DMS NEWS

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In this issue:

Did you know?

The Division of Mathematical Sciences (DMS) has 28 Program Directors representing 8 mega-programs.

DMS receives over 3000 proposals requesting funding each year.

FY2018 DMS funds supported:

   2618   regular researchers

    385   postdoctoral researchers

   1939   graduate students

   1214   undergraduate students

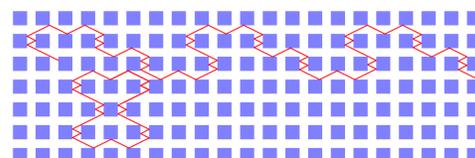# 2020 Breakthrough Prize in Mathematics

Alex Eskin, Arthur Holly Compton Distinguished Service Professor of Mathematics, University of Chicago

The 2020 Breakthrough Prize in mathematics was recently awarded to Alex Eskin for his extraordinary work in the dynamics and geometry of the moduli space of Abelian differentials. The citation points to his and Mirzakhani's proof of the "magic wand theorem" in their seminal 2013 paper.
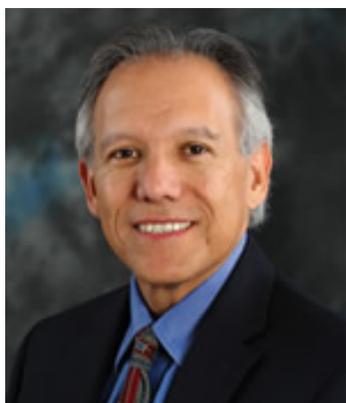
Dr. Eskin was born in Kiev; he received his bachelor's degree in mathematics from University of California, Los Angeles and studied physics and mathematics at Stanford University and Massachusetts Institute of Technology before receiving his PhD in math from Princeton University. He joined the University of Chicago faculty in 1996. Eskin is a member of the American Academy of Arts and Sciences and the National Academy of Sciences; among his other honors are a Sloan Fellowship and a Simons Investigator Award.

DMS is proud to support Dr. Eskin's work.

https://blogs.ams.org/beyondreviews/2019/09/06/alex-eskin-wins-2020-breakthrough-prize-in-mathematics/

UPDATE FROM THE DIVISION DIRECTOR

Juan C. Meza

Welcome to the new DMS Newsletter! We've been wanting to develop new and improved means of communicating with the mathematics and statistics communities and the result is the newsletter you are now reading. Our goal is to provide the community with news of interest to you from both the Division of Mathematical Sciences as well as NSF.

In this issue, you will see some planned regular features such as the Division Director's Update, New Activities and Programs, Get to Know Your Program Officers, as well as other items of interest.

In the area of partnerships, I'm excited to announce that we have two new programs that will foster more international collaborations. The first new collaboration is between the UKRI/EPSRC and DMS and is now accepting proposals for joint research between PIs in the US and the UK. This collaboration follows the signing of a Memorandum of Understanding on Research Cooperation between UKRI and the NSF in 2018, which provided an overarching framework to encourage collaboration between research communities in the two countries. As our own NSF Assistant Director for Mathematical and Physical Sciences, Dr. Anne Kinney, said: "Mathematics has always been a global enterprise. Through this new collaboration we will help bring together the best ideas from our two countries to bear on some of the most challenging problems facing mathematics." For full details, check out: https://www.nsf.gov/pubs/2019/nsf19082/nsf19082.jsp

In addition, DMS is a new participant in the NSF US-Israel Binational Science Foundation (BSF) Collaborative Research Opportunities program. The goal of this US-Israel collaborative research opportunity is to help reduce barriers to working internationally. Through this program, US and Israeli researchers can submit a single collaborative proposal that will undergo a single review process at NSF, which will be the lead agency. For full details, please see: https://www.nsf.gov/pubs/2017/nsf17120/nsf17120.jsp

We've also been busy with several of NSF's Big Ideas including Harnessing the Data Revolution (HDR), Quantum Leap, and Understanding the Rules of Life. In particular, DMS has played a major role in HDR working jointly with CISE on 4 different solicitations, including Ideas Labs, Frameworks, HDR-TRIPODS, and Data Science Corps. For more details on these solicitations as well as the overall HDR programs, you can check out: https://www.nsf.gov/hdr/

Another exciting event was the recent Joint Statistical Meetings in July. We had strong participation from DMS Program Officers in the Statistics Program with an extremely well received Meet the Program Officers that gave conference participants an opportunity to schedule and meet with the staff one-on-one. It was so successful that we are planning on providing a similar opportunity at the Joint Mathematics Meetings in January.

I hope to be able to provide you more news on upcoming events. Overall, we're hoping to keep the newsletters short, timely, and informative. If you have any thoughts on features you would like us to include or any other comments on the general layout, we would be pleased to hear from you.

Happy Holidays!

PECASE AWARDS IN DMS

In 1996, the Presidential Early Career Award for Scientists and Engineers (PECASE) was established as the highest honor bestowed by the United States Government on science and engineering professionals in the early stages of their independent research careers. Awardees are selected for their pursuit of innovative research at the frontiers of science and technology and their commitment to community service as demonstrated through scientific leadership, public education, or community outreach. The following DMS nominees from years 2015-2017 received this distinction in a ceremony held on July 25, 2019 in Washington DC.

PECASE award ceremony at NSF (from left to right): J. Meza, D. Lockhart, P. Loh & daughter, T. Luo, T. Bartoszynski.

Lorena Bociu (North Carolina State University)

"Control and Sensitivity Analysis for Fluid-Elasticity Interactions and Fluid-Solid Mixtures"

Po-Shen Loh (Carnegie Mellon University)

"Algebraic extremal combinatorics"

Lillian Pierce (Duke University)

"Research and Training at the Intersection of Number Theory and Analysis"

Chuan Xue (Ohio State University)

"Multiscale Modeling of Axonal Cytoskeleton Dynamics and Axonal Transport"

Han Liu (Northwestern University) (photo unavailable)

"An Integrated Inferential Framework for Big Data Research and Education"

See the full list of FY2019 DMS CAREER awardees.

MAJOR AWARDS

The 2019 Abel Prize

Karen Uhlenbeck

In March 2019, Dr. Karen Keskulla Uhlenbeck, Distinguished Visiting Professor in the School of Mathematics at the Institute of Advanced Study and Professor and Sid Richardson Regents Chair of Mathematics at the University of Texas at Austin was awarded the Abel Prize for her pioneering work in geometric partial differential equations, gauge theory and integrable systems. The Abel Prize has been awarded annually since 2003 for, "contributions to the field of mathematics of extraordinary depth and influence." It was established by the Norwegian government on the occasion of the 200th anniversary of Niels Henrik Abel's birth.

Dr. Uhlenbeck was born in 1942 in Cleveland, Ohio and grew up in Ohio and New Jersey. She studied physics and mathematics at the University of Michigan and completed her Ph.D in 1968 supervised by Richard Palais with a graduate fellowship from the National Science Foundation. She was invited to give a plenary lecture at the ICM in 1990 (only the second woman after Emmy Noether to do so) and was awarded the U. S. National Medal of Science in 2000. Dr. Uhlenbeck's extraordinary body of work includes her seminal contributions to gauge theories, especially 4-dimensional Yang-Mills equations. These have led to exciting developments in mathematical physics (Standard Model; quantum gravity) as well as our understanding of 4-dimensional topology via the groundbreaking work of Clifford Taubes and Simon Donaldson. (photo credit: Andrea Kane, IAS).

2020 New Horizons in Mathematics Prizes

Tim Austin

Emmy Murphy

Xinwen Zhu

Tim Austin is Associate Professor of Mathematics at the University of California, Los Angeles. His award is for, "multiple contributions to ergodic theory, most notably the solution of the weak Pinsker conjecture."

Emmy Murphy is Associate Professor of Mathematics at Northwestern University. Her award is for, "contributions to symplectic and contact geometry, in particular the introduction of notions of loose Legendrian submanifolds and, with Borman and Eliashberg, overtwisted contact structures in higher dimensions.
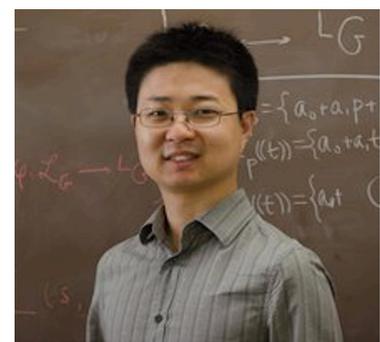
Xinwen Zhu is Professor of Mathematics at Caltech. His award is for, "applications to the theory of Shimura varieties and the Riemann-Hilbert problem for p-adic varieties."

MEET A PROGRAM DIRECTOR

In 2019 the Division of Mathematical Sciences welcomes two new permanent program directors: Dr. Swatee Naik and Dr. Marian Bocea. We take a moment to give them a warm welcome to continue their excellent work in DMS.

Swatee Naik was born and raised in Mumbai, India. She completed her Ph.D in 1994 from Indiana University in Bloomington under the supervision of Charles Livingston. Her thesis was in the area of low dimensional topology. She joined the faculty at the University of Nevada at Reno in 1994 where she served as Core Mathematics Director (2005-2007), Chair of the Department (2007-2008) and Chair of the Faculty Senate (2013-2014). Since 2015 she served as (rotating) Program Director in Topology & Geometric Analysis which included a detail in the Division of Graduate Education assisting with the NSF Research Traineeship Program. Swatee enjoys Bollywood music, eating spicy Indian food and spending time with her family.

Marian Bocea was born in Craiova, Romania. He received his undergraduate education as well as M.S. and Ph.D. degrees in Mathematics from University of Craiova, Romania, and he also holds M.S. and Ph.D. degrees in Mathematical Sciences from Carnegie Mellon University. Marian's research interests are in Partial Differential Equations, Calculus of Variations, and their applications, particularly to Materials Science. Prior to joining DMS in 2017 as a Program Director (VSEE), he was an Associate Professor of Mathematics at Loyola University Chicago. At NSF, Marian has worked in the Applied Mathematics (2017-2019) and Analysis programs and represented DMS on the foundation-wide management team for DMREF - the primary program by which NSF participates in the Materials Genome Initiative for Global Competitiveness (MGI). Since 2019, his main responsibility within DMS is in the Analysis program and he is a member of the Mathematical Sciences Research Institutes management team. When he is not working, Marian enjoys traveling and spending time with his wife and daughter.

DMS HIGHLIGHTS: PI SPOTLIGHT

Lai-Sang Young

Lai-Sang Young is the Henry & Lucy Moses Professor of Science and Professor of Mathematics at the Courant Institute of Mathematical Sciences, a division of New York University. She was recently awarded a 5 year grant (DMS 1901009) by the Analysis program (Dr. Young is also supported by NSF SBE 1734854). Dr. Young's project, "Dynamical Systems: Connecting theory to applications", proposes to increase the number of fields where dynamical systems theory is applied. As part of a precursor grant, DMS 1363161, and in collaboration with Dr. Robert Shapley and Dr. Logan Chariker, they have constructed a new mathematical model to explain how the human brain processes visual information; this was also featured in a recent article in Quanta Magazine ("A mathematical model unlocks the secrets of vision" by Kevin Hartnett). In other work applying dynamical systems, Dr. Young together with Dr. Pereira used delay differential equations to model epidemic control. Dr. Young also extended the theory of hyperbolic dynamical systems from finite to infinite dimensions with her former PhD student Alex Blumenthal and introduced stochastic models of neural networks with Dr. Yao Li. Dr. Young was recently named Distinguished Visiting Professor at the Institute for Advanced Study in Princeton, NJ.

DMS Links

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