Annual Report

2018 -19

Mathematics Department Drexel University

DEPARTMENT DIRECTORY

Leadership

Shari Moskow, PhD Department Head; Professor of Mathematics
J. Douglas Wright, PhD Associate Department Head; Professor of Mathematics
David Ambrose, PhD Associate Department Head; Professor of Mathematics

Administration

Paige Chmielewski, Undergraduate Program Coordinator
Kenneth Hemphill, Budget Coordinator
Gene Phan, Computer Specialist
Sobha Philip, Graduate Program Manager (Math Resource Center)
Amy Tiernan, Program Assistant (Math Resource Center)

Tenure Track Faculty

David M Ambrose

Jonah Blasiak

Robert P. Boyer

Patrick Clarke

Pavel Grinfeld

Yixin Gu,

R. Andrew Hicks

Pawel Hitczenko

Dmitry Kaliuzhnyi-Verbovetskyi

Georgi Medvedev

Shari Moskow

Ronald K. Perline

Marci A. Perlstadt

Eric J. Schmutz

Li Sheng

Gideon Simpson

Xiaoming Song

Hugo Woerdeman

J. Douglas Wright

Thomas P.-Y.Yu

Teaching Faculty

Jason S. Aran

Fernando Carreon

Daryl Falco

Raymond J. Favocci

Anatolii Grinshpan

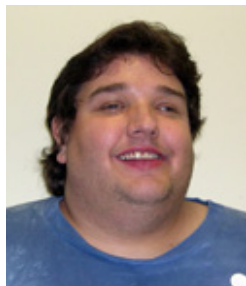Robert Immordino

Marna Mozeff

Oksana P. Odintsova

Dimitrios Papadopoulos

Joel Pereira

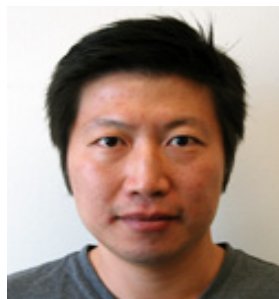Adam C. Rickert

Jian Song

Jeanne M. Steuber

Kenneth P. Swartz

K. S. Virbhadra

Richard D. White

Dennis G. Yang

Matthew Ziemke

Visiting Faculty

Anuj Abhishek

Huseyin Acan

Ilker Colak

Anna Pun

Adjunct Faculty

Yasmin B-Pant

John P. Coppola

Harold D. Gilman
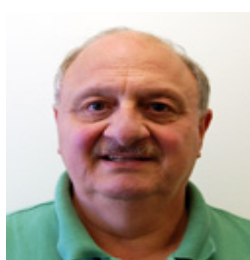

June K. Gordon

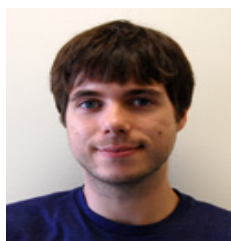*Boris L. Kheyfets*

Susanne Kriete

Leo W Lampone

Brianna Pezzato

Patricia Henry Russel

Valerie Sarris

Patrick Shields

Olga Trubina

Vaishalee Wadke

Sergio Zefelippo

Kai Zhao

New Faculty

Anuj Abhishek, PhD, Visiting Assistant Professor

Anuj Abhishek, PhD, received his PhD in Mathematics from Tufts University in 2018. His research interests include inverse problems, integral geometry and microlocal analysis. His work has focused on proving support theorems for certain integral transforms on simple, compact Riemannian manifolds.

Huseyin Acan, PhD, Visiting Assistant Professor

Huseyin Acan, PhD, recently competed three years as an NSF postdoctoral fellow and lecturer at Rutgers University. He received his PhD from the Ohio State University in 2013 and spent two years as an NSF postdoctoral researcher at Monash University in Melbourne, Australia. His research interests include probabilistic combinatorics, random graphs, asymptotic counting and analysis of stochastic processes.

Jiang Song, PhD, Assistant Teaching Professor

Jiang Song, PhD, received his PhD in Mathematics from the University of Kansas in 2010. He was a triennial assistant professor at Rutgers University at New Brunswick, and an assistant professor in the mathematics, statistics and actuarial science departments at the University of Hong Kong. He joined Drexel in 2016 for a one-year visit in the Department of Mathematics, and now joins us as an assistant teaching professor.

Drexel Service Recognition Awards 2018

Drexel University recognized and appreciated Dr. Boyers forty years of service and contribution to the university during the 2018 recognition award.

Dr. Boyer with University President Mr. Fry

Dr. Boyer with math department head, Dr. Moskow

Teaching & Research Assistants

Nathan Anderson

Joshua Carmichael

Kennett Dela Rosa

A J Furia

Ben Grossman

Eammon Hart

Kathryn Ioele

Ben Irwin

Joshua Jackson

Felix Jon

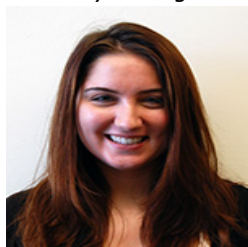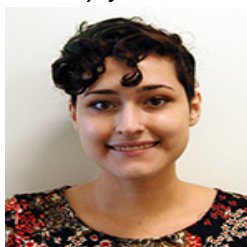Emily Kelting

Hyeju Kim

Dom Macaluso

Josh McGinnis

Heather Newman

Tayler Pangburn

Samantha Rodriguez

Rob Scholle

Dan Summers

James Thomas

Isaac Woods

Alex Yaroslavskiy

Yaqi Zhang

Tenure and Promotions

Tenure and promotion to Associate Professor

Jonah Blasiak

Promotion to Associate Teaching Professor

Jason Aran
Anatolii Grinshpan
Dennis Yang

Departmental Service Assignments

Tenure & Promotions

Chair: Hugo Woerdeman & All tenured faculty members

Graduate Admissions Committee

Chair: Andrew Hicks & Jonah Blasiak, Gideon Simpson, Xiaoming Song

Graduate Program Committee

Chair: Doug Wright & Robert Boyer, Hugo Woerdeman, Yixin Guo

Undergraduate Program Committee

Chair: Dmitry Kaliuzhnyi-Verbovetskyi & Marci Perlstadt, Jason Aran, Thomas Yu, David Ambrose, Gideon Simpson

Undergraduate Recruitment Committee

Chair: Marna Mozeff & Dimitri Papadopoulos, Ronald Perline, Pavel Grinfeld

Tenure-Track Hiring Committee

Chair: Georgi Medvedev & Jonah Blasiak, Doug Wright, Hugo Woerdeman

Post Doc Search Committee

Chair: Yixin Guo & Patrick Clark, Eric Schmutz, Xiaoming Song

Teaching Faculty Promotion - Thomas P.-Y. Yu

Undergraduate Advisor - Ronald Perline

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Assistant Scheduler - Andrew Hicks

Transfer Credits - Li Sheng

Colloquium Coordinator - Georgi Medvedev

Distinguished Speaker Coordinator - Eric Schmutz

Library Liaison - Ken Swartz, Joel Pereira

University 101 - Ronald Perline

Math Competition coordinator - Dimitri Kaliuzhnyi-Verbovetskyi

Mathematics Student Organization faculty advisor - Jason Aran

Actuarial Society faculty advisor - Marci Perlstadt

Placement Exam Coordinator - Raymond Favocci

Problem of the month coordinator - Pavel Grinfeld

Pi Day coordinators - Raymond Favocci, Adam Rickert, Marna Mozeff

Awards:

Huseyin Acan - co-author of *Succinct Data Structures for Families of Interval Graphs* which won Best Paper Award at WADS 2019

David Ambrose - 2018 T. Brooke Benjamin Prize in Nonlinear Waves - SIAM Conference on Nonlinear Waves and Coherent Structures, June 2018

Hugo Woerdeman - 2019 Outstanding STAR Mentor, STAR (Students Tackling Advanced Research) Scholars Program, 2019

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Publications:

Acan, Huseyin, S. Chakraborty, S. Jo, and S. R. Satti, Succinct Data Structures for Families of Interval Graphs, Algorithms and Data Structures, 11646, Springer, Cham, 2019

Acan, Huseyin, and B. Pittel, On connectivity, conductance and bootstrap percolation for a random k-out, age-biased graph, Random Structures Algorithms, p. 1-26, 2019

Acan, Huseyin, and J. Kahn, Disproof of a packing conjecture of Alon and Spencer, Random Structures Algorithms, p. 1-14, 2019

Acan, Huseyin, P. Devlin, and J. Kahn, Proof of an entropy conjecture of Leighton and Moitra, Journal of Combinatorial Theory, Series A, 161, p. 299-308, 2019

Ambrose, David M., M.C. Lopes Filho, and H.J. Nussenzveig Lopes, Confinement of vorticity for the 2D Euler-alpha equations. Journal of Differential Equations, 265, p. 5472-5489, 2018

Ambrose, David M., J.L. Bona, and T. Milgrom, Global solutions and ill-posedness for the Kaup system and related Boussinesq systems, Indiana University Mathematics Journal, 68, p. 1173-1198, 2019

B.F. Akers, **David M. Ambrose**, and D.W. Sulon, Periodic traveling interfacial hydroelastic waves with or without mass II: Multiple bifurcations and ripples, European Journal of Applied Mathematics, 30, p. 756-790, 2019

S. Liu and David M. Ambrose, sufficiently strong dispersion removes ill-posedness in truncated series models of water waves, Discrete Continuous Dynamical Systems, 39, p. 3123-3147, 2019

T. Akhunov, **David M. Ambrose**, and **J. Douglas Wright**, Well-posedness of fully nonlinear KdV-type evolution equations, Nonlinearity, 32, p. 2914-2954, 2019

Ambrose, David M., **Gideon R. Simpson**, **J. Douglas Wright**, and **Dennis G. Yang**, Existence theory for magma equations in dimension two and higher, Nonlinearity, 31, p. 4724, 2018

Ambrose, David M., Strong solutions for time-dependent mean field games with non-separable Hamiltonians, Journal de Mathématiques Pures et Appliquées, 113, p. 141-154, 2018

Ambrose, David M. and **J. Douglas Wright**, Nonexistence of small, smooth, time-periodic, spatially periodic solutions for nonlinear Schrödinger equations, Quarterly Applied Mathematics, 77(3), p. 579–590, 2019

Blasiak, Jonah and R.I. Liu, Kronecker coefficients and noncommutative super Schur functions, Journal of Combinatorial Theory, Series A (158), p. 315-361, 2018

Blasiak, Jonah and S. Fomin, Rules of Three for commutation relations, Journal of Algebra, 500, p. 193-220, 2018

Bor, G., M. Levi, **Ronald Perline** and S. Tabachnikov, Tire Track Geometry and Integrable Curve Evolution, Mathematical Research Notices, 2018.

Boyer, Robert and Y. Yoo, Unitary Representations of Infinite Wreath Products, Annals of Functional Analysis, 10(1), p. 97-105, 2019

Brogan, J. P., Y. Yang, and **Thomas Yu**, Numerical methods for biomembranes based on piecewise linear surfaces, Numerical Mathematics and Advanced Applications: ENUMATH 2017, Springer Nature, Switzerland AG, 2018.

Cakoni, F., B. Guzina, **Shari Moskow**, and Tayler Pangburn, "Scattering by a bounded highly oscillating periodic medium and the effect of boundary correctors." SIAM Journal of Applied Mathematics, 79(4), p. 1448-1474, 2019

Chen, D., D.E. Henson, M.T. Hueman, A.M. Schwartz, **Li Sheng**, H. Wang, C.Q. Yang, creating prognostic systems for cancer patients: A demonstration using breast cancer. Cancer Medicine, 7(36113621), 2018

Chen, D., D.E. Henson, M.T. Hueman, Q. Pan, A.M. Schwartz, **Li Sheng**, H. Wang, C.Q. Yang, Creating Prognostic Systems by the Mann-Whitney Parameter, 2018 IEEE/ACM International Conference on Connected Health: Applications, Systems and Engineering Technologies, p. 33-39, 2018

Chen, X., Y. Hu, J. Song and **Xiaoming Song**. Temporal asymptotics for fractional parabolic Anderson model, Electronic Journal of Probability, 23(14), p. 1-39, 2018

Chiba, H., **Georgi S. Medvedev**, and M. Mizuhara, Bifurcations in the Kuramoto model on graphs, Chaos, 28(073109), 2018

H. Chiba and **Georgi S. Medvedev**, The mean field analysis for the Kuramoto model on graphs I. The mean field equation and transition point formulas, Discrete and Continuous Dynamical Systems - A, 2019

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H. Chiba and **Georgi S. Medvedev**, The mean field analysis for the Kuramoto model on graphs II. Asymptotic stability of the incoherent state, center manifold reduction, and bifurcations, Discrete and Continuous Dynamical Systems, 2019

Davidson, K.R., V.I. Paulsen, and **Hugo J. Woerdeman**, Complete spectral sets and numerical range, Proceedings of the American Mathematical Society, 146(3), p. 1189–1195, 2018

Duchamp, T., G. Xie and **Thomas Yu**, Smoothing nonlinear subdivision schemes by averaging. Numerical Algorithms, 77(2), p. 361–379, 2018

Faver, T., and **J. Douglas Wright**, Exact diatomic Fermi-Pasta-Ulam-Tsingou solitary waves with optical band ripples at infinity, SIAM Journal on Mathematical Analysis, 50(1), p. 182-250, 2018

Fukawa-Connelly, T., M. Hegg, B. Katz, and **Dimitrios Papadopoulos**, Preservice teacher proficiency with transformations-based congruence proofs after a college proof-based geometry class, The Journal of Mathematical Behavior, 51, p. 56-70, 2018

Fukawa-Connelly, T., V. Krupnik, J. Olsen, T. Paoletti, **Dimitrios Papadopoulos**, and K. Weber, Teacher questioning and invitations to participate in advanced mathematics lectures, Educational Studies in Mathematics, 98(1), p. 1-17, 2018

Giardetti, N., A. Shapiro, S. Windle and **J. Douglas Wright**, Metastability of solitary waves in diatomic FPUT lattices, Mathematics in Engineering, 2018

Grinshpan, Anatolii and **Hugo J.Woerdeman**, A Linear-algebraic proof of Hilbert's Ternary Quartic Theorem, The American Mathematical Monthly, 126(7), p. 620-627, 2019

Hicks, R. Andrew, S. Rody, and **Ronald K. Perline**, "Eigensurfaces of eigenmirrors," Journal of the Optical Society of America A, 36, p. 1312-1321, 2019

Hitczenko, Pawel and A. Lohss, Probabilistic consequences of some polynomial recurrences, Random Structures and Algorithms, 53, p. 652-666, 2018

Hitczenko, Pawel and Aleksandr Yaroslavskiy, Distribution of the number of corners in tree-like and permutation tableaux, Proceedings of the 29th International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms, Leibniz International Proceedings in Mathematics, 110, p. 28:1-28:13, 2018

Kaliuzhnyi-Verbovetskyi, Dmitry and **Georgi S. Medvedev**, The mean field equation for the Kuramoto model on graph sequences with non-Lipschitz limit, SIAM Journal of Mathematical Analysis, 50(3), p. 2441–2465, 2018

Martins, R., D. Panario, C. Qureshi, and **Eric Schmutz**, Periods of iterations of mappings over finite fields with restricted preimage sizes, Proceedings for the 29th International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms, 2018

Medvedev, Georgi S. and X. Tang, The Kuramoto model on power law graphs: Synchronization and Contrast States, Journal of Nonlinear Science, 2018

Medvedev, Georgi S., Corrigendum and addendum to 'The Nonlinear Heat equation on W-Random Graphs', Archive for Rational Mechanics and Analysis, 2019

Moskow, Shari and Schotland, J.C., Chapter 12: Inverse Born Series, The Radon Transform: The First 100 Years and Beyond, p. 273-295, 2019

Ou, M. and **Hugo J. Woerdeman**, "On the augmented Biot-JKD equations with Pole-Residue representation of the dynamic tortuosity," Operator Theory: Advances and Applications, 272, Birkhäuser/Springer, Cham p. 307-328, 2019

Paulsen, V.I. and **Hugo J. Woerdeman**, Reverse Cholesky factorization and tensor products of nest algebras, Proceedings of the American Mathematical Society, 146(4), p. 1693–1698, 2018

Simpson, Gideon, D. Watkins. Relative Entropy Minimization over Hilbert Spaces via Robbins-Monro. AIMS Mathematics, 4(3), p. 359-383, 2019

Sremac, Stefan, **Hugo J. Woerdeman**, and H. Wolkowicz, Maximum determinant positive definite Toeplitz completions, Operator theory, analysis and the state space approach, 421-441, Oper. Theory Adv. Appl., 271, Birkhäuser/Springer, Cham, 2018

Stefanov, A. and **J. Douglas Wright**, Small amplitude traveling waves in the full-dispersion Whitham equation, Journal of Dynamics and Differential Equations, 2018

Presentations:

Acan, Huseyin, "Bootstrap percolation on uniform attachment graphs," Discrete Mathematics Seminar, Rutgers University, October 2018, Invited

Acan, Huseyin, "Bootstrap percolation on uniform attachment graphs," AMS Sectional Meeting, Auburn University, Auburn, AL, March 2019, Invited

Acan, Huseyin, "Exploring uniform attachment graphs," Rochester Institute of Technology, Colloquium, Rochester, NY, February 2019, Invited

Ambrose, David, "Well-posedness and ill-posedness results for equations with nonlinear and/or degenerate dispersion," Joint Mathematics Meetings, SIAM Minisymposium on Problems in Quasilinear Dispersive PDE, San Diego, CA, January 2018

Ambrose, David, series of lectures at IPAM Summer School on Mean Field Games, Institute for Pure and Applied Mathematics, UCLA, Los Angeles, CA, June 2018, Invited

Ambrose, David, "Ill-Posedness of Truncated Series Models of Water Waves," 12th AIMS Conference on Differential Equations and Dynamical Systems, Session on Nonlinear Evolution Equations, National Taiwan University, Taipei, Taiwan, July 2018, Invited

Ambrose, David, "Convergence of a Boundary Integral Method for 3D Interfacial Flow with Surface Tension," 12th AIMS Conference on Differential Equations and Dynamical Systems, Session on Nonlinear and Nonlocal Evolution PDEs, National Taiwan University, Taipei, Taiwan, July 2018, Invited

Ambrose, David, "Nonexistence of small doubly periodic waves for dispersive PDE," AMS Central Section Meeting, Special Session on Coherent Structures in Interfacial Flows, Ohio State University, Columbus, OH, March 2018, Invited

Ambrose, David, "On vortex sheets and mean field games," PDE Seminar, Universidade Federal do Rio de Janeiro Department of Mathematics, Rio de Janeiro, Brazil, September 2018, Invited

Ambrose, David, "Global bifurcation theory for periodic interfacial waves," Session lecture, AMS Eastern Section meeting, Newark, DE, September 2018, Invited

Ambrose, David, "Existence theory for a mean field games model of household wealth," Seminar, Analysis and PDE Seminar, UCLA Department of Mathematics, Los Angeles, CA, February 2019, Invited

Ambrose, David, "On vortex sheets and mean field games," PDE Seminar, Universidade Federal do Rio de Janeiro Department of Mathematics, Rio de Janeiro, Brazil, September 2018, Invited

Ambrose, David, "Vortex sheets, Boussinesq equations, and other problems in the Wiener algebra," Workshop on water waves, Mathematical Research Institute of Oberwolfach, Oberwolfach, Germany, July 2019, Invited

Ambrose, David, "Vortex sheets, Boussinesq equations, and other problems in the Wiener algebra," plenary lecture, IMACS Conference on Nonlinear Waves, Athens, GA,   April 2019, Invited

Ambrose, David, "Periodic traveling hydroelastic waves," session lecture, IMACS Conference on Nonlinear Waves, Athens, GA, April 2019, Invited

Ambrose, David, "A convergent boundary integral method for 3D interfacial flow with surface tension," minisymposium lecture, SIAM Conference on the Geosciences, Houston, TX, March 2019, Invited

Blasiak, Jonah, "Catalan functions and k-Schur positivity," Spring Eastern AMS Sectional Meeting at Northeastern University, Boston, MA, April 2018

Blasiak, Jonah, "Catalan functions and k-Schur positivity," Spring Southeastern AMS Sectional Meeting, Vanderbilt University, April 2018, Invited

Boyer, Robert, "Zero Attractors for Sections of Combinations of Exponentials," Society for Industrial and Applied Mathematics, Session in Applied Mathematics, Oregon Convention Center, Portland, OR, July 2018

Guo, Yixin, "Neural Networks with Short Range and Long Range Connectivity," special session, 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Taipei, Taiwan, July 2018

Hitczenko, Pawel, "Corners in tree-like tableaux," Institute of Statistical Science, Academia Sinica, Taipei, Taiwan, August 2018, Invited

Medvedev, Georgi S., "The Kuramoto Model on Convergent Graph Sequences," SIAM Conference on Dynamical Systems and Applications, Snowbird, CO, May 2019

Medvedev, Georgi S., "The Kuramoto model on convergent graph sequences," School and Workshop on Patterns of Synchrony, International Center of Theoretical Physics, Trieste, Italy, May 2019

Moskow, Shari, "Reduced order models for spectral domain inversion: Galerkin   equivalence and generation of internal data," special session on Recent Advances in Inverse Problems and Imaging, Joint Mathematics Meetings in Baltimore, MD, January 2019, Invited

Moskow, Shari, "Reduced order models for spectral domain inversion: Galerkin   equivalence and generation of internal data," Mathematics in Optical Imaging, Institute for Mathematics and its Applications, Minneapolis, MN, April 2019, Invited

Moskow, Shari, "Women in Analysis," Banff International Research Station, Banff, Alberta, Canada, June 2019, Invited

Moskow, Shari, "Reconstruction methods for inverse problem", Banff International Research Station, Banff, Alberta, Canada, June 2019, Invited

Moskow, Shari, "Reduced order models for spectral domain inversion: Galerkin   equivalence and generation of internal data" Applied Inverse Problems Grenoble, Saint-Martin-d'Hères, France July 2019, Invited

Moskow, Shari, "Reduced order models for spectral domain inversion: Galerkin   equivalence and generation of internal data," ICIAM, Valencia, Spain, July 2019, Invited

Simpson, Gideon, "Approaches to Metastability in Materials Science," seminar, Temple University, Philadelphia, PA, November 2018, Invited

Simpson, Gideon, "Approaches to Metastability in Materials Science, colloquium, Tulane University, New Orleans, LA, January 2018

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Simpson, Gideon, "Existence theory for magma equations in dimension two and higher, Drexel Waves Conference," Drexel University, Philadelphia, PA, May 2018, Invited

Simpson, Gideon, "Spin-Diffusions and Diffusive Molecular Dynamics," AIMS Conference on Dynamical Systems, Taipei Taiwan, July 2018, Invited

Simpson, Gideon, "Accelerated Sampling with Local Entropy," SIAM Conference on Materials Science, Portland, OR, July 2018, Invited

Simpson, Gideon, CIRM (Luminy), workshop, Marseille, France, September 2018

Song, Xiaoming, "Backward stochastic differential equations, fractional Brownian motion and their applications in finance," Finance & Financial Engineering Seminar Series, Stevens Institute of Technology, Hoboken, NJ, October 2018, Invited

Song, Xiaoming, "Large deviations for functionals of Gaussian processes," International Conference on Stochastic Partial Differential Equations, University of Alberta, Canada, September-October 2018, Invited

Song, Xiaoming, "Large deviations for functionals of Gaussian processes," Workshop on Stochastic Analysis and their Applications, Jilin University, Changchun, Jilin, China, July 2018, Invited

Song, Xiaoming, "Probability density of lognormal fractional SABR model," Workshop on Stochastic Analysis and Related Topics, University of Hong Kong, Hong Kong, China, July 2018, Invited

Song, Xiaoming, "Nonlinear Feynman-Kac formulae for SPDEs with space-time noise," The 5th IMS-APRM, Singapore National University, Singapore, June 2018, Invited

Song, Xiaoming, "Stochastic processes and stochastic modeling," seminar at the Department of Automation, Shanghai Jiao Tong University, Shanghai, China, July 2019, Invited

Song, Xiaoming, "Nonlinear Feynman-Kac formulae for SPDEs with space-time noise," International Workshop on Probability, Uncertainty and Quantitative Risk, Shandong University at Weihai, China, July 2019, Invited

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Song, Xiaoming, "Fractional stochastic wave equation driven by a Gaussian noise rough in space," session IP07 on Stochastic Partial Differential Euqations at the 7th IMS-China International Conference on Statistics and Probability, Dalian, China, July 2019, Invited

Song, Xiaoming, "Fractional stochastic wave equation driven by a Gaussian noise rough in space," Workshop on the Theory and Applications of Stochastic Partial Differential Equations, The Fields Institute, Toronto, Ontario, Canada, June 2019, Invited

Song, Xiaoming, "Fractional stochastic wave equation driven by a Gaussian noise rough in space," Seminar at the Department of Mathematical Sciences, University of Nevada at Las Vegas, Las Vegas, NV, March 2019, Invited

Song, Xiaoming, "Large deviations for functionals of Gaussian processes," joint probability seminar, University of Pennsylvania, Philadelphia, PA, March 2019, Invited

Song, Xiaoming, "Large deviations for functionals of Gaussian processes," seminar on Stochastic Processes, University of Utah, Salt Lake City, UT, March 2019, poster presentation

Woerdeman, Hugo, "Multivariable moment problems," 2018 February Fourier Talks at the Norbert Wiener Center for Harmonic Analysis and Applications, University of Maryland, College Park, MD, February 2018

Woerdeman, Hugo, "Maximum determinant positive definite Toeplitz completions," 2018 International Workshop on Matrices and Operators, Shanghai University, Shanghai, China, July 2018

Woerdeman, Hugo, "Real zero polynomials and A. Horn's problem," Inverse Problems and Analysis Seminar at the University of Delaware, Newark, DE on February 2019

Woerdeman, Hugo, "Real zero polynomials and A. Horn's problem," 2019 International Linear Algebra Society Meeting (ILAS 2019), Rio de Janeiro, Brazil, July 2019

Woerdeman, Hugo, "A Determinantal Representation for Bivariate Polynomials without roots on the bitorus," 2019 International Linear Algebra Society Meeting (ILAS 2019), Rio de Janeiro, Brazil July 2019

Wright, J. Douglas, University of Kansas Analysis Seminar, Lawrence, KS, February 2018, Invited

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Wright, J. Douglas, "Traveling Waves in Diatomic Fermi-Pasta-Ulam-Tsingou Lattices," AIMS Conference on Dynamical Systems, Taipei, Taiwan, August 2018, Invited

Wright, J. Douglas, "Traveling waves in diatomic FPUT lattices", PDE Seminar, University of Houston, Houston, TX, February 2019, Invited

Wright, J. Douglas, "Generalized solitary wave solutions of the capillary-gravity Whitham equation," IMACS Conference on Nonlinear Waves, Athens GA, April 2019, Invited

Yu, Thomas, "Conforming vs Non-conforming methods for solving Geometric Variational Problems," International Conference on Scientific Computing, Department of Mathematics, Chinese University of Hong Kong, Hong Kong, China, December 2018, Invited

Yu, Thomas, "Conforming vs Non-Conforming methods for biomembranes," DelMar Numerics Day 2018, University of Delaware, Newark, DE, May 2018

Yu, Thomas, "Discrete curvatures and biomembranes," 9th International Conference on Curves and Surfaces, Arcachon, France, June 2018

Yu, Thomas, "Numerical Methods for Biomembranes: conforming subdivision methods versus non-conforming PL methods," AMS Sectional meeting, minisymposium, University of Hawaii at Manoa, Honolulu, Hawaii, March 2019, Invited

Yu, Thomas, "Multiscale Representations of Manifold-valued data and the Curvature tensor," International Congress on Industrial and Applied Mathematics 2019, minisymposium, Valencia, Spain, July 2019, Invited

Yu, Thomas, "Numerical Methods for Biomembranes: conforming subdivision methods versus non-conforming PL methods," International Congress on Industrial and Applied Mathematics 2019, minisymposium, Valencia, Spain, July 2019, Invited

Grants:

Ambrose, David, National Science Foundation, DMS 1515849, Dynamics of Dispersive PDE, 2015-2018, $269,987

Ambrose, David, PI, and Co-PI Xiaoming Song, National Science Foundation, DMS 1613965, 2016 Gene Golub Summer School at Drexel University, 2016-2018, $25,500

Ambrose, David, PI, National Science Foundation, DMS-1907684, Partial Differential Equation Methods for Mean Field Games, 2019-2022, $316,981

Blasiak, Jonah, National Science Foundation, DMS 1600391, Tools for Positivity, 2016-2019, $195,000

Blasiak, Jonah, National Science Foundation, Schubert Calculus and Catalan functions, 2019-2022, $180,000

Medvedev, Georgi, PI, National Science Foundation, DMS 1715161, Mean Field Analysis of Dynamical Networks, 2017-2020, $199,000

Moskow, Shari, National Science Foundation, Heterogeneous Optical Media: Boundary Effects, Spectral Properties and Inversion, 2017-2020, $339,999

Moskow, Shari, Timed for a Successful Career: NSF/AWM Travel Grants for Women in the Mathematical Sciences 2016-2019, $432,687

Moskow, Shari, co-PI, National Science Foundation DUE, Preparing Mathematics and Science Teachers for Middle School. 2018-2022, $1,199,374

Simpson, Gideon, Co-PI, National Science Foundation, Collaborative Research: Stochastic Methods for Multiscale Distributions, 2018-2021, $98,134

Woerdeman, Hugo, Simons Foundation, Collaborative grant, The multivariable Schur class and determinantal representations, 2015-2020, $35,000

Wright, J. Douglas, National Science Foundation, DMS Applied Mathematics, Wave propagation in heterogeneous nonlinear dispersive systems, 2015-2018, $340,446

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Yu, Pok Yin, National Science Foundation, DMS 1522337, New Developments in Geometric and Multiscale Numerical Methods, $230,000, 2015-2018

Yu, Pok Yin, PI, National Science Foundation, "Geometric Approximation and Variational Problems," DMS 1913038, $299,999, 2019-2022

Faculty Appointments/ Conference Organizations:

Ambrose, David, co-organizer, SIAM minisymposium "Problems in Quasilinear Dispersive PDE," 2018 Joint Mathematics Meetings, San Diego, CA, January 2018

Ambrose, David, co-organizer, 2018 IPAM Graduate Summer School on Mean Field Games and Applications, University of California, Los Angeles, Los Angeles, CA, June 2018

Ambrose, David, member scientific program committee, 2019 IMACS Conference on Nonlinear Evolution Equations/Nonlinear Waves, University of Georgia, Athens, GA, April 2019

Ambrose, David and **J. Douglas Wright**, co-organizers, special session on Water Waves and Other Dispersive Phenomena at AIMS Conference on Dynamical Systems, Taipei, Taiwan, July 2018

Blasiak, Jonah, co-organizer, Mid-Atlantic Algebra, Geometry, and Combinatorics (MAAGC), Drexel University, Philadelphia, PA, May 2018

Hitczenko, Pavel, member program committee, Meeting on Analytic Algorithmics and Combinatorics, New Orleans, LA, January 2018

Kaliuzhnyi-Verbovetskyi, Dmitry and **Hugo Woerdeman**, co-organizers, special session "Recent Progress in Multivariable Operator Theory," Joint Mathematics Meetings, Baltimore, MD, January 2019

Moskow, Shari, co-organizer, ICERM semester program, "Model and dimension reduction in uncertain and dynamic systems," Spring 2020.

Moskow, Shari, co-organizer, ICERM workshop, "Computational Statistics and Data Driven Models," April 2020

Moskow, Shari, minisymposium organizer, "Homogenization and inverse problems", AIP, Grenoble, July 2019

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Simpson, Gideon, board member, University Research Computing Facility (URCF)

Song, Xiaoming, co-organizer, workshop on Stochastic Analysis and Related Topics, University of Hong Kong, Pok Fu Lam, Hong Kong, July 2018

Song, Xiaoming, co-organizer, session on "Gaussian functionals and application to Finance," 7th IMS-China International Conference on Statistics and Probability, Dalian, China, July 2019

Woerdeman, Hugo J., board member, International Research Center for Tensor and Matrix Theory of Shanghai University

Woerdeman, Hugo J., vice president, Steering Committee, International Workshop on Operator Theory and its Applications

Woerdeman, Hugo J., vice president, International Linear Algebra Society

Woerdeman, Hugo J., chair, International Linear Algebra Society (ILAS) Institutional Membership Committee

Woerdeman, Hugo J., co-organizer, minisymposium "Operator Theory and Quantum Information," International Workshop on Operator Theory and its Applications, East China Normal University, Shanghai, China, July 2018

Woerdeman, Hugo J., chair, Israel Gohberg ILAS-IWOTA 2020 Lecturer Selection Committee

Woerdeman, Hugo J., co-organizer, special session "Recent Progress in Multivariable Operator Theory," Joint Mathematics Meetings, Baltimore, MD, January 2019

Woerdeman, Hugo J., organizer, mini-symposium "'Matrix techniques in operator theory and operator algebras," 2019 International Linear Algebra Society Meeting (ILAS 2019), Rio de Janeiro, Brazil, July 2019

Wright, J. Douglas, vice-chair, SIAM activity group on Nonlinear Waves and Coherent Structures, January 2017-December 2018

Wright, J. Douglas, co-organized, special session on Water Waves at Mathematics of Wave Phenomena Conference, Karlsruhe, Germany, July 2018

Editorial Positions:

Ambrose, David, Division Editor of Journal of Mathematical Analysis and Applications

Hitczenko, Pawel, Editorial Board Member, Open Journal of Discrete Mathematics

Kaliuzhnyi-Verbovetskyi, Editor, Linear Operators and Linear Systems

Kaliuzhnyi-Verbovetskyi, Dmitry, Associate Editor, Journal Complex Analysis and Operator Theory

Woerdeman, Hugo J., Associate Editor, Indagationes Mathematicae

Woerdeman, Hugo J., Associate Editor, Annals of Functional Analysis

Woerdeman, Hugo J., Co-editor, "Operator theory, analysis and the state space approach," in honor of Rien Kaashoek

Graduate Presentations:

Kennett Dela Rosa,"Location of Ritz values in the numerical range of normal matrices," The 15th workshop on Numerical Ranges and Numerical Radii (WONRA), Toyo University, Japan, June 2019

Aleksandr Yaroslavskiy, "Distribution of the number of corners in tree-like and permutation tableaux," 29th International Conference on Probabilistic, Combinatorial and Asymptotic Methods for the Analysis of Algorithms, Uppsala, Sweden, June 2018
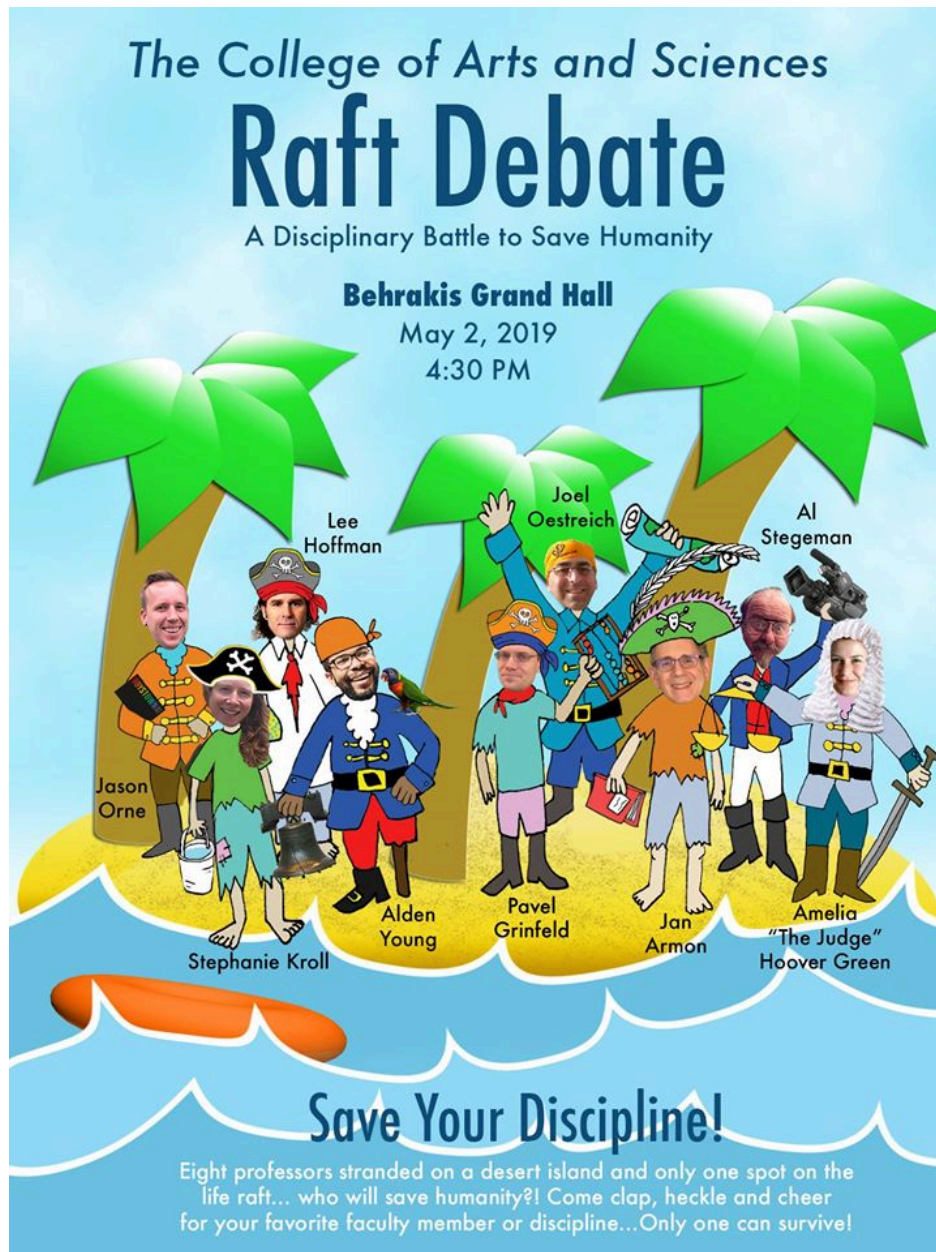
Joshua Jackson, "A Determinantal Representation for Bivariate Polynomials whose Bezoutians admit a Canonical Factorization", AMS Sectional Meeting, University of Delaware, Newark, DE, September 29-30, 2018. - Invited

Joshua Jackson, "A Determinantal Representation for Bivariate Polynomials whose Bezoutians admit a Canonical Factorization", The 8th International Conference on Matrix Analysis and Applications (ICMAA 2019), July 15-18, 2019, University of Nevada, Reno (UNR), Nevada, USA. - Invited

Joshua Jackson, "A Determinantal Representation for Bivariate Polynomials whose Bezoutians admit a Canonical Factorization." AMS Sectional meeting, University of Florida, November 2019 - Invited

CoAS Raft Debate:

The College of Arts and Sciences
Raft Debate
A Disciplinary Battle to Save Humanity

Behrakis Grand Hall
May 2, 2019
4:30 PM

Joel Oestreich
Lee Hoffman
Al Stegeman
Jason Orne
Alden Young
Pavel Grinfeld
Jan Armon
Amelia "The Judge" Hoover Green
Stephanie Kroll

Save Your Discipline!

Eight professors stranded on a desert island and only one spot on the life raft... who will save humanity?! Come clap, heckle and cheer for your favorite faculty member or discipline...Only one can survive!

Dr. Pavel Grinfeld of the math department won the debate. Congratulations Dr. Grinfeld!

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Honors Day:

Robert J. Bickel Scholarship:

Thomas Ciszak   *Xizhi Tan*

Jasper MacNaughton   *Lin Yuan*

Isaiah Siegl

Frank H. M. Williams Prize in Mathematics: *Stephen Costa*

Dr. Robert C. Busby Mathematics Award: *Jadzia Watsey*

Williams Scholarship

Costa, Stephen
Stephen Costa is a senior double – majoring in mathematics and in finance with a 4.0 GPA.
He also received Drexel's National Merit Finalist scholarship and Robert J. Bickel Scholarship.
He worked at Willis Towers Watson as a retirement actuarial Intern. Currently he is a part-time employee at Independence Blue Cross as a Medicare pricing actuarial Intern and will be a full-time employee from July 2019.

Robert J. Bickel Scholarship

Tan, Xizhi
Xizhi (Sam) took three years and four majors to find out her passion in Math. She joined the math department last summer and finished 52 credits in two quarters with all A's. She is a tutor at the Math Resource Center and currently on co-op working as a digital accessibility analyst at JP Morgan. She also worked at Comcast as an assistant product manager. (Her favorite quote: "It is never too late to transfer to math – by Xizhi Tan)

MacNaughton, Jasper
Jasper is a rising senior pursuing a BS in Mathematics with minors in Computer Science & Economics in the Pennoni Honors College. He was a treasurer for the undergraduate student government. Currently, he is a member of Drexel Tennis Club Team and Pi Kappa Phi Fraternity.
He worked as an analyst at a finance company and a software developer at SAP. He is currently in Germany for his co-op and working in SAP's Security Research Lab on Differential Privacy methods for protecting sensitive data. He is hoping to work as a software developer on applications of machine learning, upon graduation.

Ciszak, Thomas
Thomas is a senior majoring in mathematics and minoring in finance. He worked at Drexel IT as a help desk technician and supported faculty and students. He did both his co-op at PECO, first time as a business analyst and currently as a financial econometrics' analyst.

Siegl, Isaiah
Isaiah is a sophomore majoring in mathematics with a Computer Science minor in the Pennoni Honors College. He is a math tutor at the Math Resource Center. Currently he is on co-op working at Independence Blue Cross.

Yuan, Lin
Lin is a senior majoring in mathematics and currently on co-op at PJM Interconnection LLC as an analyst.

Busby Scholarship

Watsey, Jadzia
Jadzia is a senior in the BS/MS program working towards a bachelor's in mathematics and a Master's in Teaching, Learning & Curriculum and STEM education and minoring in Psychology.
She was the president and founder of DragonsTeach student organization. She is a member of Kappa Delta Pi, an honor society in education. She was a tutor at the Math Resource Center, a peer mentor for freshman math majors & DragonsTeach students. She completed her student teaching at the Philadelphia High School for Girls. In the coming fall, she will be teaching at the Philadelphia High School for Creative Performing Arts.

Dr. Robert C Busby Mathematics Award:

Funded in honor of Drexel alumnus and Professor Robert C. Busby, who was a member of the mathematics department at Drexel from 1966 to 1968 and from 1970 to 2003. Presented to an outstanding undergraduate mathematics major who volunteers their time as a mentor or tutor. Dr. Busby's career at Drexel mirrors the evolution of the institution. As an undergraduate, he attended Drexel Institute of Technology which did not have a mathematics major. When he returned as an assistant professor, Drexel soon became Drexel University and the department was developing its Ph.D. program. Dr. Busby had an active role in its establishment and advised one of the first doctoral students.

Dr. Busby with sons - Scott Busby & Robert Busby.
Robert & Scott were Drexel graduates

Dr. Busby and sons with math department head Dr. Shari Moskow and Undergraduate program adviser Dr. Ron Perline

The math department is grateful and appreciates Dr. Busby's contribution for a noble cause

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Colloquium:

10/3/2018: Michael L. Overton, New Yok University
Abstract: Numerical Investigation of Crouzeix's Conjecture

10/31/2018: Brian Allen, US Military Academy
Abstract: Applications of Inverse Mean Curvature Flow to General Relativity

11/14/2018: Huseyin Acan, Drexel University
Abstract: Bootstrap Percolation on Uniform Attachment Graphs

11/28/2018: David Scheinker, Stanford University
Abstract: Improving Healthcare with Queuing, Optimization and Neural Networks

1/15/2019: Zachary Hamaker, University of Michigan
Abstract: Schubert Calculus, Involutions and Symmetric Matrices

1/17/2019: Evita Nestoridi, Cambridge University
Abstract: Mixing Time and Cutoff Phenomenon

1/23/2019: Pierre-Emmanuel Jabin, University of Maryland
Abstract: Quantitative Estimates of Propagation of Chaos for Large systems of Interacting Particles

1/24/2019: Konstantin Matveev, Brandies University
Abstract: ART and the Kerov Conjecture

1/28/2019: Darij Grinberg, University of Minnesota
Abstract: Quotients of Symmetric Polynomial Rings Deforming the Cohomology of the Grassmannian

2/6/2019: Sandra Cerrai, University of Maryland
Abstract: Large -time Asymptotics in the Smoluchowski-Kramers Approximation of Infinite Dimensional Systems

3/21/2019: Dejan Slepcev, Carnegie Mellon University
Abstract: Approximating Measures by one Dimensional Objects and Optimal Network

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4/3/2019: Paul Dupuis, Brown University
Abstract: Performance Bounds and Optimization of Stochastic Systems Under Model Uncertainty

4/10/2019: Aleksandar Donev, Courant Institute of Mathematical Sciences, New York University
Abstract: The Numerical Methods to Study the Dynamics of Suspensions of Colloids Sedimented above a Bottom Wall and Driven by Externally Applied Forces (Sedimentation) or Torques (Micro rollers)

5/20/2019: Wilfred Gangbo, UCLA
Abstract: Optimal Mass Transport Theory

Analysis Seminar:

April 1: Anatolii Grinshpan, Drexel University
Title: About Flint Hills

April 8: Stephen Melczer, UPenn
Title: Asymptotics of Multivariate Generating Functions

April 29: Kennett Dela Rosa, Drexel University
Title: Location of Ritz Values in the Numerical Range of Normal Matrices

May 6: Thomas P.-Y Yu, Drexel University
Title: Analysis of P-Recurrence: A Dynamical System Point of View

May 13: Joshua Jackson, Drexel University
Title: A Determinantal Representation for Bivariate Polynomials whose Bezoutians Admit a Canonical Factorization

May 20: Matthew Ziemke, Drexel University
Title: An Elementary Construction of the GKSL Master Equation for N-Level Open Quantum Systems

June 3: Hugo Woerdeman, Drexel University
Title: Fourier Coefficients of Spectral Density Functions

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Partial Differential Equations and Applied Mathematics Seminar:

10/25/2018: Alpar Meszaros, UCLA
Title: Master Equations in the Theory of Mean Field Games

11/1/2018: Sam Walsh, University of Missouri
Title: Capillary- Gravity Water Waves with Exponentially Localized Vorticity

11/8/2018: Loc Nguyen, University of North Carolina, Charlotte
Title: A Numerical Method for the Inverse Tomographic Problem with Incomplete Data: The PDE Approach

12/6/2018: Elaine Cozzi, Oregon State University
Title: Incompressible Euler Equations and the Effect of Changes at a Distance

1/24/2019: Katy Craig, University of California, Santa Barbara
Title: Aggregation Diffusion to Constrained Interaction: Minimizers and Gradient Flows in the Slow Diffusion Limit

2/21/2019: Milton Lopez Filho, Federal University of Rio de Janeiro
Title: The Vanishing Alpha Limit for the Euler-Alpha Equations in Domains with Boundary

3/20/2019: Roy Goodman, NJIT
Title: Bifurcations in the Schrodinger Equation on a Quantum Graph

4/25/2019: Daniel Lacker, Colombia University
Title: Inverting the Markovian Projection

5/2/2019: Zhenfu Wang, UPenn
Title: Propagation of Chaos for Large Systems of Interacting Particles with Almost Poisson Kernels

5/16/2019: Xin Liu, Clemson University
Title: Optimal Control of a Time-Varying Double-Ended Production Queueing Model

5/23/2019: Jameson Graber, Baylor University
Title: Variational Methods for First Order Mean Field Games

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CAGE Seminar:

10/11/2018: Mark Skandera, Lehigh University
        Title: Combinatorial Evaluation of Hecke Algebra Induced Sign Characters

11/1/2018: Michele D' Adderio, Univ. Libre de Bruxelles
        Title: Delta Conjectures

11/6/2018: Anna Pun, Drexel University
        Title: Catalan Functions and k-Schur Functions

11/15/2018: Vasu Tewari, UPenn
        Title: Divided Symmterization and Generalized Permutahedra

11/29/2018: George Wang, UPenn
        Title: Crystals Under Lock and Key

12/6/2018: Tamar Friedmann, Haverford
        Title: From Lie Algebras to Catalan Numbers and Beyond

1/31/2019: Sean Griffin, University of Washington
        Title: Schur-Positivity and Labeled Binary Trees

2/7/2019: Charlotte Chan, Princeton University
        Title: Buildings and Flag Varieties

2/14/2019: Philippe Nadeau, University of Lyon
        Title: The Cohomology Class of the Peterson Variety

2/21/2019: Thomas Lam, University of Michigan
        Title: Back Stable Schubert Calculus

2/28/2019: Olya Mandelshtam, Brown University
        Title: Combinatorics of the ASEP on a Ring and Macdonald Polynomials

3/21/2019: Gabe Feinberg, Washington University
        Title: Fully Commutative Elements of Complex Reflection Groups

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3/28/2019: Vladimir Retakh, Rutgers University
      Title: On Non-Commutative Positivity

4/5/2019: Sami Assaf, University of South Carolina
      Title: Kohnert Polynomials

4/9/2019: Sarah Brauner, University of Minnesota
      Title: Enumerating Linear Systems on Graphs

4/18/2019: Linda Chen, Swarthmore College
      Title: Degeneracy Loci, Brill-Noether Theory and Tableau Formulas

5/3/2019: Karola Meszaros, Cornell
      Title: The Many Aspects of Schubert Polynomials

5/9/2019: Marcelo Aguiar, Cornell
   Title: Mobius Functions for Real Hyperplane Arrangements

Albert Herr Teaching Assistant Award:

Aleksandr Yaroslavskiy & Joshua D. Jackson shared the prestigious AlHerr teaching assistant award in 2018-19 academic year. Congratulations!

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Math Resource Center:

The Math Resource Center of Drexel University offers a very comfortable learning environment to promote student achievement and success. Instruction in the Math Resource Center is very informal. Students are welcome to come to the Resource Center with questions whenever they need help in understanding math course work. Tutors are available to give one on one help during the less rushed hours and provide group tutoring during busy hours. The center is open 42 hours per week, having minimum five tutors per hour. The center provides free personalized help to all Drexel University students taking a Math class. The tutor list includes Teaching faculty, Teaching Assistants and Undergraduate students

2018-19 MRC Student Visits
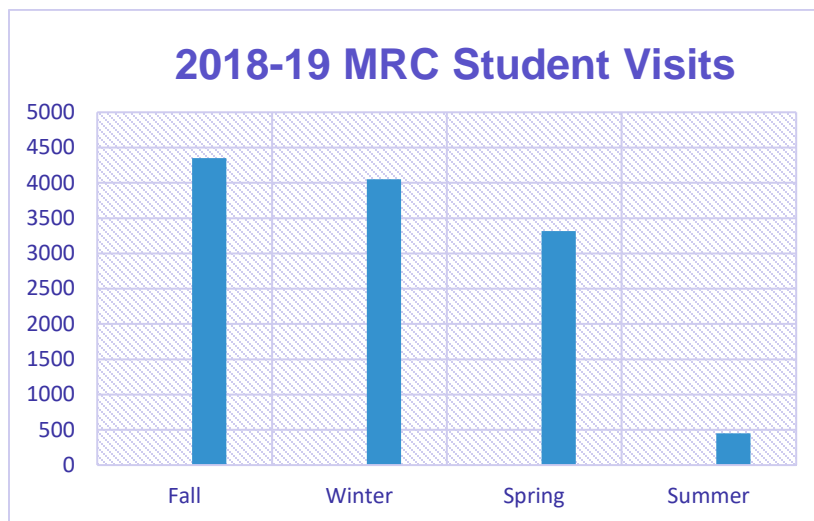
Distinguished Speaker:

Dr. Wilfrid Gangbo, the University of California was the 2018-19 distinguished speaker. He gave an introductory talk to the "Optimal Transport Theory", which in the past two decades, has emerged as a fertile field of inquiry and a powerful tool for applications to problems within and beyond mathematics.
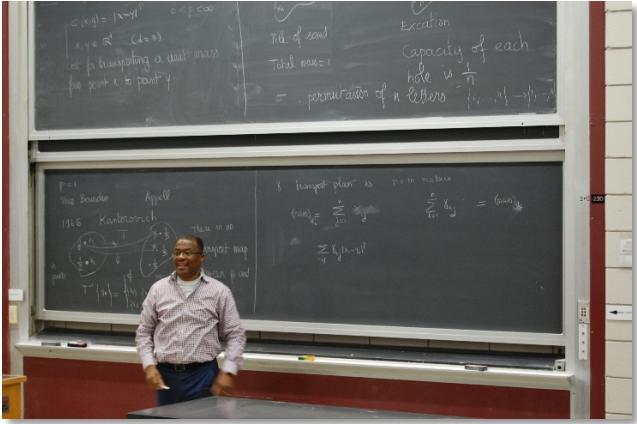
Math Student Organization

This year, the Mathematics Student Organization (MSO) was able to host several events and experienced increased interest and attendance. Part of the success can be attributed to our efforts – such as asking for feedback from students in activities fairs, meetings – in understanding what the students want from an organization such as the MSO. We learned that students want the organization to focus on "more math", have more discussions and interactions on mathematical topics to build a sense of community and engagement.

Students organized events such as problem-solving nights and discussions on mathematical videos to help develop an intuitive understanding of problems and explore ways to approach them for solutions. Early during Fall Term, to attract and gear students for the Virginia Tech Regional Math Contest and the Putnam Examination, MSO organized several weeks of problem-solving sessions where students were provided with advanced puzzles, riddles, and written problems. The historically popular Rubik's cube night was a success with an attendance of around 25.

President - Curtis Bechtel
Vice-President - Zeviel Imani
Treasurer - Preetham Mohan
Event Co-ordinator - Omesh Dwivedi
Secretary - Valentina Ozornina
Faculty Advisor - Jason Aran

SIAM

SIAM in the 2018-2019 academic year hosted a number of wonderful talks by mostly Drexel's third- and fourth-year mathematics graduate students. The discussions primarily featured applications of probability and matrix analysis but ranged to include talks about differential equations, algebra, and other fields. As per tradition, we also hosted the 9th annual Epsilon talks, allowing our first-year students a chance to highlight their interests and work through brief talks to the rest of the department.

10/24/18 - A Central Limit Theorem for Permutation Tableaux: **Aleksandr Yaroslavskiy**

10/31/18 - Data Filling with Soap Bubbles: **Felix Jones**

11/14/18 - Construction Brownian Motion: **Nathan Anderson-Stahl**

12/5/18 - Quantum Information Theory and Maximally Entangled States: **Benjamin Grossmann**

1/16/19 - Transfer Functions, Lurking Isometries, and Realization Results: **Joshua Jackson**

1/30/19 - Continuity of a Function Associated to the Ritz Region of a Point: **Kennett Dela Rosa**

2/6/19 - Weighted Dependency Graphs for Families of Mutually Dependent Random Variables II:
     Aleksandr Yaroslavskiy

2/13/19 - Weighted Dependency Graphs for Families of Mutually Dependent Random Variables II: **Aleksandr Yaroslavskiy**

3/14/19 - Pi Day Recreational Mathematics: **Drexel Graduate Students**

4/12/19 - Sampling through Weighted Ensemble: **Felix Jones**

4/19/19 - How are Poncelet's Theorem, Blaschke Products, and Numerical Ranges Related? **Kennett Dela Rosa**

4/26/19 - A Closer Look at Indefinite Inner Products: **Joshua Jackson**

5/5/19 - Drexel University Ninth Annual Epsilon Talks: **First-Year Graduate Students**

5/10/19 - The Generalized Backward Stochastic Differential Equation: **Nathan Anderson-Stahl**

5/24?19 - Hall Marriage Problem and Related Problems: **Eammon Hart**

5/31/19 - Eigenvalue Perterbation: **Alexander Furia**

6/7/19 - Mathematical Neural Fields: **Dominick Macaluso**

6/10/19 - Expansions of Catalan Functions: **Daniel Summers**

President - Aleksandr Yaroslavskiy
Vice-President - Joshua Jackson
Treasurer – Eammon Hart
Secretary - Gabriel Pimentel
Faculty Advisor - Robert Boyer

2018 Certificate of Recognition recipient (and the faculty advisor who nominated them):

Daniel Summers (Robert Boyer), Drexel University

In Memoriam: – Bernard Kolman

Bernie was a faculty member at Drexel University for 34 years. He authored or co-authored 16 textbooks on a range of subjects from college algebra to a survey of Lie groups and Lie algebras. He was the president of Eastern Pennsylvania- Delaware section of the Mathematics Association of America from 1985-1987. He retired from full time teaching in 1998 and began a rich post-retirement period of travel, photography, cooking and enjoyment of family. He will be missed by his family and friends.

Pi – Day:

Star Scholars – Outstanding Mentor

Dr. Hugo Woerdeman won the award of an outstanding Mentor for the 2019 STAR program. He mentored Micah Quillen.

PhD Degree Awarded

Benjamin Grossmann successfully defended his thesis "Rank in Metric Analysis: On the preservers of Maximally Entangled States and Fractional Minimal Rank" and received his PhD under the guidance of **Dr. Hugo Woerdeman.**

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Daniel Summers successfully defended his thesis "Expansion of Catalan Functions" and received his PhD under the guidance of **Dr. Jonah Blasiak** & Dr. Jennifer Morse (Previous mentor)
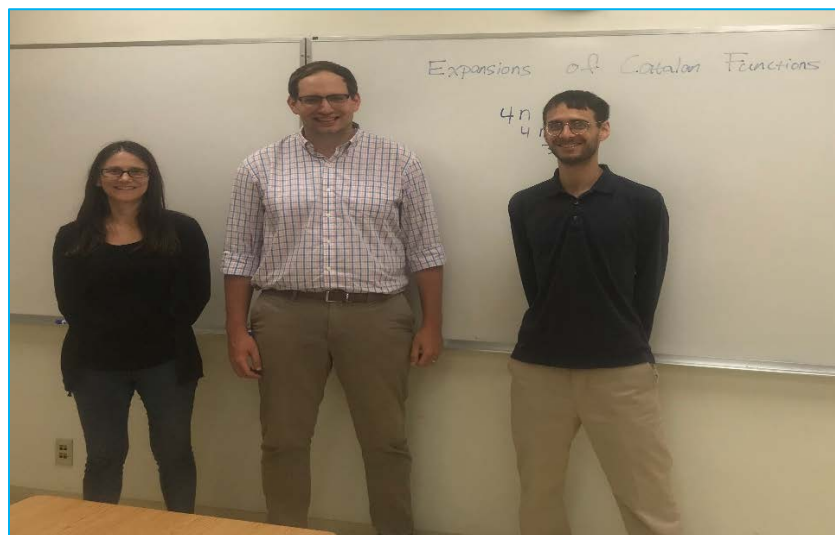
Patrick Shields successfully defended his thesis "Inflated Weight – a dual Approach to Structure Constants for K-Theory of Grassmannians, and a Charge Statistic for Shifted Tableaux and received his PhD under the guidance of **Dr. Jonah Blasiak** & Dr. Jennifer Morse (Previous mentor).

Patrick Shields   Jonah Blasiak

Master's Degree Awarded

1. Nathan Anderson -Stahl
2. Andrew Pallotto
3. Eammon Hart
4. Jacob Woods
5. Gabriel Pimentel

Undergraduate Degree with Honors

Summa Cum Laude

1. Stephen Costa – Summa Cum Laude
2. Sanjana Venkat – Summa Cum Laude
3. Preetham Mohan – Summa Cum Laude
4. Yuwei Zhou – Summa Cum Laude
5. Curtis Bechtel – Summa Cum Laude
6. Guruansh Singh – Summa Cum Laude

Magna Cum Laude

1. Sophia Nelson – Magna Cum Laude
2. Noah Springer – Magna Cum Laude
3. Jacquelynn Ross – Magna Cum Laude
4. Jadzia Watsey – Magna Cum Laude
5. Zhilang Zhang – Magna Cum Laude
6. Thomas Ciszak – Magna Cum Laude

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Cum Laude

1. Patrick Lombardo – Cum Laude
2. Mary Garrity – Cum Laude
3. Valentina Ozornina – Cum Laude
4. Jacob Woods – Cum Laude
5. Asad Ansari – Cum Laude

Sabrina Martin	Thomas Padilla
Lan Wei	Daria Dressler
Yuqin Lin	Madison Lyons
Alexander Nelson	Benjamin Lee
Changpei Liu	

WE'RE HAVING A PARTY!

Holiday Party & Monday Tea!