Joint Mathematics Meetings
Washington, DC
January 5–8, 2009

January 2009 Prizes and Awards

4:25 P.M., Tuesday,
January 6, 2009

Program

Opening Remarks
James G. Glimm, President
American Mathematical Society

Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics
Mathematical Association of America

Euler Book Prize
Mathematical Association of America

Chauvenet Prize
Mathematical Association of America

Levi L. Conant Prize
American Mathematical Society

Albert Leon Whiteman Memorial Prize
American Mathematical Society

Leonard M. and Eleanor B. Blumenthal Award for the Advancement of Research in Pure Mathematics
Leonard M. and Eleanor B. Blumenthal Trust for the Advancement of Mathematics

Ruth Lyttle Satter Prize in Mathematics
American Mathematical Society

Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman
Association for Women in Mathematics

Louise Hay Award for Contributions to Mathematics Education
Association for Women in Mathematics

Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student
American Mathematical Society
Mathematical Association of America
Society for Industrial and Applied Mathematics

George David Birkhoff Prize in Applied Mathematics
American Mathematical Society
Society for Industrial and Applied Mathematics

Communications Award
Joint Policy Board for Mathematics

Certificates of Meritorious Service
Mathematical Association of America

Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics
Mathematical Association of America

Frank Nelson Cole Prize in Algebra
American Mathematical Society

Leroy P. Steele Prize for Mathematical Exposition
American Mathematical Society

Leroy P. Steele Prize for Seminal Contribution to Research
American Mathematical Society

Leroy P. Steele Prize for Lifetime Achievement
American Mathematical Society

Closing Remarks
Joseph A. Gallian, President
Mathematical Association of America

Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics

In 1991 the Mathematical Association of America instituted the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics in order to honor college or university teachers who have been widely recognized as extraordinarily successful and whose teaching effectiveness has been shown to have had influence beyond their own institutions. Deborah Tepper Haimo was president of the Association, 1991–1992. She died at age eighty-five in Claremont, California, on May 17, 2007.

Citation

Michael Bardzell

Michael Bardzell has had a pronounced impact, both locally at Salisbury University in Maryland and well beyond. At Salisbury he has involved many students with a variety of backgrounds in research. Over the last twelve years, his students have presented their work at various venues, including the National Conference on Undergraduate Research (for eleven of the last twelve years), regional undergraduate conferences and local meetings, and national and sectional meetings of the MAA. Several of his students have won awards for their presentations, and a variety of publications have resulted.

In addition, Professor Bardzell, together with faculty from five institutions, has received two grants from the CCLI program of the NSF Division of Undergraduate Education. The second of these was on visualizing abstract mathematics and included his organization of two summer undergraduate research retreats at New College of Florida, where students spent a week learning and investigating various aspects of mathematics. The grants have also led to a set of laboratory exercises that help students visualize concepts in abstract algebra, including normal subgroups, quotient groups, and subnormal series. There are similar exercises in dynamical systems and number theory, as well as two computer programs that allow for mathematical visualization, and the collection of related data for student exploration.

In the twelve years Professor Bardzell has taught at Salisbury, he has taught 24 different courses, many of which he designed. These include a capstone course, two cross-listed courses with computer science, and four graduate courses for in-service teachers. In partnership with school districts in Maryland and Delaware, he and his colleagues have developed a series of workshops for high school teachers in geometry, in real world mathematics, and in algebra.

In 2001, he won the Distinguished Faculty Award of Salisbury. In 2007, he won the MAA MD-DC-VA Sectional Teaching Award. For all of his accomplishments, and for his commitment to mathematics education, Michael Bardzell is very deserving of the Haimo Distinguished Teaching Award.

Biographical Note

Michael Bardzell graduated summa cum laude with departmental honors in physics from Mary Washington College. There he was recruited during his senior year to engage in an undergraduate research project with a new faculty member. In the spring of 1989 he attended the 3rd National Conference on Undergraduate Research in San Antonio, which significantly affected his interest in academics. After staying at Mary Washington an extra year to complete the requirements for a mathematics major, Bardzell then went on to complete his M.S. and Ph.D. in mathematics at Virginia Tech. Since that time he has been on the faculty at Salisbury University where he enjoys teaching a variety of courses, supporting student research, and promoting the time-honored student vs. faculty volleyball grudge match, which takes place each spring immediately following Salisbury's Pi Mu Epsilon induction ceremony. In his spare time he enjoys camping with his family and cycling on the Eastern Shore of Maryland.

Response from Michael Bardzell

Reading over the names of previous winners of the Haimo Award is a humbling experience. It is truly an honor to join this group of dedicated mathematics teachers, and I thank my department, the MD-DC-VA Section of the MAA, and the Haimo Award Committee for what has led to this recognition. It has been a blessing to work with a wonderful group of colleagues at Salisbury University, especially my department chair for all of her years of support. My colleagues' commitment to teaching has been an inspiration since beginning a career with them 12 years ago. Their early encouragement to get involved with student research allowed me to develop what has become one of my strongest teaching passions. I am also indebted to all of my research students over the years. Many of them touched my life in ways I never imagined possible when starting in academics. For their influence, I am most grateful.

Citation

David Pengelley

For the past 20 years, David Pengelley has been continually reinventing his teaching, and the mathematical community has benefited greatly from those innovations.

At the beginning of the calculus reform movement, he and his colleagues developed a program of student projects. Major multi-step problems were used to engage students in imaginative thinking, to challenge them to integrate ideas and to express them in a written report. They disseminated this work to instructors in one hundred projects published in the MAA volume, *Student Research Projects in Calculus*, a best seller. Student projects have become a part of many calculus reform courses.

Pengelley is passionate about using primary historical sources in teaching. He feels that studying primary sources fosters motivation, broadens perspective, reveals context, hones verbal and deductive skills, provides excitement, brings students closer to the practice of research, shows the genesis and progression of ideas, and displays the human face of mathematics. Moreover, knowledge of difficulties of the past can help students better understand the problems of today. At New Mexico State University, he developed honors courses based on primary sources leading to two coauthored textbooks of guided primary sources, *Mathematical Expeditions: Chronicles by the Explorers* and *Mathematical Masterpieces: Further Chronicles by the Explorers*. These and his many national and international presentations and minicourses have widely disseminated this pedagogy. Furthermore, this approach has led to Pengelley's own original research in the history of mathematics.

NSF has supported Professor Pengelley's innovations through seven multi-year grants spanning 20 years. His current grant is a collaboration to develop student projects based on primary sources for a variety of discrete mathematics and computer science courses, thereby melding the student project and historical sources approaches. His personal dream is that all students would learn the principal content of their mathematics directly from studying primary sources, as done in the humanities.

More recently, Pengelley has been developing a student-centered, inquiry-based teaching method as an alternative to lecturing. Students prepare in advance via guided reading, writing assignments, and warm-up exercises. Thus, their first contact with new material never occurs via lecture, allowing class time to be spent more productively and at a higher intellectual level.

In 2007, Professor Pengelley won a Faculty Outstanding Achievement Award from the College of Arts and Sciences at New Mexico State University, and in both 1993 and 2008 he won the MAA Southwestern Section Teaching Award.

On campus, Pengelley is an extremely popular and successful teacher. In addition, his teaching methods and their connections to history of mathematics have been disseminated through a wide variety of publications and talks, domestically and internationally, and even through a broadcast interview with the BBC. For all these accomplishments, David Pengelley is eminently deserving of the Haimo Distinguished Teaching Award.

Biographical Note

David Pengelley was raised in Canada and the U.S., punctuated by immersion in the German boarding school Die Odenwaldschule. His B.S. is from the University of California, Santa Cruz, and Ph.D. from the University of Washington, including a year at Oxford University unsuccessfully trailing his thesis advisor, Doug

Ravenel, around the world. After an M.I.T. Moore Instructorship he came to New Mexico State University.

Professor Pengelley seems to continue increasing the number of hats he wears, collaborating in communities of which he may be the only intersection point. He continues long-time research in algebraic topology, on the structure over the Steenrod and Kudo–Araki–May algebras of the homology and cohomology of classifying spaces for various types of vector bundles, and connections to invariant theory. This has been supplemented by developing the pedagogies of teaching with student projects and with primary historical sources, most recently with both rolled into one. And he has developed a mathematics education graduate course on the role of history in teaching mathematics. To Pengelley's great surprise, teaching with primary sources has led to research in history, including two decades marinated in Sophie Germain's nineteenth century manuscripts on *Fermat's Last Theorem*, and a potential addiction to exposing Leonhard Euler. More on these eclectic pursuits can be found at http://www.math.nmsu.edu/~davidp.

David loves backpacking and wilderness, is active on environmental issues, and has become a fanatical player with the NMSU Badminton Club.

Response from David Pengelley

I am heartened and honored to receive recognition for the eclectic fringe of activities I seem driven to pursue. A common thread is to create a classroom pervaded by active student inquiry, and by higher level discussion, in which mathematics may come alive as something of fun, beauty, awe, and humanity—just what it should be.

I am so grateful for tremendous encouragement, inspiration, ideas, and opportunities making my adventures possible. I heartily thank my diverse teaching collaborators, way too many to mention here. I also appreciate my collaborators in algebraic topology research for their support and tolerance of my sometimes consuming nontopology activities. They have enabled me to continue mathematical research while embarking on huge teaching adventures. I also relish the worldwide community devoted to fostering history in the pedagogy of mathematics, and thank the history of mathematics research community for welcoming me when teaching with primary sources slid me inexorably into their laps.

I have been blessed with enthusiastic, loving, and supportive family. My parents, Daphne and Ted, provided perpetual encouragement, and somehow instilled the spark of interest in history; and my sister Alison Penfield continues this as that most caring of personal cheerleaders. My wife Pat Penfield (sort that one out!) is my constant encouragement, love, and insightful and incisive compass, for which I am ever grateful.

New Mexico State University has tolerated, even supported, unusual teaching endeavors, with a nurturing honors program, a stream of wonderful colleagues who have become partners in innovation, and some enabling departmental leadership. I have found a truly congenial and stimulating balance between teaching and research, have had class sizes and teaching freedom to activate students and build personal relationships, and have had a receptivity to my wearing multiple hats, in mathematical research, pedagogical innovation, and research in history of mathematics. Of course the reward of working with wonderful students has made it all worth it.

Finally, the MAA and its members are an inspiration, since our community is increasingly valuing and fostering the history of mathematics in professional development, teaching, and publication.

Citation

Vali Siadat

Vali Siadat is an educator, scholar, and researcher at the City College of Chicago, Richard J. Daley Campus, who cares deeply about the success of his students, and does whatever it takes to help them achieve their educational goals.

Student comments from a recent semester give a sense of his impact. “My fear of taking calculus was wiped out in the first class...” “I have always liked mathematics. However, after my experience in Dr. Siadat’s class, I [feel] passionate about the subject...” “He has always shown to students that he cares about their future, and wants them to succeed in life.”

Vali Siadat is best known for his Keystone Project, a synergistic teaching program that focuses on frequent assessment, constant feedback, and student support. In a controlled experiment with 800 entering college students, 63% of Keystone students passed an Elements of Algebra class, while only 18% passed in the control group. An interesting concomitant result was that the Keystone students also achieved significant positive gains on a standardized reading test whereas those in the control group did not.

He has also been a leader in Project Access, a NASA-funded mathematics-based summer program for low-income and minority students. Each summer from 1996–2004, 80–100 students were recruited from 52 middle schools and high schools to explore engineering as a career option. Vali Siadat directed the local program and was a key figure in developing curriculum related to mathematical logic and computer science for the national program.

As a mentor and advisor, Siadat supports students to obtain internships in scientific organizations and laboratories outside the college. He has had excellent success in arranging numerous summer research internship programs for two-year college students at the world renowned Argonne National Laboratory.

As a scholar with two doctorates, one in pure mathematics and another in mathematics education, Vali continues with his research to develop innovative approaches in pedagogy and improvement of teaching of undergraduate mathematics. His research in this area has been widely recognized and published in peer-reviewed journals.

Dr. Siadat won the Distinguished Professor Award of Richard J. Daley College in 1999–2000. He won the 1999 Exemplary Initiatives in the Classroom Award from the National Council of Instructional Administrators, the 2001 Award for Excellence in Teaching from the Illinois Council of Teachers of Mathematics, and the 2001 Excellence in Learning-Centered Instruction Award from the Illinois Community College Board. He received the MAA Illinois Section's Distinguished Teaching Award in 2002, and the Carnegie Foundation for the Advancement of Teaching Illinois Professor of the Year Award in 2005.

Vali Siadat is a dedicated, tireless, and effective teacher of mathematics. He is extremely deserving of the Haimo Distinguished Teaching Award.

Biographical Note

Vali Siadat earned his B.S. from the University of California at Berkeley. While working as a professional engineer in California's Silicon Valley, he obtained an M.S.E.E. from San Jose State University. Throughout his academic and professional work, however, mathematics remained the subject of his utmost passion. Upon coming to Illinois, he enrolled at the University of Illinois at Chicago where he earned an M.S. in applied mathematics, a Ph.D. in pure mathematics (harmonic analysis) and a D.A. (Doctor of Arts) in mathematics education. Dr. Siadat has taught at several institutions of higher learning, including California State University at Dominguez Hills, University of Southern California, Chicago State University, Loyola University Chicago and the City Colleges of Chicago where he is currently professor of mathematics at its Richard J. Daley campus. He was the director/co-principal investigator of over three-quarter of a million dollar grant from NASA to conduct Project Access/Chicago PREP program. He is also the director/co-principal investigator of a grant from the Gabriella and Paul Rosenbaum Foundation intended to expand the Keystone Project. Dr. Siadat has published in mathematics and mathematics education journals and has had numerous presentations at state-wide and national mathematics meetings.

Response from Vali Siadat

I am deeply honored to have received this prestigious national award from the MAA. My gratitude goes to all my students (over 10,000 as I last counted), who provided me with the opportunity to teach, mentor and nurture them, and to cultivate a culture of intellectual curiosity and academic excellence. I am also indebted to my colleagues in the mathematics community who inspired me and exhorted me to move on and reach the skies. I would also like to thank my two-time doctoral advisor and the co-developer of the Keystone Method, Professor Yoram Sagher, who has always supported me throughout my academic career. Finally, I would like to thank the MAA and the Haimo Awards Committee for their distinguished service to the mathematics community.

Euler Book Prize

The Euler Book Prize is given to the author or authors of an outstanding book about mathematics. Mathematical monographs at the undergraduate level, histories, biographies, works of mathematical fiction, and anthologies are among those types of books eligible for the prize. They shall be judged on clarity of exposition and the degree to which they have had or show promise of having a positive impact on the public's view of mathematics in the United States and Canada. A textbook, though not normally eligible for this award, could be recognized if the Committee on the Euler Book Prize is convinced that it is innovative, distinctive, well written, and very likely to have a long-standing impact on mathematics.

The prize was established in 2005 and will be given every year at a national meeting of the Association, beginning in 2007, the 300th anniversary of the birth of Leonhard Euler. This award also honors Virginia and Paul Halmos, whose generosity made the award possible.

Citation

Siobhan Roberts

King of Infinite Space: Donald Coxeter, the Man Who Saved Geometry, Walker and Company, New York, 2006.

This book by Siobhan Roberts gives an intimate and engaging portrait of one of the most influential mathematicians of the last century. It also provides a mathematical history of those years, including the currents set in motion by Hilbert's 23 problems, the influence of Bourbaki, and the unexpected applications of mathematics to computer science, communications, information, crystallography, medical research, environmental studies, as well as in art—Coxeter's work directly inspired *Circle Limit III* by M.C. Escher. Above all, it gives a superbly readable account, in personal terms, of the search for beauty that sets mathematics in motion, and of the synergy of individual and group efforts that make it happen. It's an engaging page-turner, even for nonmathematically trained readers, and it will offer them an insider's look at the world of mathematics and the people who create it. The scope of Roberts' research and scholarship is impressive, and fully documented in fine print with 74 pages of endnotes, a 14-page bibliography, and eight appendices.

From many years of experience, Coxeter had a sure sense of what was important and what was peripheral and indulgent. "Saving geometry" refers to his stance in the 1950s and 1960s, and indeed throughout his entire career, when he was one of the few mathematicians who completely immersed his thinking in the world of classical geometry. Those were difficult times to be a geometer. Jean

Dieudonné, who represented the views of Bourbaki, notoriously proclaimed, “Down with Euclid; Death to Triangles!” A thaw, of sorts, came in 1968, when Dieudonné declared: “[O]ne must never speak of anything dead in mathematics because the day after one says it, someone takes this theory, introduces a new idea into it, and it lives again.” That same year Bourbaki produced a volume featuring Coxeter groups, Coxeter matrices, and Coxeter graphs—later described as the only great book that Bourbaki ever wrote. At last, Coxeter was vindicated.

King of Infinite Space will fascinate the general reader with its detailed and frank account of Coxeter's personal life. It will also strike a special chord with mathematicians, because it honors the spirit of wonder and openness that Coxeter embodied in his approach to mathematics.

Biographical Note

Siobhan Roberts is a Toronto writer whose work focuses, to a greater or lesser extent, on reconciling what the British novelist and scientist C.P. Snow famously referred to as “the two cultures” of science and art. She is currently the creative producer and writer on a documentary film about Coxeter for TVOntario. In 2007–2008 she was a Director's Visitor at the Institute for Advanced Study in Princeton, where she generally chased her curiosity and began research on another book in the works about the Princeton mathematician John Horton Conway. She writes for numerous publications, including *The New York Times*, *The Boston Globe*, *SEED*, *The Mathematical Intelligencer*, *The Walrus*, *Canadian Geographic*, *Maisonneuve*, and the *Globe and Mail*. Current projects range from wind engineering to paleontology, the latter for a forthcoming article in *Smithsonian* on the Burgess Shale fossils. Her magazine profile of Coxeter, titled "Figure Head," appeared in *Toronto Life* magazine and won a National Magazine Award.

Response from Siobhan Roberts

While researching *King of Infinite Space*, I came upon a book with a title that caught my imagination: *I Want To Be A Mathematician*, by Paul R. Halmos. I promptly placed my order at Amazon. While only tangentially relevant to my subject at hand, I dipped into Halmos’ “automathography” from time to time and the spirit of his title spurred a similar sentiment as I wrote. Math was one of my favorite subjects in high school. Then I flipped the arts-or-sciences coin and studied history at university. Writing the Coxeter book serendipitously caused my happy reunion with an entire world of ideas that I almost forgot I missed. And Halmos’ passion for mathematics, for conveying math to a general audience (his article on Bourbaki in *Scientific American* was an invaluable source), served as a powerful inspiration. For this kaleidoscope of intersecting reasons it is particularly nice to receive the Euler Prize, founded by Virginia and Paul Halmos. It is a great, and encouraging, honor.

Chauvenet Prize

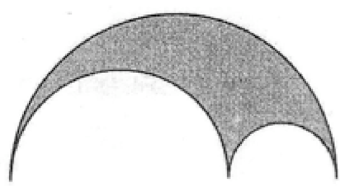
The Chauvenet Prize is awarded to the author of an outstanding expository article on a mathematical topic by a member of the Association. First awarded in 1925, the prize is named for William Chauvenet, a professor of mathematics at the United States Naval Academy. It was established through a gift in 1925 from J. L. Coolidge, then MAA president. Winners of the Chauvenet Prize are among the most distinguished of mathematical expositors.

Citation

Harold P. Boas

"Reflections on the Arbelos," *American Mathematical Monthly*, 113 (2006), no. 3, 236–249.

As with most good mathematical stories, this fascinating piece begins with a problem, a geometry problem that was sent to the author by a young mathematician and that deals with a mathematical figure known as an "arbelos." (An arbelos is the region bounded by three semicircles, tangent in pairs, with diameters on the same line; see the figure.)



The subject's long history, on which much of this erudite and beautifully written paper dwells, is smoothly interwoven with interesting results and elegant proofs. Reflections and inversions in lines and circles are key tools.

The classical remarkable theorem, attributed to Pappus by default, concerning an infinite chain in an arbelos is described. The proof by Pappus was a *tour de force* of Euclidean geometry, while the modern proof using inversion is elegantly simple. Connections are made with Pythagorean triangles (i.e., right triangles that are similar to triangles having sides with integral lengths), and also with the Gothic arch.

The author made a surprising discovery. Textbooks in solid mechanics deal with "Mohr's circle," which come up in analyzing shear stress. The relevant linear-algebra theorem is that the range of a certain mapping is an arbelos.

In addition to Pappus, Jacob Steiner, William Thomson (Lord Kelvin), and Leon Bankoff play roles in the story. (Bankoff was a dentist with a strong interest in mathematics, including the arbelos.) This paper stands out as a model of expository excellence.

Biographical Note

Harold P. Boas is professor of mathematics at Texas A&M University in College Station. His cited article on the arbelos, which also received the 2007 Lester R. Ford Award from the MAA, is a departure from his primary research interest in multi-dimensional complex analysis. He shared the 1995 Stefan Bergman Prize with his collaborator Emil J. Straube for progress on the boundary-regularity theory of solutions of the inhomogeneous Cauchy–Riemann equations on pseudoconvex domains. He has served as book-review editor of the *American Mathematical Monthly* (1998–1999), as editor of the *Notices of the American Mathematical Society* (2001–2003), and as editor of the *Anneli Lax New Mathematical Library* (2007–2009). He has supervised the dissertations of four Ph.D. students.

Response from Harold Boas

I am honored to receive the Chauvenet Prize, the MAA's most prestigious award for expository writing. What a pleasure it is to be recognized for work that was actually recreation! I thank the distinguished selection committee for choosing me from among many worthy authors.

As I write these words, some of the world's premier athletes are performing feats of physical prowess at the Summer Olympic Games. We mathematicians, who play instead the game of ideas, get our thrills not from "faster, higher, stronger" but from "clearer, deeper, sharper." Like the athletes, however, we esteem precision of presentation, command of complexity, and elegance of execution.

Whether in the arena or in the academy, every individual prizewinner's success depends on the support of many unsung heroes. I laud the dedicated editors, referees, and production staff who faithfully shepherd the mathematical literature into print.

Levi L. Conant Prize

This prize was established in 2000 in honor of Levi L. Conant to recognize the best expository paper published in either the *Notices of the AMS* or the *Bulletin of the AMS* in the preceding five years. Levi L. Conant (1857–1916) was a mathematician who taught at Dakota School of Mines for three years and at Worcester Polytechnic Institute for twenty-five years. His will included a bequest to the AMS effective upon his wife's death, which occurred sixty years after his own demise.

Citation

John W. Morgan

The Levi L. Conant Prize for 2009 is awarded to John Morgan for his article, "Recent Progress on the Poincaré Conjecture and the Classification of 3-Manifolds," *Bull. Amer. Math. Soc.* 42 (2005), 57–78.

The celebrated Poincaré Conjecture, formulated in modern terms, asks "Is a closed 3-manifold having trivial fundamental group diffeomorphic to the 3-dimensional sphere?" This conjecture evolved from Poincaré's 1904 paper and inspired an enormous amount of work in 3-dimensional topology in the ensuing century. Thurston's Geometrization Conjecture subsumes the Poincaré Conjecture as a special case and speculates which 3-manifolds admit a Riemannian metric of constant negative curvature 1.

By proposing the existence of nice metrics on 3-manifolds, Thurston's far-reaching conjecture links together in an essential way the relevant topology and geometry and suggests a more analytic approach to classifying 3-manifolds. Hamilton's remarkable series of papers develops one such geometric-analytic approach using the Ricci flow and establishes crucial analytic estimates for evolving metrics and curvature. This set the stage for Perelman's much acclaimed work and the ultimate proof of these conjectures.

Morgan's paper was written in 2004 at a critical juncture in this story, just after the appearance of Perelman's papers and while they were still undergoing scrutiny by experts. It made the momentous developments surrounding the conjectures of Poincaré and Thurston accessible to a wide mathematical audience. The article captured key concepts and results from topology and differential geometry and conveyed to the reader the significance of the advances. Morgan's exposition is elegant and mathematically precise. The paper transmits a great amount of information in a seemingly effortless flow of mathematical ideas from across a broad spectrum of topics. It was a valuable survey when it appeared and remains so today.

Biographical Note

Morgan received his PhD in mathematics from Rice University in 1969. From 1969–1972 he was an instructor at Princeton University, and from 1972–1974 an assistant professor at MIT. From 1974–1976 he was member of IHES in Paris. He has been a professor of mathematics at Columbia University since 1976 and during that time a visiting professor at Stanford, Harvard, the Institute for Advanced Study, MSRI in Berkeley, Université Paris-Sud, and IHES. He will become the founding director of the Simons Center for Geometry and Physics in Stony Brook in September 2009.

Morgan's mathematical speciality is topology and geometry and he has worked on high dimensional surgery, the topology of Kähler manifolds, and the topology and geometry of manifolds of dimensions 3 and 4. He is an editor of the Journal of the American Mathematical Society.

Morgan lives in New York City with his wife. They have two children—Jake who lives in London, and Brianna who is an undergraduate at Columbia University.

Response from John Morgan

I am honored to be awarded the 2009 Levi L. Conant Prize for my article, "Recent Progress on the Poincaré Conjecture and the Classification of 3-manifolds."

This is one of the most amazing developments in mathematics, representing as it does the solution of a 100-year-old problem. The advance is even more interesting because it uses a beautiful combination of analytic and geometric tools to solve a topological problem. It was a great pleasure to decipher these arguments and to understand their beauty and power—and the pleasure was only increased in the telling of the story. In working through the arguments behind these results, I benefited from the insights of various people, and it is a pleasure to thank them. First and foremost is Gang Tian with whom I have had a collaboration spanning several years as we sorted out in great detail the arguments. I had many fruitful discussions with Bruce Kleiner, John Lott, and Tom Mrowka. Finally, my greatest gratitude goes to Richard Hamilton, who developed the theory of Ricci flow and suggested the program to use this method to solve the 3-dimensional problems, and above all to Grigory Perelman whose mathematical power and insight led to the resolution of the conjectures.

Albert Leon Whiteman Memorial Prize

This prize was established in 1998 using funds donated by Mrs. Sally Whiteman in memory of her husband, the late Albert Leon Whiteman. Mrs. Whiteman requested that the prize be established for notable exposition on the history of mathematics. Ideas expressed and new understandings embodied in the exposition awarded the Whiteman Prize will be expected to reflect exceptional mathematical scholarship. The prize is awarded every three years at the Joint Mathematics Meetings.

Citation

Jeremy John Gray

In awarding the Albert Leon Whiteman Prize to Jeremy J. Gray of the Open University and the University of Warwick, the American Mathematical Society recognizes the value of his many historical works, which have not only shed great light on the history of modern mathematics but also have given an example of the ways in which historical scholarship can contribute to the understanding of mathematics and its philosophy. In addition, Gray's work as an editor, teacher, translator, and organizer of forums for historical work has helped invigorate the study of the history of modern mathematics internationally.

Gray's book *Ideas of Space* (1979) deals with geometrical studies through history, from the Babylonians to Einstein. His fascination with non-Euclidean geometry is evident in much of his work, and in this book he imparts to the reader a sense of the importance of the topic to mathematics and its history.

His book *Linear Differential Equations and Group Theory from Riemann to Poincaré* (1986) is outstanding for the broad spectrum of topics it covers, for the depth in which it covers them, and for the skill with which they are woven together. In addition, the lively style of the narrative passages and of the philosophical discussions makes reading it as entertaining as it is enlightening, although, inevitably, full understanding of the mathematical content demands concentrated work on the part of the reader.

The *Hilbert Challenge* (2000) is a worthy successor to the earlier works, again weaving together many strands of a story—this time the story of the Hilbert problems—to give the reader an appealing introduction to wide areas of modern mathematics.

His publications have taken a great many forms and have covered very wide areas. He has edited and written introductions to works of Janos Bolyai and Julian Coolidge. He has produced, with John Fauvel, a compendious book of readings in the history of mathematics, originally for the Open University but since published by Macmillan. In addition to his undergraduate textbook on the history of geometry in the nineteenth century, *Worlds Out of Nothing* (2007), he has been co-editor of two volumes of scholarly contributions to the study of history of mathematics, *Episodes in the History of Modern Algebra* (*1800–1950*) with Karen Parshall, and *The Architecture of Modern Mathematics* with José Ferreirós.

Among his many scholarly publications in journals, his translation and annotation of Gauss's Tagebuch in *Expositiones Mathematicae*, volume 4 (1984), is a particularly valuable contribution.

Jeremy Gray's spirited presentations of a wide range of subjects of nineteenth and twentieth century mathematics have earned the respect of his colleagues for the quality of both their historical scholarship and their mathematical accuracy and insight, exactly the traits that the Whiteman Prize is meant to recognize.

Biographical Note

Jeremy Gray studied mathematics at the University of Oxford and obtained his PhD at University of Warwick in 1980. He has taught at the Open University since 1974, where he became a professor of the history of mathematics in 2002, and he is an honorary professor at the University of Warwick, where he lectures on the history of mathematics. In 1996 he was a resident fellow at the Dibner Institute for the History of Science and Technology, MIT, and in 1998 he gave an invited lecture at the International Congress of Mathematicians in Berlin. He lives in London with his wife, Sue Laurence, and their daughters, Martha and Eleanor.

Response from Jeremy Gray

I am honoured to receive the Albert Leon Whiteman Memorial Prize of the American Mathematical Society. Mathematicians work in an exciting and important profession. Their research, the quality of their ideas, the applications they develop, and their teaching all make vital contributions to the society around them, and many people from every country in the world can be drawn in to this endeavour. Historians of mathematics have the opportunity to describe this enterprise as it occurred in all its different cultural settings from 6,000 years ago to yesterday, and in this way enrich everyone's appreciation of mathematics. In the last 50 years much has been done by my colleagues around the world in the history of mathematics; their work has been an inspiration to me. When I began to work on the nineteenth century, that century was not so long ago. Now large periods of the twentieth century are open to historical analysis. This will be a particularly rich topic for anyone interested in modern mathematics, and the American Mathematical Society is to be congratulated on its support for the history of our subject. I wish to thank my colleagues at the Open University and the University of Warwick who have helped me so much and whose support for the history of mathematics has been very important to me. Especially I wish to thank my co-authors and co-editors who have contributed so much. Above all I thank my wife and children for the love and joy they have brought to my life and for all that that has made possible.

Leonard M. and Eleanor B. Blumenthal Award for the Advancement of Research in Pure Mathematics

The Leonard M. and Eleanor B. Blumenthal Trust for the Advancement of Mathematics recognizes distinguished achievements in the field of mathematics through the Leonard M. and Eleanor B. Blumenthal Award for the Advancement of Research in Pure Mathematics. The award is presented to the individual deemed to have made the most substantial contribution in research in the field of pure mathematics, and who is deemed to have the potential for future production of distinguished research in such field. To fulfill these criteria, the prize committee has decided to grant the award for the most substantial PhD thesis produced in the four year interval between awards.

Citation

Maryam Mirzakhani

The Leonard M. and Eleanor B. Blumenthal Trust Award for the Advancement of Research in Pure Mathematics is awarded to Maryam Mirzakhani for her exceptionally creative, highly original thesis. This work combines tools as diverse as hyperbolic geometry, "classical methods" of automorphic forms, and symplectic reduction to obtain results on three different important questions. These results include a recursive formula for Weil–Petersson volumes of moduli spaces of Riemann surfaces, a determination of the asymptotics of the number of simple closed geodesics on a hyperbolic surface in terms of length, and a new proof of Witten's Conjecture (originally established by Kontsevich) establishing the KdV recursion for the intersection numbers on moduli space.

Biographical Note

Maryam Mirzakhani obtained her BSc in Mathematics (1999) from the Sharif University of Technology. She holds a PhD from Harvard University (2004), where she worked under the supervision of Curtis McMullen. She was a Clay Mathematics Institute Research Fellow from 2004–July 2008 and is a professor at Princeton University. Her research interests include Teichmüller theory, hyperbolic geometry, and ergodic theory.

Response from Maryam Mirzakhani

I am deeply honored to be a recipient of the Leonard M. and Eleanor B. Blumenthal Award.

First, I would like to thank my PhD advisor, Curt McMullen, for introducing me to many fascinating areas of mathematics and for his invaluable help and encouragement throughout all these years. I am also grateful to the math department at Harvard University and all my graduate school teachers for providing a great environment for graduate students. I want to express my gratitude to my teachers at Sharif University of Technology for showing me the beauty of mathematics. I am gratefully indebted to my many friends in the Boston area, especially Roya Beheshti, whose friendship has been a source of happiness and inspiration for me.

Finally, I thank my family for all their unceasing love and support.

Ruth Lyttle Satter Prize in Mathematics

The Satter Prize was established in 1990 using funds donated by Joan S. Birman in memory of her sister, Ruth Lyttle Satter, to honor Satter's commitment to research and to encourage women in science. The prize is awarded every two years to recognize an outstanding contribution to mathematics research by a woman in the previous five years.

Citation

Laure Saint-Raymond

The Ruth Lyttle Satter Prize in mathematics is awarded to Laure Saint-Raymond for her fundamental work on the hydrodynamic limits of the Boltzmann equation in the kinetic theory of gases.

Saint-Raymond and Golse established the definitive connection between weak solutions of the Boltzmann and the Leray solution of the incompressible Navier–Stokes equation for an important set of collision kernels in their paper, "The Navier–Stokes limit of the Boltzmann equation for bounded collision kernels," *Invent. Math.* 155 (2004), no. 1, 81–161.

Saint-Raymond also established the convergence of weak solutions of the Boltzmann equation to the dissipative solutions of the incompressible Euler equation in the most general setting in "Convergence of solutions to the Boltzmann equation in the incompressible Euler limit," *Arch. Ration. Mech. Anal.* 166 (2003), no. 1, 47–80.

The study of hydrodynamic limit theorems dates back to the work of Maxwell, Boltzmann, and Hilbert, and has been extensively investigated by mathematicians and physicists. The results of Laure Saint-Raymond are a landmark in the subject.

Biographical Note

Laure Saint-Raymond received her PhD in Applied Mathematics from the Université Paris VII in 2000. She joined the Centre National de la Recherche Scientifique (CNRS) as a research scientist in the Laboratoire d'Analyse Numérique, Université Paris VI. In 2002, she became a professor in the Laboratoire J.-L. Lions, Université Paris VI. In 2007, she joined the École Normale Supérieure.

She has received several awards, including the Louis Armand Prize from the French Academy of Sciences, the Claude-Antoine Peccot Award from the College of France, and the Pius XI Gold Medal from the Pontificia Academia Scientiarum. In 2006, she was awarded together with François Golse the first SIAG/APDE Prize on behalf of the paper, "The Navier–Stokes Limit of the Boltzmann Equation for Bounded Collision Kernels" published in *Inventiones Mathematicae*. Last year, she received the European Mathematical Society Prize in Amsterdam.

Her research has focused on the study of problems in mathematical physics, including the Boltzmann equation and its fluid dynamic limits, the Vlasov–Poisson system and its gyrokinetic limit, and problems of rotating fluids coming from geophysics. Her most striking work concerns the study of the hydrodynamic limits of the Boltzmann equation in the kinetic theory of gases, where she answered part of a question posed by Hilbert within the framework of his sixth problem.

Response from Laure Saint-Raymond

I am very grateful to the AMS and the Satter Prize Committee for awarding me this prize; it is truly encouraging to be recognized in this way. I am deeply indebted to my former adviser and collaborator François Golse, with whom part of the above cited work has been done.

I would like to use this opportunity to also thank all my American colleagues for their many kind invitations that I am too rarely able to honour. I thank especially mathematicians at Brown University, UCLA, MIT, Minnesota, and Harvard. I hope to have occasions in the future to develop more collaborations with them.

Finally, special thanks go to my family for their patience and their support.

Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman

In 1990, the Executive Committee of the Association for Women in Mathematics (AWM) established the Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman. The prize is named for former AWM president and one of its founding members, Alice T. Schafer (professor emeritus from Wellesley College), who has contributed a great deal to women in mathematics throughout her career. The criteria for selection include, but are not limited to, the quality of the nominees' performance in mathematics courses and special programs, an exhibition of real interest in mathematics, the ability to do independent work, and, if applicable, performance in mathematical competitions.

AWM is pleased to present the nineteenth annual Alice T. Schafer Prize to **Maria Monks**, Massachusetts Institute of Technology.

Additionally, the accomplishments of three outstanding young women, all senior mathematics majors, were recognized on Monday, January 5, 2009. AWM was pleased to honor **Doris Dobi**, Massachusetts Institute of Technology, **Nicole Larsen**, Georgia Institute of Technology, and **Ila Varma**, California Institute of Technology, as **honorable mention** recipients in the Schafer Prize competition. Their citations are available from the AWM.

Citation

Maria Monks

Maria Monks, a junior mathematics major at the Massachusetts Institute of Technology, has already written six research papers: one has been accepted for publication by the *Journal of Combinatorial Theory Series A*, three have been submitted to leading research journals, and the other two are in nearly final form. On five of these six papers she is the sole author. Her outstanding work is already so widely known in the mathematical research community that she gets invitations to speak at mathematics meetings and in research departments. At the same time, Monks does exceptional work in her classes at MIT and has achieved a perfect grade point average. Furthermore, she has contributed phenomenal service to the mathematics community, for example, by coaching the USA team for the Girls Math Olympiad in China.

Monks wrote her first research paper while in high school and has since worked on diverse topics in combinatorics and number theory. She has impressed her recommenders with her amazing growth as a research mathematician. One of her projects concerns Freeman Dyson's partition ranks and has earned her such praise as "dramatically beautiful" and "really sensational." A key consequence of her work is a fully combinatorial explanation of the fact that $Q(n)$, the number of partitions of n into distinct parts, is divisible by 4 for almost every n. One of her recommenders writes that this work is "right in the mainstream of a really hot area" and "reveals [...] startling insight."

Maria Monks' outstanding research abilities, her exceptional course work, and her great leadership in the mathematics community make her this year's winner of the Schafer prize.

Response from Maria Monks

I am very honored to receive the 2009 Alice T. Schafer Prize. I am grateful to the Association for Women in Mathematics for their encouragement and recognition of women in mathematics.

Many people have helped make my mathematical journey possible thus far.

First and foremost, I thank my father, Ken Monks, for his continual support and encouragement in all of my mathematical endeavors. He opened my eyes to the beauty of mathematics and served as a coach, teacher, and mentor throughout my childhood, inspiring me to pursue my love of mathematics to the best of my ability. I am also grateful for the love and support of my mother, Gina Monks, and my brothers, Ken and Keenan Monks, and I am thankful for the countless mathematical discussions and problem-solving sessions that our entire family has had together.

I thank Joe Gallian for nominating me for this prize and for his mentorship at the Duluth REU in the summers of 2007 and 2008. I also thank Ricky Liu, Reid Barton, and Nathan Kaplan for their help, insights, and proofreading of my papers at the Duluth REU. I am grateful for Ken Ono's help and direction during my visit to Madison in the summer of 2008. I also thank Zuming Feng for giving me the opportunity to be a coach of the Girls Math Olympiad team this year. Finally, thanks to my teachers at MIT for making college a wonderful educational experience so far.

Louise Hay Award for Contributions to Mathematics Education

In 1990, the Executive Committee of the Association for Women in Mathematics (AWM) established the Louise Hay Award for Contributions to Mathematics Education. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. While Louise Hay was widely recognized for her contributions to mathematical logic and for her strong leadership as head of the Department of Mathematics, Statistics, and Computer Science at the University of Illinois at Chicago, her devotion to students and her lifelong commitment to nurturing the talent of young women and men secure her reputation as a consummate educator. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

Citation

Deborah Loewenberg Ball

In recognition of her deep and wide contributions to mathematics education, the Association for Women in Mathematics (AWM) presents the nineteenth annual Louise Hay Award to Deborah Loewenberg Ball, dean of the School of Education at the University of Michigan.

Deborah Ball presents a unique combination of highly integrated talents and accomplishments: long experience and continued engagement as an accomplished elementary mathematics teacher; original, rigorous, and prolific contributions on the frontiers of research in mathematics education; a high standing and respect among research mathematicians for the insight and integrity with which she treats mathematical ideas; and visionary intellectual and administrative leadership to reform the institutions of mathematics teacher education in this country.

One of Deborah's primary research interests is the mathematical knowledge needed for teaching (MKT). She recognized before many that the mathematical knowledge needed by elementary school teachers is significantly different from that needed for STEM careers. Her investigations of what MKT is, how it may be measured, and how teachers' knowledge of it impacts the learning of children are providing a foundation for reforms of the mathematics education and development of teachers. As Michèle Artigue (professor of mathematics at the Université Paris VII and president of the International Commission on Mathematical Instruction (ICMI)) wrote, "Deborah Ball's research addresses crucial issues for mathematics education, those related to teacher knowledge and teacher education. There exists today a huge amount of research on such issues, but that developed by Deborah Ball for more than 20 years now is highly original and offers an outstanding contribution to the field." Many of Deborah's doctoral students, starting with Liping Ma at Michigan State University, are already recognized scholars in the field.

While still a graduate student, Deborah played a leading role in writing the National Council of Teachers of Mathematics (NCTM) Professional Standards for Teaching. As Glenda Lappan (University Distinguished Professor in the Department of Mathematics at Michigan State University, and former president of the NCTM) wrote, "I served as the overall chair with Deborah directing the group charged with writing the leading section on Mathematics Teaching. To this day, people in the field of mathematics education consider this leading section as the clearest and most compelling articulation of a set of standards for teaching ever written or likely to be written."

In their letter of nomination, Hyman Bass (a former president of the American Mathematical Society) and Edward Silver (William Brownell Collegiate Professor in Education at the University of Michigan) wrote, "Deborah's leadership in the world of mathematics education research and policy has been widely recognized, and the clarity, eloquence, and effectiveness of her public (written and oral) communication are much appreciated." Deborah was named head of the RAND Mathematics Study Panel.

She was a major contributor to several NRC projects, notably the one that produced the widely cited report, "Adding It Up." She was one of the few educators on the Glenn Commission, otherwise populated mainly by members of Congress and business leaders. She headed the subgroup on teaching of the National Mathematics Advisory Panel, whose report was recently released. She chaired the ICMI Study 15 on the Professional Education and Development of Teachers of Mathematics. Deborah Hughes Hallett (professor of mathematics at the University of Arizona and the eighth recipient of the Louise Hay Award) wrote, "Over the last decade, Deborah has been extraordinarily effective in promoting real collaboration and communication. In countless presentations, videotapes, and live demonstrations, she has displayed the insight a mathematics educator brings to an elementary school classroom. She has been tireless in organizing conferences in which other mathematicians and mathematics educators have the opportunity to learn from each other."

Some of Deborah's most remarkable qualities and skills are reflected in the productive relationships that she has formed with the mathematics research community, including the establishment of disciplined discourse with mathematical figures who have otherwise been somewhat alienated from the education community. This led to her placement on the panel "Reaching for Common Ground in Mathematics Education," a series of discussions of mathematicians with mathematics educators, that helped to subdue the "Math Wars." She was enlisted to develop an elementary mathematics education program in the Park

City Mathematics Institute. And this led to her appointment as the first education trustee of MSRI, "a position that she took in order to help me engage MSRI in the dialogue about mathematics education," according to David Eisenbud, formerly director of MSRI, now a professor of mathematics at the University of California at Berkeley. "Although this dialogue is often heated and opinionated, Ball has scrupulously supported the high road of careful scholarship and research over the ever-present temptation to polemic and opinion. She has led MSRI in this area for five years, and has taken a leadership role in the four (about to be five) annual conferences on mathematics education held at MSRI."

The AWM is pleased to honor Deborah Loewenberg Ball with the 2009 Louise Hay Award for her innovative and crucially important research into the mathematics needed by elementary school teachers, her ability to communicate mathematics to children and related understandings to diverse communities of adults, her healing effect on the divisions among communities, and her effective national and international leadership.

Response from Deborah Loewenberg Ball

Receiving the Louise Hay Award is a tremendous honor for me, and a big surprise. As someone who entered mathematics largely from the world of teaching mathematics to young children, I am still often a visitor, a fascinated tourist, in the discipline's territory. Elementary teachers bear a serious and challenging responsibility to engage young learners in a field in which they themselves are not professionals. This responsibility, and the challenges it brings, is one that has preoccupied me, as a classroom teacher, a teacher educator, and a researcher. The problem presents a paradox of sorts, for mathematicians are not, in the main, mathematically prepared to teach children either. The compression that comes with expertise, especially in mathematics, can impede the work of making the subject learnable by others. Those who are insiders, professionals in the field, often find it difficult to "unpack" what they know. But, I, and others like me, are in the position of trying to acquaint children with a territory that we ourselves do not inhabit.

From my perspective, it was crucial to enter the territory and to meet and work with its inhabitants. I have been fortunate to have met and worked with mathematicians who have helped me explore the territory, learning to travel back and forth between the world of teaching mathematics and the world of doing mathematics. These mathematicians included Peter Hilton, Herb Clemens, Phil Kutzko, Roger Howe, Bill McCallum, David Eisenbud, and Hy Bass. Through their patient engagement, I came to discern more and more significant mathematics in the thinking of young children, and to see the work of teaching as involving mathematical depth that I had not appreciated. As they became fascinated with the mathematics in the world of elementary teaching, I saw mathematics I had not realized. Through the bridges we built together, the two worlds came much closer together. What it means to be convinced of a mathematical claim, how to represent something elegantly and clearly, or how to pose a mathematical question—these are mathematical problems that arise in third grade and in an algebraic geometry seminar.

Learning to talk across the apparent divide made it recede, and has enabled progress on the thorny question of what mathematics is entailed by the work of teaching. I began to appreciate that my students and I are inhabitants of the disciplinary territory, and that our work there can be done with integrity, and with an eye on the mathematical horizon to which my students are headed. But it took openness and collaboration to get to this point. I feel fortunate to have had the opportunities to learn and to work in close detail, inside of practice, on this problem that fascinated me, this paradox of how to bring closer together the worlds of mathematics and young children. There is a lot more to do; I hope the years to come bring more collaboration and interchange among us, and less scrappy arguing. The children deserve our best efforts together.

I am grateful to the Hay Award Selection Committee and to the AWM for this tremendous honor.

American Mathematical Society
Mathematical Association of America
Society for Industrial and Applied Mathematics

Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student

The Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student recognizes and encourages outstanding mathematical research by undergraduate students. It was endowed by Mrs. Frank Morgan of Allentown, Pennsylvania.

Citation

Aaron Pixton

Aaron Pixton is the winner of the 2009 Morgan Prize for Outstanding Research by an Undergraduate Student. The award is based on five impressive papers in addition to his Princeton senior thesis. One of Pixton's papers has already appeared in the *Proceedings of the American Mathematical Society*, two others have been accepted by *Forum Mathematicum* and the *International Journal of Number Theory*, and two others have been submitted. In addition to being creative, Pixton's work spans a remarkable range of topics, including combinatorial number theory, modular forms, algebraic topology, and Gromov–Witten invariants.

Pixton participated in Research Experience for Undergraduates (REU) programs at Cornell University, the University of Wisconsin-Madison, and the University of Minnesota Duluth, and wrote interesting papers at all three. One of his mentors described his "ability to digest current research papers, to formulate interesting questions ..., and within a week's time, to start solving [them]" as "simply astonishing" and considers his work as "probably stronger than many Ph.D. dissertations." Another mentor describes the "depth and breadth" of his papers as "amazing."

Biographical Note

Aaron Pixton was born in Binghamton, New York, and has lived in nearby Vestal, New York, all his life. He was interested in mathematics from an early age, when he enjoyed reading recreational math books. His formal study of mathematics began when he took various math classes from Binghamton University during high school.

Pixton spent the past four years studying mathematics at Princeton University, from which he graduated in June 2008. During this time period, Pixton took advantage of opportunities to work on original research both at Princeton during the school year and at REUs during the summers.

Pixton is currently at the University of Cambridge doing Part III of the Mathematical Tripos. Next fall, he will be returning to Princeton to enter the Ph.D. program there, where he plans to study some combination of number theory and algebraic geometry. Pixton's nonmathematical diversions include playing chess, reading fantasy books, and watching his seven cats.

Response from Aaron Pixton

I am extremely honored to have been selected for the 2009 Morgan Prize by the AMS, MAA, and SIAM. I would like to thank everyone who has helped and encouraged me to do research. First, I thank my parents for always supporting my desire to think about mathematics. Next, I thank my coauthors, Tom Church, Carl Erickson, and especially Alison Miller; they not only collaborated and shared their ideas with me, but they also taught me a lot in the process of doing so. I would like to thank Tara Brendle, Ken Ono, and Joe Gallian for giving me interesting mathematics to think about during the enjoyable REUs that they ran. I thank the other students at these research programs for greatly enriching my mathematical experiences. Finally, I would like to thank everyone in the Princeton Mathematics Department for providing a supportive and stimulating mathematical environment for the last four years; particular thanks are due to Manjul Bhargava for teaching the classes which made me most excited about being a mathematician and to Chris Skinner and Rahul Pandharipande for supervising the research I did at Princeton.

Citation for Honorable Mention, Morgan Prize

Andrei Negut

The Morgan Prize Committee is pleased to award Honorable Mention for the 2009 Morgan Prize for Outstanding Research by an Undergraduate Student to Andrei Negut. The award recognizes his excellent Princeton senior thesis on "Laumon spaces and many-body systems," which establishes a large part of a conjecture of Braverman made at the 2006 International Congress of Mathematicians. In addition to this work, Negut has made important contributions to problems in very diverse fields: algebraic cobordism theory and dynamical systems. His recommenders consider Negut to be off to a "spectacular start" and look forward to future great achievements.

Biographical Note

Andrei Negut was born and lived in Romania until the age of 18, by which time his passion for mathematics had been sparked. He attended Princeton University as an undergraduate, where contacts with some of the world's best mathematicians and teachers inspired his passion for the subject. At Princeton, he had the chance to pursue several research projects in different fields, honing his area of interest and broadening his appreciation of mathematics. After finishing his undergraduate studies, Negut spent a year in Europe, traveling between several research institutes (i.e., IHES in France, MPIM in Germany, and IMAR in Romania), learning mathematics from various perspectives. Next year, he will pursue graduate studies at Harvard University. Apart from mathematics, he enjoys travelling the world, photography, and the Russian culture.

Response from Andrei Negut

I am very honored to have been awarded this prize, which means very much to me on a personal basis. On a more global scale, it makes me very happy to see that the mathematical community carefully watches over young mathematicians and is always willing to offer them its support.

George David Birkhoff Prize in Applied Mathematics

This prize was established in 1967 in honor of Professor George David Birkhoff. The initial endowment was contributed by the Birkhoff family and there have been subsequent additions by others. It is awarded for an outstanding contribution to "applied mathematics in the highest and broadest sense." Currently, the prize is awarded every three years. The award is made jointly by the American Mathematical Society and the Society of Industrial and Applied Mathematics. The recipient must be a member of one of these societies and a resident of the United States, Canada, or Mexico.

Citation

Joel Smoller

The 2009 George David Birkhoff Prize in Applied Mathematics is awarded to Joel Smoller for his leadership, originality, depth, and breadth of work in dynamical systems, differential equations, mathematical biology, shock wave theory, and general relativity. His classic text on shock waves has had far-reaching impact on the field. His work with Charles Conley led to many results on reaction-diffusion equations, with diverse applications to biology, physiology, and chemistry. His work with Arthur Wasserman on bifurcation theory, which introduced an equivariant version of the Conley index, was a *tour de force* of original methods, providing a rigorous analysis and characterization of radial stationary solutions of the Einstein Yang–Mills equations. He and Blake Temple developed a theory of shock wave propogation in general relativity and gave the first exact solution of the Einstein equations. Overall, his powerful intuition for innovative new directions and his forcefulness in cementing powerful collaborations have been emblematic of a career worthy of emulation.

Biographical Note

Joel Smoller was born in New York City and was an undergraduate at Brooklyn College. He obtained his PhD at Purdue University in 1963, writing a thesis in abstract functional analysis. He has spent his entire academic career at the University of Michigan and was promoted to full professor in 1969. Shortly after arriving at Michigan, his research interests changed to Partial Differential Equations. He has supervised 27 PhD students, including Tai-Ping Liu (Stanford), David Hoff (Indiana), Robert Gardner (UMass.), Blake Temple (UC, Davis), and Zhouping Xin (Chinese University of Hong Kong). Smoller has held the Lamberto Cesari Chair of Mathematics at The University of Michigan since 1998. His awards include a senior Humboldt Fellowship, 2005–2008; Morningside Lecturer, International Congress of Chinese Mathematicians, 2001 and 2004; Rothschild Professor and Rothschild Lecture, University of Cambridge (UK), 2003; Patton Lecturer, Indiana University, 2001; Distinguished Alumnus Award, Purdue University, 2000; Excellence in Research Award, University of Michigan, 1996; Plenary Address at Marcel Grossman Conference in Physics (Stanford University), 1994; joint Harvard, MIT, Brandeis lecture, 1994; Margaret and Herman Sokol Award, University of Michigan, 1992; Ordway Lecturer, University of Minnesota, 1985; Guggenheim Fellowship, 1980–1981. Three issues of the journal *Methods and Applications of Analysis*, 12, nos. 2,3,4, displaying his picture on the covers, were dedicated to him in 2005. Smoller has been the editor for five journals, *Michigan Mathematics Journal*, *Applicable Analysis*, *Journal of Hyperbolic Differential Equations*, *Nonlinearity*, and he was the PDE editor for the *Transactions of the American Mathematical Society*, 1982–1986. National meetings were dedicated to his 60th and 70th birthdates at UC, Davis and Stanford University, respectively.

Response from Joel Smoller

It is a great honor to be chosen as the recipient of the 2009 George David Birkhoff Prize in Applied Mathematics. I am appreciative of the American Mathematical Society and to the Society for Industrial and Applied Mathematics for their recognition of my research accomplishments. Above all, I would like to thank my many collaborators for their generosity, their encouragement, and for patiently introducing me to a wealth of new ideas. Special thanks are due to Blake Temple, who has been a long time collaborator and has shared many of his beautiful new ideas with me.

Many outstanding mathematicians have influenced me and affected the trajectory of my research career. In particular, I owe many thanks to Edward Conway, who taught me the mathematics of shock waves, and to Charles Conley, who was my friend, mentor, and collaborator for many years. Both Conway and Conley passed away unexpectedly more than 20 years ago, but I still miss them. James Glimm, Peter Lax, and Shing-Tung Yau, have always supported and encouraged me, and for this I owe them many thanks. My younger collaborator Felix Finster, has greatly influenced my work by taking me into new and exciting directions. Finally, my many excellent students, including Blake Temple, David Hoff, Tai-Ping Liu, Zhouping Xin, and Robert Gardner, have had an impact on my career by being both my teachers and collaborators.

I have always been attracted to special problems whose analysis uncovers new phenomena in physical settings. I have tended to start in new directions, rather than work on more technical problems that finish up fields. Like most, I learn best through collaboration, and I have been extremely lucky to find brilliant colleagues who have led me into so many rewarding experiences.

Joint Policy Board for Mathematics Communications Award

The Joint Policy Board for Mathematics (JPBM) established its Communications Award in 1988 to reward and encourage journalists and mathematicians who, on a sustained basis, bring mathematical ideas and information to nonmathematical audiences. The award recognizes a significant contribution or accumulated contributions to the public understanding of mathematics, and it is meant to reward lifetime achievement. JPBM represents the American Mathematical Society, the American Statistical Association, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics.

Citation

George Csicsery (2009)

The 2009 JPBM Communications Award is awarded to George Csicsery for his extraordinary body of work showing the process of mathematical thinking through the medium of film.

George Csicsery is an artist who has employed his talents to communicate the beauty and fascination of mathematics and the passion of those who pursue it. This began with the film *N is a Number: A Portrait of Paul Erdős* (1993), which has been broadcast in Hungary, Australia, The Netherlands, Japan, and the United States. In 2008 he completed the biographical documentary *Julia Robinson and Hilbert's Tenth Problem,* and *Hard Problems: The Road to the World's Toughest Math Contest,* a documentary on the preparations and competition of the US International Mathematical Olympiad team in 2006. Other recent works include *Invitation to Discover* (2002), made for the Mathematical Sciences Research Institute, and *porridge pulleys and Pi* (2003), a 30-minute piece on mathematicians Hendrik Lenstra and Vaughan Jones which premiered at Teléscience in Montreal, Canada, in November 2003. Through his films, George Csicsery expresses the excitement experienced by mathematically gifted individuals, and he has delighted mathematicians, students, and the public with his intriguing stories told through the media of film.

Biographical Note

George Paul Csicsery, a writer and independent filmmaker since 1968, was born in Germany in 1948 and immigrated to the United States in 1951. As an undergraduate at the University of California at Berkeley in 1969, he made three short experimental films, and these led to a masters degree in Cinema from San Francisco State College. He has directed 26 films, including dramatic shorts, performance films, and documentaries.

His screenplay, *Alderman's Story*, a period epic set during King Philip's War in New England in 1675, was awarded first prize at the Rhode Island International Film Festival Screenplay Competition in 2005. His articles, reviews, and interviews have appeared in film journals, newspapers, and many other publications. He has taught Cinema at the Film Arts Foundation, San Francisco State University, and at the University of California, Davis. Csicsery's films on historical, ethnographic, and cultural subjects include works on pirates, prostitutes, romance novel writers, policemen, scouts, and Transylvanian folk musicians.

In 1988 Csicsery's career took a dramatic turn when he began work on a biographical film about Paul Erdős. *N is a Number: A Portrait of Paul Erdős*, is still his best known and most popular work, with broadcasts, screenings, and DVD copies in constant demand worldwide. That film led to more projects on mathematical subjects. *Invitation to Discover* about MSRI, and *porridge pulleys and Pi* about Hendrik Lenstra and Vaughan Jones, were both completed in 2003. *The Right Spin* (2005), the story of astronaut Michael Foale's role in saving the Mir space station in 1997, was made for Math Awareness Month. *Julia Robinson and Hilbert's Tenth Problem*, a one-hour biographical documentary, premiered in January 2008 at the Joint Mathematics Meetings. *Hard Problems: The Road to the World's Toughest Math Contest* also premiered there in January 2008. The feature documentary about American students at the 2006 International Mathematical Olympiad (IMO) was produced with the Mathematical Association of America.

Csicsery is currently completing a new project for MSRI and a film of interviews with mathematician Paul Halmos for the MAA. Both are scheduled for 2009 release on DVD. Future projects include films about Ronald Graham and Coincidence.

Response from George Csicsery

It is a great honor to receive this award, especially when I look at the list of previous recipients—Martin Gardner, Constance Reid. Wow! I am hardly in their league.

It is tremendously satisfying to be recognized in this fashion, especially because making films about mathematicians has often been such an uphill and lonely battle. The most frequent question I get when I try to explain what I do is, "Who will be interested in a film about mathematicians?" Believe it or not, the first person to ask me that question was Paul Erdős. And I had no acceptable answer for him until after *N is a Number* was broadcast in five countries and had sold 4,000 copies in VHS.

Why did I start making films about mathematicians? My standard explanation was that I was a refugee from the social sciences looking for terra firma, and mathematicians seemed interested in actually finding out if something is true or not. More recently, I've developed another theory. There are more people in mathematics than in any other field who claim that they don't know anything. And to someone who really doesn't know anything, that is almost like having a community.

The task of explaining mathematics and mathematicians on film would be impossible without the patience and passion for the subject that I've encountered. Mathematicians are the most enthusiastic expositors of their subject helping me look for ways to translate complex ideas under the severe time limitations imposed by the medium of film.

The list of people behind the successful completion of the films being recognized is a long one, starting with Charles L. Silver, Ronald Graham, Paul Erdős, Hyman Field, and includes Don Albers of MAA Publications, and Klaus Peters who both provided early opportunities for distribution of my films. David Eisenbud and Bob Osserman at MSRI became key advocates. Jim Carlson and the Clay Mathematics Institute, along with Will Hearst, provided financial support for the film about *Julia Robinson and Hilbert's Tenth Problem*. I wish to thank Constance Reid, Martin Davis, and Yuri Matiyasevich for their heroic efforts as protagonists in that film. *Hard Problems* was a dream project brought to me by Joe Gallian, who then raised the funding. It was supported by everyone at MAA and AMC, especially Steve Dunbar and Tina Straley. There are many others, including all of the people on the film production teams—cinematographers, editors, sound engineers, composers, and assistants. They all deserve this recognition and my thanks.

Certificates of Meritorious Service

The Certificate of Meritorious Service is presented for service at the national level or for service to a section of the Association. The first such awards were made in 1984. At each January meeting of the Association, honorees from several sections are recognized.

Citation

Carl C. Cowen, Indiana Section

The MAA is pleased to present Carl Cowen with the MAA's Certificate of Meritorious Service. Carl has made significant contributions to the Mathematical Association of America at both the section and national levels.

Carl Cowen is most widely recognized as a former President of the Mathematical Association of America. He has served on many national committees, including the Joint Policy Board for Mathematics and the National Assessment of Educational Progress (NAEP) Mathematics Planning Committee. He has also been active on committees for SIAM, AMS, and the NSF.

Within the MAA, Carl was a co-founder and past-president of SIGMAA on Mathematical and Computational Biology, has been a member of the Joint Advisory Board for *Focus* and *MAA Online*, was chair of the recent Strategic Planning Group on Governance and a member of the 1999 New Agenda Planning Group, was chair of the Coordinating Council on Education, and is a frequent consultant for Project NExT.

A former Governor and Chair of the Indiana Section, Carl was awarded the 1995 Indiana Section Award for Distinguished College or University Teaching and the 2003 Indiana Section Award for Distinguished Service. In 1997, Carl received the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching. Over the course of his professional career, Carl has made over 40 presentations at MAA meetings, and has multiple articles published in the *American Mathematical Monthly*.

Carl Cowen is an extraordinary example of an effective contributor to the goals of the Mathematical Association of America at both local and national levels. He is well deserving of the Certificate of Meritorious Service.

Response from Carl C. Cowen

I'd like to thank my colleagues from the Indiana Section for nominating me for this award. I'd also like to thank my wife, Janice, and the rest of my family for supporting me in my work as a mathematician and teacher and especially in my work in the mathematical community.

I'm very grateful to mathematicians of the past for creating and sustaining the MAA as an organization to support mathematics and mathematicians, and I'm pleased to have the opportunity to serve the community through the MAA. I also appreciate the work of other mathematicians who will continue to support the MAA and mathematics in the future—I hope many of you will take the opportunity to do so! Thank you very much for this honor!

Citation

Richard Anderson, Louisiana-Mississippi Section

The MAA is pleased to present the Meritorious Service Award to the late Richard D. Anderson. Dr. Anderson completed his undergraduate degree in mathematics at the University of Minnesota. His academic career was interrupted by his service as a naval officer in the Pacific theater during World War II. After the war, he returned to graduate study at the University of Texas where he completed his doctoral degree under the direction of R. L. Moore in 1948. He took a position at the University of Pennsylvania from 1950 to 1956 with stints at the nearby Institute for Advanced Studies at Princeton. In 1956, he accepted a position at Louisiana State University where he remained until the end of his life. While there, he held the title of Boyd Professor of Mathematics.

R. D. Anderson's influences on mathematics were many and varied. His research interest in infinite dimensional topology is widely regarded as seminal to the field. He directed the dissertations of ten students through the years. His achievements were recognized by the Bolzano Medal by the Czechoslovakian Academy of Science and the Award for Distinguished Service from the MAA. He served as chair of the National Science Foundation Advisory Panel on Mathematics. He was both a vice president of the AMS and a president of the MAA, one of only seven people to hold such high offices in both organizations. After his retirement, Dr. Anderson remained active in mathematics and mathematics education. He was the senior advisor to the Louisiana System Initiatives Program (LaSIP), which was funded by the NSF as an effort to improve mathematics and science education for K–12 students. In the Louisiana-Mississippi Section he was actively involved before and after his retirement, attending the Section meetings annually and contributing to the vitality of the Section.

Citation

John Fuelberth, Nebraska-Southeast South Dakota Section

John Fuelberth was born and raised in Wayne, Nebraska, and received his undergraduate mathematics degree at Wayne State College. He received his Ph.D. in ring theory from the University of Nebraska-Lincoln in 1969 and began his teaching career at the University of Northern Colorado in 1968. John began teaching part time at Wayne State College in 1981 and has been teaching full time since 1988 where he has enjoyed helping students learn mathematics. He retired this year after 26 years of service. His interests in teaching included the use of computer algebra systems. John's research interests include abstract algebra, ring theory, and finite geometries. He has had publications in the *Proceedings of the American Mathematical Society*, *Proceedings of the London Mathematical Society*, and *Communications in Algebra*.

Dr. Fuelberth was very active in the MAA and he served the Nebraska-Southeast South Dakota Section of the MAA as chair and liaison. He served as MAA Nebraska-Southeast South Dakota Section Governor from 2002–2005. He is the only chair of the section to serve two consecutive terms—due to a snowstorm! John and his wife Anita have two children and four grandchildren. His service is very much deserving of recognition, and he has the appreciation of all the members of the Nebraska-Southeast South Dakota Section.

Response from John Fuelberth

I am deeply honored to receive this award and want to thank the Nebraska-Southeast South Dakota Section for nominating me for this award. I have truly enjoyed being involved with the MAA as it has been a cornerstone of my professional life in mathematics. The annual section meetings are always a highlight of the year for me. I truly enjoy renewing my friendships with other colleagues and learning new ideas from them. This honor is a capstone for my career as I have just retired from teaching. I will always have a soft spot in my heart for the MAA and what it does for mathematics.

Citation

John R. Michel, Ohio Section

The MAA is pleased to recognize Professor John R. Michel as a 2009 recipient of the Certificate of Meritorious Service. We gratefully acknowledge the many contributions that he has made to the Ohio Section, the MAA, and the greater mathematical community.

Professor Michel has served the Ohio Section as secretary-treasurer (1985–1991) and president (1995–1996). Also in service to the Section, he has been chair of several committees, including the Program Committee, Nominating Committee, and Local Arrangements Committee. He was an originator of the Ohio Project NExT. In this capacity he mentored dozens of Ohio new faculty members, sharing his experience and wisdom. Many of these are current officers of the Section.

Michel did his undergraduate work at the University of Missouri and received his Ph.D. in functional analysis from the University of Wisconsin. He joined the faculty at Marietta College in 1970. He was chair of the department of mathematics for nine years. He wrote the National Science Foundation grant that helped fund computers and software for the department's first calculus computer labs. He was twice selected as a Harness Fellow, awarded on the basis of excellence in teaching. His many and diverse contributions to the college were formally recognized when he received the Marietta College Service Award in 2002. Professor Michel retired from the college in 2004.

For 30 years Michel worked summers as a consultant for Caltech's Jet Propulsion Laboratory. He has developed novel algorithms and computer programs used for navigation of some of NASA's robotic space missions to Mars, Jupiter, and Saturn. His continued interest in space exploration led to his involvement in founding Space Adventure Camp at Marietta College, an educational outreach for Ohio youth.

During a sabbatical at Duke University in 2000, Professor Michel wrote Matlab supplements to most of the modules of the online Connected Curriculum Project and also originated several new modules for use in calculus and linear algebra.

For his many years of dedicated service and outstanding leadership, the MAA is proud to honor Professor John R. Michel.

Response from John R. Michel

It is a great honor to be recognized by my friends and colleagues in the Ohio Section. In particular, I am pleased that the citation recognizes my role in the founding of Ohio NExT in 1997 and as one of the coordinators in its early years. My colleagues Barbara Aston and Tom LaFromboise should also be recognized as partners in this enterprise. As we veterans moved on, Angela Spalsbury and David Sobecki laudably took on the responsibilities of running the program. Ohio NExT has been a great boon to the Ohio Section, helping provide a new generation of Section members and a generous supply of new leaders.

Citation

David R. Stone, Southeastern Section

David R. Stone has served the Mathematical Association of America with distinction at the national, section, state, and local levels over his 40-year career as a mathematics professor at Georgia Southern University in Statesboro, Georgia. He has held several important appointments during that time, including serving three terms on the Board of Governors, two terms on the MAA Executive Committee, two terms on the Nominations Committee, and two terms on the Joint Advisory Board for *Focus* and *MAA Online*. He has also chaired several national committees. These include the Committee on Sections, the Committee on Departmental Liaisons, the Subcommittee on Early Career Mathematicians, and the Committee on Pólya Lecturers. He has also been an active and contributing member to many other national committees, including the Alder Awards Committee, the Committee on SIGMAAs, the 1997 and 2003 MathFest Program Committees, the Project NExT Advisory Panel, the Coordinating Council on Awards, the Development Committee, the Strategic Planning Design Committee, and the Strategic Planning Working Group on Governance. He has also served the Association on search committees for MAA Executive Director and Director of Member Services. In 2007, David Stone was a nominee for MAA President-Elect.

David Stone's service at the Section level is equally remarkable. He served as Governor, Chair, Chair-Elect, Past-Chair, Newsletter Editor, State Director for Georgia, and Project Director for the Southeastern Section Project NExT. He is currently the Beginning Faculty Activities Coordinator. He has also served on committees within the Section, including the Teaching Award Committee, which he chaired, as well as the Nominations and Service Award Committees on which he was a member several times. Due to his exemplary service record at the Section level, David Stone received the 1998 Southeastern Section Distinguished Service Award.

At the state and local levels, David Stone served as Departmental Liaison for 10 years and chartered the MAA Student Chapter at Georgia Southern University. He also served as a faculty advisor for the student chapter and coached the Math Jeopardy Team. In addition, he served for many years as the liaison between the MAA and the Academic Advisory Committee on Mathematical Subjects of the University System of Georgia. This year he served as the speaker for the MAA Georgia State Dinner.

David Stone has conducted his career in such a way that his work epitomizes the goals and mission of the MAA. His excellence in working with undergraduates in the classroom and beyond has been recognized in many ways, including the 2005 Southeastern Section Award for Distinguished College or University Teaching of Mathematics as well as several other university and college teaching awards. His outreach to the public schools has also been recognized by two of the highest honors in the Georgia Council of Teachers of Mathematics: the Gladys M. Thomason Award for Distinguished Service in 1993 and the John Neff Award in 2005. David Stone's service contributions to the MAA and to the mathematics community overall also led to his selection for the Georgia Southern University Award for Excellence in Contributions to Service and the Georgia Southern University College of Science & Technology Service Award in 2000.

In dedicating his career to the advancement of mathematics, particularly at the undergraduate level, David Stone has established himself as a valued contributor and leader in the MAA. Based on these exceptional contributions throughout his career, the MAA presents David R. Stone the Meritorious Service Award.

Response from David R. Stone

I am honored, surprised and gratified upon receiving the Meritorious Service Award. I want to thank the MAA, especially the Southeastern Section, which has been my mathematical family for many years: colleagues have become friends and have helped me grow professionally, while the meetings and activities have been beneficial and fun—my service in the Section has been a pleasure. I would like to give special thanks to and for John Neff—I've tried to live up to the example he set and to contribute in the ways we all wish he were still here to do. I also want to thank my friend and collaborator Tina Straley for her help and advice on many projects and Martha Abell for being a wonderful colleague and supportive chair. And none of this would have been possible without the support and encouragement of my wife, Ann.

Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics

The Gung and Hu Award for Distinguished Service to Mathematics, first presented in 1990, is the endowed successor to the Association's Award for Distinguished Service to Mathematics, first presented in 1962. This award is intended to be the most prestigious award for service offered by the Association. It honors distinguished contributions to mathematics and mathematical education, in one particular aspect or many, and in a short period or over a career. The initial endowment was contributed by husband and wife Dr. Charles Y. Hu and Yueh-Gin Gung. It is worth noting that Dr. Hu and Yueh-Gin Gung were not mathematicians, but rather a professor of geography at the University of Maryland and a librarian at the University of Chicago, respectively. They contributed generously to our discipline because, as they wrote, "We always have high regard and great respect for the intellectual agility and high quality of mind of mathematicians and consider mathematics as the most vital field of study in the technological age we are living in."

Citation

Robert Megginson

A great deal of Bob Megginson's interest and time has been absorbed by the problem of the serious underrepresentation of minorities in mathematics. He has not only worked on this problem through the professional committee structure and with programs on college and university campuses, but has also spent much time working directly with students from various underrepresented groups. For example, beginning in 1992, he helped design and teach programs for precollege students at Turtle Mountain Community College, a tribally controlled college of the Turtle Mountain Chippewa Nation in North Dakota. The purpose of these programs is to keep Native American students in the educational pipeline leading to college degrees in mathematics and related fields, and the programs have accumulated a record of success in doing exactly that. Megginson has also mentored many undergraduate and graduate students from varied backgrounds who have gone on to receive degrees in mathematically based disciplines.

Professor Megginson has served on and chaired numerous professional and national committees; noted here are some of those that address the problem of underrepresentation of minorities in mathematics. He was co-chair of the MAA Committee on Minority Participation in Mathematics and chair of the MAA's Coordinating Council on Human Resources. In addition he chaired the Human Resources Advisory Committee of the Mathematical Sciences Research Institute (MSRI) in Berkeley, and currently is chair of the Committee on Opportunities in Science of the American Association for the Advancement of Science. He chaired the subcommittee of the AMS Committee on the Profession charged with identifying successful diversity programs. Bob Megginson has been an advisor to many programs of the American Indian Science and Engineering Society and is a Sequoyah Fellow of the organization. His many talks at colleges and universities as well as at national meetings have addressed the issues of attracting students from diverse backgrounds into the mathematical sciences, both the why and the how.

Bob Megginson's service in helping underrepresented students succeed in mathematics and science is complemented and enriched by many of his other professional activities: co-principal investigator on several grants that have helped fund MAA's National Research Experiences for Undergraduates Program (NREUP); principal investigator on a NSF grant to implement an electronic mathematics testing and skill building center at the University of Michigan (2000–2003); co-organizer for both the 1999 and 2004 Conferences for African American Researchers in the Mathematical Sciences, June 1999 at Michigan and June 2004 at MSRI; and principal investigator on an MAA-led project for enhancing mathematics/science faculty at Native American Tribal Colleges in the use of calculators and technology (Project ENACT). Megginson designed, directed, and implemented a reformed precalculus program at Michigan that emphasized cooperative learning, and he was director of the Michigan mathematics laboratory, a walk-in tutoring service.

Dr. Megginson's mathematical area is functional analysis, specifically the geometry of Banach spaces; his graduate textbook *An Introduction to Banach Space Theory* was published by Springer in 1998. He served as Deputy Director of MSRI from 2002 through 2004, after which he returned to the University of Michigan where he is currently Arthur F. Thurnau Professor of Mathematics and Associate Dean for Undergraduate and Graduate Education in the College of Literature, Science, and the Arts. He contributed to the MAA Notes volume *Rethinking the Road Toward Calculus* and his article "College-based Precollege Intervention Projects: A Model for Outreach to Groups Underrepresented in Science and Mathematics" appears in the *Journal of Public Service and Outreach*, Fall 1999.

Bob Megginson's work has been recognized by his alma mater (the University of Illinois) as well as the University of Michigan where he has been a faculty member since 1992. He was featured in the University of Illinois alumni magazine with the article "A Mathematician Against the Odds" in the November/December 1999 issue. That year he also received the University of Michigan Regents' Award for Distinguished Public Service. He has received the University of Michigan College of Literature, Science, and Arts Excellence in Education Award three different times (1994, 1997, and 2000). Megginson received the University of Michigan Harold R. Johnson Diversity Service Award in 2000 and is included in Bonnie Juettner's 2002 book *100 Native Americans Who Shaped American History*. Megginson was also the recipient of the 1999 Ely S. Parker Award of the American Indian Science and Engineering Society, AISES's highest honor, which is given each year to one Native American scientist, mathematician, or engineer for lifetime service to the Native American community and contributions to his or her field of study. In 2006, the Quality Education for Minorities Network honored him with its Etta Zuber Falconer Excellence in Mathematics Teaching Award. For his record of mentoring students and other works on underrepresentation, he was one of ten individuals who were honored at the White House with the 1997 U.S. Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring.

Response from Robert Megginson

I was greatly surprised and deeply honored to learn that I had been selected for this prestigious award, particularly when I look at the distinguished list of past recipients. There are many connected with the Association to whom I owe a debt of thanks for helping bring this about, too many to be able to list here. However, I must mention Lida Barrett who really started this all, by inviting me in the late 1980s to serve on the MAA's newly formed Committee on Minority Participation in Mathematics, and that single phone call had an immeasurable impact on my subsequent career. To the rest of my mentors and collaborators who have worked with me on these issues since that first invitation, thanks much to you also. Since all of this work is so collaborative, this award is as much yours as mine.

Frank Nelson Cole Prize in Algebra

This prize was founded in honor of Frank Nelson Cole on the occasion of his retirement as secretary of the AMS after 25 years of service and as editor-in-chief of the *Bulletin of the American Mathematical Society* for 21 years. The endowment was made by Cole, contributions from Society members, and his son, Charles A. Cole. Prizes are awarded at five-year intervals for contributions to algebra or the theory of numbers.

Citation

Christopher Hacon and James McKernan

The 2009 Frank Nelson Cole Prize in Algebra is awarded to Christopher Hacon and James McKernan for their groundbreaking joint work on higher dimensional birational algebraic geometry. This work concerns the minimal model program, by which S. Mori and other researchers made great progress in understanding the geometry of three-dimensional projective algebraic varieties in recent decades. The case of dimension greater than three, however, remained largely open. The work of Hacon and McKernan has transformed the study of the minimal model program in higher dimensions, in particular regarding the existence and termination of flips and the finite generation of the canonical ring. Specifically, the prize is awarded for two joint papers of theirs: "Boundedness of pluricanonical maps of varieties of general type," *Invent. Math.* 166 (2006), 1–25, and "Extension theorems and the existence of flips" (in *Flips for* 3*-folds and* 4*-folds*, 76–110, Oxford Lecture Ser. Math. Appl., 35, Oxford Univ. Press, Oxford, 2007). The former paper, in addition to proving the result referred to in the title, also established their key lifting lemma for sections. The latter manuscript, which drew on their earlier paper, proved the inductive step on the existence of flips.

Biographical Note

Christopher Hacon was born in Manchester, England, in 1970. He received his undergraduate degree in mathematics from the Università di Pisa and the Scuola Normale Superiore di Pisa in 1992, and he received his PhD in mathematics from UCLA in 1998. His advisor was Robert Lazarsfeld. He was a post-doc at the University of Utah in 1998–2000, an assistant professor at the University of California, Riverside, in 2000–2002, and he has been a professor at the University of Utah since 2002. He received a Sloan Fellowship in 2003, an AMS Centennial Fellowship in 2006, and the Clay Research Award in 2007. His research interests are in algebraic geometry and, in particular, in the classification of higher dimensional algebraic varieties.

Biographical Note

James M^c^Kernan was born in London, England, in 1964. He received his BA in mathematics from University of Cambridge in 1985, whilst attending Trinity College, and his PhD in mathematics from Harvard University under the supervision of Joseph Harris in 1991. He then held temporary positions at the University of Utah, 1991–1993, University of Texas at Austin, 1993–1994, and Oklahoma State University, Stillwater, 1994–1995. He joined the faculty at the University of California, Santa Barbara, in 1995 and the faculty at Massachusetts Institute of Technology in 2007. In 2007 he received the Clay Research Award. His research interests are in algebraic geometry, especially birational geometry and the classification of algebraic varieties.

Response from Christopher Derek Hacon and James M^c^Kernan

The minimal model program is an attempt to extend the classification of complex projective surfaces achieved by the Italian School of Algebraic Geometry at the beginning of the 20th century to higher dimensional complex projective varieties. The main idea is to produce an optimal representative of any smooth projective variety via a finite sequence of well understood birational maps called flips and divisorial contractions. This representative is called a minimal model. In dimension three this program was completed by S. Mori with his work on the existence of 3-dimensional flips. In higher dimensions the main problem is to show that flips always exist and that there is no infinite sequence of flips.

It had always been our hope to say something significant about this problem. This dream became a reality when, by combining ideas of V. Shokurov and Y.-T. Siu, we were able to prove that flips exist in any dimension and that (under mild technical assumptions) carefully chosen sequences of divisorial contractions and flips always give a birational map to a minimal model.

We are very happy that the Selection Committee decided to recognize this field of research. We would like to stress that our accomplishments are based on a long series of beautiful results obtained by Y. Kawamata, J. Kollàr, S. Mori, M. Reid, V. Shokurov, Y.-T. Siu, and many others. We are also in debt to our co-authors C. Birkar and P. Cascini who were instrumental in the completion of a significant part of this program, and to A. Corti for many useful conversations on the Minimal Model Program.

One of the nicest things about receiving this award is that it gives us an opportunity to publicly acknowledge the invaluable aid we have received from others. Christopher Hacon would like to thank Aleksandra, Stefan, Ana, Sasha and Kristina Jovanovic-Hacon, D. Hacon, C. Peters, and G. Gianelli for their support, love and encouragment; F. Catanese, R. Lazarsfeld, and J. Kollàr for inspiring him to work in the field of higher dimensional birational geometry; the mathematics department at the University of Utah (in particular A. Bertram, H. Clemens, and J. Carlson) for hiring him (twice!) and providing a wonderful research environment; and the NSF, NSA, AMS, and the Clay and Sloan Foundations for their generous financial support. James M^c^Kernan would like to thank his family for their support. He would also like to thank his advisor J. Harris, for inspiring

him with so much beautiful projective geometry; J. Kollàr and S. Mori for their support and encouragement over the whole of his career; V. Shokurov, who is always so generous with his ideas; and Y. Kawamata and M. Reid for their help. He would like to thank the mathematics department at the University of California, Santa Barbara—where a considerable amount of this work was done—for providing such a great environment to do research; and the mathematics department at the Massachusetts Institute of Technology. He is also very grateful to the NSF, NSA, and the Clay Foundation for their generous financial support.

Leroy P. Steele Prize for Mathematical Exposition

The Leroy P. Steele Prizes were established in 1970 in honor of George David Birkhoff, William Fogg Osgood, and William Caspar Graustein and are endowed under the terms of a bequest from Leroy P. Steele. Prizes are awarded in up to three categories. The following citation describes the award for Mathematical Exposition.

Citation

I. G. Macdonald

Symmetric Functions and Hall Polynomials, Second edition. The Clarendon Press, Oxford University Press, New York, 1995.

I. G. Macdonald's book gathers a wealth of material related to symmetric functions into a beautifully organized exposition. Pioneering work of Frobenius, Schur, and others established important connections between symmetric functions and the representation theory of the symmetric group and complex general linear group. Since their work, many further connections were developed with representation theory, algebraic geometry, intersection theory, enumerative combinatorics, special functions, random matrix theory, and other areas. Until the first edition of Macdonald's book appeared in 1979, the theory of symmetric functions was scattered throughout the literature and very difficult to learn. This first edition collected, unified, and expanded such material as Schur functions, Hall polynomials, Hall–Littlewood symmetric functions, the characters of GL $n(q)$, and the Hecke ring of GL n over a local field, none of which had previously received an adequate exposition. The second edition of 1995 added a huge amount of new material, including Jack polynomials and the two-parameter Macdonald polynomials, which have subsequently arisen in many unexpected areas, such as in the Hilbert scheme of n points in the plane and in the representation theory of affine Hecke algebras and quantum affine algebras. An especially notable feature of Macdonald's book is the "examples" (really exercises with solutions) which include a vast variety of additional results, many of them original. The importance and popularity of Macdonald's book is evidenced by the more than 3600 citations on Google Scholar. Macdonald's book has been and continues to be an invaluable resource to researchers throughout mathematics.

Biographical Note

Ian Macdonald was born in Middlesex, England, in 1928. After army service he went to Cambridge University in 1949 and graduated in 1952. He spent the next five years in the British Civil Service (government administration). Subsequently, he held teaching positions successively at the universities of Manchester, Exeter, Oxford, Manchester (again), and London. He was elected a Fellow of the Royal Society of London in 1979 and was awarded the Polya prize by the London Mathematical Society in 1991.

His research since the 1960's has been mainly in the general area of Lie theory, in particular the combinatorial infrastructure (root systems, Weyl groups) and associated objects such as orthogonal polynomials and power series identities.

Response from Ian Macdonald

I am both honoured and delighted to be awarded a Steele Prize for Mathematical Exposition for my book, *Symmetric Functions and Hall Polynomials*.

The origins of that book go back to the beginning of my mathematical career at Manchester in the late 1950's. Whilst there, I learned about Hall polynomials and what are now called Hall–Littlewood symmetric functions from Sandy Green, who had recently made crucial use of them in his determination of the character tables of the finite general linear groups. Some years later I was invited to write a survey article on Hall polynomials for the Jahresbericht der DMV. That article never got written, partly for the usual reasons but also partly because it became clear to me that such a survey would for the sake of clarity need to be prefaced by a self-contained account of the algebra of symmetric functions, which at that time was lacking in the mathematical literature. I hope my book may have been of service to students and others who need to know the basic facts about symmetric functions, even if their interest in Hall polynomials is minimal.

Leroy P. Steele Prize for Seminal Contribution to Research

The Leroy P. Steele Prizes were established in 1970 in honor of George David Birkhoff, William Fogg Osgood, and William Caspar Graustein and are endowed under the terms of a bequest from Leroy P. Steele. Prizes are awarded in up to three categories. The following citation describes the award for Seminal Contribution to Research.

Citation

Richard Hamilton

The 2009 Leroy P. Steele Prize for Seminal Contribution to Research is awarded to Richard Hamilton for his paper "Three-manifolds with positive Ricci curvature," *J. Differential Geom.* 17 (1982), 255–306.

Differential geometry includes the study of Riemannian metrics and their associated geometric entities. These include the curvature tensor, geodesic distance function, natural differential operators on functions, forms, and tensors as well as many others. A given smooth manifold has an infinite dimensional space of Riemannian metrics whose geometric behavior may vary dramatically. By its very nature geometry must be coordinate invariant, so two Riemannian metrics which are related by a diffeomorphism of the manifold must be considered equivalent. The question of choosing a natural metric from the infinite dimensional family is nicely illustrated by the case of compact oriented two dimensional surfaces. For surfaces of genus 0 there is a unique choice of equivalence class of metrics with curvature 1, while for genus 1 (resp. genus greater than 1) there is a finite dimensional moduli space of inequivalent metrics with curvature 0 (resp. curvature −1).

The cited paper of Richard Hamilton introduced a profoundly original approach to the construction of natural metrics on manifolds. This approach is the Ricci flow, which is an evolution equation in the space of Riemannian metrics on a manifold. The stationary points (for the normalized flow) are the Einstein metrics (constant curvature in dimensions 2 and 3). The Ricci flow is a nonlinear diffusion equation which may be used to deform any chosen initial metric for a short time interval. In the cited paper Hamilton showed that, in dimension 3, if the initial metric has positive Ricci curvature, then the flow exists for all time and converges to a constant curvature metric. This implies the remarkable result that a three manifold of positive Ricci curvature is a spherical space form (a space of constant curvature). Over the next twenty years Hamilton laid the groundwork for understanding the long time evolution for an arbitrary initial metric on a three manifold with an eye toward the topological classification problem. For this purpose he developed the idea of the Ricci flow with singularities in which the flow would be continued past singular times by performing surgeries in a controlled way. Finally, through the spectacular work of Grisha Perelman in 2002, the difficult issues remaining in the construction were resolved, and the program became successful.

In addition to the applications to the topology of three manifolds, the Ricci flow has had, and continues to have, a wide range of applications to Riemannian and Kähler geometry. The cited paper truly fits the definition of a seminal contribution; that is, "containing or contributing the seeds of later development."

Biographical Note

Richard Streit Hamilton was born in Cincinnati, Ohio, in 1943. He graduated from Yale summa cum laude in 1963, and received his PhD from Princeton in 1966, writing his thesis under Robert Gunning. He has taught at Cornell University, UC San Diego, and UC Irvine, where he held a Bren Chair. He is currently Davies Professor of Mathematics at Columbia University in New York City, where he does research on geometric flows. In 1996 Richard Hamilton was awarded the Oswald Veblen Prize of the American Mathematical Society, and he is a Member of the American Academy of Arts and Sciences and the National Academy of Sciences.

Response from Richard Hamilton

It is a great honor to receive the Steele Prize acknowledging the role of my 1982 paper in launching the Ricci flow, which has now succeeded even beyond my dreams. I am deeply grateful to the prize committee and the AMS.

When I first arrived at Cornell in 1966, James Eells Jr. introduced me to the idea of using a nonlinear parabolic partial differential equation to construct an ideal geometric object, lecturing on his brilliant 1964 paper with Joseph Sampson on harmonic maps, which was the origin of the field of geometric flows. This now encompasses the harmonic map flow, the mean curvature flow (used in physics to describe the motion of an interface, and also in image processing as well as isoperimetric estimates), the Gauss curvature flow (describing wear under random impact), the inverse mean curvature flow (used by Huisken and Ilmanen to prove the Penrose conjecture in relativity), and many others, including Ricci flow.

James Eells Jr. also first suggested I use analysis rather than topology to prove the Poincaré conjecture on the grounds that it is difficult for topologists to solve a problem where the hypothesis is the absence of topological invariants. And indeed as Lysander said, "Where the lion's skin will not reach, we must patch it out with the fox's." So I started thinking in the '70s about how to use a parabolic flow to round out a general Riemannian metric to an Einstein metric by spreading the curvature evenly over the manifold. Now the Ricci curvature tensor is in a certain sense the Laplacian of the metric, so that zero Ricci curvature in the Riemannian case is really the elliptic equation for a harmonic metric, while in the Lorentzian case it is the hyperbolic wave equation for a metric, which is Einstein's theory of relativity. So it is only natural to guess that the parabolic heat equation for a metric is to evolve it by its Ricci curvature, which is the Ricci flow.

It is often the case that the credit for a discovery goes not to the first person to stumble upon a thing, but to the first who sees how to use it. So the significance of my 1982 paper was that it proves a very nice result in geometry, that a three dimensional manifold with a metric of positive Ricci curvature is always a quotient of the sphere. To prove this I developed a number of new techniques and estimates that opened up the field, in particular using the maximum principle on systems to obtain pinching estimates on curvature. Right afterward Shing-Tung Yau pointed out to me that the Ricci flow would pinch necks, performing a connected sum decomposition. I was very fortunate that shortly after I moved to UCSD where I could collaborate with Shing-Tung Yau, Richard Schoen, and Gerhard Huisken, who coached me in the use of blow-ups to analyse singularities, making it possible to handle surgeries. It was also very important that Peter Li and Yau pointed out the fundamental importance of their seminal 1986 paper on Harnack inequalities, leading to my Harnack estimate for the Ricci flow, which is fundamental to the classification of singularities. And in 1997 I proved a surgical decomposition on four-manifolds with positive isotropic curvature. In 1999 I published a paper outlining a program for proving geometrization of three-manifolds by performing surgeries on singularities and identifying incompressible hyperbolic pieces as time goes to infinity, only as I was still lacking control of the injectivity radius, I had to assume a curvature bound. This was supplied four years later in 2003 by the brilliant work of Grigory Perelman in his noncollapsing estimate, which led to his remarkable pointwise derivative estimates, allowing him to complete the program.

But the importance of Ricci flow is not confined to three dimensions. For example, we can hope to prove results on four-manifold topology, which are far more difficult. The Ricci flow on canonical Kähler manifolds is well advanced, based on the work of Huai-Dong Cao and Grigory Perelman, which might lead to a theorem in algebra. Ricci flow also is closely connected to the renormalization group in string theory, and might be used to find stationary Lorentzian Einstein metrics in higher dimensions, giving applications to physics. And just recently we have the very lovely result of Richard Schoen and Simon Brendle using Ricci flow to prove the much stronger result in differential geometry of diffeomorphism rather than homeomorphism in the quarter-pinching theorem using the much weaker assumption of pointwise rather than global pinching.

Now that many outstanding mathematicians are working on it, the story of the Ricci flow is just beginning.

Leroy P. Steele Prize for Lifetime Achievement

The Leroy P. Steele Prizes were established in 1970 in honor of George David Birkhoff, William Fogg Osgood, and William Caspar Graustein and are endowed under the terms of a bequest from Leroy P. Steele. Prizes are awarded in up to three categories. The following citation describes the award for Lifetime Achievement.

Citation

Luis Caffarelli

Luis Caffarelli is one of the world's greatest mathematicians studying nonlinear partial differential equations (PDE). This is a difficult field: there are rarely exact formulas for solutions of nonlinear PDEs, and rarely will exact algebraic calculations yield useful expressions.

Instead researchers must typically invoke functional analysis to build "generalized" solutions for many important equations. What remains is the profound and profoundly technical problem of proving regularity for these weak solutions and, by universal acclaim, the greatest authority on regularity theory is Luis Caffarelli.

His breakthroughs are so many, and yet so technical, that they defy any simple recounting here. But it was certainly Caffarelli's work on "free boundary" problems that first showed his deep insights. Free boundary problems entail finding not only the solution of some PDEs, but also the very region within which the equation holds. Luis Caffarelli's vast work totally dominates this field, starting with his early papers on the obstacle problem. In estimate after estimate, lemma after lemma, he shows that the generalized solution and the free boundary have a bit more regularity than is obvious, then a bit more, and then more; until finally he proves under a mild geometric condition that the solution is smooth and the free boundary is a smooth hypersurface. The arguments are intricate, but completely elementary.

Later papers introduce countless technical innovations that broaden the analysis to PDE free boundary problems of all sorts. Caffarelli has likewise revolutionized the study of fully nonlinear elliptic PDEs, and particularly the Monge–Ampere equation. His breakthroughs here include boundary second derivative estimates, classifications of possible degeneracies for solutions, regularity theory for optimal mass transfer schemes, etc. In all this work Caffarelli is an endlessly inventive technical magician, for instance using the maximum principle in one paper to derive L_p estimates for second derivatives of solutions.

During his years at the University of Minnesota, the University of Chicago, NYU, the Institute for Advanced Study, and now the University of Texas, Luis Caffarelli has collaborated widely and directed many PhD students. He is extraordinarily generous, in both his personal and professional lives. One of his coauthors at a conference once described extending to a fully nonlinear equation some previous research on a linear PDE. He reported that the earlier workers on the linear equation used a formula for the solution, but that "we had something better than an exact formula. We had Luis."

Biographical Note

Luis A. Caffarelli was born in Buenos Aires, Argentina, in December of 1948. He completed his PhD in mathematics at the Universidad de Buenos Aires in 1972 under the direction of Calixto Calderón. In 1973, he came to the United States with a postdoctoral fellowship to the University of Minnesota, where by 1979 he attained a professorship.

He has been a professor at the University of Chicago (1983–1986), the Courant Institute (1980–1982 and 1994–1997), and the Institute for Advanced Study (1986–1996).

Since 1997, Luis Caffarelli has been a professor in the Department of Mathematics and the Institute for Computational Engineering and Science at the University of Texas at Austin, holding the Sid Richardson Chair 1.

He is a member of several academies, including the National Academy of Science, holds several honorary degrees and professorships, and has been awarded several distinguished prizes, including the Bocher Prize of the AMS and the Rolf Schock Prize of the Swedish Academy of Science. Finally, he has delivered the Colloquium and Plenary Lectures of the AMS, and Plenary Lectures at the International Congress of Mathematics in Beijing, 2002, and the International Congress of Industrial and Applied Mathematics in Zurich, 2007.

His main mathematical interests are in nonlinear analysis and partial differential equations. He has contributions in areas concerning phase transitions, free boundary problems, the Landau–Ginzburg equation; fluid dynamics, Navier–Stokes and quasi-geostrophic flows; fully nonlinear equations from optimal control, the Monge–Ampere equation and optimal transportation; and more recently nonlinear homogenization in periodic and random media and nonlinear problems involving nonlocal diffusion processes.

Response from Luis Caffarelli

On this very happy occasion, I would like to thank the Selection Committee for having awarded me this great distinction.

I would also like to thank my parents, my wife Irene, and my children Alejandro, Nicolas and Mauro, for accompanying me through the years and sharing with me their love and their encouragement.

I came to the United States to the University of Minnesota in January of 1973. There was no email, no fax, and even the telephone was very expensive. But I found at Minnesota and in the midwest an extraordinary group of people. My colleagues were extremely generous, dedicated and friendly, and they taught me much of what I know. They shared their ideas and gave me guidance as I began my research program.

Through the years, I have had the opportunity to belong to wonderful institutions and to befriend and collaborate with extraordinary scientists all over the world. This led to further opportunities to mentor very talented young people who have invigorated my research with new ideas.

The Steele Prize, that so much honors me, should also serve to recognize the many mathematicians that have contributed in so many ways to make nonlinear analysis and applied mathematics a central part of science today.

Summary of Awards

For AMS

George David Birkhoff Prize in Applied Mathematics: Joel Smoller

Frank Nelson Cole Prize in Algebra: Christopher Hacon and James McKernan

Levi L. Conant Prize: John Morgan

Ruth Lyttle Satter Prize in Mathematics: Laure Saint-Raymond

Leroy P. Steele Prize for Lifetime Achievement: Luis Caffarelli

Leroy P. Steele Prize for Mathematical Exposition: I.G. Macdonald

Leroy P. Steele Prize for Seminal Contribution to Research: Richard Hamilton

Albert Leon Whiteman Memorial Prize: Jeremy John Gray

For AMS-MAA-SIAM

Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student: Aaron Pixton

For AWM

Louise Hay Award for Contributions to Mathematics Education: Deborah Loewenberg Ball

Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman: Maria Monks

For JPBM

Communications Award: George Csicsery

For MAA

Certificates of Meritorious Service: Carl C. Cowen, Richard Anderson, John Fuelberth, John R. Michel, David R. Stone

Chauvenet Prize: Harold P. Boas

Euler Book Prize: Siobhan Roberts

Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics: Robert Megginson

Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics: Michael Bardzell, David Pengelley, Vali Siadat

For Leonard M. and Eleanor B. Blumenthal Trust for the Advancement of Mathematics

Leonard M. and Eleanor B. Blumenthal Award for the Advancement of Research in Pure Mathematics: Maryam Mirzakhani

Index of Award Recipients