

Mathematics People

Toro Awarded Blackwell–Tapia Prize



Tatiana Toro

Tatiana Toro of the University of Washington, Seattle, has been awarded the 2020 Blackwell–Tapia Prize. The prize honors excellence in research among people who have promoted diversity within the mathematical and statistical sciences.

The prize citation reads in part: “Toro is an analyst whose work lies at the interface of geometric measure theory, harmonic analysis, and partial differential equations. Her work focuses on understanding mathematical questions that arise in an environment where the known data are very rough. The main premise of her work is that under the right lens, objects, which at first glance might appear to be very irregular, do exhibit quantifiable regular characteristics. With collaborators, she introduced a new framework to study boundary regularity questions for second-order partial differential operators. They laid the foundation for what has become a new, rapidly developing area within PDEs. They also brought tools from geometric measure theory to study basic questions about the structure of harmonic measure. Their ideas have provided a new and original approach to understanding the relationship between the geometry of a domain and the regularity at the boundary of the solutions to second-order partial differential equations.

“Her professional service is a multidimensional endeavor. It includes service to the mathematical community at large, mentoring at different levels of the academic ladder, and outreach to elementary schools. Her commitment toward addressing issues of equity and underrepresentation of certain groups in the mathematical sciences is a guiding principle in each one of these settings. She serves as a member of the Board of Trustees of the Institute for Pure and Applied Mathematics (IPAM) at UCLA, a member of the Board of Directors of the Banff International Research Station (BIRS), and as cochair of the Scientific Advisory Committee of MSRI in Berkeley. She is a member of the US National Committee for the International Mathematical

Union. She is also a member of the board of the College Assistant Migrant Program (CAMP) at the University of Washington. This program is federally funded through the US Department of Education’s Office of Migrant Education. It is designed to outreach to and support students from migrant and seasonal farmworker families during their first year in college. Inspired by the CAMP students, Toro spearheaded an effort to launch the first Latinx in the Mathematical Sciences Conference (LATMATH). This conference took place at IPAM in April 2015. Participants included high school students, undergraduate students, graduate students, postdoctoral scholars and faculty, and researchers in industry and government. In 2018 she co-organized the second Latinx in the Mathematical Sciences Conference funded through the Mathematical Sciences Institutes Diversity initiative. This conference attracted over 250 participants.”

Toro was born in Bogotá, Colombia, and received her PhD from Stanford University in 1992 under the direction of Leon Simon. She held positions at the University of California, Berkeley, and the University of Chicago before joining the University of Washington. She has been a member of the Mathematical Sciences Research Institute (MSRI) in Berkeley, a fellow at the Radcliffe Institute for Advanced Study of Harvard University, and Chancellor Professor at UC Berkeley. She has held two Alfred P. Sloan Foundation Fellowships, a Guggenheim Foundation Fellowship, and two Simons Foundation Fellowships. She received the Landolt Distinguished Graduate Mentor Award from the University of Washington in 2019. She is a Fellow of the AMS. She is an elected member of the American Academy of Arts and Sciences and a Miembro Correspondiente de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales. Toro was an invited speaker at the 2010 International Congress of Mathematicians in Hyderabad, India. She delivered an invited address at the Joint Mathematics Meetings in New Orleans, Louisiana, in 2011 and the NAM Clayton–Woodard Lecture at the Joint Mathematics Meetings in Seattle in 2016. In 2020 she was the inaugural AMS Mirzakhani Lecture speaker at the Joint Mathematics Meetings in Denver, Colorado. She tells the *Notices*: “I am a swimmer. I have two kids (seventeen and twenty-two), two dogs, two cats, and a husband, also a mathematician.”

The Blackwell–Tapia Prize and Conference honor David Blackwell, the first African American to be elected to the National Academy of Sciences, and Richard Tapia, recipient of the National Medal of Science in 2010. The prize recognizes a mathematician who has contributed significantly to research in his or her area of expertise and who has served as a role model for mathematical scientists and students from underrepresented minority groups or has contributed in other significant ways to addressing the problem of underrepresentation of minorities in math.

—Blackwell–Tapia Conference announcement

Simons Foundation Investigators Named

The Simons Foundation has named the Simons Foundation Investigators for 2020. Following are the investigators whose work involves the mathematical sciences.

Mathematics

Alexei Borodin of the Massachusetts Institute of Technology studies problems on the interface of representation theory and probability that link to combinatorics, random matrix theory, and integrable systems. His most recent work carries over the ideas and techniques of the theory of symmetric functions to solvable lattice models of statistical physics.



Ciprian Manolescu

Ciprian Manolescu of Stanford University works in low-dimensional topology and gauge theory. His research is centered on constructing new versions of Floer homology and applying them to questions in topology. With collaborators, he showed that many Floer-theoretic invariants are algorithmically computable. He also developed a new variant of Seiberg–Witten Floer homology, which he used to prove the existence of nontriangulable manifolds in high dimensions.



Fernando
Codá Marques

Fernando Codá Marques of Princeton University is a geometer. His recent work, in collaboration with André Neves, developed a full Morse theory for the area functional in closed Riemannian manifolds. The ideas introduced by them have revitalized the subject, leading to the discovery that closed minimal surfaces are ubiquitous in these spaces.

Codá Marques and his wife, Ana, have two children, Pedro and Luisa.



Zhiwei Yun

Zhiwei Yun of the Massachusetts Institute of Technology works at the intersection of representation theory, algebraic geometry, and number theory. He uses ideas and techniques from geometry to solve problems in group representations and number theory. He has constructed the first examples of motives of type E_7 and E_8 and solved a related inverse Galois problem. In joint work with Wei Zhang, he has given a geometric interpretation of higher derivatives of L -functions for function fields.

Theoretical Computer Science



Venkatesan
Guruswami

Venkatesan Guruswami of Carnegie Mellon University conducts research that has led to major advances in the theory of error-correcting codes, approximate optimization, pseudorandomness, and related complexity-theoretic and mathematical aspects. His work on list decoding has yielded codes with minimum possible redundancy for correcting worst-case errors. His recent works include notable progress on polar

codes, deletion-correcting codes, codes for cloud storage, and constraint satisfaction problems. He tells the *Notices* that, in his (sadly limited) spare time, he enjoys traveling, ethnic vegetarian food, racquet sports, crime thrillers, and Carnatic (south Indian classical) music.



Omer Reingold

Omer Reingold of Stanford University conducts research in the foundations of computer science and, most notably, in computational complexity, cryptography, and the societal impact of computation. Among his fundamental contributions are small-memory deterministic graph walks, explicit constructions of lossless expander graphs, randomness extractors, and pseudorandom functions,

as well as establishing influential notions in the area of algorithmic fairness. He is a Fellow of the Association for Computing Machinery (ACM). His honors include the 2005 Grace Murray Hopper Award and the 2009 Gödel Prize. He tells the *Notices*: “I [have] had an ongoing involvement with theater since my days as a theater major in Talma Yalin arts high school many years ago. In the last couple of decades I was part of both scripted theater troupes as well as playback theater troupes. Playback theater is a form

of improvisational theater based on true stories from the audience. Very recently [I was] appointed to be the artistic director of the Yanshufim playback troupe and teaching playback theater at Stanford as part of the [computer science] department to enhance students' collaboration and research capabilities."

David Woodruff of Carnegie Mellon University works in the foundations of data science, specifically in data streams, machine learning, randomized numerical linear algebra, sketching, and sparse recovery. One of his breakthroughs was the first randomized relative error approximation algorithms for least-squares regression and low-rank approximation that run in input sparsity time (i.e., time proportional to the number of nonzero entries in the input). His work on data streams includes the first optimal algorithms for approximately counting distinct elements, approximating the frequency moments and finding heavy hitters, as well as optimal lower bounds for the complexity of certain algorithms.

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

Prizes of CAIMS

The Canadian Applied and Industrial Mathematics Society (CAIMS) has awarded several prizes for 2020.



Vakhtang Putkaradze

Vakhtang Putkaradze of the University of Alberta has been awarded the 2020 CAIMS-Fields Industrial Research Prize of CAIMS and the Fields Institute for his work in geometric mechanics, an area that unifies dynamical systems, the calculus of variations, continuum mechanics, and related topics with a geometric perspective. Putkaradze received his PhD in physics in 1997 from the University of Copenhagen. He is currently site director of the Pacific Institute for the Mathematical Sciences (PIMS) at the University of Alberta. He enjoys spending time outdoors with his family, participating in such activities as hiking, biking, and playing soccer.



Raymond Spiteri

Raymond Spiteri of the University of Saskatchewan was awarded the CAIMS Arthur Beaumont Distinguished Service Award "in recognition of his outstanding service to CAIMS/SCMAI as member and chair of the Doctoral Dissertation

Award committee, organizer and regular contributor of annual meetings, cofounder of the CAIMS/SCMAI journal *Mathematics in Science and Industry*, for spearheading improvements to CAIMS/SCMAI operations, and for his leadership as president-elect, president, and past-president." Spiteri received his PhD from the University of British Columbia. He is the director of the Centre for High-Performance Computing at Saskatchewan. He tells the *Notices*: "My first language is Maltese. I didn't speak any English before I was three years old. I love languages and can dabble around in about seven of them (English, Maltese, Spanish, Italian, French, German, and Arabic), all apparently with a Canadian accent, eh."



Jun Liu

Jun Liu of the University of Waterloo received the 2020 CAIMS/PIMS Early Career Award "in recognition of his contributions to mathematical control theory for cyber-physical systems, using innovative approaches that combine theoretical depth and computational analysis, applied to problems that are of practical importance." He received his PhD in

2010 from the University of Waterloo. In his spare time, Liu enjoys spending time with his family, reading, watching movies (especially documentaries), camping, hiking, playing soccer, and watching his sons play hockey.



Steven Ruuth

Steven Ruuth of Simon Fraser University received the 2020 CAIMS Research Prize "in recognition of his outstanding contribution to the development of robust numerical methods for time dependent partial differential equations and interfacial dynamics, and the impact of his work in scientific computing." He received his PhD in 1996 from the University

of British Columbia. He received the CAIMS Doctoral Dissertation Award in 1996 and the Germund Dahlquist Prize from the Society of Industrial and Applied Mathematics (SIAM) in 2011. He enjoys packrafting and Arctic travel, and last year he visited Tuktut Nogait National Park in Canada's Northwest Territories for fifteen days of river travel and backpacking.

—From CAIMS announcements

NCTM Lifetime Achievement Awards Given

The National Council of Teachers of Mathematics (NCTM) has awarded its Lifetime Achievement Awards to **Karen Karp** of Johns Hopkins University and **Rita Janes** of Newfoundland and Labrador, Canada.



Karen Karp

According to the prize citation, Karp has “dedicated her life to not only mathematics but also the intersection of mathematics education and special education.” Karp received her degree in elementary education with a concentration in mathematics and science from Adelphi University and spent much of her career at the University of Louisville. At Johns Hopkins she is currently advisement

coordinator of the EdD program, mentoring doctoral students as well as the faculty advisers who oversee the students through their dissertations. Karp has served as president of the Association of Mathematics Teacher Educators (AMTE), has held numerous positions with the Greater Louisville Council of Teachers of Mathematics and the Nassau County, New York, Mathematics Teachers Association, and has served on the board of directors, as well as on more than forty committees, for the NCTM. She was coprincipal investigator on an NSF grant that brought together mathematics educators and special educators to develop ways to support students with special needs. Her awards include Outstanding Faculty Mentor Award of the Johns Hopkins University School of Education, as well as the University of Louisville’s Outstanding Doctoral Mentor Award, the President’s Distinguished Teaching Award, and the President’s Distinguished Service Award for a Career of Service. She was a member of the International Congress on Mathematics Education’s study group on students with special needs and has facilitated countless workshops and professional development sessions. She has authored or coauthored more than thirty books and more than eighty articles and book chapters. In her free time she loves being with her family at the lake, reading to grandchildren, and doing puzzles of any kind.

The citation for Janes states: “Rita Janes has been exemplary as a teacher at all levels, a mathematics coordinator, a university instructor, a researcher, a writer of mathematics materials and assessments, a moving force in curriculum work, a leader in professional development, and a conference planner and speaker.” She spent ten years teaching at the Memorial University of Newfoundland and has been a mentor for teachers “throughout Newfoundland and Labrador, Canada, and the United States with her

enthusiasm about the importance of understanding mathematical concepts and her beliefs that any child can learn mathematics and that every teacher must understand the concepts that they are teaching.” Her service to the NCTM includes serving on several committees and working with conferences as chair, cochair, or member of regional meetings and the 2005 NCTM annual meeting. She has written books, chapters, articles, television scripts, and assessment items for the Student Achievement Indicators Program; has worked on curriculum committees; and has conducted summer institutes for mathematics teachers. Her honors include the Barnes Award for outstanding contributions to the professional development of teachers in the province of Newfoundland and Labrador and the Queen Elizabeth II Diamond Jubilee Medal for her dedicated service to peers, community, and Canada.

—From an NCTM announcement

Wang and Xu Awarded Traub Prize in IBC

Heping Wang of Capital Normal University, Beijing, China, and **Guiqiao Xu** of Tianjin Normal University, Tianjin, China, have been awarded the 2020 Joseph F. Traub Prize for Achievement in Information-Based Complexity. They will share the cash prize of US\$3,000, and each will receive a plaque.

—Joseph F. Traub Prize Committee announcement

Constantin Awarded Wittgenstein Prize

Adrian Constantin of the University of Vienna has been awarded the 2020 Wittgenstein Prize. According to the citation, Constantin is a specialist in the waves and currents of the oceans and the atmosphere, and his research helps to better predict the extent of climate phenomena and natural disasters. Constantin was born in Timisoara, Romania. He has been a professor at the University of Vienna since 2008. His honors include the Göran Gustafsson Prize from the Royal Swedish Academy of Sciences, the Friedrich Wilhelm Bessel Prize from the German Humboldt Foundation, and an ERC Advanced Grant. The Wittgenstein Prize carries a cash value of up to 1.5 million euros (approximately US\$1,700,000) to support research for five years following the award. It is awarded by the Austrian Science Fund on behalf of the Austrian Ministry for Science.

—Wittgenstein Prize announcement

AWM Schafer Prizes Awarded

The Association for Women in Mathematics (AWM) has awarded the 2020 Alice T. Schafer Prize, which recognizes excellence in research by an undergraduate woman, to **Natalia Pacheco-Tallaj** of Harvard University. She has been involved in research dating back to high school and continued through her undergraduate career, participating in REUs at the University of Michigan and Williams College. As an undergraduate, she has done research in knot theory and has published several papers. She has also excelled in course work, including graduate-level courses, and independent reading with mentors. **Yuhan (Michelle) Jiang** of the University of California, Berkeley, was named runner-up for the prize. Her research includes algebraic geometry of singular plane curves, algebraic combinatorics, and representation theory. Honorable mentions were awarded to **Teresa Yu** of Williams College, **Marisa Gaetz** of the Massachusetts Institute of Technology, and **Alice Lin** of Princeton University.

—From an AWM announcement

EMS Prizes Awarded

The European Mathematical Society (EMS) has awarded ten EMS Prizes, the Felix Klein Prize, and the Otto Neugebauer Prize for 2020.

The EMS Prizes are awarded to researchers not older than thirty-five years of European nationality or working in Europe in recognition of excellent contributions in mathematics. The awardees for 2020 are:

- **Karim Adiprasito**, Hebrew University of Jerusalem and the University of Copenhagen, for work in the field of combinatorics, combining methods from algebra, geometry, and topology in innovative ways and solving problems in a wide range of areas.
- **Ana Caraiani**, Imperial College London, for work in classical and p -adic Langlands programs, Shimura varieties, and arithmetic geometry.
- **Alexander Efimov**, Steklov Mathematical Institute of RAS, Russia, for work in algebraic geometry, mirror symmetry, and quantum algebra.
- **Simion Filip**, University of Chicago, for studies of the interactions between dynamical systems, especially on locally homogeneous and Teichmüller spaces, and algebraic geometry, particularly Hodge theory and complex geometry.
- **Aleksandr Logunov**, Princeton University, for work in harmonic analysis, potential theory, and geometric analysis.

- **Kaisa Matomäki**, University of Turku, for research in number theory, including results on the distribution of multiplicative functions over short intervals of numbers.
- **Phan Thành Nam**, Ludwig Maximilian University of Munich, for research in analysis and mathematical physics, in particular in many-body quantum mechanics, spectral theory, calculus of variations, and partial differential equations and numerical analysis.
- **Joaquim Serra**, ETH Zurich, for research in elliptic and parabolic partial differential equations, reaction-diffusion equations, free boundary problems, and integro-differential equations.
- **Jack Thorne**, University of Cambridge, for work in number theory and arithmetic aspects of the Langlands program, especially in algebraic number theory.
- **Maryna Viazovska**, École Polytechnique Fédérale de Lausanne, for work in number theory and optimal configurations on manifolds, for her work in solving the sphere-packing problem in dimensions 8 and 24, and for research on spherical designs.

The Felix Klein Prize is awarded to a scientist, or a group of at most three scientists, under the age of thirty-eight for using sophisticated methods to give an outstanding solution, which meets with the complete satisfaction of industry, to a concrete and difficult industrial problem. The recipient of the 2020 Klein Prize is **Arnulf Jentzen** of the University of Munster for research on machine-learning approximation algorithms, computational stochastics, numerical analysis for high-dimensional partial differential equations, stochastic analysis, and computational finance.

The Otto Neugebauer Prize is awarded for highly original and influential work in the field of history of mathematics that enhances our understanding of either the development of mathematics or a particular mathematical subject in any period and in any geographical region. The 2020 Prize was awarded to **Karine Chemla** of CNRS for research on the history of mathematics within ancient China, geometry in France in the first half of the nineteenth century, and the theory of the history of mathematics, with a focus on the relationships between mathematics and the cultures in relation to which they are produced.

The prize lectures will be given at the Eighth European Congress of Mathematics in June 2021.

—From an EMS announcement

2020 SIAM Prizes

The Society of Industrial and Applied Mathematics (SIAM) has awarded a number of prizes for 2020.

Nick Trefethen of the University of Oxford was awarded the John von Neumann Lectureship “for outstanding and distinguished contributions to the field of applied mathematics and for the effective communication of these ideas to the community.”

Anna Seigal of the University of Oxford received the Richard C. DiPrima Prize for an early-career researcher who has done outstanding research in applied mathematics and who has completed his or her doctoral dissertation and all other requirements for his or her doctorate.

Kaushik Bhattacharya of the California Institute of Technology received the Theodore von Karman Prize, awarded for a notable application of mathematics to mechanics and/or the engineering sciences.

Roland Glowinski of the University of Houston was awarded the W. T. and Idalia Reid Prize for research in, or other contributions to, the broadly defined areas of differential equations and control theory.

Tony F. Chan of King Abdullah University of Science and Technology received the award for Distinguished Service to the Profession.

Rajiv Maheswaran of Second Spectrum was awarded the Gerald and Judith Porter Public Lectureship, given every year at the Joint Mathematics Meetings on a mathematical topic accessible to the broader community. The topic of his lecture is “The Fantastic Intersection of Math and Sports: Where No One Is Afraid of a Decimal Point.”

Erik Demaine of the Massachusetts Institute of Technology was awarded the I. E. Block Community Lectureship. The topic of his lecture was “Mathematics Meets Origami.”

—From *SIAM announcements*

Prizes of the London Mathematical Society

The London Mathematical Society (LMS) has honored the following mathematical scientists with its prizes for 2020.

Martin Liebeck of Imperial College London was awarded the Pólya Prize for his “profound and prodigious contributions to group theory, particularly the subgroup structure of simple groups and probabilistic group theory.”

Peter Clarkson of the University of Kent was awarded the Senior Anne Bennett Prize “in recognition of his tireless work to support gender equality in UK mathematics, and particularly for his leadership in developing good practice among departments of mathematical sciences.”

Thomas Hales of the University of Pittsburgh was awarded the Senior Berwick Prize in recognition of his book *Dense sphere packings: A blueprint for formal proofs*, published in the LMS Lecture Note Series in 2012.

Françoise Tisseur of the University of Manchester was awarded the Fröhlich Prize “for her important and highly

innovative contributions to the analysis, perturbation theory, and numerical solution of nonlinear eigenvalue problems.”

Shephard Prizes were awarded to the following:

Kenneth Falconer, FRSE, of the University of St Andrews, for his “many original and profound results in fractal geometry, particularly the description, occurrence, geometrical properties and dimensional analysis of fractal sets and measures.”

Des Higham, FRSE, of the University of Edinburgh for seeking to make the theory, application, and insights from network science accessible to wide audiences, with much effort invested in public events and transparent descriptions.

Whitehead Prizes were awarded to the following individuals:

Maria Bruna of the University of Cambridge “in recognition of her outstanding research in asymptotic homogenization, most prominently in the systematic development of continuum models of interacting particles systems.”

Ben Davison of the University of Edinburgh “in recognition of his outstanding contributions to the foundations, the structure, and applications of Donaldson–Thomas invariants.”

Adam Harper of the University of Warwick “for his deep and important contributions to analytic number theory and, in particular, for his work on the value distribution of the Riemann zeta function and random multiplicative functions using sophisticated ideas and techniques from probability theory.”

Holly Krieger of the University of Cambridge “for her deep contributions to arithmetic dynamics, to equidistribution, and to bifurcation loci in families of rational maps and for her recent proof (with DeMarco and Ye) of uniform boundedness results for numbers of torsion points on families of bielliptic genus two curves in their Jacobians.”

Andrea Mondino of the University of Oxford “in recognition of his contributions to geometric analysis in differential and metric settings. In particular, he has played a central part in the development of the theory of metric measure spaces with Ricci curvature lower bounds.”

Henry Wilton of the University of Cambridge “for his remarkable contributions to geometric and combinatorial group theory.”

—From an *LMS announcement*

Credits

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