Joint Mathematics Meetings

ATLANTA, GEORGIA

January 5–8, 2005

January 2005 Prizes and Awards

4:25 P.M., Thursday, January 6, 2005

Program

Opening Remarks
David Eisenbud, President
American Mathematical Society

Levi L. Conant Prize
American Mathematical Society

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

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

Bôcher Memorial Prize
American Mathematical Society

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

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

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

Book Prize
American Mathematical Society

Certificates of Meritorious Service
Mathematical Association of America

Frank Nelson Cole Prize in Number Theory
American Mathematical Society

Ruth Lyttle Satter Prize in Mathematics
American Mathematical Society

Communications Award
Joint Policy Board for Mathematics

Beckenbach Book Prize
Mathematical Association of America

Albert Leon Whiteman Memorial Prize
American Mathematical Society

Leroy P. Steele Prize for Mathematical Exposition
American Mathematical Society

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

Leroy P. Steele Prize for Lifetime Achievement
American Mathematical Society

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

Closing Remarks
Ronald L. Graham, President
Mathematical Association of America

Levi L. Conant Prize

This prize was established in 2000 in honor of Levi L. Conant and recognizes the best expository paper published in either the *Notices of the AMS* or the *Bulletin of the AMS* in the preceding five years.

Citation

Allen Knutson and Terence Tao

The Levi L. Conant Prize in 2005 is awarded to Allen Knutson and Terence Tao for their stimulating article "Honeycombs and Sums of Hermitian Matrices," *Notices of the AMS* 48 (2001), no. 2, 175–186.

In 1912 Hermann Weyl raised the problem of characterizing the possible sets of eigenvalues of the sum $A+B$ of two Hermitian matrices A, B in terms of the sets of eigenvalues of each of them. This is a very natural problem with applications to many areas, particularly to quantum theory. In particular, it allows one to describe the possible results of measurements of the sum of two observables in terms of those of the individual observables. Yet surprisingly little progress was made until a full solution was found in 1998. Soon after, Knutson and Tao introduced the concept of "honeycombs" and used them to simplify the solution and prove some related conjectures.

In eminently readable and unpretentious style, the authors give an account of their approach to Weyl's problem. After a brief introduction to the 1962 conjecture of Alfred Horn, which recasts the Weyl problem in terms of a conjectured series of inequalities for the eigenvalues of the sum matrix $A+B$, the authors introduce honeycombs, a type of diagram reminiscent of a beehive. Using 15 clearly explained figures that help one to picture various combinatorial nuances, the authors expertly lead the reader through the intricacies of their work. They gently transport us from Weyl's classical problem to a "quantum" analog, involving the Littlewood-Richardson formula for multiplicities of representations of unitary groups within tensor products. They then explain the key "saturation conjecture," which connects the classical and quantum problems to each other and implies the validity of Horn's conjecture. Having shown that the saturation conjecture can be reduced to a problem about honeycombs, they sketch its proof, all the while playing strongly to the reader's intuition. The story that is recounted brushes against symplectic geometry, invariant theory, combinatorics, and computational complexity, but the authors deftly keep the reader from getting overwhelmed by technicalities.

By skillfully combining honeycomb diagrams with a high level of exposition, Knutson and Tao make this fascinating subject accessible to a wide mathematical audience.

Biographical Note

Allen Knutson

Allen Knutson did his graduate work in symplectic geometry, overlapping with Terence Tao at Princeton where their common love of linear algebra brought them together to work on Horn's conjecture, and finishing up at MIT. (This was in fact his third graduate school, the first being UC Santa Cruz, which matches his number of undergraduate institutions—Caltech, NYU, and the Budapest Semesters in Mathematics Program.)

In addition to the *Notices* article concerning his and Tao's combinatorial work together, he has another one solely on “The symplectic and algebraic geometry of Horn's problem,” *Linear Algebra Appl*. 319 (2000), no. 1-3, pp. 61--81.

After an NSF postdoc at Brandeis with Gerald Schwarz, Knutson moved in 1999 to UC Berkeley, where he is now associate professor. His awards include a Clay research summer fellowship, a Sloan fellowship, and the International Jugglers' Association world record in two-person ball juggling from 1990–1995. (The record was for 12 balls; nowadays the record is 13.)

Response from Professor Knutson

I am extremely honored, and gratified, to receive the Conant Prize; almost as much as to receive the initial invitation to write the article!

One of the most mysterious aspects of the original conjecture of Horn was a sort of continuous/discrete schizophrenia, in which real eigenvalues were occasionally required to be natural numbers. This already suggested that there should be other related, naturally discrete, mathematical fields in which the “eigenvalues” would be automatically integral. Three of these have come up: dominant weights of representations of $GL(n)$, Schubert classes on Grassmannians, and integral honeycombs.

The work of Totaro and Helmke-Rosenthal, and its more difficult converse by Klyachko, went back and forth between the Hermitian matrices and the Schubert classes. Ours is pretty much entirely in the combinatorial realm, with honeycombs, hives, and puzzles. Belkale's proof is entirely in the Schubert domain, and is being given a very pretty generalization by Purbhoo and Sottile, beyond Grassmannians to other “minuscule flag varieties.” It still seems amazing that Horn could guess a recursive statement completely within the Hermitian framework!

The saturation problem (as distinct from Horn's conjecture) seems most naturally stated and studied purely within representation theory, and has received a solution recently for general groups by Kapovich and Millson, “A path model for geodesics in Euclidean buildings and its applications to representation theory,” math.RT/0411182.

Biographical Note

Terence Tao

Terence Tao was born in Adelaide, Australia, in 1975. He received his Ph.D. in mathematics from Princeton University in 1996 under the advisorship of Elias Stein. He has been at the University of California, Los Angeles, as a Hedrick assistant professor (1996–1998), assistant professor (1999–2000), and professor (2000–). He has also held visiting positions at the Mathematical Sciences Research Institute (1997), the University of New South Wales (1999–2000), and the Australian National University (2001–2003).

Tao has been supported by grants from the National Science Foundation and fellowships from the Sloan Foundation, Packard Foundation, and the Clay Mathematics Institute. He received the Salem Prize in 2000 and the Bôcher Prize in 2002.

Tao's research concerns a number of areas, including harmonic analysis, geometric and arithmetic combinatorics, analytic number theory, nonlinear evolution equations, and algebraic combinatorics.

Response from Professor Tao

I am deeply touched and honoured, and perhaps even a little surprised, to receive this award. Allen and I were fascinated by this problem of summing Hermitian matrices ever since we were graduate students, and we were always struck by just how much geometric, algebraic, and combinatorial structure underlies this innocuous sounding problem.

This area of mathematics is highly interdisciplinary, benefitting from ideas in fields as diverse as algebraic geometry, symplectic geometry, representation theory, enumerative combinatorics, linear algebra, and the geometry and combinatorics of convex polytopes; this topic seems to draw the interest of mathematicians from many other fields (for instance, I myself was drawn to this problem despite being primarily in analysis). I hope our article helps popularize this topic further. (An excellent survey of the field can be found in the reference [F2] in the cited article.)

Some further progress has been achieved since the publication of the *Notices* article. For instance, we now understand while honeycombs (and the closely related Littlewood-Richardson rule) “solve” the Hermitian matrix and $U(n)$ tensor product problems, they are in fact much more tightly connected with the “infinite negative curvature” or “zero temperature” variants of those problems.

Indeed, recent work of Speyer has connected honeycombs to a variant of the Hermitian matrix problem in which the underlying field C is replaced by the field $C\{t\}$ of Pusieux series, while recent work of Henriques and Kamnitzer has also connected honeycombs to GL_n crystal representations. Meanwhile, there have now been several alternative proofs of the Horn and saturation conjectures (in very different settings) which use completely different techniques, such as Derksen and Weyman's proof of the saturation conjecture via quiver representations, Kapovich-Leeb-Millson's proof of the saturation conjecture via the theory of modules over discrete valuation rings, or Belkale's geometric proof of the Horn and saturation conjectures via the transversality analysis of Schubert varieties.

There are clearly some very rich interconnections between very distinct areas of mathematics here, and there is much that is still left to be done; we are nowhere close to uncovering the underlying theory which explains all of these connections. For instance, the situation when the underlying group $U(n)$ (or GL_n) is replaced by another Lie group is still only partially understood. Another completely open question is how these honeycombs “converge” in the large dimensional limit (as n goes to infinity), as there should definitely be some connection with free probability and free convolution.

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

In 1991, the Mathematical Association of America instituted the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics in order to honor college or university teachers who have been widely recognized as extraordinarily successful and whose teaching effectiveness has been shown to have had influence beyond their own institutions. Deborah Tepper Haimo was President of the Association, 1991–1992.

Citation

Gerald L. Alexanderson

Jerry Alexanderson is a master teacher, an inspiration to both students and colleagues. In his 47 years of teaching at Santa Clara University (35 years of which he was department chair), he has consistently had the reputation for being not only the best, but also one of the most demanding teachers. His classes are amusing, entertaining, and highly informative, an impressive mix of challenging mathematics and historical anecdotes, delivered clearly and concisely.

Many mathematicians (and former students in other careers) discovered the excitement of mathematics in the first course they took with Jerry, and his personal advice and encouragement continues to guide many of those careers today. "Memories of my classes with Jerry include a tour of complex numbers and DeMoivre's Theorem in the first week of a freshman calculus class, a cast of colorful mathematicians (dueling and scratching graffiti on bridges), impossible exam questions (which somehow we were able to answer), fast chalk, bow ties, and eyes peering over glasses in (mock?) surprise that some cultural or intellectual fact had slipped our minds."

Jerry is also an indefatigable author and editor, producing roughly 100 articles and reviews, five undergraduate texts (on trigonometry, problem solving, abstract algebra, and discrete mathematics), two collections of mathematics contest problems, and four resource books that focus on mathematical people and their interests. He has served as editor of *Mathematics Magazine*, problems editor of *The American Mathematical Monthly*, editor of the *Spectrum* book series, and as Director of the Putnam Competition. Jerry's interest in excellent teaching at all levels led to his involvement in sixteen NSF summer and in-service institutes for teachers in California and in Switzerland, and in five NSF Cooperative College-School Science Projects for gifted students.

Gerald L. Alexanderson has been called "a true Renaissance man" for his breadth of knowledge, far-ranging interests, and his devotion to the art of teaching. We are delighted to honor him with the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Biographical Note

Educated at the University of Oregon and Stanford University, Gerald L. Alexanderson joined the faculty of Santa Clara University in 1958, where he is currently Valeriote Professor of Science. At Stanford he started off with a course from George Pólya and was strongly influenced by his teaching style and his interest in problems. In 2000, the MAA published his biography of Pólya. For the MAA, Alexanderson served as editor of Mathematics Magazine, and later as secretary and president.

As to hobbies, contrary to widespread rumors, Alexanderson does not climb mountains, ski, go windsurfing, or otherwise participate in extreme sports. He leads a quiet life in California, sedulously avoiding inclement weather he might encounter elsewhere. As editor of the MAA's *Spectrum* Series, he reads lots of book manuscripts. Unfortunately this makes it quite impossible for him to read any books that have already been published.

Response from Professor Alexanderson

I deeply appreciate this award and wish to thank the members of the Haimo Award Committee, officers and board members of the MAA. In particular, I would like to mention one of my closest friends, Deborah Tepper Haimo, who was MAA president when I was secretary. We worked together harmoniously, I think without exception, throughout her term of office and beyond. I have the greatest respect for Debbie's foresight, her generosity in supporting these awards, and her deep loyalty to our community. A colleague of mine recently produced a DVD on winners of the Haimo Award and I saw it a few weeks back. It is humbling to be in the company of such stellar teachers and, I would like to think, good friends.

Thank you very much.

Citation
Deborah Hughes-Hallett

Deborah Hughes-Hallett is known for her superb skills in the classroom, having "an uncanny ability to make clear... the remarkable and beautiful nature of mathematics." She excels at all scales, from the classroom to the international educational scene. Her pioneering programs at the University of Arizona and at Harvard will continue to support and inspire the worldwide teaching of mathematics for decades. The best known is the Harvard-based Calculus Consortium, which has developed alternative calculus curricula and fostered a lively national debate on the teaching of calculus.

Less well-known courses shaped and taught by Deborah in her 35-year career are the precalculus course Math Ar at Harvard, and (currently) an innovative Mathematics for Business Decisions course at the University of Arizona. Her key role in the design and delivery of mathematics courses for the Summer Program for the Mid-Career Master in Public Administration and the Master in Public Administration in International Development at Harvard's Kennedy School of Government has won high praise. These courses reach an astonishing variety of students: underprepared freshmen needing remediation, minority students seeking research careers, and an array of senior level government officials and NGO officials from developing countries. They have involved a fundamental rethinking of either curriculum or method, and are driven by her uncompromising devotion to her students and her rigorous understanding of how they think. "To Deb, no question is annoying, no student is beyond help." At the Kennedy School, Deb attends each lecture in the program's core economics, statistics, and optimization courses so she can link her teaching to the applications encountered there.

Deborah's insights and exemplary teaching have influenced many others: undergraduates who teach Math Ar, graduate assistants at Harvard and Arizona, and high school and university teachers who have attended her many workshops on teaching calculus.

For her extraordinary commitment to the understanding of learning and teaching mathematics, it is a great pleasure to award Deborah Hughes-Hallett with the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Biographical Note

Deborah Hughes-Hallett is Professor of Mathematics at the University of Arizona and Adjunct Professor at the Kennedy School of Government, Harvard. With Andrew M. Gleason at Harvard, she organized the Calculus Consortium based at Harvard, which brought together faculty from a wide variety of schools to work on undergraduate curricular issues. She is actively involved in discussions about the teaching of undergraduate mathematics at the national and international level and is an author of several college level mathematics texts. She recently completed work on a report for the National Academy of Sciences' Committee on Advanced Study in American High Schools and is a member of the MAA Committee on Mutual Concerns. In 1998 and 2002 she was co-chair of the International Conference on the Teaching of Mathematics in Greece, attended by several hundred faculty from about 50 countries. She established programs for master's students at the Kennedy School of Government, precalculus, and quantitative reasoning courses (with Andy Gleason), and courses for economics majors. She was awarded the Louise Hay Prize and elected a fellow of the American Association for the Advancement of Science for contributions to mathematics education. She won the three teaching prizes given at Harvard.

Response from Professor Hughes-Hallett

I want to thank Debbie Haimo for making this award possible, my department for nominating me, and the MAA for selecting me. Most of all, I want to thank my teachers who taught me enough to win it. These teachers—my students at Harvard, Arizona, and Middle East Technical University—have patiently guided my efforts to understand their thinking processes. Their excitement at a problem understood, and their frustration at a theorem still murky, fascinate and challenge me. The delight in their eyes as they suddenly see a vista of connections, the determination in their voices as they realize that they too can succeed in mathematics, inspire me. Above all, students have taught me that my belief in them is more powerful than the clearest explanation or the best-designed class. I am honored to have watched so many students find their mathematical wings and soar.

Citation

Aparna Higgins

Aparna Higgins is one of the dynamos of the U.S. mathematical community. Her ease with and genuine connection to students is remarkable; her dedication to teaching and mentoring is recognized by colleagues near and far. At the University of Dayton, where she has been for 20 years, she has developed several new courses, and “she is fearless to incorporate new pedagogical strategies into the classroom.” She teaches with passion and high expectations, and her students respond, acknowledging her nurturing interest that extends far beyond classroom and graduation. Her tireless service to the Honors program (directing research of 11 honors students) and organization of undergraduate mathematics conferences has had a profound impact. In the larger mathematical community, she has given generous time in serving on the MAA Student Chapters Committee, the MAA Subcommittee for Research by Undergraduates, and in co-directing Project NExT.

Aparna's own web page reveals her not-so-well-kept secret: "I love mathematics, and I love teaching. I enjoy reading mathematics and reading about it, I enjoy discussing mathematical things—even jokes, and I enjoy spending time with mathematicians and with students who are interested in mathematics." This love of all things mathematical and the desire to encourage others fuels her charisma, energy, and enthusiasm. Her joy is contagious in the classroom, at MAA student chapter meetings, in her REU summer programs, and with Project NExT Fellows.

Aparna has received two teaching awards from the University of Dayton and the 1995 MAA Ohio Section award. She has been a key person responsible for the strong interest in getting undergraduates involved in research, both by directing REU programs at the University of Dayton, and in giving frequent minicourses at AMS-MAA joint meetings and for Project NExT on how to engage undergraduate students in mathematics research.

For her passionate devotion to teaching and mentoring, it is a great pleasure to present Aparna Higgins with the Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics.

Biographical Note

Teaching has always been part of the professional and personal lives of Aparna Higgins. Her parents were teachers, her husband teaches mathematics, and her mother-in-law was a teacher. Aparna received her B.Sc. in mathematics from the University of Bombay, India, in 1978, and her M.S. (1980) and Ph.D. (1983) degrees from the University of Notre Dame. She is a Professor at the University of Dayton, Ohio, where she has taught since 1984, except for three interesting leaves spent at the Naval Postgraduate School in Monterey, California, and the United States Military Academy in West Point, New York, where she continued to learn about the teaching of mathematics. Aparna sees in-class teaching as only one part of introducing students to the profession of mathematics. She has encouraged students to do mathematics outside of class as recreation or as research, and she has created events for students to present student-generated mathematics. Her greatest professional satisfaction has come from directing students in undergraduate research. Her most enjoyable service has been on the MAA Committee on Student Chapters and as a co-director of Project NExT. Both those activities have put her in touch with about a thousand people all eager to talk about her favorite subject—teaching undergraduate mathematics.

Response from Professor Higgins

I am deeply honored and humbled to receive this award from the Mathematical Association of America. I thank the MAA for the award and for the opportunities it has provided me to make contributions to the mathematical development of students and new faculty, by letting me serve on the Committee on Student Chapters and on the Project NExT team. My gratitude to Chris Stevens and Joe Gallian is immeasurable. I have been fortunate to work with these two deeply thoughtful and very accomplished teachers of mathematics, whose encouragement and support has helped me hone my ideas and efforts in teaching mathematics and in undergraduate research. I thank Harry Mushenheim, whose office has been next to mine for twenty years, for being my mentor and my partner in the REU ventures, and I thank my chairs who have helped me implement my ideas for the benefit of our students at the University of Dayton. Abraham Goetz of the University of Notre Dame and M. S. Huzurbazar of the Institute of Science in Bombay taught me, by their examples, about loving mathematics for its own sake, and about enjoying one's classes and maintaining high standards of learning, no matter the level of the course. I thank my students for challenging my teaching beliefs and making me reflect on my teaching. I am very grateful to my Honors thesis students, from whom I learned much about the process of creating mathematics, and who taught me how to be supportive and challenging simultaneously, and how to move them ahead without leading them. I thank the Project NExT Fellows and consultants, who have been so eager to

share with me their ideas for good teaching and their successes and failures. In particular, Gavin LaRose, Judith Covington, and Wiebke Diestelkamp have been valuable contributors to my efforts with students.

My most important help and inspiration comes from my husband, Bill Higgins, who teaches mathematics at Wittenberg University. Thank you, Bill, for the insights on mathematical questions, for the patient explanations of student behavior, for the discussions at the dinner table on what example best conveys a specific mathematical idea, for keeping our home computers running, and for providing the steady support and safe environment for our family that has allowed me to pursue my professional interests.

Louise Hay Award for Contributions to Mathematics Education

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

Citation
Susanna S. Epp

In recognition of her exemplary and broad range of contributions to mathematics education, the Association for Women in Mathematics (AWM) presents the Fifteenth Annual Louise Hay Award to **Susanna S. Epp** of the Department of Mathematical Sciences at DePaul University.

Dr. Epp's career began when she earned her Ph.D. from the University of Chicago under the direction of Irving Kaplansky in 1968. She taught briefly at Boston University and the University of Illinois at Chicago and then joined the faculty of DePaul University. In 2004, she was named a Vincent de Paul Professor, one of the first group of professors so honored.

After initial research in commutative algebra, Professor Epp became interested in cognitive issues associated with teaching analytical thinking and proof. For the past twenty-five years, she has committed herself to helping students come to understand the unspoken logic and language that underlie mathematical thought. This theme runs throughout her well-known and very popular textbook, *Discrete Mathematics with Applications*, about which students write her glowing emails from such far–flung countries as Japan, England, Sweden, and Australia. For instance, one computer science student wrote, "I would like to take the opportunity to congratulate you on your fantastic book.... I believe that this is the best-written textbook I have ever seen." Conveying the nature of mathematical reasoning is also a primary theme of the book *Precalculus and Discrete Mathematics*, which she co-authored as part of the University of Chicago School Mathematics Project (UCSMP) Secondary Series (edited by Zalman Usiskin).

Epp has also raised awareness of issues in the teaching of logic and proof through a series of articles in the *American Mathematical Monthly*, the *Mathematics Teacher*, the NCTM Yearbook *Developing Mathematical Reasoning in Grades K–12*, the DIMACS volume *Discrete Mathematics in the Schools* (edited by Joseph G. Rosenstein, Deborah S. Franzblau, and Fred S. Roberts), and the volume *Mathematical Thinking and Problem Solving* (edited by Alan H. Schoenfeld).

From 1999 to 2004, Professor Epp worked as a member of the writing group that produced the Mathematical Association of America publication *Undergraduate Programs and Courses in the Mathematical Sciences: CUPM Curriculum Guide 2004*. The *Guide* urges mathematics departments to tailor courses and programs to meet their students' real needs; help all students develop analytical, critical reasoning, problem-solving, and communication skills; convey the breadth and interconnections of the mathematical sciences; and promote interdisciplinary cooperation. Recently, Epp was named co-editor of *CUPM-IR*, the online Illustrative Resources that accompany the *Guide*.

Epp has given many colloquium lectures, talks for students, and talks at national MAA meetings. She has organized and moderated panels, workshops, and MAA sessions. She has served as a reviewer for textbooks and NSF proposals and as a consultant for the Educational Testing Service and the College Board. She has judged high school mathematics contests and served on school advisory boards. In 1996, she jointly organized an international symposium on teaching logic and reasoning held at Rutgers University. In 2004 she spoke at the 10th International Congress on Mathematics Education and was one of eight mathematicians invited to participate in the Research for Better Schools Project to help develop the TIMMS videos for use in teacher education.

For Project NExT Epp has been both a speaker and mentor. Emily Hynds of Samford University, a Project NExT fellow, used Epp's discrete mathematics book as an undergraduate and became acquainted with her at a Project NExT presentation. Hynds wrote: "I have been most touched by her abilities as a teacher and communicator … she is both a scholar and a nurturer."

At DePaul University, Epp developed more than a dozen successful courses, including two in discrete mathematics and one in mathematical reasoning. Perhaps her most innovative course is "Mathematical Pedagogy: Theory and Practice." As part of that course, each student works as a tutor—an extremely valuable experience for undergraduate majors. In all of her courses, she encourages students to pursue teaching as a career and over the years she has inspired many to become teachers.

When serving as chair of the Department of Mathematical Sciences, she developed a joint computer science-mathematics major and a "pure mathematics" concentration, and she did much to promote upper-level mathematics courses to a broader audience. Her colleague, Jeanne LaDuke wrote, "This fall there are about thirty students enrolled in our first quarter abstract algebra course as compared to fewer than a dozen just a few years ago." She also introduced a new calculus course sequence to enable students lacking precalculus skills to complete the one-year sequence during a one-year period by incorporating precalculus material along the way. Michael L. Mezey, professor and dean at DePaul, wrote that she is a faculty leader who “invariably takes a leadership role because she always comes prepared to meetings, has thought carefully about the issues, and has the ability to find common ground among people of differing views.”

Epp served as an Associate Editor of the *Mathematics Magazine* and as a referee for numerous journals. She also served on many MAA Committees, including the Committee on the Evaluation of Teaching, the Committee on Curricular Renewal Across the First Two Years, the Committee on the Undergraduate Program in Mathematics (CUPM), and the President’s Task Force on the *NCTM Standards*. Of her work on the Task Force, former MAA President Kenneth A. Ross wrote, “… if I had to identify the most valuable members [of that Task Force] Susanna would be on any short list.”

For her selfless contributions to mathematics education, her role as a mentor, her scholarship, her administrative skills, her human qualities of kindness, absolute honesty and trustworthiness, and her willingness to listen, the Association for Women in Mathematics is pleased to designate Susanna S. Epp as the Fifteenth Annual Louise Hay Awardee. She most fittingly evokes the memory of all that fellow Chicagoan Louise Hay exemplified as a teacher, scholar, administrator, and human being.

Response from Susanna S. Epp

I am honored to have been chosen to receive the Louise Hay Award for Contributions to Mathematics Education from the Association for Women in Mathematics. I became acquainted with Louise during the time my husband was her colleague at the University of Illinois at Chicago, and I remember her as a person of great intelligence and a warm and vibrant personality.

I grew up as a “faculty brat.” Both my parents were English teachers, my father at Northwestern University and my mother (typical of the times) at a local junior college. After receiving my doctorate, I expected to continue a career as a research mathematician. However, my plans slowly changed when, a few years after joining the faculty of DePaul University, I became concerned about the difficulties students were having in our post-calculus courses and became involved in creating a course for our majors to serve as a “bridge” to more sophisticated mathematical thinking.

Working with the students in the course in an intensely interactive way was, perhaps, the most profound educational experience of my life. The attempt to address the difficulties they were having actually led me to deepen my own understanding of and appreciation for the role of logic and language in mathematical thought. And trying to figure out concrete ways to help them develop their understanding turned out to be much more of an intellectual challenge than I had anticipated. When explanations are too complex, students capable of comprehending them don’t need a special course, but when they are not sufficiently detailed, students aren't able to act on them. I am still working to try to find the best balance, and I continue to be grateful to my students for the stimulation they have provided me and for all that I have learned from them.

My involvement with the course led me to explore new and fascinating territory—mathematical logic, cognitive psychology, and mathematics education research. In addition, a talk I gave about the course in an MAA session organized by Anthony Ralston proved to be the gateway to participation in the larger community of mathematicians with a special interest in mathematics education. By giving the talk I became acquainted with him and with Martha Siegel and the excellent work they did to involve the MAA in the effort to determine what a course in discrete mathematics should look like, and I was invited to participate in the Tulane Conference on calculus reform and to join my first MAA committee. My life has been greatly enriched ever since by the many thoughtful and dedicated people I have had an opportunity to work with through national organizations, most especially the MAA.

The older I get the more I realize the debt I owe my own teachers. In this connection, I should start by mentioning my parents, whose keen interest and careful attention to language and whose evident commitment to good teaching surely shaped my own sensibility. My eyes were first opened to the view that mathematics is a subject with ideas as well as formulas and techniques by my husband, Helmut, who on a high school date (!) introduced me to the power and beauty of the field axioms. As a student at Northwestern and the University of Chicago, I benefited from uniformly high quality mathematics instruction. Although I can't list all the fine teachers I had, I would particularly mention Izaak Wirszup, Daniel Zelinsky, Ralph Boas, Ky Fan, Arunas Liulevicius, Antony Zygmund, I. N. Herstein, and Irving Kaplansky, all of whom, in their own ways, helped lead me to appreciate the elegance, rigor, and excitement of mathematics. I hope that I have been able to pass on some of this appreciation to my own students.

BÔCHER MEMORIAL PRIZE

This prize, the first to be offered by the AMS, was founded in memory of Professor Maxime Bôcher, who served as President of the AMS 1909–1910. The original endowment was contributed by members of the Society. It is awarded for a notable paper in analysis published during the preceding six years. To be eligible, the author should be a member of the American Mathematical Society or the paper should have been published in a recognized North American journal. Currently, this prize is awarded every three years.

Citation

Frank Merle

The Bôcher Prize is awarded to Frank Merle (Cergy-Pontoise, France), for his fundamental work in the analysis of nonlinear dispersive equations, represented most recently by his joint work "Stability of blow-up profile and lower bounds for blow-up rate for the critical generalized KdV equation" (with Y. Martel), *Annals of Math*. 155 (2002), 235–280, "Blow up in finite time and dynamics of blow up solutions for the L^2-critical generalized KdV equation" (with Y. Martel), *J. Amer. Math. Soc*. 15 (2002), 617–664, and "On universality of blow-up profile for L^2 critical nonlinear Schrödinger equation" (with P. Raphael), *Invent. Math*. 156 (2004), no. 3, 565–672.

Biographical Note

Frank Merle was born November 22, 1962, in Marseille, France. He received his Ph.D. at the Ecole Normale Supérieure in 1987, and also held a CNRS research position there from 1988 to 1991. From 1989 to 1990, he was assistant professor at the Courant Institute. Since 1991, he has been Professor of Mathematics at the Université de Cergy-Pontoise. From 1998 to 2003, he was a member of the Institut Universitaire de France, and, in 1996 and from 2003 to 2004, a member of the Institute for Advanced Study in Princeton.

Over the years, he has held various visiting positions at the University of Chicago, Rutgers University, Stanford University, the Courant Institute, IAS-Princeton, MSRI-Berkeley, the University of Tokyo, the CNRS, and Leiden University.

Merle's awards and honors include the Institut Poincaré Prize in Theoretical Physics (1997), the Charles-Louis de Saulse de Freycinet Prize of the Academie des Sciences de Paris (2000), and an invitation to speak at the International Congress of Mathematicians in 1998.

Response from Professor Merle

It is a great honor to be awarded the Bôcher Memorial Prize. I am grateful to the prize committee and to the American Mathematical Society for their recognition of this research. I am also deeply grateful to Jean Bourgain and Carlos Kenig for their constant support and early recognition of this work, and to George Papanicolaou who introduced me to these problems and supported me. I would like to thank people who influenced me early in my career and over the years, such as Henri Berestycki, Haim Brezis, Louis Nirenberg (who was a role model), Hiroshi Matano, Rorbert V. Kohn, Abbas Bahri, Jean Ginibre, my close collaborators Yvan Martel, Pierre Raphael, and Hatem Zaag, and family and friends.

The cited work is concerned with the Critical Generalized Korteweg-de Vries (CGKdV) and Critical Schrodinger (CNLS) equations. We considered the existence and description of solutions which break down (or blow up) in finite time, and related qualitative properties of the equations such as long-time behavior of global solutions. Such problems were proposed as models for understanding break-down in the Hamiltonian context. A number of people including Ya.G. Sinai and V. E. Zakharov first investigated these problems in the 1970s using formal asymptotics combined with numerical methods. Initial work led to less-than-clear results for CGKdV, and to a controversial blow-up rate for CNLS. In 1988, for the generic behavior of the break down, Papanicolaou and coauthors suggested a rate equal to the scaling rate corrected by the square root Loglog(t); but this rate is different from that of the explicit blow-up solution.

In the last decade, from Bourgain's seminal work, from the work of Kenig, Gustavo Ponce, Luis Vega, and now from the work of a large mathematical community, a huge breakthrough arose out of analytical methods based on frequency localization properties of the solution of dispersive equations. This approach extends linear type behavior (in particular global existence results) to various nonlinear contexts. For nonlinear type behavior (in particular for the qualitative study of break-down), little is known apart from stability results of the 1980s based on global energy arguments by P.-L. Lions and M. Weinstein.

The approach we took for these problems was not to justify possible formal asymptotics and construct one solution with a given behavior; instead, we looked for properties of these equations that were rigid enough to classify different blow-up and dynamical behaviors. Since the 1980s, this geometrical approach has had great success in elliptic theory and in geometry. Earlier research on the nonlinear heat equation (Merle and Zaag) suggested that this approach might also be successful for evolution equations. Using the Hamiltonian structure, we were able to localize in physical space dispersive effects which occur naturally at infinity. By their local nature, these effects give a new set of estimates and provide a dynamical rigidity for the asymptotic behavior of solutions (by way of a monotonicity formula, or by local quantities which do not oscillate in time or which satisfy a maximum principle).

For the CGKdV problem, a mechanism of balance between local dispersive effects and Hamiltonian constraints on the solutions allows us to prove and describe blow-up. In the process, we also eliminate the formally expected candidate. Nevertheless, getting a sharp lower bound for the blow-up rate remains an open problem. In the subcritical case, these techniques give asymptotic stability in the energy space of a soliton or finite sum of solitons.

For the CNLS problem, an exact description of blow-up is given (at least for solutions with a single blow-up point). It confirms that the remarkable conjecture of Papanicolaou (along with M. Landman, C. Sulem, and P.-L. Sulem) is the only generic behavior. Additional rigidities for the global behavior of solutions are also exhibited.

In the future, I think three directions should be investigated. The first is to extend this approach to other dispersive problems. Bearing in mind the qualitative elliptic theory of the 1980s and 1990s, the second direction is to carry out a similar program in the context of oscillatory integral problems. In particular, I think questions from the dynamical systems viewpoint should be considered, such as classification of connections between critical points. The last direction is to develop techniques using localization in both space and frequency to investigate a new set of questions.

Again, I thank the prize committee for honoring these lines of research, and I look forward to continued work on them.

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

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

The Frank and Brennie Morgan Prize stands to recognize and encourage outstanding mathematical research by undergraduate students. It was endowed by Mrs. Frank Morgan of Allentown, PA.

Citation

Reid Barton

The winner of the 2004 Morgan Prize for Outstanding Research in Mathematics by an Undergraduate is Reid W. Barton. The award is based on the research paper "Packing densities of patterns."

Packing densities were introduced by Herb Wilf in 1992-93. Some of the early questions were settled by Alkes Price, Fred Galvin and Walter Stromquist. Recent contributions were made by M.H. Albert, M.D. Atkinson, C.C. Handley, D.A. Holton, W. Stromquist, A. Burstein, P. Hästö, and T. Mansour. The main goal of Barton's paper is to extend the theory of packing densities of permutations to that of patterns, i.e. words allowing repetition of letters. After resolving the basic conceptual issues elegantly, Barton delves into the study of packing densities for specific families of layered patterns. He proves several important results, some generalizing earlier results by the above-mentioned authors, some opening up new vistas. Barton also outlines a possible program to tackle open questions, and formulates new conjectures. This is all in all a remarkable debut paper in the area of pattern research in combinatorics, an area of considerable current interest. Commentators consider Barton's paper the best paper so far on packing densities, and praise it for its clarity, new techniques, and new results.

Biographical Note

Reid W. Barton is a senior at the Massachusetts Institute of Technology majoring in mathematics. A resident of Arlington, MA, Reid began his formal studies in mathematics at Tufts University while in middle school. As a high school student, he earned four gold medals at the International Mathematical Olympiad, placing first with a perfect score in 2001. In 2001 he also placed first at the International Olympiad in Informatics, earning his second IOI gold medal. As an undergraduate, he has been designated a Putnam Fellow the past three years and has been a member of MIT's Putnam team, which placed first in 2003 and second in 2001. Reid has also competed on MIT's ACM International Collegiate Programming Contest team, finishing fifth and second at the 2003 and 2001 World Finals, respectively. An accomplished pianist, Reid performs in MIT Chamber Music Society groups. He is an avid bridge player and also enjoys playing intramural soccer, hockey, and ultimate.

Response from Mr. Barton

I am very honored to receive the 2004 Frank and Brennie Morgan Prize. I would like to thank the AMS-MAA-SIAM Morgan Prize Committee for selecting me for this award. I would also like to thank Joe Gallian, director of the Duluth REU, for providing the opportunity to do research on a challenging problem in a stimulating environment, and all those affiliated with the Duluth REU who gave me feedback on my research.

Honorable Mention

Citation

Po-Shen Loh

The Morgan Prize Committee is pleased to award honorable mention for the 2004 Morgan Prize for Outstanding Research in Mathematics by an Undergraduate to Po-Shen Loh. This recognition is based on his senior thesis at Caltech on “Random graphs and the second eigenvalue problem.”

His result is a probabilistic estimate. It extends the work of Alon and Roichman involving the second-largest eigenvalue of the Cayley graph of a sufficiently large group with respect to a subset of a certain size. The improvement upon the Alon/Roichman result comes from replacing the order of the group by the sum of degrees of its irreducible representations. This is considerably smaller for non-Abelian groups in general.

The second-largest eigenvalue of a graph is a characterization of the expansion of the graph, which is an important concept in combinatorics and the theory of computation. Graphs with large expansion are used in the derandomization of algorithms, the design of error correcting codes, and other applications. Their investigations have been an active research area for two decades. Po-Shen Loh’s contribution is a nice result, and the promise of great things to come.

Biographical Note

Po-Shen Loh received his mathematics degree from Caltech in 2004, and is currently studying mathematics at the University of Cambridge on a one-year Winston Churchill Foundation Scholarship. This fall, he will start his Ph.D. at Princeton University, aided by fellowships from the Hertz Foundation and the National Science Foundation. As a grade-school student in Madison, Wisconsin, Po-Shen first developed his dual interests in mathematics and computer science through competitions, representing the United States at the international level in both subjects. At Caltech, these interests migrated to research, thanks to many supportive faculty in the mathematics, applied mathematics, and computer science departments, and to Caltech's Summer Undergraduate Research Fellowship program.

Po-Shen's research interests, combinatorics and its applications, are the product of this varied background. In his spare time at Cambridge, Po-Shen explores topics in other fields, tinkers with computers, and enjoys the British countryside with his wife, a fellow Caltech graduate.

Response from Mr. Loh

I feel very honored to be designated Honorable Mention for this award, and I am very grateful to all of the people involved in organizing this prize competition. I would like to mention several institutions and individuals who contributed significantly to this final result. Caltech provided a special close-knit academic and social atmosphere that allowed my creativity and imagination to flourish, and its Summer Undergraduate Research Fellowship program gave me the opportunity to explore various fields of research during the summers of 2000, 2001, 2002, and 2003. During those summers, I worked for three wonderful Caltech advisors: Alain Martin and Leonard Schulman from computer science, and Emmanuel Candes from applied mathematics. Leonard Schulman supervised my 2003 project, which evolved into the senior thesis that won this Honorable Mention. His guidance was essential. I would also like to recognize the mathematics department at Caltech, in whose supportive company I developed the bulk of my mathematical knowledge. Finally, thank you to Debbie, my family, and my friends for your consistent support and encouragement.

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

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

AWM is pleased to present the Fifteenth Annual Alice T. Schafer Prize to **Melody Chan**, Yale University.

Additionally, the accomplishments of three outstanding young women, all senior mathematics majors, were recognized on Wednesday, January 5, 2005. AWM was pleased to honor **Margaret I. Doig**, University of Notre Dame, and **Elena Fuchs**, University of California, Berkeley, as **runners-up** and **Annalies Vuong**, University of California, Santa Barbara, as an **honorable mention** recipient in the Schafer Prize competition. Their citations are available from the AWM.

Citation

Melody Chan

Melody Chan is a senior at Yale University where she excelled in a wide variety of mathematics courses and was awarded the prestigious Hart Lyman Prize. She has made presentations at the Yale Math Club, earned an honorable mention on the Putnam Competition and is Vice President of the Yale chapter of Phi Beta Kappa. Melody also did outstanding work in advanced courses at the Budapest Semester in Mathematics in Hungary.

Melody participated in an REU at East Tennessee State University where she investigated the pebbling number problem. Her approach to the problem was described as "ingenious," and she was able to significantly improve on the bounds for the pebbling number of a graph with n vertices. She gave a well-received talk on this work at the Joint Mathematics Meetings in 2003, and her results have been submitted for publication.

In the summer of 2004, Melody participated in an REU at the University of Minnesota at Duluth during which she wrote three professional level papers on the concept of the distinguishing number. In the first paper, she was able to answer a long-standing open question, dating from the paper in which the distinguishing number was introduced. In her subsequent papers, she took a group-theoretic approach to the distinguishing number problem. This work exhibited a mastery of groups acting on sets. Various experts in the field described her papers as “remarkable” and “beautiful work” and a “foundational contribution” to the field that will likely be frequently cited.

Response from Melody Chan

I am truly happy to be able to accept the 2005 Alice T. Schafer Prize from the Association for Women in Mathematics. I view this prize as both an honor and a responsibility. The AWM fills an invaluable role in encouraging women to pursue mathematical careers, and I can only hope to contribute to the pursuit of its commendable goals.

So many people deserve my most profound thanks for their support. In particular, I would like to thank Richard Beals and Dana Angluin, two of my professors at Yale without whose guidance and excellent teaching I would be a very different person and mathematician. I would also like to thank Anant Godbole and Joseph Gallian for their wonderful REU programs at East Tennessee State University and at the University of Minnesota Duluth. Finally, I would like to thank my research advisors at Duluth, Melanie Wood and Philip Matchett, who have helped me so much at every stage of the mathematical research process.

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

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

Citation

Manjul Bhargava

The 2005 Leonard M. and Eleanor B. Blumenthal Award for the Advancement of Research in Pure Mathematics is awarded to Manjul Bhargava of Princeton University in recognition of his 2001 Ph.D. dissertation entitled "Higher Composition Laws." There Bhargava found a remarkable generalization of Gauss' law of composition on binary quadratic forms to other prehomogeneous vector spaces. Using his new understanding of some of these prehomogeneous vector spaces, Bhargava is able to count asymptotically the number of quartic number fields of absolute discriminant at most X, as X goes to infinity. This problem had been open since Davenport and Heilbronn settled the corresponding problem for cubic number fields in 1971. In his thesis Bhargava also established, for the first time, a case of the Cohen-Lenstra-Martinet heuristics on the class groups of cubic number fields.

Biographical note

Manjul Bhargava was born in Hamilton, Ontario, Canada, but spent most of his early years in Long Island, New York. He received his A.B. in Mathematics *summa cum laude* from Harvard University in 1996 and his Ph.D. from Princeton University in 2001. He is now Professor of Mathematics at Princeton, and is also the first Clay Mathematics Institute Five-Year Long-Term Prize Fellow. An accomplished tabla player whose research interests span number theory, combinatorics, and representation theory, Professor Bhargava has received numerous accolades, awards, and honors, including the Detur Prize for Outstanding Academic Achievement (1993), three Derek Bok Awards for Excellence in Teaching (1993–1995), the Hoopes Prize for Excellence in Scholarly Work and Research (1996) from Harvard

University, the AMS-MAA-SIAM Frank and Brennie Morgan Prize for Outstanding Undergraduate Research in Mathematics (1997), the MAA Merten M. Hasse Prize for Exposition (2003), and a Packard Foundation Fellowship in Science and Engineering (2004). He was named one of *Popular Science* magazine's "Brilliant 10" in 2002. Dr. Bhargava has given many invited addresses, colloquia, seminars, and public lectures at colleges and universities across North America and Europe.

Response from Professor Bhargava

I am very grateful and honored to be the recipient of the 2005 Blumenthal Award. During the past few years I have had the good fortune of interacting with many wonderful mathematicians (both faculty and students), whose friendship and wisdom have been a constant source of inspiration for me. I would like to thank them all, and, in particular, I wish to express my deep gratitude to my advisor Andrew Wiles and to Peter Sarnak for all their enthusiasm, encouragement, and guidance during my thesis work. I am also very thankful to the Department of Mathematics at Princeton University and the Mathematical Sciences Research Institute for providing me with a wonderful work environment, and to the Hertz Foundation and the Clay Mathematics Institute for funding this work. Finally, I would like to express my thanks to my family for all their love and support.

BOOK PRIZE

This prize was established in 2003 to recognize a single, relatively recent, outstanding research book that makes a seminal contribution to the research literature, reflects the highest standards of research exposition, and promises to have a deep and long-term impact in its area. The book must have been published within the six calendar years preceding the year in which it is nominated. Books may be nominated by members of the Society, by members of the selection committee, by members of AMS editorial committees, or by publishers.

Citation

William P. Thurston

Three-Dimensional Geometry and Topology

by William P. Thurston; edited by Silvio Levy

William P. Thurston's "Geometrization Program" is one of the big events of modern mathematics. The main thrust of the program is to prove a classification of all 3-manifolds by showing that each such manifold can be broken up into pieces, each of which admits a geometric structure which is hyperbolic, Euclidean, spherical, or one of five other model 3-dimensional geometries. A corollary of the program would be the Poincaré conjecture.

More than twenty years ago, Thurston wrote an extensive set of notes explaining the key ideas of his program. These notes were circulated informally by the Princeton Mathematics Department—a copy could be had for the cost of the photocopying—and today the book is in most mathematics libraries. The contents of these notes cannot be considered to be a proof of the geometrization conjecture. They are instead a manifest, laying out all the key ideas and explaining how things fit together. The book, *Three-Dimensional Geometry and Topology*, is the first volume of a multi-volume work projected to provide all the details of the proof of Thurston's program. It begins at a quite elementary level, but takes the reader to a rather sophisticated stage of classifying the uniformizing geometries of a compact 3-manifold. This result is a major step of the geometrization program. Even though the geometrization program remains unproved, this is exciting and vital mathematics.

Thurston's book is nearly unique in the intuitive grasp of subtle geometric ideas that it provides. It has been enormously influential, both for graduate students and seasoned researchers alike. Certainly the army of people who are working on the geometrization program regard this book as "the touchstone" for their work. A book that has played such an important and dynamic role in modern mathematics is eminently deserving of the AMS Book Prize.

Biographical Note

William P. Thurston was born October 30, 1946 in Washington, D.C.; he received his Ph.D. in Mathematics from the University of California at Berkeley in 1972. He taught at the IAS (1972–1973) and at MIT (1973–1974) before joining the faculty of Princeton University in 1974. Professor Thurston returned to UC-Berkeley, this time as a faculty member, in 1991 and became director of MSRI in 1993. He then taught at UC-Davis from 1996–2003 and accepted a position at Cornell University in 2003, where he holds joint appointments in the Department of Mathematics and the Faculty of Computing and Information Science.

Professor Thurston held an Alfred P. Sloan Foundation Fellowship from 1974–1975; in 1976 he was awarded the AMS Oswald Veblen Geometry Prize for his work on foliations. In 1979 he became the second mathematician ever to receive the Alan T. Waterman Award, and in 1982 Professor Thurston was awarded the Fields Medal. He is a member of the American Academy of Arts and Sciences and the National Academy of Sciences.

CERTIFICATES OF MERITORIOUS SERVICE

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

Citation

Charles Cable, Allegheny Mountain Section

The Allegheny Mountain Section of MAA is very pleased to nominate Professor Emeritus Charles Cable of Allegheny College for the Meritorious Service Award. Dr. Cable has served the local section for over 30 years. He has given many talks, organized local meetings, and served on many sectional and MAA committees. He was also an editorial reviewer for *Mathematics Magazine* for five years and he was the first Associate Editor of *Focus*. From 1973 to 1975 he was Chair of the Allegheny Mountain Section and during his tenure as Chair, he initiated student sessions as part of the regular program of our Sections Meetings. These included both informational talks and panels and papers presented by students. Allegheny Mountain Section, through the efforts of Professor Cable, was the first Section to have special sessions for students. The office of Coordinator of Student Programs was added to the Section by-laws in 1976.

In 1982, Dr. Cable was elected Governor of our Section. Among the action items brought to the Board of Governors was the establishment of Student Chapters of the MAA. The idea of instituting Student Chapters arose through the efforts of many people, including those in our Section. Professor Cable strongly supported this effort and he worked hard to convince the other Governors of its value. The Student Chapter Program was passed in 1984, the final year of his Governorship. He also served on the Committee for Student Chapters for the first six years of its existence and co-authored the by-laws for Student Chapters. Today, Student Chapters are a source of pride and an important extension of the MAA.

Dr. Cable was one of a group in the 1970's and 1980's who worked diligently within the MAA to change attitudes toward women in mathematics and to include more women in the profession. During his tenure as Governor, the Allegheny Mountain Section received a Citation from the MAA honoring "those who have furthered the progress of mathematics by enhancing significantly the status of women in mathematics."

The Allegheny Mountain Section is proud to have Charles Cable among its members and greatly appreciates his many contributions.

Response from Professor Cable

I am deeply honored to receive this award and I want to thank those who have nominated me. I am grateful for the opportunities I have had as a member of MAA. It has been a privilege to meet and work with so many dedicated and caring mathematics faculty and talented students.

When my initial efforts to form Student Chapters were unsuccessful, I was quite disappointed and I gave up. However, several months later Professor Paul Halmos urged me to try once again saying that sometimes it takes a while to get used to new ideas. I followed his suggestion and found that he was correct. This persistence eventually paid off. I am thrilled by how spectacularly successful this endeavor has been. It is gratifying to see so many undergraduate math majors excited about mathematics and presenting results of their research at both the sectional and national level.

Citation

Jon Scott, MD-DC-VA Section

The MD-DC-VA award for Meritorious Service is presented to Jon Scott of Montgomery College. Jon has held several positions in the Section, including the offices of Treasurer and Section Governor. He continues to serve in an advisory role with the section Executive Committee, and is extremely generous with his time and energy in section matters, including managing book sales and information distribution at section meetings as well as coordinating recognition of Modeling Competition winners. Jon also has a history of service to the national MAA that is impressive in both quantity and quality. Some of his more recent contributions are serving as co-organizer for the MAA sponsored workshops on “Leading the Academic Department,” serving on the PREP management team, and organizing MAA-NSF-DUE poster sessions at the National Meetings. Jon also served a term as Visiting Mathematician at MAA headquarters.

Response from Professor Scott

It is indeed a special honor to receive the Certificate of Meritorious Service from the MAA. My thanks go to all the members of the Maryland-District of Columbia-Virginia Section for allowing me to contribute to our profession. There are so many people within the Section that do so much. I thank them all for their leadership and support. The MAA, both at the section and national levels, has played a tremendous part in my continued professional growth, and ultimately in what I am able to accomplish with my students. I am only too happy to give something back to the Association. Thanks.

Citation

Barbara Osofsky, New Jersey Section

The New Jersey Section is pleased to nominate Barbara L. Osofsky to be the recipient of the 2005 Mathematical Association of America Certificate of Meritorious Service.

Professor Osofsky became a member of the MAA in 1958, while an undergraduate student in Cornell University, and has been a member ever since, becoming a life member in 1986. She received her B.A. and M.A. in mathematics, with a minor in physics, from Cornell and then moved to New Jersey, where she began her teaching career as an instructor at Douglass College of Rutgers University. She completed her Ph.D. in mathematics at Rutgers, and then she spent a year as a member of the Institute for Advanced Study on an NSF postdoctoral program. Barbara has been teaching and doing research in homological algebra at Rutgers University ever since.

Barbara is a member of the MAA, AMS, and AWM. She was active in both the AMS and the MAA early in her career, but later became much more active in the MAA. Her interests and service have been diverse and significant. She has served on and/or chaired a large number of national MAA committees: program committees for national meetings, including chairing the program committee for the last joint summer meetings with the AMS in Seattle 1996, and the program committee for the first MAA MathFest in Atlanta in 1997; editorial committees for the MAA, including chairing the *Carus Monograph* Editorial Committee for three years early in her career, and now back on that committee; two *ad hoc* committees to select a *Monthly* editor; committees to select the Chauvenet and Beckenbach award winners and to select a Hedrick Lecturer; and the Short Course Subcommittee, which she chaired for several years. She helped write a manual for organizers of Short Courses at the winter and summer national meetings and selected organizers for the Short Courses. She has served as the New Jersey Section Governor (1994–1997) and as First Vice President of the MAA at the national level (2000–2002).

For her many years of outstanding, dedicated service at both the local and national levels, the New Jersey Section regards Professor Osofsky to be well-deserving of the MAA Award for Meritorious Service.

Response from Professor Osofsky

It is indeed an honor to be the 2005 recipient of the Certificate of Meritorious Service of the Mathematical Association of America. I thank the New Jersey Section for nominating me. I very much appreciate this award, but even more I appreciate the invaluable opportunity I have had to work with so many wonderful, dedicated, creative people in the New Jersey Section and on the national level of the Mathematical Association of America.

Since my undergraduate days at Cornell in the late 1950's, when I began my long association with the MAA by taking problems in the *Monthly* section, I have watched the MAA grow and blossom. I later began attending meetings and serving on a variety of MAA committees to do my small part in contributing to this growth. As a result, I became more and more in awe of the many MAA visions of what the undergraduate mathematical experience might be, the insights of our members on how to get there, and the incredibly large amounts of time and effort spent by my MAA colleagues to further the goals of the Association. This has been a source of great pleasure to me, and I am very grateful to have had the chance to work with such dedicated people in our common cause.

Citation
Roy Deal, Jr., Oklahoma-Arkansas Section

Roy B. Deal joined the MAA in 1940, while an undergraduate at the University of Oklahoma, but playing professional baseball for a year interrupted his studies. After that, Deal worked as a foreman for Boeing building airplanes from 1940–1944 and then served as an instructor in radar theory with the US Navy from 1944–1945. Returning to the University of Oklahoma, Deal finished his undergraduate degree in Mathematics in 1947, his M.A. in 1948, and his Ph.D. in 1953, with a thesis in metric differential geometry written under the supervision of C. E. Springer. Deal then worked as a faculty member at Oklahoma A&M College, which became Oklahoma State University in 1957. Deal attained the rank of Professor in 1961, directing 21 doctoral theses before leaving in 1967 to become Professor in Biostatistics and Epidemiology at the University of Oklahoma Health Sciences Center. Deal served as Professor at OUHSC from 1967 until retiring in 1985. During that time he directed nine more doctoral theses and was influential in many more. He has consulted and lectured extensively, visiting at the Sorbonne in 1960–1961, and at the Universities of Dublin, Manchester, London, Stockholm, Athens, and Pahlavi University in Shiraz, Iran from 1976–1977. He has also been actively concerned with mathematics education, lecturing in a six-week NSF Summer Institute for mathematics teachers in Durant, OK, in 1960.

Deal served as the Chair of the Oklahoma MAA Section in 1954, as an MAA Visiting Lecturer from 1963–1965, and as Governor of the Section from 1966–1969. Deal was active in renaming the Section as the Oklahoma-Arkansas section in 1965, and he was also instrumental in establishing the N.A. Court Lecture Series in 1970 as part of our Section's annual spring meeting, honoring Professor Emeritus N.A. Court of the University of Oklahoma, who was one of the MAA's founding members. Deal gave an invited address at the first independent section meeting in March 1956 entitled *Another method of steepest descent in linear programming*. He delivered the Court Lecture in 1978, entitled *Mathematics as a hobby*. He has continued active participation in our Section during his retirement and has probably delivered more lectures at section meetings than any other individual. The title of his most recent talk in March 2004 shows that he hasn't slowed down much in his retirement: *Easy proofs of properties of elementary functions, including relations to Bernoulli numbers, Euler numbers, and the Riemann Zeta function*.

The Oklahoma-Arkansas Section of the MAA is pleased and very proud to present the Certificate of Meritorious Service to Professor Emeritus Roy B. Deal, Jr.

Response from Professor Deal

This is certainly a highlight in my long, happy association with the MAA, since Nathan Altshiller Court drove to my house, ten miles out in the country, in December 1939 to talk my parents into giving me my first membership in the MAA for Christmas that year. I have fond memories of encouraging student papers, attending and presenting papers, contacts as a visiting lecturer, time on the Board of Governors, involvement in the problems section, including watching for years what seemed to be a competition between N.A. Court and C.W. Trigg, and my involvement in the business meetings of the OK-AR Section. I am preparing a paper for the 2005 section meeting and planning another for 2006. I have observed that I have a pedagogical tendency in my writing which I am sure has been influenced by more than sixty years of reading the *American Mathematical Monthly*.

Citation

Ernie Solheid, Southern California-Nevada Section

Ernie Solheid has been the Meeting Coordinator of the Southern California-Nevada Section for seven years and has done an excellent job in the selection of the sites for the Spring and Fall Meetings of the Section. The organization of the meetings has been impeccable. We are very fortunate to have Ernie in this position. Mario Martelli, past Governor, Secretary-Treasurer, and Program Chair of the Section, suggested Ernie's name when Barbara Beechler, who had been Secretary-Treasurer, Meeting Coordinator, and Newsletter Editor for many years, stepped down from all three duties for health reasons. Barbara was very impressed by Ernie's work. She told Mario that suggesting his name was one of the best services he had done for the Section!

Response from Professor Solheid

I would like to thank my friends and colleagues in the Southern California-Nevada Section of the MAA for this very special recognition. It has been a privilege and a pleasure to work alongside them and to participate in the Section's activities for the past several years. I am most honored to receive the Certificate of Meritorious Service for the Section.

FRANK NELSON COLE PRIZE IN NUMBER THEORY

This prize was founded in honor of Frank Nelson Cole on the occasion of his retirement as Secretary of the AMS after 25 years of service and as editor-in-chief of the *Bulletin* for 21 years. The endowment was made by Cole, contributions from Society members, and his son, Charles A. Cole. This prize is awarded every three years.

Citation

Peter Sarnak

The Frank Nelson Cole Prize in Number Theory is awarded to Peter Sarnak of New York University and Princeton University for his work relating the distribution of zeros of L-functions in certain families to the distribution of eigenvalues in a large compact linear group of a type that depends on the family of L-functions one is considering. In particular it is awarded for the book *Random Matrices, Frobenius Eigenvalues and Monodromy* (with N. Katz) in which this Katz-Sarnak philosophy is introduced and in which it is extensively verified in the function field case. This philosophy has had a major impact on the direction of work in analytic number theory. In addition the prize is awarded for the papers "The non-vanishing of central values of automorphic L-functions and Landau-Siegel zeros" (with Iwaniec) and "Low lying zeros of families of L-functions" (with H. Iwaniec and W. Luo) in which this philosophy is tested in the much harder number field case. For example, the second paper shows, subject to suitable Riemann hypotheses, that the low lying zeros of the L-functions of modular forms with root number 1 (resp. -1) are distributed like the low lying eigenvalues of a random matrix in $SO(2N)$ (resp. $SO(2N+1)$) as N gets large.

Biographical Note

Peter Sarnak was born on December 18, 1953 in Johannesburg, South Africa. He received his Ph.D. from Stanford University in 1980. Professor Sarnak began his academic career at the Courant Institute of Mathematical Sciences, advancing from assistant professor (1980–1983) to associate professor (1983). He moved to Stanford University as a professor of mathematics (1987–1991). Professor Sarnak has been a professor of mathematics at Princeton University since 1991 and at the Courant Institute since 2001. Since 2002, Professor Sarnak has held the position of Eugene Higgins Professor of Mathematics at Princeton, having served as the H. Fine Professor (1995–1996) and as department chair (1996–1999).

Professor Sarnak was a Sloan Fellow (1983–1985) and a Presidential Young Investigator (1985–1990). In 1991, he was elected to the American Academy of Arts and Sciences. A winner of SIAM's Polya Prize (with P. Deift and X. Zhou) in 1998, Professor Sarnak was elected to membership in the National Academy of Sciences

(2002), won the AMS's Levi L. Conant Prize (jointly with N. Katz) in 2003, and held the Rothschild Chair from the Isaac Newton Institute in Cambridge, U. K., and the Aisenstadt Chair from the Centre de Recherches Mathématiques in Montréal in 2004. He has sat on numerous editorial boards, oversight committees, and advisory committees and he has published extensively in the areas of number theory and automorphic forms.

Response from Professor Sarnak

It is a great honor for me to receive this prize. I have mostly worked in collaboration with others. Not only has this allowed me to achieve things I could never have done by myself, but it is also more fun (especially when you are stuck, which, of course, is most of the time). This recognition belongs as much to my coworkers as to me.

In my work with Nick Katz cited above, our original aim was to determine if there was a function field analogue of the phenomenon (due to Montgomery and Odlyzko) that the local fluctuations of the distribution of the zeros of the Riemann Zeta function are governed by the distributions of the eigenvalues for the Gaussian Unitary Ensemble in random matrix theory. After a lot of false starts and misunderstandings we found such an analogue. Its source lay in the analysis of the large n limit of monodromy groups associated with families of such zeta functions. This led naturally to the possibility that the distribution of low lying zeros of a family of automorphic L-functions might also be governed in a decisive way by a symmetry type associated with the family. The extensive numerical computations of zeros of such L-functions by Mike Rubinstein, who was a graduate student at Princeton at that time, gave us valuable evidence for this belief.

The paper with Henryk Iwaniec and Wenzhi Luo, cited above, developed methods to study these questions for L-functions of automorphic forms. The paper with Iwaniec does the same for the related problem of the quantitative study of nonvanishing of such L-functions at special points on the critical line and its arithmetical applications. This allowed for the verification of aspects of the conjectured distribution of zeros as dictated by the symmetry.

One of my greatest pleasures in connection with these works has been to see how others have picked up on these ideas and run with them, far beyond what I had anticipated. Let me mention in particular the remarkable conjectures for the moments of central values of families of L-functions (Keating, Snaith, Conrey, Farmer, and Rubinstein) and the determination of some of these moments as well as far-reaching quantitative nonvanishing results for such central values (Kowalski, Michel, Soundararajan, and VanderKam).

Finally, it was Paul Cohen who many years ago, when I was a student at Stanford, pointed me to Montgomery's work on the pair-correlation of the zeros of zeta and its connection to random matrix theory and asked why is it so?

My efforts to try to answer that question began with a paper with Zeev Rudnick on the higher correlations for zeros of the Zeta function and led eventually to the works cited above.

Ruth Lyttle Satter Prize in Mathematics

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

Citation

Svetlana Jitomirskaya

The Ruth Lyttle Satter Prize in Mathematics is awarded to Svetlana Jitomirskaya for her pioneering work on non-perturbative quasiperiodic localization, in particular for results in her papers (1) "Metal-insulator transition for the almost Mathieu operator," *Ann. of Math.* (2) 150 (1999), no. 3, 1159–1175, and (2) with J. Bourgain, "Absolutely continuous spectrum for 1D quasiperiodic operators," *Invent. Math.* 148 (2002), no. 3, 453–463. In her *Annals* paper, she developed a non-perturbative approach to quasiperiodic localization and solved the long-standing Aubry-Andre conjecture on the almost Mathieu operator. Her paper with Bourgain contains the first general non-perturbative result on the absolutely continuous spectrum.

Biographical Note

Svetlana Jitomirskaya was born on June 4, 1966 and raised in Kharkov, Ukraine, in a family of two accomplished mathematicians (later three, counting her older brother). She received her undergraduate degree (1987) and Ph.D. (1991) from the Moscow State University. Since 1990 she has held a research position at the Institute for Earthquake Prediction Theory, in Moscow. In 1991 she came with her family to Southern California. She was employed by UC Irvine as a part-time lecturer (1991–1992), and rose through the ranks to a visiting assistant professor (1992–1994), and to regular faculty (since 1994). She took a leave from UCI to spend nine months at Caltech (1996). She was a Sloan fellow (1996–2000) and a speaker at ICM 2002. She is married and has three children, ranging in age from 1 to 17.

Response from Professor Jitomirskaya

I am very grateful to the AMS for this honor, and to the members of the Ruth Lyttle Satter Prize Committee for identifying and selecting me. It is humbling to be on the same list with the past recipients of this prize.

I must say that I have never felt disadvantaged because of being a woman mathematician; in fact, the opposite is true to some extent. However, compared to most others, I did have a unique advantage—a fantastic role model from early on, my mother Valentina Borok, who would have been much more deserving of such a prize than I am now, had it been available in her time. I see my receiving of this prize as a special tribute to her memory.

It is a pleasure to use this opportunity to say some thanks. It was great to be raised by my parents, and I was lucky to be a student of Yakov Sinai, who was both my undergraduate (since 1984) and graduate advisor. I am also very grateful to Abel Klein, whose support and encouragement in the postdoctoral years were crucial for my career. I had many wonderful collaborators from each of whom I learned a lot. Three of those particularly stand out, as they have majorly influenced my work. They are, in chronological (for me) order: Barry Simon, Yoram Last, and Jean Bourgain. Each of them has not only introduced new techniques to me and had a visible influence on my style and choice of topics, but provided a special inspiration and changed the way I think about mathematics. I am also grateful to Jean for entering, with his methods and ideas, the area of quasiperiodic operators. That certainly brought this field to a new level and changed how it is perceived by many others.

Finally, special thanks go to my family, as I wouldn't have accomplished a fraction of what I did without patience, support, and a lot of sacrifice on their part.

JOINT POLICY BOARD FOR MATHEMATICS

JOINT POLICY BOARD FOR MATHEMATICS COMMUNICATIONS AWARD

The Joint Policy Board for Mathematics Communication Award was established in 1988 to reward and encourage journalists and other communicators who, on a sustained basis, bring mathematical ideas and information to nonmathematical audiences. The award recognizes a significant contribution or accumulated contributions to public understanding of mathematics. It is a lifetime award.

Citation

Barry Cipra

The Joint Policy Board for Mathematics presents its 2004 Communications Award to Dr. Barry Cipra who, for nearly twenty years, has written about mathematics of every kind—from the most abstract to the most applied. His lucid explanations of complicated ideas at the frontiers of research have appeared in dozens of articles in newspapers, magazines, and books.

While some of his audience undoubtedly consists of mathematicians themselves, he writes for scientists and scholars who are mathematically literate. In this way, he has reached many thousands of scientists. Dr. Cipra's work has educated mathematicians and nonmathematicians alike by exposing them to current and deep mathematical ideas about the beauty and power of mathematics. Barry Cipra has given his readers a greater understanding of the ideas of mathematics, but most importantly he has changed their perception of the nature of mathematics.

Biographical Note

Dr. Barry Cipra received his doctoral degree in mathematics from the University of Maryland in 1980. After a brief career as an academic, he turned to freelance writing, and he has continued with that work for the past 15 years. He has written many articles for some of the premier journals of scientific exposition, including *Science and Nature*. Examples of the intriguing titles of his articles are “Simple Recipe Creates Acid Test for Primes” and “How to Play Platonic Billiards.” He is a regular contributor to SIAM News, writing many dozens of articles that are accessible and illuminating. He has authored five volumes of *What's Happening in the Mathematical Sciences* for the AMS, each including a compilation of expository articles on recent mathematical developments aimed at the mathematically literate public. Those volumes have been widely distributed (and admired) in the scientific community in Washington.

Cipra received the 1991 Merten M. Hasse Prize from the Mathematical Association of America for an expository article on the Ising model, published in the December 1987 issue of the *American Mathematical Monthly*. He is the author of *Misteaks … and how to find them before the teacher does …* (a calculus supplement), published by AK Peters, Ltd.

Dr. Cipra completed his Ph.D. degree under the direction of Michael Razar, with much help from Steve Kudia. He was a Moore Instructor at the Massachusetts Institute of Technology, a research instructor at the Ohio State University, and an assistant professor at St. Olaf College in Northfield, Minnesota, before turning to freelance writing.

Response from Dr. Cipra

It is a great honor to receive the JPBM Communications Award. To be able to write about mathematics for a living—to meet so many first-rate mathematicians and learn about their exciting work—is a pleasure beyond description. This is an amazing age in which to be reporting on mathematics and its applications. I never would have guessed, in 1987, that I would wind up reporting on the proofs of Fermat's Last Theorem and the Kepler Conjecture (and, very possibly, the Poincaré Conjecture). I have witnessed an incredible growth in the applications of mathematics, especially in biology, which fifteen years ago was barely a whisper at math meetings and now is a prominent theme at many. Perhaps most surprisingly, I've seen mathematics go from a virtual nonentity in popular culture to become the basis (or McGuffin) of award-winning plays and movies.

I've been helped by many people over the years. Chief among them are Klaus Peters, Lynn Steen, Ed Block, Paul Sally, and Sam Rankin. I would like to thank my editors, especially Gail Corbett, Tim Appenzeller, and Paul Zorn, who have made the final, published versions of my articles so much better than their first drafts. Indeed, the key to writing, I've found, is expressible in a familiar mathematical term: iteration. The hard part, as mathematicians well know, is making sure the iterative process converges to the desired result.

BECKENBACH BOOK PRIZE

The Beckenbach Book Prize, established in 1986, is the successor to the MAA Book Prize which was 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. This prize is awarded to an author of a distinguished, innovative book published by the MAA. The award is not given on a regularly scheduled basis, but is given only when a book appears that is judged to be truly outstanding.

Citation

James S. Tanton

The Beckenbach Book Prize Committee nominates the book *Solve This: Math Activities for Students and Clubs* by James Tanton, published by the MAA, for the Beckenbach Book Prize.

This book takes classic puzzles, and little-known puzzles, and some exceedingly clever original puzzles and re-interprets them as activities for student math clubs. The writing is engaging and the puzzles and activities are simultaneously deep, accessible, and enjoyable. The author's approach is fresh and different, and his puzzles and activities are presented in a way that is completely charming.

The book, however, is much more than just a collection of ideas to use with math clubs. It causes, coerces, and induces the reader to think about mathematics in non-conventional ways, exploring diverse topics from number theory, geometry, combinatorics, probability, knot theory, topology, tiling, and many more. The sections on “Take it Further” and “Solutions and Discussions” expand upon many of the problems and activities to suggest additional directions of exploration, provide notes and proofs on some important areas and theorems of mathematics, and present problems whose solutions are still unknown. Even professional mathematicians are likely to encounter questions and problems that will capture their interest in this creative, innovative, and delightful exposure to mathematics and mathematical thinking.

Biographical Note

At first glance it is difficult to determine what James Tanton has done/is doing with his academic career. After obtaining his Ph.D. from Princeton in 1994, Tanton followed the usual track of Visiting Professor/Assistant Professor/Associate Professor at three different institutions (New College of the University of South Florida, St. Mary’s College of Maryland, and Merrimack College) but was soon lured away by the joys of interacting with, teaching, being taught by, and publishing research articles with younger students, K–12, at the Boston-based Math Circle. During those three years Tanton also worked as a consultant for various teacher-training programs and college and secondary textbook editors, all under the pretext that he actually knew something about the state of secondary-level mathematics education. He didn't. But Tanton eventually decided to try practicing what he preached by heading into the secondary scene directly himself. He worked at Milton Academy for a short stint and now finds himself to be a regular high-school teacher at St. Mark's School in Southborough, Massachusetts. He has never worked harder in any aspect of his mathematical career than he is working now—and he is still in a state of shock over what he is really learning, for the first time, about life as a high-school math teacher. (Better be careful about what you preach!) Just to keep sanity completely out of reach, Tanton is also founding a new Institute of Mathematics at St. Mark's School to do interesting things that can be best read about on the web.

Response from Dr. Tanton

Sadly, I am unable to be present for today's prize ceremony, but my absence in no way is an indication of a lack of appreciation and delight. I am truly flattered and honored to be the 2005 recipient of the Beckenbach Book Prize for *Solve This*. I would never have guessed that the text is so well enjoyed. Thank you.

I am particularly touched that this piece is being honored in this way. Creative play, flexibility of the mind, and innovative thinking really are key elements to success in the scientific and mathematical research world, but alas so much of a student's early exposure to mathematics is confined, fixed, and, particularly on the secondary level, rote. A math club provides a natural forum for innovative exploration and a chance for students to learn how to ask questions, not just to answer someone else's questions. (How many graduate students have sufficient sense of ease to propose their own lists of possible research endeavors?) I hope *Solve This* really does foster a sense of personal mathematical enquiry and, moreover, encourage adaptability of the mind.

I will honor this award by choosing an activity from the book for this week's math club activity at St. Mark's School. (I might even choose an activity from the manuscript pages of *Solve This Too!*)

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 four years at the Joint Mathematics Meetings.

Citation

Harold M. Edwards

In awarding the Albert Leon Whiteman Prize to Harold Edwards, the American Mathematical Society pays tribute to his many publications over several decades that have fostered a greater understanding and appreciation of the history of mathematics, especially the theory of algebraic numbers. Edwards' historical work has all been related to the theory of numbers and has been presented mainly in two forms: mathematical expositions that are organized in the historical order of development so as to convey a genetic understanding of the relevant mathematical theory and traditional scholarly historical papers. Both forms combine clear and careful historical scholarship with an attendant mastery of the underlying mathematics and together constitute a major contribution to our understanding of the history of mathematics in the spirit of the guidelines set for the Whiteman Prize.

The first of Edwards' several major genetic expositions was presented in his book *Riemann's Zeta Function* (1974), which provides the reader with a deep mathematical understanding of Riemann's seminal paper and the many investigations that were more or less inspired by it. His second book, *Fermat's Last Theorem: A Genetic Introduction to Algebraic Number Theory* (1977), was also of this type, its goal being to introduce the reader to algebraic number theory by retracing some of the crucial discoveries in their original contexts and with their original motivations. In particular, the careful, 177-page exposition of the work of Kummer that it contains provides the reader with a solid understanding of the theory of algebraic numbers as it was perceived by one of the principal founders of the theory. In 1984 Edwards published his third book-length genetic exposition. Bearing the title *Galois Theory*, it focused on a clear exposition of the somewhat cryptic work of Galois, thereby providing the reader with a deeper understanding of the mathematical considerations that gave birth to present-day Galois theory. Any historian or mathematician interested in exploring some aspect of the history of the Riemann zeta function, the theory of algebraic numbers, or Galois theory would be wise to begin by a careful study of one of Edwards' books.

Edwards' more traditional scholarly historical papers have an evident symbiotic relation with his genetic expositions. This is especially true of his book on Fermat's Last Theorem. The masterful account of Kummer's mathematics that it contains has its roots in two important, purely historical papers on “The background of Kummer's proof of Fermat's Theorem for regular primes” (1975, 1977). Based on a careful reading of the relevant publications and the use of unpublished documents, these papers present a clear, accurate, and illuminating account of an important—and previously poorly understood—episode in the history of algebraic number theory. Among the many insights contained in these papers is a critique of the widely accepted view that it was Fermat's conjectured theorem that formed the primary motivation for Kummer's revolutionary theory of ideal factorization. A cogent historical case is made for the view that it was actually the loftier quest for higher reciprocity laws that inspired Kummer.

Much of Edwards' subsequent historical research focuses upon the two men, Kronecker and Dedekind, who in quite different ways sought to develop Kummer's ideas beyond the special number fields he had considered. The first fruits of these efforts are contained in his paper “The genesis of ideal theory” (1980). In his publications Edwards is frank about his preference for Kummer's approach over the now-familiar approach eventually developed by Dedekind. His awareness of his own prejudices and their potential for misrepresentation has resulted in remarkably objective and illuminating accounts of the work of both mathematicians.

Indeed, it is perhaps because the final set-theoretic form of Dedekind's theory is neither as obvious nor as natural to Edwards as it is to most present-day mathematicians that he has succeeded so well in delineating the gradual changes Dedekind made to his theory of ideals, which, as he has shown, actually resembled Kummer's in its initial versions. His paper “Dedekind's invention of ideals” (1982) summarizes cogent historical arguments for the radical nature of Dedekind's eventual approach to ideal theory and for the likely sources of his inspiration.

That Dedekind's theory of ideals won out over the rival generalization of Kummer's theory, namely Kronecker's theory of divisors, is due at least in part to Dedekind's superior expository skill in presenting his work. Kronecker, on the other hand, withheld his ideas on divisor theory from publication for decades as he sought to work them out in a suitable form. Then in a paper of 1882, as a *Festschrift* in honor of Kummer, Kronecker finally put something into print, but, much to the disappointment of his contemporaries, he did no more than present a sketch of his ideas that was difficult even for experts such as Dedekind to penetrate. One of Edwards' signal achievements has been to reconstruct and expound Kronecker's theory (as well as Dedekind's reaction to it). He began this process in “The genesis of ideal theory” and completed it in his book *Divisor Theory* (1990), which provides the sort of systematic and coherent exposition of divisor theory that Kronecker himself was never able to achieve. Edwards has also used the resultant insights into Kronecker's actual practice of algebraic number theory to provide a more informed interpretation of his scattered—and often misrepresented—remarks on the philosophy of mathematics. (His forthcoming paper "Kronecker's Fundamental Theorem of General Arithmetic" is a good example.) Although Edwards' personal sympathy for an intuitionist view of mathematics seems to have been the motivation for much of his historical work relating to Kronecker, the final products of his efforts are characterized by their studied objectivity. They have laid to rest many unfounded anecdotes about Kronecker and his views that had been promulgated by other historians.

Edwards' combination of historical insights and sound mathematical scholarship make him a worthy recipient of the Whiteman Prize.

Biographical Note

Harold M. Edwards was born in Champaign, Illinois, in 1936. He received a B.A. from the University of Wisconsin in 1956, an M.A. from Columbia in 1957, and a Ph.D. from Harvard in 1961. After teaching at Harvard (1961–1962) and Columbia (1962–1966) he went to New York University in 1966, where he has remained. He is now Emeritus Professor. He has published seven books: *Advanced Calculus* (1969, 1980, 1993), *Riemann's Zeta Function* (1974, 2001), *Fermat's Last Theorem* (1977), *Galois Theory* (1984), *Divisor Theory* (1990), *Linear Algebra* (1995), and *Essays in Constructive Mathematics* (2005).

Response from Professor Edwards

I am deeply grateful to be awarded the Whiteman Prize, especially so because I am only the second recipient, the first having been my esteemed colleague Thomas Hawkins.

I must echo the pleasure Tom Hawkins expressed in his response four years ago at this "manifestation of the importance the AMS attaches to the historical study of mathematics" as well as his recollection that "when I committed myself to a career in history of mathematics, there was in this country no such recognition of historical work by professional mathematical societies."

Hawkins's phrase, "the historical study of mathematics," strikes me as particularly apt. I have always felt that my study was mathematics, not the history of mathematics, but the study of the history has always been for me the easiest—and often the only—point of entry into the study of a given mathematical topic. My book on the zeta function began thirty-five years ago with a wish to understand, and, I admit, a wish to prove, the Riemann hypothesis. For me, the natural approach was to read Riemann's own words, and after I had studied his cryptic eight page paper in some detail, I thought that others might profit from an exposition of what I had learned. Publishing a work of this sort did not appear then to be a very promising career choice, but it came from a deeply felt attitude toward the study of mathematics and was more an expression of a need than a career choice. How gratifying it is to have the value of the work done for such a reason confirmed by this prize!

I would like to take advantage of this opportunity to express my gratitude to three individuals who have not been mentioned in the acknowledgements in any of my books, because their influence on any one book was so indirect, but who were each immensely important to my career:

First, to Raoul Bott, who was my thesis advisor more than forty years ago; his plain-spoken, common-sense approach to mathematics has inspired all who have ever heard him lecture, not to mention those of us who had the good luck to start our research careers with him.

Second, to Morris Kline, who would certainly be a prime candidate for this prize if he were still alive. He hired me at NYU and, being a historian himself, he furthered my historical work in many ways.

And third, to Uta Merzbach, a valued colleague who took a very helpful interest in my work and whose sharing with me of her expertise and experience in historical research was my only education in such work.

Thank you to the AMS, to the selection committee, and to Mrs. Sally Whiteman, who established the prize in memory of her husband, Albert Leon Whiteman.

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

Branko Grünbaum

Branko Grünbaum's book, "Convex Polytopes," has served both as a standard reference and as an inspiration for three and a half decades of research in the theory of polytopes. That theory is currently very active and enjoys connections with many other areas of mathematics, including optimization, computational algebra, algebraic geometry, and representation theory. Much of the development that led to the present, thriving state of polytope theory owes its existence to this book, which served as a source of information for workers in the field and as a source of inspiration for them to enter the field. Despite the passage of time, "Convex Polytopes" retains its value both as an exposition of the theory and as a reference work. Springer-Verlag's decision to issue a second edition in 2003, consisting of Grünbaum's original text plus notes by Volker Kaibel, Victor Klee, and Gunter Ziegler to describe newer developments, will extend the book's influence to future generations of mathematicians.

Biographical Note

Branko Grünbaum was born in 1929 in what was then Yugoslavia. In 1948 he started studying mathematics at the University of Zagreb, and a year later emigrated to Israel. After receiving his Ph.D. from the Hebrew University in Jerusalem in 1957 under the guidance of Aryeh Dvoretzky, he was a member of the Institute for Advanced Study in Princeton for two years. In 1961 he returned to the Hebrew University. Following a visiting appointment at Michigan State University in 1965, in 1966 he became professor at the University of Washington; he has been in Seattle ever since, as Professor Emeritus from 2000 on. At various times he had visiting appointments at the University of Kansas, UCLA, and Michigan State University. His interests cover much of geometry and combinatorics, with the principal activity on convex sets and polytopes, and tilings. In recent years, most of his efforts were devoted to configurations of points and lines in the Euclidean plane, and to non-convex polygons and polyhedra. He is happy to be able to give courses on these topics, and to see that the material has started to attract attention after a long period of quiescence.

Response from Professor Grünbaum

The beginning of "Convex Polytopes" was in notes and explanations I prepared for students in my seminar at the Hebrew University in 1963. The main topic concerned the material of Klee's seminal preprints about the face vectors of convex polytopes, and Steinitz's characterization of graphs of convex 3-polytopes. In time, the notes expanded and formed the core of the book. I was fortunate to have M. A. Perles contribute to the book his path-breaking results dealing with Gale diagrams, and to receive the cooperation of Vic Klee and G. C. Shephard for other parts of the book. After the book went out of print there were several attempts to publish an updated version; they foundered on the sheer quantity of the relevant new material. It took the mathematical depth and organizational ability of Günter Ziegler and the help of Volker Kaibel and Vic Klee to complete the task. I am greatly indebted to all of them. Naturally, I am deeply appreciative of the Steele Prize, and greatly honored by it.

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, limited this year to the field of algebra.

Citation

Robert P. Langlands

The Steele Prize for a Seminal Contribution to Mathematical Research is awarded to Robert Langlands for the paper "Problems in the theory of automorphic forms," *Springer Lecture Notes in Math.*, vol. 170, 1970, pp. 18--86. This is the paper that introduced the Langlands conjectures.

The Langlands conjectures asserted deep relations among modular forms that encompassed as special cases Class Field theory, the Artin conjectures, and Eichler-Shimura theory, which they extended to higher dimensional varieties. The conjectures provided a unifying principle for the theory of automorphic forms, and in particular a relatively clear guide to their relation with *L*-functions. As a result of this paper, the systematic relation between global and local theory and the systematic use of adele groups became fixtures in the subject.

The Langlands conjectures had their origin in Langlands' theory of Eisenstein series, which was itself a major mathematical advance. The conjectures are still unproved, but many difficult cases have been established recently. It's hard to think of any other instance in the history of mathematics where conjectures gave so accurate a road map of what would turn out to be true in so many different situations. And few other conjectures have generated so much research of such high quality.

Biographical Note

Robert P. Langlands was born October 6, 1936 in New Westminster, British Columbia, Canada. He received his A.B. and M.A. degrees at the University of British Columbia in 1957 and 1958, respectively, and his Ph.D. from Yale University in 1960. His principal speciality is the theory of automorphic forms. He is best-known for the Langlands Program, which proposes deep links between algebra and analysis, having significant ramifications for number theory.

Professor Langlands held positions at Princeton University from 1960–1967, at Yale University from 1967–1972, and, since 1972, he has been at the Institute for Advanced Study. He is the recipient of numerous honorary doctorates and awards, including the AMS Cole Prize in Number Theory in 1982, the Commonwealth Award in 1984, the National Academy of Sciences Medal in 1988, the Wolf Prize in Mathematics (1995–1996), and the French Academy of Sciences' La Grande Médaille d'or de l'Académie des Sciences in 2000. He is a fellow of the Royal Society of Canada (1972) and the Royal Society of London (1981); he is also a member of the American Academy of Arts and Sciences (1990), the National Academy of Sciences (1993), the American Philosophical Society (2004), the American Mathematical Society, and the Canadian Mathematical Society. Professor Langlands is the author of numerous research papers.

Response from Professor Langlands

The pleasure of learning that one is to be awarded a Steele Prize or perhaps almost any prize in mathematics is, for anyone with a sense of proportion, soon followed by the uneasy sentiment that there are others more deserving and, at least if the prize is coveted, that they are quite aware of it. There is little to be done with the unease but to live with it and to be grateful to those unknown members of the selection committee who appreciated what you had tried to do and made an effort to persuade the other members of the committee of its merits.

The unease is, in any case, soon followed by a more troubling impulse, the desire to supplement the citation and to explain what one really had in mind. I shan't do that now, except to mention that in the paper on "Problems in the theory of automorphic forms," dedicated I recall to Salomon Bochner, the emphasis was on what I later came to call *functoriality*, thus, in particular, on the Artin conjecture and a possible nonabelian class-field theory. Hasse-Weil *L*-functions were mentioned only in passing as a more or less obvious—once I had learned of the Taniyama-Shimura-Weil conjecture—afterthought. By the time the paper was published, I had reflected for two or three years on the "working hypotheses," as I called them, contained in it, and I no longer had any serious doubts.

In the following years various mathematicians, myself included, were able to do something with them, even some things quite striking, as with, say, base change and the Artin conjecture in the tetrahedral and octahedral case or with various general forms of the Ramanujan conjecture. Nevertheless, for lack of courage and historical perspective, I did not, as I now believe, appreciate until quite recently the real import of the suggestions and the depth one would have to attain to solve the problems posed. Unfortunately, it may now, at least for me, be too late for boldness. On the other hand, until serious inroads had been made on what the experts call the *fundamental lemma* the time was not ripe for it.

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

Israel M. Gelfand

The broad and lasting impact of I. M. Gelfand on mathematics is difficult to convey in a short space. He has had a profound influence on many fields of research through his own work and through his interactions with other mathematicians, including students. Here we can only touch on a few highlights.

Gelfand's first major achievement is the theory of commutative normed rings, which he developed in the late 1930s in his thesis. His use of maximal ideals was crucial not only in harmonic analysis, but also in the subsequent development of algebraic geometry. Next, in collaboration with Naimark, he proved that noncommutative normed rings with involution may be represented as operators in Hilbert space, a cornerstone of the modern theory of C*-algebras. In the 1940s Gelfand turned to representation theory and the theory of generalized functions. There are also foundational papers from this period on integral geometry, geodesic flows on surfaces of negative curvature, and generalized random processes.

Beginning in the mid 1940s Gelfand led many investigations on partial differential equations, and in a well-known paper published in 1960 asked for a topological classification of elliptic operators, based on the observation that the index is a homotopy invariant of the leading symbol. This led to the Atiyah-Singer index theorem, with its many profound implications and applications. We also mention his work with, among others, Levitan and Dickii on inverse spectral problems and scattering theory.

Gelfand, in collaboration with Fuks in the late 1960s, investigated the cohomology of infinite-dimensional Lie algebras, particularly those associated with a manifold. Even for the algebra of vector fields on the circle there is nontrivial and interesting cohomology. This work led to characteristic classes of foliations.

This brief account omits many fundamental results—the Bernstein-Gelfand-Gelfand resolution of representations, work on integral geometry and the Radon transform, combinatorial characteristic classes, etc.—as well as recent work on such topics as determinants, noncommutative polynomials, etc. Gelfand has also had a parallel career working on applied problems, ranging from computation to biology.

Gelfand's mathematical influence has spread not only through his many research papers, but also through his books, lectures, and seminars. His series of five books (with various coauthors) on Generalized Functions dates from the late 1950s and has been a classic for 50 years. A recent book with Kapranov and Zelevinski entitled *Discriminants, Resultants, and Multidimensional Determinants* is also a major work. In between are monographs on many other topics. Gelfand's seminar, which began in Moscow and continues in Piscataway, has long been a training ground for participants and speakers. His educational activities extend to younger mathematicians as well, including a correspondence school in both Russia and the United States as well as many books on elementary mathematics.

Biographical Note

Israel M. Gelfand was born on September 2, 1913 in Krasnye Okny, Ukraine; he received his Ph.D. and D.Sc. in Mathematics from Moscow State University in 1935 and 1940, respectively. For almost 50 years (1941–1990), Professor Gelfand served as Professor of Mathematics at Moscow State University; he has held visiting professor positions at Harvard and MIT (1989–1990) and, since 1990, he has served as Professor of Mathematics at Rutgers University. Professor Gelfand is the author of more than 800 articles and 30 books in mathematics, applied mathematics, and theoretical biology. He has worked chiefly in the area of functional analysis and representation, but he has significantly contributed to many other areas of mathematics as well.

Professor Gelfand is the recipient of many awards and honors, including the State Prize of the U.S.S.R. (1953), the Lenin Prize (1956), the Wolf Foundation Prize (1978), the Kyoto Prize (1989), and a MacArthur Foundation Fellowship (1994). He is a member of the American Academy of Arts and Sciences (1964), the Royal Irish Academy (1970), the National Academy of Sciences (1970), the Royal Swedish Academy (1974), the Académie des Sciences de France (1976), the British Royal Society (1977), the Academia dei Lincei of Italy (1988), the Japan Academy of Sciences (1989), a Lifetime Member of the New York Academy of Sciences (2000), and the European Academy of Sciences (2004). In addition, Professor Gelfand, a corresponding member of the U.S.S.R. Academy of Science since 1953, was elected to full membership in 1984. He is also the recipient of many honorary degrees.

Response from Professor Gelfand

I am very touched to receive this award from the American Mathematical Society. For me it is a confirmation that everything that I worked for through my entire life was not in vain. This recognition of my work from my peers, colleagues, and friends from the American Mathematical Society is especially meaningful for me. Mathematics for me is a universal and adequate language of sciences and it is an example of how people of different cultures and backgrounds can communicate and work together. This is extremely important in our times.

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

The Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics is the most prestigious award made by the Association. This award, first given in 1990, is the successor to the Award for Distinguished Service to Mathematics, awarded since 1962, and has been made possible by the late Dr. Hu and his wife, Yueh-Gin Gung. It is worth noting that Dr. Hu was not a mathematician. He was a retired professor of geology at the University of Maryland. He had such strong feelings about the basic nature of mathematics and its importance in all human endeavors that he felt impelled to contribute generously to our discipline.

Citation

Gerald L. Alexanderson

The Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics is the most prestigious award for service made by the Association, to be given for service to mathematics that has been widely recognized as extraordinarily successful. It would be difficult to find anyone who fits this description better than Gerald L. Alexanderson.

Jerry has a long record of able service to mathematics as a practitioner, teacher, administrator, professional organization leader, publicist, advocate, and enthusiast whose love for mathematics and its people comes through clearly in his public talks and widely-read books. One of his most notable characteristics is his extraordinary compassion and concern for the human beings who come into contact with our profession, whether they be the students whose knowledge and interest he has furthered as an award-winning teacher, or the mathematicians and their wives for whom Jerry has provided care in their old age. His sympathy for his interviewees in the *Mathematical People* volumes (coauthored with Don Albers and Constance Reid) makes his subjects come alive as real people with interesting things to say beyond mathematics, which has contributed greatly to the popularity of the books with the general public and helped counter some of the common stereotypes about mathematicians.

Jerry believes strongly in the promotion of young talent through problem solving, and has been the Associate Director of the William Lowell Putnam competition since 1975. He has coauthored two problem-solving books, and each year coauthors the article on the competition's results that appears in the *Monthly*.

At the local level, Jerry has distinguished himself as a strong proponent of mathematics on his own campus, Santa Clara University, serving as chair of his department for thirty-five years and in many other administrative positions within the university, as well as on its Board of Trustees. He received a President's Special Recognition Award in 1996 for this service to his institution.

On the national level, Jerry's leadership has been sought by mathematics research and professional organizations at the highest level. As the chair of the Board of Trustees of the American Institute of Mathematics since 1994, Jerry has seen that institution grow from a vision of two silicon valley businessmen interested in supporting mathematics to a world-class research institute, whose Research Conference Center receives major funding from the National Science Foundation and is preparing to move into a new state-of-the-art facility. Jerry also served for many years on the executive committee of the Fibonacci Association, and as its President from 1980 to 1984.

Even without his service to the MAA, Jerry's contributions to our profession would merit this award. However, his remarkable record of service to the Association cannot go unmentioned. During his fifty years of MAA membership he has served as associate editor of the *College Mathematics Journal*, co-editor of the problems section of the *Monthly*, editor of *Mathematics Magazine*, and editor of the *Spectrum* book series; as chair of the Council on Publications and the Development Committee; as chair and member of countless other sectional and national MAA committees, including the Board of Governors on which he is currently serving his twenty-first consecutive year and twenty-fourth overall; as secretary and chair of the Northern California Section; and as the Association's First Vice President, Secretary, and, from 1997 through 1999, its President. Jerry currently chairs the committees overseeing the remodeling of the MAA's carriage house into its new Mathematical Sciences Conference Center and planning the mathematical sessions to be held there, which is just one example of his continuing leadership as the Association expands in new directions.

Much of Jerry Alexanderson's professional life has been devoted to assuring that the achievements of other mathematicians are recognized and appreciated. For this reason, it is particularly fitting for his own achievements to be recognized by the MAA's highest award for service. For his long record of service at all levels to mathematics and its people, the Mathematical Association of America is pleased to present Gerald L. Alexanderson the 2005 Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics.

Biographical Note

Educated at the University of Oregon and Stanford University, Gerald L. Alexanderson joined the faculty of Santa Clara University in 1958, where he is currently Valeriote Professor of Science. At Stanford he started off with a course from George Pólya and was strongly influenced by his teaching style and his interest in problems. In 2000, the MAA published his biography of Pólya. For the MAA, Alexanderson served as editor of *Mathematics Magazine*, and later as secretary and president.

As to hobbies, contrary to widespread rumors, Alexanderson does not climb mountains, ski, go windsurfing, or otherwise participate in extreme sports. He leads a quiet life in California, sedulously avoiding inclement weather he might encounter elsewhere. As editor of the MAA's *Spectrum* Series, he reads lots of book manuscripts. Unfortunately this makes it quite impossible for him to read any books that have already been published.

Response from Professor Alexanderson

Prior to this I have never confused Atlanta with Las Vegas. But I never won a jackpot in Las Vegas comparable to this. Unaccustomed as I am to winning awards, I find that winning two within an hour is rather overwhelming. I recall an occasion similar to this in 1963 when my advisor, George Pólya, won the second of the MAA's Distinguished Service Awards at meetings in Berkeley. (In case you're wondering, the first winner was Mina Rees.) I drove Pólya to Berkeley and on the way back to Palo Alto we stopped to have dinner at the great but now almost forgotten Ritz Old Poodle Dog, a wonderfully historic San Francisco restaurant dating back to the Gold Rush. It was a fine day of celebration. I could never have imagined that forty-one years later I would be receiving this award myself.

It would have been impossible for me to accomplish much of anything at all without the help over many years of my colleagues in my own department (I won't name names because there are so many and I would risk leaving someone out), my colleagues at the MAA, and my many coauthors over the years. We are very fortunate to be in mathematics, a great field, intellectually rewarding and populated with so many dedicated, smart, and interesting people. I'm grateful to the members of the Gung-Hu Award Committee who recommended me to the Board of Governors. It gives me great pleasure to accept this award. Thank you very much—again.

Summary of Awards

For AMS

Bôcher Memorial Prize: Frank Merle
Book Prize: William P. Thurston
Frank Nelson Cole Prize in Number Theory: Peter Sarnak
Levi L. Conant Prize: Allen Knutson and Terence Tao
Leroy P. Steele Prize for Lifetime Achievement: Israel M. Gelfand
Leroy P. Steele Prize for Mathematical Exposition: Branko Grünbaum
Leroy P. Steele Prize for Seminal Contribution to Research: Robert P. Langlands
Ruth Lyttle Satter Prize in Mathematics: Svetlana Jitomirskaya
Albert Leon Whiteman Memorial Prize: Harold M. Edwards

For AMS-MAA-SIAM

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

For JPBM

Communications Award: Barry Cipra

For AWM

Louise Hay Award for Contributions to Mathematics Education: Susanna S. Epp
Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman: Melody Chan

For MAA

Beckenbach Book Prize: James S. Tanton
Certificates of Meritorious Service: Charles Cable, Jon Scott, Barbara Osofsky, Roy Deal, Jr., and Ernie Solheid
Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics: Gerald L. Alexanderson
Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics: Gerald L. Alexanderson, Deborah Hughes-Hallett, Aparna Higgins

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

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

Index of Award Recipients