Voiculescu Receives NAS Award in Mathematics

Dan Virgil Voiculescu

DAN VIRGIL VOICULESCU has received the 2004 NAS Award in Mathematics from the National Academy of Sciences (NAS). He was honored for "the theory of free probability, in particular, using random matrices and a new concept of entropy to solve several hitherto intractable problems in von Neumann algebras."

The NAS Award in Mathematics was established by the AMS in commemoration of its centennial, celebrated in 1988. The award is presented every four years in recognition of excellence of research in the mathematical sciences published within the past ten years. The award carries a cash prize of $5,000. Previous recipients are Robert P. Langlands (1988), Robert MacPherson (1992), Andrew J. Wiles (1996), and Ingrid Daubechies (2000).

The *Notices* asked Dimitri Shlyakhtenko of the University of California, Los Angeles, to describe Voiculescu's work. Shlyakhtenko responded: "Noncommutative probability theory views elements of a noncommutative von Neumann algebra as analogs of classical random variables. One of Voiculescu's discoveries is that in this more general noncommutative framework there is room for a new notion of independence, called freeness. Freeness bears the same relationship to free products of algebras as ordinary independence does to Cartesian products of probability spaces. Amazingly, as Voiculescu showed, many theorems and concepts in classical probability have very nice free probability analogs; this list includes the central limit theorem, notions of convolution, infinitely divisible laws, and so on. Remarkably, there is also a free probability analog of the classical information-theoretic notion of entropy. Free probability theory has now grown into a rich field, with connections and applications to many other areas of mathematics. For example, Voiculescu's discovery that certain random matrices are asymptotically free as their sizes go to infinity makes possible computations of expected asymptotic spectral density of their eigenvalues. On the other hand, his and his followers' work in free probability has led to a number of revolutionary results in von Neumann algebra theory, especially for von Neumann algebras associated to free groups."

Dan Virgil Voiculescu was born on June 14, 1949, in Bucharest, Romania. He studied mathematics at the University of Bucharest and received his Ph.D. there in 1977 under the direction of Ciprian Foias. Voiculescu was an assistant (1972–73) at the University of Bucharest and then a researcher (1973–75) at the Mathematics Institute in Bucharest. After the dismantling of the institute, he was a researcher (1975–86) in the mathematics department of INCREST in Bucharest. In 1986, after attending the International Congress of Mathematicians (ICM) in Berkeley, he stayed on as a visiting professor at the University of California, Berkeley. In 1987 he assumed his present position as a professor of mathematics at Berkeley. He was a Guggenheim Fellow (1997), a Miller Professor at Berkeley (1997–98), a visiting professor at the Institut Henri Poincaré (1999), and a Senior Scholar of the Clay Mathematics Institute (2000). He held the International Blaise Pascal Research Chair in spring 2003 and spring 2004. Over the years he has made several visits to the Institut des Hautes Études Scientifiques, the Schrödinger Institute in Vienna, and The Fields Institute in Toronto. Voiculescu was an invited speaker at the ICM in Warsaw in 1983, at the European Mathematical Congress in Paris in 1992, and at the ICM in Zurich in 1994.

—Allyn Jackson

Mathematics People

Paulos Receives AAAS Award

JOHN ALLEN PAULOS of Temple University has received the 2003 Award for Public Understanding of Science and Technology of the American Association for the Advancement of Science (AAAS). Paulos received his Ph.D. from the University of Wisconsin. He has written a number of books intended to increase public understanding and appreciation of mathematics, including *Innumeracy, A Mathematician Reads the Newspaper, Once upon a Number*, and *A Mathematician Plays the Stock Market.* His articles have appeared in the *The New York Times* and *The Wall Street Journal* and in *Forbes* and *Discover* magazines, among others.

He is particularly interested in probability, logic, and the philosophy of science. He is a popular speaker and radio and television commentator. The award, which recognizes scientists and engineers who make outstanding contributions to the "popularization of science", carries a prize of $5,000 and a commemorative plaque.

—Elaine Kehoe

AIM Five-Year Fellow Announced

The American Institute of Mathematics (AIM) has announced that the recipient of the 2004 AIM Five-Year Fellowship is JACOB LURIE of the Massachusetts Institute of Technology. He was chosen from a field of more than 130 applicants.

Lurie received the Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate in 2000 and won first place in the Westinghouse Science Talent Search in 1996. His research interests include algebraic geometry, homotopy theory, and their interrelationships. He will receive his Ph.D. from MIT in 2004; his thesis is titled "Derived Algebraic Geometry".

The AIM five-year fellowships are awarded each year to outstanding new Ph.D. students in an area of pure mathematics. The fellowships cover sixty months of full-time research, as well as funds for travel and equipment. Each fellowship carries a stipend of $4,000 per month, with an additional $4,000 per year allocated for travel and equipment.

—From an AIM announcement

Duquesne Receives Meyer Prize

The Institut de Recherche Mathématique Avancée (IRMA) has created an annual prize in memory of the mathematician Paul André Meyer (1934–2003), who spent his career at IRMA. The prize honors an outstanding young probabilist working, as Meyer did, in the field of stochastic processes. IRMA, which is in Strasbourg, is a laboratory of the Centre National de la Recherche Scientifique and of the Université Louis Pasteur.

The first IRMA Prize in Memory of Paul André Meyer was awarded in February 2004 to THOMAS DUQUESNE.

Duquesne is twenty-nine years old and is a Maître de Conférences at the Université de Paris-Sud. He was a doctoral student of Jean-François Le Gall and defended his Thèse d'Université (Ph.D. thesis) on random trees, Lévy processes, and superprocesses in October 2001.

Duquesne's first important contribution to research was to extend path decompositions à la Williams and à la Bismut to very general real Lévy processes. But perhaps his most striking discoveries pertain to continuous random trees. Consider a random tree such that the (random) numbers of offspring of the vertices are independent and have the same probability law. When this law is in the domain of attraction of a stable law, by conditioning with the total size of the tree and letting this size tend to infinity, Duquesne obtains an asymptotic object, the stable continuous random tree, of which only some very particular examples, such as the Brownian tree, were previously known. Those trees have since been instrumental in

constructing some fragmentation processes; they are likely to play a prominent role in many asymptotic studies.

His subsequent work, some done jointly with Le Gall, involves continuous random trees, defining them as limits in more general, or different, settings than above, and studying their properties in depth. Linked to such trees are the Lévy snakes, yielding a pathwise realization which is very useful in the probabilistic interpretation, via superprocesses, of some nonlinear partial differential equations.

—From an IRMA announcement

Asatryan Awarded Emil Artin Junior Prize

The 2004 Emil Artin Junior Prize in Mathematics has been awarded to GURGEN R. ASATRYAN of Yerevan State University, Armenia. Asatryan was chosen for his paper "A solution to identities problem in 2-element HSI algebras", *Mathematical Logic Quarterly* **50** (2004), 175–178.

Established in 2001, the Emil Artin Junior Prize in Mathematics carries a cash award of US$500 and is presented usually every year to a student or former student at an Armenian university who is under the age of thirty-five for outstanding contributions to algebra, geometry, topology, and number theory—the fields in which Emil Artin made major contributions. Previous awardees were Vahagn Mikaelian (2001) and Artur Barkhudaryan (2002).

The prize committee consisted of A. Basmajian, Y. Movsisyan, and V. Pambuccian.

—Artin Prize Committee announcement

2004 Clay Research Fellows Announced

The Clay Mathematics Institute (CMI) has announced the appointment of four Research Fellows: CIPRIAN MANOLESCU and MARYAM MIRZAKHANI of Harvard University, and ANDRÁS VASY and AKSHAY VENKATESH of the Massachusetts Institute of Technology. They were selected for their research achievements and their potential to make significant future contributions. The CMI will fully support the fellows' research for a period of two to four years.

Ciprian Manolescu, born in 1978, is a native of Romania. He is currently completing his Ph.D. at Harvard University under the direction of Peter B. Kronheimer. In his undergraduate thesis he gave an elegant new construction of Seiberg-Witten Floer homology, and in his Ph.D. thesis he gave a remarkable gluing formula for the Bauer-Furuta invariants of four-manifolds. His research interests span the areas of gauge theory, low-dimensional topology, symplectic geometry, and algebraic topology.

Maryam Mirzakhani, born in 1977, is a native of Iran. She is currently completing her Ph.D. at Harvard under the direction of Curtis T. McMullen. In her thesis she showed how to compute the Weil-Petersson volume of the moduli space of bordered Riemann surfaces. Her research interests include Teichmüller theory, hyperbolic geometry, ergodic theory, and symplectic geometry.

András Vasy, born in 1969, is a native of Hungary. He received his Ph.D. from MIT in June 1997 under the direction of Richard B. Melrose. Vasy is currently an associate professor at MIT. The focus of his research program is scattering theory, specifically the theory of N-body quantum Hamiltonians. Vasy has proved several deep results in this field concerning the structure of the scattering matrix and asymptotic behavior of generalized eigenfunctions, and has more recently extended these techniques to study analysis on symmetric spaces. In 2002 he received the Alfred P. Sloan Research Fellowship.

Akshay Venkatesh was born in New Delhi, India, in 1981 and was raised in Australia, where he attended the University of Western Australia in Perth. In 2002 he received his Ph.D. from Princeton University, where he worked under the direction of Peter Sarnak. Since that time he has held a C. L. E. Moore Instructorship at MIT. Venkatesh has made major progress in counting and equidistribution problems in automorphic forms and number theory. His research areas include representation theory, number theory, locally symmetric spaces, and ergodic theory.

The Clay Research Fellows were formerly called Clay Long-Term Prize Fellows. Previous fellows are: Manjul Bhargava, Daniel Biss, Alexei Borodin, Maria Chudnovsky, Dennis Gaitsgory, Sergei Gukov, Elon Lindenstrauss, Mircea Mustata, Igor Rodnianski, and Terence Tao.

—From a CMI news release

Corrections

Based on information received from the degree-granting institutions, the *Notices* published two incorrect thesis titles in the August 2003 and February 2004 issues respectively. The correct thesis title for Curtis Caravone (University of Colorado, Department of Mathematics) is "Integrability of the Multiplicity Function for a Generalized Multiresolution Analysis". The correct title for Sonia Ramirez (Central Michigan University, Department of Mathematics) is "Viscous-Invicid Coupled Problem with Interfacial Data".

—Managing Editor