

Mathematics People

Simons Foundation Investigators Named

The Simons Foundation has named seventeen mathematicians, theoretical physicists, and theoretical computer scientists as Simons Investigators for 2016. The Simons Investigators program provides a stable base of support for outstanding scientists, enabling them to undertake long-term study of fundamental questions. The names and institutions of the awardees whose work involves the mathematical sciences and brief excerpts from the prize citations follow.



Vladimir Markovic

VLADIMIR MARKOVIC of the California Institute of Technology has made fundamental contributions to the theory of three-dimensional manifolds, resolving several long-standing problems, among them the proof of the Thurston conjecture concerning immersed almost-geodesic surfaces in closed hyperbolic three-manifolds.



James McKernan

JAMES MCKERNAN of the University of California San Diego, in collaboration with Caucher Birkar, Paolo Cascini, and Christopher D. Hacon, has established one of the cornerstones of the minimal model program: the finite generation of canonical rings in all dimensions.

to many areas revolving broadly around the study of Diophantine equations. Among his achievements are



Bjorn Poonen

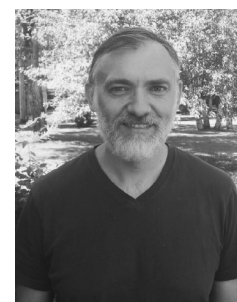
the construction of examples of threefolds without rational points but vanishing local and global obstructions, new heuristics concerning rational points on elliptic curves, and results about rational points on curves of higher genus. Outside of mathematics, Poonen serves as the leader of the tenor section of the chorus *Musica Sacra*, based in Cambridge, Massachusetts.

MINA AGANAGIC of the University of California Berkeley applies insights from quantum physics to mathematical problems in geometry and topology. She has made deep and influential conjectures in enumerative geometry, knot theory, and mirror symmetry using predictions from string theory and from M -theory.



Mina Aganagic

The work of ANTON KAPUSTIN of the California Institute of Technology lies at the interface of physics and mathematics. He applied ideas from gauge theory to the study of the geometric Langlands program in mathematics and has applied sophisticated mathematics to the classification of exotic quantum states of matter. Kapustin tells the *Notices*: "I grew up in Moscow while the Soviet Union was still in existence. My father, from whom I have inherited my love for jazz and classical music, is a pianist and a composer, while my mother worked as an interpreter for many years. Nevertheless, they encouraged my interest in physics and math since early age. While in grade school, I enjoyed solving physics problems from the *Kvant* magazine, but the math problems seemed too artificial and remote from the real world. Now I know better."



Anton Kapustin

MADHU SUDAN of Harvard University is known for his work in computational complexity theory. He has made fundamental contributions in the areas of probabilistically checkable proofs, non-approximability of optimization problems, and computational aspects of error-correcting codes. More recently, he initiated the study of universal semantic communication.



Madhu Sudan

INGRID DAUBECHIES of Duke University constructed the first example of what mathematicians



Ingrid Daubechies

call “wavelets,” which have had an immense impact on pure and applied mathematics. She has made and continues to make creative applications of wavelets to a large variety of problems in engineering and other fields.

—From a Simons Foundation announcement

Gowers Awarded Sylvester Medal

SIR TIMOTHY GOWERS of the University of Cambridge has been awarded the 2016 Sylvester Medal of the Royal Society of London “for his groundbreaking results in the theory of Banach spaces, pure combinatorics, and additive number theory.” The Sylvester Medal is awarded in even-numbered years “for the encouragement of mathematical research.” The award carries a cash prize of 1,000 pounds (approximately US\$1,300). The prize will be awarded at the Royal Society’s Anniversary Day in November 2016.



Sir Timothy Gowers

Gowers tells the AMS: “I have five children, ranging in age from five to twenty-three. I come from a family of musicians and enjoy playing jazz piano.”

Gowers is interviewed in the Graduate Student Section (page 1026) and featured on The Back Page (page 1033).

—From a Royal Society announcement

International Mathematical Olympiad



Left to right: Ankan Bhattacharya, Allen Liu, Ashwin Sah, Michael Kural, Yuan Yao, Junyao Peng.

A team from the United States won first place at the fifty-seventh International Mathematical Olympiad (IMO) held

in Hong Kong, July 6–16, 2016, finishing with 214 points out of a possible 252.

The members of the US team were:

- ANKAN BHATTACHARYA (International Academy East, Troy, Michigan),
- MICHAEL KURAL (Greenwich High School, Greenwich, Connecticut),
- ALLEN LIU (Penfield Senior High School, Penfield, New York),
- JUNYAO PENG (Princeton International School of Mathematics and Science, Princeton, New Jersey),
- ASHWIN SAH (Jesuit High School, Portland, Oregon),
- YUAN YAO (Phillips Exeter Academy, Exeter, New Hampshire),

all of whom were awarded gold medals for their individual scores. Liu and Yao each earned perfect test scores. Liu also received gold medals in the 2014 and 2015 competitions. The team’s leader was Po-Shen Loh of Carnegie Mellon University, interviewed in the September *Notices* Graduate Student Section (p. 905).

Total Points: 252
1. United States — 214
2. Republic of Korea — 207
3. China — 204

The IMO is the world championship mathematics competition for high school students, in which the brightest mathematics students from more than one hundred countries compete. The six US team members were selected through a series of competitions organized by the Mathematical Association of America (MAA), culminating with the USA Mathematical Olympiad. The IMO consists of solving six extremely challenging mathematical problems in a nine-hour competition administered over two days. The 2017 IMO will be held in Rio de Janeiro, Brazil, July 12–24, 2017.

—From an MAA announcement

Scholze Awarded Leibniz Prize

PETER SCHOLZE of the University of Bonn has been awarded one of ten 2016 Gottfried Wilhelm Leibniz Prizes by the German Research Foundation (DFG). The prize carries a cash award of 2.5 million euros (approximately US\$2,800,000). The prize citation reads: “At twenty-seven, Peter Scholze is the youngest researcher to receive the Leibniz Prize in its more than thirty-year history. Scholze is already considered to be one of the world’s leading mathematicians and a rare talent which only emerges every few decades. In recent years he has already answered fundamental



Peter Scholze

questions in arithmetic algebraic geometry which had remained unsolved for decades. This is especially true of his proof of the so-called Langlands conjecture for p -adic local bodies. His theory of so-called perfectoid spaces has dramatically expanded the spectrum of methods in mathematics. These and other aspects of Scholze's work have been praised as both perspicuous and elegant, and have won him the highest recognition throughout the mathematical community." The Leibniz Prizes aim to improve the working conditions of outstanding researchers and expand the research possibilities open to them, free them from administrative work, and enable them to recruit highly qualified early-career researchers. The prizes were awarded in March 2016.

—From a DFG announcement

Prizes of the London Mathematical Society

The London Mathematical Society (LMS) has awarded a number of prizes for 2016.

The De Morgan Medal was awarded to SIR TIMOTHY GOWERS of the University of Cambridge for his seminal contributions to functional analysis, additive number theory, and combinatorics, as well as for his numerous activities on the national and international mathematical stages.

The Fröhlich Prize was awarded to DOMINIC JOYCE of the University of Oxford for his profound and wide-ranging contributions to differential and algebraic geometry.

The Senior Berwick Prize was awarded jointly to KEISUKE HARA of Mynd, Inc., and MASANORI HINO of the University of Kyoto in recognition of their paper "Fractional order Taylor's series and the neo-classical inequality," *Bulletin of the London Mathematical Society* 42 (2010).

The Anne Bennett Prize was awarded to JULIA WOLF of the University of Bristol in recognition of her outstanding contributions to additive number theory, combinatorics, and harmonic analysis and to the mathematical community.

Whitehead Prizes were awarded to the following individuals:

AREND BAYER of the University of Edinburgh for his breakthroughs in the study of stability conditions on derived categories and their associated moduli spaces and for his pioneering applications of this work to birational geometry.

GUSTAV HOLZEGEL of Imperial College London for his work on the celebrated black hole stability problem in general relativity, especially his pioneering papers on asymptotically (anti) de Sitter black holes.

JASON MILLER of the University of Cambridge for his landmark contributions to the geometric understanding of the two-dimensional free field and its relation to SLE curves.

CAROLA-BIBIANE SCHÖNLIEB of the University of Cambridge for her spectacular contributions to the mathematics of image analysis.

—From an LMS announcement

Prizes Awarded at the ECM

Several prizes were awarded at the Seventh European Congress of Mathematicians, held July 18–22, 2016, in Berlin, Germany. Each of the prizewinners also gave a prize lecture at the Congress.

PATRICE HAURET of Michelin Tires was awarded the Felix Klein Prize. The prize citation reads, "Patrice Hauret's research and teaching in the field of applied mathematics have made extremely useful contributions to industrial needs: He has advanced the modeling and simulation of tires for Michelin. And he has dealt with the interaction of solids with flows (as the air spinning of filaments), and multiscale-approaches, as required, e.g., in the simulation of filters of any kind."

JEREMY GRAY of Open University was awarded the Otto Neugebauer Prize. The citation reads, "Jeremy Gray is one of the (if not the) leading historians of modern mathematics. His highly original, extensive, and deep body of work on nineteenth- and twentieth-century mathematics has greatly advanced our knowledge about this period."

In addition, EMS prizes were awarded to the following individuals:

SARA ZAHEDI, Royal Institute of Technology, Sweden, "for her outstanding research regarding the development and analysis of numerical algorithms for partial differential equations with a focus on applications to problems with dynamically changing geometry."

MARK BRAVERMAN, Princeton University, "for his important contributions to several fields at the interface of mathematics and computer science with answers to many basic questions on the computability of objects that arise in dynamical systems, on computing of Riemann mappings and a remarkable solution of the Linial-Nisan conjecture."

VINCENT CALVEZ, Ecole Normale Supérieure de Lyon, "for his pioneering work at the intersection between mathematics and biology with fundamental contributions to mathematical analysis and development of new mathematical models with applications in biology and biophysics."

GUIDO DE PHILIPPIS, SISSA Trieste, Italy, "for his outstanding contributions to the regularity of solutions of Monge-Ampère equation and optimal maps and for his deep work on quantitative stability inequalities for the first eigenvalue of the Laplacian and rigidity in some isoperimetric type inequalities."

PETER SCHOLZE, University of Bonn, "for his original and groundbreaking contributions at the interface of arithmetic algebraic geometry and the theory of automorphic forms, for example, with his new proof of the local Langlands conjecture for p -adic local fields and his theory of perfectoid spaces."

PÉTER VARJÚ, University of Cambridge, “for his deep work on arithmetic combinatorics and its applications to spectral gap estimates and equidistribution, including a solution to a long-standing problem regarding equidistribution of random walks on the isometry group of Euclidean spaces, his contribution to the study of spectral gap on quotients of arithmetic groups, self similar sets and measures.”

THOMAS WILLWACHER, ETH Zurich, “for his striking and important research in a variety of mathematical fields: homotopical algebra, geometry, topology and mathematical physics, including deep results related to Kontsevich’s formality theorem and the relation between Kontsevich’s graph complex and the Grothendieck-Teichmüller Lie algebra.”

JAMES MAYNARD, Oxford University, “for his remarkable and deep results in number theory, mainly dealing with nontrivial aspects of the theory of primes and in particular his original and new proof and improved estimate of the famous, so called, ‘small gaps between primes theorem.’”

HUGO DUMINIL-COPIN, Institut des Hautes Études Scientifiques, “for his outstanding research in statistical physics, in particular on critical phenomena for models in dimensions below the critical one, including Fortuin-Kasteleyn percolation, Ising and Potts models, self-avoiding walks and to harmonic analysis in disordered media.”

GEORDIE WILLIAMSON, Max Planck Institute for Mathematics, “for his fundamental contributions to representation theory of Lie algebras and algebraic groups, for example, with the elegant proof of Soergel’s conjecture on bimodules associated to Coxeter groups and the counter-examples to expected bounds in Lusztig’s conjectured character for rational representations of algebraic groups.”

—From an ECM announcement

2016 SIAM Prizes

The Society for Industrial and Applied Mathematics (SIAM) has awarded several prizes for 2016.

The John von Neumann Lectureship has been awarded to DONALD KNUTH of Stanford University. The lectureship is awarded for outstanding and distinguished contributions to the field of applied mathematical sciences and for the effective communication of these ideas to the community.

The Richard C. DiPrima Prize was awarded to BLAKE H. BARKER of Brown University. The prize is given to an early career researcher who has done outstanding research in applied mathematics.

The Prize for Distinguished Service to the Profession was awarded to LINDA PETZOLD of the University of California Santa Barbara. The prize is awarded to an applied mathematician who has made distinguished contributions to the furtherance of applied mathematics on the national level.

The George Pólya Prize in Combinatorics was awarded to JOZSEF BALOGH, University of Illinois,

Urbana-Champaign; ROBERT MORRIS, IMPA; WOJCIECH SAMOTIJ, Tel Aviv University; DAVID SAXTON, University of Cambridge; and ANDREW THOMASON, DPMMS, Cambridge University. The prize is given every four years for a notable application of combinatorial theory.

The W. T. and Idalia Reid Prize in Mathematics was awarded to IOANNIS G. KEVREKIDIS of Princeton University. The prize is given for research in or other contributions to the broadly defined areas of differential equations and control theory.

The I. E. Block Community Lectureship was awarded to TADASHI TOKIEDA of the University of Chicago. The lecture is intended to encourage public appreciation of the excitement and vitality of science.

The Award in the Mathematical Contest in Modeling was given to Southwest Jiaotong University and Wuhan University, both in China. It is awarded to two of the teams judged “Outstanding” in the Mathematical Contest in Modeling (MCM).

The Outstanding Paper Prizes are given for outstanding papers published in SIAM journals. The 2016 prizes were awarded to the following individuals:

- BOAZ BARAK, MARK BRAVERMAN, XI CHEN, and ANUP RAO for their paper “How to compress interactive communication,” *SIAM Journal on Computing* 42 (2013).

- NICOLA MASTRONARDI and PAUL VAN DOOREN for their paper “The antitriangular factorization of symmetric matrices,” *SIAM Journal on Matrix Analysis and Applications* 34 (2013).

- XIAOCHUAN TIAN and QIANG DU for their paper “Analysis and comparison of different approximations to nonlocal diffusion and linear peridynamic equations,” *SIAM Journal on Numerical Analysis* 51 (2013).

The SIAM Student Paper Prizes are given to the most outstanding papers submitted to the SIAM student paper competition. The 2016 prizes were awarded to the following individuals:

- MARIO BERLJAJA, University of Manchester, for the paper “Generalized rational Krylov decompositions with an application to rational approximation.”

- NATALIE STANLEY, University of North Carolina at Chapel Hill, for the paper “Clustering network layers with the strata multilayer stochastic block model.”

- FATMA TERZIOGLU, Texas A&M University, for the paper “Some inversion formulas for the cone transform.”

—From SIAM announcements

Jim Douglas Jr.

Jim Douglas Jr., the Compere and Marcella Loveless Distinguished Professor Emeritus of Computational Mathematics at Purdue University, died on April 27, 2016, after a brief illness.

After earning a PhD in mathematics from Rice University, Jim began his career at Humble Oil,



Jim Douglas Jr.

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which later became part of ExxonMobil. Together with Henry Rachford and Don Peaceman, Jim developed the alternating-direction implicit method for solving finite-difference approximations to certain partial differential equations. This work inspired a great deal of further research and continues to find new applications in modern-day convex optimization and data analysis problems. Jim returned to Rice as a faculty member in 1957 and was eventually named the W. L. Moody Professor. He moved to the University of Chicago in 1967, where he turned his attention to the mathematical understanding of the finite element method for partial differential equations. In 1987, Jim was appointed Director of the Center for Applied Mathematics and named the Compere and Marcella Loveless Distinguished Professor of Computational Mathematics at Purdue.

During his distinguished career, Jim wrote more than two hundred papers with more than seventy coauthors. He was a Fellow of both SIAM and AMS and was the recipient of the Cedric K. Ferguson Medal from the Society of Petroleum Engineers, the Robert Earl McConnell Award from the American Institute of Mining, Metallurgical, and Petroleum Engineers, and a Commemorative Medal from Charles University, Prague.

Jim was a dedicated mentor to dozens of students and postdocs, many of whom became leaders in computational science.

—Gregery T. Buzzard
Purdue University

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