Mathematics People

Munshi Awarded ICTP-IMU Ramanujan Prize


Ritabrata Munshi

Ritabrata Munshi of the Indian Statistical Institute and the Tata Institute of Fundamental Research has been awarded the 2018 Ramanujan Prize for Young Mathematicians from Developing Countries for his outstanding work in number theory. The prize is awarded by the Abdus Salam International Centre 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: "Ritabrata Munshi has made profound contributions to analytic number theory, in particular to the study of analytic properties of L-functions and automorphic forms. L-functions were defined in great generality by Robert Langlands, and while much is known about them from the representation theoretic and arithmetic geometry points of view, their deeper analytic properties are largely unknown.

"In recent years, the work of Henryk Iwaniec and his collaborators has started to shed light on growth properties of these L-functions in the case of the group $GL(2)$, proving what are now called subconvexity theorems. These theorems, which are actually estimates for the L-function on the 'critical' line, represent progress towards the proof of the Lindelof hypothesis, which is one of the big open problems in analytic number theory, perhaps second only to the Riemann hypothesis.

"Munshi takes these techniques to new levels by proving subconvexity theorems for some L-functions that come from $GL(3)$. In a series of remarkable papers he has extended the reach of the classical Hardy-Littlewood-Ramanujan 'circle method' to obtain sharp subconvexity estimates for L-functions arising from cusp forms on higher rank groups.

"The progress from $GL(2)$ to $GL(3)$ is very hard won and involves a lot of technical prowess as well as ingenuity. While many authors have established some special cases, Ritabrata's results are perhaps the most far-reaching and most general. In addition, he has made striking contributions to other areas in number theory like Diophantine equations, quadratic forms and elliptic curves. His work also makes clear that he is far from done, and that we should expect to see many more interesting results from him in the future."

Munshi received his PhD from Princeton University in 2006 under the direction of Andrew Wiles. His honors include the 2015 Shanti Swarup Bhatnagar Prize for Science and Technology in mathematical sciences and the 2017 Infosys Prize in Mathematical Sciences.

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 announcement

Sisto Receives 2018 Duszenko Award


Alessandro Sisto

Alessandro Sisto of ETH Zürich has been named the recipient of the 2018 Duszenko Award for his significant contributions to the study of generalizations of hyperbolic groups. According to the prize citation, "he proved deep and interesting results, addressing wide range of questions and using wide range of techniques: random walks, bounded cohomology, embedding obstructions." He received his PhD from the University of Oxford in 2013 under the direction of Cornelia Drutu. He was a postdoctoral fellow at ETH Zürich before becoming an assistant professor. In 2018 he co-organized the Young Geometric Group Theory conference in Les Diablerets, Switzerland. He has written papers on various topics in geometric group theory, as well as other fields. When not doing mathematics, he climbs.

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

2018 Dirac Medals Awarded

The Dirac Medals for 2018 have been awarded by the International Centre for Theoretical Physics (ICTP) to SUBIR SACHDEV of Harvard University, DAM THANH SON of the University of Chicago, and XIAO-GANG WEN of the Massachusetts Institute of Technology "for their independent contributions towards understanding novel phases in strongly interacting many-body systems, introducing original transdisciplinary techniques."

According to the prize citations, Sachdev "has made pioneering contributions to many areas of theoretical condensed matter physics. Of particular importance were the development of the theory of quantum critical phenomena in insulators, superconductors and metals; the theory of spin-liquid states of quantum antiferromagnets and the theory of fractionalized phases of matter; the study of novel deconfinement phase transitions; the theory of quantum matter without quasiparticles; and the application of many of these ideas to a priori unrelated problems in black hole physics, including a concrete model of non-Fermi liquids."

Dam Thanh Son

Son "was the first to understand that gauge/gravity duality could be used to address basic questions in strongly interacting many-body problems from cold trapped atoms to the quark-gluon plasma. He was able to show that one could compute transport coefficients, such as viscosity and conductivity, analytically in these systems, and that strong coupling typically gives rise to a bound on these coefficients. More recently, he has argued for the emergence of a Dirac fermion at the half-filled Landau level, work which has stimulated rapid developments in our understanding of three-dimensional gauge theories."

Xiao-Gang Wen

Wen "has pioneered the concept of topological order as a new principle to understand gapped quantum systems. He found that states with topological order contain non-trivial boundary excitations, and he developed chiral Luttinger theory for the boundary states of quantum Hall systems. He realized that quantum Hall states fall outside of the usual Landau paradigm for characterizing phases of matter, and he showed how to classify them. He unveiled deep connections between topological order and entanglement. More recently, he has developed the concept of symmetry protected topological phases. These ideas have close connections to anomalies in quantum field theory."

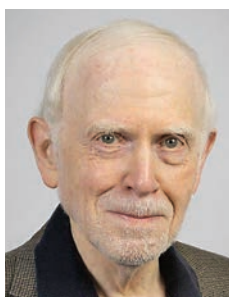
The medals are awarded to scientists who have made significant contributions to theoretical physics and carry a cash award of US$5,000.

—From an ICTP announcement

2018 Poincaré Prizes Awarded

The International Association of Mathematical Physics (IAMP) has awarded the 2018 Henri Poincaré Prizes for mathematical physics to MICHAEL AIZENMAN of Princeton University, PERCY DEIFT of New York University, and GIOVANNI GALLAVOTTI of Universitá di Roma La Sapienza.

Michael Aizenman



Percy Deift

Giovanni Gallavotti

Aizenman was honored "for his seminal contributions to quantum field theory, statistical mechanics, and disordered systems in which he pioneered innovative techniques that demonstrate the beautiful and effective interplay between physical ideas, mathematical analysis, geometric concepts, and probability theory." Deift was recognized "for his seminal contributions to Schrödinger operators, inverse scattering theory, nonlinear waves, asymptotic analysis of Fredholm and Toeplitz determinants, universality in random matrix theory, and his deep analysis of integrable models." Gallavotti was honored "for his outstanding contributions to equilibrium and non-equilibrium statistical mechanics, quantum field theory, classical mechanics, and chaotic systems, including, in particular, the renormalization theory for interacting fermionic systems and the fluctuation relation for the large deviation functional of entropy production."

SEMYON DYATLOV of the University of California Berkeley and the Massachusetts Institute of Technology was selected the recipient of the 2018 Early Career Award of the IAMP "for the introduction and the proof of the fractal uncertainty principle, which has important applications to quantum chaos and to observability and control of quantum systems."

The Poincaré Prizes, sponsored by the Daniel Iagolnitzer Foundation, recognize outstanding contributions that lay the groundwork for novel developments in mathematical physics. The prizes recognize and support young people of exceptional promise who have already

NEWS

Semyon Dyatlov

made outstanding contributions to the field. The prize is awarded every three years at the International Congress on Mathematical Physics. The Early Career Award, sponsored by Springer Publishing Company, is given in recognition of a single achievement in mathematical physics and is reserved for scientists under the age of thirty-five.

—From IAMP announcements

2018 Computer-Aided Verification Award

The Computer-Aided Verification (CAV) Award is given for fundamental contributions to the field of computer-aided verification. Six researchers were selected in 2018 for their outstanding contributions to the enhancement and scalability of model checking by introducing bounded model checking based on Boolean satisfiability (SAT) for hardware (BMC) and software (CBMC). They are:

- Armin Biere, Johannes Kepler University
- Alessandro Cimatti, Fondazione Bruno Kessler
- Edmund M. Clarke, Carnegie Mellon University
- Daniel Kroening, University of Oxford
- Flavio Lerda, Carnegie Mellon University
- Yunshan Zhu, Synopsys

The CAV award carries a cash prize of US$10,000, shared equally among recipients.

—From a CAV announcement

Perfekt Awarded Inaugural Zemánek Prize

Karl-Mikael Perfekt of the University of Reading has been named the first recipient of the Jaroslav and Barbara Zemánek Prize, given in functional analysis with an emphasis on operator theory. Perfekt was honored for his "essential input in a variety of topics in operator theory," especially his "breakthrough work on spectral theory of singular integral operators, in particular on the essential spectrum of the double layer operators, and his penetrating study of 'multiplicative' Hankel operators."

The prize was founded by the Institute of Mathematics of the Polish Academy of Sciences (IMPAN) to encourage research in functional analysis, operator theory, and related topics. The prize recognizes the work of mathematicians under thirty-five years of age who have made important contributions to the field. The monetary amount of the prize is 12,000 PLN (approximately US$3,200). More information about the prize is available at `www.impan.pl/en/events/awards/b-and-j-zemanek-prize`.

—Nikolai Nikolski, University of Bordeaux

MAA Awards Presented

The Mathematical Association of America (MAA) presented several awards for writing and education at its 2018 summer MathFest.

The Carl B. Allendoerfer Award for excellent mathematical writing published in *Mathematics Magazine* was presented to Fumiko Futamura and Robert Lehr of Southwestern University for their joint paper, "A New Perspective on Finding the Viewpoint."

The Trevor Evans Award for excellent writing for an undergraduate audience published in *Math Horizons* was presented to James Propp of the University of Massachusetts, Lowell, for his article "The Paintball Party."

The Paul R. Halmos–Lester R. Ford Awards for exceptional writing published in *The American Mathematical Monthly* were presented to the following: Paul E. Becker and Jennifer Ulrich of Pennsylvania State University Behrend, Martin Derka of Car Media 2.0, and Sheridan Houghten of Brock University for their article "Build a Sporadic Group in Your Basement"; to Maria Deijfen of Stockholm University, Alexander E. Holroyd of the University of Cambridge, and James B. Martin of St. Hugh's College, University of Oxford, for their article "Friendly Frogs, Stable Marriage, and the Magic of Invariance"; to Francis E. Su of Harvey Mudd College for his article "Mathematics for Human Flourishing"; and to Michael Barnsley of Australian National University and Andrew Vince of the University of Florida for their article "Self-Similar Polygonal Tiling."

The George Pólya Awards for exceptional papers published in the *College Mathematics Journal* were presented to Ben Blum-Smith of TED and Samuel Coskey of Boise State University for their article "Fundamental Theorem on Symmetric Polynomials: History's First Whiff of Galois Theory"; and to Stephen Kaczkowski of the South Carolina Governor's School for Science and Mathematics for his article "Mathematical Models for Global Mean Sea Level Rise."

The Daniel Solow Author's Award for authors of undergraduate teaching materials was presented to the following for their coauthored textbook, *Introduction to Statistical Investigations*: Nathan Tintle of Dordt College; Beth Chance, Allan Rossman, and Soma Roy, all of California Polytechnic State University San Luis Obispo; George Cobb of Mt. Holyoke College; and Todd Swanson and Jill VanderStoep of Hope College.

The Henry L. Alder Awards honor beginning college or university faculty members whose teaching has been highly effective and successful in undergraduate mathematics. Chad Awtrey of Elon University has mentored a total of thirty-seven undergraduates and seven high school students on thirty-three different research projects; these students have given sixty-five presentations at national and regional meetings and have coauthored seventeen research papers with Awtrey. David Clark of Grand Valley State University has mentored twenty-two students, many of whom have received awards and grants for their work; is coauthoring a book on mathematical enrichment

activities; and participates in MathPath, a summer math program for students ages eleven to fourteen. MOHAMED OMAR of Harvey Mudd College has created YouTube videos to help students study for the GREs, has published several articles on the teaching and learning of mathematics, and has mentored more than twenty-five undergraduates on more than twenty research projects, several of which have been published in top combinatorics and algebra research journals.

The Mary P. Dolciani Award was presented to AL CUOCO, Distinguished Scholar at Education Development Center, for his contributions to mathematics education, especially the highly original and highly mathematical nature of these contributions to mathematics education and the national stature of his programs.

The Annie and John Selden Prize for Research in Undergraduate Mathematics Education, given for a significant record of published research in undergraduate mathematics education, was presented to ELISE LOCKWOOD of Oregon State University for her publication record and her conclusions about the role of example-based reasoning that focuses on sets of outcomes in providing insights to combinatorics tasks.

—From MAA announcements

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 2018, together with their PhD institutions (in parentheses) and the institutions at which they will use their fellowships.

- CAROLYN ABBOTT (University of Wisconsin-Madison), University of California Berkeley
- HANNAH ALPERT (Massachusetts Institute of Technology), The Ohio State University
- PAUL APISA (University of Chicago), Yale University
- DORI BEJLERI (Brown University), Massachusetts Institute of Technology
- JOHN BERMAN (University of Virginia), University of Texas at Austin
- DANIEL BERNSTEIN (North Carolina State University), Massachusetts Institute of Technology
- HAROLD BLUM (University of Michigan), University of Utah
- SARAH CANNON (Georgia Institute of Technology), University of California Berkeley
- CHARLOTTE CHAN (University of Michigan), Princeton University
- IAN CHARLESWORTH (University of California Los Angeles), University of California Berkeley
- ANASTASIA CHAVEZ (University of California Berkeley), University of California Davis
- WILLIAM CHEN (Pennsylvania State University), McGill University
- YI CHEN (Rutgers University), Princeton University
- MICHELLE CHU (University of Texas at Austin), University of California Santa Barbara
- LAURE FLAPAN (University of California Los Angeles), Northeastern University
- ROBERT FRASER (University of British Columbia), University of Edinburgh
- CHRIS GERIG (University of California Berkeley), Harvard University
- JULIAN GOLD (University of California Los Angeles), Northwestern University
- JEREMY HAHN (University of Wisconsin-Madison), Massachusetts Institute of Technology
- KYLE HAYDEN (Boston College), Columbia University
- SAMUEL HOPKINS (Massachusetts Institute of Technology), University of Minnesota
- SAMEER IYER (Brown University), Princeton University
- IAN JAUSLIN (University of Rome Sapienza), Princeton University
- WILLIAM JOHNSON (University of California Berkeley), Fudan University
- DANIEL KRIZ (Princeton University),Massachusetts Institute of Technology
- ERIC LARSON (Massachusetts Institute of Technology), Stanford University
- XUE LIU (Massachusetts Institute of Technology), Max Planck Institute
- NICOLE LOOPER (Northwestern University), University of Cambridge
- BENJAMIN LUND (University of Georgia), Princeton University
- KRITHIKA MANOHAR (University of Washington), California Institute of Technology
- MATTHEW MILLS (University of Nebraska-Lincoln), Michigan State University
- COURTNEY PAQUETTE (University of Washington), University of Waterloo
- SAMUEL PUNSHON-SMITH (University of Maryland), Brown University
- DAVID ROLNICK (Massachusetts Institute of Technology), University of Pennsylvania
- ANNA ROMANOV (University of Utah), University of Sydney
- JONATHAN RUBIN (University of Chicago), University of California Los Angeles
- SOPHIE SPIRKL (Princeton University), Rutgers University
- JONATHAN WANG (University of Chicago), Massachusetts Institute of Technology
- JONATHAN ZHU (Harvard University), Princeton University
- ANDREW ZUCKER (Carnegie Mellon University), Université Paris Diderot

—NSF announcement

NEWS

2018 Pi Mu Epsilon Student Presentation Awards

Pi Mu Epsilon, the student mathematics honor society, awards outstanding student presentations given at the conference held in conjunction with the Mathematical Association of America's (MAA) annual MathFest. In 2018 the MathFest was held in Denver, Colorado.

The AMS, the American Statistical Association, and the Budapest Semesters in Mathematics for Excellence in Student Exposition or Research funded the Pi Mu Epsilon Speaker Awards. The awardees, along with their institutions and the titles of their presentations, are:

- PRESTON BIRO, Texas A&M University, "A Statistical Approach to the Effect of Suspensions in the NFL"
- KELLER BLACKWELL, University of South Florida-Tampa, "Structural Properties of Twisted Hermitian Codes and Applications to Cryptography"
- KATHLEEN BUCH, Xavier University, "Optimizing Congressional Voting Districts Using a Genetic Algorithm"
- WILLIAM CRAIG, Virginia Institute of Technology, "Quiver Hall-Littlewood Functions and Kostka-Shoji Polynomials"
- BRIAN DARROW JR., Southern Connecticut State University, "On Developing an Early Warning System"
- SAMUEL DELATORE, Youngstown State University, "A Not-So-Fair Guessing Game and the Math Behind It"
- ANTHONY DICKSON, Youngstown State University, "The Prime Number Theorem: A Historical Look at How Mathematicians Proved It"
- CAROLINE HOWELL, Troy University, "Mapping Sound Waves in Octave"
- JACOB KIRSCH, Saint John's University, "Image Recognition Using Polynomial Regression and Artificial Neural Networks"
- ROBERT LEHR, Southwestern University, "Perspective Drawing: How to Find the Immersion Point"
- KATHERINE MANTYCH, Elmhurst College, "The Rational-Float Data Type"
- BRIDGET MUELLER-BRENNAN, University of Illinois at Urbana-Champaign, "New Songs in the Deep: A Passive Acoustic Analysis of the Temporal and Spatial Distribution of Omura's Whales (*Balaenoptera omurai*)"
- DANIEL PLUMMER, Howard University, "Bitcoin, Blockchain Technology and the Future of Commerce"
- HENRY POTTS-RUBIN, College of Wooster, "A Convention for Drawing Knots and Links on the Real Projective Plane"
- VICTORIA ROBINSON, University of Mississippi, "On a Generalization of the Fibonacci Sequence"
- BAO VAN, St. Norbert College, "Building Low Rank Matroids"

The Council for Undergraduate Research Award for Outstanding Student Research was awarded to VLADIMIR SWORSKI, Cleveland State University, for "Problem 21: An Exploration of Dial Rings." The Janet L. Andersen Award for Outstanding Student Exposition or Research in Mathematical or Computational Biology was awarded to ALLISON GERK, St. Norbert College, "Columnaris Disease and the Population Dynamics of Infected Fish."

—From a Pi Mu Epsilon announcement

Photo credits

Photo of Ritabrata Munshi courtesy of Ritabrata Munshi.
Photo of Alessandro Sisto by Monika Krichel.
Photo of Dam Thanh Son copyright UChicago.
Photo of Xiao-Gang Wen courtesy of Xiao-Gang Wen.
Photo of Percy Deift ©NYU Photo Bureau: Miller.
Photo of Giovanni Gallavotti courtesy of Giovanni Gallavotti.
Photo of Semyon Dyatlov courtesy of Ali Hussain, MIT Math Department.
Photo of Michael Aizenman courtesy of Michael Aizenman.