



2014 Joint Mathematics Meetings, Baltimore, MD  
MAA Undergraduate Student Poster Session, January 17  
Outstanding Presentations

**1.  $\mathbb{Q}$ -Symmetric Polynomials and nilHecke Algebras**

Ritesh Ragavender, South Brunswick High School

*Advisor: Alexander Ellis, MIT PRIMES USA*

**10. An Invariant for Singular Links**

Tsutomu Okano, Carnegie Mellon University

Danny Orton, California State University, Fullerton

*Advisor: Carmen Caprau, California State University, Fresno (California State University at Fresno REU)*

**12. On the Schur Positivity of Differences of Products of Schur Functions**

Jeremiah Emidih, University of California, Riverside

Nadine Jansen, North Carolina A&T State University

Jeremy Meza, Carnegie Mellon University

*Advisor: Rosa Orellana, Dartmouth College*

**18. Polygon Partitions and Reversions of Series**

Alison Schuetz, Hood College

*Advisor: Gwyneth R Whieldon, Hood College*

**22. Classification of  $W$ -Measurably Sensitive Transformations**

David Stevens, Williams College

*Advisor: Cesar Silva, Williams College*

**30. Linking Social Media to Crime and Disorder**

Anna Ma, University of California, Los Angeles

Yang Hu, California State University, San Marcos

*Advisor: Blake Hunter, University of California, Los Angeles (Institute of Pure and Applied Mathematics REU)*

**35. Lake Mead Temperature Modeling**

Catherine Schepp, Haverford College

*Advisor: Lisa Driskell, Colorado Mesa University*

**43. Long-term Behavior of Solutions to a Wave Equation with Degenerate Damping**

Thomas Anderson, New Jersey Institute of Technology

William Tritch, Andrews University

Elizabeth Galvin, Marist College

*Advisor: Daniel Toundykov and George Avalos, University of Nebraska-Lincoln*

**54. The Algebra of Block Permutations**

Isabel Corona, Metropolitan State University of Denver

Matthew Sarmiento, Columbia University

Ryan Contreras, Columbia University

*Advisor: Rosa Orellana, Dartmouth College (Berkeley, California REU)*

**61. Weak Rational Ergodicity of Rank-One Transformations in Infinite Ergodic Theory**

Francisc Bozgan, University of California, Los Angeles

Jane Wang, Princeton University

*Advisor: Cesar E. Silva, Williams College*

**69. Modeling and Analysis of Strategies in the Symmetric and Asymmetric El Farol Problem**

Weicheng Ye, Stony Brook University

*Advisor: Harbir Lamba, George Mason University*

**73. A Contagion Model of Emergency Airplane Evacuations**

Junyuan Lin, Pepperdine University

*Advisor: Timothy Lucas, Pepperdine University (UCLA REU)*

**89. Automatic Detection of Rare Bird Species Using Neural Networks**

Nicole Bender, Marist College

*Advisor: Arik Kershenbaum, NIMBioS (NIMBioS REU)*

**93. Generalizations of Tokuyama's Formula to the Hall-Littlewood Polynomials**

Uma Roy, Boston University PROMYS

Roger Van Peski, Boston University PROMYS

Vineet Gupta, Boston University PROMYS

*Advisor: Lucia Mocz, Princeton University*

**101. Supervised STM Image Segmentation of Self-Assembled Molecule Layers**

Daniel Lander, Pepperdine University

*Advisor: Dominique Zosso, University of California, Los Angeles*

**103. Finite Geometry in the Card Game SET**

Yumi Li, Willamette University

Claire Frechette, Brown University

Jordan Awan, Clarion University

*Advisor: Liz McMahon, Lafayette College (Lafayette College REU)*

**113. Applying Machine Learning Techniques to Baseball Pitch Prediction**

Corey Stafford, Columbia University

Michael Hamilton, Rutgers University

*Advisor: Hien Tran, North Carolina State University (North Carolina State University REU)*

**123. Expansion of a Stochastic Model for *Anelosimus studiosus* Movement during Prey Capture**

Alex Quijano, East Tennessee State University

*Advisor: Ariel Cintron-Arias, East Tennessee State University*

**130. The Regulatory Effect of microRNAs on the DNA Mismatch Repair Pathway**

Madeleine Weinstein, Harvey Mudd College

*Advisor: Reinhard Laubenbacher, Virginia Bioinformatics Institute (Virginia Bioinformatics Institute REU)*



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**134. A within-host mathematical model of HIV infection during combination therapies**

Candace Baker, University of Central Oklahoma

*Advisor: Sean Lavery, University of Central Oklahoma*

**138. Modeling Homeostatic Expansion of Various T Cell Populations**

Molly Lynch, College of the Holy Cross

*Advisor: David Damiano, College of the Holy Cross*

**143. Modeling Illicit Drug Use: Analyzing the Spread of Methamphetamine Through Urban and Rural Areas**

Lilyana Gross, California State University, Monterey Bay

Bernadette Bucher, University of Alabama

Robin Mabe, Grove City College

Danielle Williams, East Stroudsburg University

*Advisor: Alun Lloyd, North Carolina State University*

**147. Dynamical Systems Modeling of the Cold Shock Response in *Saccharomyces cerevisiae***

Katrina Sherbina, Loyola Marymount University

*Advisor: Ben G. Fitzpatrick, Kam D. Dahlquist, Loyola Marymount University*

**151. Characterization of Blink Motion Through Curve Fitting**

Joseph Brosch, University of Delaware

*Advisor: Richard Braun, Dept of Mathematical Sciences, U of Delaware*

**154. Irreducible representations of  $SU(n)$  with prime power degree**

Sarah Peluse, The University of Chicago

*Advisor: Ken Ono, Emory University (Emory University REU)*

**158. The Speeds of Families of Intersection Graphs**

Jessica Shi, Massachusetts Institute of Technology

*Advisor: Francisco Unda, Massachusetts Institute of Technology*

**161. On the Crossing Number of the Cartesian Product of a Vertex-transitive Graph with a Cycle**

Junho Won, Massachusetts Institute of Technology PRIMES

*Advisor: Chiheon Kim, Massachusetts Institute of Technology*

**165. A Generalization of Fibonacci Far-Difference Representations and Gaussian Behavior**

Philippe Demontigny, Williams College

*Advisor: Steven Miller, Williams College*

**166. Reconstruction of Video Using SVD With Delays**

Wonjun Lee, George Mason University

*Advisor: Tim Sauer, George Mason University*

**174. Rotation Number of Outer Billiard with Polygonal Invariant Curves**

Zijian Yao, Brown University

*Advisor: Sergei Tabachnikov, ICERM / Penn State University*



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**202. Applications of Gersgorin Disc Theory to the Detection of Hopf Bifurcations**

Morgan Swaidan, California Lutheran University  
*Advisor: Christopher Brown, California Lutheran University*

**207. A Geometric Interpretation of Knot Complement Gluings**

Martin Bobb, Carleton College  
*Advisor: Rolland Trapp, California State University, San Bernardino*

**213. Convex Region Isoperimetric Conjecture**

Maggie Miller, University of Texas at Austin  
*Advisor: Frank Morgan, Williams College (REU?)*

**219. Towards generalizing thrackles to arbitrary graphs**

Jin-Woo Oh, The Stony Brook School  
*Advisor: Rik Sengupta, MIT*

**225. Random subtrees of complete graphs**

Alex Chin, North Carolina State University  
Kellie MacPhee, Dartmouth College  
Charles Vincent, Lafayette College  
*Advisor: Gary Gordon, Lafayette College (Lafayette College REU)*

**227. Extreme Zero Forcing, Maximum Nullity, and Minimum Rank for Oriented Graphs**

Katrina Jacobs, Pomona College  
Joshua Carlson, Iowa State University  
*Advisor: Leslie Hogben, A. Berliner, T. Peters, N. Warnberg, Iowa State University, St. Olaf, Culver-Stockton (Iowa State University REU)*

**232. Robust Graph Ideals**

Timothy Duff, New College of Florida  
Karl Schaefer, Rice University  
*Advisor: Adam Booher, University of California, Berkeley (University of California, Berkeley REU)*

**239. Geometric Variations on the Euclidean Steiner Tree Problem**

Jack Holby, St. Lawrence University  
*Advisor: Sam Vandervelde, St. Lawrence University*

**249. On the residue classes of  $\pi(n)$  modulo  $t$  and bounded gaps between products of special primes**

Ping Ngai Chung, Massachusetts Institute of Technology  
Shiyu Li, University of California, Berkeley  
*Advisor: Ken Ono, Emory University (Emory University REU)*

**253. Periodicity of Third-Order Linear Recursive Sequences**

Shan Shan, Agnes Scott College  
*Advisor: Alan Koch, Agnes Soctt College*



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**260. Maximal Varieties over Finite Fields arising from Algebraic Groups and  $\ell$ -adic Representations of their Symmetry Groups**

Dylan Yott, Boston University

*Advisor: Jared Weinstein, Boston University*

**263. Congruence properties of Taylor coefficients of modular forms**

Hannah Larson, Harvard University

*Advisor: Ken Ono, Emory University (Emory University REU)*

**283. Anomaly Detection Using Dictionary Learning**

Sara Staszak, Macalester College

Mengjie Pan, Bryn Mawr College

Zach Siegel, Pomona College

Mark Eisen, University of Pennsylvania

*Advisor: Alicia Johnson, Macalester College (Minneapolis REU)*

**287. Doubly Ensemble Movie Prediction With Social Media Data Using TBEEF**

Christopher Rackauckas, Oberlin College

*Advisor: Avery Ching, Hong Kong University of Science and Technology (Research in Industrial Projects - Hong Kong REU)*

**290. Modeling NBA Player Value from Box Score Data**

Daniel Persia, Denison University

*Advisor: Matthew Neal, Denison University*

**301. Torified Rational Links**

Karly Brint, Pitzer College

*Advisor: Rollie Trapp, CSUSB (California State University, San Bernardino REU)*

**307. The Fundamental Groups of the Digital Line and Circles**

Dane Lawhorne, University of Mary Washington

*Advisor: Randall Helmstutler, University of Mary Washington*

**308. Determining the Structure of Length- $k$  Steenrod Operations as  $A(r)$ -Modules**

Benjamin Kraft, Massachusetts Institute of Technology

*Advisor: Mark Behrens, Massachusetts Institute of Technology*