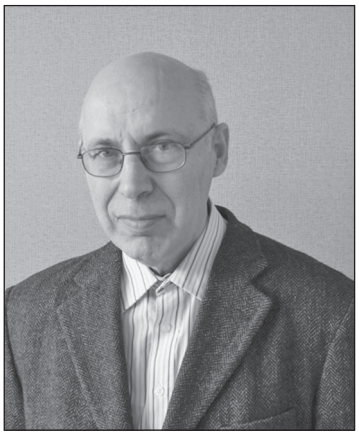
Mathematics People

Henkin Awarded 2011 Bergman Prize

GENNADI HENKIN of the University of Paris has been awarded the 2011 Stefan Bergman Prize. Established in 1988, the prize recognizes mathematical accomplishments in the areas of research in which Stefan Bergman worked. The prize consists of one year's income from the prize fund, which was US$24,000 for 2011. The previous Bergman Prize winners are: David W. Catlin (1989), Steven R. Bell and Ewa Ligocka (1991), Charles Fefferman (1992), Yum Tong Siu (1993), John Erik Fornæss (1994), Harold P. Boas and Emil J. Straube (1995), David E. Barrett and Michael Christ (1997), John P. D'Angelo (1999), Masatake Kuranishi (2000), László Lempert and Sidney Webster (2001), M. Salah Baouendi and Linda Preiss Rothschild (2003), Joseph J. Kohn (2004), Elias M. Stein (2005), Kengo Hirachi (2006), Alexander Nagel and Stephen Wainger (2007-2008), and Ngaiming Mok and Duong H. Phong (2009). On the selection committee for the 2011 prize were Harold P. Boas, Carlos E. Kenig, and Linda Preiss Rothschild (chair).

Citation

G. M. Henkin has made fundamental contributions to the theory of functions on complex manifolds, integral representations in several complex variables, and the multidimensional Cauchy-Riemann equations. Henkin is a pioneer of the construction of explicit integral representations adapted to the geometry of a domain in a complex manifold. Sophisticated analysis of these concrete integrals leads to refined solutions of classical problems of several complex variables with precise control on uniform, Hölder, and L^p norms. Applications include uniform estimates for solutions of the inhomogeneous multidimensional Cauchy-Riemann equations, uniform estimates for extensions of holomorphic functions from submanifolds, and uniform approximation of holomorphic functions that are continuous on the closure of a domain. The Bergman kernel function is a canonical but nonexplicit holomorphic reproducing kernel. At the end of the 1960s Henkin and E. Ramírez de Arellano independently constructed on strongly pseudoconvex domains in $\mathbb{C}^n$ a noncanonical but explicit holomorphic reproducing kernel, the so-called Henkin-Ramírez kernel. This seminal work has seen a vast development at the hands of numerous authors, including



Gennadi Henkin

Henkin and his many collaborators. The book *Theory of Functions on Complex Manifolds* by Henkin and J. Leiterer contains an account of the construction of global integral representations for differential forms in the general setting of strongly pseudoconvex polyhedra in Stein manifolds. A subsequent book by the same authors, *Andreotti-Grauert Theory by Integral Formulas*, contains an exposition of constructive integral representations on a class of complex manifolds intermediate between Stein manifolds and compact manifolds. The resulting uniform interpolation and approximation results for $\bar{\partial}$ ∂-cohomology classes have applications in the theory of holomorphic vector bundles and in the theory of the tangential Cauchy-Riemann equations. The Bergman theory concerns square-integrable holomorphic functions. In an influential paper with M. Gromov and M. Shubin, Henkin proved the infinite-dimensionality of the space of square-integrable holomorphic functions on pseudoconvex manifolds equipped with a suitable group action. Some of Henkin's work at the interface of complex analysis, partial differential equations, and geometry concerns the paradoxical question of solvability of unsolvable problems. Hans Lewy's famous example of an unsolvable partial differential equation is based on the local unsolvability in top degree of the tangential Cauchy-Riemann equations on a strongly pseudoconvex boundary. Henkin found a necessary and sufficient condition for global solvability, together with L^p estimates for the solution. A general compact, strongly pseudoconvex, three-dimensional CR-manifold cannot be embedded into complex Euclidean space, nor can a generic deformation of an embeddable one. In a remarkable paper with C. L. Epstein, Henkin revealed the subtle structure of embeddable deformations of embeddable three-dimensional CR-structures. Henkin has made many other noteworthy contributions, including the application of multidimensional integral representations to objects of mathematical physics, such

as the complex Radon transform and inverse scattering problems; results on compactness and subellipticity of the $\bar{\partial}$-Neumann problem on domains with nonsmooth boundary; variations of the edge-of-the-wedge theorem; a study of zero sets of functions in the multidimensional Nevanlinna class; a proof of the biholomorphic inequivalence of analytic polyhedra and strongly pseudoconvex domains; and theorems on nonisomorphism of Banach spaces of holomorphic functions. G. M. Henkin's research is profound, insightful, and groundbreaking.

Biographical Sketch

Gennadi Markovich Henkin was born in Moscow in 1942. He received his Ph.D. in 1967 from Moscow State University, under the direction of Anatolii G. Vitushkin. In 1973 Henkin received the degree of Doctor of Sciences in Physics and Mathematics, also from Moscow State University, with a thesis entitled *Integral representations in some problems of functions in several complex variables*. Henkin has been a professor of mathematics at the University Paris VI since 1991 and a leading scientific researcher at the Central Economical Institute of the Russian Academy of Sciences since 1973. At the International Congress of Mathematicians in Warsaw in 1983, he gave a 45-minute invited address, "Tangent Cauchy-Riemann equations and the Yang-Mills, Higgs and Dirac fields". He received the Prize of the Moscow Mathematical Society in 1970, for works on the problem of isomorphic classification of Banach spaces of smooth and of holomorphic functions. In 1992 he was awarded the Kondratiev Prize of the Russian Academy of Sciences in Mathematical Economics, for works on Shumpeterian dynamics and nonlinear wave theory. Henkin has more than 130 publications in various areas, including complex and functional analysis, mathematical economics and evolution equations, integral geometry, and inverse problems.

About the Prize

The Bergman Prize honors the memory of Stefan Bergman, best known for his research in several complex variables, as well as the Bergman projection and the Bergman kernel function that bear his name. A native of Poland, he taught at Stanford University for many years and died in 1977 at the age of 82. He was an AMS member for 35 years. When his wife died, the terms of her will stipulated that funds should go toward a special prize in her husband's honor. The AMS was asked by Wells Fargo Bank of California, the managers of the Bergman Trust, to assemble a committee to select recipients of the prize. In addition the Society assisted Wells Fargo in interpreting the terms of the will to assure sufficient breadth in the mathematical areas in which the prize may be given. Awards are made every one or two years in the following areas: (1) the theory of the kernel function and its applications in real and complex analysis; and (2) function-theoretic methods in the theory of partial differential equations of elliptic type with attention to Bergman's operator method.

—Allyn Jackson

Schoenfeld and Radford Receive 2011 ICMI Medals

The International Congress on Mathematical Education (ICME) of the International Mathematical Union (IMU) has awarded two major prizes for 2011. ALAN SCHOENFELD of the University of California Berkeley has received the Felix Klein Medal for Lifetime Achievement, and LUIS RADFORD of Université Laurentienne, Sudbury, Canada, was awarded the Hans Freudenthal Medal for a major cumulative program of research.

From the Citation for Alan Schoenfeld

The Felix Klein Medal for 2011 is given to Alan H. Schoenfeld, University of California Berkeley, in recognition of his more than thirty years of sustained, outstanding lifetime achievements in mathematics education research and development. Alan Schoenfeld developed a keen interest in mathematics education early in his career and emerged as a leader in research on mathematical problem solving. He shows a lifelong pursuit of deeper understanding of the nature and development of mathematical learning and teaching. His work has helped to shape research and theory development in these areas, making a seminal impact on subsequent research. Alan Schoenfeld has also done fundamental theoretical and applied work that connects research and practice in assessment, mathematical curriculum, diversity in mathematics education, research methodology, and teacher education. He has more than 200 highly cited publications in mathematics education, mathematics, educational research, and educational psychology. His scholarship is of the highest quality, reflected in esteemed recognition over the years.

Alan Schoenfeld has nurtured a generation of new scholars who generate increasing impact on mathematics education research. He has undertaken a remarkable amount of outstanding work for national, regional, and international communities in education, mathematics, and mathematics education, providing leadership in professional associations and joint research endeavors, and has been an invited keynote speaker at numerous conferences around the globe.

Alan Schoenfeld began his career as a research mathematician. After obtaining a B.A. in mathematics from Queen's College, New York, in 1968 and an M.S in mathematics from Stanford University in 1969, he earned a Ph.D. in mathematics at Stanford in 1973. He became a lecturer at the University of California at Davis in 1973, and in 1975 a lecturer and research mathematician in the Graduate Group in Science and Mathematics Education (SESAME) at the University of California Berkeley. After academic appointments at Hamilton College (1978–1981) and the University of Rochester (1981–1984), Schoenfeld was invited back to U.C. Berkeley in 1985 to develop the mathematics education group. He has been a full professor since 1987 and now has a named chair in education and is an affiliated professor in the mathematics department. He has also been a Special Professor of the University of Nottingham since 1994.

He has been an elected member of the U.S. National Academy of Education since 1994, a member of its executive board in 1995, and vice president in 2001. He also served as the president of the American Educational Research Association (AERA) in 1998–1999. In 2000 he led the writing team for *Principles and Standards for School Mathematics* for the National Council of Teachers of Mathematics.

Among Alan Schoenfeld's many publications we mention his highly cited, groundbreaking book, *Mathematical Problem Solving* (1985); his chapter on cognition and metacognition, "Learning to think mathematically: Problem solving, metacognition, and sense-making in mathematics" (in the 1992 *Handbook for Research on Mathematics Teaching and Learning*); his rigorous study of the development and learning of a complex mathematical idea, *Learning* (1993, coauthored with J. P. Smith and A. A. Arcavi); his finely detailed work on teacher decision making, "Toward a theory of teaching-in-context" (published in *Issues in Education* in 1998); and his most recent book, *How We Think* (2010). Alan Schoenfeld's seminal theoretical contributions are all based on, and buttressed by, long sequences of carefully designed experiments and their exhaustive analysis.

From the Citation for Luis Radford

The Hans Freudenthal Medal for 2011 is given to Luis Radford, Université Laurentienne, Canada, in recognition of the theoretically well-conceived and highly coherent research program over the past two decades which has had a significant impact on the community. His development of a semiotic-cultural theory of learning has been anchored in detailed observations of students' algebraic activity. His research has been documented extensively in renowned scientific journals, books, and handbooks, as well as in numerous invited keynote presentations. The impact of Luis Radford's program of research has led to significant new insights in algebra teaching and learning and more broadly with his development of a widely applicable theory of learning.

Luis Radford has given many mentoring workshops for graduate students in Italy, Spain, Denmark, Colombia, Mexico, and Brazil. He has influenced teachers, teacher educators, and curriculum developers. He has served as associate editor of *For the Learning of Mathematics* and is currently an associate editor of *Educational Studies in Mathematics*.

Luis Radford graduated from the Universidad de San Carlos in Guatemala in 1977 with a degree in civil engineering. He then taught at that university's engineering school, followed by studies at Université Louis Pasteur I, Strasbourg, France, where he obtained a Licence in Mathematics and Fundamental Applications in 1981, a Diplôme of Advanced Studies in Mathematical Didactics in 1983, and a Doctorat de troisième cycle in Mathematical Didactics in 1985. He then returned to Guatemala, where he taught as an associate professor at the Universidad de San Carlos in the Humanities Faculty. In 1992 he moved to Canada, where he obtained a position in the School of Education at Université Laurentienne, Sudbury, Ontario, as full professor.

Luis Radford's research program can be traced back to the early 1990s, when he initiated a study that examined the role of historical-epistemological analyses of learning within a sociocultural perspective. His work continued to evolve, drawing upon the works of Vygotsky, Bakhtin, and Voloshinov to develop a semiotic-cultural framework to investigate the ways in which students use signs and endow them with meaning in their initial encounters with algebra. In further development he elaborated the notion that thinking is a sensuous and sign-mediated reflective activity embodied in the corporeality of actions, gestures, and artifacts, leading to a formulation of knowing and being as mutually constitutive. Luis Radford has more than 170 publications, many of them highly cited. Luis Radford's research program was ranked first in three consecutive competitions of the Social Sciences and Humanities Research Council of Canada (Education 1): 2004–2007, 2007–2010, and 2010–2013.

—From an ICME announcement

CMI Awards Announced

The Clay Mathematics Institute (CMI) has announced several awards for 2012.

JEREMY KAHN of Brown University and VLADIMIR MARKOVIC of the California Institute of Technology have been named recipients of the 2012 Clay Research Award "for their work in hyperbolic geometry: (1) their proof that a closed hyperbolic three manifold has an essential immersed hyperbolic Riemann surface, i.e., the map on fundamental groups is injective; (2) their solution of the Ehrenpreis conjecture: that given any two compact hyperbolic Riemann surfaces, there are finite covers of the two surfaces which are arbitrarily close in the Teichmüller metric."

IVAN CORWIN and JACK THORNE have been named Research Fellows for four and five years, respectively. Corwin received his Ph.D. in 2011 from New York University. His research involves computing exact formulas for the statistics of the solution to the Kardar-Parisi-Zhang nonlinear stochastic PDE. He presently holds the Schramm Memorial Postdoctoral Fellowship at Microsoft Research New England and the Massachusetts Institute of Technology. Thorne will receive his Ph.D. this year from Harvard University. His primary research interests are algebraic number theory and representation theory and the diverse connections between them. Most recently he has been interested in using automorphy lifting techniques to establish new cases of the Fontaine-Mazur conjecture.

ROMAN TRAVKIN has been appointed a Clay Research Scholar for a period of three years. He will receive his Ph.D. this year from the Massachusetts Institute of Technology. His thesis proved the "generic part" of the quantum geometric Langlands duality for the group $GL(n)$ over a base field of positive characteristic, showing that in this context it is a twisted version of the Fourier-Mukai transform.

The awards will be presented at the 2012 Clay Research Conference, to be held June 18–19 at Oxford University in the Martin Wood Lecture Theatre of the Physics Department. Both Kahn and Markovic will speak on their work at that occasion. Other confirmed speakers are: Artur Avila (IMPA/CNRS), Francis Brown (CNRS), Stavros Garoufalidis (Georgia Tech), Marc Lackenby (Oxford), and Peter Scholze (Univ. of Bonn). Registration is free but strongly recommended. Please see `http://www.claymath.org/`.

—From a CMI announcement

McKibbin Awarded ANZIAM Medal

ROBERT MCKIBBIN of Massey University has been awarded the 2012 ANZIAM (Australian and New Zealand Industrial and Applied Mathematics group) Medal for his work in applied and industrial mathematics. According to the prize citation, "he has been one of the preeminent applied mathematicians in New Zealand, with a particular focus on geophysical, geothermal and industrial applications. His mathematical work ranges from geothermal fluid dynamics and hydrothermal eruptions to the modeling of ground subsidence and aluminium smelting cells." The medal is awarded every two years for wide-ranging contributions to the discipline on the basis of a combination of research achievements, activities enhancing applied or industrial mathematics or both, and contributions to ANZIAM.

—From an ANZIAM announcement

Long Awarded Michler Prize

LING LONG of Iowa State University has been awarded the 2012–2013 Ruth I. Michler Memorial Prize by the Association for Women in Mathematics (AWM). Her research involves modular forms for finite index subgroups of the modular group. These groups play an important role in Grothendieck's program of *dessins d'enfants* (children's drawings). In 1997 she earned a B.Sc. from Tsinghua University, Beijing, China, majoring in mathematics with a minor in computer science and engineering. Long received her Ph.D. in mathematics from the Pennsylvania State University in 2002, where she studied modularity of elliptic surfaces under the direction of Wen-Ching Winnie Li and Noriko Yui. At Cornell she plans to work with Ravi Ramakrishna on Galois representations attached to noncongruence modular forms based on the pioneering work of Anthony Scholl and her joint work with Oliver Atkin, Li, and Tong Liu.

The Michler Prize grants a midcareer woman in academia a residential fellowship in the Cornell University mathematics department without teaching obligations.

—From an AWM announcement

Jona-Lasinio Receives Heineman Prize

GIOVANNI JONA-LASINIO of the University of Rome has been awarded the 2012 Dannie Heineman Prize for Mathematical Physics. He was honored "for contributions to the interaction between statistical mechanics, field theory and the theory of elementary particles, including spontaneous symmetry breaking, critical phenomena and a general theory of dissipative systems."

The prize carries a cash award of US$10,000 and is presented in recognition of outstanding publications in the field of mathematical physics. The prize was established in 1959 by the Heineman Foundation for Research, Educational, Charitable, and Scientific Purposes, Inc., and is administered jointly by the American Institute of Physics (AIP) and the American Physical Society (APS). The prize is presented annually.

—From an APS announcement

National Academy of Engineering Elections

The National Academy of Engineering (NAE) has elected sixty-six new members and ten foreign associates. MICHAEL S. WATERMAN, professor of biological sciences, computer science, and mathematics at the University of Southern California, was elected "for development of computational methods for DNA and protein sequence analyses." FRANK P. KELLY, professor of the mathematics of systems and master of Christ's College, University of Cambridge, was elected "for contributions to the theory and optimization of communication networks."

—From an NAE announcement