
Mathematics People

Barlow Receives 2009 CRM-Fields-PIMS Prize

MARTIN BARLOW of the University of British Columbia has been awarded the 2009 CRM-Fields-PIMS Prize. The prize, awarded annually by the Centre de Recherches Mathématiques (CRM), the Fields Institute, and the Pacific Institute for the Mathematical Sciences (PIMS), recognizes exceptional contributions by a mathematician working in Canada. The prize carries a cash award of CA\$10,000 (approximately US\$8,000) and an invitation to give a lecture at each institute.

According to the prize citation, Barlow “is a leading figure in probability and the leading international expert in diffusion on fractals and other disordered media”. He has made important contributions in the fields of partial differential equations (including major progress on the De Giorgi conjecture), stochastic differential equations, the mathematical finance of electricity pricing, filtration enlargement, and branching measure diffusions.

Barlow received his undergraduate degree from Cambridge University in 1975 and his Ph.D. from University College of Swansea, Wales, in 1978. He held a Royal Society University Research Fellowship at Cambridge University from 1985 to 1992, when he joined the mathematics department at the University of British Columbia. He has held a number of visiting professorships at leading universities, including the University of Tokyo; Cornell University; Imperial College, London; and the Université de Paris. In 2008 he received the Jeffery-Williams Prize of the Canadian Mathematical Society. He has also been the recipient of the Rollo Davidson Prize and the Junior Whitehead Prize of the London Mathematical Society. He is a fellow of the Institute of Mathematical Statistics, the Royal Society of Canada, and the Royal Society of London.

The CRM and the Fields Institute established the CRM-Fields Prize in 1994 to recognize exceptional research in the mathematical sciences. In 2005, PIMS became an equal partner, and the name was changed to the CRM-Fields-PIMS Prize. Previous recipients of the prize are H. S. M. (Donald) Coxeter, George A. Elliott, James Arthur, Robert V. Moody, Stephen A. Cook, Israel Michael Sigal, William T. Tutte, John B. Friedlander, John McKay, Edwin Perkins, Donald A. Dawson, David Boyd, Nicole Tomczak-Jaegermann, Joel S. Feldman, and Allan Borodin.

—From a Fields Institute announcement

Wilking and Zirnbauer Awarded Leibniz Prizes

Two mathematicians are among eleven recipients of the 2009 Gottfried Wilhelm Leibniz Prizes awarded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation). BURKHARD WILKING of the University of Münster was awarded the prize in differential geometry. MARTIN R. ZIRNBAUER of the University of Cologne was awarded the prize in mathematical physics.

Wilking is a leader in the field of differential geometry. According to the prize citation, “his work has had a decisive influence, in particular on what is known as ‘Riemannian geometry’.” He has achieved “spectacular breakthroughs” both in the classification of Riemannian manifolds of positive sectional curvature and in the convergence of the Ricci flow. He “takes a very original approach to algebraic methods using geometric intuition, which enables him to achieve a deep understanding of the geometric properties of manifolds.”

Zirnbauer is “one of the world’s leading mathematical physicists”. His research interests focus primarily on condensed matter and in particular on mesoscopic electronic systems, which exhibit chaos due to disorder or a lack of geometric symmetry. He has done research on color-flavor transformation and on the generalization of the three Wigner-Dyson universality classes of random matrices for the “tenfold way”. He is adept at translating physics questions into modern mathematical language, thus stimulating successful cooperation between mathematics and physics.

As part of the Leibniz Prize, Wilking and Zirnbauer have each received a cash award of 2.5 million euros (approximately US\$3.6 million), which they may use as they like for their own research over a period of up to seven years.

—From a Leibniz Prize announcement

Prizes of the Mathematical Society of Japan

The Mathematical Society of Japan (MSJ) awarded several prizes in autumn 2008.

MASANAO OZAWA of Nagoya University has been awarded the Autumn Prize for his contributions to the mathematical foundations of quantum information. He showed that Heisenberg’s uncertainty principle is not physically correct, and he proposed and proved the

inequality that replaces the principle. He has quantitatively generalized the Wigner-Araki-Yanase theorem and shown severe theoretical restrictions for the construction of quantum computers, has succeeded in characterizing all physically possible observables as a measure with the values in the completely positive operators, and finally solved Hilbert's sixth problem. The Autumn Prize is awarded to an individual who has made outstanding contributions within the preceding five years to mathematics in the highest and broadest sense.

The Analysis Prizes have been awarded to KEN-ITI SATO of Nagoya University, HIDEO TAMURA of Okayama University, and NAKAO HAYAHI of Osaka University in recognition of their outstanding contributions to analysis. Sato was honored for his contributions to developments in the theory of Levy processes and in particular for his work on stochastic integrals with respect to Levy processes and infinitely divisible distributions. Tamura was selected for his contributions to the asymptotic analysis of the spectrum arising from quantum physics and in particular for his results on the Aharonov-Bohm effect in scattering theory and the sharp error estimate to the Trotter-Kato product formula. Hayahi was recognized for his work on various nonlinear dispersive equations and in particular for his construction of modified wave operators for general equations of KdV type and construction of modified scattering operators for nonlinear Schrödinger equations and nonlinear Klein-Gordon equations.

—From a *Mathematical Society of Japan* announcement

Naor Receives Packard Fellowship

ASSAF NAOR, a mathematician at New York University, has been awarded a Fellowship for Science and Engineering from the David and Lucile Packard Foundation for the year 2008. He works in analysis and geometry, investigating “the extent to which abstract geometries with an intrinsic notion of distance (metric spaces) can be faithfully represented as points in a better understood geometry, such as Euclidean space”. His work concentrates on the development of a structure theory for metric spaces and the applications of geometry and analysis to the theory of computing.

The Packard Fellowships are awarded to researchers in mathematics, natural sciences, computer science, and engineering who are in the first three years of a faculty appointment.

—From a *Packard Foundation* announcement

Rhodes Scholarships Awarded

Two students in the mathematical sciences are among the thirty-two American men and women chosen as Rhodes Scholars by the Rhodes Scholarship Trust. The Rhodes Scholars were chosen from among 769 applicants who

were endorsed by 207 different colleges and universities in a nationwide competition. The names and brief biographies of the mathematics scholars follow.

JOSHUA A. LOSPINOSO of Sparta, New Jersey, is a senior at the United States Military Academy with a double major in economics and operations research. He has done pioneering theoretical and applied research on social network analysis, has done top-secret-level signals intelligence work at the National Security Agency, and has many publications in network analysis. He is a Regimental Operations Officer at West Point and has competed three years in the Sandhurst competition. Joshua plans to study for an M.Sc. in applied statistics at Oxford.

ANNA YERMAKOVA of Buffalo Grove, Illinois, is a senior at Northwestern University, where she majors in biochemistry, piano, and history and philosophy of science and logic. Anna immigrated to the United States from Russia when she was eleven years old. Since then she has won national awards for piano and French, has done research in chemical engineering and nanotechnology at the University of Washington and in neuroscience and biomedical engineering at Northwestern, and has composed and choreographed works in ballroom dance and flamenco. She will study for a doctorate in mathematical biology at Oxford.

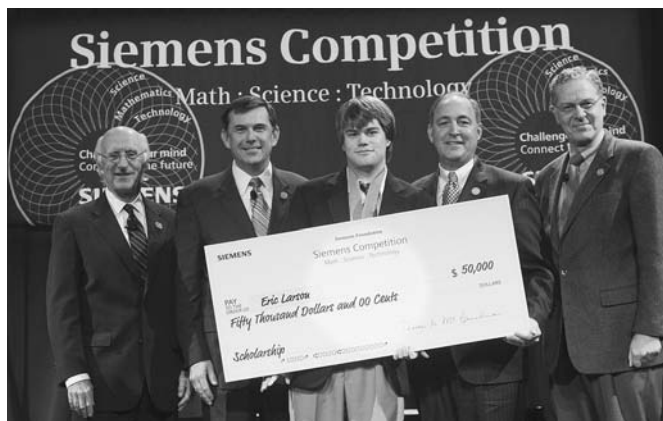
Rhodes Scholarships provide two or three years of study at the University of Oxford in England. The value of the Rhodes Scholarship varies depending on the academic field and the degree (bachelor's, master's, doctoral) and Oxford college chosen. The Rhodes Trust pays all college and university fees and provides a stipend to cover students' necessary expenses while they are in residence in Oxford, as well as during vacations, and transportation to and from England. The total value averages approximately US\$50,000 per year.

—From a *Rhodes Scholarship Trust* announcement

Siemens Competition Prizes Announced

Several students whose work involves the mathematical sciences have won prizes in the Siemens Competition in Math, Science, and Technology.

ERIC K. LARSON of South Eugene High School, Eugene, Oregon, received a US\$50,000 scholarship for his project, “The Classification of Certain Fusion Categories”. Larson is a senior who conducted mathematics research that looked to classify certain types of fusion categories. Fusion categories are a recently discovered type of algebraic structure with applications to various areas of theoretical physics, computer science, and mathematics, such as string theory, quantum computation, and knot theory. These extremely complex structures are a far-reaching generalization of groups, which are the algebraic structure traditionally used in mathematics to model symmetries. The main result of this project identifies and completely classifies a new class of fusion categories which, for the



Eric K. Larson (center) wins the US\$50,000 scholarship in the 2008 Siemens Competition. Photograph courtesy of the Siemens Foundation.

first time, contains non-group-theoretic examples. He was mentored by Pavel Etingof of the Massachusetts Institute of Technology and Victor Ostrick of the University of Oregon. Larson is an avid piano player, a four-time winner of the Oregon Junior Bach Festival; he has been invited to perform in master classes sponsored by the Eugene Symphony. He was awarded a silver medal at the Forty-eighth International Mathematical Olympiad. He is also involved in his high school's math, chemistry, and programming clubs.

ASHOK CUTKOSKY, a senior at David Henry Hickman High School, Columbia, Missouri, was awarded a US\$20,000 scholarship for his project, "Associated Primes of the Square of the Alexander Dual of Hypergraphs". Cutkosky's research uncovered new information about the intrinsic structure of hypergraphs; these results have potential applications in such problems as sharing of resources. He took an algebraic approach to study hypergraphs and worked to restate geometric properties of multivariable polynomials. He was mentored by Christopher Francisco of Oklahoma State University. Cutkosky is the captain of his school's math team and a member of the Mu Alpha Theta Math Honor Society. He placed first and second at the Great Plains Math League State Competition and received a silver medal at the USA Mathematical Talent Search in 2007.

HAYDEN C. METSKY, a senior at Millburn High School, Millburn, New Jersey, received a US\$10,000 scholarship for his project, "Improving Statistical Machine Translation Through Template-based Phrase-table Extensions". His research proposed a novel method to improve the quality of machine translation from one language to another. His approach addressed a critical problem in machine translation, that of producing good results for phrases that the system has not seen before, which will yield performance improvements to automatic translators through virtual extension of a given sample. He was mentored by Nizar Habash of Columbia University and Paul Citrin, a science teacher and advisor in Millburn High School's Science Research Program. Metsky has been named the New Jersey Governor's School of Engineering and Technology Scholar and has won the George Washington University School

of Engineering and Applied Science medal. He enjoys independent software development and has developed a "Word of the Day" widget that drew the attention of a notable online dictionary website. He is the front-page news section editor of his school newspaper. Metsky enjoys mentoring other students in math, running cross-country, and playing cello in the school orchestra. He hopes to conduct research in a computer science-related field after completing his undergraduate education.

RAPHAEL-JOEL LIM of the Indiana Academy for Science, Math, and Humanities in Muncie, Indiana, and MARK ZHANG of William P. Clements High School, Sugar Land, Texas, received a US\$20,000 scholarship for their team project, "Previously Unknown Parts of the Greene-Kleitman Partition for the Tamari Lattice". Their research answered a question about the thickness of a fundamental mathematical structure, the Tamari lattice. The team met at the Texas Mathworks Honors Summer Math Camp, where they worked closely with Max Warshauer, founder and director of the camp. The team's mentor was Edward Early of St. Edward's University. Lim, a senior, likes reading novels, tackling tough math problems, and playing competitive video games. He spent last summer as a counselor at the Texas Mathworks Honors Summer Math Camp and works as a math tutor. Zhang, also a senior, was a Siemens Competition Regional Finalist in 2007. He is a member of both the Mu Alpha Theta Math Club and the Junior Engineering Technical Society and regularly competes in a variety of math, science, and computer science competitions. In addition, he also enjoys playing the piano, reading and writing fantasy novels, programming games, sketching, playing DDR, and volunteering.

ERIKA DEBENEDICTIS of the Albuquerque Academy, Albuquerque, New Mexico, and DUANNI (TONY) HUANG of La Cueva High School, Albuquerque, received a US\$40,000 scholarship for their team project, "Optimizing the Direct Simulation Monte Carlo Algorithm for Multi-core Processors". The goal of the team's project was to create a physically realistic direct simulation Monte Carlo (DSMC) model and optimize its performance on multicore processors, making intricate simulation available on desktop computers versus a "supercomputer" that may cost tens of millions of dollars. The research could open doors to simpler methods of simulation of physical systems; such systems include the weather, reentry of space vehicles (which this project studied), auto collisions, and even modeling of complex biological processes such as molecular docking. DeBenedictis, a junior, enjoys physics and independent research projects. She competes in her school science fair and on the New Mexico Supercomputing Challenge as part of a team each year. She sings with the Girls Ensemble and her school's audition choir and plays piano. Huang, a senior, has participated in many science competitions through the years and has won honors at the Science Olympiads, Science Bowl/Quiz Bowls, and MATHCOUNTS, for which he is an assistant coach. He is a member of the National Honor Society and is actively involved in a mentorship at the Center for High Tech Materials.

—From a Siemens Competition announcement