Mathematics People

Simons Foundation Investigators Named

The Simons Foundation has named the Simons Investigators for 2017.

Mathematics:

SIMON BRENDLE of Columbia University has achieved major breakthroughs in geometry, including results on the Yamabe compactness conjecture, the differentiable sphere theorem (joint with R. Schoen), the Lawson conjecture, and the Ilmanen conjecture, as well as singularity formation in the mean curvature flow, the Yamabe flow, and the Ricci flow.

LUDMIL KATZARKOV of the University of Miami has introduced novel ideas and techniques in geometry, proving long-standing conjectures (e.g., the Shavarevich conjecture) and formulating new conceptual approaches to open questions in homological mirror symmetry, rationality of algebraic varieties, and symplectic geometry.

IGOR RODNIANSKI of Princeton University is a leading figure in the field of partial differential equations. He has recently proven theorems concerning the full nonlinear dynamics of the Einstein equations, in both the weak and strong field regimes, and has obtained new results regarding gravitational radiation associated to black hole space times.

ALLAN SLY of the University of California, Berkeley has resolved long-standing open problems on the computational complexity of phase transitions and on the dynamics of the Ising model.

Physics:

SHAMIT KACHRU of Stanford University has done work that includes the discovery of string dualities in $N = 2$ supersymmetry; foundational studies of flux compactification of string theory; mathematical studies of connections between automorphic forms, black holes, and string vacua; and quantum field theories describing "non-Fermi-liquid" behavior in condensed matter physics.

ANDERS SANDVIK of Boston University is widely recognized for his development of stochastic series expansion methods for quantum problems and for his creative applications of these and related methods to topics including deconfined quantum criticality and optimization problems.

EVA SILVERSTEIN of Stanford University has done research that connects the mathematical structure of string theory to predictions for cosmological observables, with implications for dualities, space-time singularities, and black hole physics. Her work on axion monodromy provided a theoretically consistent model of large-field inflation.

Theoretical Computer Science:

SCOTT AARONSON of the University of Texas at Austin has established fundamental theorems in quantum computational complexity and inspired new research directions at the interface of theoretical computer science and the study of physical systems.

BOAZ BARAK of Harvard University has worked on cryptography, computational complexity, and algorithms. He developed new non-black-box techniques in cryptography and new semidefinite programming-based algorithms for problems related to machine learning and the unique games conjecture.

JAMES R. LEE of the University of Washington is one of the leaders in the study of discrete optimization problems and their connections to analysis, geometry, and probability. His development of spectral methods and his work on convex relaxations has led to breakthroughs in characterizing the efficacy of mathematical programming for combinatorial optimization.

Mathematical Modeling of Living Systems:

ARVIND MURUGAN of the University of Chicago works on how organisms enhance information uptake from the environment by using inference from past experience and has applied such ideas to self-assembly dynamics, olfaction, circadian clocks, and stress-response pathways.

DAVID SCHWAB of Northwestern University has developed theories of signaling and social aggregation in the social amoeba Dictyostelium and has shown how tensor-network methods from computational quantum physics can be used in machine learning.

ARYEH WARMFLASH of Rice University has developed systems to mimic embryonic development in vitro using human embryonic stem cells and is developing dynamical system models of cell fate patterning and morphogenesis that can be rigorously compared with quantitative data on in vitro development.

DANIEL WEISSMAN of Emory University has shown that the generation of "irreducible complexity" happens most frequently in large populations and that the speed of adaptation is limited by the frequency of genetic recombination.

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Math + X:

ANDREA BERTOZZI of the University of California, Los Angeles, has contributed to many areas of applied mathematics, including the theory of swarming behavior, aggregation equations and their solution in general dimension, the theory of particle-laden flows in liquids with free surfaces, data analysis/image analysis at the micro and nano scales, and the mathematics of crime.

AMIT SINGER of Princeton University is one of the leaders in the mathematical analysis of noisy data provided by cryo-EM.

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

Teixeira Awarded ICTP-IMU Ramanujan Prize

Eduardo Teixeira

EDUARDO TEIXEIRA of the Federal University of Ceará, Brazil, has been awarded the 2017 Ramanujan Prize for Young Mathematicians from Developing Countries in recognition of his outstanding work in analysis and partial differential equations. The prize is awarded by the Abdus Salam International Center for Theoretical Physics (ICTP), the International Mathematical Union (IMU), and the Department of Science and Technology of the Government of India.

The prize citation reads: "Teixeira started working on free boundary problems during his PhD thesis, proving existence and regularity results, and obtaining qualitative properties of solutions, in the theory of nonlinear heat conduction. Subsequently, in collaboration with L. Zhang, he obtained Almgren's type frequency formulas in Riemannian manifolds. He then introduced an original approach to the regularity of degenerate elliptic equations, which consists in viewing the set of critical points of a solution as a free boundary. This interesting point of view led him to prove the continuity conjecture for elliptic equations with high-order singular structures, and in solving, in collaboration with Araujo and Urbano, a long-standing conjecture on the optimal regularity for the p-Laplacian in two dimensions. Teixeira has contributed to many other aspects of the theory of nonlinear elliptic equations. A perfect example is his recent breakthrough, in collaboration with Y. Li and Z.-C. Han, on the asymptotic radial symmetry of solutions to the kth-order Yamabe equation in punctured domains, a deep and original contribution to the theory of conformally nonlinear elliptic PDEs." The prize also recognizes his pursuit of high-level research in Brazil. At Ceará, he founded and directed one of the major research groups in partial differential equations in Latin America.

Eduardo Teixeira obtained his PhD from the University of Texas at Austin in 2005 under the direction of Luis Caffarelli. He held a three-year Hill assistant professorship position at Rutgers University. In 2008 he returned to his native country, with the ambition to further contribute to the development of the Brazilian mathematical community. He became assistant professor and subsequently full professor of mathematics at the Universidade Federal do Ceará, the same university from which he had obtained his BS degree. He was awarded the Mathematical Congress of the Americas Prize in 2013 and was elected permanent fellow of the Brazilian Academy of Sciences in 2015. He has now returned to the United States as full professor of mathematics at the University of Central Florida. He tells the *Notices*: "Today, as a researcher, I like to think about mathematics outside the formality of the office. Some of my most creative ideas came to me during leisure times. In particular, the insight of treating degenerate equations as if it were a 'nonphysical' free boundary arrived to me when I was playing with my daughter, Amanda, at the beach."

The Ramanujan Prize is awarded annually to a young researcher from a developing country. The prize carries a cash award of US$15,000, and the recipient is invited to deliver a lecture at ICTP.

—From an ICTP-IMU announcement

Lim Awarded Smale Prize

Lek-Heng Lim

LEK-HENG LIM of the University of Chicago has been awarded the third Stephen Smale Prize "for his outstanding contributions to the foundations of computational mathematics. His work seamlessly integrates scientific computing with complexity theory, statistical data analysis, and pure mathematics." He received his PhD in computational and mathematical engineering from Stanford University. He joined the faculty at Chicago in 2010, after serving as Charles Morrey Assistant Professor at the University of California, Berkeley. Lim tells the *Notices*: "I am a bit of a bibliophile. I particularly like Taipei, a city that still has many brick-and-mortar bookstores, some of which are open twenty-four hours. I am also a bit of a foodie. An appealing aspect of living in Chicago is that one can dine at a Michelin-starred restaurant for a little over $10, although that pales in comparison to Hong Kong and Singapore, where a Michelin-starred meal can go for as low as $2. In part to burn off these calories, I like biking and taking long walks with my wife along the magnificent trails next to Lake Michigan, Shing Mun River, or in the Singapore Botanic Gardens."

The Smale Prize is awarded every three years by the Society for the Foundations of Computational Mathematics.

—Elaine Kehoe

Duminil-Copin Awarded Loève Prize


Hugo Duminil-Copin

Hugo Duminil-Copin of the Institut des Hautes Etudes Scientifiques (IHES) Paris and the University of Geneva has been awarded the 2017 Loève International Prize in Probability. The prize citation reads in part: "He is best known for his early work on phase transitions in two-dimensional lattice models: the Ising and Potts models, and properties of percolation and self-avoiding walks. Within these intensively studied fields, he and coauthors proved a wide range of long-standing hard conjectures for topics including the connective constant of the honeycomb lattice; critical points for random-cluster models; conformal invariance of the planar critical Ising and FK-Ising models; continuity of phase transitions and spontaneous magnetization in such models; and growth constants and critical fugacity of self-avoiding walks. Other major results involve sharp thresholds in more general settings, for bootstrap percolation as well as Bernoulli percolation and Ising models. Recently he and coauthors proved the long-standing Baxter's conjecture about continuity/discontinuity of phase transition for the planar Potts model." Duminil-Copin received his PhD in 2011 from the University of Geneva under the direction of Stanislav Smirnov. The Loève Prize is awarded every two years for outstanding contributions in probability by researchers under the age of forty-five.
—David Aldous, University of California, Berkeley

Pipher Named 2018 Noether Lecturer


Jill Pipher

Jill Pipher of Brown University has been named the 2018 Noether Lecturer by the Association for Women in Mathematics (AWM) and the AMS. She was honored "for her profound impact on mathematics, both through her work in the fields of harmonic analysis and partial differential equations and through her service to the profession." According to the prize citation, Pipher "is best known for her fundamental contributions to solutions and regularity of partial differential equations in minimally smooth domains"—for example, in her work with Verchota that "settled a long-standing conjecture on the solvability of the Dirichlet problem with L^2 boundary data on bounded Lipschitz domains." She has also done groundbreaking work in cryptography.

Pipher received her PhD from the University of California, Los Angeles and served on the faculty of the University of Chicago before joining Brown. She was the founding director of the Institute for Computational and Experimental Mathematics at Brown University. She was a member of the inaugural class of fellows of the AMS and served as president of AWM. She will give the Noether Lecture at the 2018 Joint Mathematics Meeting in San Diego, California.
—From an AWM announcement

Koberda Awarded 2017 Duszenko Prize


Thomas Koberda

Thomas Koberda of the University of Virginia has been awarded the 2017 Kamil Duszenko Prize in Mathematics for his work on low-dimensional topology and dynamics, especially for a paper exploring connections between right-angled Artin groups and mapping class groups. He received his PhD from Harvard University in 2012 under the direction of Curt McMullen. From 2012 to 2015 he was both an NSF postdoc and assistant professor at Yale University; he joined the faculty at Virginia in 2015. He received a Sloan Research Fellowship in 2017. Koberda tells the *Notices*: "I enjoy running, cooking, and wine. In my spare time, I love to read and to learn foreign languages."

The Duszenko Award is given by the Wrocław Mathematicians Foundation (WMF) for outstanding work or research that has significantly contributed to the deepening of knowledge and further progress in the field of mathematics. It was founded in honor of Kamil Duszenko, a young mathematician who died of acute lymphoblastic leukemia at the age of twenty-eight. It will be given at least every two years in the fields of mathematics and hematology.
—From a WMF announcement

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2017 Dirac Medals Awarded

David Deutsch

Peter W. Shor

The Dirac Medals for 2017 have been awarded by the International Centre for Theoretical Physics (ICTP) to Charles H. Bennett of the IBM Watson Research Center, David Deutsch of Oxford University, and Peter W. Shor of the Massachusetts Institute of Technology "for their pioneering work in applying the fundamental concepts of quantum mechanics to solving basic problems in computation and communication and therefore bringing together the fields of quantum mechanics, computer science, and information." According to the prize citation, Bennett "proved that classical computation can be done without consumption of energy by inventing what is now known as reversible classical computation"; Deutsch "invented the notion of a quantum Turing machine, the concept of the quantum logic gate and quantum circuit, as well as the network model of computations"; and Shor "consolidated the field of quantum computation by designing the quantum algorithm for factoring large numbers." The medals are awarded to scientists who have made significant contributions to theoretical physics and carry a cash award of US$5,000.

—From an ICTP announcement

2017 Mathematical Olympiad Results

The team from South Korea finished first in the Fifty-eighth International Mathematical Olympiad (IMO) in Rio de Janeiro, Brazil. All six team members won gold medals. China finished second, followed by Vietnam, the United States, and Iran. Three of the US team members were awarded gold medals: Ankan Bhattacharya, Andrew Gu, and James Lin. Zachary Chroman, Vincent Huang, and Junyao Peng received silver medals. Ankan also won a gold medal at the 2016 IMO and was the 2016 national Who Wants to Be a Mathematician champion. The 2018 Mathematical Olympiad will be held in Romania in July 2018.

—From MAA announcements

MAA Awards Presented

The Mathematical Association of America (MAA) awarded several writing and education prizes at its summer MathFest.

The Carl B. Allendoerfer Awards for excellent mathematical writing published in *Mathematics Magazine* were given to Brian Conrey and Kent Morrison of the American Institute of Mathematics, along with James Gabbard, University of Southern California; Katie Grant, University of California San Diego; and Shang-Chi Andrew Liu, University of California Los Angeles, all for the article "Intransitive Dice." Vladimir Pozdnyakov, University of Connecticut, and Michael Steele, University of Pennsylvania, were honored for their article "Buses, Bullies, and Bijections."

The Trevor Evans Award for excellent writing for an undergraduate audience published in *Math Horizons* was awarded to Cornelia A. Van Cott of the University of San Francisco for her article "A Pi Day of the Century Every Year."

The Paul R. Halmos–Lester R. Ford Awards for exceptional authors published in the *American Mathematical Monthly* were given to the following: Harold P. Boas, Texas A&M University, for his article "Mocposite Functions"; Adrien Kassel, Ecole Normale Supérieure, and David B. Wilson, Microsoft Research, for their article "The Looping Rate and Sandpile Density of Planar Graphs"; Deborah Kent, Drake University, and David Muraki, Simon Fraser University, for "A Geometric Solution of a Cubic by Omar Khayyam … in which Colored Diagrams Are Used Instead of Letters for the Greater Ease of Learners"; and Lawrence Zalcman, Bar-Ilan University, for "A Tale of Three Theorems."

The George Pólya Awards for exceptional papers published in the *College Mathematics Journal* were awarded to Viktor Blåsjö, Mathematical Institute of Utrecht University, for "How to Find the Logarithm of Any Number Using Nothing but a Piece of String" and Travis Kowalski, South Dakota School of Mines and Technology, for "The Sine of a Single Degree."

The Merten M. Hasse Prize, for a noteworthy paper published by the MAA of which at least one of the authors is a younger mathematician, was awarded to Lasse Rempe-Gillen, University of Liverpool, and Zhaiming Shen, a graduate student at the University of Pennsylvania, for their paper "The Exponential Map Is Chaotic: An Invitation to Transcendental Dynamics" published in the *American Mathematical Monthly*.

The Daniel Solow Author's Award recognizes authors of undergraduate mathematics teaching materials. The 2017 inaugural recipient is Ted Sundstrom of Grand Valley State University for *Mathematical Reasoning: Writing and Proof*.

The Henry L. Alder Awards honor beginning college or university faculty members whose teaching has been highly effective and successful in teaching undergraduate mathematics. The 2017 recipients are Steven Klee of Seattle University, who is known for seamlessly incorporat-

ing undergraduate research into his classroom curriculum and mentoring student researchers who go on to publish and present their work; and Mary Beisiegel of Oregon State University for her superb teaching, cultivating engaging classrooms, and her work building up professional development among her teaching peers.

The Mary P. Dolciani Award was presented to Tatiana Shubin of San Jose State University for her devotion to mathematical education at the K–12 student level, bringing Math Circles to new communities, particularly indigenous populations.

The Awards for Meritorious Service are presented for service at the national level or to a section of the MAA. The awardees are James Alvarez, University of Texas at Arlington; Scott Hochwald, University of North Florida; Heidi Keck, Western Colorado State University; Jason Molitierno, Sacred Heart University; and Gerard A. Venema, Calvin College.

—From an MAA announcement

*NSF Postdoctoral Research Fellowships Awarded

The Mathematical Sciences Postdoctoral Research Fellowship Program of the Division of Mathematical Sciences (DMS) of the National Science Foundation (NSF) awards fellowships each year for postdoctoral research in pure mathematics, applied mathematics and operations research, and statistics. Following are the names of the fellowship recipients for 2017, together with their PhD institutions (in parentheses) and the institutions at which they will use their fellowships.

- Kenneth Ascher (Brown University), Massachusetts Institute of Technology
- Maxime Bergeron (University of British Columbia), University of Chicago
- Zarathustra Brady (Stanford University), Massachusetts Institute of Technology
- William Chan (California Institute of Technology), University of North Texas
- Laura Cladek (University of Wisconsin), University of British Columbia
- Erin Compaan (University of Illinois Urbana—Champaign), Massachusetts Institute of Technology
- Jennifer Crodelle (Rensselaer Polytechnic Institute), Courant Institute of Mathematical Sciences, New York University
- Theodore Drivas (Johns Hopkins University), Princeton University
- Max Engelstein (University of Chicago), Massachusetts Institute of Technology
- Sylvester Eriksson-Bique (New York University), University of California, Los Angeles
- Alexandra Florea (Stanford University), University of Bristol
- Evan Gawlik (Stanford University), University of California, San Diego
- Allen Gehret (Univerity of Illinois at Urbana—Champaign), University of California, Los Angeles
- Nate Harman (Massachusetts Institute of Technology), University of Chicago
- Sean Howe (University of Chicago), Stanford University
- Peter Jantsch (University of Tennessee), Texas A&M University
- Lien-Yung Kao (University of Notre Dame), University of Chicago
- Casey Kelleher (University of California, Irvine), Princeton University
- Alisa Knizel (Massachusetts Institute of Technology), Columbia University
- Brian Lawrence (Stanford University), Columbia University
- Oleg Lazarev (Stanford University), Columbia University
- Daniel Le (University of Chicago), University of Toronto
- Caitlin Leverson (Duke University), Georgia Institute of Technology
- Christopher Lopez (University of California, Irvine), University of California, Santa Barbara
- László M. Lovász (Massachusetts Institute of Technology), University of California, Los Angeles
- Kyle J. Luh (Yale University), Harvard University
- Olya Mandelshtam (University of California, Berkeley), Brown University
- Anna Medvedovsky (Brandeis University), Max Planck Institute for Mathematics
- Oliver Pechenik (University of Illinois at Urbana—Champaign), University of Michigan
- Thomas Polstra (University of Missouri), University of Utah
- Rohini Ramadas (University of Michigan), Harvard University
- Eric Ramos (University of Wisconsin—Madison), University of Michigan
- Donald Robertson (Ohio State University), University of Utah
- Elina Robeva (University of California, Berkeley), Massachusetts Institute of Technology
- Casey Rodriguez (University of Chicago), Massachusetts Institute of Technology
- Henri Roesch (Duke University), University of California, Irvine
- Nicholas Salter (University of Chicago), Harvard University
- Kevin Schreve (University of Wisconsin—Milwaukee), University of Michigan—Ann Arbor
- Alexander Shapiro (University of California, Berkeley), University of Toronto
- Matthew Stoffregen (University of California, Los Angeles), Massachusetts Institute of Technology

**The most up-to-date listing of NSF funding opportunities from the Division of Mathematical Sciences can be found online at:* www.nsf.gov/dms *and for the Directorate of Education and Human Resources at* www.nsf.gov/dir/index.jsp?org=ehr. *To receive periodic updates, subscribe to the DMSNEWS listserv by following the directions at* www.nsf.gov/mps/dms/about.jsp.

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- Arnav Tripathy (Stanford University), Harvard University
- Dootika Vats (University of Minnesota), University of Warwick
- Ian Zemke (University of California, Los Angeles), Princeton University

—NSF announcement

Hidden Figures Honored with Book Award

Author Margot Lee Shetterly has received the 2017 Communication Award for Books from the National Academies of Sciences, Engineering, and Medicine for *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race*. The citation cites the book as "a hitherto little-known episode in the history of pioneering aerospace engineering and computing brought to light so engagingly that [it], along with the blockbuster movie it inspired, has had an unprecedented impact on the American public." The film made from the book was a finalist in the Film/Radio/TV category. The communication awards, each of which includes a US$20,000 prize, recognize excellence in reporting and communicating science, engineering, and medicine to the general public. A review of the film appeared in the June/July 2017 issue of the *Notices*. It can be retrieved at `www.ams.org/publications/journals/notices/201706/rnoti-p620.pdf`.

—From a National Academies announcement

Solomon Marcus (1925–2016)

Solomon Marcus

Solomon Marcus was a prolific and influential mathematician and interdisciplinary researcher who passionately worked until the end of his life. In the first ten years of his research career, he published almost 100 papers in mathematical analysis, set theory, measure and integration theory, and topology, including a joint paper with P. Erdős, "Sur la décomposition de l'espace Euclidien en ensembles homogènes" (1957). He completed his studies in mathematics at the University of Bucharest, earning a PhD in 1956 (with the thesis *Monotone Functions of Two Variables*—in Romanian) under the supervision of M. Nicolescu and a State Doctorate in Sciences in 1968.

In the 1950s, the young Assistant Professor Solomon Marcus enchanted his students with the wealth of examples and problems that he brought to the analysis seminar.

From 1964 on he published many papers and books in theoretical computer science, linguistics, poetics and theory of literature, semiotics, cultural anthropology, biology, history and philosophy of science, and education. His book *Grammars and Finite Automata* (1964, in Romanian) is arguably the first monograph devoted to regular languages. He authored three pioneering books in mathematical linguistics and poetics: *Introduction mathématique à la linguistique structurelle* (1967), *Algebraic Linguistics; Analytical Models* (1967), and *Mathematische Poetik* (1973). His book *Words and Languages Everywhere* (2007) includes a collection of papers in language theories.

In a letter to the editor (*Notices*, 2009) on F. Dyson's "Birds and Frogs," he proposed a more refined typology of mathematicians inspired by F. Bacon's 1620 *Novum Organum*: ants, spiders, and bees. Ants (such as A. Zygmund) remain involved in one particular field, compensating by depth the lack of diversity; spiders (such as G. Cantor) propose a personal construction, with little reference to anybody else; and bees (such as P. Erdős) constantly move from problem to problem. He concluded with a few open problems, such as "Can we transfer these metaphors from individuals to historical periods?"

Solomon Marcus crossed many frontiers, geographical and transdisciplinary, and acquired not only erudition but also encyclopedic knowledge. As a public intellectual, he saved gifted scientists and scholars from marginalization. With equal ease, in his impeccable French, he magisterially debated the great French virologist Luc Montagnier a few years ago, on the stage of the Ateneul Român.

Marcus was a member of the Romanian Academy. He received many prizes, including the Royal Decoration of Nihil Sine Deo and the Star of Romania, Romania's highest civil order.

In his long career Marcus inspired, stimulated, encouraged, and advised many students, undergraduate and graduate, in Romania and abroad, to do mathematical research and, in the last decades, interdisciplinary studies. His sixteen PhD students form a small part of this group.

His 10-kilometer daily walk—his "constitutional"—may well have been one of the secrets of his great vitality and forward-looking exuberance.

He was never bored; he never felt the need of a proper vacation. In his last telephone conversation with Cristian Calude, when he was in the hospital, Solomon Marcus's strongest desire was to get back to work.

—Alexandra Bellow, Northwestern University
Cristian S. Calude, University of Auckland, New Zealand

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