Mathematics People

Simons Foundation Investigators

The Simons Foundation has named eighteen mathematicians, theoretical physicists, and theoretical computer scientists as Simons Investigators for 2015. 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.

IAN AGOL of the University of California Berkeley has made major contributions to three-dimensional topology and hyperbolic geometry, completing some of Thurston's problems elucidating the structure of 3-manifolds. He proved several deep and long-standing conjectures, including the Virtual Haken conjecture, the Marden Tameness conjecture and the Simon conjecture.

BEN GREEN of the University of Oxford is an expert in analytic number theory. Among his achievements is the Green-Tao theorem, establishing that primes contain arbitrarily long arithmetic progressions.

RAPHAËL ROUQUIER of the University of California Los Angeles has initiated a new field in mathematics, "higher representation theory". He constructed novel categories of geometric and representation-theoretic interest and applied these to problems in the theory of finite groups, Lie theory, algebraic geometry, and mathematical physics.

CHRISTOPHER SKINNER of Princeton University works in number theory and arithmetic geometry. One of his striking recent results is a proof, in joint work with collaborators, that a positive proportion of elliptic curves defined over the rational numbers satisfies the Birch–Swinnerton-Dyer conjecture.

SUBHASH KHOT of New York University initiated a new direction in computational complexity theory and approximation algorithms based on his Unique Games conjecture,

which is currently one of the most important conjectures in theoretical computer science.

CHRISTOPHER UMANS of the California Institute of Technology works on complexity theory, in particular algorithms and randomness in computations. He has established new upper bounds for the complexity of matrix multiplication and developed a novel algorithm for polynomial factorization.

The work of ALEXEI KITAEV of the California Institute of Technology on topologically protected states of matter helped found the field of topological quantum computing; his prediction that topological superconductors may sustain Majorana fermions has initiated major experimental activity. His ongoing work concerns the mathematical classification of the possible quantum phases of matter.

The work of ANASTASIA VOLOVICH of Brown University on gauge and gravity theories has introduced a new perspective on Feynman diagram calculations, along with powerful and extremely efficient methods for their evaluation. Her ongoing work is uncovering deep mathematical structures within the gauge theories of particle physics.

The work of MICHAEL WEINSTEIN of Columbia University bridges the areas of fundamental and applied mathematics, physics, and engineering. He is known for his elegant and influential mathematical analysis of wave phenomena in diverse and important physical problems. His and his colleagues' work on singularity formation, stability, and nonlinear scattering has been central to the understanding of the dynamics of coherent structures of nonlinear dispersive wave equations arising in nonlinear optics, macroscopic quantum systems, and fluid dynamics. This led to work on resonances and radiation in Hamiltonian partial differential equations, with applications to energy flow in photonic and quantum systems. Recently, he has explored wave phenomena in novel structures such as topological insulators and metamaterials.

—From a Simons Foundation announcement

Green Awarded Sylvester Medal

BEN GREEN of the University of Oxford has been awarded the 2014 Sylvester Medal of the Royal Society of London "for his famous result on primes in arithmetic progression, and his subsequent proofs of a number of spectacular theorems over the last five to ten years." 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$1,500).

—*From a Royal Society announcement*

Prizes of the London Mathematical Society

The London Mathematical Society (LMS) has awarded a number of prizes for 2015. The Pólya Prize was awarded to BORIS ZILBER of the University of Oxford for his visionary contributions to model theory and its applications. The Shephard Prize was awarded to KEITH BALL of the University of Warwick for his many beautiful results in geometry (particularly the geometry of convex shapes), number theory, and probability theory. The Naylor Prize and Lectureship in Applied Mathematics was awarded to STEPHEN J. CHAPMAN of the University of Oxford for his outstanding contributions to modeling and methods development in applied mathematics. The Anne Bennett Prize was awarded to APALA MAJUMDAR of the University of Bath in recognition of her outstanding contributions to the mathematics of liquid crystals and to the liquid crystal community.

The Berwick Prize has been awarded to PIERRE-EMMANUEL CAPRACE of Université Catholique de Louvain and NICOLAS MONOD of École Polytechnique Federale de Lausanne in recognition of their papers "Isometry groups of nonpositively curved spaces: Structure theory" and "Isometry groups of nonpositively curved spaces: Discrete subgroups," *Journal of Topology* **2** (2009), no. 4, 661–700; 701–746.

The LMS also awarded a number of Whitehead Prizes. The Senior Whitehead Prize was awarded to ROBERT MACKAY of the University of Warwick for his outstanding contributions to research in dynamical systems and its applications. A remarkably creative and prolific mathematician, in addition to the broad impact of his research, he has made an outstanding contribution to the mathematical community generally.

The Whitehead Prizes are given to mathematicians with less than fifteen years' experience at the postdoctoral level (allowing for career breaks). This year's Whitehead Prizes were awarded to the following individuals: PETER KEEVASH of the University of Oxford for his work in combinatorics, in particular his stunning proof of the existence of combinatorial designs for all parameters satisfying the obvious necessary conditions; JAMES MAYNARD of the University of Oxford for his spectacular results on gaps between prime numbers; CHRISTOPH ORTNER of the University of Warwick for contributions to the mathematical foundations, development, and implementation of the quasicontinuum method; MASON PORTER of the University of Oxford in recognition of his outstanding interdisciplinary contributions and in particular to the emerging field of network science; DOMINIC VELLA of the University of Oxford for his spectacular contributions to the modeling of instability and interfacial phenomena in fluids and solids; and DAVID LOEFFLER of the University of Warwick and SARAH ZERBES of University College London for their joint work in number theory, in particular for their discovery of a new Euler system, and for their applications of this to generalizations of the Birch–Swinnerton-Dyer conjecture.

The Hirst Prize and Lectureship was awarded to JOHN O'CONNOR and EDMUND ROBERTSON of the University of St. Andrews for their creation, development, and maintenance of the MacTutor History of Mathematics website. The Communication Prize was awarded to CHRISTOPHER BUDD of the University of Bath in recognition of his sustained excellence and innovation in the communication of mathematics.

—*From an LMS announcement*

International Mathematical Olympiad

A team from the United States won first place at the fifty-sixth International Mathematical Olympiad (IMO) held in Chiang Mai, Thailand, July 4–13, 2015, finishing with 185 points.

The members of the US team were RYAN ALWEISS (Bergen County Academies, Hackensack, New Jersey), ALLEN LIU (Penfield Senior High School, Penfield, New York), YANG LIU (Ladue Horton Watkins High School, St. Louis, Missouri), SHYAM NARAYANAN (Blue Valley West High School, Overland Park, Kansas), and DAVID STONER (South Aiken High School, Aiken, South Carolina), all of whom were awarded gold medals, and MICHAEL KURAL (Greenwich High School, Greenwich, Connecticut), who earned a silver medal. Allen Liu and Yang Liu were also gold medal winners in the 2014 competition.

The team from China finished second with 181 points, and the team from South Korea was third with 161 points.

The IMO is the preeminent mathematical competition for high-school-age students from around the world. The IMO consists of solving six extremely challenging mathematical problems in a nine-hour competition administered over two days. The 2016 IMO will be held in Hong Kong, July 6–16, 2016.

—*From an IMO announcement*

Karen E. Smith named 2016 Noether Lecturer

Photo courtesy of Karen E. Smith.

Karen E. Smith

The Association for Women in Mathematics (AWM) and the American Mathematical Society (AMS) are pleased to announce that Karen E. Smith will deliver the Noether Lecture at the 2016 Joint Mathematics Meetings. Dr. Smith is the Keeler Professor of Mathematics at the University of Michigan. She has been selected as the 2016 Noether Lecturer for her outstanding work in commutative algebra and its interface with algebraic geometry.

Smith received a bachelor's degree in mathematics in 1987 from Princeton University. After a year of teaching high school, she went to the University of Michigan and received a PhD in mathematics in 1993 under the direction of Melvin Hochster. Immediately after receiving her doctorate Smith spent a year at Purdue University as an NSF postdoc working with Craig Huneke, followed by a position as a Moore Instructor at MIT. In 1997, even though she was promoted to assistant professor at MIT, she chose to move back to the University of Michigan, where she continues to teach and do research.

Smith's research in commutative algebra was recognized in 2001 when she received the Ruth Lyttle Satter Prize. Given every two years, this prize recognizes an outstanding contribution to mathematics research by a woman in the previous six years. The citation states: "The Ruth Lyttle Satter Prize in Mathematics is awarded to Karen E. Smith of the University of Michigan for her outstanding work in commutative algebra, which has established her as a world leader in the study of tight closure, an important tool in the subject introduced by Hochster and Huneke. It is also awarded for her more recent work which builds new bridges between commutative algebra and algebraic geometry via the concept of tight closure."

—From an AWM Announcement

Inside the AMS

From the AMS Public Awareness Office

Art of Problem Solving sponsors Who Wants to Be a Mathematician. The AMS is pleased to welcome AoPS as a sponsor of the game. AoPS is the online community sponsor of Who Wants to Be a Mathematician and is providing gift certificates to all participating schools in 2015–2016. Since 2003, AoPS has developed a wide range of educational materials for outstanding K–12 math students. Its online community at `aops.com` has over 180,000 members and hundreds of thousands of visitors each month. See more at `www.ams.org/wwtbam`.

Joint AMS-EMS-SPM Meeting. See highlights of the Joint International Meeting of the AMS, European Mathematical Society (EMS), and Portuguese Mathematical Society/Sociedad Portuguesa de Matemática (SPM). The meeting, held at the University of Porto in the UNESCO world heritage city of Porto, Portugal, June 10–13, drew 1,103 participants from fifty-nine countries. See `www.ams.org/ams-portugal-mtg15`.

AMS for Students. High school and undergraduate students and mentors in mathematical sciences can follow news and find information on special math programs, graduate schools, competitions, and awards, as well as where to publish and present research, how math is applied, where to find internships, get free math help, and enjoy math outside the classroom. See `www.ams.org/students`.

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—Annette Emerson and Mike Breen
AMS Public Awareness Officers
paoffice@ams.org