JOINT MATHEMATICS MEETINGS
SAN ANTONIO • JAN 10-13, 2015
AMERICAN MATHEMATICAL SOCIETY
MATHEMATICAL ASSOCIATION OF AMERICA

JANUARY 2015

PRIZES AND AWARDS

4:25 P.M., SUNDAY, JANUARY 11, 2015

PROGRAM

OPENING REMARKS
David Vogan, American Mathematical Society

BECKENBACH BOOK PRIZE
Mathematical Association of America

CHAUVENET PRIZE
Mathematical Association of America

EULER BOOK PRIZE
Mathematical Association of America

DEBORAH AND FRANKLIN TEPPER HAIMO AWARDS FOR DISTINGUISHED COLLEGE OR UNIVERSITY TEACHING OF MATHEMATICS
Mathematical Association of America

YUEH-GIN GUNG AND DR. CHARLES Y. HU AWARD FOR DISTINGUISHED SERVICE TO MATHEMATICS
Mathematical Association of America

LOUISE HAY AWARD FOR CONTRIBUTION TO MATHEMATICS EDUCATION
Association for Women in Mathematics

M. GWENETH HUMPHREYS AWARD FOR MENTORSHIP OF UNDERGRADUATE WOMEN IN MATHEMATICS
Association for Women in Mathematics

ALICE T. SCHAFER PRIZE FOR EXCELLENCE IN MATHEMATICS BY AN UNDERGRADUATE WOMAN
Association for Women in Mathematics

COMMUNICATIONS AWARD
Joint Policy Board for 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

FRANK NELSON COLE PRIZE IN ALGEBRA
American Mathematical Society

LEVI L. CONANT PRIZE
American Mathematical Society

RUTH LYTTLE SATTER PRIZE IN MATHEMATICS
American Mathematical Society

ALBERT LEON WHITEMAN MEMORIAL PRIZE
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
Bob Devaney. Mathematical Association of America

BECKENBACH BOOK PRIZE

THE BECKENBACH BOOK PRIZE, established in 1986, is the successor to the MAA Book Prize established in 1982. It is named for the late Edwin Beckenbach, a long-time leader in the publications program of the Association and a well-known professor of mathematics at the University of California at Los Angeles. The prize is intended to recognize the author(s) of a distinguished, innovative book published by the MAA and to encourage the writing of such books. The award is not given on a regularly scheduled basis. To be considered for the Beckenbach Prize a book must have been published during the five years preceding the award.

CITATION

Seth Braver

Lobachevski Illuminated, MAA Spectrum, 2011.

Mathematicians of all stripes know that the non-Euclidean revolution was a game-changer in nineteenth century mathematics. But relatively few mathematicians are acquainted with the little book that heralded this revolution: Nikolai Lobachevski's *Theory of Parallels* (in German, 1840).

Seth Braver has come to our rescue. In *Lobachevski Illuminated*, he gives us a translation of the text, accompanies each of its 37 propositions with an extensive commentary, and places these ideas in their proper historical context. As a result, Braver has done nothing less than give new life to an old masterpiece.

He begins by celebrating Euclid's *Elements* as "...mankind's greatest monument to the power of rational, organized thought." So brilliantly did Euclid develop his geometry, and so long did this development dominate the mathematical landscape, that "...any individual with the impertinence to challenge Euclid's authority was certain to inspire reactions of both incredulity and scorn."

Lobachevski was sufficiently impertinent—and insightful—to do just that. He replaced Euclid's parallel postulate by an alternative to create a geometry so different that he called it "imaginary." By leading us through Lobachevski's text, Braver manages to recreate the excitement and, yes, the unease that nineteenth century mathematicians must have felt. At the outset he cautions the modern reader, "If you have never left the Euclidean world before, then be forewarned: you are about to embark on a thoroughly disorienting (but strangely exhilarating) journey."

In the book, Braver sets apart Lobachevski's words (in red) from his own running commentary (in black) to flesh out the terse style of the original. In the process, we become familiar—even comfortable—with a new definition of "parallel," with triangles that have no circumscribing circle, with horocycles and horospheres, and with the peculiar trigonometry that arises naturally in the process. It's all there in Lobachevski's own words, augmented by Braver's rich illuminations.

To add a bit of context to the geometrical ideas, the author pauses now and then to discuss the works of predecessors such as Saccheri, Legendre, Gauss, and Clairaut. For instance, the last of these had shown that the parallel postulate holds if and only if a rectangle exists. Braver raises the intriguing question of how "... the history of non-Euclidean geometry might have unfolded had Euclid assumed the existence of a rectangle rather than his parallel postulate. ... Could the mere assumption that a rectangle exists have provoked Saccheri's struggle to 'free Euclid from every flaw'?"

The reader of *Lobachevski Illuminated* will encounter a host of such provocative questions, will delve deeply into the history of geometry, and will gain a thorough appreciation of the genius of Nikolai Lobachevski.

Biographical Note

The peculiar experiences of **Seth Braver** in academia include exposing the then-president of the Greek Academy as a plagiarist and being fired twice for heresy—first from a community college for laughing openly at the graphing calculator bandwagon, then from a "Great Books" college for (among other sins) proclaiming *Tristram Shandy* a more profound book than *Nicomachean Ethics*. In addition to *Lobachevski Illuminated*, he has published *Ill Enough Alone* (White Violet, Hemet, CA, 2014), a volume of poetry. He lives in Olympia, Washington.

Response from Seth Braver

To receive, in 2015, a prize for a book that was published in 2011, submitted for publication in 2009, written in 2005–06, and conceived in 2003, is more than a bit disorienting. I feel I am accepting this prize on behalf of an old friend now deceased. Winning this prize would not have surprised him, convinced as he was of his book's many merits. It surprises me, however, well aware as I am of *Lobachevski Illuminated*'s many failings. Thank you—from both of us.

CHAUVENET PRIZE

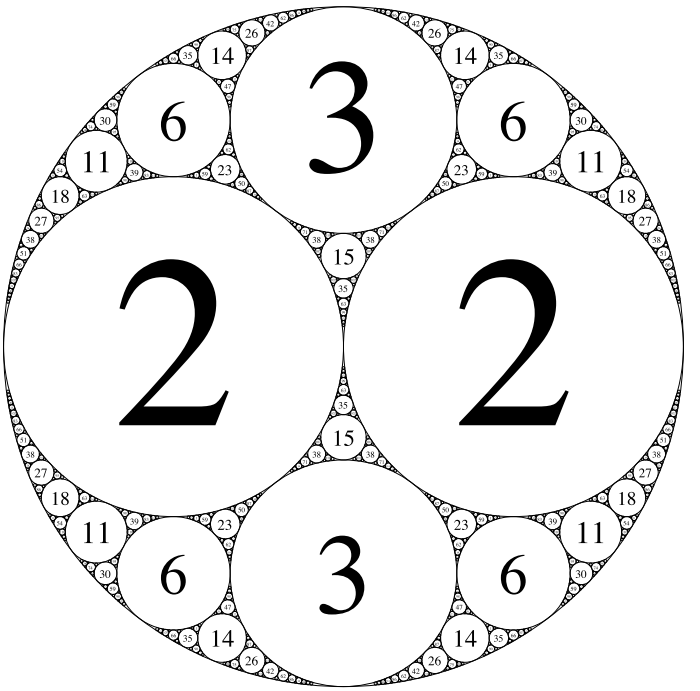
THE CHAUVENET PRIZE is awarded to the author of an outstanding expository article on a mathematical topic by a member of the Association. First awarded in 1925, the prize is named for William Chauvenet, a professor of mathematics at the United States Naval Academy. It was established through a gift in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

CITATION

Dana Mackenzie

"A Tisket, a Tasket, an Apollonian Gasket," *American Scientist*, **98** January–February 2010, no. 1, 10–14.

Start with three mutually tangent circles, insert a fourth circle tangent to all three, and iterate. If the four circles have curvatures that are integers, then all subsequent curvatures are integers too, and the construction yields an integral Apollonian circle packing.



Writing as a tour guide for the scientifically literate traveler to the world of mathematical research, the author narrates a charming Apollonian journey with waypoints that include classical Greek geometry, correspondence between René Descartes and Princess Elizabeth of Bohemia, Japanese temple problems, the poetry of a Nobel laureate in chemistry, and fractal dimension. During the excursion, the guide muses on cultural differences between physicists and mathematicians, computer experimentation as a source of mathematical problems, and creativity as an ingredient in mathematical proof.

Beginning with the first principles, the engaging exposition conducts the reader to the frontiers of mathematical research. The author whets the reader's appetite for further adverntures by mentioning some unsolved problems of number theory. This exemplary article appeals to mathematicians and nonmathematicians alike.

Biographical Note

Dana Mackenzie enjoyed both writing and mathematics from a young age. As a child, he eagerly read the books and columns of Martin Gardner. He went on to get a Ph.D. from Princeton in 1983 and taught for thirteen years at Duke University and Kenyon College.

However, mathematical research and teaching made too little use of his abilities as a writer, and finally in 1996 he decided to pursue his other first love. He studied for a year in the Science Communication Program at the University of California at Santa Cruz, and since then he has been a freelance journalist, specializing in mathematics but wandering off to other sciences when a good enough story presents itself.

Mackenzie's writing has been published in such magazines as *Scientific American*, *Science*, *Discover*, *New Scientist*, *Smithsonian*, and *American Scientist*. He has written two books for the general public, including *The Universe in Zero Words* (Princeton University Press, 2012). He also writes the ongoing series *What's Happening in the Mathematical Sciences*, published by the American Mathematical Society.

Mackenzie lives in Santa Cruz with his wife, his cat Max, and an always-changing entourage of foster kittens.

Response from Dana Mackenzie

The article for which I am receiving this prize was one of my most delightfully serendipitous experiences as a writer. David Eisenbud invited me to spend a semester as journalist in residence at MSRI. One afternoon, I happened to notice a screen saver on my computer which, as I would later learn, was an image of an Apollonian gasket. I knew only that it was fascinating and mysterious.

Later I picked up a poster at the Joint Mathematics Meetings that had a very similar illustration, and that motivated me to find out what was going on with these circles with numbers in them. I soon learned about Peter Sarnak's research at Princeton, and I knew at that point that I had a great topic for an article.

As a journalist, you need not just a great idea but also a place to publish it. I was again lucky that Brian Hayes, who writes an ongoing column for *American Scientist*, was going on sabbatical. He asked me if I could write a guest column, and I leaped at the opportunity.

Without David Eisenbud, Peter Sarnak, Brian Hayes, and the anonymous programmer who wrote the code for that screen-saver, this prize would never have come to me. They all share the credit, and I thank all of them!

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

Edward Frenkel

Love and Math: The Heart of Hidden Reality, Basic Books, New York, 2013.

What if you had to take an art class in which you were only taught how to paint a fence? What if you were never shown the paintings of van Gogh and Picasso, were not even told they existed? Alas, this is how math is taught, and so for most of us it becomes the intellectual equivalent of watching paint dry. In *Love and Math*, renowned mathematician Edward Frenkel reveals a side of math we've never seen, suffused with all the beauty and elegance of a work of art. In this heartfelt and passionate book, Frenkel shows that mathematics, far from occupying a specialist niche, goes to the heart of all matter, uniting us across cultures, time, and space. *Love and Math* tells two intertwined stories: of the wonders of mathematics and of one young man's journey learning and living it. Having braved a discriminatory educational system to become one of the twenty-first century's leading mathematicians, Frenkel now works on one of the biggest ideas to come out of mathematics in the last fifty years: the Langlands Program. Considered by many to be a Grand Unified Theory of Mathematics, the Langlands Program enables researchers to translate findings from one field to another so that they can solve problems, such as Fermat's Last Theorem, that had seemed intractable before. At its core, *Love and Math* is a story about accessing

a new way of thinking, which can enrich our lives and empower us to better understand the world and our place in it. It is an invitation to discover the magic hidden universe of mathematics.

Biographical Note

Edward Frenkel is a professor of mathematics at the University of California, Berkeley, which he joined in 1997 after being on the faculty at Harvard University. He is a member of the American Academy of Arts and Sciences, a Fellow of the American Mathematical Society, and the winner of the Hermann Weyl Prize in Mathematical Physics. The book for which he is receiving the prize was a *New York Times* best seller and has been named one of the Best Books of 2013 by both Amazon and iBooks. It is being translated into fourteen languages. Frenkel has also coproduced, codirected, and played the lead in the film *Rites of Love and Math* (Sycamore Films, 2010).

Response from Edward Frenkel

I am delighted and honored to receive the 2015 Euler Book Prize. I think mathematics is the most crucial, and yet the most misunderstood, subject today. We math practitioners are the ones who keep this precious knowledge, and it is our responsibility to share it with the rest of the world. I hope that this book will inspire its readers to want to learn more about the subject and will also inspire other mathematicians to talk about it to the public in more creative and unconventional ways.

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

Brian Hopkins

Professor Brian Hopkins is described as a master teacher with a genuine desire to see all of his students succeed. With a knack for posing problems and the ability to create an atmosphere of mutual respect and exploration in his classroom, Hopkins's courses are student centered, featuring carefully chosen problems that lead students to discover mathematics for themselves. Discovery happens at all levels, from elementary counting problems in finite mathematics to complex applications of modern mathematics in symbolic dynamics, phylogenic trees, or the mathematics of search engines. In many of his upper-division courses, Hopkins also exposes mathematics majors to the nature of mathematical research by having his students read contemporary research articles. Students praise Hopkins for his passion for mathematics, his patient and giving manner, his challenging coursework, and his unique teaching style.

At Saint Peter's University, Hopkins has been instrumental in creating three new courses for the math department: the Mathematics Technology Laboratory, where sophomore majors learn Mathematica and LaTeX; an undergraduate research course in which students outside of the University's Honors Program can do research; and the Senior Seminar in Mathematics, which serves as a capstone experience for mathematics majors. He has also helped the department develop a three-course graduate-level track for middle school teachers to meet new certification requirements. His teaching in this three-course sequence is informed by his many years of working with teachers in professional development.

Hopkins has been working closely with fifty to sixty teachers each year since 1998 as a staff member with the Institute for Advanced Study's Park City Mathematics Institute (IAS/PCMI). Participants ranging from elementary to high school mathematics teachers voice appreciation for Hopkins's ability to connect with such a diverse group in a meaningful way, enhancing teacher instruction by improving mathematical knowledge and re-invigorating the teachers' interest in the field. He has had similar impact on hundreds of Colorado and New Jersey middle school and high school teachers in his role as facilitator for both the Pikes Peak Math Teachers Circle Summer Academy (2008–12) and the Institute for New Jersey Mathematics Teachers since 2002.

Brian is an active researcher with interests in combinatorial number theory and mathematics applied to social science, including game theory and fair division. Over the years, Brian has led undergraduate research with over thirty students at Saint Peter's University, including two REU programs for which he obtained external funding. This work has led to over twenty student presentations and posters at local and national conferences.

Saint Peter's University students have recognized Professor Hopkins's talents by awarding him the Francis A. Varrichio Award for Excellence in Teaching in 2004, 2007, and 2012. Hopkins also received the New Jersey MAA Section Award for Distinguished College or University Teaching of Mathematics in 2011. He won the George Pólya Award in 2005 for an article in the *College Mathematics Journal* titled "The Truth about Königsberg" (co-authored with Robin Wilson, *College Math. J.*, **35** (2004), no. 3, 198–207), and in January of 2014 Hopkins started his new role as editor of that MAA journal.

Biographical Note

Brian Hopkins is a professor of mathematics at Saint Peter's University in Jersey City, New Jersey. He received a B.S. in mathematics and a B.A. in philosophy from the University of Texas and his Ph.D. from the University of Washington. He has also taught at Seattle University, Harvey Mudd College, and New York University (in the politics department!) Another major aspect of his teaching has been facilitating content-based professional development for K–12 mathematics teachers in New Jersey, Colorado, and Washington state, and reaching throughout the country with the IAS/PCMI Summer School Teachers Program. Hopkins edited the 2009 *Resources for Teaching Discrete Mathematics* (Mathematical Association of America, Washington, DC, 2001) and co-edited *Martin Gardner in the Twenty-First Century* (Mathematical Association of America, Washington, DC, 2012). He has published research papers dealing with integer partitions, combinatorial proofs, graph theory, Rado numbers, history of mathematics, game theory, and fair division.

Response from Brian Hopkins

Although there is one name cited for this award, this wonderful honor is shared by many: years of students at Saint Peter's University, from first-year core students engaged in the Kevin Bacon game saying "this isn't math" while learning graph theory to upper-division majors working long hours on infamous "Hopkins projects" that go past what the textbooks cover; colleagues at Saint Peter's University and the New Jersey Section who encourage my research and teaching; K–12 teachers from around the country who spend their time with me on content-based professional development; various funders that make programs such as undergraduate research and teacher professional development institutes possible; and my supportive husband Michael McNett. Several of my own experiences with creative pedagogy inspire my teaching, such as with James Vick (writing and current events in mathematics), Michael Starbird (Moore method topology; Francis Su was a classmate), John Sullivan (appreciation of historical sources), Virginia Warfield (teaching informed by education research), James King (well-used technology), the IAS/PCMI Summer School Teachers Program (lecture-free courses), and Paul Hildebrandt and George Hart (mathematical big builds). I look forward to more rich experiences in the shared work of teaching and learning.

CITATION

Judith Covington

Professor Judith Covington is a talented and passionate teacher devoted to mentoring current and future teachers. Her teaching is characterized as well rounded, making use of a healthy balance of traditional and innovative teaching methods. Her students describe her as patient, accessible, dedicated, helpful, and knowledgeable. Her colleagues admire the energy and expertise she brings to the classroom and to the teachers she mentors. Covington's ability to reach and inspire future and current teachers is a special gift.

Covington has received several large grants to develop teacher preparation programs in Louisiana. In the late 1990s she designed two new innovative courses for future elementary teachers and an intensive summer workshop for middle school teachers. The courses remain a requirement for students in elementary education today. Louisiana State University–Shreveport has been recognized by the state of Louisiana for its exceptional preparation of elementary education graduates in mathematics and the sciences. Covington also designed a highly successful inquiry-based college geometry course for pre-service teachers. In 2010 Professor Covington founded the North Louisiana Math Teachers Circle (NLMTC), involving teachers from northern Louisiana in monthly problem-solving sessions. Pre-service and in-service teachers appreciate Covington for fostering a love of problem-solving and a passion for mathematics. Her enthu-

siasm for mathematics and her dedication to her students is clearly making a difference in her local community.

Covington has also had an extraordinary impact in teaching at the national level. A member of the first Project NExT class, she has served on the Project NExT leadership team for almost twenty years, having a direct and profound impact on the professional careers of over 1400 new faculty who are, themselves, shaping mathematics education across the nation. She runs the Project NExT NExTEd email list, providing a vibrant forum for young faculty specializing in mathematics education, and she teaches a Project NExT minicourse titled "Preparing Teachers." As her colleagues describe, Covington's knowledge, energy, and ability to work with people make her the perfect role model for teachers of all levels.

Covington's success in teaching has been recognized at the university, local, and state levels. In 2004 she was awarded the LSU–Shreveport Elmer and Barbara Simon Distinguished Teaching Professorship, and in 2012 she received both the Champions for Mathematics Education Award from the local National Council of Teachers mathematics affiliate and the Louisiana-Mississippi MAA Section's Distinguished Teaching Award.

Biographical Note

Judith Covington earned a B.S. in mathematics education from Northwestern State University in Natchitoches, Louisiana, in 1985, where her father was a member of the mathematics department. She then attended the University of Louisiana–Lafayette where she earned an M.S. in 1987 and a Ph.D. in 1993. She did her Master's work under the direction of Dr. Henry Heatherly, and her Ph.D. advisors were Dr. Bradd Clark and Dr. Vic Schneider. She accepted her first job at LSU–Shreveport upon graduation and continues to work there as a professor of mathematics. Early in her career Judith developed a passion for working with future teachers and the majority of her teaching load is courses for future elementary teachers. She has provided professional development opportunities for teachers at all levels. In 2010 she founded the North Louisiana Math Teachers' Circle which is still active today. Each month about 25 middle school teachers gather to work on interesting problems in mathematics. Judith was a Project NExT Fellow in 1994–95 and served as an Associate Co-Director and subsequently Associate Director of Project NExT between 1997 and 2014.

Response from Judith Covington

I am both honored and humbled by this award. I would especially like to thank those who nominated me and those who participated by writing letters of support for me. I have had the opportunity in my career to have been influenced by many wonderful teachers, starting with my parents, Thomas and Glenda Covington, and the wonderful teachers I had at Natchitoches Central

High School, then Northwestern State University, and finally at the University of Louisiana–Lafayette. Both of my Ph.D. advisors placed a value on teaching as well as working with local teachers and passed that along to me. Every teacher that I had at every level has participated in the creation of the teacher I am today. I was lucky enough to have graduated just in time to be a part of the first group of Project NExT Fellows in 1994, and I was influenced in so many ways by Christine Stevens and Jim Leitzel. Thanks to their offer to work on the Project NExT team, my life and my teaching have never been the same. I have been honored to work on the Project NExT team with a wonderful group of folks: Chris Stevens, Jim Leitzel, Joe Gallian, Aparna Higgins, Gavin LaRose, Julie Barnes, Matt DeLong, and Steve Schlicker. Each of them has had an effect on me.

CITATION

Shahriar Shahriari

Shahriar Shahriari is a gifted and accomplished teacher, recognized for the significant timehe spends mentoring students. Described as both passionate and inspirational, he has the ability to engage students of all levels, and he makes concerted efforts to reach out to students from under-represented groups. Students, alumni, and colleagues are particularly appreciative of the supportive learning communities Shahriari creates by intentionally getting students to work collaboratively in groups. These learning communities have empowered students to become resourceful and self-reliant. Students describe their experience working with Shahriari as challenging, transformational, and deeply rewarding.

At Pomona College, Professor Shahriari designed a widely popular and challenging Honors Calculus II course that uses the Prime Number Theorem as a unifying theme for the standard calculus curriculum covering convergence, differentiation, and integration. Shahriari teaches this course using hands-on experimentation, and his colleagues report that students "clamber over themselves to engage with it." As one colleague describes, the course "proceeds like a collection of seemingly independent short stories whose thematic commonalities slowly, but surely and excitingly, come into relief as a beautiful and connected theory." Shahriari teaches at a high level of sophistication, but he organizes the material in manageable pieces. The notes and problem sets for the course were ultimately published by the AMS in the form of a textbook titled *Approximately Calculus*—a book that won the American Library Association's Choice Award for Outstanding Academic Title in 2007.

At Pomona, Shahriari has won the Wig Distinguished Professor Award for Excellence in Teaching four times. Recipients of the Wig Award are elected by the junior and senior classes in recognition of exceptional teaching and mentorship as well as service to the college and community. Shahriari also cofounded

the Pomona Academy for Youth Success (PAYS), a summer program targeting high school students from traditionally under-represented groups and which is designed to mentor students on all things related to college admission and college life. In nine years, it has graduated 220 students, all of whom have been accepted at four-year institutions. Professor Shahriari was also the cofounder of an undergraduate research seminar in the mathematics department at Pomona, and he has published peer-reviewed research articles with twenty-four student co-authors.

Biographical Note

Shahriar Shahriari is the William Polk Russell Professor of Mathematics at Pomona College where he has been since 1989. He is a graduate of Oberlin College and received his Ph.D. from University of Wisconsin–Madison where he was a student of Marty Isaacs. Shahriari is the author of *Approximately Calculus*, which was published by the AMS in 2006 and was selected as a Choice Outstanding Academic Title for 2007. Combinatorics of posets and extremal combinatorics are Shahriari's main research interests. He serves on the editorial board of *Order* and is the author of over thirty research articles, many with undergraduate co-authors. Shahriari has won Pomona College's Wig Distinguished Professor Award for Excellence in Teaching four times, is a cowinner of MAA's Carl B. Allendoerfer Award in 1998, and is the recipient of the 2014 Southern California–Nevada Section of the Mathematics Association of America (MAA) Teaching Award. At Pomona College, Shahriari was one of the founders of PAYS, a four-week residential academic summer program for high school students from underprivileged backgrounds, the inaugural Pomona Posse mentor, and one of the initiators of "Learning Communities" in math classes. Shahriari coteaches "Research Circle," a class where the sole aim is to work on an open research problem, and he emphasizes collaboration and student discovery in all of his classes.

Response from Shahriar Shahriari

It is a true honor to be a recipient of the MAA's 2015 Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics. I especially thank my colleagues and students at Pomona College who took the time to nominate me.

I grew up in Tehran, Iran, and benefited from a culture that valued teachers and mathematics. My fourth grade teacher, the late Mr. Isakhani, was the first to excite me with mathematics. Most Wednesdays he would give us a quiz on the material that he hadn't yet covered. I vividly remember the first time—possibly the only time—that I figured out one of those problems. During my time in high school, Iran had high school math teachers with national reputations. My good fortune was that one of these was my father Parviz Shahriari (1926–2012) who,

in addition to being a great model for how to teach, wrote and translated many popular mathematics books. My dad instilled in me the belief that, with patience and persistence, everyone can be successful in mathematics, that dedicated teachers are the key to an effective educational system, and that in the pursuit of social justice, access to quality education and effective teaching of mathematics has a role to play.

I modeled my own teaching after my numerous great teachers. At Oberlin I was mesmerized by Bob Young and Sam Goldberg's classes, and at Madison I learned so much from Marty Isaacs. My colleagues at Pomona College and across the globe remind me daily that the mathematics profession is full of inspiring and committed teachers. Moreover, I have had the fortune of a steady stream of wonderful students. I thank them all. Finally, I thank Nanaz Fathpour, my wife, for her continued support, and my two sons, Kiavash and Neema, who keep it real and make sure that I don't take myself too seriously.

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

W. James Lewis

The 2015 Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics is presented to W. James Lewis for his outstanding contributions to the mathematics education of teachers, for his leadership in the mathematics profession and in academia at all levels, for his work increasing the visibility and participation of women in mathematics, for his exemplary work serving the state of Nebraska, and especially for his vision and ability to bring together diverse stakeholders in support of positive change in mathematics.

Over the past two decades, Jim Lewis has profoundly changed not only mathematics education but also the way mathematicians think about mathematics education. In the late 1990s, the Conference Board of the Mathematical Sciences (CBMS) decided that the mathematics community, represented by a variety of mathematics organizations, should make recommendations about how K–12 mathematics teachers should be educated. The community at the time was still embroiled in the "math wars," and almost every educator and mathematician had strong opinions, not only about teacher preparation but about mathematics education in general.

Jim took on two major roles during this time: chair of the Steering Committee that produced *The Mathematical Education of Teachers*, published jointly by the MAA and the AMS as part of the CBMS Issues in Mathematics Education series; and cochair of the National Academy of Sciences committee that wrote *Educating Teachers of Science, Mathematics and Technology: New Practices for the New Millennium* (National Academic Press, Washington, DC, 2000).

The Mathematical Education of Teachers (*MET*), published in 2001, expounded what ought to be the principles behind the preparation of high-quality mathematics teachers at the elementary, middle, and high school levels. It was unwavering in its strong advice, but also recognized practical limitations. A masterful blend of common sense, research-based recommendations, and sensible commentary, it changed the way mathematicians and educators interact when talking about teacher preparation.

As part of the effort to disseminate MET, Jim cochaired the 2001 National Summit on the Mathematical Education of Teachers and later the advisory board for the second "national summit" focusing on minority-serving institutions. Jim continued to urge the involvement of mathematicians in the mathematical education of teachers through activities, such as Nebraska State Coordinator for the MAA's PMET grant; chair of the organizing committee for the 2007 MSRI Critical Issues Workshop "Teaching Teachers Mathematics"; chair of the organizing committee for the 2008 MSRI workshop "Using Partnerships to Strengthen Elementary Mathematics Teacher Education"; chair of the organizing committee for the 2011 CBMS Forum on "Teaching Teachers in the Era of the Common Core"; and chair of the organizing committee for the 2014 MSRI Critical Issues Workshop "The Role of the Mathematics Department in the Mathematical Preparation of Teachers." Between 2005 and 2010, Jim was one of two mathematicians who served on the National Research Council Committee that produced the report "Preparing Teachers: Building Evidence for Sound Policy." When the CBMS leadership decided it was time to update the MET publication, they again turned to Jim to lead the effort: he chaired the writing team that produced the 2012 document, *The Mathematical Education of Teachers II*. The creation of this report was again a collaborative effort from a diverse group of experts given cohesion through Jim's leadership and vision. It too will have a lasting impact on our community.

Jim's mathematics education work at the national level has not been restricted to the mathematical education of teachers. He was a member of the AMS Task Force that produced *Towards Excellence: Leading a Doctoral Mathematics Department in the 21st Century* (American Mathematical Society, Providence, RI, 1999). He wrote the first four chapters of this publication, which begins with the sentence, "We have a simple message: To ensure their institution's commitment to excellence in mathematics research, doctoral departments

must pursue excellence in their instructional programs." Research mathematics departments that have adopted the philosophy advocated in *Towards Excellence* have produced Ph.D. graduates who are strong researchers and well-rounded stewards of the profession. Several ongoing efforts of the AMS grew out of the book, including chairing a workshop at its annual meetings as well as recognition each year of outstanding departments.

Venturing into the world of K–12 mathematics curriculum, Jim was one of the authors of the U.S. Department of Education's What Works Clearinghouse practice guide, *Developing Effective Fractions Instruction for Kindergarten through Eighth Grade*. He was also a member of the NCTM committee that produced the documents, "Focus in Grade 6: Teaching with Curriculum Focal Points" and "Focus in Grades 7 and 8: Teaching with Curriculum Focal Points."

Jim was chair of the MAA Coordinating Council on Education, the AMS Committee on Science Policy, and the AMS Task Force on the First-Year College Mathematics Experience. He has served as a member of the AMS Committee on Education, the U.S. Department of Education's Mathematics Education Study Panel, the NRC's Mathematical Sciences Education Board, NSF's Education and Human Resources Directorate Advisory Board, NSF's Mathematics Education Portfolio Review Committee, MSRI's Education Advisory Committee, Arizona's Institute for Mathematics and Education, and Math for America's Board of Directors. He has served as Chair of the CBMS and has served on the advisory board for several NSF-funded projects. Currently, Jim is a member of the planning committee for the Association of Public and Land Grant Universities' Mathematics Teacher Education Partnership.

Jim has had a profound effect on the shape of K–16 education at the University of Nebraska–Lincoln and across the state of Nebraska. His work with pre-service teachers started with the creation (in close collaboration with Professor Ruth Heaton from UNL's Department of Teaching, Learning and Teacher Education) of the Mathematics Semester—a ten-hour integrated experience involving courses in math content, pedagogy, and field experience that is now part of the education of all future elementary teachers at UNL. With financial support from both internal and external sources, Jim has since created an impressive collection of professional development opportunities for in-service teachers over the past ten years. During this time, he has been the principal investigator for two NSF Math Science Partnerships, Math in the Middle and NebraskaMATH, and an NSF Robert Noyce Scholarship grant, NebraskaNOYCE.

The Math in the Middle program enabled 156 teachers to earn master's degrees, and these teachers are now taking leadership roles in their school districts and in the state. NebraskaMATH focuses on teachers at the primary and high school levels; one facet of the program is Primarily Math, which enables teachers to earn K–3 Mathematics Specialists Certificates, and another is the New Teacher

Network, where secondary mathematics teachers earn graduate credits and receive mentoring as they begin their teaching careers. In order to have a long-term and lasting impact on teachers, Jim created the Nebraska Math and Science Summer Institutes, offering graduate-level courses for in-service teachers in a sustainable way, both online and in-person across the state.

Jim has also worked hard to encourage gender equity and diversity in mathematics. Upon becoming chair in 1988, he was dismayed to realize that the UNL Department of Mathematics would award no Ph.D.s to women during the decade of the 1980s. He committed to transforming the environment to one in which talented women would be given the opportunities and support needed to succeed. He led the charge to re-examine the structure of the graduate program, making changes as needed to remove barriers to success, replacing those barriers with celebrations of achievement, and improving the graduate experience for all students. He actively recruited qualified women into the graduate program, building the critical mass of women needed to ensure the longevity of the gender equity of the program. Since 1995 the department has awarded 42 percent of its Ph.D.s to women. Even now, two decades later, the department has maintained gender equity in the graduate program. The UNL Department of Mathematics is nationally known as one of the most successful departments in the country for mentoring women in the profession. In recognition of this tremendous transformation, the department received a 1998 National Science Foundation Presidential Award for Excellence in Science, Math, and Engineering Mentoring. Jim was individually honored as well with the 1996 UNL Chancellor's Commission on the Status of Women Award and the 1997 Lincoln–Lancaster County Women's Commission Erasmus Correll Award.

Throughout his career, Jim has been a tireless advocate of the idea that mathematics research and education go hand in hand. During his fifteen-year tenure as department chair at UNL, his department created programs to enrich K–12 education, to encourage undergraduate research, and to promote gender equity and diversity including UNL's Math Day, the All Girls/All Math summer camps for high school girls, an NSF-funded REU in applied mathematics, and the Nebraska Conference for Undergraduate Women in Mathematics. Partially because of Jim's legacy, the AMS honored the UNL Department of Mathematics with the Society's 2009 Award for an Exemplary Program or Achievement in a Mathematics Department.

Biographical Note

W. James Lewis is the Aaron Douglas Professor of Mathematics and Director of the Center for Science, Mathematics, and Computer Education at the University of Nebraska–Lincoln. He is a Fellow of the American Mathematical Society. Jim has been active in many professional organizations including service as chair of CBMS, the MAA's Coordinating Council on Education and Leitzel Lecture

Committee, and the AMS's Committee on Science Policy. He received his Ph.D. in mathematics from Louisiana State University.

Response from W. James Lewis

It is a great honor to receive the MAA'S 2015 Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics. It is also humbling, as the distinguished list of fifty-one former winners includes many we all recognize as giants in our profession. Having the opportunity to contribute to mathematics, both locally at my own university and nationally through our professional organizations, including the MAA, AMS, and CBMS, has greatly enriched my career. I want to express my deep appreciation to the many mentors I have had throughout my career and to the colleagues and friends with whom I have had the opportunity to work, both at the University of Nebraska–Lincoln and nationally. Finally, I thank the MAA for this honor and thank my wife, Doris, for her support and encouragement.

LOUISE HAY AWARD FOR CONTRIBUTION 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

T. Christine Stevens

The 2015 Louise Hay Award for Contribution to Mathematics Education is presented to T. Christine Stevens, professor of mathematics and computer science at Saint Louis University, in recognition of her outstanding contributions to the teaching and learning of mathematics. Stevens received her Ph.D. from Harvard University under the direction of Andrew Gleason. She was cofounder and codirector, with James Leitzel, of Project NExT, a professional development program of the MAA for faculty in their first two years of full-time teaching. She was the sole director of Project NExT during 1998–2009, gradually adding recent Project NExT Fellows and others to the leadership team. More than 1000 new faculty members participated in Project NExT under her leadership, about half of them women. Approximately 400 other faculty have been involved with Project NExT as consultants and workshop presenters. Many fellows have gone on to win teaching awards of their own, often citing Project NExT as a factor in their success.

Her contributions to mathematics education are manifold. She has impacted national science policy through her service as an AMS/MAA/SIAM Congressional

Science Fellow, her chairing of the MAA's Science Policy Committee, and her service on the SIAM Science Policy Committee. She was an Associate Program Director for the Teacher Enhancement Program at NSF. She has been a strong advocate for expanding opportunities for under-represented groups as a member of the MAA Committee on Minority Participation in Mathematics and on many other committees.

Response from T. Christine Stevens

It is somewhat embarrassing to admit that I do not remember when I first joined the Association for Women in Mathematics. What I do clearly recall is the vital role that AWM played for me when I first started attending the Joint Mathematics Meetings, where it sponsored outstanding lectures and provided inspiration, encouragement, and interesting company for women mathematicians. Little did I expect that, thirty-five years later, I would be receiving an award from the very organization that had so greatly impressed me at the outset of my career. It is an immense honor for me to join the list of eminent mathematicians and mathematics educators who have received the Louise Hay Award.

I am grateful to the AWM for this award and to those who worked with me in shaping Project NExT: Jim Leitzel, Joe Gallian, Aparna Higgins, Judith Covington, and Gavin La Rose. It is a special treat to be recognized for doing work that was, in fact, a lot of fun. Most of all, I am grateful to the Project NExT fellows, whose dedication to mathematical research and education not only mirrors the interests of Louise Hay, but also fills me with optimism about the future of our profession.

M. GWENETH HUMPHREYS AWARD FOR MENTORSHIP OF UNDERGRADUATE WOMEN IN MATHEMATICS

THE AWARD is named for M. Gweneth Humphreys (1911–2006). Professor Humphreys graduated with honors in mathematics from the University of British Columbia in 1932, earning the prestigious Governor General's Gold Medal at graduation. After receiving her master's degree from Smith College in 1933, Humphreys earned her Ph.D. at age 23 from the University of Chicago in 1935. She taught mathematics to women for her entire career, first at Mount St. Scholastica College, then for several years at Sophie Newcomb College, and finally for over thirty years at Randolph-Macon Woman's College. This award, funded by contributions from her former students and colleagues at Randolph-Macon Woman's College, recognizes her commitment to and her profound influence on undergraduate students of mathematics.

CITATION

Ruth Haas

The Association for Women in Mathematics is pleased to present its fifth annual M. Gweneth Humphreys Award to Professor Ruth Haas of the Department of Mathematics at Smith College.

Dr. Haas has been a driving force in the strong and vibrant mathematics community at Smith College. She has nurtured and supported a generation of women mathematics students at Smith. An impressive alumnae body attests enthusiastically to the crucial role Dr. Haas played in their decision to major in mathematics, attend graduate school, and ultimately pursue careers in the mathematical sciences. Former students praise her unwavering support as they move on from Smith, pursue their careers, and face both personal and academic setbacks. Dr. Haas was instrumental in establishing the Center for Women in Mathematics and the highly successful post-baccalaureate program at Smith. There is a constellation of other academic and community-building initiatives developed and supported by Dr. Haas, including a highly effective undergraduate research course, the annual WIMIN conference (Women In Mathematics In the Northeast), a program for junior visitors, a high school outreach program, and weekly seminars.

The importance of Dr. Haas's contributions to Smith and to the mathematics community in general is best understood by the following extraordinary statement from her nomination letter: "Of the U.S. citizen women earning doctorates in mathematics in 2013 from the top 100 graduate schools in America, 6 percent were mentored by Ruth Haas. From her position at a relatively small school, Ruth Haas is mentoring a sizable percentage of the new generation of American women mathematicians."

The AWM is proud to honor Ruth Haas's outstanding achievements in inspiring undergraduate women to discover and pursue their passion for mathematics.

Response from Ruth Haas

I am deeply honored to receive this award and thank the AWM as well as my colleagues and students who nominated me. Many factors contribute to the success of Smith women in mathematics, including the supportive and challenging environment created by all of my colleagues and the intelligence and determination of our students. I feel fortunate to have been able to contribute to these students individually and to the mathematical community through them. Sometimes it is small things that make a difference for an individual: a word of support at just the right moment or a simple suggestion to consider an alternative possibility. To me, the art of good mentoring is seizing the moment to support and counsel. One of the most important things we share as mentors and role models is that we struggled too. As we celebrate the fact that an extraordinary woman has finally won a Fields Medal, it is still rare to find a roomful of mathematicians in which women are well represented. We still need that women mathematicians can be ordinary.

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 honors Alice T. Schafer (1915–2009), one of the founders of AWM and its second president, who contributed greatly 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 twenty-fifth annual Alice T. Schafer Prize to **Sheela Devadas**, Massachusetts Institute of Technology.

Additionally, the accomplishments of two outstanding young women were recognized on Saturday, January 10, 2015. AWM was pleased to honor **Samantha Petti**, Williams College as **runner-up** for the 2015 Schafer prize competition. **Madeline Brandt**, Reed College, was recognized as the **honorable mention** recipient in the Schafer prize competition. Their citations are available from the AWM.

CITATION

Sheela Devadas

Sheela Devadas is majoring in mathematics at MIT. As a sophomore in high school, Devadas joined a research group for high school students at MIT (PRIMES), where she was assigned a project on Cherednik algebras. As a 15-year-old, she quickly mastered the basics of representation theory, commutative algebra, and computer algebra systems. In 2011, the Advantage Testing Foundation Math Prize for Girls announced the names of nineteen "astonishingly accomplished young women," including Silver Medalist, Sheela Devadas.

After completing her junior year of high school, she began studying at MIT, taking many advanced mathematics courses, including Fourier analysis, arithmetic geometry, discrete mathematics, and graduate-level courses in randomness and computation, representation theory, cryptography, and commutative algebra.

Continuing her work in representation theory, she is now co-author of a paper to appear in the *Journal of Commutative Algebra*. Her mentors comment that this is an "excellent paper" and her work is at a level far beyond her age. Devadas shows great breadth by also engaging in research in theoretical computer science, specifically homomorphism testing. These results are currently being written for publication.

Sheela Devadas, who has the "highest level of imagination and skill" is an "outstanding student" who is "brilliant, and at the same time very hard working, mature, and motivated. This is surely a winning combination." She "has a bright research career ahead of her" and of the "many amazing MIT undergraduates, Sheela is second to none."

Response from Sheela Devadas

I am very honored by my selection as the winner of the 2015 Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman. I was first introduced to complex mathematics by Ms. Tatyana Finkelstein, my middle school math teacher; she gave me interesting problems to work on, encouraged me to pursue opportunities such as the MIT PRIMES program, and always provided inspiration. I would like to thank the MIT PRIMES program for enabling me to do research in representation theory in high school and my research mentor Dr. Steven Sam for his invaluable teaching and guidance in my first experience with research. I am grateful to my advisor Professor Pavel Etingof for suggesting my PRIMES research project and for his continued guidance, advice, and teaching. At the PROMYS program at Boston University I was able to listen to the engaging lectures of Professor Glenn Stevens and make a connection with a greater mathematical community. I am grateful to Professor Ronitt Rubinfeld for suggesting and guiding me through research in linearity testing. MIT not only offers wonderful classes but also provides ample opportunities for undergraduate research. Finally, I would like to thank my family for their support in all my endeavors.

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

Nate Silver

The 2015 JPBM Communications Award is presented to Nate Silver for his award-winning `FiveThirtyEight.com` website, his *New York Times* best seller, *The Signal and the Noise: Why Most Predictions Fail—But Some Don't* (The Penguin Press, New York, 2012), and a host of other ways in which he has helped the public to better understand the world through sound and innovative use of statistics and extraordinarily lucid explanations of his work.

Biographical Note

Nate Silver is a leading statistician and best-selling author known for his unique brand of creativity, journalism, and statistical analysis. He is the founder of the award-winning website `FiveThirtyEight`, which was acquired by ESPN in 2013. The site relaunched as an ESPN entity on March 17, 2014, and expanded its coverage to include topics such as sports, economics, culture, science and technology, among others. `FiveThirtyEight` continues to provide data-driven coverage of politics, including forecasts of upcoming elections.

Silver has established himself as today's leading statistician through his innovative analyses of political polling. He first gained national attention during the 2008 presidential election, when he correctly predicted the results of the presidential election in 49 of 50 states, along with all 35 U.S. Senate races. In 2012, `FiveThirtyEight` predicted the election outcome in all 50 states. `FiveThirtyEight` has made Nate the public face of statistical analysis and political forecasting.

His most recent book, *The Signal and The Noise: Why So Many Predictions Fail—But Some Don't*, is a *New York Times* best seller. Before he came to politics, Nate established his credentials as an analyst of baseball statistics. He developed a widely acclaimed system called PECOTA (Player Empirical Comparison and Optimization Test Algorithm), which predicts player performance, career development, and seasonal winners and losers. He is a co-author of a series of books on baseball statistics, which include *Mind Game, Baseball Between the Numbers*, and *It Ain't Over 'til It's Over*. Nate has written for `ESPN.com`, *Sports Illustrated*, *Slate*, *Baseball Prospectus*, *Newsweek*, *The New York Post*, and *The Los Angeles Times*.

Silver has earned a series of accolades. *Fast Company* chose Nate as No. 1 on their list of the 100 Most Creative People in Business 2013. He was among *TIME*'s 100 Most Influential People of 2009 and *Rolling Stone*'s 100 Agents of Change. In 2012 and 2013, `FiveThirtyEight` won Webby Awards as the Best Political Blog.


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

Levent Alpoge

Levent Alpoge is the recipient of the 2015 AMS-MAA-SIAM Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student for several contributions in the fields of number theory, probability, and combinatorics. As an undergraduate, his senior thesis on the average number of integral points in elliptic curves received the Captain Jonathan Fay Prize for the best senior thesis wrtten by a Harvard undergraduate. He has authored or co-authored seven papers, where he has established a substantial record of proposing innovative solutions for difficult problems.

Alpoge participated in two REUs, one at Williams College in 2012 and the other at the University of Minnesota at Duluth in 2013. Several of his publications resulted from projects that were first initiated in these REUs.

In addition to the Captain Jonathan Fay Prize at Harvard, Alpoge has received many other prizes, including the Sophia Freund Prize, the Thomas T. Hoopes Prize, the David Mumford Prize, and the Churchill Scholar Award.

Biographical Note

Levent Alpoge was born and raised in Dix Hills, New York. He is a graduate of the Long Island School for the Gifted, Half Hollow Hills High School West, and Harvard University, where he obtained an A.B. in mathematics and an A.M. in physics through advanced standing. He is currently at Cambridge University undertaking Part III of the Mathematical Tripos as a Churchill Scholar, and

he will enter Princeton's Ph.D. program in the fall. His mathematical focus is number theory, which he first discovered at the Ross Program at The Ohio State University.

While at Harvard, Levent took many courses in mathematics, physics, and computer science. He spent the summer of 2011 at the PRISE program at Harvard on a Herchel Smith fellowship, studying algebraic number theory under Benedict Gross. He spent his next two summers at the Williams SMALL and Duluth REUs, working on problems in analytic number theory and combinatorics under Steven Miller and Joe Gallian, respectively. During this time, he also worked as a course assistant for mathematics courses at Harvard, obtaining certificates for distinction in teaching; he gave talks at various conferences as well as Harvard's own Math Table; and he taught 8–10 year olds at Bob and Ellen Kaplan's Math Circle.

His nonmathematical pursuits include playing soccer, distance running, and reading histories and biographies.

Response from Levent Alpoge

It is an incredible honor to receive the 2015 AMS-MAA-SIAM Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student. I would first like to thank Mrs. Morgan and the AMS, MAA, and SIAM for this award and for encouraging undergraduate research in mathematics. I would also like to thank Steven Miller and Joe Gallian both for advising me and for running such superb REUs at Williams College and the University of Minnesota–Duluth. I would next like to thank all my teachers at LISG, Hills West, and Harvard, particularly Mrs. Kapner at LISG, Mr. Blayne, Mr. Maroney, and Mrs. Notskas at Hills West, and Professors Elkies, Gaitsgory, and Gross at Harvard for their patient and unselfish teaching throughout my education. I would like to also thank Jacob Tsimerman, my senior thesis adviser, and Arul Shankar for both devising a wonderful problem for my senior thesis and patiently explaining and re-explaining the beautiful mathematics surrounding it to me. On the topic of my thesis, I would like to thank Professor Gallian (again!) for getting me to ask for a thesis problem in the first place, since I would have thought it out of the question were it not for his encouragement. I would of course like to thank my friends for making life so fun, and, most importantly, I would like to thank my family for their constant love and support.

Citation for Honorable Mention

Akhil Mathew

Honorable Mention goes to Akhil Mathew for the 2015 AMS-MAA-SIAM Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student. Mathew's areas of research are algebraic topology, algebraic geometry, and category theory. He has received special recognition for

his senior thesis at Harvard University titled "The Galois Group of Homotopy Theory," where he has introduced several new ideas in descent theory and Galois theory for structuring ring spectra.

Mathew is the recipient of several prizes while at Harvard, including the David Mumford Prize and the Thomas T. Hoopes Prize. He participated in two REUs, one in 2013 at Emory University and the other at Pennsylvania State University in 2010.

Biographical Note

Akhil Mathew was born in Chennai, India, but grew up in Madison, New Jersey. He became interested in mathematics as a child through popular books. As a high school student, he took university-level classes, and he began participating in mathematics research. He received third place in the Intel Science Talent Search in 2010 for this research. During college, he participated in REU programs at Pennsylvania State University and at Emory University, and he did summer research at Harvard through internal fellowships. In 2014 he earned a B.A. in pure mathematics from Harvard University. He is now a first-year graduate student at the University of California, Berkeley, supported by an NSF Graduate Fellowship. His primary mathematical interests are in algebraic topology, algebraic geometry, and higher category theory.

Response from Akhil Mathew

It is an honor and a privilege to receive Honorable Mention for the 2015 AMS-MAA-SIAM Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student. I would like to thank my many mentors and collaborators, and in particular Dennis Gaitsgory, Mike Hopkins, and Jacob Lurie for their help and support at Harvard.

AMERICAN MATHEMATICAL SOCIETY
SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS

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.

CITATION

Emmanuel Candès

The 2015 George David Birkhoff Prize in Applied Mathematics is awarded to Emmanuel Candès for his work on compressed sensing, which has revolutionized signal processing and medical imaging, and for his related work on computational harmonic analysis, statistics, and scientific computing. In his Ph.D. thesis, Candès developed curvelets and ridgelets as generalizations of wavelets that capture higher-order structure. Starting from his computational experiments with MRI images, Candès, along with coworkers Terence Tao and Justin Romberg, developed compressed sensing and introduced the Restricted Isometry Property (RIP) that leads to exact recovery of sparse signals with high probability. As some of the original work on compressed sensing, these results have had a broad impact on mathematics, statistics, and applications. Candès has continued to successfully apply principles of sparsity and l_1 minimization to a variety of other problems, such as matrix completion, robust principal component analysis, and phase retrieval (i.e., recovery of a signal from measurement only of its magnitude).

Biographical Note

Emmanuel Candès is the Barnum–Simons Chair in Mathematics and Statistics, a professor of electrical engineering (by courtesy), and a member of the Institute of Computational and Mathematical Engineering at Stanford University. Prior to his appointment as a Simons Chair, Candès was the Ronald and Maxine Linde

Professor of Applied and Computational Mathematics at the California Institute of Technology. His research interests are in computational harmonic analysis, statistics, information theory, signal processing, and mathematical optimization with applications to the imaging sciences, scientific computing, and inverse problems. He received his Ph.D. in statistics from Stanford University in 1998.

Candès has received several awards including the Alan T. Waterman Award from the National Science Foundation (NSF), which recognizes the achievements of early-career scientists. Other honors include the 2005 James H. Wilkinson Prize in Numerical Analysis and Scientific Computing awarded by the Society of Industrial and Applied Mathematics (SIAM), the 2008 Information Theory Society Paper Award, the 2010 George Pólya Prize awarded by SIAM, the 2011 Collatz Prize awarded by the International Council for Industrial and Applied Mathematics (ICIAM), the Lagrange Prize in Continuous Optimization awarded jointly by the Mathematical Optimization Society (MOS) and SIAM, and the 2013 Dannie Heineman Prize presented by the Academy of Sciences at Göttingen. In 2014 Candès was elected to the National Academy of Sciences and to the American Academy of Arts and Sciences.

Response from Emmanuel Candès

I owe a great debt of gratitude to the American Mathematical Society and the Society for Industrial and Applied Mathematics for selecting me as the recipient of the George David Birkhoff Prize. One of the most appealing aspects of receiving a prize is that one is automatically joining the company of previous recipients. Here, I cannot think of a higher honor than being associated with those distinguished mathematicians who have all shaped our science over the last fifty years. Incidentally, I have taught the 1931 Birkhoff ergodic theorem a countless number of times.

Historically, applied mathematics was largely motivated by great questions in physics. However, the applications of mathematics keep on expanding, and in the last few decades we have witnessed the explosion of a new kind of applied mathematics whose primary concern is information and data. I wish to thank Yves Meyer and David Donoho for introducing to me to the mathematics of information. David served as my Ph.D. advisor in statistics at Stanford and gave me the best start any young scholar can possibly receive in any field—period. If I have any taste for problems, I owe it to him. The citation highlights joint work with Terence Tao and with my former post-doc Justin Romberg; this distinction is as much theirs at it is mine. In fact, I regard my collaboration with Terry over the years as one of the most precious things that has happened to me. Brad Efron famously said that the advantage of being a statistician is that you can play in everyone's backyard. I wish to thank the scientists and engineers (circuit designers, radiologists, bio-physicists, ...) who have allowed me to apply our theories, making their promise a little more precise. Finally, I have been

blessed with wonderful graduate students and post-docs who have had a great diversity of backgrounds. These young collaborators, with whom I have done most of my work, have enriched me tremendously and taken me in unexpected directions. I am particularly grateful to Laurent Demanet, Lexing Ying, Justin Romberg, Benjamin Recht, Stephen Becker, Yaniv Plan, Xiaodong Li, Vladislav Voroninski, Mahdi Soltanolkotabi, Carlos Fernandez Granda, and Rina Foygel Barber for expanding my research horizons.

My last words are for the love of my life, Chiara Sabatti, who has played the most important role in my professional and personal development. I married up.

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 three-year intervals for contributions to algebra or the theory of numbers.

CITATION

Peter Scholze

The 2015 Frank Nelson Cole Prize in Algebra is awarded to Peter Scholze for his work on perfectoid spaces which has led to a solution of an important special case of the weight-monodromy conjecture of Deligne ("Perfectoid Spaces," *Publ. Math. Inst. Hautes Études Sci.* **116** (2012), no. 1, 245–313). Scholze has also found other spectacular applications of perfectoid spaces to p-adic Hodge theory and the p-adic geometry of Shimura varieties (and many more are expected).

A perfectoid field K is a complete non-Archimedean field K with characteristic $p > 0$ residue field and a nondiscrete valuation of rank 1 such that the Frobenius map $\Phi : \mathcal{O}_K/p \to \mathcal{O}_K/p$ is surjective, where $\mathcal{O}_K \subset K$ is the subring of elements of norm ≤ 1. To any perfectoid field K, one can associate a second perfectoid field $K^\flat$ of characteristic p given by the fraction field of

$$\{(a_n)_{n\in\mathbf{N}} \in (\mathcal{O}_K/p)^{\mathbf{N}}; a_{n+1}^p = a_n \quad \forall n\}.$$

For example, if K is the completion of $\mathbb{Q}_p(p^{1/p^\infty})$, then $K^\flat$ is the completion of $\mathbb{F}_p((t))(t^{1/p^\infty})$, and in this case, by a theorem of Fontaine and Wintenberger, there is a canonical isomorphism of absolute Galois groups $\mathrm{Gal}(\bar{K}/K) \cong \mathrm{Gal}(\bar{K}^\flat/K^\flat)$. In his work on perfectoid spaces, Scholze generalizes this result obtaining a comparison between geometric objects over K and geometric objects over $K^\flat$. More precisely, he defines the notion of perfectoid space over K (a kind of analytic space over K), and he shows that the category of perfectoid spaces over K and that of perfectoid spaces over $K^\flat$ are equivalent. This provides a link between geometry over local fields of mixed characteristic and geometry over local fields of equal characteristic, where the questions are usually more

tractable. Using the theory of perfectoid spaces, Scholze shows that Deligne's weight-monodromy conjecture over p-adic fields will follow from the known equal characteristic case if one can show that certain fractal-like subsets of $\mathbb{P}^n_{K^\flat}$ can be approximated by algebraic subvarieties. He also shows that smooth complete intersection subschemes of toric varieties satisfy this approximation result, and hence Deligne's weight-monodromy conjecture holds for these varieties.

Biographical Note

Peter Scholze was born in Dresden, Germany, in 1987. After going to high school at the Heinrich-Hertz-Oberschule in Berlin, he studied in Bonn, where he earned his Ph.D. in 2012 under Michael Rapoport. His thesis was on perfectoid spaces and the weight-monodromy conjecture. In July 2011 he was appointed as a Clay Research Fellow for five years, and in 2012 he obtained a Hausdorff Chair at the University of Bonn. In 2013 he received the Prix Peccot of the Collège de France and the SASTRA Ramanujan Prize. Moreover, he received the Clay Research Award, and was an invited speaker at the ICM 2014.

Response from Peter Scholze

It is a great honor to receive the 2015 Frank Nelson Cole Prize in Algebra. Looking back at the list of previous recipients of the prize, I am humbled to be named on this list. I am indebted to my advisor Michael Rapoport, who not only suggested that I should work on the weight-monodromy conjecture but was also convinced that it should be possible to reduce it to its equal characteristic version after a very ramified base change. Moreover, I would like to thank Gerd Faltings for the courses he taught at the University of Bonn. Although I felt like I never understood anything in his lectures, I still think that I learned an enormous amount and am heavily influenced by them. Finally, I want to thank my wife, daughter, parents, and friends for everything they have done for me.

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

Jeffrey C. Lagarias and Chuanming Zong

The 2015 Levi L. Conant Prize is awarded to Jeffrey C. Lagarias and Chuanming Zong for their article, "Mysteries in Packing Regular Tetrahedra," which appeared in the *Notices of the AMS*, **59** (2012), no. 11, 1540–1549.

Finding the best way to pack regular tetrahedra into ordinary three-dimensional space is a problem that goes back to antiquity and remains of great interest today, both in mathematics and materials science. Aristotle claimed regular tetrahedra can fill space with no gaps, but this is false. We still do not know the densest packing, but progress has been rapid in recent years. The article by Jeffrey Lagarias and Chuanming Zong leads the broad range of *Notices* readers through the 2000-year history of the subject, including its appearance in 1900 in Hilbert's 18th problem, into its mathematical heart. It uses effective illustrations to highlight surprising discoveries, new techniques, and further conjectures.

Biographical Note

Jeffrey C. Lagarias was born in Pittsburgh, Pennsylvania, in 1949. He obtained the S.B./S.M. in 1972 and the Ph.D. in 1974 from the Massachusetts Institute of Technology with a thesis in number theory under the direction of Harold M. Stark. He worked at AT&T Bell Laboratories from 1974–95 and at AT&T Shannon Laboratories from 1995–2003. Since that time he has been professor of mathematics at the University of Michigan. He has held visiting positions at the University of Maryland, Rutgers University (computer science), University of Paris VII (physics), and Stanford University. His research spans many fields,

including number theory, optimization, discrete geometry, and computational topology. He has given AMS invited addresses in each of the fields above.

Response from Jeffrey C. Lagarias

I am grateful for receiving the 2015 Levi L. Conant Prize for the *Notices of the AMS* article with Chuanming Zong. This article was a chance to describe the incredible history of the problem of packing space with congruent regular tetrahedra, and to present many attractive and elegant unsolved problems about packing small sets of regular tetrahedra. My Ph.D. student Elizabeth R. Chen made a significant contribution with her 2008 paper constructing the then densest-known packing, which started a flurry of activity in physics and materials science leading to tremendous progress on the problem. I am happy that in 2010 she regained, and still holds, the world record for densest packing of congruent regular tetrahedra (jointly with Michael Engel and Sharon C. Glotzer). This problem itself traces back to Aristotle in connection with the physics of the material world. I was interested to discover that Michael Scot, later consigned to the second lowest circle of Hell in Dante's *Inferno*, and St. Thomas Aquinas, patron saint of colleges and of students, each had connections with the problem. In writing the article, the historical detective work of Dirk Struik, together with an English translation of his Dutch article by Marjorie Senechal, and the expertise of Chuanming were very helpful. Since Beijing is twelve time zones from Ann Arbor, I could work on the article all day, email it to Chuanming, who then could also work on it all day! I have received help in learning the skill of writing from many people, including my parents, my advisor Harold M. Stark, and my Bell Labs mentors and colleagues Ron Graham, Andrew Odlyzko, and Ingrid Daubechies, to name only a few. To all of the above and to the AMS and the selection committee for the award, I express my deepest gratitude.

Biographical Note

Chuanming Zong was born in Shandong province, China, in 1962. He obtained his B.S. from Shandong University, his M.S. from the Chinese Academy of Sciences, and his Ph.D. from Technical University of Vienna. From 1993 to 2000, he worked at the Chinese Academy of Sciences. Since 2000, he has been a professor at Peking University. He was a long-term visitor to IHES (twice), ETH-Zurich, University College London (twice, a research fellow of The Royal Society), TU-Berlin (an Alexander von Humboldt Fellow), MSRI, and others. He works in geometry of numbers and discrete geometry, in particular Hilbert's 18th problem. He was one of the two plenary speakers at Asiacrypt2012 and was a plenary speaker at the 2012 Annual Meeting of the Chinese Mathematical Society. He received a Chinese National Science Award in 2009, a von Prechtl Medal from TU Vienna in 2008, and an S. S. Chern Prize of the Chinese Mathematical Society in 2007.

Response from Chuanming Zong

It is a wonderful honor to receive the 2015 Levi L. Conant Prize from the AMS. In February 1991 I took the train from Beijing, through Moscow and Budapest, to Vienna with a dream of making a mathematical career. It took me seven days, as I recall. In April 1993 I obtained a Ph.D. from TU Vienna, under the supervision of Professor Peter M. Gruber and Professor Edmund Hlawka. They were the first to introduce me to Hilbert's 18th problem, which was the seed of my scientific work. When I traveled around the world, I met I. M. Gelfand, F. Hirzebruch, J. K. Moser, C. A. Rogers, and K. F. Roth who had great influence on my mathematical vision and taste. In my mathematical career I have obtained help and support from Wentsun Wu, Yuan Wang, Kung-Ching Chang, Boju Jiang, Christian Buchta, William Chen, Weiyue Ding, Weinan E, Xiaoshan Gao, Richard Gardner, Martin Henk, Jeff Lagarias, David Larman, Peter Mani-Levitska, Yiming Long, Monika Ludwig, Zhiming Ma, Shige Peng, Richard Pollack, Marjorie Senechal, Gang Tian, Xiaoyun Wang, Joerg Wills, Lo Yang, Guenter Ziegler, and many others. To all of the above, and to the AMS and the selection committee for this award, I owe my deepest gratitude.

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 six years.

CITATION

Hee Oh

The 2015 Ruth Lyttle Satter Prize in Mathematics is awarded to Hee Oh of Yale University. Oh has made fundamental contributions to the fields of dynamics on homogeneous spaces, discrete subgroups of Lie groups, and applications to number theory. Oh's recent work, different parts jointly with A. Kontorovich, with N. Shah, with M. Lee, and with A. Mohammadi, has concentrated on the classical problem of relating Apollonian circle packings to equidistribution properties for groups acting on hyperbolic spaces. This work brings together in a beautiful way dynamics on homogeneous spaces, the geometry and topology of three-dimensional manifolds, and various subtle number-theoretic phenomena, for example the distribution of primes. The quantitative methods developed by Oh and her collaborators have found numerous applications by others.

Biographical Note

Hee Oh was born in 1969 and grew up in Gwang Ju, South Korea. She obtained her B.Sc. in Mathematics from Seoul National University in 1992 and received her Ph.D. from Yale University in 1997, where her advisor was Gregory Margulis. Oh held faculty positions at Princeton University (1999–2003), the California Institute of Technology (2003–06), and Brown University (2006–13). Since the fall of 2013, she is a professor of mathematics at Yale University. She is also a KIAS scholar at Korea Institute for Advanced Study since 2008 where she visits every summer. She was an invited speaker at the International Congress of Mathematicians in 2010 and gave a joint invited address at the 2012 AMS-MAA Joint Mathematics Meeting.

Response from Hee Oh

I am very honored to receive the 2015 Ruth Lyttle Satter Prize in Mathematics. I would like to thank my Ph.D. advisor Gregory Margulis for his constant support and encouragement. I am grateful to Peter Sarnak for sharing with me his enthusiasm and inspiration, which became the source of many of my papers. In fact, it was he who introduced to me the Apollonian circle packings. Since then, I have been fascinated by the beauty of Kleinian groups, especially the dynamical aspects of Kleinian manifolds. I would like to express my gratitude to all the collaborators I have worked with, especially to Amir Mohammadi with whom I have been exploring the theory of homogeneous dynamics on Kleinian manifolds for the last several years. His energy and friendship have been invaluable.

I am very grateful to my husband Seong-June for his support and love, and to my beautiful children, Yoony and Joy, for continuing to be proud that their mom is a mathematician despite frequently leaving them to the care of their dad while traveling to conferences and meetings. I wouldn't be where I am now without the unimaginable support from my parents. They stayed with me for several years when my second child Joy was born in 2006, and I cannot imagine how I would have managed without their help. My sisters Hyun and Jin were always there for support, and often counseled me at difficult moments of my life.

Several years ago, my son, Yoony, challenged me to bring home the Nobel Prize when I challenged him to obtain the title of grand master in chess. When I explained to him that there is no Nobel Prize in mathematics but Fields Medal, he then challenged me to win the Fields Medal instead. I had to excuse myself once again since my age surpassed the qualifying age limit for the medal. I am happy to report to him, now a national master, that I have received a prize of high honor.

I discovered my love of mathematics somewhat late in high school. Although I loved doing mathematics, overcoming the lack of confidence was a barrier. I share this in hopes that young women who love doing mathematics but are not confident know that they are not alone, and that being a woman does not have to hinder you from choosing the life of a mathematician. When I was a postdoctoral fellow, I happened to read an interview with Karen Uhlenbeck who shared a similar statement about her experience as a female mathematician. This was indeed an encouragement for me. I was lucky to have parents and teachers who have never confined me in what I could do because of my gender. I believe things are changing toward a positive direction but are still very slow. I hope this can serve as encouragement for young, bright women who wish to pursue mathematics, to have confidence in following their passion.

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

Umberto Bottazzini

The 2015 Albert Leon Whiteman Prize of the American Mathematical Society is awarded to Umberto Bottazzini of the University of Milan for his many works in the history of mathematics, notably on the rise of modern mathematics in Italy and on analysis in the nineteenth and early twentieth centuries.

He is well known for his great attention to primary sources and has written on many aspects of the community of Italian mathematicians. Several early papers deal with Enrico Betti, the influence of Riemann on the Italian mathematicians, and the creation of the Scuola Normale Superiore di Pisa. These essays were collected in his book *Va' pensiero: Immagini della matematica nell'Italia dell'Ottocento* (Il Molino, Bologna, Italy, 1994), which is a substantial and important analysis that contributed to a much enhanced recognition of the role of Italian mathematicians from Betti and Cremona to Pincherle and Volterra. Then, with A. Conte and P. Gario he co-edited the Castelnuovo–Enriques correspondence (*Riposte Armonie: Lettere di Federigo Enriques a Guido Castelnuovo*, Bollati, Boringhieri, Italy, 1996), and this lifelong interest in the mathematicians of Italy has recently led to his book (with Pietro Nastasi) *La patria ci vuole eroi: Matematici e vita politica nell'Italia del Risorgimento* (Zanichelli, Turin, Italy, 2013), which discusses the surprisingly extensive involvement of Italian mathematicians with politics in the decades before and after the unification of Italy.

His monograph *The Higher Calculus: A History of Real and Complex Analysis from Euler to Weierstrass* (English translation, Springer, New York, 1986) is the first book on the history of analysis to treat the real and complex aspects together, in

keeping with their progress through the nineteenth century. It combines insights into the mathematics with a vigorous sensitivity to context and intellectual history, it embraces issues of foundational importance as they arose in applied mathematics, and it succinctly captures the lives and interests of working mathematicians. The book marks the start of his important contributions to the history of complex function theory, the subject of his invited address to the International Congress of Mathematicians in Beijing in 2002. A full-length account (with Jeremy Gray) of the history of complex function theory from its beginnings to 1914 was published in 2013, entitled *Hidden harmony—geometric fantasies: The rise of complex function theory* (Springer, New York, 2013). The chapters on Cauchy and Weierstrass alone extend, deepen, and in many ways rewrite what has been claimed as the contributions of these two founding fathers of complex analysis.

He is the author of *Il flauto di Hilbert* (UTET, Torino, Italy, 2003), a stimulating history of mathematics from Newton and Leibniz to Hilbert's work and beyond, and of a profound 150-page analysis of Cauchy's *Cours d'analyse* (Editrice, Bologna, 1990) that is the definitive treatment. For many years he has maintained a weekly column on mathematical topics for the Italian newspaper *Il Sole 24 Ore*. The range and quality of his contributions is appreciated equally for their historical subtlety and mathematical insight, and this makes him a natural recipient of the Whiteman prize.

Biographical Note

Umberto Bottazzini studied mathematics at the University of Milan. After graduation in 1973 his interests soon turned toward the history of mathematics. He spent two years as assistant professor at the newly founded University of Calabria (Italy), then in 1979 he was appointed to the University of Bologna, where he taught for a decade before moving to the University of Palermo. In 1995 he was a resident fellow of the Dibner Institute for History of Science and Technology at the Massachusetts Institute of Technology, and he spent the years from 1996 to 1999 as a fellow of the interdisciplinary research Center Beniamino Segre of the Academy of Lincei in Rome. Since 2004 he has been professor for the history of mathematics at the University of Milan. His research interests are devoted to the history of modern mathematics, and the history of complex analysis in particular. The latter was the subject of his invited address to the ICM 2002 in Beijing. In addition he devoted a number of papers and books to the history of Italian mathematics in the nineteenth century. For more than twenty-five years he contributed the Sunday Supplement of the Italian newspaper *Il Sole 24 Ore* with a column on mathematical subjects, and for this activity in 2006 he was awarded the Pitagora Prize from the town of Crotone for the popularization of mathematics.

Response from Umberto Bottazzini

I feel deeply honored to receive the 2015 Albert Leon Whiteman Memorial Prize of the American Mathematical Society, especially so because as the fifth recipient I follow such esteemed colleagues as Thomas Hawkins, Harold Edwards, Jeremy Gray, and Joseph Dauben. I owe my deepest gratitude to the selection committee for this award, and to the American Mathematical Society for its support to the history of our discipline. In the early 1970s, when I became attracted by the history of mathematics and committed myself to an academic career in this area, history of mathematics was poorly cultivated in Italy, and historical research work was hardly given any recognition by the professional mathematical society. Happily, things were to change quickly, and I benefited from the support and interest in my work provided by my colleagues in the mathematical departments where I happened to be appointed. At the same time, I had the chance to attend regularly the meetings on the history of mathematics held at the Mathematisches Institut Oberwolfach. There I became acquainted with many colleagues around the world, whose work has been an important source of inspiration to me. I also wish to thank my students, my co-authors and co-editors, and above all my wife and my son, who helped me much more than they may imagine.

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

Robert Lazarsfeld

The 2015 Leroy P. Steele Prize for Mathematical Exposition is awarded to Robert Lazarsfeld for his books, *Positivity in Algebraic Geometry I* (Ergebnisse der Mathematik und iher Grenzgebiete. 3. Folge. A Series of Modern Surveys in Mathematics, 48, Springer-Verlag, Berlin, 2004) and *Positivity in Algebraic Geometry II* (Ergebnisse der Mathematik und iher Grenzgebiete. 3. Folge. A Series of Modern Surveys in Mathematics, 49, Springer-Verlag, Berlin, 2004).

Lazarsfeld's books *Positivity in Algebraic Geometry I* and *II* were instant classics. He has succeeded wonderfully in putting together under the same heading most of the areas of classical and modern complex algebraic geometry dedicated to, or influenced by, the study of positivity. The positivity of the title encompasses a circle of ideas germinating from the notion of an ample line bundle on a smooth projective variety. Roughly speaking, such a line bundle induces an embedding of the variety into a projective space. By means of this embedding, the restriction of the classical Fubini–Study metric gives rise to a positive, or Kähler, form on the variety in the sense of differential geometry. Fundamental work of Kodaira showed that, conversely, positivity in the differential-geometric sense implies positivity in the algebro-geometric one. This circle of ideas has been enlarged over the years to include singular varieties, higher rank bundles, and eventually more general sheaves, singular Kähler metrics, and fractional divisors, leading to the introduction of multiplier ideals in both an analytic and algebraic settings. Here, for the first time in textbook form, the resulting algebraic theory of multiplier ideals is fully developed. Furthermore, Lazarsfeld's books work out the theory of asymptotic multiplier ideals, tools that have since become of utmost importance in birational geometry; they were used in the proofs of

landmark theorems such as the invariance of plurigenera, the finite generation of the canonical ring, and the existence of flips. His books are now used for courses and for reading and research seminars all over the world. They can be used both as textbooks and as sources for current research problems, and so have great value for both students and experts in the field. They are exceptionally well written, with numerous examples, new proofs, and especially new results reflecting Lazarsfeld's great taste and originality.

Biographical Note

Robert Lazarsfeld was born in New York City in 1953. He graduated from Harvard College in 1975 and received his Ph.D. from Brown University in 1980 under the direction of William Fulton. After a postdoctoral stint as an instructor at Harvard, he went to UCLA in 1983. He remained there until moving to the University of Michigan in 1997, where in 2007 he became the Raymond L. Wilder Collegiate Professor. Since 2013, Lazarsfeld has been on the faculty of the mathematics department at Stony Brook University.

Lazarsfeld was a Sloan Foundation Fellow (1984), a Presidential Young Investigator (1985–1990), an invited speaker at the International Congress of Mathematicians (1990), and a Guggenheim Fellow (1998). He delivered the 2005 AMS Colloquium Lecture and was elected to the American Academy of Arts and Sciences in 2006. From 2002 to 2009, Lazarsfeld served on the editorial board of the *Journal of the AMS*, and in 2012 he became a Fellow of the AMS.

Response from Robert Lazarsfeld

I am delighted and honored to receive the 2015 Leroy P. Steele Prize for Mathematical Exposition for my monographs on positivity in algebraic geometry. Writing it was a protracted labor of love—or, as it occasionally seemed, madness—so naturally I'm very gratified that in the end the book appears to have proved itself useful. I've always believed that it's worth striving to present mathematics well, and I'm pleased to have these efforts acknowledged here.

The book owes a great deal to many teachers, students, and colleagues, but I'd like to single out three to whom I have a particular debt. To begin with I'm grateful to János Kollár for suggesting in the first place that I might write a book for the Ergebnisse series. I am also indebted to Bill Fulton, who not only introduced me as a graduate student to the circle of questions around positivity but also taught me the importance of good mathematical writing. Finally, quite a bit of the material that appears in the book I either learned from Lawrence Ein or worked out together with him, and I'd like to take this opportunity to express my thanks to him.

AMERICAN MATHEMATICAL SOCIETY

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

Rostislav Grigorchuk

The 2015 Leroy P. Steele Prize for Seminal Contribution to Research is awarded to Rostislav Grigorchuk for his article "Degrees of growth of finitely generated groups and the theory of invariant means," (*Izv. Akad. Nauk SSSR Ser. Mat.*, **48** (1984), no. 5, 939–985). In this paper Grigorchuk constructed the first examples of a finitely generated group whose growth was faster than polynomial but slower than exponential, answering a question raised by J. Milnor in 1968. These groups had other amazing properties: they are torsion, they give a new counterexample to the Burnside problem, and they are amenable, but not elementary amenable, thus answering another old question of M. Day. Moreover, Grigorchuk's groups turned out to be just infinite and yet have finite nilpotent width.

Grigorchuk showed that the class of groups of intermediate growth is extremely rich: it contains a continuum of 2-generator pairwise distinct groups with respect to quasi-isometry, a relation much weaker than isomorphism of groups. This breakthrough greatly sharpened results of B. H. Neumann who had proved the existence of a continuum of nonisomorphic 2-generator groups in 1937.

It is important that Grigorchuk's work not only gave solutions to old standing problems but also discovered new exciting classes of groups which became known as "branch groups" and "self-similar groups." These groups provided examples with the previously unknown asymptotic behavior of random walks and the spectral densities of discrete Laplacians. They found applications in the theory of fractals, holomorphic dynamics, spectral theory of groups and graphs, and theory of finite automata.

Grigorchuk used the idea of Kolmogorov complexity to study the complexity of algorithmic problems in his groups. This work attracted the attention of computer scientists and cryptographers.

The work of Grigorchuk has influenced several generations of researchers in group theory. It would be impossible to imagine the modern group theory without Grigorchuk's work.

Biographical Note

Rostislav Grigorchuk, is Distinguished Professor at Texas A&M University, and he graduated from Lomonosov Moscow State University in 1978. His advisers were Dmitry Anosov and Anatoly Stepin. He taught from 1978 to 1995 at the Moscow State University of Railway Engineering, where he also eventually occupied the position of head of the Department of Mathematics, and from 2000 to 2002 at Lomonosov Moscow State University. He was invited to the Steklov Institute of Mathematics (Moscow) in 1995 and worked there as a leading researcher from 1995 to 2002. In 2002 he moved to College Station, Texas, in the U.S.

Dr. Grigorchuk was born in 1953 in the small village of Mukhavets in the Vishnivci district of the Ternopilska region in Ukraine. He received the Prize of the Moscow Mathematical Society in 1979, was an invited speaker at the ICM (Kyoto, 1990), was a Senior Fulbright Professor at the University of Columbia in 1991 (by invitation of Professor H. Bass), twice received the Award for Best Scientific Results from the Russian Academy of Science (1999 and 2001), received the Distinguished Achievement Award from The Association of Former Students of Texas A&M University (2009), and was honored as a Fellow of the AMS (2013).

His research interests are in group theory, dynamical systems, random walks, spectral theory of groups and graphs, operator algebras, theory of fractals, theory of automata, and formal languages.

Response from Rostislav Grigorchuk

It is a great honor to receive this award. I credit my father, Ivan Grygorchuk, and my high school math teachers, Vira Habryd in Ivanovo-Frankivsk and Volodymyr Axelrod in Chernivtci (Ukraine), for stimulating my interest in mathematics and teaching me how to achieve my goals. From my thesis adviser Anatoly Stepin at Moscow University and my further mentors Dmitri Anosov and Yakov Sinai, I learned many things, in particular how to mix ergodic theory with algebra and functional analysis, and not to be afraid to attack difficult problems. It was a pleasure listening to a talk in one of their seminars for three to four hours (for instance a talk of G. Kasparov or M. Lyubich) and then to play soccer the next day against the team of another seminar. I furthermore learned a lot from Sergei Adian and Vladimir Arnold, to whom I am also grateful.

Group theory is a fascinating area of mathematics with a prominent past and future. Infinite finitely generated groups and their approximation by finite groups play a special role in various contexts. Such great problems of modern mathematics as the Baum–Connes conjecture, the Novikov conjecture, and the Atiyah conjectures are in equal measure problems in topology and group theory. The same is true for the Poincaré and Andrews–Curtis conjectures.

The developments of the last few decades, including studies around the Burnside problem (P. Novikov, S. Adian, E. Golod, E. Zelmanov), the theory of hyperbolic groups initiated by Gromov, groups with automatic structure as introduced by Cannon and Thurston, groups of intermediate growth as discovered following Milnor's question about their existence, the notion of amenability invented by von Neumann and N. Bogolyubov, property (T) of Kazhdan, and much more, have enriched group theory, led to powerful applications, and made it an attractive area for young researchers. The Leroy P. Steele Prize for Seminal Contribution to Research that is awarded to me is a reflection of the growing authority and popularity of group theory.

I thank my students, collaborators, and colleagues for their support, patience, and interest in my research and my lectures. I am grateful to the administration of my department and of the College of Science at Texas A&M University, where I enjoy excellent conditions for teaching and carrying out research. My wife Nina, my daughter Olesya, and my parents were always very supportive in my work and shared with me the difficulties and pleasures that life serves to us. To all of them, and to the Steele Prize Committee and the American Mathematical Society, I express my deepest gratitude.

AMERICAN MATHEMATICAL SOCIETY

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

Victor Kac

The structure and representation theory of finite-dimensional Lie groups and Lie algebras has left no part of mathematics untouched since the mid-1800s. The search for an analogous theory for infinite-dimensional Lie groups and algebras is much more recent but is no less important and fundamental. Kac has been the prime mover in creating this theory over the past forty-five years.

Kac–Moody algebras, introduced by Kac and Moody in 1967, quickly became a basic and natural area of investigation in representation theory. They now are seen to form the backbone of many aspects of combinatorics, integrable systems, modular forms, enumerative algebraic geometry, and the Langlands Program. They also play an important role in quantum field theory and statistical mechanics. Kac's discovery of the Weyl–Kac character formula laid the foundation for the study of representation theory of Kac–Moody algebras and yielded the interpretation of the famous Macdonald identities as denominator identities. Kac's work on the representation theory of the Virasoro algebra has found important applications to integrable systems, conformal field theory, statistical physics, and the study of moduli spaces of curves.

Kac's classification of simple Lie superalgebras, echoing the nineteenth century Killing–Cartan classification of simple Lie algebras, has had an enormous influence in setting the stage for subsequent developments in super geometry. Kac's theorems and conjectures on the representation theory of quivers have shaped the development of this growing field.

Kac's recognition theorem and the Kac–Weisfeiler conjectures paved the way to a much deeper understanding of the structure and representations of modular Lie algebras. Recently, Kac and his students developed structure and representation

theories of linearly compact superalgebras and related theories of conformal algebras and pseudoalgebras.

Several generations of mathematicians have found the three editions of Kac's book *Infinite-Dimensional Lie Algebras* (Third edition, Cambridge University Press, Cambridge, 1990) indispensable to their education and research.

The 2015 Leroy P. Steele Prize for Lifetime Achievement is awarded to Victor Kac in recognition of all these achievements.

Biographical Note

Victor Kac

My ancestors lived in a small Romanian *shtetl* called Lipcani. My father grew up in a wealthy family, and after high school he was supposed to go to Paris to study at the Sorbonne. Instead, he chose to stay in Lipcani for three more years waiting for his beautiful sweetheart to graduate from high school. In 1940, my future parents enrolled in Kishinev University. Soon after, the eastern part of Romania was annexed by the Soviet Union, and the wealthiest citizens of Lipcani, including my paternal grandparents, were arrested and deported to Siberia.

A year later, Germany invaded the Soviet Union, and Romanian forces, working with the German fascists, rounded up all the Jews from Lipcani and sent them to their deaths in concentration camps. Thus, all my great-grandparents, my maternal grandparents, and many other members of our extended family perished in the Holocaust. Luckily, my parents were evacuated with the rest of the students at Kishinev University to the Ural Mountains, where I was born on December 19, 1943.

In 1944 we returned to the liberated Kishinev. My parents found jobs in a publishing house; they worked very long hours to earn a living. To this day I remember the clicking of the typewriter every evening as I was going to bed and every morning as I was waking up.

I fondly remember the Kishinev school where I studied from 1950 to 1960. In the summer of 1959, a friend from high school persuaded me to participate in a local Math Olympiad, where, to my astonishment, I won second place. It was then that I decided to become a mathematician. I went to a nearby library and took out all available books with math problems. At first, it would take me several days to solve a problem, but one by one I mastered them all. Encouraged, I enrolled in the Math Circle at Kishinev University. There I met a girl who told me that she was not going to study in our provincial university, but would go to Moscow instead. I instantly decided that I too would try to get accepted into Moscow University.

The years 1960–68 at Moscow University were the happiest of my "Soviet" life. How can one describe in a few lines the excitement and the enthusiasm of those years? The university was the center of mathematics and independent thinking in a huge country—a powerful fountain of new ideas and the source of most important discoveries.

During my sophomore year, I was incredibly fortunate to meet Ernest Vinberg, then still a graduate student, who together with Arkadii Onishchik had just founded a Lie group seminar, an offshoot of the famous Dynkin seminar. (By this time Eugene Dynkin had turned his full attention to probability.) Two years later Vinberg gave me a problem, which determined the direction of my research for the rest of my life. Under his guidance, in 1965 I defended my master's thesis "Algebraic definition of compact Lie groups" and my Ph.D. thesis "Simple irreducible graded Lie algebras of finite growth" in 1968. I admire mathematicians who change the direction of their research several times, each time starting from scratch. This has never happened in my case where each new direction was a natural offshoot of my previous work.

After graduating, I was able to find a job at the Moscow Institute of Electronic Machine Building, a school with no graduate program and a very large teaching load. There wasn't even a slightest chance for me to find another job, as new draconian anti-semitic practices had been introduced in the country. Even worse, most Soviet math journals would not publish my papers, and it was next to impossible to obtain permission to publish abroad.

Fortunately, in the beginning of the 1970s a new beacon of hope brightened the grim Soviet reality: a mass emigration had begun. When my friends David Kazhdan and Boris Weisfeiler emigrated, it came as a shock, but gradually I understood that I too had no other choice. In 1977 I left the Soviet Union.

While in Rome waiting for a U.S. visa, I was offered a job at MIT, and on March 15, 1977—the date which I still consider the most important of my life—I arrived in the U.S. The following day I came to MIT. Without even asking for my documents, a department administrator gave me a key to my office and asked for my bank account number. "What is a bank account?" I asked. My new life had begun.

Response from Victor Kac

It is a great honor to be awarded the 2015 Leroy P. Steele Prize for Lifetime Achievement. I am humbled to be among so many great mathematicians awarded the prize in previous years. I am most grateful to the American Mathematical Society for this prestigious award, and particularly to the members of the Steele Prize Committee for making this difficult decision.

I would like to credit my mentors for their support:

- Ernest Vinberg, who was my thesis advisor at Moscow University, and to whom I've been always turning when getting stuck in a problem;
- Bert Kostant, who convinced his colleagues to grant tenure to a hapless refugee from the Soviet Union;
- Is Singer and Eugene Dynkin, who gave me crucial support in a difficult period of my "western" life; and
- David Kazhdan, who, being a few years younger than me, was nevertheless my mentor with his infinite knowledge and wisdom.

I've been blessed in having many collaborators. It is a pleasure to acknowledge them—over sixty-five in number. It is impossible to list all of them here and the work we have done. However, I must mention the three men of immense mathematical talent with whom I co-authored more than ten papers:

- Dale Peterson—together we discovered modular invariance of characters of affine Lie algebras and the "Kac–Peterson class", and we built the foundations of the theory of Kac–Moody groups.
- Minoru Wakimoto—together we discovered the "Kac–Wakimoto spectrum" (as called nowadays by physicists); we made advances in representation theory of affine Lie superalgebras and its connections to representation theory of superconformal algebras via the quantum Hamiltonian reduction; and we made advances in number theory, especially to the emerging theory of mock theta functions.
- Alberto De Sole—together with our students, we've been building the foundations of rigorous algebraic theory of infinite-dimensional integrable systems.

I should also mention the joint work with Corrado De Concini and Claudio Procesi on quantum groups at roots of unity, and the work with them and Enrico Arbarello relating representation theory to the geometry of algebraic curves. We retained our friendship throughout the years since my emigration period in Rome, when I received their helping hand.

SUMMARY OF AWARDS

FOR AMS

FRANK NELSON COLE PRIZE IN ALGEBRA: PETER SCHOLZE

LEVI L. CONANT PRIZE: JEFFREY C. LAGARIAS AND CHUANMING ZONG

RUTH LYTTLE SATTER PRIZE IN MATHEMATICS: HEE OH

ALBERT LEON WHITEMAN MEMORIAL PRIZE: UMBERTO BOTTAZZINI

LEROY P. STEELE PRIZE FOR LIFETIME ACHIEVEMENT: VICTOR KAC

LEROY P. STEELE PRIZE FOR MATHEMATICAL EXPOSITION: ROBERT LAZARSFELD

LEROY P. STEELE PRIZE FOR SEMINAL CONTRIBUTION TO RESEARCH: ROSTISLAV GRIGORCHUK

FOR AWM

LOUISE HAY AWARD FOR CONTRIBUTION TO MATHEMATICS EDUCATION: T. CHRISTINE STEVENS

M. GWENETH HUMPHREYS AWARD FOR MENTORSHIP OF UNDERGRADUATE WOMEN IN MATHEMATICS: RUTH HAAS

ALICE T. SCHAFER PRIZE FOR EXCELLENCE IN MATHEMATICS BY AN UNDERGRADUATE WOMAN: SHEELA DEVADAS

FOR MAA

BECKENBACH BOOK PRIZE: SETH BRAVER

CHAUVENET PRIZE: DANA MACKENZIE

EULER BOOK PRIZE: EDWARD FRENKEL

DEBORAH AND FRANKLIN TEPPER HAIMO AWARDS FOR DISTINGUISHED COLLEGE OR UNIVERSITY TEACHING OF MATHEMATICS: JUDITH COVINGTON, BRIAN HOPKINS AND SHAHRIAR SHAHRIARI

YUEH-GIN GUNG AND DR. CHARLES Y. HU AWARD FOR DISTINGUISHED SERVICE TO MATHEMATICS: W. JAMES LEWIS

FOR AMS-MAA-SIAM

FRANK AND BRENNIE MORGAN PRIZE FOR OUTSTANDING RESEARCH IN MATHEMATICS BY AN UNDERGRADUATE STUDENT: LEVENT ALPOGE AND AKHIL MATHEW

FOR AMS-SIAM

GEORGE DAVID BIRKHOFF PRIZE IN APPLIED MATHEMATICS: EMMANUEL CANDÈS

FOR JPBM

COMMUNICATIONS AWARD: NATE SILVER

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