debra L. Hydorn**, University of Mary Washington (1056-C1-1757)
- ▶ 3:20PM *What is sangaku?* Preliminary report.
(1865) **Peter N Wong**, Bates College (1056-C1-382)
- ▶ 3:40PM *Writing Critically with Enthusiasm for Mathematicians.*
(1866) **Suzanne Galayda***, New Mexico State University, and **Alexandra D'Italia**, Southwestern Law School (1056-C1-1405)

- ▶ 4:00PM *Visualizing the Dynamics of the Unit Circle Group.* Preliminary report.
(1867) **Anne M. Burns**, Long Island University, C.W. Post Campus (1056-C1-353)
- ▶ 4:20PM *A Feigenbaum Face.*
(1868) **Ann Robertson**, Connecticut College (1056-C1-1955)
- ▶ 4:40PM *Lithographs Representing Some Mathematical Topics.*
(1869) **Lisl Gaal**, University of Minnesota (1056-C1-1789)
- ▶ 5:00PM *Monument to Error, Perspectives: The Love of Form, and Solution Set.*
(1870) **Jeffrey M Groah**, Lone Star College-Montgomery (1056-C1-392)
- ▶ 5:20PM *Further Aesthetic Explorations in Phase Space.*
(1871) **Douglas E. Norton**, Villanova University (1056-C1-1801)

MAA Session on General Contributed Papers, XII

1:00 PM – 5:10 PM

Organizers: **Eric S. Marland**, Appalachian State University
Daniel J. Curtin, Northern Kentucky University

- ▶ 1:00PM *On Determining the Number of Clusters—An Empirical Study of Different Algorithms.*
(1872) **Brian Bies**, Washington University in St Louis, **Kathryn Dabbs**, University of Tennessee, and **Hao Zou***, Macalester College (1056-Z1-1500)
- ▶ 1:15PM *The Spaghetti Model: DNA Sequencing using Graph Theory.*
(1873) **Faun C. C. Doherty**, **Peter A. Gentile***, **Jennifer M. Magee** and **Christian J. Miedel**, Washington and Jefferson College (1056-Z1-240)
- ▶ 1:30PM *Uniquely H-Saturated Graphs.*
(1874) **Joshua Cooper**, University of South Carolina, **John Lenz**, **Timothy LeSaulnier**, **Paul Wenger*** and **Douglas B. West**, University of Illinois at Urbana-Champaign (1056-Z1-1195)
- ▶ 1:45PM *A vertex ordering result for an application of DNA sequencing using tripartite unit probe interval graphs.*
(1875) **Faun C. C. Doherty**, **Christian J. Miedel***, **Peter A. Gentile** and **Jennifer M. Magee**, Washington and Jefferson College (1056-Z1-239)
- ▶ 2:00PM *Higher Reciprocity.* Preliminary report.
(1876) **Nancy Carol Buck**, University of North Carolina Greensboro (1056-Z1-754)
- ▶ 2:15PM Break.
- ▶ 2:30PM *A connectivity preserving discontinuous function.*
(1877) **Jeffrey M Groah**, Lone Star College-Montgomery (1056-Z1-389)
- ▶ 2:45PM *PTA(9)s fixed under multiplier -1.*
(1878) **Chirashree Bhattacharya**, Randolph-Macon College (1056-Z1-1795)
- ▶ 3:00PM *Linear Operators and Zeros of Polynomials.* Preliminary report.
(1879) **Andrzej Piotrowski**, University of Alaska Southeast (1056-Z1-2038)
- ▶ 3:15PM *Be the Volume: A hands-on method for presenting the estimation of volume under a surface.*
(1880) **Jessica M Mikhaylov**, U.S. Military Academy, West Point (1056-Z1-1282)
- ▶ 3:30PM *Dual Enrollment vs Duel Enrollment.*
(1881) **Larry Bouldin*** and **Benjamin King**, Roane State Community College (1056-Z1-1364)

- 3:45PM *Is Mathematics Indispensable and Are Pre-requisites Needed in Mathematics Courses?*
(1882) **Padraig M. McLoughlin**, Kutztown University of Pennsylvania (1056-Z1-356)
- ▶ 4:00PM *Teaching a Course on Women in Mathematics.*
(1883) Preliminary report.
Cynthia J Woodburn, Pittsburg State University (1056-Z1-516)
- 4:15PM *A Basic College Level Mathematics course for a lay man knowing only four basic operations with nonnegative integers.*
(1884) **Santanu Chakraborty**, University of Texas - Pan American, Edinburg, Texas (1056-Z1-80)
- ▶ 4:30PM *Experiences in Recruiting, Retention and Graduation in the Kean STEM Scholarship Program.*
(1885) **Louis Beaugris***, **Pablo Zafra** and **Kikombo NGoy**, Kean University (1056-Z1-875)
- ▶ 4:45PM *Riverbend Community Math Center – Promoting mathematical thinking in local elementary and middle schools.* Preliminary report.
(1886) **Amanda Katharine Serenevy**, Riverbend Community Math Center (1056-Z1-989)
- 5:00PM *Reversing the Pattern of Low Performance in College Algebra Using the National Center for Academic Transformations' Roadmap Model.*
(1887) **A. Dale Magoun***, **A. Serpil Saydam** and **Charlotte H. Owens**, University of Louisiana at Monroe (1056-Z1-833)

MAA Session on Mathlets for Teaching and Learning Mathematics

1:00 PM – 5:35 PM

Organizers: **Joe Yanik**, Emporia State University
Thomas E. Leathrum, Jacksonville State University
David M. Strong, Pepperdine University

- ▶ 1:00PM *Mathlets for Visualizing the Geometry of Numbers.*
(1888) **Karl-Dieter Crisman**, Gordon College (1056-K1-1741)
- ▶ 1:20PM *Number Lab: Experiencing Numbers.*
(1889) **David B Posner**, Napa CA (1056-K1-302)
- 1:40PM *National Curve Bank.*
(1890) **Shirley B. Gray**, California State University, Los Angeles (1056-K1-119)
- ▶ 2:00PM *Retrieving old mathematics with new technology.*
(1891) **Susan L. Addington**, California State University, San Bernardino (1056-K1-1810)
- ▶ 2:20PM *Linear programming with mathlets.*
(1892) **H. Smith Risser**, Montana Tech (1056-K1-189)
- 2:40PM *A Picture is Worth a Thousand Words in Geogebra.*
(1893) **Joanne C Caniglia**, Kent State University (1056-K1-150)
- ▶ 3:00PM *Multivariable Calculus Java Applets with Blaise.*
(1894) Preliminary report.
Elisha Peterson, United States Military Academy (West Point) (1056-K1-1272)
- ▶ 3:20PM *Geometric Constructions as Interactive Java Applets with Feedback Feature.*
(1895) **Tibor Marcinek**, Central Michigan University (1056-K1-1474)
- ▶ 3:40PM *Dynamic Visualization Tools for Multivariable Calculus.* Preliminary report.
(1896) **Paul E Seeburger**, Monroe Community College (1056-K1-907)

- ▶ 4:00PM *Hypothesis Testing: Tools for Exploration and Practice.*
(1897) **Sarah L Mabrouk**, Framingham State College (1056-K1-1486)
- 4:20PM *Google-opoly.*
(1898) **Tim Chartier**, Davidson College (1056-K1-1532)
- ▶ 4:40PM *The Lurch Project: Validation on Demand.*
(1899) Preliminary report.
Nathan Carter, Bentley University, **Paul F Christiano**, MIT, and **Kenneth G Monks***, University of Scranton (1056-K1-1588)
- ▶ 5:00PM *Applets for Discovery and Assessment in Math for Liberal Studies.*
(1900) **Doug Ensley*** and **James Hamblin**, Shippensburg University (1056-K1-1966)
- ▶ 5:20PM *Graph2D: An Interactive Graphing Library using the HTML Canvas.*
(1901) **R. Alexander Milowski**, San Francisco, CA (1056-K1-1499)

MAA Session on Research on the Teaching and Learning of Undergraduate Mathematics, II

1:00 PM – 4:55 PM

Organizers: **Keith Weber**, Rutgers University
Stacy Brown, Pitzer College
Natasha A. Speer, University of Maine
Karen A. Marrongelle, Portland State University

- ▶ 1:00PM *Early Eigen Thinking: Students' Interpretations of the Matrix Equation $Ax=2x$.*
(1902) **Christine Larson***, Indiana University, **Michelle Zandieh**, Arizona State University, **Chris Rasmussen** and **Frances Henderson**, San Diego State University (1056-P5-1366)
- ▶ 1:40PM *Investigating Student Conceptions of Function Composition.* Preliminary report.
(1903) **Stacey A. Bowling**, Arizona State University (1056-P5-1101)
- 2:00PM *How beginning teachers understand student thinking in calculus.* Preliminary report.
(1904) **Thomas W Judson***, Stephen F. Austin State University, and **Matthew Leingang**, New York University (1056-P5-680)
- ▶ 2:20PM *The Role of Angle Measure and the Radius as a Unit of Measurement in Developing Coherent Understandings of Trigonometric Functions.*
(1905) **Kevin C. Moore**, Arizona State University (1056-P5-671)
- ▶ 2:40PM *Parameter or variable or unknown? The special case of the definite integral.* Preliminary report.
(1906) **May F Hamdan**, Lebanese American University (1056-P5-446)
- ▶ 3:00PM *Students' Understandings of Equivalence Relations.*
(1907) **Jim Brandt**, Southern Utah University (1056-P5-1956)
- ▶ 3:20PM *Learning the phase plane: How two students' understandings of time and rate affected their learning of exponential functions.*
(1908) **Carlos W Castillo-Garsow**, Arizona State University (1056-P5-1568)
- ▶ 3:40PM *The Role of Homework in Developing Students' Mathematical Conceptions.* Preliminary report.
(1909) **Eric D Weber*** and **Marilyn P Carlson**, Arizona State University (1056-P5-303)

- 4:00PM *Enhancing Undergraduate Students' Views and Experiences of Learning Mathematics in Inquiry-Based Learning Contexts.*
▶ (1910) **Marja-Liisa Hassi***, **Sandra Laursen** and **Anne-Barrie Hunter**, Ethnography & Evaluation Research, University of Colorado at Boulder (1056-P5-1694)
- 4:20PM *Researching the Integration of Mathematical and Educational Perspectives in Mathematics Teacher Preparation.* Preliminary report.
(1911) **Rebecca H McGraw*** and **Priya Prasad**, University of Arizona (1056-P5-1692)
- 4:40PM *A Theoretical Framework for Designing Professional Development Workshops for Mathematics Faculty.*
▶ (1912) **Stan T Yoshinobu**, California State Polytechnic University, San Luis Obispo (1056-P5-622)

MAA Session on Visualization in Mathematics, II

1:00 PM – 5:15 PM

Organizers: **Sarah J. Greenwald**, Appalachian State University
Walter Whiteley, York University

- 1:00PM *Visual Analytics to Explore Elementary Probability.*
▶ (1913) Preliminary report.
James D. Factor, Alverno College, and **Edmond J. Nadler***, Eastern Michigan University (1056-R5-2027)
- 1:20PM *Visualization via Excel in Mentoring Mathematics Faculty of a Developing Nation.*
▶ (1914) **Deane E. Arganbright**, Divine Word University, Madang, Papua New Guinea (1056-R5-362)
- 1:40PM *Using Computer Graphics as an Aid to Visualizing Functions of a Complex Variable.*
▶ (1915) **Laurene V. Fausett**, TAMU-Commerce (1056-R5-252)
- 2:00PM *Efficient Graph Visualization for Applications: Databases, Data Mining, and Video Games.*
(1916) **Charles Andrew Tannouri**, Towson University (1056-R5-1978)
- 2:20PM *Confluent Graphs: Making Graphs Pretty.*
▶ (1917) **Talitha M Washington**, University of Evansville (1056-R5-1614)
- 2:40PM *Pedagogical Understanding of Non-Textual Elements in Mathematics Textbooks among Teachers and Curriculum Developers.* Preliminary report.
(1918) **Rae Young Kim*** and **Sharon Senk**, Michigan State University (1056-R5-2045)
- 3:00PM *Diagrams in Abstract Algebra: How are Diagrams used in the Proving Process?* Preliminary report.
▶ (1919) **Nissa Yestness**, University of Northern Colorado (1056-R5-2072)
- 3:20PM *Visualization Lessons from Visual Group Theory.*
(1920) **Nathan Carter**, Bentley University (1056-R5-1812)
- 3:40PM *Visualizing the polyhedral geometry of algebraic systems.*
▶ (1921) **Marshall Hampton**, University of Minnesota Duluth (1056-R5-290)
- 4:00PM *Visualization for the Simulation of the Chemical Vapor and Infiltration Process.*
(1922) **Joyati Debnath***, Winona State University, Winona, MN, **Srabasti Dutta**, College of Saint Elizabeth, and **Andrew Jones**, Florida A&M University (1056-R5-657)
- 4:20PM *Educational Applications of Projective Geometry.*
▶ (1923) Preliminary report.
David Booth, Austin Texas (1056-R5-1064)

- 4:40PM *Projective Geometry as a Vehicle for Schooling the Imagination, I.*
▶ (1924) **Martin Levin**, Silver Spring, MD (1056-R5-1090)
- 5:00PM *Projective Geometry as a Vehicle for Schooling the Imagination II.*
(1925) **Martin Levin**, Silver Spring, MD (1056-R5-1589)

SIAM Minisymposium on New Trends in Mathematical Methods in Imaging Science

1:00 PM – 5:50 PM

Organizers: **Rick Chartrand**, Los Alamos National Laboratory
Stacey E. Levine, Duquesne University
Jennifer L. Mueller, Colorado State University
Luminita A. Vese, University of California Los Angeles

- 1:00PM *Nonconvex compressive sensing: getting the most from very little information.*
▶ (1926) **Rick Chartrand**, Los Alamos National Laboratory (1056-90-1078)
- 1:30PM *This is SPIRAL TAP: Sparse Poisson intensity reconstruction algorithms (theory and practice).*
(1927) **Zachary T. Harmany**, Duke University, **Roummel F. Marcia***, University of California, Merced, and **Rebecca M. Willett**, Duke University (1056-68-662)
- 2:00PM *Locally Adaptive Kernel Regression: A Non-parametric Framework for Multidimensional Signal Processing and Analysis.*
(1928) **Hiroyuki Takeda**, **Hae Jong Seo** and **Peyman Milanfar***, University of California, Santa Cruz (1056-62-1599)
- 2:30PM *Hyperspectral Image Classification by Matching Node Connectivities.*
(1929) **Naoki Saito***, University of California, Davis, and **Linh Lieu**, New York, NY (1056-62-1209)
- 3:00PM *Comparisons of reconstruction methods in electrical impedance tomography on a mammography geometry.*
▶ (1930) **Ethan K Murphy***, **David Isaacson**, **Gary Saulnier** and **Jon Newell**, Rensselaer Polytechnic Institute (1056-65-1216)
- 3:30PM *Local stability in a minimization problem for conductivity imaging.*
(1931) **M. Zuhair Nashed*** and **Alexandru Tamasan**, University of Central Florida (1056-49-1684)
- 4:00PM *Total Variation and Cheeger Ratio Cuts.* Preliminary report.
(1932) **Arthur D Szlam***, Courant Institute and UCLA math, and **Xavier Bresson**, UCLA math (1056-49-1013)
- 4:30PM *Variational methods for data fusion, segmentation, deblurring, and image inpainting.*
▶ (1933) **Andrea Bertozzi**, UCLA (1056-49-695)
- 5:00PM *Novel Integro-differential equations in image processing and its applications.*
(1934) **Eitan Tadmor**, University of Maryland, College Park, and **Prashant Athavale***, University of California, Los Angeles (1056-49-1717)
- 5:30PM *Multiscale Flat Norm Shape Signatures.*
▶ (1935) **Kevin R. Vixie**, Washington State University (1056-28-1677)

**MAA Committee on Technology in Mathematics
Education Panel Discussion**

1:00 PM – 3:55 PM

Technology in teaching mathematics: History and current practices. (There will be a 15-minute break halfway through this discussion)

Organizers: **Marilyn A. Reba**, Clemson University
Lila F. Roberts, Georgia College & State University

**SIGMAA on Math Circles for Students and Teachers,
Part II**

1:00 PM – 5:00 PM

Fostering, supporting, and propogating Math Circles.

Organizers: **James S. Tanton**, St. Mark's Institute of Mathematics
Tatiana Shubin, San Jose State University

AWM Workshop Panel Discussion

1:00 PM – 2:00 PM

Career opportunities: The early years.

Moderator: **Rachelle C. Decoste**, Wheaton College
Panelists: **Ann Almgren**, Lawrence Berkeley National Lab
Maura B. Mast, University of Massachusetts-Boston
Sharon M. Frechette, College of the Holy Cross
Ulrica Y. Wilson, Morehouse College

AMS Session on Number Theory, IV

1:15 PM – 4:25 PM

- 1:15PM *On the Density of Abundant Numbers.* Preliminary report.
▶ (1936) **Mitsuo Kobayashi**, Dartmouth College (1056-11-1527)
- 1:30PM *On the parity of k -th powers mod p .*
(1937) **Jennifer Paulhus***, **Todd Cochrane** and **Christopher Pinner**, Kansas State University (1056-11-1554)
- 1:45PM *The Constant Terms of Eisenstein Series on Loop Groups over a Function Field.*
(1938) **Kyu-Hwan Lee** and **Philip J Lombardo***, University of Connecticut (1056-11-1556)
- 2:00PM *Ramanujan-type congruences in partition-theoretic counting functions.*
(1939) **Michael Patrick Dewar**, University of Illinois at Urbana-Champaign (1056-11-1557)
- 2:15PM Break
- 2:30PM *Monogeneity in cyclotomic fields.*
(1940) **Leanne Robertson**, Seattle University (1056-11-1735)
- 2:45PM *An elementary approach to proving and discovering BBP-type formulas.*
(1941) **John R. Greene*** and **Melissa Larson**, University of Minnesota Duluth (1056-11-1738)
- 3:00PM *Values of Asai L -functions and combinatorial identities.* Preliminary report.
(1942) **Dominic Lanphier**, Western Kentucky University (1056-11-1864)

- 3:15PM *Cyclic Base change and Rankin-Selberg Convolutions.*
(1943) **Timothy Lee Gillespie**, University of Iowa (1056-11-1871)
- 3:30PM *Gauss' Method for determining cyclotomic numbers.*
(1944) **Ciarán Mac an Bhaird*** and **Pat McCarthy**, National University of Ireland Maynooth (1056-11-2118)
- 3:45PM *Supersingular distribution on average for congruence classes of primes.*
(1945) **Nahid Walji**, California Institute of Technology (1056-11-1936)
- 4:00PM *Green-Tao theorem in function fields.*
(1946) **Thai Hoang Le**, UCLA (1056-11-1906)
- 4:15PM *An asymptotic formula for Goldbach's conjecture with monic polynomials.*
▶ (1947) **Mark Kozek**, Whittier College (1056-11-1900)

ASL Invited Address

2:00 PM – 2:50 PM

- (1948) *Model theory and non-archimedean tame topology, with a view towards Berkovich spaces.*
Francois Loeser, Ecole Normale Superieure (1056-03-76)

MAA-Project NExT Panel Discussion

2:00 PM – 3:15 PM

- Organizing and running an effective seminar/capstone course for mathematics majors.*
Organizers: **Karolyne Fogel**, California Lutheran University
Russell Goodman, Central College
Thomas Langley, Rose-Hulman Institute of Technology
Panelists: **Mariah Birgen**, Wartburg College
Lipika Deka, California State University-Monterey Bay
Nezam Iraniparast, Western Kentucky University
Brian Miceli, Trinity University

AMS Session on Algebras, II

2:30 PM – 3:40 PM

- 2:30PM *"Separating the Degree Spectra of Structures" and Beyond: An Overview of My Dissertation in Computable Model Theory with Some New Extensions.*
(1949) **Tyler J Markkanen**, Saint Mary-of-the-Woods College (1056-03-1592)
- 2:45PM *Model Theory of Stable Groups.*
(1950) **Paul Baginski**, Université Lyon 1 (1056-03-1682)
- 3:00PM *Continuous Control in Exact Non-Split Categories.* Preliminary report.
(1951) **Timothy K Lance**, Francis Marion University (1056-19-647)
- 3:15PM *Motivic symmetric ring spectrum representing algebraic K -theory.*
(1952) **Youngsoo Kim**, University of Illinois at Urbana-Champaign (1056-19-1069)
- 3:30PM *Simply Un-Real: Grassmann hypercomplex numbers, geometric algebra, and the (past and) future of "vector" calculus.* Preliminary report.
▶ (1953) **Debra A. Warne*** and **Paul G. Warne**, James Madison University (1056-08-1553)

AWM Workshop: Research Presentations by Recent Ph.D.s, II

2:30 PM – 4:20 PM

- 2:30PM *Interpolation on Rational Surfaces.*
(1954) **Amanda Knecht**, University of Michigan (1056-14-152)
- 3:00PM *Killing Forms of Isotropic Lie Algebras.*
(1955) **Audrey Malagon**, Mercer University (1056-17-181)
- 3:30PM *The mixed boundary value problem in Lipschitz domains.*
(1956) **Katharine A. Ott*** and **Russell Brown**, University of Kentucky (1056-35-744)
- 4:00PM *K3 surfaces with discrete symmetry groups.*
(1957) **Ursula Anne Whitcher**, Harvey Mudd College (1056-14-201)

AMS-MAA-SIAM Gerald and Judith Porter Public Lecture

3:00 PM – 4:45 PM

- (1958) *The calculus of friendship.*
Steven Strogatz, Cornell University (1056-00-40)
- 4:00PM Reception: Please come to greet and chat with the speaker. Light refreshments will be served.

ASL Contributed Papers, II

3:10 PM – 5:20 PM

- 3:10PM *A simple epsilon substitution method for ID1.*
(1959) **Grigori Mints**, Stanford University
- 3:35PM *Trees, sheaves and definition by recursion.*
(1960) **Nate Ackerman**, University of California, Berkeley
- 4:00PM *A bimodal deontic evidential logic for the right to prove truths.*
(1961) **Billy Joe Lucas**, Manhattanville College
- 4:35PM *Characterizations of stable and NIP theories by generalized indiscernible sequences.*
(1962) **Lynn Scow**, University of California, Berkeley
- 5:00PM *Expansion of Presburger Arithmetic with a predicate for $\lfloor \sqrt{2}x \rfloor$.*
(1963) **Demirhan Tunc**, University of Notre Dame

MAA Minicourse #2: Part B

3:30 PM – 5:30 PM

Using GeoGebra to create activities and applets for visualization and exploration.

Organizer: **Michael K. May**, Saint Louis University

MAA Minicourse #9: Part B

3:30 PM – 5:30 PM

Getting students involved in undergraduate research.

Organizers: **Aparna W. Higgins**, University of Dayton

Joseph A. Gallian, University of Minnesota Duluth

Reception in Honor of Retiring MAA Secretary Martha Siegel

5:00 PM – 6:15 PM

AMS Banquet Reception

6:30 PM – 7:30 PM

AMS Banquet

7:30 PM – 10:00 PM

Matthew Miller
AMS Associate Secretary
Columbia, South Carolina

Gerard A. Venema
MAA Associate Secretary
Grand Rapids, Michigan