Mathematics People


Alice Guionnet

Guionnet Awarded Pascal Medal

Alice Guionnet of ENS Lyon is the recipient of the 2018 Blaise Pascal Medal for her work in random matrices. According to the prize citation, she is "an inspiring leader in the field of probability and random matrices. She has established surprising links with various other fields of mathematics as spectral theory, operator algebra, free probability, which led her to several outstanding results. Her 'single ring theorem' is a real masterpiece of analysis." She founded the theory of "matrix models." Her honors include the Rollo Davidson Prize (2003), the Loève Prize (2009), and selection as a Simons Investigator (2012). The medal recognizes "an outstanding and demonstrated personal contribution to science and technology and the promotion of excellence in research and education."

—From a European Academy of Sciences announcement

Seward and Wright Awarded 2018 Brin Prize


Brandon Seward

Brandon Seward of the Courant Institute of Mathematical Sciences and Alex Wright of the University of Michigan have been awarded the 2018 Michael Brin Dynamical Systems Prize for Young Mathematicians. Seward was recognized "for his groundbreaking work on entropy theory for actions of countable groups, extending to this general setting fundamental results of the classical theory such as Sinai's factor theorem and Krieger's finite generators theorem." Wright was recognized for his fundamental work on the Teichmüller geometry and dynamics of the moduli space of Riemann surfaces, especially on the classification of $SL_2(\mathbb{R})$-invariant orbifolds and the discovery of unexpected examples.

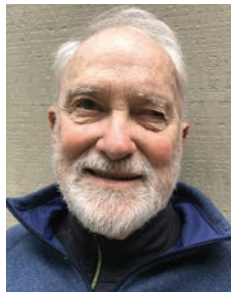

Alex Wright

Seward received his PhD in 2015 from the University of Michigan under the supervision of Ralf Spatzier. He spent a year at the Hebrew University of Jerusalem before joining the Courant Institute in 2016. Wright received his PhD in 2014 from the University of Chicago under the supervision of Alex Eskin. He then spent four years at Stanford University, where he worked under the supervision of and collaborated with Maryam Mirzakhani. He joined the University of Michigan in the fall of 2018. He received a Clay Research Fellowship in 2014.

The prize is funded by an endowment from Michael Brin and is awarded for specific contributions to the field of dynamical systems made by researchers within four years of their PhD degrees. It carries a cash award of US$4,000.

—Giovanni Forni, Chair, Prize Selection Committee

Heineman Prize Awarded


Bill Sutherland

Bill Sutherland of the University of Utah, Francesco Calogero of the University of Rome "La Sapienza," and Michel Gaudin of Commissariat de l' Energie Atomique (CEA) have been awarded the 2019 Dannie Heineman Prize for Mathematical Physics by the American Institute of Physics (AIP) and the American Physical Society (APS). According to the prize citation, they were honored "for profound contributions to the field of exactly solvable models in statistical mechanics and many body physics, in particular the construction of the widely studied Gaudin magnet and the Calogero–Sutherland, Shastry-Sutherland, and Calogero–Moser models." Sutherland tells the *Notices:* "I grew up for the most part in the small farming community of Marshall, Missouri; I would agree that I have many Missouri character traits, for better or for worse. My local teachers were very good, especially 'Granny' Crutcher who taught me math, and asked me to evaluate new math text-

books the salesmen had given her." Sutherland was the first in his family to go to college; a summer program in physics at the Missouri School of Mines led to his forgoing his senior year in high school to go directly to college. In later years he and his wife, Veronica, taught in an open classroom that their children attended in Salt Lake City, where they enjoyed cross-country skiiing. Calogero is an arms control and disarmament activist who served as secretary general of the Pugwash Conference on Science and World Affairs from 1989 to 1997; he served as chair of the Pugwash Council from 1997 to 2002 and is still an ex officio member.

The Heineman Prize recognizes outstanding publications in the field of mathematical physics. The prize carries a cash award of US$10,000.

—From an AIP-APS announcement

Rossman Awarded Aisenstadt Prize


Benjamin Rossman

Benjamin Rossman of the University of Toronto has been awarded the 2018 André Aisenstadt Prize of the Centre de Recherches Mathématiques (CRM).

The prize citation reads: "Ben works in computational complexity theory, a branch of theoretical computer science that classifies problems according to their relative difficulty. His research seeks to quantify the minimum resources required to solve basic problems in combinatorial models such as Boolean circuits. Through creative techniques based in logic and the probabilistic method, Ben has derived groundbreaking lower bounds on the complexity of detecting cliques and determining connectivity in random graphs. His other notable results include size and depth hierarchy theorems for bounded-depth circuits, answering long-standing questions. This work has contributed to a reemergence of interest in circuit complexity, a concrete approach to P vs NP, which had seen little progress since breakthroughs of the 1980s." He delivered the Aisenstadt Prize lecture, "The complexity of detecting cliques and cycles in random graphs," at the University of Montreal in November 2018.

Rossman received his PhD in 2010 from the Massachusetts Institute of Technology under the direction of Madhu Sudan. He held postdoctoral positions at the Tokyo Institute of Technology, the Simons Institute for the Theory of Computing at Berkeley, and the National Institute of Informatics in Tokyo before joining the University of Toronto in 2016. He was a Sloan Fellow (2017) and an invited speaker at the International Congress of Mathematicians in Rio de Janeiro (2018). In 2018 he co-organized a special semester in Lower Bounds in Computational Complexity at the Simons Institute. Rossman tells the it *Notices*: "These days I spend nearly all my free time playing with my one-year-old son."

—From a CRM announcement

Zhitnitsky Receives CAP-CRM Prize


Ariel Zhitnitsky

Ariel Zhitnitsky of the University of British Columbia has been awarded the CAP-CRM Prize in Theoretical and Mathematical Physics "for his ground-breaking contributions to theoretical high energy physics, in particular for his development of the 'invisible axion' model, and for his work on the vacuum structure of non-Abelian gauge theories." In what the prize citation calls one of his "most influential ideas," he proposed that the Strong CP problem in the standard model could be resolved by a nearly invisible axion; presently several experimental groups are searching for such axions. According to the citation, "This paper has over 1000 citations and has influenced experimental searches, and the proposed axions are a candidate for cosmological cold dark matter. Another influential work was accomplished with V. Chernyak, providing a set of wave-functions that allow computation of exclusive amplitudes at high energies, such as form-factors or two-particle decays of heavy mesons. A series of papers with D. Son analyzed anomalous topological nondissipating currents in dense matter using an effective Lagrangian approach. Zhitnitsky later investigated the roles of these topological currents in neutron stars as a model for kicks and superconductivity. With D. Kharzeev, he further used these results to explain the CP-odd asymmetries observed at the relativistic heavy ion collider, and proposed that the bulk of dark matter is anti-baryonic so that the universe as a whole could be baryon-symmetric. Zhitnitsky has made key contributions to our understanding of the QCD phase transition, hadron physics, dark matter, QCD axions and neutron stars."

The prize is awarded by the Canadian Association of Physicists (CAP) and the Centre de Recherches Mathématiques (CRM) and recognizes exceptional achievements in theoretical and mathematical physics.

—From a CAP-CRM announcement

Anantharaman Awarded Infosys Prize

Nalini Anantharaman of the University of Strasbourg, France, has been awarded the 2018 Infosys Prize for Mathematical Sciences for her work related to quantum chaos, "specifically for the effective use of entropy in the study of semiclassical limits of eigenstates in quantum analogs of chaotic dynamical systems and for her work on the delocalization of eigenfunctions on large regular graphs." The prize citation states: "The quantum world is one of the deepest secrets of the universe and mathematics is the language that helps us understand this world. Mathematicians and physicists have been trying for decades to unravel the mysteries of this subatomic world. . . . Anantharaman's work impressively explores the deep relationship between classical and quantum systems and the unexpected use of entropy to prove some of the hard results."

Anantharaman was born in Paris, France, and received her PhD from Université Pierre et Marie Curie in 2000 under François Ledrappier. She has held positions at Ecole Normale Supérieure de Lyon, Ecole Polytechnique (Palaiseau), University of California Berkeley, Université Paris-Sud, Orsay, and the Institute for Advanced Study, Princeton. Her honors include the Grand Prix Jacques Herbrand (2011), the Salem Prize (2011), and the Henri Poincaré Prize for Mathematical Physics in 2012 (with Freeman Dyson, Barry Simon, and Sylvia Serfaty).

The Infosys Prizes recognize outstanding researchers and scientists in the fields of mathematical sciences, engineering and computer science, humanities, life sciences, physical sciences, and social sciences.

—From an Infosys announcement

Packard Fellowships Awarded


Keenan Crane

Two researchers whose work involves the mathematical sciences have been awarded 2018 Packard Fellowships by the David and Lucile Packard Foundation. Keenan Crane of Carnegie Mellon University received a Fellowship in computer and information sciences. Crane describes his work as focusing on "mathematical, computational, and mechanical foundations for designing complex 3D structures that can be built from shape-shifting 2D materials. New kinds of dynamic, shape-shifting matter such as programmable metamaterials, self-folding robotics, and active hydrogels driven by changes in heat, light, or humidity open up an abundance of new possibilities for applications. But with each new material comes new questions about geometry: which shapes can we make, and how?" Crane's work "aims to dramatically increase the geometric complexity of flexible, shape-shifting objects, by developing new computational tools for shape-shifting design. This work builds on the emerging field of discrete differential geometry, which provides faithful computational analogues for fundamental objects from geometry and physics." He tells the *Notices:* "I never feel like I truly understand something until I can draw a picture of it—there is something about turning mathematics into code into imagery that forces a serious reality check on your understanding! Somehow this disposition led me to the field of discrete differential geometry, which has further deepened my appreciation for the beautiful things that can happen when mathematicians and computer scientists work together."

Mahdi Soltanolkotabi of the University of Southern California received a Fellowship in computer and information sciences. He describes his work as follows: "Nonconvex learning algorithms are enabling transformative societal changes by revolutionizing how we process data. Despite wide empirical success, a satisfactory understanding of the behavior of these algorithms is still lacking. In particular, as systems and processes become increasingly automated with algorithms aiding or replacing human judgment, the importance of more reliable learning methodologies coupled with a thorough understanding of their behavior intensifies.

"The overarching goal of my research is to develop guiding theory, scalable algorithms and tools that make the modern practice of nonconvex learning more principled, reliable, and effective. I intend to contribute significantly to the transformation of modern data analysis from a collection of effective yet mysterious heuristics to a principled and completely reliable scientific discipline. Such a development will not only demystify existing practices but will facilitate new algorithms and system designs that better utilize computational and data resources."

Packard Fellows receive US$875,000 over five years to pursue their research. The Fellowships are designed to allow maximum flexibility in how the funding is used.

—From Packard Foundation announcements

NEWS

Efron Awarded International Prize in Statistics

Bradley Efron of Stanford University has been awarded the International Prize in Statistics in recognition of the "bootstrap," a method he developed in 1977 for assessing the uncertainty of scientific results that has had extraordinary impact across many scientific fields. According to the prize citation, "With the bootstrap, scientists are able to learn from limited data in a simple way that enables them to assess the uncertainty of their findings. In essence, it is possible to simulate a potentially infinite number of data sets from an original data set and—in looking at the differences—measure the uncertainty of the result from the original data analysis." The prize is awarded every other year by a foundation consisting of the American Statistical Association, the Institute of Mathematical Statistics, the International Biometric Society, the International Statistical Institute, and the Royal Statistical Society.

—International Prize in Statistics announcement

Bhatnagar Prizes Awarded

The Shanti Swarup Bhatnagar (SSB) Prizes for Science and Technology have been awarded in the mathematical sciences. Amit Kumar of IIT Delhi was honored for his work in combinatorial optimization and graph theoretic algorithms. Nitin Saxena of IIT Kanpur was recognized for work in algebraic complexity. The prize recognizes excellence in scientific research in India.

—From a Bhatnagar Prize announcement

2018 NSF CAREER Awards

The National Science Foundation (NSF) has named a number of recipients of 2018 Faculty Early Career Development (CAREER) Awards. The awards support early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their departments or organizations. Following are the names, institutions, and proposal titles of the awardees selected by the NSF Division of Mathematical Sciences (DMS).

• Christine Breiner, Fordham University: Existence and regularity of solutions to variational problems in geometric analysis

• Aaron Brown, University of Chicago: Rigidity of group actions on manifolds

• Wei-Kuo Chen, University of Minnesota–Twin Cities: Mean field spin glasses and related applications

• Xiaohui Chen, University of Illinois at Urbana–Champaign: Computer-intensive statistical inference on high-dimensional and massive data: From theoretical foundations to practical computations

• Eric Chi, North Carolina State University: Stable and scalable estimation of the intrinsic geometry of multiway data

• Tudor Dan Dimofte, University of California–Davis: The algebraic structures of three-dimensional gauge theory

• Semyon Dyatlov, Massachusetts Institute of Technology: Classical and quantum chaos

• Ellen Eischen, University of Oregon, Eugene: Structure and interpolation in number theory and beyond

• Brittany Froese Hamfeldt, New Jersey Institute of Technology: Generated Jacobian equations in geometric optics and optimal transport

• Kristen Hendricks, Michigan State University: Equivariant Floer theory and low-dimensional topology

• Leah Johnson, Virginia Polytechnic Institute and State University: Quantifying heterogeneity and uncertainty in the transmission of vector borne diseases with a Bayesian trait-based framework

• Eric Katz, Ohio State University: Tropical and diophantine geometry

• Rongjie Lai, Rensselaer Polytechnic Institute: Geometry and learning for manifold-structured data in 3D and beyond

• Qin Li, University of Wisconsin–Madison: Applicable kinetic computation with boundaries and rough media

• Galyna Livshyts, Georgia Institute of Technology: High-dimensional geometry and its applications

• Po-Ling Loh, University of Wisconsin–Madison: Something old, something new: Robust statistics in the 21st century

• Li Ma, Duke University: Advances in multi-scale Bayesian inference and learning on massive data

• Daniel McDonald, Indiana University: Calibrating regularization for enhanced statistical inference

• Hoi H. Nguyen, Ohio State University: Littlewood–Offord theory and universality in random structures

• Stefan Patrikis, University of Utah: Galois representations: Deformation theory and motivic origins

• Braxton Osting, University of Utah: Variational and geometric methods for data analysis

• Julius Ross, University of Illinois at Chicago: Stability, Kahler geometry, and the Hele–Shaw flow

• Lars Ruthotto, Emory University: A flexible optimal control framework for efficient training of deep neural networks

• Christopher Rycroft, Harvard University: Adapting the fluid projection method to model elasto-plastic materials

• Steven Sam, University of California–San Diego: Categorical and classical symmetries in commutative algebra and algebraic geometry

• Hayden Schaeffer, Carnegie-Mellon University: Sparse model selection for nonlinear evolution equations

• Laura Schaposnik, University of Illinois at Chicago: Branes in the moduli space of Higgs bundles

• Benjamin Shaby, Pennsylvania State University: Hierarchical models for spatial extremes

• Anne Shiu, Texas A&M University: Biochemical reaction systems: From structure to dynamics

• Nike Sun, University of California–Berkeley: Phase transitions in randomized combinatorial search and optimization problems

• Thomas Trogdon, University of California–Irvine: Numerical linear algebra, random matrix theory and applications

• Paula Vasquez, University of South Carolina at Columbia: Multi-scale modeling of biological gels by coupling Langevin equations and fractional viscoelastic constitutive models

• Chunmei Wang, Texas Tech University: Primal-dual weak Galerkin finite element methods

• Ying Wang, University of Oklahoma Norman: Mathematical analysis and numerical methods for the underground oil recovery models

• Zhiren Wang, Pennsylvania State University: Dynamical rigidity related to group actions and arithmetics

• Liang Xiao, University of Connecticut: Slopes of p-adic modular forms

• Yue Yu, Lehigh University : A local–nonlocal coupling framework for tissue damage in fluid-structure interaction

• Wenliang Zhang, University of Illinois at Chicago: Local cohomology, de Rham cohomology and D-modules

—From NSF announcements

Credits

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