
Mathematics People

Agrawal and Moreira Awarded TWAS Prize in Mathematics

MANINDRA AGRAWAL of the Indian Institute of Technology and CARLOS GUSTAVO TAMM DE ARAUJO MOREIRA of the Instituto de Matemática Pura e Aplicada have been awarded the 2010 TWAS Prize in Mathematics, given by the Academy of Sciences for the Developing World (TWAS). Agrawal was honored “for his discovery of a novel characterization of prime numbers leading to a deterministic and efficient way of testing primality of a number.” Moreira was recognized “for his fundamental contribution to the study of the interplay between fractal geometry and dynamical bifurcations.” Each prize carries a cash award of US\$15,000. The winners will each present a lecture about his research at the academy’s general meeting in 2011.

—From a TWAS announcement

Manin Awarded Bolyai Prize

YURI MANIN of the Max-Planck-Institut für Mathematik and Northwestern University has been awarded the János Bolyai International Mathematical Prize of the Hungarian Academy of Sciences for his book *Frobenius Manifolds, Quantum Cohomology, and Moduli Spaces*, published by the AMS in 1999. The prize, which consists of a cash award of US\$25,000 and a medal, was presented at the Hungarian Academy of Sciences on December 1, 2010. The award was established in 1903 by the Hungarian Academy of Sciences in honor of János Bolyai, codiscoverer of non-Euclidean geometry. The prize is awarded every five years to the author of the best mathematical monograph containing original research that was published in the previous ten years.

—From a Hungarian Academy of Sciences announcement

PECASE Awards Announced

Two mathematicians who were nominated by the National Science Foundation received Presidential Early Career Awards for Scientists and Engineers (PECASE) from President Obama. JOSE H. BLANCHET MANCILLA of Columbia University was honored for furthering research using simulation for estimating the likelihood of rare but potentially catastrophic events and for educating students using state-of-the-art Monte Carlo methods. KATRIN WEHRHEIM of the Massachusetts Institute of Technology was honored for contributing to geometry and analysis, for expositions of fundamental and emerging techniques in symplectic geometry, and for encouraging women and girls in mathematics at levels from middle school to junior university faculty.

—From an NSF announcement

Kamnitzer Awarded Aisenstadt Prize

JOEL KAMNITZER of the University of Toronto has been awarded the 2011 André-Aisenstadt Prize of the Centre de Recherches Mathématiques (CRM) for his “substantial and deep contributions to the field of geometric representation theory and related topics.” The prize recognizes outstanding research achievement by a young Canadian mathematician in pure or applied mathematics.

—From a CRM announcement

CAREER Awards Presented

The Division of Mathematical Sciences (DMS) of the National Science Foundation (NSF) has honored twenty-nine mathematicians in fiscal year 2010 with Faculty Early Career Development (CAREER) awards. The NSF

established the awards to support promising scientists, mathematicians, and engineers who are committed to the integration of research and education. The grants provide funding of at least US\$400,000 over a five-year period. The 2010 CAREER grant awardees and the titles of their grant projects follow.

FEDERICO ARDILA, San Francisco State University, Matroids, Polytopes, and Their Valuations in Algebra and Geometry; PAUL ATZBERGER, University of California, Santa Barbara, Emergent Biological Mechanics of Cellular Microstructures; ERHAN BAYRAKTAR, University of Michigan, Ann Arbor, Topics in Optimal Stopping and Control; JANET BEST, Ohio State University, Mathematical Questions Arising from Neural Systems: Research and Education; LEWIS BOWEN, Texas A&M Research Foundation, Ergodic Theory of Nonamenable Group Actions; YITWAH CHEUNG, San Francisco State University, Diophantine Analysis of Dynamical Systems; IZZET COSKUN, University of Illinois, Chicago, The Cohomology and Birational Geometry of Moduli Spaces; SAMIT DASGUPTA, University of California, Santa Cruz, Explicit Class Field Theory, Stark's Conjectures, and Families of Modular Forms; SARAH DAY, College of William and Mary, Computational Dynamics and Topology; DAVID DUMAS, University of Illinois, Chicago, Complex Projective Structures, Teichmüller Theory, and Character Varieties; DANIEL GROVES, University of Illinois, Chicago, Surface Bundles and Logic in Geometric Group Theory; ABHINAV KUMAR, Massachusetts Institute of Technology, Lattices and Sphere Packings, Arithmetic Geometry, and Computational Number Theory; MELVIN LEOK, University of California, San Diego, Computational Geometric Mechanics: Foundations, Computation, and Applications; GILAD LERMAN, University of Minnesota, Twin Cities, New Paradigms in Geometric Analysis of Data Sets and Their Applications; JINCHI LV, University of Southern California, High-Dimensional Variable Selection and Risk Properties; DAN MARGALIT, Georgia Institute of Technology, Group-Theoretical, Dynamical, and Combinatorial Aspects of Mapping Class Groups; YAJUN MEI, Georgia Institute of Technology, Streaming Data Analysis in Sensor Networks; IRINA MITREA, University of Minnesota, Twin Cities, Spectral Theory for Singular Integrals, Validated Numerics and Elliptic Problems in Non-Lipschitz Polyhedra: Research and Outreach; JULIA PEVTSOVA, University of Washington, From Modular Representation Theory to Geometry: Connections and Interactions; NICHOLAS PROUDFOOT, University of Oregon, Eugene, Geometric Category O and Symplectic Duality; ALEXANDER RAKHLIN, University of Pennsylvania, Statistical and Computational Complexities of Modern Learning Problems; DAN ROMIK, University of California, Davis, Combinatorial Probability, Limit Shapes and Enumeration; JUAN SOUTO, University of Michigan, Ann Arbor, Kleinian, Arithmetic, and Mapping Class Groups; DANIEL SPIRN, University of Minnesota, Twin Cities, Mathematics of Vorticity in Ginzburg-Landau Theory and Fluids; SETH SULLIVANT, North Carolina State University, Algebraic Problems in Statistics and Biology; MARIA WESTDICKENBERG, Georgia Institute of Technology, Combining Research on Dynamic Metastability and Hydrodynamic Limits with a Multifaceted Outreach Plan; BRETT WICK, Georgia

Institute of Technology, An Integrated Proposal Based on the Corona Problem; JON WILKENING, University of California, Berkeley, Optimization and Continuation Methods in Fluid Mechanics; GORDAN ZITKOVIC, University of Texas, Austin, Equilibria and Stability in Financial Markets.

—*Elaine Kehoe*

Chang Chosen Professor of the Year

PING-TUNG CHANG, professor of mathematics at Matanuska-Susitna College, Palmer, Alaska, has been selected one of four Professors of the Year by the Council for Advancement and Support of Education (CASE) and the Carnegie Foundation for the Advancement of Teaching. His teaching has been inspired by George Polya's problem-solving method, through which he teaches students the tools they need to solve a problem, what method of solving the problem will be most effective, and how to carry it out. This approach helps students become more confident and engaged in solving and reasoning. He uses tests for formative assessment only and encourages students to retake tests until they master the content. This method has increased students' confidence and promoted a relaxed learning environment. He works with high school students to help them with math and has worked to develop more effective mathematics teaching methods in China.

—*Elaine Kehoe*

Rhodes Scholarships Awarded

Four students in the mathematical sciences are among thirty-two American men and women who have been chosen as Rhodes Scholars by the Rhodes Scholarship Trust. The Rhodes Scholars were chosen from among 837 students at 309 colleges and universities.

ZACHARY M. FRANKEL of Brooklyn, New York, is a senior at Harvard College with concentrations in physics and mathematics. He is fluent in Japanese, is an accomplished debater, and has done advanced graduate work in quantum field theory. He has also been a research assistant at the Kennedy School of Government. He has worked extensively with the Global Viral Forecasting Initiative, taking a semester off to develop models that help global health organizations and governments prevent future pandemics. Frankel plans to do a D.Phil. at Oxford in infectious diseases (zoology).

WILLIAM J. ZENG of Great Falls, Virginia, is a senior at Yale majoring in physics. His course work ranges from quantum physics and mathematics to comparative literature, philosophy, and Hindi. He has done research at the Massachusetts Institute of Technology and at the Quantum Device Lab in Zurich, and he was an intern in New Delhi with the Indian Youth Climate Network. He has

competed internationally on Yale's lightweight crew and has volunteered with the Special Olympics. He plans to do the M.Sc. in mathematics and the foundations of computer science at Oxford.

ESTHER O. UDUEHI, Evansville, Indiana, is a senior at Indiana University, Bloomington, where she majors in biochemistry and mathematics. She was also a visiting student at Oxford. A Wells Scholar, Presidential Intern and Senator Richard Lugar Scholar, and a member of Phi Beta Kappa, she is president of the Indiana University Minority Association of Premedical Students. She has won several awards for her research in organic chemistry and has participated in a United States-Russia global health care study program and has done research at the Broad Institute of the Massachusetts Institute of Technology and at Harvard University. She plans to do the D.Phil. in chemistry at Oxford.

PRERNA NADATHUR of Roseville, Minnesota, is a senior at the University of Chicago, where she majors in mathematics and minors in linguistics and philosophy. She writes poetry and fiction, plays violin in the university chamber orchestra, performs classical Indian dance, and has won prizes for her piano performances. Prerna has also been a leader in student government and in social justice activities and founded a chapter of Students for a Democratic Society. She has done independent research on social choice theorems, set theory, and homology. At Oxford she will do the M.Phil. in general linguistics and comparative philology.

—From a Rhodes Scholarship Trust announcement

Daniel Rudolf Awarded 2010 IBC Prize

DANIEL RUDOLF of the University of Jena, Germany, has been awarded the 2010 Information-Based Complexity (IBC) Young Researcher Award. The award is given for significant contributions to information-based complexity by a young researcher who has not reached his or her thirty-fifth birthday by September 30 of the year of the award. The prize consists of US\$1,000 and a plaque. The award will be presented at the Foundations of Computational Mathematics (FoCM) conference in Budapest in July 2011.

—Joseph Traub
Columbia University

About the Cover

Random Young diagrams

The cover was suggested (albeit loosely) by the article in this issue on free cumulants, written by Jonathan Novak and Pyotr Śniady. Free cumulants are a tool in the theory of non-abelian probability, and the distribution of Young diagrams was one of the earliest applications of that theory.

The images on the cover were produced by a kind of random walk that generates Young diagrams by adding one box randomly in each step, being sure that the result is again a Young diagram. Such a path of diagrams is in effect a numbering of the boxes in the diagram or, in other words, a Young tableau. Thus, in this process a Young diagram of size n is assigned a probability proportional to the number of Young tableaux giving rise to that diagram. It was proven by S. V. Kerov and A. M. Vershik on the one hand, and B. F. Logan and L. A. Shepp on the other, that as n goes to infinity the random diagrams, scaled by $1/\sqrt{n}$, tend to cluster around a fixed shape (indicated in the cover images by a grey curve). This is a non-abelian analogue of tossing coins and getting heads close to half the time. Later work analyzed in more detail the non-abelian Gaussian distribution involved.

This early work has been elaborated extensively, notably in continuing and remarkable work of Kerov and Philippe Biane. It is in Biane's work that free cumulants have proven to be especially valuable. Each Young diagram of size n corresponds to an irreducible representation of \mathfrak{S}_n , and the distribution of Young diagrams defined above is associated to the asymptotic behavior of the regular representation of \mathfrak{S}_n . Biane has shown how other weightings may be associated to the asymptotic limit of other families of representations of the symmetric group. Kerov and others have explored the asymptotic distribution associated to other infinite series of groups, such as $GL_n(\mathbb{F}_q)$ as $n \rightarrow \infty$, but much remains to be discovered.

I have found the written version of Biane's ICM talk in Beijing a good guide to the literature. Along with all the proceedings of the International Congresses, it may be found at

<http://www.mathunion.org/ICM/>

Kerov died at a relatively young age, in 2000. A short memorial article by Vershik can be found in volume 121 of the *Journal of Mathematical Sciences*. The preface of Kerov's book *Asymptotic Representation Theory of the Symmetric Group and Its Applications in Analysis* presents an introduction to his work. Many of his papers can be found at

<http://www.pdmi.ras.ru/~kerov/textfiles/index.html>

I was a little surprised to see that there is no entry on Kerov in Wikipedia, but then, according to Vershik's memorial, this seems to continue a trajectory along which Kerov deserved more recognition than he got.

—Bill Casselman
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