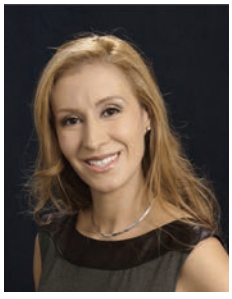
Mathematics People

Presidential Awards for Excellence in Science, Mathematics, and Engineering Mentoring

Two educators and an educational program whose work involves the mathematical sciences were selected to receive the Presidential Awards for Excellence in Science, Mathematics, and Engineering Mentoring.


Erika Camacho

ERIKA CAMACHO of Arizona State University was honored for her mentoring philosophy, which centers on the core belief that every individual is capable of achievement and that each individual should be appropriately challenged according to her or his particular needs. Camacho has held Sloan and Ford Foundation Fellowships and has received a Leader and Mentor in Undergraduate Research Citation from the National Security Agency, the National Latina Leadership Award from the National Hispanic Women's Corporation, the SACNAS Distinguished Undergraduate Institution Mentor Award, the Outstanding Mentor Award from the Department of Mathematics of the University of Texas at Arlington, and the Outstanding Latino/a Faculty in Higher Education: Research/Teaching Award from the American Association of Hispanics in Higher Education. She is a member of the AMS Council, Committee on Education, and Young Scholars Award Committee.

GLENN S. LEE of Waialua High and Intermediate School, Waialua, Hawaii, has taught mathematics and science to youngsters from the rural, semi-isolated community of Waialua, where social services, workforce training opportunities, and alternative agricultural programs have been limited. His activities have enabled students from groups traditionally underrepresented in science, technology, engineering, and mathematics—Pacific Islanders, African Americans, and native Hawaiians—to successfully complete a high school program, pursue postsecondary education, and acquire the knowledge and skills needed to compete in a twenty-first-century workforce environment.

The ENHANCING DIVERSITY IN GRADUATE EDUCATION (EDGE) program was honored for providing introductions to key figures in the scholarly field, gaining visibility for one's research and teaching accomplishments, and making key connections with public and private organizations for career professional work. Participants in the program constituted thirty-five percent of PhDs granted to African American women in the mathematical sciences during the years 2005 to 2009. The EDGE program was the recipient of the AMS Mathematics Programs That Make a Difference Award in 2007.

—From a National Science Foundation announcement

Edelsbrunner Awarded Wittgenstein Prize


Herbert Edelsbrunner

HERBERT EDELSBRUNNER of the Institute of Science and Technology Austria (IST Austria) has been awarded the Wittgenstein Prize of the Austrian Science Fund.

Edelsbrunner is "one of the world's leading researchers in computational geometry and topology [who] has played a significant role in laying the foundations of his field." According to the prize citation, Edelsbrunner "is pursuing three main research areas, each with the goal of further developing computational topology and thus opening up new areas of application. These emphases include stochastic, algebraic, and geometric questions within the field of topological data analysis. All three aspects are necessary to gain the—possibly revolutionary—insights necessary to understand the microscopic world of materials."

Edelsbrunner received his PhD in technical mathematics from Graz University of Technology in 1982. In 1985 he joined the faculty of the University of Illinois at Urbana–Champaign. In 1996, he cofounded the software company Geomagic. In 1999 he moved to Duke University, and he joined IST Austria in 2009. He was awarded the Alan T. Waterman Award of the National Science Foundation in 1991. He was elected to the American Academy of Arts and Sciences in 2005, to the German Academy of Sciences Leopoldina in 2008, and to the inaugural class of Fellows of the European Association for Theoretical Computer

Science in 2014. He is a member of the Austrian Academy of Sciences and of Academia Europaea.

The prize carries a cash award of 1.5 million euros (approximately US$1,750,000) to support the mathematician's research for a period of five years.

—From an IST Austria announcement

Penrose Awarded Clay Dissemination Award


Sir Roger Penrose

Sir Roger Penrose of the University of Oxford has been selected to receive the Clay Award for Dissemination of Mathematical Knowledge by the Clay Mathematics Institute "in recognition of his outstanding contributions to geometry, relativity, and other branches of mathematics, and of his tireless work in explaining mathematical ideas to the public through popular books, public lectures, and broadcasts."

The citation goes on: "Roger Penrose has made extraordinary and wide-ranging contributions to mathematics and its applications, often making novel and inspiring connections across disciplinary boundaries. He started out in algebraic geometry under W. V. D. Hodge and J. A. Todd at Cambridge, but within a few years of completing his PhD thesis on Tensor Methods in Algebraic Geometry, he had laid the foundations of the modern theory of black holes with his celebrated paper on gravitational collapse. For this work he was awarded the Wolf Prize in Physics, with Stephen Hawking. His exploration of foundational questions in relativistic quantum field theory and quantum gravity, based on his twistor theory, had a huge impact on differential geometry. In other areas, a paper that he wrote as a student introduced what is now known as the Moore–Penrose inverse. His discovery of 'Penrose tilings' spawned a new field in geometry, as well as having an impact in crystallography. It was Penrose who first suggested that Church's lambda calculus could be a powerful tool in exploring programming language semantics. In his collaboration with M. C. Escher, he crossed over into the visual arts.

"His work in public engagement goes beyond the simple exposition of mathematics. In his popular books, he has set out, with considerable success, to engage the public with the development of his ideas and to draw them into an interconnected world of intellectual endeavour which is the common property of all, not just of 'specialists.' So his books on artificial intelligence aim not just to inform his readers about deep mathematical ideas of relevance to the subject but also to enable and encourage participation of the public in discussion of the nature of consciousness.

"He is an energetic public lecturer, traveling widely and attracting large audiences because he speaks in direct and engaging terms about mathematical ideas that he thinks are worth communicating and that his audiences think are worth trying to understand. Many of his lectures have been recorded and made available online, along with recordings of television appearances. They have been viewed by hundreds of thousands of people."

The prize is awarded in recognition of personal contributions to research in mathematics at the highest level, as well as of distinction in explaining recent advances to the public at large.

—From a CMI announcement

Kashiwara Awarded Kyoto Prize


Masaki Kashiwara

Masaki Kashiwara of Kyoto University has been awarded the Kyoto Prize in Basic Sciences for Outstanding Contributions to a Broad Spectrum of Modern Mathematics, including his work in advancing *D*-module theory.

According to the prize citation, Kashiwara "established the theory of *D*-modules, thereby playing a decisive role in the creation and development of algebraic analysis. His numerous achievements—including the establishment of the Riemann–Hilbert correspondence, its application to representation theory, and construction of crystal basis theory—have exerted great influence on various fields of mathematics and contributed strongly to their development." The prize is awarded by the Inamori Foundation to individuals who have contributed significantly to the scientific, cultural, and spiritual betterment of humankind. The prize carries a cash award of 100 million yen (approximately US$900,000).

—From an Inamori Foundation announcement

Simons Foundation Investigators Named

The Simons Foundation has named the Simons Foundation Investigators for 2018. Following are the investigators whose work involves the mathematical sciences.

Mathematics:

André Arroja Neves of the University of Chicago is a leading figure in geometric analysis with important contributions ranging from the Yamabe problem to geometric flows. Jointly with Fernando Marques, he transformed the field by introducing new ideas and techniques that

led to the solution of several open problems which were previously out of reach. Together or with coauthors, they solved the Willmore conjecture, the Freedman–He–Wang conjecture in knot theory, and Yau's conjecture on the existence of minimal surfaces in the generic case.

SYLVIA SERFATY of New York University works on understanding the behavior of physical systems via the tools of mathematical analysis, partial differential equations, and probability. A large part of her work has focused on the Ginzburg–Landau model of superconductivity, tackling and largely solving the problem of why and when vortices form the so-called Abrikosov triangular lattices. She has recently turned her attention to the statistical mechanics and dynamics of Coulomb-type systems and other many-particle systems with long-range interactions.

AKSHAY VENKATESH of Stanford University works in number theory and related fields. A major focus of his recent work has been the topology of locally symmetric spaces, in particular on new phenomena that occur when one leaves the setting of Shimura varieties. In that context, he has postulated and gathered evidence for a deep relationship between this topology and the motivic cohomology of certain algebraic varieties. In August, Venkatesh became a 2018 Fields medalist.

Theoretical Computer Science:

CONSTANTINOS DASKALAKIS of the Massachusetts Institute of Technology works on computation theory and its interface with game theory, economics, probability theory, statistics, and machine learning. His work has resolved long-standing open problems about the computational complexity of the Nash equilibrium, the mathematical structure and computational complexity of multi-item auctions, and the behavior of machine-learning methods such as the expectation-maximization algorithm. He has obtained computationally and statistically efficient methods for statistical hypothesis testing and learning in high-dimensional settings, as well as results characterizing the structure and concentration properties of high-dimensional distributions.

RAN RAZ, Princeton University. Raz's main research area is computational complexity theory, with a focus on proving lower bounds for computational models. He works on Boolean and algebraic circuit complexity, communication complexity, probabilistically checkable proofs, and interactive proof systems. In the last years, he studied relations between communication complexity and information complexity of communication protocols and worked on unconditional lower bounds on the number of samples needed for learning, under memory constraints.

Mathematical Modeling of Living Systems:

CLAUDIA CLOPATH, Imperial College of Science, Technology, and Medicine. Claudia Clopath's work has contributed to our understanding of learning in the brain. She has developed mathematical models of learning to link the plasticity observed experimentally at the neural level to the function at the network and behavioral levels.

LUCY COLWELL of the University of Cambridge has demonstrated that the three-dimensional structure of proteins can be determined from large sequence alignments. Her current research develops methods for relating phenotype to genotype, using large data sets from high throughput biological experiments, focusing mainly on proteins, small molecules and nucleic acids.

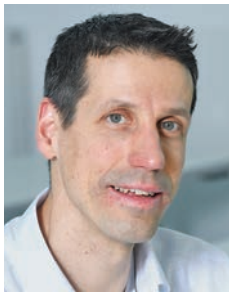
ELENI KATIFORI of the University of Pennsylvania is a recipient of a Burroughs Wellcome Career Award at the Scientific Interface and a National Science Foundation Career Award. Her research interests are primarily theoretical and span broad areas from soft matter physics with a focus on biologically inspired physics to thin shell elasticity and biological transport networks.

DANIELA WITTEN of the University of Washington is a leader in the field of statistical machine learning. Her work focuses on the development of supervised and unsupervised learning methods for making sense of large and messy data sets arising from genomics, neuroscience, and other fields. She has developed new frameworks for performing clustering, graphical modeling, and matrix decompositions in the high-dimensional setting.

The Simons Investigators program provides a stable base of support for outstanding scientists, enabling them to undertake long-term study of fundamental questions.

—From a Simons Foundation announcement

Székelyhidi Awarded Leibniz Prize



László Székelyhidi

LÁSZLÓ SZÉKELYHIDI of the University of Leipzig was awarded the 2018 Leibniz Prize for his research in the theory of partial differential equations. According to the prize citation, "the methods he developed have enriched the interchange between geometry and analysis in mathematics. His new insights have a significance far beyond his own research area, for example in the understanding of Euler equations in hydrodynamics and elasticity theory in continuum mechanics. Euler equations have posed a major challenge in mathematics for over two hundred years. Together with Camillo De Lellis, Székelyhidi has developed new approaches to the construction of non-smooth solutions to Euler equations. These led to a complete proof of Onsager's conjecture, which states that solutions below a certain Hölder continuity do not conserve energy but can reduce or, in a non-physical way, increase it. In the field of elasticity theory in continuum mechanics, Székelyhidi, in his doctoral thesis, succeeded in constructing a poly-

convex variation problem with an extremal that cannot be differentiated at any point. In collaboration with Daniel Faraco, he achieved another scientific breakthrough with a compactness result, which is closely related to Morrey's conjecture."

Székelyhidi received his PhD in 2003 from the University of Leipzig. He held research positions at Princeton University and ETH Zurich. In 2007 he was appointed professor at the University of Bonn, and he has been at the University of Leipzig since 2011. In 2010 he received the Oberwolfach–Preis für Analysis und Angewandte Mathematik. He was an invited speaker at the ICM in Seoul in 2014 and a plenary speaker at ICMP Chile in 2015.

—From a German Research Foundation announcement

Kwaśnicki Awarded Gordin Prize

MATEUSZ KWAŚNICKI of Wrocław University of Science and Technology has received the 2018 European Mathematical Society Gordin Prize for his outstanding contributions to the spectral analysis of Lévy processes. The prize honors the memory of Mikhail Gordin and is awarded to a junior mathematician from an Eastern European country working in probability or dynamical systems. The award consists of a cash prize of US$4,000.

—From an EMS announcement

European Girls' Mathematical Olympiad

L–R: Wanlin Li, Catherine Wu, Emily Wen, Megan Joshi, and Deanna Haunsperger.

The team from the Russian Federation took first place at the European Girls' Mathematical Olympiad (EGMO) held in Florence, Italy, in April 2018. The team from the United States took second place, and the team from the United Kingdom finished third. The 2018 EGMO US team members were CATHERINE WU, WANLIN LI, EMILY WEN, and MEGAN JOSHI. Wu and Li received gold medals; Joshi received a silver medal; and Wen earned a bronze medal. Students from fifty-two countries participated in the competition for female high school students. Seventeen students were awarded gold medals, thirty-nine received silver, and fifty-two won bronze. The US team is organized by the Mathematical Association of America as part of the MAA American Mathematics Competitions.

—From an MAA announcement

International Mathematical Olympiad

L–R: Michael Ren, Adam Ardeishar, James Lin, Vincent Huang, Andrew Gu, and Mihir Singal.

The 2018 International Mathematical Olympiad was held in Cluj-Napoca, Romania, from July 3 to 14. The team from the United States took first place. The team from Russia finished second, and the team from China was awarded third place. The US team consisted of ADAM ARDEISHAR, ANDREW GU, VINCENT HUANG, JAMES LIN, MICHAEL REN, and MIHIR SINGHAL. Gu, Huang, and Lin were members of the 2017 team. Lin earned a perfect score. Gu, Huang, Lin, Ren, and Singhal won gold medals; Ardeishar earned a silver medal. The team was coached by Po-Shen Loh of Carnegie Mellon University. The sixtieth competition will be held in the United Kingdom in 2019.

—From an MAA announcement

NEWS

2018 SIAM Prizes

The Society for Industrial and Applied Mathematics (SIAM) has awarded several prizes for 2018.

The Martin Kruskal Lectureship was awarded to MICHAEL I. WEINSTEIN of Columbia University. The prize is given for significant contributions to the mathematical theory of nonlinear waves and coherent structures.

The SIAM–MOS George B. Dantzig Prize was awarded to ANDRZEJ RUSZCZYNSKI of Rutgers University and ALEXANDER SHAPIRO of the Georgia Institute of Technology. The prize is awarded for original research that, by its originality, breadth, and depth, is having a major impact on the field of mathematical optimization.

The Gábor Szegő Prize was awarded to THOMAS TROGDON of the University of California Irvine. The SIAM Activity Group on Orthogonal Polynomials and Special Functions awards the prize every two years to one individual in his or her early career for outstanding research contributions in the area of orthogonal polynomials and special functions.

The AMS-MAA-SIAM Gerald and Judith Porter Public Lecture was awarded to MOON DUCHIN of Tufts University. Her lecture was titled "Political Geometry: Voting Districts, 'Compactness,' and Ideas about Fairness." This lecture on a mathematical topic accessible to the broader community is given each year at the Joint Mathematics Meetings.

The 2018 SIAM-MOS Lagrange Prize in Continuous Optimization was awarded to FRANCIS BACH of the INRIA-SIERRA Project, NICOLAS LE ROUX of Google Brain, and MARK SCHMIDT of the University of British Columbia. The prize is awarded every three years for an outstanding contribution in the area of continuous optimization published in the six calendar years prior to the award year.

—From SIAM announcements

Prizes of the London Mathematical Society

The London Mathematical Society has awarded a number of prizes for 2018.

The Pólya Prize was awarded to KAREN VOGTMANN of Warwick University for her profound and pioneering work in geometric group theory, particularly the study of automorphism groups of free groups.

The Fröhlich Prize was awarded to FRANCESCO MEZZADRI of the University of Bristol for his profound and wide-ranging contributions to random matrix theory and its applications.

A Senior Berwick Prize was awarded to MARC LEVINE of the University of Duisburg-Essen in recognition of his paper "A Comparison of Motivic and Classical Stable Homotopy Theories," *Journal of Topology* **7** (2014), no. 2.

The Hirst Prize has been awarded to JEREMY GRAY of the Open University and the University of Warwick for his research and books on the history of mathematics, especially differential equations and geometry in and around the nineteenth century.

The Anne Bennett Prize was awarded to LOTTE HOLLANDS of Heriot-Watt University in recognition of her outstanding research at the interface between quantum theory and geometry and of her leadership in mathematical outreach activities.

Whitehead Prizes were awarded to the following individuals:

CAUCHER BIRKAR of Cambridge University in recognition of his outstanding research in higher dimensional algebraic geometry, most prominently his recent groundbreaking finiteness results on Fano varieties and Mori fiber spaces. In August, Birkhar became a 2018 Fields medalist.

ANA CARAIANI of Imperial College London for her important contributions to the Langlands program.

HEATHER HARRINGTON of the University of Oxford for her outstanding contributions to mathematical biology, which have generated new biological insights using novel applications of topological and algebraic techniques.

VALERIO LUCARINI of the University of Reading for his work applying the ideas and methods of statistical physics to the theory and modeling of climate dynamics and for his leadership in the field of mathematics applied to climate science.

FILIP RINDLER of the University of Warwick for his solutions to fundamental problems on the border between the theory of partial differential equations, calculus of variations, and geometric measure theory.

PÉTER VARJÚ of the University of Cambridge for his deep and groundbreaking contributions to analysis and probability on algebraic structures.

—From an LMS announcement

Photo Credits

Photo of Erika Camacho courtesy of AHHE.
Photo of Herbert Edelsbrunner courtesy of IST Austria.
Photo of Sir Roger Penrose courtesy of Cirone-Musi, Festival della Scienza.
Photo of Masaki Kashiwara courtesy of the Inamori Foundation.-o-
Photo of László Székelyhidi courtesy of DFG.
Photos of the EGMO and IMO winners courtesy of MAA.