JOINT MATHEMATICS MEETINGS
SAN DIEGO • JAN 10–13, 2018
AMERICAN MATHEMATICAL SOCIETY
MATHEMATICAL ASSOCIATION OF AMERICA

January
2018

Prizes and Awards

4:25 p.m., Thursday,
January 11, 2018

PROGRAM

OPENING REMARKS
Deanna Haunsperger, Mathematical Association of America

GEORGE DAVID BIRKHOFF PRIZE IN APPLIED MATHEMATICS
American Mathematical Society
Society for Industrial and Applied Mathematics

BERTRAND RUSSELL PRIZE OF THE AMS
American Mathematical Society

ULF GRENANDER PRIZE IN STOCHASTIC THEORY AND MODELING
American Mathematical Society

CHEVALLEY PRIZE IN LIE THEORY
American Mathematical Society

ALBERT LEON WHITEMAN MEMORIAL PRIZE
American Mathematical Society

FRANK NELSON COLE PRIZE IN ALGEBRA
American Mathematical Society

LEVI L. CONANT PRIZE
American Mathematical Society

AWARD FOR DISTINGUISHED PUBLIC SERVICE
American Mathematical Society

LEROY P. STEELE PRIZE FOR SEMINAL CONTRIBUTION TO RESEARCH
American Mathematical Society

LEROY P. STEELE PRIZE FOR MATHEMATICAL EXPOSITION
American Mathematical Society

LEROY P. STEELE PRIZE FOR LIFETIME ACHIEVEMENT
American Mathematical Society

SADOSKY RESEARCH PRIZE IN ANALYSIS
Association for Women in Mathematics

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

MICROSOFT RESEARCH PRIZE IN ALGEBRA AND NUMBER THEORY
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

BECKENBACH BOOK PRIZE
Mathematical Association of America

CHAUVENET PRIZE
Mathematical Association of America

EULER BOOK PRIZE
Mathematical Association of America

THE 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

CLOSING REMARKS
Kenneth A. Ribet, American Mathematical Society

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. The recipient must be a member of one of these societies and a resident of the United States, Canada, or Mexico.

CITATION

Bernd Sturmfels

The 2018 George David Birkhoff Prize in Applied Mathematics is awarded to Bernd Sturmfels for his instrumental role in creating the field of applied algebraic geometry. He has made foundational contributions to combinatorics, algebraic geometry and symbolic computation and he has introduced algebraic techniques to numerous areas of applied mathematics including bioinformatics, computer vision, optimization, and statistics. Like Birkhoff, the intellectual range of his work stretches from pure mathematics to the very applied and demonstrates the unity of mathematics. In addition, he is an exceptional expositor, a wonderful teacher, and a dedicated mentor to young mathematicians.

Biographical Note

Bernd Sturmfels received doctoral degrees in Mathematics in 1987 from the University of Washington, Seattle, and the Technical University Darmstadt, Germany. After postdoctoral years in Minneapolis and Linz, Austria, he taught at Cornell University, before joining UC Berkeley in 1995, where he is Professor of Mathematics, Statistics and Computer Science. Since 2017 he is a director at the Max-Planck Institute for Mathematics in the Sciences, Leipzig. His honors include a Sloan Fellowship, a David and Lucile Packard Fellowship, a Clay Senior Scholarship, an Alexander von Humboldt Senior Research Prize, the SIAM von Neumann Lecturership, and the Sarlo Distinguished Mentoring Award. He served as Vice President of the American Mathematical Society, and he was awarded an honorary doctorate from Frankfurt University in 2015. A leading experimentalist among mathematicians, Sturmfels has authored ten books and 250 research articles, in the areas of combinatorics, algebraic geometry, symbolic computation, and their applications. He has mentored forty-five doctoral students and numerous postdocs. His current research addresses questions in algebra that are inspired by statistics, optimization, and biology.

Response from Bernd Sturmfels

I am deeply honored and delighted to receive the 2018 George David Birkhoff Prize in Applied Mathematics. I greatly appreciate the citation and the recognition from the American Mathematical Society and the Society for Industrial and Applied Mathematics. George David Birkhoff is one of my heros: he embodies the unity of mathematics, scholarship and mentorship.

The Birkhoff Prize was established exactly fifty years ago, and it is the greatest honor for me to join the distinguished list of scholars who have shaped our science for half a century. This year's award regonizes the emerging field of Applied Algebraic Geometry and the many wonderful colleagues and mentees who have been involved in its development.

A pivotal event was the yearlong research program at the Institute for Pure and Applied Mathematics in 2006–2007. The IMA director at the time, Doug Arnold, was an amazing cheerleader. It was his idea to create a SIAM Activity Group in Algebraic Geometry, and thus establish direct link between a "pure" field that is central to mathematics with exciting new directions of application. This development ultimately led to the SIAM Journal on Applied Algebra and Geometry, which now offers a home for the directions listed in the citation.

Birkhoff taught us that mathematics can be outward looking and yet remain deep. Connections with the life sciences are especially important. They continue to be a challenge and an opportunity, and I owe a lot to Lior Pachter for guiding me towards this path. While it is most valuable to apply mathematics to biology, I continued to be intrigued by the converse. My hope is to witness the discovery of new and innovative ways in which biology can contribute to mathematics.

I am indebted to my mentors, Louis Billera, Jürgen Bokowski, Bruno Buchberger, William Fulton, Israel Gel'fand and Victor Klee, who taught me the craft of our field, and guided me into the academic community. Through them I learned that I might not be an imposter after all.

It is amazing fun to work with others, and I had the great fortune of collaborating with many inspiring colleagues. Most of all, I am grateful to my PhD students and postdocs at Cornell, Berkeley, Berlin and Leipzig. They have been my ultimate teachers. Finally, I wish to thank my family, my wife, Hyungsook, and my children, Nina and Pascal, for their support of my mathematical journey, and for putting up with my crazy early-morning schedule.

Bertrand Russell Prize of the AMS

The Bertrand Russell Prize of the AMS was established in 2016 by Thomas Hales. The prize looks beyond the confines of the profession to research or service contributions of mathematicians or related professionals to promoting good in the world. It recognizes the various ways that mathematics furthers fundamental human values. Mathematical contributions that further world health, our understanding of climate change, digital privacy, or education in developing countries, are some examples of the type of work that might be considered for the prize.

Citation

Christiane Rousseau

The 2018 Bertrand Russell Prize of the American Mathematical Society is awarded to Professor Christiane Rousseau in recognition of her many contributions furthering human values and the common good through mathematics. Throughout her career, Professor Rousseau has inspired people of all ages and diverse backgrounds through her lectures, publications, and a wide range of activities reaching out to the general public. In particular, through her visionary leadership of the thematic year *Mathematics of Planet Earth 2013* and her continuing active involvement in the ongoing activities that grew from it, Professor Rousseau has created opportunities for the mathematics community worldwide to confront crucial challenges facing our planet while highlighting the contributions of mathematicians to the well-being of society.

Christiane Rousseau earned her doctorate from the University of Montréal in 1977, to which she returned as a faculty member in 1979, after a postdoctoral position. She has remained at Montréal since, including a period as department head. Her research falls primarily within dynamical systems and differential equations, areas in which she has published nearly 100 papers and supervised about 10 PhD students. Rousseau served as President of the Canadian Mathematical Society from 2002 to 2004. She has been a delegate to the General Assembly of the International Mathematical Union on three occasions, and served as Vice President of the IMU from 2011 to 2014. She remains on the IMU Executive Committee. Throughout all this, Rousseau has been steadfastly dedicated to mathematical outreach at all levels. She has published many articles in popular science magazines. She regularly lectures in schools and vocational colleges. For decades she has organized and participated in mathematics camps of the Association Mathématiques du Québec. For the last decade she has organized the public lecture series of the Centre de Recherche Mathématiques (CRM), and she regularly gives public lectures herself at other venues. In 2008 she coauthored a textbook on Mathematics and Technology, which remains in widespread use and has been translated into several languages.

In the early part of this decade Rousseau conceived of the idea of *Mathematics of Planet Earth 2013*, a year-long international program aimed at both the mathematics community and the general public, with the goal of identifying fundamental mathematical problems that contribute to the understanding and sustainability of our planet, and, at the same time of informing the public about the role of mathematics in addressing these challenges. Professor Rousseau proved indefatigable and highly skilled as an advocate and organizer of MPE 2013. She personally secured patronage of MPE 2013 from UNESCO, which hosted an MPE 2013 day at its Paris headquarters. The Simons Foundation supported a high-level public lecture series for MPE 2013 which was delivered around the globe. Over the course of the year the program's activities grew to involve many researchers worldwide and over 140 scientific societies, universities, research institutes, and foundations. Over fifteen major programs and 60 workshops were held at math institutes, and there were dozens of special sessions at conferences, public lectures, special schools for graduate students, and research experiences for undergraduates. Museum-quality exhibits and high-quality curriculum materials for all levels were produced and remain in use. Rousseau herself wrote an article on the discovery of the inner core of the earth for an MPE-themed special issue of the College Mathematics Journal, which received the MAA's Polya Prize the next year.

Another indication of the success of MPE 2013, is that it did not disappear at the end of the calendar year, but instead transitioned to an ongoing MPE activity. A series of educational workshops and a research network on mathematics and climate have been funded by the US NSF. A multi-institutional MPE Centre for Doctoral Training has been established with support of the British Engineering and Physical Sciences Research Council. Other MPE working groups and projects have been established around the world. SIAM has started SIAG/MPE, an activity group in the area. Through another initiative of Professor Rousseau, there have been two juried international competitions for exhibits on the themes of MPE, resulting in a permanent exhibition curated by IMAGINARY, a project of the Oberwolfach institute, and made available to museums and schools worldwide.

Through her commitment, dedication, energy, and ability, Professor Rousseau has mobilized mathematicians to take on world challenges, advancing the discipline and making her a most appropriate recipient of the first Bertrand Russell Prize of the AMS.

Biographical Note

Christiane Rousseau got her PhD from the Université de Montréal in 1977. After a postdoc at McGill University she became professor at the Department of Mathematics and Statistics of the Université de Montréal. Her research field is dynamical systems. She chaired her department from 1993 to 1997. Christiane Rousseau was Vice-President of the Canadian Mathematical Society for 1995–1997 and then President for 2002–2004. She chaired the Canadian National Committee for 2004–08, and led two Canadian bids for the International Congress of Mathematicians, ICM 2010 and 2014. Christiane Rousseau was Vice-President of the International Mathematical Union (IMU) for 2011–2014 and she is a member of the Executive Committee of the IMU for 2015-2018. She was interim Director of CRM for the year 2008–09. During that period, she started *Mathematics of Planet Earth 2013* (MPE2013) with thirteen North American institutes in mathematical sciences. MPE2013 grew to the size of an international year under the patronage of UNESCO. For 2015–2017, she is a member of the Scientific Board of the International Basic Sciences Program of UNESCO. Since 2013, she is a Fellow of the AMS and she was the recipient of the George Pólya Award in 2014. Christiane Rousseau is very involved in outreach activities, including the magazine *Accromath*, the organization of public lectures, the organization of math camps and the training of preservice high school teachers.

Response from Christiane Rousseau

I feel extremely privileged to receive the 2018 Bertrand Russell prize of the AMS. And I am very thankful to the AMS for this honor. The success of *Mathematics of Planet Earth* (MPE) came from a team work, and I am very grateful to my American colleagues, in particular Brian Conrey, Hans Kaper and Mary Lou Zeeman, for their commitment to the success of MPE2013 and to the move to MPE at the end of the year. As soon as I had the idea of Mathematics of Planet Earth, it became a passion for me to learn more about the many contributions of mathematics to the understanding of our planet. At the same time, the more I learnt about the threats coming from global changes and the increase of the world population, the more I felt that our community has to play a role. Indeed, mathematics has so much to say on these challenges that it is a must to train a new generation of researchers who can contribute to these problems: this is why MPE spread by itself over the world. And one does not need to be an applied mathematician to convey the message through one's teaching or outreach activities. MPE has made the case that, by joining forces internationally, we can have an impact. The work is just starting. A scientific consensus has grown on global changes and has led to the Paris climate agreement of December 2015. But that agreement is now in danger and many countries do not respect their commitments. We must continue the work with our colleagues from other scientific disciplines.

2018 Ulf Grenander Prize in Stochastic Theory and Modeling

The Grenander prize, established in 2017 in honor of Ulf Grenander (1923–2016), recognizes exceptional theoretical and applied contributions in stochastic theory and modeling. It is awarded for seminal work, theoretical or applied, in the areas of probabilistic modeling, statistical inference, or related computational algorithms, especially for the analysis of complex or high-dimensional systems. Grenander was an influential scholar in stochastic processes, abstract inference, and pattern theory. He published landmark works throughout his career, notably his 1950 dissertation, *Stochastic Processes and Statistical Interference* at Stockholm University, *Abstract Inference*, his seminal *Pattern Theory: From representation to inference* and *General Pattern Theory*. A long-time faculty member of Brown University's Division of Applied Mathematics, Grenander was a fellow of the American Academy of Arts and Sciences, the National Academy of Sciences and was a member of the Royal Swedish Academy of Sciences.

Citation

Judea Pearl

The 2018 Grenander Prize in Stochastic Theory and Modeling is awarded to Judea Pearl for the invention of a model-based approach to probabilistic and causal reasoning, for the discovery of innovative tools for inferring these models from observations, and for the development of novel computational methods for the practical applications of these models.

Grenander sought to develop general tools for constructing realistic models of patterns in natural and man-made systems. He believed in the power of rigorous mathematics and abstraction for the analysis of complex models, statistical theory for efficient model inference, and the importance of computation for bridging theory and practice. Judea Pearl has relied on these very same principles, bringing to it an energy and creativity that is remarkably reminiscent of the scientific life of Ulf Grenander.

In the 1980s, through a series of seminal papers and the landmark book *Probabilistic Reasoning in Intelligent Systems*, Pearl demonstrated how reasoning systems based on probabilities could address the principle shortcomings of the rule-based systems that had dominated decades of AI research. He argued that properties of classical logic make it difficult for rule-based systems to cope with reasoning under uncertainty, and proposed that graphical models of conditional independence, also known as Bayesian networks, can make this type of inference tractable in practice. Pearl's arguments prevailed, and by the early 1990s Bayesian networks and other graphical models had become the preferred framework for much of AI research and a rich source of challenging and important problems in mathematical statistics and computer science.

Mindful of the considerable computational challenges surely to be encountered in practice, Pearl proposed the belief propagation algorithm in Bayesian networks, which recast the problem of computing posterior distributions given evidence as a scheme for passing local messages between network variables. Although exact computations through dynamic programming are possible, Pearl recognized that in most problems of interest this would not be feasible and in fact belief propagation turned out to be remarkably effective in many applications.

Pearl's primary goal in adopting Bayesian networks for formulating structured models of complex systems was his conviction that Bayesian networks would prove to be the right platform for addressing one of the most fundamental challenges to statistical modeling: the identification of the conditional independencies among correlated variables that are induced by truly causal relationships. In a series of papers in the 1990s, Pearl clearly showed that statistical and causal notions are distinct and how graphical causal models can provide a formal link between causal quantities of interest and observed data. In order to determine whether the effect of a proposed action can be predicted from a given causal Bayesian network on a set of observable and unobservable variables, Pearl invented his remarkable "do-calculus" for reasoning about causal and associated probabilities, interventions and observations. Given a Bayesian network that is consistent with the joint statistics of a set of observable variables, Pearl's calculus provides a systematic and provably correct plan of derivations to determine the causal effect of one variable on another from nonexperimental data. These contributions are beautifully presented in his influential book *Causality*. Whereas many challenges arise, for example involving data collection and counterfactual interventions, and the story is by no means over, Pearl's "do-calculus" has been widely adopted and is perhaps the most convincing and constructive of the existing approaches to causality.

Pearl has had a sweeping impact on the theory and practice of statistics and machine learning, and his ideas continue to engage mathematicians, statisticians and many other scientists with challenging analytic and algorithmic problems that are at the heart of modern AI.

Biographical Note

Judea Pearl is professor of computer science and statistics at UCLA. He graduated from the Technion, Israel Institute of Technology, and joined the faculty of UCLA in 1970, where he currently directs the Cognitive Systems Laboratory and conducts research in artificial intelligence, human cognition and philosophy of science.

Pearl has authored numerous scientific papers and three books, *Heuristics* (1983), *Probabilistic Reasoning* (1988) and *Causality* (2000, 2009) which won the London School of Economics Lakatos Award in 2002. A recent book, *Causal Inference in Statistics* (2016, with M. Glymour and N. Jewell) introduces modern causal analysis to undergraduate statistics education. His forthcoming *The Book of Why* (2018, with Dana Mackenzie) explains for a general audience how the concept of cause and effect, the grand taboo in science, can be placed on a firm mathematical foundation.

Pearl is a member of the National Academy of Sciences and the National Academy of Engineering, a fellow of the Cognitive Science Society and a founding fellow of the Association for the Advancement of Artificial Intelligence. In 2012, he won the Technion's Harvey Prize and the ACM Alan Turing Award for the development of a calculus for probabilistic and causal reasoning.

Response from Judea Pearl

I am extremely honored to receive the Ulf Grenander Prize from the American Mathematical Society. The idea that my work in artificial intelligence has been noticed by mathematicians makes me view it from new perspectives, colored both by my passion for mathematics and by the universal challenges that mathematics poses to the human intellect.

I also view this Prize in the context of a philosophical puzzle that has haunted me for many years: Why has science deprived cause-effect relationships from the benefit of mathematical analysis? My college professors could not write down an equation to express the most obvious causal statement. For example, that the rooster crow does not cause the sun to rise, or that the falling barometer does not cause the incoming storm. Unlike the rules of geometry, mechanics, optics, or probability, the rules of cause and effect have not been encoded in a mathematical framework. Why have scientists allowed these rules to languish in bare intuition, deprived of mathematical tools that have enabled other branches of science to flourish and mature?

My research in the past twenty-five years has attempted to rectify this historical neglect using graphs, instead of formulas, and to capture what the data we observe can tell us about causal forces in our world. The Ulf Grenander Prize tells me that these attempts have not been totally unnoticed. I hope therefore that this Prize will further encourage mathematicians to delve into the intricate problems that the calculus of causation has opened and that this influx of interest will lead to new insights into the logic that governs human understanding.

Chevalley Prize in Lie Theory

The Chevalley Prize is awarded for notable work in Lie Theory published during the preceding six years; a recipient should be at most twenty-five years past the Ph.D. The prize is awarded in even-numbered years, without restriction on society membership, citizenship, or venue of publication.

Citation

Dennis Gaitsgory

The 2018 Chevalley Prize is awarded to Dennis Gaitsgory for his work on the geometric Langlands program, especially his fundamental contributions to the categorical Langlands conjecture and its extension in his recent work with Dima Arinkin.

The original arithmetic Langlands program applies to number fields. What is now called the geometric Langlands program applies to function fields, in particular to fields $\mathbb{F}$ of meromorphic functions on complex nonsingular algebraic curves X. It arose from a series of ideas of Beilinson, Deligne, Drinfeld and Laumon in the 1980s, following Langlands' far-reaching results and conjectures from the 1960s. The goal is to establish reciprocity laws between a certain type of geometric data attached to G-bundles on X (specifically, sheaves on the moduli space of G-bundles on X) and spectral data consisting of homomorphisms from the Galois group of $\mathbb{F}$ to the Langlands dual of G. Here G is a Chevalley (or more generally, reductive) group over the ground field.

Dennis Gaitsgory is largely responsible for having created a systematic theory from what had been a collection of provocative ideas and insights. Gaitsgory's major results include: his proof of the "Vanishing Conjecture," which is a geometric analogue of regularity of Rankin-Selberg L-functions; his construction of the (geometric) Hecke eigensheaf corresponding to a (spectral) irreducible local system for $G = \mathrm{GL}(n)$, joint with Frenkel and Vilonen and extending the work of Drinfeld for $n = 2$; his construction with Braverman of (geometric) Eisenstein series corresponding to (spectral) reducible local systems, following special cases established by Laumon; his remarkable application of the nearby-cycles functor from algebraic geometry to geometric Langlands; his work with Braverman and Finkelberg on the Uhlenbeck compactification—work which may also extend some of the theory of Eisenstein series from G to a Kac-Moody group; and his proof of a miraculous duality for the stack of G-bundles and its role in the functional equation for Eisenstein series.

The geometric Langlands program is most naturally formulated in terms of derived categories. The conjectural reciprocity law then becomes a statement about the existence of an equivalence between two categories, and is known as the categorical Langlands conjecture. The derived category for the geometric side is the category of D-modules on the stack of G-bundles on X. On the spectral side, it is the category of quasi-coherent sheaves on the stack of local systems for the dual group of G. However, the category on the spectral side has suffered from a number of internal contradictions. In two recent, fundamental papers, Gaitsgory and Arinkin were able to correct this problem. The authors introduced a larger category for the spectral side, which they were then able to relate to a more familiar category based on parabolic subgroups of G. The revised categorical Langlands conjecture is very elegant and bears a closer resemblance to the original arithmetic Langlands program. In particular, it introduces objects that correspond in the arithmetic program to the expected automorphic representations that occur in the discrete spectrum but which do not satisfy the generalized Ramanujan conjecture.

The two papers of Gaitsgory with Arinkin represent the state of the art for the geometric Langlands program. Despite (or perhaps because of) their abstraction, they contain many beautiful ideas. They can be seen as marvelous examples of the unity of mathematics.

Gaitsgory's recent work on these topics appears in "Singular support of coherent sheaves and the geometric Langlands conjecture", *Selecta math. (N.S.)* **21** (2015), 1–199 (with D. Arinkin), "Geometric constant term functor(s)", *Selecta math. (N.S.)* **22** (2016), 1881–1951 (with V. Drinfeld), "A strange' functional equation for Eisenstein series and miraculous duality on the moduli stack of bundles", arXiv: 1404.6780, and "The category of singularities as a crystal and global Springer fibers", arXiv: 1412.4394 (with D. Arinkin). Earlier notable publications include "On a vanishing conjecture appearing in the geometric Langlands correspondence", *Annals of Mathematics (2)* **160** (2004), no. 2, 617–682 and "Geometric Eisenstein series", *Inventiones Mathematicae* **150** (2002), no. 2, 287–384 (with A. Braverman).

Biographical Note

Dennis Gaitsgory received his PhD in 1998 from Tel Aviv University, where he studied with Joseph Bernstein. He was a Junior Fellow at Harvard (1997–2001) and a Clay Research Fellow (2001–2004). He held his first faculty position at the University of Chicago (2001–2005), and is currently a professor of mathematics at Harvard University.

His research focuses on the Geometric Langlands Theory in its various aspects (local and global, classical and quantum), and its relation to other areas of mathematics (geometry of moduli spaces of bundles on curves, the theory of D-modules, derived algebraic geometry, representations of Kac-Moody Lie algebras).

He was a recipient of the prize of the European Mathematical Society in 2000, and of a Simons Fellowship in 2015–2016.

Response from Dennis Gaitsgory

I am immensely honored to receive the Chevalley prize.

I remember a phrase of my PhD advisor, Joseph Bernstein, that in addition to the three commonly known pillars of mathematics (algebra, analysis and geometry), there is the fourth one—Lie theory, which describes the fundamental laws of symmetry. The mathematical objects produced by Lie theory are obtained by coupling a certain combinatorial data (Dynkin diagram, or more generally a root datum) to another type of mathematical structure. In its most basic incarnation, when this other piece of structure is a field, we obtain Chevalley groups.

As an aside, Claude Chevalley and my advisor's advisor, I.M. Gelfand, were at the origin of the above philosophy. A significant part of the work of the founder of this prize, G. Lusztig, can be seen in this light as well.

The Langlands correspondence is a striking property of Lie theory. It says that given a root datum, its coupling to a certain family of mathematical data (let us call it A-data) produces an object equivalent to one obtained by coupling the *dual root datum* with another type of data (call it B-data). The proximity of our terminology (i.e., A and B) to that appearing in quantum field theory is not a coincidence.

The geometric Langlands theory is a particular case of this phenomenon. Here, the A-coupling produces the category of D-modules on the moduli space of G-bundles on a given algebraic curve, and the B-coupling produces the category of quasi-coherent sheaves on the stack of G-local systems on the same curve.

My current perspective is that at its most fundamental, the geometric Langlands theory appears in its quantum version, where one can (hope to) trace the geometric Langlands phenomenon down to its source, i.e., directly relate the corresponding categories of D-modules to combinatorial data. Namely, one starts with a root datum and a *quantum parameter* and explicitly produces a certain geometric object, called a *factorization algebra* (technically, this is a family of perverse sheaves on configuration spaces of colored divisors). The categories on both the A and the B sides should be related by explicit procedures to the category of modules over this factorization algebra.

I am thrilled that my work has been recognized as a contribution to the development of Lie theory.

On this occasion, I would like to thank the people who have mentored me throughout my career: Sasha Beilinson, Joseph Bernstein, Vladimir Drinfeld and David Kazhdan. I am grateful to Dima Arinkin for the very inspiring collaboration. Finally, I would like to thank Jacob Lurie, for opening my eyes onto the world of higher categories, which became key technical tools in the geometric Langlands theory.

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

Karen Hunger Parshall

The 2018 Albert Leon Whiteman Prize of the American Mathematical Society is awarded to Karen Hunger Parshall of the University of Virginia for her outstanding work in the history of mathematics, and in particular, for her work on the evolution of mathematics in the USA and on the history of algebra, as well as for her substantial contribution to the international life of her discipline through students, editorial work and conferences.

Professor Parshall has a long and distinguished publishing record in the history of mathematics: four seminal books, one monograph, four co-edited volumes, more than fifty research papers, and a great number of reviews and papers directed at wider audiences. She has particularly studied two themes: the evolution of mathematics in the USA and the history of algebra. Concerning the first theme, she co-authored with D. Rowe *The Emergence of the American Mathematical Research Community (1876–1900)* (AMS, 1994). She subsequently extended that work to the year 1950 in numerous research papers. As for her second research focus, the history of algebra, she has produced decisive works in the history of the theory of algebras, of invariant theory, and of the theory of finite groups, as well as a synthesis, co-authored with V. Katz, *Taming the Unknown: A History of Algebra from Antiquity to the Early Twentieth Century* (Princeton University Press, 2014). At the intersection of these two themes, she devoted two major books to the towering figure of British mathematician James Joseph Sylvester (1814–1897), his mathematical research as well as his role in the creation of the Mathematics Department at the Johns Hopkins University and the founding of the *American Journal of Mathematics*.

Parshall unites approaches long thought to be contradictory. She masters impressive amounts of archival evidence, applies utmost scrutiny and competence in analyzing both mathematical content and institutional contexts, and establishes links between local mathematical environments and the appreciation of particular mathematical objects within those environments. Examples include her fine comparison of German and Anglo-American approaches to invariant theory in the nineteenth century and her analysis of the way in which Sylvester applied his combinatorial and algebraic work to chemistry. She has also reflected on issues linking mathematics and society, for instance the internationalization of mathematics, and the place of women in mathematics.

Parshall excels in exposition. She gave a plenary lecture at the hundredth anniversary celebration of the Mathematical Association of America in 2015 and was an invited speaker at the International Congress of Mathematicians in Zürich in 1994 as well as at the Joint Mathematics Meetings in 1995, 2000, and 2008. She served on the editorial board of the *American Mathematical Monthly* (1996–2006) and of The *Mathematical Intelligencer* (1989–1992), and has written articles for the large audiences of these journals, in particular on the history of mathematical education. She has played a key role in developing the History of Mathematics into a professional discipline in the USA. Several former doctoral students of hers are now professors and researchers. As managing editor (1994-1996) and then editor (1996–1999) of *Historia Mathematica*, Chair of the International Commission for History of Mathematics for eight consecutive years, and co-organizer of several international conferences, she has also shaped the domain beyond national borders.

The depth and variety of her contributions, historical and mathematical, make her a natural and notable recipient of the Whiteman Prize.

Biographical Note

Karen Hunger Parshall is Commonwealth Professor of History and Mathematics at the University of Virginia. She earned her BA in French and mathematics as well as her MS in mathematics at Virginia before pursuing her graduate work at the University of Chicago. She earned her PhD in history there in 1982, working under the supervision of I. N. Herstein in mathematics and Allen G. Debus in the history of science.

She followed her first job, in the Mathematics Department at Sweet Briar College (1982–1987), with a year in the Mathematics Department at the University of Illinois at Urbana–Champaign. Since 1988, she has been on the faculty at the University of Virginia, where she has a joint appointment in the Departments of History and Mathematics, teaching the history of science in the History Department and mathematics and the history of mathematics in the Mathematics Department. This dual commitment has been reflected in her professional service. She has been actively involved with *Historia Mathematica*, an international journal for the history of mathematics, since the 1990s, serving as its Editor-in-Chief from 1996 to 1999. She also served as a member of the Councils of the American Mathematical Society (1998–2001) and of the History of Science Society (2001–2004). In 2002 and then again in 2006, she was elected to four-year terms as Chair of the International Commission.

She has been privileged to lecture on her research in many venues, among them, as an invited hour speaker at the International Congress of Mathematicians in Zürich (1994), as a plenary lecturer at the Joint Mathematics Meetings in San Francisco (1995), in Washington, D.C. (2000), and in San Diego (2008), and as one of the MAA's Centennial Speakers in Washington, D.C. (2013). She was particularly honored that her research was supported in 1996–1997 by both the John Simon Guggenheim Foundation and the National Science Foundation's Program for Visiting Professorships for Women and that it was recognized by her election (in 2002) as a Corresponding Member of the Académie internationale d'histoire des sciences and (in 2012) as an Inaugural Fellow of the American Mathematical Society.

Her most recent books are *Taming the Unknown: A History of Algebra from Antiquity to the Early Twentieth Century* (co-authored with Victor Katz) (2014) and *Bridging Traditions: Alchemy, Chemistry, and Paracelsian Practices in the Early Modern Era: Essays in Honor of Allen G. Debus* (co-edited with Michael T. Walton and Bruce Moran) (2015). She is currently at work on a book-length study of the American mathematical research community, 1920-1950.

Response from Karen Hunger Parshall

I am deeply honored and profoundly humbled to be named the 2018 recipient of the Albert Leon Whiteman Memorial Prize in the history of mathematics. Although the history of mathematics has a long history, going back in the western intellectual tradition at least to the work of Eudemus of Rhodes in the fourth century BCE, its recognition and institutionalization in the modern academy has by no means been automatic. Is it history? Is it mathematics? Is it somehow both? Is it somehow neither? These questions have had different answers as the history of mathematics has sought a niche in the intellectual continuum.

When I was an undergraduate at the University of Virginia trying to decide whether to go to graduate school in mathematics or in French, I had never heard of the history of science much less the history of mathematics. Those subjects just were not offered at UVA. Indeed, they were not offered at most colleges and universities. In my junior year, though, I had an amazing stroke of good fortune. My French advisor and mentor, Bob Denommé, convinced me that I was ready to dive into the graduate offerings, and he particularly steered me into the course, ostensibly on eighteenth-century French literature, offered that fall by the University's visiting professor from France. Little did I realize when I walked into that classroom, that the course was really going to be one on the history of eighteenth-century French science and that my professor, Jacques Roger, was one of the leading historians of science in France. By the end of that semester, I had discovered a whole new field and was being encouraged to choose it for graduate school. I would not have to decide between French and mathematics!

As an historian of science, I would need all of my languages, and, by working on the history of mathematics, I would need all of the mathematics I had had and more. But how would it work? Would I be able to get a job as an historian of mathematics? At a time before the internet, I sent off letters to a dozen historians and philosophers of science whose names I found in the library by looking up and reading their books. They did not know this UVA undergraduate from Adam, and several of them never answered or answered perfunctorily. One, though, the philosopher of science, Abner Shimony, at Boston University wrote me back a long and thoughtful letter with what in retrospect may have been idealistic advice. Still, it was just the advice that this idealistic undergraduate needed to hear: if you work hard at it, things will fall into place.

The first thing that fell into place was my admission to the University of Chicago's Morris Fishbein Center for the History of Science and Medicine in the Department of History. On my first visit to the campus after receiving my letter of acceptance, I met with two of the faculty members associated with the Center, its Director and ultimately my history of science advisor, mentor, and friend, Allen Debus, and Saunders Mac Lane. When I showed up at Mac Lane's office door and talked to him about my interests in the history of nineteenth- and twentieth-century algebra, he told me that we needed to go down the hall so that I could meet his colleague, Yitz Herstein. When I told Herstein what I wanted to work on, he said in an uncharacteristically Rhett Butleresque way "My dear, I have been waiting for you to walk through my door for fifteen years." From that moment on, I had an advisor in mathematics and, thanks to Chicago's interdisciplinarity, ended up taking half of the courses for my PhD in history in the Mathematics Department with Yitz, Irving Kaplansky, Jon Alperin, and Mac Lane. The dissertation that I subsequently produced on Wedderburn's contributions to the history of the theory of algebras was written under their steady mathematical gazes as well as with the benefit of the incisive historical critique of Allen Debus and my other professors in the history of science, especially Bob Richards and Noel Swerdlow. In working together to work with me, these mathematicians and historians of science gave me an answer to the question "what is the history of mathematics?" They showed me that it could and should be both history and mathematics, at the same time that it intimately intertwines the two.

Since 1988, when its then Dean of the Faculty, the physicist Hugh Kelly, made possible a completely unheard of fifty-fifty joint appointment for me in History and Mathematics, the University of Virginia has provided a challenging but supportive environment. There, I have pursued my research, trained graduate students in the history of mathematics, and introduced undergraduates to the amazingly rich histories of science and mathematics. I have continually benefitted from my daily bouncing back and forth between conversations with colleagues in both of my departments. Two in particular, my colleague in history, Joe Kett, and my colleague in mathematics, my husband Brian Parshall, have, through their respective insights, helped me become a better historian of mathematics. And, the same is true of my PhD students—Della Dumbaugh, Patti Hunter, Sloan Despeaux, Deborah Kent, and Laura Martini—while they were working on their dissertations and in the years since.

I also came to realize that, even though it may have seemed like I had to carve, with much help, my own academic niche, I was by no means alone. I came, through the Joint Mathematics Meetings and the efforts initially of Victor Katz and Fred Rickey, to realize that there was a vibrant community of historians of mathematics in the United States as well as internationally. Joe Dauben at the City University of New York, and the fourth Whiteman Memorial Prize winner, has been a constant source of professional inspiration throughout my career, as was the noted English historian of mathematics, Ivor Grattan-Guinness. Another friend and colleague, Albert Lewis, opened for me the treasure trove that is the Archive of American Mathematics. My debts to other colleagues and collaborators in the United States, Great Britain, France, the Netherlands, Germany, Spain, Italy, Mexico, Brazil, Australia, China, and elsewhere are simply too numerous to detail. Their work and the give-and-take in which we engage here at the Joint Mathematics Meetings as well as at meetings and less formal encounters around the world have helped us all to grow as historians of mathematics and the field to develop as a discipline at the interface between history and mathematics.

I extend my most heartfelt thanks to all of these colleagues as well as to the AMS's selection committee. My thanks also go to Sally Whiteman. She made the Alfred Leon Whiteman Memorial Prize possible and, in so doing, prominently recognized research in the history of mathematics within the broader mathematical research community.

AMS

American Mathematical Society

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 twenty-five years of service and as editor-in-chief of the *Bulletin of the American Mathematical Society* for twenty-one years. The endowment was made by Cole, contributions from Society members, and his son, Charles A. Cole. The Cole Prize in Algebra is awarded every three years for a notable paper in algebra.

Citation

Robert Guralnick

The 2018 Frank Nelson Cole Prize in Algebra is awarded to Robert Guralnick of the University of Southern California for his groundbreaking research on representation theory, cohomology, and subgroup structure of finite quasi-simple groups, and the wide-ranging applications of this work to other areas of mathematics.

Guralnick's paper "First cohomology groups of Chevalley groups in cross characteristic" (with Pham Huu Tiep), published in the *Annals of Mathematics* in 2011, establishes an explicit upper bound for the dimension of the cohomology groups $H^1(G;V)$, where G is a finite Chevalley group defined over the finite field of characteristic p, and V is an irreducible representation of G in characteristic $\neq p$. This bound extends previous results of Cline, Parshall, and Scott (which apply to representations in characteristic p) and is of key importance for the Aschbacher-Scott program of understanding maximal subgroups of arbitrary finite groups.

The paper "Bounds on the number and sizes of conjugacy classes in finite Chevalley groups with applications to derangements" (with Jason Fulman), published in *Transactions of the American Mathematical Society* in 2012, gives a sharp bound for the total number of irreducible representations of finite Chevalley groups, resolving a long-standing question. This bound played a key role in recent advances on several old conjectures in group theory, including the Ore Conjecture, and the non-commutative Waring Problem.

The paper "Products of conjugacy classes and fixed point spaces" (with Gunter Malle) published in the *Journal of the American Mathematical Society* in 2012, proves a strong generation result for finite simple groups. As consequences, the authors prove the 1966 conjecture of P.M. Neumann concerning fixed point subspaces in an irreducible representation of any finite group and a conjecture of Bauer, Catanese and Grunewald concerning unmixed Beauville structures (building on earlier work including that of Garion, Larsen and Lubotzky).

These papers represent only a small portion of Guralnick's overall contribution to group theory and adjacent areas, such as the inverse Galois problem, algebraic curves, arithmetic aspects of representation theory, expanders, etc. He is a prolific and dynamic problem solver, whose work has been getting more infuential with the passage of time, and he has become the "go-to" person for a wide range of mathematicians in need of group-theoretic expertise.

SPECIAL NOTE FROM THE SELECTION COMMITTEE: Vladimir Voevodsky, our colleague on the Prize Committee, passed away just before the completion of the selection process. His input in our deliberations was invaluable, and we know he would have been very pleased with the final outcome.

Biographical Note

Robert Guralnick was born and raised in Los Angeles and received both his undergraduate and graduate degrees from UCLA. He then spent two years as a Bateman Research Instructor at Caltech before moving to USC in 1979 where he is currently a professor. He served as department chair from 1990–1996 and has had visiting positions at Yale, Rutgers, MSRI, Caltech, Hebrew University, Cambridge, the Newton Institute, IAS and Princeton. He is a fellow of the AMS as well as the Association for the Advancement of Science. He was the G. C. Steward fellow at Caius College in Cambridge (2009). He was a Simons Foundation Fellow in 2012. He has given plenary talks at the annual meeting of the AMS (2013) and the British Math Colloquium (2014). He gave a distinguished PIMS lecture (2014) and an invited talk at the 2014 ICM in Seoul. He presented a distinguished lecture series at the Technion (2016). He served as the managing editor of the *Transactions of the AMS* (2004–2012) and is currently the managing editor of the *Forum of Math, Pi and Sigma*, an associate editor for the *Annals of Math* and is also on the editorial board of the *Bulletin of the AMS*.

Response from Robert Guralnick

I am tremendously honored and overwhelmed to receive the Frank Nelson Cole Prize of the American Mathematical Society. I would like to first thank Robert Steinberg, Michael Aschbacher and John Thompson for their encouragement and help during my years as a graduate student and in my early career (and beyond). I would also like to thank my many fantastic coauthors—in particular, Jason Fulman, Gunter Malle and Pham Huu Tiep—the coauthors on the papers mentioned in the citation for the prize—as well as Jan Saxl, Alex Lubotzky, Skip Garibaldi, Tim Burness and many others.

The classification of finite simple groups is one of the most momentous results in mathematics. It is unique in its length and complication. John Thompson's revolutionary work first on the odd order paper with Walter Feit and then even more significantly with the N-group papers developed the tools that allowed just the possibility that a classification could be completed. Daniel Gorenstein then had the audacity to organize an attempt to classify finite simple groups and as he had stated—the amazing achievements by Michael Aschbacher sped up the process immensely. The consequences of the classification have been ubiquitous and have had enormous consequences in group theory of course, but also in number theory, algebraic geometry, logic and many other areas. The classification is much more than a list of the finite simple groups. It says that the typical finite simple group is a finite group of Lie type—i.e., a finite analog of a simple algebraic or Lie group. Then one can use the theory of algebraic groups to study these finite groups. This allows us to know about representations in the natural characteristic and about the subgroup structure of these groups. Moreover, the Deligne-Luzstig theory and its subsequent developments allow us to study the representation theory of these finite simple groups in characteristic zero and in cross characteristic.

Many problems in diverse areas can be translated to problems in group theory typically via representation theory or permutation group theory. There are many reduction theorems (perhaps most notably the Aschbacher-O'Nan-Scott theorem) which further reduce problems to properties of finite simple groups. I am especially enamored of problems where the translation of the problem is interesting as well as the group theoretic solution (and determining which group theoretic solutions give rise to solutions of the original problem).

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

Henry Cohn

The 2018 Levi L. Conant Prize is awarded to Henry Cohn for his article "A Conceptual Breakthrough in Sphere Packing," published in 2017 in the *Notices of the AMS*.

In 2016, Maryna Viazovska gave an astounding solution to the sphere packing problem in dimension 8. Just a week later, Cohn, Kumar, Miller, Radchenko, and Viazovska solved the sphere packing problem in dimension twenty-four by similar ideas.

Cohn's article unfolds the dramatic story behind these proofs. What is special about 8 and 24 that makes the proof work only in these dimensions? The answer is that there are truly extraordinary sphere packings in these dimensions, arising from the E_8 lattice in dimension 8 that appears in Lie theory, and the Leech lattice in dimension 24 that is so closely connected with finite simple sporadic groups.

In 2003, Cohn and Elkies showed that the solution to the sphere packing problem in dimensions $d \in \{8, 24\}$ would follow from the existence of special functions on $\mathbb{R}^d$. They conjectured the existence of these functions, which have come to be known as *magic functions*. Calculations performed by Cohn, Elkies, Kumar, and Miller "left no doubt that the magic functions existed: one could compute them to fifty decimal places, plot them, approximate their roots and power series coefficients, etc. They were perfectly concrete and accessible functions, amenable to exploration and experimentation, which indeed uncovered various intriguing patterns. All that was missing was an existence proof." Viazovska not only provided the missing existence proof, she also gave a remarkable construction of the magic functions in terms of quasi-modular forms, establishing a deep new connection between sphere packings and number theory.

Throughout the article, Cohn adds motivation and insight. What hints were there of the relevance of modular forms? How do magic functions relate to the density of sphere packings? Why is a strategy based on linear programming more sensible than it initially appears? Why is the Fourier transform a powerful tool for understanding periodic point configurations?

Viazovska's breakthrough was one of the mathematical highlights of the year 2016. However, non-experts had no natural entry point to this exciting discovery. Cohn's beautiful exposition decisively addresses this lack, both illuminating the wide circle of ideas leading to the proof and drawing the contrast between the conclusive results in dimensions 8 and 24 and our almost complete lack of knowledge in other dimensions. This strange and striking tale will fascinate readers from every mathematical background.

Biographical Note

Henry Cohn received his PhD from Harvard University in 2000, and is now a principal researcher at Microsoft Research New England and an adjunct professor of mathematics at MIT. His research interests include discrete mathematics, broadly interpreted, and he particularly enjoys applying abstract mathematics to concrete problems. His interest in concrete mathematical structures was kindled in 1990 at the PROMYS summer math program for high school students, and he now coteaches the number theory classes at PROMYS and PROMYS Europe with Glenn Stevens. He received an AIM five-year fellowship in 2000 and the Lester R. Ford award in 2005, spoke in the combinatorics section at the 2010 ICM, and has been a fellow of the American Mathematical Society since 2015. Despite their isomorphic names, he and the French number theorist Henri Cohen are not in fact the same person.

Response from Henry Cohn

It's a pleasure and an honor to receive the 2018 Levi L. Conant Prize. The E_8 and Leech lattices are fascinating objects, and I hope readers will grow to love them as much as I do.

Of course this article would not exist if not for Maryna Viazovska's breakthrough. I am also grateful to Noam Elkies, Abhinav Kumar, Stephen D. Miller, and Danylo Radchenko for exploring this subject with me, to David Rohrlich and Glenn Stevens for the seminar that introduced me to modular forms, to Donald Cohn, Noam Elkies, Steven Kleiman, James Propp, and Susan Ruff for their insights on mathematical writing, and to my wife, Rachel Miller, for affectionately indulging my preoccupation with higher dimensions.

AWARD FOR DISTINGUISHED PUBLIC SERVICE

THIS award was established by the AMS Council in response to a recommendation from their Committee on Science Policy. The award is presented every two years to a research mathematician who has made a distinguished contribution to the mathematics profession during the preceding five years.

CITATION

Sylvain Cappell

The 2018 AMS Award for Distinguished Public Service is presented to Sylvain Cappell, Julius Silver Professor of Mathematics at New York University, for his remarkable mentoring of talented young mathematicians, his dedication to protecting human rights, and his extraordinary involvement in outreach. During his years at the Courant Institute, Cappell has displayed an exceptional ability to recognize and nurture mathematical talent. He was a founder of the Courant Institute's Center for Mathematical Talent and has continuously served on its board. Cappell has identified, counseled, and mentored dozens of mathematicians starting at the primary levels through to the university and professoriate. Many of these individuals went on to distinguished careers in mathematics. For several decades, he mentored faculty and developed math-related workshops for the Faculty Resource Network. Cappell has also immersed himself in service to the mathematics profession in other ways. He has been an eloquent spokesman for human rights, serving for two decades on the Advisory Boards for the Committee of Concerned Scientists and the academic organization Scholars at Risk. He has served as advisor to organizations ranging from the Rothschild Foundation and CalTech to NYC Math Circles, the Museum of Mathematics, and Math for America.

Mathematicians focused on research often forget that their profession requires public service in order sustain it. Sylvain Cappell is a model for all mathematicians—a distinguished research mathematician devoted not only to doing mathematics but also to nurturing and serving it well.

Biographical Note

Sylvain Cappell was born in Belgium in 1946 to Holocaust survivors. His parental family immigrated to the U.S. in 1950. He obtained his BA (Summa Cum Laude) from Columbia University in 1966 in math (while taking enough literature courses for a major), where he studied with Samuel Eilenberg. He obtained his PhD in mathematics from Princeton in 1969, working under the supervision of William Browder; and then to 1974 held academic appointments there.

Since 1974 he has been at NYU's Courant Institute of Mathematical Sciences, a full professor since 1978, and in 2008 was appointed by NYU to its Julius Silver Professorship. He has also held visiting faculty appointments at Harvard University, the University of Pennsylvania, Weizmann Institute of Science, the Institut des Hautes Études Scientifiques and the Institute for Advanced Study.

His 100 scientific publications include research works on geometric topology and its connections to many other areas of mathematics, including algebraic, symplectic, combinatorial and differential geometry, as well as algebraic K-theory and global analysis. He was awarded both Sloan Foundation and Guggenheim Foundation Fellowships and has given invited addresses to both the American Mathematical Society and the International Congress of Mathematicians. He has chaired and served on external review committees for many leading universities, foundations, government science agencies and research institutes in the U.S. and abroad. He has served on, including as chair, American Mathematical Society national committees, on the Council of the AMS, on the AMS Executive Committee and subsequently as Vice President of the AMS (2010–2013) and is an inaugural Fellow of the AMS. At NYU he has twice been Chair of the Faculty Senate. He co-edited the two volumes of *Surveys on Surgery Theory,* published by Princeton University Press.

Professor Cappell has supervised nineteen doctoral theses, two at Princeton and seventeen at NYU. Several of his former students and postdocs have chaired leading math departments in the U.S. and Europe, and these and others have been research and educational leaders. His extensive, long-term involvements in math education of young people include serving from its inception on the Advisory Council of the Museum of Mathematics and as advisor to the Math-for-America Foundation. He has long mentored math gifted students of all ages in the tri-state region.

Professor Cappell is fluent and lectures in several languages, including French (his first language) and Hebrew. He lives in Greenwich Village with his wife Amy Cappell. They'd met as students in Bronx High School of Science (some students of which he has mentored over the years). His wife of thirty years taught art at Stuyvesant High School (from which Professor Cappell also over the years mentored students). They have four children and four grandchildren, all living in New York City.

Response from Sylvain Cappell

I'm deeply honored to receive this award. Whatever efforts I've made which it denotes are a small return for my great good fortune in having had a mathematical life in which I've enjoyed inspiring great teachers, brilliant, long-term, research collaborators who made working sessions in Greenwich Village cafes and elsewhere a delight, consistently supportive colleagues at Courant Institute with whom I've shared scientific and educational goals, and wonderful students from youngsters to doctoral and postdocs with whom adventures in learning and working together have been a joy.

I'd like to acknowledge some of the outstanding inrstitutions with which I've long been privileged to work on math educational and outreach activities.These include the National Museum of Mathematics, the Courant Institute's Center for Mathematical Talent, the Math-for-America Foundation, the New York Math Circles and the Faculty Resource Network. I've also been privileged to be involved with great human rights work in academia worldwide accomplished by the Committee of Concerned Scientists and by Scholars-at-Risk. Unfortunately, the need for such dedicated academic human rights efforts is not yet diminishing.

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

Sergey Fomin and Andrei Zelevinsky

The 2018 Steele Prize for Seminal Contribution to Research in Discrete Mathematics/Logic is awarded to Sergey Fomin and Andrei Zelevinsky (posthumously) for their paper "Cluster algebras I: Foundations," published in 2002 in the *Journal of the American Mathematical Society*.

The paper "Cluster algebras I: Foundations" is a modern exemplar of how combinatorial imagination can influence mathematics at large. Cluster algebras are commutative rings, generated by a collection of elements called cluster variables, grouped together into overlapping clusters. These variables are produced by a recursive combinatorial procedure called mutation, starting from an initial cluster of algebraically independent variables. Originally, cluster algebras were introduced to provide a combinatorial approach to total positivity in algebraic groups and Lusztig's canonical bases of quantum groups. However, in the fifteen years since their introduction, cluster algebras have been shown to be important in many seemingly different areas of mathematics, including root systems, Poisson geometry, Teichmüller theory, quiver representations, integrable systems and quantum affine algebras. This paper is a work of lasting importance, both for its varied applications and for the intrinsic beauty of the theory.

Biographical Note

Sergey Fomin is the Robert M. Thrall Collegiate Professor of Mathematics at the University of Michigan. Born in 1958 in Leningrad (now St. Petersburg), he received an MS (1979) and a PhD (1982) from Leningrad State University, where his advisor was Anatoly Vershik. He then held positions at St. Petersburg Electrotechnical University and the Institute for Informatics and Automation of the Russian Academy of Sciences. Starting in 1992, he worked in the United States, first at Massachusetts Institute of Technology, and then, since 1999, at the University of Michigan.

Fomin's main research interests lie in algebraic combinatorics, including its interactions with various areas of mathematics such as representation theory, Schubert calculus, probability theory, and computational complexity. He is the current Managing Editor of the *Journal of the AMS*, a member of the AMS Council, and a Fellow of the AMS. He served on advisory boards for MSRI and HSE Moscow, and was an invited speaker at the ICM in Hyderabad in 2010.

Biographical Note

Andrei Zelevinsky was born in Moscow in 1953. A graduate of Moscow's famed High School #2, he studied at the mathematics department of the Moscow State University (PhD 1978) where his main mentors were Joseph Bernstein, Israel Gelfand, and Alexandre Kirillov. He worked at the Institute of Earth Physics and at the Scientific Council for Cybernetics of the Soviet Academy of Sciences before moving to the United States in 1990. After a year at Cornell, he took up a professorship at Northeastern University in Boston, where he remained until his untimely death in April 2013.

Andrei Zelevinsky made fundamental contributions to representation theory of p-adic groups (with Bernstein), generalized hypergeometric systems (with Gelfand and M. Kapranov), algebraic combinatorics, total positivity, quiver representations, and cluster algebras (with various collaborators). He was an invited speaker at the ICM in Berlin (1998), a Fellow of the AMS (2012), and a recipient of the Humboldt Research Award (2004). He served on the Scientific Advisory Committee of MSRI, and on editorial boards of several leading research journals. Northeastern University posthumously honored Zelevinsky by a Distinguished University Professorship, and by inaugurating a postdoctoral program named after him, the Andrei Zelevinsky Research Instructorships.

Response from Sergey Fomin

It is a great honor to receive the Leroy P. Steele Prize from the AMS. I am thankful to the prize committee for their selection. I would like to view it as a sign of appreciation for the inherent beauty and importance of the field of algebraic combinatorics, the mathematical love of my life.

The feeling is bittersweet, as my co-author Andrei Zelevinsky did not live to enjoy this recognition of his research accomplishments. He was a dear friend, an inspiring teacher, and a brilliant mathematician.

Although Andrei and I lived until our mid-thirties in Moscow and St. Petersburg, a short train ride from each other, we first met in 1992 in Boston, where our 20-year-long collaboration took root. I am forever thankful to the fate—and to Andrei—for this most momentous partnership of my professional life.

We discovered cluster algebras in May 2000 at the Erwin Schrödinger Institute in Vienna. George Lusztig's pioneering work on total positivity and canonical bases was a major source of inspiration. Our mathematical tastes and philosophies were deeply influenced by our mentors Joseph Bernstein, I. M. Gelfand, Richard Stanley, and A. M. Vershik. Last but not least, I would like to acknowledge the great many mathematicians who over the years contributed to the development of the theory of cluster algebras. I hope that this field continues to thrive, finding new exciting applications.

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

Martin Aigner and Günter Ziegler

The 2018 Steele Prize for Mathematical Exposition is awarded to Martin Aigner and Günter M. Ziegler of the Freie Universität Berlin, for *Proofs from THE BOOK*. It is almost impossible to write a mathematics book that can be read and enjoyed by people of all levels and backgrounds, yet Aigner and Ziegler accomplish this feat of exposition with virtuoso style. The inspiration for this book is Paul Erdős' assertion that there is a celestial book where perfect proofs are kept. In *Proofs from THE BOOK*, the authors have collected a great number of sparkling little mathematical gems that are their candidates for Erdős book. These mathematical vignettes are drawn from number theory, geometry, analysis, combinatorics, and graph theory. Most of the topics in the book require only a modest mathematical background, so that it is suitable for undergraduates and mathematically inclined non-specialists. This is not to say that the mathematics is simple—even if the masterful exposition often makes it seem that way; there are answers to questions asked by Hilbert, Borsuk, Sylvester and, of course, Erdős himself. For the research mathematician, the appeal of the book is that the proofs themselves are indeed beautiful. Aigner and Ziegler have succeeded in writing a book in which the density of elegant ideas per page is extraordinarily high, and they sustain this quality throughout the text. It is also worth noting that it is not just the mathematics that is aesthetically pleasing, the authors did the typesetting themselves, and the cartoons by mathematician Karl Heinrich Hofmann add a light-hearted touch. This book does an invaluable service to mathematics, by illustrating for non-mathematicians what it is that mathematicians mean when they speak about beauty.

Biographical Note

Martin Aigner was born in 1942 in Linz, Austria. In 1960 he started his studies of mathematics, physics and philosophy at the University of Vienna, and received his PhD in mathematics from the same university in 1965. After shorter stays at various institutions in the USA he worked from 1968 to 1970 as research associate with Raj Chandra Bose at the University of North Carolina at Chapel Hill during the Special Combinatorics Year Program. He moved to Tübingen, Germany, with a Habilitations-Fellowship of the German Science Foundation in 1970, and became professor at the Freie Universität Berlin in 1973. He has been in Berlin ever since, from 2010 on as professor emeritus.

His field of research is enumerative and algebraic combinatorics, graph theory and search theory. He is the author of twelve books, among them the monographs *Combinatorial Theory* (Springer 1979), reprinted in the Springer *Classics in Mathematics* series 1997, *Combinatorial Search* (1988), *A Course in Combinatorics* (2007), and *Proofs from THE BOOK* (with Günter M. Ziegler, Springer 1998++), which is available in fourteen languages.

He is a member of the Austrian Academy of Sciences and the Berlin-Brandenburg Academy of Sciences and Humanities. In 1996 he received a Lester R. Ford Award of the MAA. He was the Richard-Rado-Lecturer at the British Combinatorial Conference in 2001, and acted as Vice President of the Organizing Committee for the ICM 1998 in Berlin.

Biographical Note

Günter M. Ziegler was born in München, Germany, in 1963. He got a PhD at MIT with Anders Björner in 1987. After four years in Augsburg and a winter in Stockholm he arrived in Berlin in 1992. In 1995 became a professor of Mathematics at TU Berlin, in 2011 he moved to Freie Universität Berlin. He has been a member of the DFG Research Center MATHEON "Mathematics for Key Technologies" since its start in 2002. He was the founding chair of the Berlin Mathematical School, which he now chairs again.

2006–2008 he was the President of the German Mathematical Society DMV. He is a member of the executive board of the Berlin-Brandenburg Academy of Sciences and Humanities, a member of the German National Academy of Sciences Leopoldina, and an inaugural Fellow of the AMS. Since 2014 he is a member of the Senate of the German Science Foundation DFG. His research centers on discrete geometry (especially polytopes), as well as on questions in algebraic topology motivated by geometric problems. His honors include a gold medal at the International Mathematics Olympiad (1981), a DFG Leibniz Prize (2001), an ERC Advanced Grant (2010) and the 2004 Chauvenet Prize of the MAA.

He is active in science communication, contributing to a multi-faceted and lively image of mathematics in public. He initiated and co-organized the German

National Mathematics Year 2008 and now directs the DMV Mathematics Media Office. He is the recipient of the 2008 Communicator Award of DFG and Stifterverband.

His books include *Lectures on Polytopes* (Springer 1995), *Proofs from THE BOOK* (with Martin Aigner, Springer 1998++), and *Do I Count? Stories from Mathematics*, CRC 2013.

Response from Martin Aigner and Günter M. Ziegler

We feel very honored to receive the Leroy P. Steele Prize for Mathematical Exposition for our book *Proofs from THE BOOK*.

It was more than twenty years ago that the idea to this project was born during some leisurely discussions with the incomparable Paul Erdős at the Mathematisches Forschungsinstitut in Oberwolfach. We suggested to him that we turn his famous saying of the celestial book (in which God keeps the perfect proofs for mathematical theorems) into a first (and very modest) approximation to THE BOOK. He was enthusiastic about the idea and suggested right away a few examples. Our book was supposed to appear in March 1998 as a present to Erdős for his 85th birthday. With Paul's unfortunate death in 1996, the book is instead dedicated to his memory.

We have no definition or characterization of what constitutes a proof from THE BOOK: All we offer is the examples that we have selected, hoping that the readers would share our enthusiasm about brilliant ideas, clever insights and wonderful observations. To make the book attractive to a large readership we selected only topics that require a modest mathematical background, but would still be interesting for the research mathematician for the sheer beauty of the argument or the intriguing open problems that remained. A lot of energy and care went into the most elegant and appealing presentation of the results and proofs that we could achieve. A book about beauty in mathematics naturally requires an equally attractive appearance. An enormous amount of time went into the crafting of the text and the margins, the selection of the photos, and the pictures and illustrations. We are very grateful to Karl H. Hofmann for his masterful cartoons that put the final touch to the make-up of the book.

At the time when we started the project we could not possibly imagine the wonderful and lasting response our book about THE BOOK would have, with all the warm letters and interesting comments, new editions, and thirteen translations as of now. It has grown over the years from 30 to 45 chapters, and as suggestions for new chapters are coming in every month, who knows... We are extremely thankful for this warm reception and seemingly never-ending interest. It is no exaggeration to say that THE BOOK has become a part of our lives.

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

Jean Bourgain

The 2018 Steele Prize for Lifetime Achievement is awarded to Jean Bourgain, IBM von Neumann Professor in the School of Mathematics at the Institute for Advanced Study, for the breadth of his contributions made in the advancement of mathematics.

Jean Bourgain is a giant in the field of mathematical analysis, which he has applied broadly and to great effect. In many instances, he provided foundations for entirely new areas of study and in other instances he gave mathematics new tools and techniques. He has solved long-standing problems in Banach space theory, harmonic analysis, partial differential equations and Hamiltonian dynamics. His work has had important consequences in probability theory, ergodic theory, combinatorics, number theory, computer science and theoretical physics. His vision, technical power and broad accomplishments are astounding.

Bourgain has so many striking results to his credit that it is difficult to select his most important contributions. His breakthroughs include the highly original proof of global existence for critical nonlinear Schrödinger equations–a proof whose techniques have been universally adopted; the first proof of the invariance of the Gibbs measure associated to certain infinite-dimensional Hamiltonian systems—a work that bridges Partial Differential Equations, Probability Theory and Mathematical Physics; and the proof of the local Erdős-Volkmann Ring Conjecture—a proof that laid the groundwork for the so-called Sum-Product Theory and its subsequent development. With Alex Kontorovich, Bourgain developed the "circle method," which has striking applications to integral Apollonian packings and the Zaremba Conjecture. In recent breakthroughs, Bourgain and Ciprian Demeter proved the l^2 Decoupling Conjecture and Bourgain, Demeter and Larry Guth proved the Vinogradov Mean Value Theorem.

Biographical Note

Jean Bourgain was born 1954 in Oostende (Belgium). He earned his PhD in 1977 under the supervision of Freddy Delbaen. From 1975 (until 1984) he held a position at the Belgian science foundation. In 1985, he was appointed to IHES faculty, and the same year he also started a halftime position at the University of Illinois as J. L. Doob professor. He joined the Institute for Advanced Study in 1994 as part of the School of Mathematics.

Bourgain was elected Associé Entranger de l'Academie des Sciences in 2000, Foreign Member of the Polish Academy in 2000, Foreign Member of Academia Europea in 2008, Foreign Member of the Royal Swedish Academy of Sciences in 2009, Foreign Associate of National Academy of Sciences in 2011 and Foreign Member of the Royal Flemish Academy of Arts and Sciences in 2013.

Bourgain has been awarded numerous prizes and awards including the Alumni Prize, Belgium NSF 1979, Empain Prize, Belgium NSF 1983, Salem Prize 1983, Damary-Deleeuw-Bourlart Prize 1985, Langevin Prize 1985, E. Cartan Prize 1990, Ostrowski Prize 1991, Fields Medal 1994, I. V. Vernadski Gold Medal 2010, Shaw Prize 2010, Crafoord Prize 2012, Title of Baron of Belgium 2016 and the Breakthrough Prize in Mathematics 2017.

Response from Jean Bourgain

I am deeply honored and grateful to receive the 2018 Steele Prize for Lifetime Achievement. Over the years, I have been fortunate to meet and interact with some remarkable individuals, with different interests and styles, from whom I learned a lot. They played a decisive role in introducing me to new subjects and encouraging my research. A large part of my work is also the result of fruitful collaborations with both junior and senior researchers, sometimes over an extended period of time. I am most grateful to them.

Exceptional working conditions also allowed me full scientific dedication. At an early career stage, it was an appointment at the Belgian Science Foundation. Later in the mid-eighties a professorship at the IHES in Bures/Yvette and at the University of Illinois Urbana–Champaign, and since 1994 at the Institute for Advanced Study in Princeton. The intensity of scientific life and exposure to new ideas they offer was and is a great experience and I would like to thank them for their trust.

At the present time mathematics is an extremely active science and its future bodes well for its constant progress both for solving old problems and opening new areas of research.

SADOSKY RESEARCH PRIZE IN ANALYSIS

THE Executive Committee of the Association for Women in Mathematics established the AWM-Sadosky Research Prize in Analysis in 2012. First presented in 2014, the prize is awarded every other year. The purpose of the award is to highlight exceptional research in analysis by a woman early in her career. The field will be broadly interpreted to include all areas of analysis. Candidates should be women, based at US institutions who are within ten years of receiving their Ph.D., or having not yet received tenure, at the nomination deadline.

The AWM-Sadosky Research Prize serves to highlight to the community outstanding contributions by women in the field and to advance the careers of the prize recipients. The award is named for Cora Sadosky, a former president of AWM and made possible by generous contributions from Cora's husband Daniel J. Goldstein, daughter Cora Sol Goldstein, friends Judy and Paul S. Green and Concepción Ballester.

CITATION

Lillian Pierce

The 2018 AWM Sadosky Research Prize in Analysis is awarded to Lillian Pierce in recognition of her outstanding contributions to harmonic analysis and analytic number theory. Pierce is one of the most talented, original and visionary analysts of her generation. Her research spans and connects a broad spectrum of problems ranging from character sums in number theory to singular integral operators in Euclidean spaces. She has made far-reaching contributions to the study of discrete analogs of harmonic-analytic integral operators, taking inspiration in classical Fourier analysis, but drawing also on methods from analytic number theory such as the circle method and diophantine approximation. In her recent work with Po Lam Yung, hailed as a remarkable breakthrough and a tour de force, she proved a polynomial Carleson theorem for manifolds, connecting two major directions of research in harmonic analysis and opening up entirely new research programs. Pierce's work on estimating short character sums, on her own and then in collaboration with Roger Heath-Brown, has produced the first significant advance in several decades on this central and difficult problem in analytic number theory. Pierce is highly regarded for her broad vision, deep knowledge of several areas of mathematics, and outstanding technical skill. Her leadership and influence in the field are widely acknowledged.

Lillian Pierce received her Ph.D. degree in 2009 from Princeton University, and has held appointments at the Institute for Advanced Study, Oxford University, and the Hausdorff Center for Mathematics before assuming her current position at Duke University. She is the recipient of a Marie Curie Fellowship, NSF Mathematical Sciences Postdoctoral Research Fellowship, and an NSF CAREER award. She has a visible and active presence in the mathematical community. Her award of the AWM-Sadosky Prize is a worthy testament to her excellence.

Response from Lillian Pierce

I am greatly honored to receive the AWM-Sadosky Research Prize in Analysis. The frontier between harmonic analysis and number theory seems to become more vivid and intriguing with each year, and I am delighted that results in both fields, and their intersection, are cited for this award, including collaborations with Roger Heath-Brown and Po-Lam Yung.

Although I did not get to meet Cora Sadosky, I indulge in feeling a kinship with her, as two descendants in the Calderón-Zygmund family. In reading reminiscences of Cora's work and life, it seems that one of her lessons for us is how effectively a mentor's personal impact can set a young career in motion. That was true for me, starting with the courses in analysis Elias Stein gave at Princeton when I was an undergraduate. The crystalline clarity of his lectures, writings, and discussions led me to a career in mathematics, and harmonic analysis in particular; then the mentorship of Roger Heath-Brown and Peter Sarnak allowed me to make a leap into analytic number theory. I feel tremendous gratitude for these generous mentors who continue to inspire me with new problems, and also for the creativity and technical expertise of my collaborators, from whom I have learned so much.

LOUISE HAY AWARD FOR CONTRIBUTION TO MATHEMATICS EDUCATION

THE Executive Committee of the Association for Women in Mathematics (AWM) established the Louise Hay Award for Contribution to Mathematics Education in 1990. 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

Kristin Umland

In recognition of her leadership and contributions advancing large-scale improvement in mathematics education, the AWM presents the 2018 Louise Hay Award to Kristin Umland. Umland's work has exemplified a passion for engaging learners in worthwhile mathematics while seeking to enhance and support their instruction. She has revamped mathematics courses for non-mathematics majors and for prospective teachers, led collaborative professional development projects for K-12 teachers in New Mexico, and investigated the impact of Math Teachers' Circles.

Recently Umland has been instrumental in the development of Illustrative Mathematics, a heavily used, online mathematics resource that advances improvement in mathematics education through a rich, coherent collection of over 1,200 vetted instructional tasks, as well as assessment items, lesson plans, and professional development modules. Because she is responsible for content development, Umland regularly oversees a professional community of dozens of educators who serve as editors and reviewers while deepening their knowledge of mathematics as they create, discuss, and use tasks.

Umland has effectively bridged the domains of mathematics, education, and policy as evidenced by the many workshops and sessions that she has organized for national meetings, bringing together veteran and emerging scholars from the fields of mathematics and mathematics education. Characterized by her nominators "as a mathematician, an educator, a project manager, a seeker and developer of talent, [and a] moderator," Kristin Umland exemplifies the tradition of Louise Hay and is richly deserving of the 2018 Louise Hay Award.

Response from Kristin Umland

Louise Hay was the Head of the Department of Mathematics at UIC from 1979 to 1989, the year she died; I began my Ph.D. program there three years later. While I never knew her, I benefitted from her legacy. I want to share three illustrations of the spirit of the department that she helped shape.

During my first semester of graduate school, Bhama Srinivasan asked me why I hadn't yet signed up for the second semester of her algebra course. I told her it was because I had spent all of the money I had saved on tuition for the first semester; she was surprised that I didn't have funding. Immediately, she helped secure me a teaching assistantship, and I was able to sign up for the second term—and continue on to finish graduate school.

Judith Baxter was hugely influential on my growth as a teacher. Her energy and enthusiasm for supporting graduate students in their teaching and academic goals was boundless. Early in my teaching career, I supervised other instructors and TAs in my new department; Judy was my role model.

I would not have been able to accomplish what I have to date without the unwavering support of my PhD advisor, Stephen Smith. He represents the ideal qualities of an academic and professional mentor: someone who pushes you to do your best, helps you to achieve your most ambitious goals, and values and celebrates your accomplishments in any area of mathematical work that you choose.

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 twenty-three 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

Erica Flapan

The Association for Women in Mathematics is pleased to present its eighth annual M. Gweneth Humphreys Award to Erica Flapan, the Lingurn H. Burkhead Professor of Mathematics at Pomona College.

Flapan's dedication to her students is exceptional, and she has received awards for teaching and advising at her home institution as well as at the national level. She has also devoted many of her summers to teaching in mathematics programs and institutes, most often at the Summer Math Program for Women at Carleton College. She has served as a mentor to more than sixty female undergraduates, many of whom have gone on to receive their doctorates and have careers in mathematics.

Students describe Flapan as a role model who serves as a champion for undergraduate women in mathematics. She inspires confidence in her students, yet her "pragmatism and directness are refreshing." She has been described as having a special talent for identifying when students may need extra support, and she "listens with kindness and magnanimity." As one student wrote, "Knowing that I essentially still had an advisor, even after I graduated, meant the world to me."

In the classroom, she has high expectations and demands rigor, but is also known as someone who tells "hilarious stories" and organizes community-building activities. As one student wrote, "Erica Flapan singlehandedly changed my perception of mathematics, mathematicians, and my place within the field." Another student shared a message from Dr. Flapan that resonated with her profoundly: "There is a place in mathematics for all of us." The AWM is proud to pay tribute to Erica Flapan's devotion to mentoring and advising.

Response from Erica Flapan

I am honored to have been selected for this prestigious award and deeply grateful to Deanna Haunsperger, Helen Wong, and numerous former students for nominating me. The most satisfying aspect of my thirty-four years of teaching mathematics has been mentoring students and helping them identify and achieve their goals. I have been extremely lucky to have the opportunity to get to know and mentor so many wonderful women students at Pomona College and at the Carleton College Summer Mathematics Program for Women (SMP). In particular, being an instructor for eleven summers at SMP changed my life in ways I could never have predicted. Above all, it enabled me to be part of a growing community of women in mathematics at all stages from undergraduates, to graduate students, to faculty members. The experience of mentoring these women and watching them develop into mathematicians who teach and mentor their own students is something I will always cherish. This could not have happened without the vision and leadership of Deanna Haunsperger and Stephen Kennedy. I cannot thank them enough for having given me the opportunity to be part of SMP.

MICROSOFT RESEARCH PRIZE IN ALGEBRA AND NUMBER THEORY

THE Executive Committee of the Association for Women in Mathematics established the AWM-Microsoft Research Prize in Algebra and Number Theory in 2012. First presented in 2014, the prize is awarded every other year. The purpose of the award is to highlight exceptional research in some area of algebra by a woman early in her career. The field will be broadly interpreted to include number theory, cryptography, combinatorics and other applications, as well as more traditional areas of algebra. Candidates should be women, based at US institutions who are within ten years of receiving their Ph.D., or having not yet received tenure, at the nomination deadline.

The AWM-Microsoft Research Prize serves to highlight to the community outstanding contributions by women in the field and to advance the careers of the prize recipients. The award is made possible by a generous contribution from Microsoft Research.

CITATION

Melanie Matchett Wood

The 2018 AWM-Microsoft Research Prize in Algebra and Number Theory is presented to Professor Melanie Matchett Wood, in recognition of her exceptional research achievements in Number Theory and Algebraic Geometry. Melanie Matchett Wood received her doctorate in 2009 from Princeton University. She is currently a Professor at the University of Wisconsin-Madison, after appointments at the American Institute of Mathematics, Stanford University, and Mathematical Science Research Institute. Wood has made deep and influential contributions to number theory and algebraic geometry. She excels at drawing connections between different areas of mathematics. Her work is a truly remarkable synthesis of number theory, algebraic geometry, topology, and probability. In arithmetic statistics, Wood, with her coauthors, gave the first heuristic account of the variation of the Mordell-Weil rank in families of elliptic curves, which predicts in particular, contrary to widely held belief among the research community, that elliptic curves over the rationals have absolutely bounded rank. Her joint work with Vakil suggests that the limiting behavior of many natural families of varieties should stabilize in a motivic sense. These results and conjectures have attracted considerable attention and spawned a substantial amount of follow-up research. More recently, she determined the behavior of the sandpile group of a random graph, thus proving an important conjecture in tropical geometry.

Beyond her outstanding scientific achievements, Wood has assumed many leadership roles in directing undergraduate research and promoting participation of women and girls in mathematics. She coached the first United States team to participate in the China Girls Math Olympiad, an international competition with a proof-based format. She is considered one of the most visible role models for a whole generation of young American women in mathematics. AWM congratulates Melanie Matchett Wood for her well-deserved AWM-Microsoft Research Prize.

Response from Melanie Matchett Wood

I am deeply honored to receive this award. I would like to thank the AWM and Microsoft for their generosity in establishing this prize. I have been lucky to have many amazing mentors and role models in mathematics, from a very early age. Moreover, the joy I get from working with my collaborators is a continual inspiration in my research. I would like to thank all my mentors and collaborators, and mention in particular Joseph Gallian, Manjul Bhargava, Ravi Vakil, Lillian Pierce, Jordan Ellenberg, and Nigel Boston. Thank you as well to my mentors and colleagues who nominated me for this award. I would like to especially thank the American Institute of Mathematics and the Packard Foundation for providing me flexible funding early in my career, which allowed me to take risks like looking far afield in mathematics for the answers to my questions in number theory. Finally, I would like to thank the University of Wisconsin-Madison for its flexibility in letting me have a faculty position suited for how I wanted to balance my career and family.

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

Vi Hart

Vi Hart is recognized with a 2018 JPBM Communications Award for entertaining, thought-provoking mathematics and music videos on YouTube that explain mathematical concepts through doodles. Hart is well known among the younger generation for videos, which include the series "Doodling in Math Class" and have an audience of millions. Hart has also authored publications in computational geometry, mathematics and music, mathematical art, and mathematics education.

Biographical Note

Vi Hart is a mathemusician and philosopher known primarily for work in mathematical understanding, musical structure, and social justice. Vi has publications in computational geometry, symmetry, mathematics and music, mathematical art, and math education, and is the principal investigator of eleVR, a research group focused on understanding how virtual and augmented reality technology can impact how humans think, see, and feel. After receiving a BA in Music from Stony Brook University, Vi travelled the world researching mathematics, writing music, and doing performance art, which eventually led to the creation of the "Doodling in Math Class" series and other videos which have together gathered over 100 million views. Hart's work has been supported by Khan Academy, culminating in the creation of "Twelve Tones", one of Hart's best known works in mathematics, music, and philosophy. Afterwards, Vi shifted to working with virtual and augmented reality technologies, with support from

SAP and Y Combinator Research. Vi is also known as co-creator of "Parable of the Polygons," an explorable explanation of systemic bias that has been played over 5 million times.

Response from Vi Hart

I am honored to join the distinguished company of recipients of this award, which has been around just about as long as I have! The list of previous recipients is halfway to being a bibliography of my own influences in mathematics. I was extremely lucky to grow up surrounded by those who have shown me the beauty, meaning—and sheer pleasure—to be found in mathematical thought. I feel strongly that this beauty *must be shared*, and have found my own particular way of reaching out to the millions of people who need more math in their lives (including many who didn't know it before). I appreciate the JPBM's openness in recognizing new media and internet media's role in mathematics communication, and I look forward to continuing to share my love of mathematics!

CITATION

Matt Parker

Matt Parker is recognized with a 2018 JPBM Communications Award for communicating the excitement of mathematics to a worldwide audience through YouTube videos, TV and radio appearances, book and newspaper writings, and stand-up comedy. In 2008 he started MathsJams, as an informal gathering of people who enjoy talking about mathematics in the pub, and it has gone on to become a global phenomenon with its own annual conference.

Biographical Note

Matt Parker is a stand-up comedian and mathematics communicator. He appears regularly on TV and online: as well as being a presenter on the Discovery Channel, his YouTube videos have been viewed over fifty million times.

Matt originally trained as a high school math teacher in Perth, Australia, before moving to the UK. Having left the classroom, he now visits schools around the world to talk to students about mathematics as part of the Think Maths organization he started. Matt is also a founder of Maths Jam events in pubs, Maths Busking taking math to the street and Maths Gear manufacturing and selling nerdy math toys.

In his remaining free time, Matt is the Public Engagement in Mathematics Fellow at Queen Mary University of London.

Matt lives in the achingly quaint English village of Godalming with his physicist wife, Lucie Green. He once organized an event that broke the world record for most people simultaneously solving Rubik's Cubes.

Response from Matt Parker

I am extremely humbled to be selected for this prize. With so much amazing mathematics communication going on around the world it is an honour to be selected by the Joint Policy Board for Mathematics. My career would not be possible without the community of mathematics enthusiasts around me.

At the completion of my mathematics degree I realised that I enjoyed talking about the subject as much as I did doing it. So a move into teaching seemed like an obvious choice and I quickly discovered that I enjoyed being a high-school math teacher immensely. Obviously there was a set curriculum I needed to get the students through, but I considered my real job was to actively engage the pupils in mathematics and try to spark a love of the subject. Everything I have done since then has been to try and share that same love of math with a wider and wider audience.

I could now easily fill the rest of this book with names of people who deserved to be named as part of this prize as much as I do; but reading such a list can be so tedious as to be meaningless. So instead here is a run-down of the general communities those names would be pulled from:

Thanks to the recreational mathematicians everywhere who celebrate the fun side of the subject: I appreciate everyone involved in MathsJams and math gathering of all types. Thanks to math teachers who do a difficult job and everyone who works with me to provide support for schools including Think Maths and Maths Inspiration. Cheers to everyone who helps get my books published; it's a shame such a team effort ends with a single name on the cover. Thank you to all my fellow YouTube channels including the incredible Numberphile. Much appreciation to all my stand-up comedy colleagues who tolerate my need to over-math everything (with special mention to Festival of the Spoken Nerd). I'm in debt to every radio and TV station who have given me a mainstream platform including the BBC and Discovery. And a final thanks to all the people out there who use math in their lives and give back by donating their time and effort to help me with projects and their money to crowd-fund my more ridiculous ideas.

And final thanks to my wife, Lucie Green, who does deserve to be named specifically because she enables all of the above and more.

AMERICAN MATHEMATICAL SOCIETY
MATHEMATICAL ASSOCIATION OF AMERICA
SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS

FRANK AND BRENNIE MORGAN PRIZE

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, PA.

CITATION

Ashvin Swaminathan

Ashvin Anand Swaminathan is the recipient of the 2018 AMS-MAA-SIAM Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student for his research in the areas of algebraic geometry, number theory, and combinatorics. Ashvin has authored ten papers, of which six have been published, one has been accepted, and three have been submitted. Seven of his papers have appeared or will appear in the *Electronic Journal of Combinatorics, Journal of Algebra, Journal of Logic and Analysis, Proceedings of the American Mathematical Society, Research in Number Theory*, and *International Journal of Number Theory*. He is described as a passionate and focused researcher with deep technical knowledge, which allows his work to be original and remarkable, making breakthroughs that are of substantial interest to experts in long established areas of mathematics.

Ashvin did research in the 2014 and 2015 University of Minnesota Duluth Research Experiences for Undergraduates (REU) program under the mentorship of Professors Joseph Gallian and Noam Elkies in the areas of combinatorial number theory and Galois representations. In addition, he also participated in the 2015 and 2016 Emory University REU program under the mentorship of Professor Ken Ono, Dr. Jesse Thorner, and Professor David Zureick-Brown, focusing on analytic number theory and arithmetic geometry. His senior thesis at Harvard was in the area of algebraic geometry and was mentored by Professors Joseph Harris and Anand Patel. While in high school, Ashvin completed research at Stanford in the areas of logic and analysis and analytic number theory under the direction of Dr. Simon Rubinstein-Salzedo and Professor Daniel Kane, respectively.

Ashvin has also been awarded Princeton's Centennial Fellowship, a National Science Foundation Graduate Research Fellowship, the Paul and Daisy Soros

Fellowship for New Americans, a Barry M. Goldwater Scholarship, and the David B. Mumford Prize (for most promising mathematics concentrator at Harvard). As a high school student, he was the national winner of the Siemens AP Science Award and was a regional finalist for the Siemens Competition in Math, Science, and Technology.

Biographical Note

Ashvin Swaminathan was born in New Jersey and raised in California. He graduated as the valedictorian from The Harker School in San Jose. He then attended Harvard University, where he received an AB in mathematics and an AM in physics, graduating summa cum laude and Phi Beta Kappa. Currently, Ashvin is pursuing a PhD in mathematics at Princeton University, where he is supported by three fellowships. Motivated by his undergraduate studies at Harvard and his work at the NSF Duluth and Emory REUs, Ashvin plans to pursue research in number theory and arithmetic geometry.

Besides research, Ashvin is passionate about teaching and has received certificates of distinction for his service as a course assistant in the Harvard mathematics department. In his spare time, Ashvin plays the violin and was fortunate to have performed with the San Francisco Symphony Youth Orchestra and in the Music@Menlo chamber music program. Ashvin also maintains interests in art history, music theory, and the classics.

Response from Ashvin Swaminathan

It is a wonderful honor for me to receive the 2018 Frank and Brennie Morgan Prize. I am deeply grateful to Mrs. Morgan for her vision and generosity and to the AMS, MAA, and SIAM for helping to support undergraduate research in mathematics. Many thanks are due to Simon Rubinstein-Salzedo for first kindling my interest in mathematics and research. Besides being fantastic advisors, Joe Gallian and Ken Ono have been wonderful sources of inspiration, advice, and help. I am grateful to both of them for providing me with opportunities to hone my research skills at their respective REU programs. I thank Jesse Thorner and David Zureick-Brown for working closely with me during my two summers at the Emory REU. Moreover, I would like to thank Joe Harris for being an incredibly generous teacher and advisor, and for offering me a glimpse of the wondrous world of algebraic geometry from his cultured perspective. I would also like to thank Anand Patel for co-advising my senior thesis with Joe Harris and for his limitless flexibility and optimism. I extend thanks to my Harvard professors, particularly Noam Elkies, Dennis Gaitsgory, Curtis McMullen, Alison Miller, and Arul Shankar, for helping to cement my interest in mathematics. Finally, I thank my parents and grandparents for their unflinching faith in my abilities and for their undying love and support.

Citation

Greg Yang

Greg (Ge) Yang is recognized with an Honorable Mention for the 2018 Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student. He has several published and submitted papers on many different fields, such as logic, neural networks, dynamical statistical mechanics, and commutative algebra. In his masters' thesis, submitted as part of the Harvard AB/SM program, Greg lays out a new mathematical theory of neural memory and algorithmic learning based on Lie groups. Noteworthy is his senior thesis developing a homological theory of functions, which is at the intersection of computational complexity theory, learning theory, and algebraic topology. Greg won the prestigious Thomas Temple Hoopes Prize for this work.

Biographical Note

Greg Yang was born in Hunan province of China, but soon moved to Guangzhou for kindergarten, then to Beijing for elementary school, to Houston, Texas for middle and high school, and finally to Cambridge, Massachusetts for his undergraduate education at Harvard College.

In his first two years at Harvard, Greg was involved in many different activities such as The Harvard Undergraduate Drummers, Freshman Arts Collaborative Experience Showcase, Harvard College Mathematics Review, Harvard College Consulting Group, and so on. At the end of his sophomore year, he decided to pursue music full time, and for the next year and a half, he worked as an EDM (electronic dance music) producer and DJ under the name Zeta. During this time, he became exposed to the ideas of artificial intelligence, and serendipitously, the realization of human-level AI became his single focus in life. After coming back to school for what would have been his senior spring semester, he took another two years off. During this period, he quickly learned most major branches of mathematics and theoretical computer science along with the forefront of artificial intelligence and in addition became fluent in physics, biology and neuroscience. At the end of the 2016–2017 school year, Greg finally obtained an AB in mathematics and SM in computer science from Harvard after accelerating his remaining course load. Greg now works as a researcher at Microsoft Research, with focus on AI and theoretical computer science.

Response from Greg Yang

It is an incredible privilege to receive Honorable Mention for the 2018 AMS-MAA-SIAM Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student. Thank you, Mrs. Morgan and the AMS, MAA, and SIAM, for establishing this award and for promoting undergraduate research in mathematics. I would like to thank Professor Madhu Sudan for many hours of discussion and advising and teaching me coding theory. I would also like

to thank Professor Shing-Tung Yau and Michael Freedman for believing in me and introducing me to researchers in mathematics and computer science. I am eternally grateful for Scott Kominers, now a professor of economics at Harvard, who from the very beginning has been steadfast in his support of me and my works. Thanks are due to Professor Alexander Rush, who provided invaluable advice on research in AI. I am also extremely thankful for Nate Ackerman, who guided me through my first research paper and was incredibly generous with his time. I thank Rutger Kuyper, who allowed me to consult his expertise when I was working on my first paper. I thank Professor Alexander Postnikov for an insightful discussion about combinatorial commutative algebra and for his support of my work. I would like to show my appreciation for Sam Schoenholz, whose paper *Deep Information Propagation* inspired me to conduct my own research into the dynamics of neural networks, and who contributed to my research by running experiments verifying my predictions. In addition, thanks are due to Gunter Ziegler, Ezra Miller, Bernd Sturmfels, and Fatemeh Mohammadi, who provided references and discussion on algebra and combinatorics during the formative period of my work on homological theory of functions. Thanks to Professors Leslie Valiant and Boaz Barak for listening to my babbles and providing encouragement. Of course, I need to give thanks to all my friends who in one way or another helped me, especially Felix Wong who did a lot of favors for me as a tutor in Quincy house and often provided insights into my problems through statistical mechanics.

Last, and most of all, I am grateful for my family's support through thick and thin, especially during my leaves of absence from Harvard when I stayed at home. Without those years of quiet thought, I would not be here today.

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

Roland van der Veen and Jan van de Craats

The Riemann Hypothesis: A Million Dollar Problem, MAA Press, 2015

Stated over 150 years ago, the Riemann hypothesis is currently the most famous open problem in mathematics. Normally such unsolved problems require years of graduate study and specialization before one can even fully comprehend the problem, let alone the avenues of approach to a solution. For this reason, mathematicians struggle to explain their theories to students in language that will not destroy the significance and beauty of their work.

In *The Riemann Hypothesis*, van der Veen and van de Craats show us this need not be the case as they take us on a remarkably compact and efficient journey from primes and their distribution to the Riemann hypothesis. Along the way we are introduced to infinite series, infinite products and complex variables and functions.

Beginning with an introduction to primes as building blocks of all integers, the authors move quickly to the prime counting function $\pi(x)$ and use computer experiments to show us that logarithms must be involved in approximating this function. The prime number theorem and Chebyshev's function are discussed and we are given a glimpse of the Riemann hypothesis itself.

In the second chapter, we are introduced to infinite series and power series as prerequisites for the Riemann zeta function. This chapter culminates with Euler's product formula, tying together the Riemann zeta function and primes. Chapter 3 provides the theory of complex numbers and functions necessary to extend the Riemann zeta function to the entire complex plane. In the final chapter, all is revealed. It is shown that Chebyshev's function has an alternate representation with a correction term that is a summation over the zeros of the zeta function.

By working through the challenging exercises given along the way, one can read this book as a self-study course or simply as an introduction to one of the most fascinating problems in mathematics. For faculty and students alike, this book will not disappoint.

Biographical Note

Jan van de Craats, born in 1944, is an emeritus mathematics professor at the University of Amsterdam. He studied mathematics and earned his PhD at Leiden University. He has been involved in countless activities aimed at stimulating mathematically talented youngsters. For many years, he was the trainer and leader of the Dutch team at the International Mathematical Olympiad. Jan van de Craats is much appreciated for his skills in explaining mathematics to a general public. In 2007, the Dutch Royal Mathematical Society awarded him with an honorary membership.

Biographical Note

Roland van der Veen received his PhD at the University of Amsterdam in 2010. After spending five years as a postdoc at UC Berkeley and Amsterdam he is now an assistant professor at Leiden University. His research focuses on the interplay of low-dimensional topology, representation theory and mathematical physics, which often comes down to playing around with knots. Roland also enjoys exploring new ways of popularizing mathematics.

Response from Jan van de Craats and Roland van der Veen

We are delighted and greatly honored to receive the 2017 Beckenbach Book Prize for our book on the Riemann Hypothesis. It resulted from an interactive online course, which we organized several times at the University of Amsterdam between 2006 and 2011. This course was intended to bring talented secondary school students from all over the country into contact with interesting and challenging university level mathematics. It showed the participants why the Riemann Hypothesis is such an important problem in mathematics.

The enthusiastic response from the participants (many decided to study mathematics at university) as well as from their teachers, stimulated us to make the instruction notes and the exercises available as a book (in Dutch), which appeared in 2011. We are very grateful to the MAA for publishing the expanded English translation of our book in the Anneli Lax New Mathematical Library Series, which includes so many wonderful texts by famous authors. We hope that our book will reach a wide audience, inspiring talented readers, young and old, all over the world, to appreciate the beauty of mathematics through one of the greatest, and, up to this moment, still unsolved mathematical problems: the Riemann Hypothesis.

CHAUVENET PRIZE

THE Chauvenet Prize is awarded to the author of an outstanding expository article on a mathematical topic. 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

Daniel J. Velleman

'The Fundamental Theorem of Algebra: A Visual Approach", *The Mathematical Intelligencer*, **37** (2015), no. 4, 12–21.

The saying "A picture is worth a thousand words" is true of mathematics, especially since the advent of the computer. Daniel Velleman beautifully exemplifies this adage by applying a colorful method for graphing complex-valued functions to illuminate one of the most established results of mathematics.

The Fundamental Theorem of Algebra asserts that every nonconstant polynomial with complex coefficients has at least one root in the complex numbers. Although easy to state, it is less easy to prove and even more difficult to visualize. Velleman demonstrates a brilliant method to overcome this difficulty by associating to every complex number a color and darkness; arguments are associated with colors ranging through the rainbow, and increasing moduli are associated with increasing lightness. The graph of a complex polynomial can be represented on a single plane by situating at the position of the input a pixel with the color and intensity of the output. The complex roots of the polynomial, revealed as black dots in a field of color, are now as easy to identify as real roots have always been by x-intercepts. Velleman draws further fascinating insights from this beautiful representation, and uses the images to elucidate three different proofs of the theorem.

Biographical Note

Daniel J. Velleman received his B.A. from Dartmouth College in 1976 and his Ph.D. from the University of Wisconsin–Madison in 1980. He was an instructor at the University of Texas before joining the faculty of Amherst College, where he taught from 1983 to 2017. He has also taught at Erindale College, Middlebury

College, and St. Michael's College, and he is now an adjunct professor at the University of Vermont. He is the author of *How To Prove It, Which Way Did the Bicycle Go?* (with Joe Konhauser and Stan Wagon), *Philosophies of Mathematics* (with Alexander George), and *Calculus: A Rigorous First Course*. He was the editor of the *American Mathematical Monthly* from 2007 through 2011. In his spare time, he enjoys singing, bicycling, and playing volleyball.

Response from Daniel J. Velleman

I am very grateful to the MAA for recognizing my work with the Chauvenet Prize, and honored to have my name listed among the many great mathematicians and expositors who have won this prize in the past. My paper started as a talk I gave at the 2000 Joint Meetings in Washington, DC. Doug Ensley and Cheryl Olsen, of Shippensburg University, organized a session at that meeting on great theorems of mathematics, and they asked me to speak about the fundamental theorem of algebra. After the conference, Doug encouraged me to write up my talk as a paper. But even once the paper was written, it remained unpublished for several years until Gizem Karaali, an associate editor for *The Mathematical Intelligencer*, encouraged me to submit it and made some helpful editorial suggestions. I would like to thank Doug and Cheryl, without whom the paper would not have been written, and Gizem, without whom it would not have been published.

EULER BOOK PRIZE

THE Euler Book Prize is awarded annually to the author of an outstanding book about mathematics. The Prize is intended to recognize authors of exceptionally well-written books with a positive impact on the public's view of mathematics and to encourage the writing of such books. The Euler Prize, established in 2005, is 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

Matt Parker

Things to Make and Do in the Fourth Dimension, Farrar, Straus and Giroux (2014)

Parker's book takes readers on a fascinating mathematical journey that includes puzzles, paradoxes, and even 4D space monsters! Written in an accessible and appealing style, *Things to Make and Do in the Fourth Dimension* is an enjoyable read for both mathematicians and general audiences. Although the unifying theme in the book is geometry, it also incorporates ideas from a variety of other fields, including number theory, graph theory, and knot theory. For those looking to expand their mathematical horizons—and have fun doing so—*Things to Make and Do in the Fourth Dimension* is an outstanding choice.

Matt Parker covers some popular mathematical topics such as Möbius strips, optimal dating algorithms, and Cantor's diagonalization argument. Although these topics can be found in other books, Parker also elegantly explains more complicated subjects such as Seifert surfaces and the Riemann zeta function. Well-known and loved by thousands of YouTube followers, he brings his seemingly effortless communication style into the written word while maintaining the integrity of each topic. What's more, the book is not just for passive reading. The author invites the reader numerous times (often with hands-on activities) to consider outcomes before solutions are revealed.

The light-hearted language and engaging writing style sparks the interest of readers and promotes further investigation into mathematical topics that build upon each other from the "Zeroth" to the "$n+1$" chapters. With the use of witty humor and quirky hand-drawn illustrations, Parker achieves the astounding goal of bringing everyday relevance to high-level mathematical concepts in a fun and interactive way. Most importantly, the book presents the beauty and fun of mathematics in a way that attracts even the most math phobic of readers.

Biographical Note

Matt Parker is a stand-up comedian and mathematics communicator. He appears regularly on TV and online: as well as being a presenter on the Discovery Channel, his YouTube videos have been viewed over fifty million times.

Matt originally trained as a high school math teacher in Perth, Australia, before moving to the UK. Having left the classroom, he now visits schools around the world to talk to students about mathematics as part of the Think Maths organization he started. Matt is also a founder of Maths Jam events in pubs; Maths Busking, taking math to the street; and Maths Gear, manufacturing and selling nerdy math toys. In his remaining free time, Matt is the Public Engagement in Mathematics Fellow at Queen Mary University of London.

Matt lives in the achingly quaint English village of Godalming with his physicist wife, Lucie Green. He holds the world record for the highest score in Space Invaders on the Atari 2600 (PAL edition).

Response from Matt Parker

It is an honor to receive the Euler prize for *Things to Make and Do in the Fourth Dimension*. I am very grateful to everyone at the Mathematical Association of America and the wider math communication community.

My goal with this book was to provide a pain-free journey from high school math up to the more advanced mathematical concepts not normally encountered until undertaking a mathematics degree. I hope that a novel take on some classic recreational math topics such as möbius looks and hexaflaxagons will help step people up to Seifert surfaces and the Riemann zeta function while reinforcing that math is something to be enjoyed and played with.

I am pleased to know that people have had as much fun as I did working through all the hands-on activities in this book and am very grateful for the award.

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 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.

Citation

Gary Gordon

Dr. Gary Gordon is recognized for his record of exemplary mathematics teaching at Lafayette College and his regional, national, and international impact as a mathematics educator. He is a creative and engaging teacher whose work has made a significant difference in the classroom for a broad group of Lafayette students. Outside the classroom, Dr. Gordon has been instrumental in leading the Lafayette REU program, has promoted problem-solving in the Lehigh Valley region and nationally, and has worked to make the profession more inclusive through outreach activities in New York City and Madagascar.

During his thirty-three years as a professor, Dr. Gordon has been an advocate of educational equity and inclusion and consistently engaged his students in a full spectrum of courses. He is noted for starting his classes with the mathematical "toy of the day," which is one of a large collection of mathematical puzzles and models passed around to stimulate conversation. Dr. Gordon's goal is to reach students at every level; he fills his classes with extracurricular readings, the Problem of the Week, and challenges at just the right level. Students love his "statistics for poets," often applauding at the end of class! He has taught workshop calculus designed to benefit women and underrepresented minorities. With the words "Don't take notes; just watch," he has produced what one former student calls "flashbulb memories" of problems.

Students both at Lafayette College and nationally have benefitted from Dr. Gordon's work leading the Lafayette College Research Experience for Undergraduates (REU). Serving as Principal Investigator for more than a decade, Dr. Gordon started the practice of the REU students attending and profiting from the Joint Mathematics Meetings and MathFest. A colleague writes that Dr. Gordon does a marvelous job of engaging with all the students and building tight-knit summer cohorts whose success is reflected in the 16 papers jointly published with students.

Community building is a common theme throughout Dr. Gordon's work. At Lafayette, he founded and sustains biweekly teaching lunches for his department's faculty to learn from one another. Early in his career, he expanded the Barge Problem Solving Competition at Lafayette to become a year-round weekly contest between eight to twelve student teams. In 1989, Dr. Gordon extended this work by cofounding an ongoing annual mathematics competition for the six campuses in the Lehigh Valley Association of Independent Colleges. He helps run a Math Bowl quiz competition at Lafayette each semester, and he has also held a quiz Bowl at a Section meeting.

Dr. Gordon has worked to make mathematics more inclusive. In 2009, he received the Lafayette Diversity Education Award for his work mentoring cohorts of urban students from New York City in a leadership and scholarship program. In the 1990s, he was a key participant in a labor-intensive workshop calculus course developed to increase the success of students from underrepresented groups. At the faculty level, he has increased the diversity of faculty in Department leadership roles. Dr. Gordon has led a trip to Madagascar on which ten undergraduate students tutored and mentored Malagasy high school students and helped prepare them to apply to American colleges.

Dr. Gordon's influence is felt nationally through his work as the editor of *Math Horizons*' "Playground" Problem Section. This work has included an extensive correspondence with an incarcerated problem solver who had limited access to mathematical materials. He is also a coauthor of the undergraduate texts *Matroids: A Geometric Introduction* and *The Joy of SET: The Many Mathematical Dimensions of a Seemingly Simple Card Game*.

The MAA recognizes the great positive impact Dr. Gary Gordon has had on mathematics education and is honored to present him with the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Biographical Note

Gary Gordon received his B.A. from the University of Florida in 1977 and his Ph.D. from the University of North Carolina in 1983, where he was deeply influenced by Tom Brylawski, his Ph.D. advisor, and Liz McMahon, his future wife. He taught at Williams College for three years, but found Williamstown much colder than his native Miami. He worked for a year in a consulting position near Washington, D.C. before rejoining the academic world at Lafayette College. His mathematical interests include geometry and combinatorics. He ran Lafayette College's REU program for a decade and has thoroughly enjoyed doing and publishing research with enthusiastic undergraduates. His favorite coauthor is Liz, though, and he is very proud of *The Joy of SET*, coauthored with Liz and their two daughters. He is the soon-to-be ex-Problem Editor for *Math Horizons*. He loves baseball, bike-riding, and occasionally banging on a piano.

Response from Gary Gordon

I've always been inspired by the MAA Haimo award winners, and it is amazing to be included in that group. At Lafayette, I am surrounded by incredible teachers who I learn from constantly. I am especially grateful to Chawne Kimber and Ethan Berkove, colleagues who supported my application for the James P. Crawford award for the EPADEL section of the MAA. I would also like to thank the thousands of students I've taught over the years—I've learned more from them than they've learned from me. Finally, my wife Liz McMahon, a former winner of the EPADEL award, inspires me to be a better teacher and a better human every day. This award really recognizes our mathematical partnership.

CITATION

Hortensia Soto

Dr. Hortensia Soto of the University of Northern Colorado is recognized for her extraordinary success in educating learners at every level. She is an innovative and caring teacher and an inspiring mentor, one whose work extends from an outreach program for high school girls to graduate education and advising on doctoral dissertations. Moreover, her efforts have impacted students and the profession far beyond the University of Northern Colorado. She organized the first annual Pike's Peak Regional Undergraduate Mathematics Research conference in 2003, and the conference is still going strong. Nationally, she is recognized for her innovative teaching approaches and research-driven curricular development.

Dr. Soto designs activities that are research based and implements them using many teaching strategies that allow her to work with the full spectrum of learners. Regardless of whom she teaches, however, she infuses a high level of content. Indeed, she has a particular interest in exploring the role that geometric visualization can play in the development of understanding of advanced mathematics. She challenges students to reach their full potential and inspires them, often through her innovative approaches. In a course on modern geometry, students made connections between equations, matrices, group theory, and physical movements before concluding the course by creating a game using transformations and Geometer's Sketchpad®. As one student stated, "The final project was brilliant."

Dr. Soto conducts research exploring student learning through "embodied cognition" activities, developing the mind and thinking through human body experiences. For example, geometry students became points on the Cartesian coordinate plane, creating lines using ropes. Her research in student activities in geometry and complex analysis courses has been published in peer review journals and led to her being invited to be the mathematics education researcher for the NSF sponsored "Revitalizing Complex Analysis Workshop" comprised of internationally known mathematics researchers focusing on improving undergraduate complex analysis courses.

Outside the classroom, Dr. Soto helps in-service mathematics teachers through professional development activities, publications in practitioner journals such as *Teaching Children Mathematics* and *Mathematics Teacher* (NCTM) and editorial boards of such journals. She mentors Project NExT fellows, graduate students, junior faculty members, and colleagues on teaching practices and research projects. Moreover, as a couple of her students attest, "She drives us as future teachers to always connect mathematical ideas."

Dr. Soto's influence is further extended through Las Chicas de Mathemáticas, an outreach program for high school girls. More specifically, Las Chicas de Mathemáticas is a residential camp for 32 young women grades 9 through 12 that introduces them to college level math, college life, STEM related careers, and other women who are passionate about mathematics. She co-founded and directs this program, which exposes girls to a high level of mathematics while encouraging them to become lifelong learners. She describes the program in a chapter in an NCTM *Yearbook*, and in the book, *Out-of-School Time STEM Programs for Females: Implications for Research and Practice*.

Dr. Soto also recognizes the importance of preparing future teachers by challenging them to think about different pedagogical approaches they might use in their future classrooms. She takes a similar approach in graduate courses, always pushing them to think about new ideas and new technologies. That is, she encourages future teachers to challenge their future students to push themselves and to do their best, and in so doing, she is helping to create the next generation of innovative, caring, and inspiring teachers.

The MAA recognizes the great positive impact of Dr. Hortensia Soto on mathematics students and teachers at her own institution, in her region, and across the country, and is honored to present her with the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Biographical Note

Dr. Hortensia Soto was raised on a farm in rural western Nebraska; in high school she was the substitute mathematics teacher when needed. Although she was certain she did not want to teach, it is her passion. She is currently a professor in the School of Mathematical Sciences at the University of Northern Colorado, where she works with prospective K-16 teachers. Tensia is fortunate to be at an institution where she has the opportunity to blend her research and teaching and thus, continually revises her teaching. Through her teaching, outreach efforts, and professional development, Tensia always strives to "pay it forward" by opening doors for others as her teachers did for her. She is a proud working member of the MAA where she served as the Associate Treasurer and will serve as the next Associate Secretary. Most importantly, she is the mom of a good-hearted young man named Miguel.

Response from Hortensia Soto

I am humbled, honored, and quite giddy to receive this award. I am grateful to my colleague and friend Gulden Karakok for nominating me for this award. I am fortunate to work at a university that welcomes creative student-centered teaching including refinement of our teaching mistakes. By contributing to my classroom and to my research, my students have transformed my teaching—they inspire me to be a better teacher. I want to send a special shout-out to my fifth grade teacher, Mrs. Calvert, who took the time to work with me so I could advance to the "high group." She opened a door for me and showed me what it means to teach. Finally, I want to thank my son Miguel for letting me use his mathematical conceptions and misconceptions in my teaching and I especially want to thank my parents who taught me about perseverance.

CITATION

Ronald Taylor, Jr.

Dr. Ronald Taylor, Jr. is recognized for his outstanding success in the mathematics classroom at Berry College as well as his extraordinary influence on the teaching of mathematics nationwide. Over the last two and a half decades, he has transformed the lives of untold numbers of students and faculty. To his students at Berry, he brings a unique blend of student-centered learning, creativity, and tireless dedication that both inspires and enables them to pursue mathematics. Beyond Berry, that same tireless dedication has made the acronym IBL stand for both a way of teaching and a goal of teaching.

Dr. Taylor is cited by colleagues as a model teacher who blends effective learning pedagogies with a humanistic devotion. He encourages students to learn mathematics by doing as opposed to watching. Classroom time is carefully focused on student needs, with students presenting or critiquing exercises and proofs. He is praised for his way of bringing out the best in students and instilling them with confidence, even if they do not see the potential in themselves.

At Berry College, Dr. Taylor is praised for his work to help create a mathematical community through his teaching, advising, and mentorship of students. His colleagues note that he establishes personal connections with students starting at first-year orientation and is extremely active in finding ways to motivate and engage students outside of class throughout their college career. He invites math speakers, hosts a problem solving group, and organizes participation in regional and national competitions. Through this work, Dr. Taylor develops strong relationships with students that last well beyond their time at Berry.

Inspired by a Leitzel lecture, Dr. Taylor started a math club in 2006, called the Dead Poets Society (DPS) after the film of the same name. Using quotes from Polya's *How to Solve It* in lieu of Walt Whitman, he created this weekly club for students to have fun problem solving. Starting with the lure of free pizza, the club evolved to a regular attendance of 15–20 students and has resulted in over ten submissions of problem solutions in mathematics journals. Dr. Taylor shared his insights into the DPS and how to organize an active math club in a *MAA Focus* co-authored article in 2016. These ideas have influenced many others, with Dead Poets Society chapters now at 13 different colleges.

Nationally, Dr. Taylor has broadly impacted the teaching of mathematics through his work supporting Inquiry Based Learning (IBL) instruction. He has mentored numerous faculty as they transform their classroom teaching to match their goals for student learning. The IBL based course notes from his Proof Structures course were the first notes published in the *Journal of Inquiry Based Learning in Mathematics*. The forthcoming MAA book *A TEXas Style Introduction to Proof* expands upon these notes.

As a master practitioner of IBL methods, Dr. Taylor co-chaired the organizing committee of the Legacy of R. L. Moore conference from 2009–2012. His leadership brought about a fundamental shift by refocusing the conference onto the implementations of IBL. This shift, formalized by the renaming of the conference to include "Inquiry Based Learning Forum," helped involve a new generation of faculty, and enabled more students to learn through this engaging teaching style.

Dr. Taylor has also found ways to share his delight in mathematics outside of the formal classroom. He taught at a summer camp for middle school girls funded by an MAA Tensor Women and Mathematics grant and he taught a summer math course to minority students as part of Project SUCCESS, funded by the 100 Black Men of Atlanta. Dr. Taylor influences the teaching of pre-college math through summer workshops for in-service teachers, lasting a few weeks each summer.

The MAA recognizes the impact Dr. Ron Taylor Jr. has had on his numerous students and on the mathematics teaching community nationwide, and is honored to present him with the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Biographical Note

Ronald Taylor, Jr. is Professor of Mathematics at Berry College and an MAA Project NExT Fellow. He earned his PhD in mathematics from Bowling Green State University, where he spent two years teaching in the nationally recognized Chapman Learning Community. Previously, he earned bachelor's degrees in political science and mathematics and computer science from Concord College and a master's in mathematics from Winthrop University. Ron has written a variety of articles in different areas of mathematics, several with undergraduate students. Recently, the MAA published his textbook *A TEXas Style Introduction to Proof*, coauthored with Patrick X. Rault. In addition to mathematics, Ron taught martial arts at Berry College for eight years. In his extracurricular time, he has had roles with Berry's athletic department and the local minor league baseball team where he has been lucky enough to be paid to sit and watch sports.

Response from Ronald Taylor, Jr.

I am honored by being selected to receive this award. It is humbling to be included among so many people who are such great teachers. As a student I liked mathematics, but it was not until I became a professor that I really learned to love mathematics. I want to thank two different groups for that shift in perspective. The first group includes professors, colleagues and mentors who have given graciously of their time and energy in a variety of ways that have helped me expand my understanding of mathematics and teaching. Many of them would probably not think that what they did was anything special, but their influence was meaningful to me. Just as a small stone can cause a big ripple, these gestures have had a great effect on me and I have tried to pass this on to the second collection of people. This group consists of students who, through their curiosity and willingness to embrace my sometimes alternative teaching methods, have helped guide me to a deeper appreciation of mathematics at the same time as I was aiming to guide them to a greater understanding of mathematics. To all of these folks, I say a sincere thank you. Thank you also to the MAA for promoting an atmosphere that encourages this kind of transformative experience.

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, writing, "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

David Bressoud

The 2018 Gung and Hu Award goes to **Dr. David Bressoud** for his prolific service to many professional mathematical societies including the Mathematical Association of America, for his influential leadership in exploring the role of calculus in our schools and our nation, and for a laudable career that has been rich in mathematical research, mathematics education, and mathematical exposition.

Before embarking on his graduate studies, David set the stage for his lifelong orientation towards service by serving two years in the Peace Corps, teaching math and science at the Clare Hall School in Antigua, West Indies. He has served the mathematical community intensively for decades. Recently, David served as President-Elect, President, and Past-President of the MAA. Beyond his presidency, the list of committees David has served on and/or chaired over the years is lengthy and deep, and includes many varied bodies and organizations. His many areas of service include: the Conference Board of the Mathematical Sciences (director), the AMS Committee on Education, the MAA Committee on the Undergraduate Program in Mathematics (chair), the mathematics section of the American Association for the Advancement of

Science (chair), the College Board's Mathematical Sciences Academic Advisory Committee, the MAA Second Century Campaign (chair), the College Board AP Calculus Development Committee (chair), MAA Special interest group on Teaching Advanced High School Mathematics (chair), numerous prize committees for various organizations, and numerous committees related to mathematics education.

David has served as Director of the FIPSE-sponsored program Quantitative Methods for Public Policy and PI for two NSF-sponsored national studies of Calculus: *Characteristics of Successful Programs in College Calculus and Progress through Calculus*. He was an author of the 2004 MAA Curriculum Guide. David has also contributed mathematical service on the editorial boards of publications including *MAA Focus, The Fibonacci Quarterly, The Ramanujan Journal*, and the *International Journal for Research in Undergraduate Mathematics Education.*

Aside from these commitments, David has served mathematics education by authoring ten books, including celebrated texts such as *Second Year Calculus from Celestial Mechanics to Special Relativity, A Radical Approach to Real Analysis* (now in its second edition), *A Radical Approach to Lebesgue's Theory of Integration*, and *Proofs and Confirmations: The Story of the Alternating Sign Matrix Conjecture*. David also recorded a series of twenty-four video lectures on "The Queen of the Sciences: A History of Mathematics," designed for a popular audience.

David has published over sixty research articles in number theory, combinatorics, special functions, and mathematics education. He was the recipient of both a Sloan Foundation Fellowship (1981–83) and a Fulbright Fellowship (1985–86). He held visiting positions at the Institute for Advanced Study, the University of Wisconsin-Madison, the University of Minnesota, Université Louis Pasteur (Strasbourg, France), and the State College Area High School.

Finally, as some of the previous points suggest, David is interested in a scholarly approach to undergraduate mathematics education and for many years has held National Science Foundation grants related to its improvement and understanding, including *A National Agenda for Advancing the Undergraduate Mathematics Curriculum, Characteristics of Successful Programs in College Calculus, Integration of Strategies that Support Undergraduate Education in STEM*, and *Progress through Calculus*. David does not merely develop ideas related to undergraduate mathematics, but he takes great pains to disseminate them. He gives dozens of talks every calendar year at conferences, workshops, colleges and universities, and organizations such as the National Academy of Sciences, the Presidents Council of Advisors on Science and Technology, and even portions of the U.S. House of Representatives.

David has received the MAA Distinguished Teaching Award (Allegheny Mountain Section), the MAA Beckenbach Book Award for *Proofs and Confirmations*, and has been a Pólya Lecturer and a Leitzel Lecturer for the MAA. Beyond the MAA, he is a recipient of Macalester's Thomas Jefferson Award and, more recently, their Trustees Award for Meritorious and Distinguished Service.

David has become the authority on the important articulation problem for high school mathematics and college mathematics, especially for calculus. He has drawn national attention to this issue in numerous ways, including through his MAA Launchings columns and through his leadership on many committees.

Biographical Note

David, a former President of MAA and an AMS Fellow, taught maths and science as a Peace Corps Volunteer after graduating from Swarthmore in 1971. He received his Ph.D. from Temple University in 1977, studying with Emil Grosswald, then taught at Penn State for 17 years where he worked with George Andrews in partition theory. He chaired the Department of Mathematics and Computer Science at Macalester College from 1995 to 2001, where he currently holds a DeWitt Wallace Chair in Mathematics. In 2017, he took over from Ron Rosier as Director of the Conference Board of the Mathematical Sciences. He has chaired the AP Calculus Development Committee, helped to write the CUPM's *2004 Curriculum Guide*, and served as PI on two MAA-administered NSF grants to study the national state of calculus instruction. David has published ten books and over sixty research articles in number theory, combinatorics, special functions, and mathematics education.

Response from David Bressoud

This is an incredible honor. From Mina Rees in 1962 to Martha Siegel last year, I find myself in the company of the mathematicians I most admire for their dedication and service to this community. I owe a great debt to Emil Grosswald, my doctoral advisor, who instilled in me a deep sense of obligation, and to Wayne Roberts whose tireless service has always been an inspiration. I've been supported and aided by many talented people including George Andrews, Tina Straley, Chris Rasmussen, and especially my colleagues at Macalester. This award honors the community that supports us all.

Summary of Awards

For AMS-SIAM

- **George David Birkhoff Prize in Applied Mathematics**: Bernd Sturmfels

For AMS

- **Bertrand Russell Prize of the AMS**: Christiane Rousseau
- **Ulf Grenander Prize in Stochastic Theory and Modeling**: Judea Pearl
- **Chevalley Prize in Lie Theory**: Dennis Gaitsgory
- **Albert Leon Whiteman Memorial Prize**: Karen Hunger Parshall
- **Frank Nelson Cole Prize in Algebra**: Robert Guralnick
- **Levi L. Conant Prize**: Henry Cohn
- **Award for Distinguished Public Service**: Sylvain Cappell
- **Leroy P. Steele Prize for Seminal Contribution to Research**: Sergey Fomin and Andrei Zelevinsky
- **Leroy P. Steele Prize for Mathematical Exposition**: Martin Aigner and Günter Ziegler
- **Leroy P. Steele Prize for Lifetime Achievement**: Jean Bourgain

For AWM

- **Sadosky Research Prize in Analysis**: Lillian Pierce
- **Louise Hay Award for Contribution to Mathematics Education**: Kristin Umland
- **M. Gweneth Humphreys Award for Mentorship of Undergraduate Women in Mathematics**: Erica Flapan
- **Microsoft Research Prize in Algebra and Number Theory**: Melanie Matchett Wood

For JPBM

- **Communications Award**: Vi Hart and Matt Parker

For AMS-MAA-SIAM

- **Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student**: Ashvin Swaminathan; Honorable mention: Greg Yang

For MAA

- **Beckenbach Book Prize**: Roland van der Veen and Jan van de Craats
- **Chauvenet Prize**: Daniel Velleman
- **Euler Book Prize**: Matt Parker
- **Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics**: Gary Gordon, Hortensia Soto and Ronald taylor, Jr.
- **Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics**: David Bressoud

Index of Award Recipients