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Volume 9

Integral

NEWS FROM THE MATHEMATICS DEPARTMENT AT MIT

Dear Friends,

Welcome to the first *Integral* under new management. Mike Sipser, now dean of the School of Science, truly modernized the department's leadership during his 10 years as head, with *Integral* one of his many innovations. We are very appreciative of Mike. I am enjoying working with him as the next department head.

This issue of *Integral* follows the winter 2014 issue, and will focus primarily on developments through spring 2015, but also includes MathROOTS of last summer. The next issue will come after our move, to show off the new space and bring the news up-to-date.

Return to Building 2

Anticipation is growing about our move back to our beloved Building 2 in January. As regular readers of *Integral* know, the Building 2 renovation is the vanguard for the renovation of the entire Bosworth Building. Ann Beha Architects did a fantastic job in modernizing the space while maintaining its original design. The project's most striking feature is the addition of a fourth floor. Other highlights include an expanded common room, a huge first-year graduate student office beneath the "Ziggurat," and a beautiful fourth floor seminar room. Our return to Building 2 coincides with MIT's centenary celebration of the Main Campus later in 2016.

The new Building 2 renovation depended on the support of our many colleagues and friends. We are especially grateful for the generosity of David Leighton, Tom Leighton and Bonnie Berger, Art Samberg, David desJardins, Bob and Lisa Reitano, Alex Morcos, and Ted Kelly and the Kelly Family Foundation. We also owe a special debt of gratitude to Jim and Marilyn Simons, long term friends of the math department.

New Faculty and Faculty Conferences

Last year we appointed four junior faculty: Semyon Dyatlov (analysis), Vadim Gorin (probability & representation theory), Emmy Murphy (differential topology), and Philippe Rigollet (statistics & machine learning). Sigurdur Helgason, who joined our faculty in 1960, retired in 2014. We also hosted three major birthday conferences, for Isadore Singer (90th!), Richard Stanley, and David Vogan. In the fall we celebrated MikeFest, a day-long symposium for Mike Sipser's 60th, highlighting Mike's research, mentoring and teaching career, and his amazing years as department head.

Simons Lectures

The annual Simons Lecture series of last spring featured talks by Leslie Greengard of the Courant Institute and Laure Saint-Raymond of ENS and Paris VI.

MathROOTS

We are especially happy with the launch of MathROOTS last summer, the newest addition to the department's PRIMES outreach program. Over a 12-day period, 20 African-American and Latino high school students, selected nationally, studied topics like "Modular Arithmetic" and "Hamilton's Quaternions," residing at a camp filled with math games, guest lectures, recitations, team contests, and group trips.

Inside is more on these and other features, with our web site maintaining the latest happenings.

Have a wonderful year!

Tom Mrowka

—Tom Mrowka, Department Head
Singer Professor of Mathematics

Inside:

Mathematics Welcomes Four New Faculty

Semyon Dyatlov, Assistant Professor of Mathematics, came to MIT as a Clay Research fellow in 2013. Semyon is an analyst who uses methods of microlocal analysis and dynamical systems to study problems in scattering theory (specifically scattering resonances), quantum chaos, and general relativity. He earned his PhD from UC Berkeley under Maciej Zworski in 2013 and was subsequently a postdoc fellow at MSRI in mathematical general relativity.

Vadim Gorin, Assistant Professor of Mathematics, came to MIT as a CLE Moore Instructor in 2012. His research belongs at the intersection of asymptotic representation theory and large stochastic systems originating in random matrix theory and statistical mechanics. He earned the Candidate of Sciences at Moscow State University and received his PhD at Utrecht University. In 2012 he was a postdoctoral fellow at MSRI's Random Spatial Processes semester.

Emmy Murphy, Assistant Professor of Mathematics, came to MIT as a CLE Moore Instructor in 2012. She received her PhD from Stanford University under Yakov Eliashberg in 2012. Emmy is a geometric topologist, using flexibility phenomena and h-principles to reduce the subtleties of symplectic and contact geometry to pure topology and resolving many open questions.

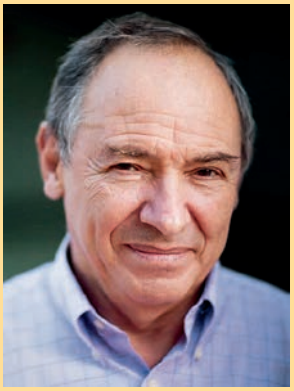
Philippe Rigollet, Assistant Professor of Mathematics, comes to MIT from Princeton University. He received his PhD from University of Paris VI in 2006, followed by appointments at Georgia Tech and Princeton. Philippe works at the intersection of statistics, machine learning, and optimization, focusing primarily on the design and analysis of statistical methods for high-dimensional problems. His recent research focuses on the statistical limitations of learning under computational restraints.

Retiring Faculty

Sigurdur Helgason first came to MIT as a CLE Moore Instructor in 1954 and later joined our faculty following appointments at Princeton, Chicago, and Columbia. Sigurdur is a geometric analyst who made major contributions to representation theory, to group actions on homogeneous spaces, and to generalized Radon transforms. His Fourier transform on symmetric spaces yielded deep new results about invariant differential equations. His classic text *Differential Geometry and Symmetric Spaces* trained generations of mathematicians; this book, its expanded second edition, and its successor, *Groups and Geometric Analysis,* earned him the 1988 Leroy P. Steele Prize. Sigurdur graduated 17 PhDs (13 at MIT) and served as the graduate faculty chair for seven years. He received MIT's first Graduate Teaching Award in 1975. He is a member of the Icelandic and the Royal Danish Academies and a fellow of the American Academy of Arts and Sciences.

Faculty Spotlights

Victor Kac Honored for Lifetime Achievement



Victor Kac received the American Mathematical Society's 2015 Leroy P. Steele Prize for Lifetime Achievement for "ground-breaking contributions to Lie Theory and its applications to Mathematics and Mathematical Physics." The citation lists a number of discoveries and results, beginning with the Kac-Moody algebras, that were fundamental to developments in combinatorics, integrable systems, modular forms, enumerative algebraic geometry, and the Langlands program. In mathematical physics, Kac's program made major contributions to quantum field theory, string theory, and statistical mechanics. His highly influential text, *Infinite-Dimensional Lie Algebras*, is now in its third edition.

Victor holds the Medal of the College de France, as well as the Wigner Medal (with Robert Moody) given by the Group Theory and Fundamental Physics Foundation. He is an honorary member of the Moscow Mathematical Society, fellow of the American Academy of Arts and Sciences, and member of the National Academy of Sciences. Victor is the fifth MIT mathematics faculty member so honored in the 24 years that the Steele Prize has been given.

George Lusztig Honored with Shaw Prize

George Lusztig was awarded the 2014 Shaw Prize in the Mathematical Sciences "for his fundamental contributions to algebra, algebraic geometry and representation theory and for weaving these subjects together to solve old problems and reveal beautiful new connections." This is one of the major international awards in mathematics. Prior winners include Maxim Kontsevich, Simon Donaldson, and Andrew Wiles.

George is the Abdun-Nur Professor of Mathematics and was the Norbert Wiener Professor from 1999–2009. He has received major distinctions throughout his career, including the Berwick Prize, the AMS Cole Prize in Algebra, and the Brouwer Medal of the Dutch Mathematical Society. He is a fellow of the Royal Society and of the American Academy of Arts and Sciences, and a member of the National Academy of Sciences.

George generously donated a significant portion of his Shaw Prize to establish the department's George Lusztig PRIMES mentorships to support graduate student mentors in their continuing work in PRIMES (see pg. 8). He also established a new AMS Prize, the Chevalley Prize in Lie Theory, that will be awarded biannually (starting in 2016) for "notable work in Lie theory published during the preceding six years."

Photo Credit: Chinese University of Hong Kong

Larry Guth Distinguished as Simons Investigator

The Simons Foundation selected Larry Guth as Simons Investigator in 2014. Larry has contributed to fundamental questions in Riemannian, symplectic, and combinatorial geometry. His recent work relates to the Kakeya problem, an open question in Euclidean geometry with connections to both Fourier analysis and to incidence estimates in extremal combinatorics. A recent breakthrough in the area of incidence problems introduced polynomials into the subject and applied basic results in algebraic geometry. Larry has been developing these ideas and applying them to combinatorics, the Kakeya problem, and Fourier analysis.

Larry joined the MIT faculty as professor in 2012 from the Courant Institute. He received his PhD at MIT under Tom Mrowka in 2005, followed by appointments at Stanford and the University of Toronto. Among other distinctions, he was awarded the Salem Prize in Mathematics in 2013 for outstanding contributions to analysis.

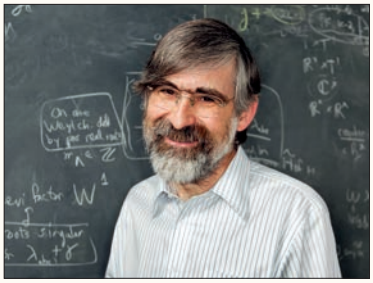
Paul Seidel Named Norman Levinson Professor

Paul Seidel was appointed the Norman Levinson Professor of Mathematics as of July 2014. He studies symplectic topology and the mathematics of mirror symmetry. Among his many influential works, perhaps most notable is his 2008 monograph, *Fukaya Categories and Picard-Lefschetz Theory*. Paul received the 2010 AMS Veblen Prize in Geometry "for his fundamental contributions to symplectic geometry and, in particular, for his development of advanced methods for computation and symplectic invariants." In 2012, he received a Simons Investigator Award. He holds a fellowship at the Radcliffe Institute for Advanced Study for academic year 2014–15. He is a fellow of the AMS and a member of the American Academy of Arts and Sciences.

Paul joined the department faculty in 2007, following professorship appointments at Imperial College and the University of Chicago. He received his DPhil from Oxford University in 1997 under the direction of Simon Donaldson.

David Vogan Named Norbert Wiener Professor

David Vogan was named the Norbert Wiener Professor of Mathematics. As Jeffrey Adams wrote in the AMS Notices, "David has been at the forefront of representation theory of Lie groups since his revolutionary Ph.D. thesis. His energy, generosity, and outgoing nature have put him at the center of an ongoing research program at the highest level." In 2002, David became a co-founder of the Atlas of Lie Groups and Representations. David is just as committed to teaching, mentoring, and service to the department — as a frequent committee chair and as department head, 1999–2004 — and to the community at large, as president of the AMS, 2013–2014.



Vogan joined the MIT faculty in 1979 after receiving his PhD from MIT in 1976 under Bertram Kostant. In 2007 he was selected as the department's Robert E. Collins Distinguished Scholar, and in 2011 he received the AMS Conant Prize for expository excellence. David is a fellow of the AMS and of the American Academy of Arts and Sciences, and a member of the National Academy of Sciences.

Faculty Recognitions

Bill Minicozzi, **Paul Seidel**, and **Gigliola Staffilani** were elected fellows of the American Academy of Arts and Sciences. **Roman Bezrukavnikov**, **George Lusztig**, **Bjorn Poonen**, and **Scott Sheffield** were awarded the Simons Fellowship in Mathematics. **Bjorn Poonen** also received the 2014 School of Science Teaching Prize for Undergraduate Education. **Bonnie Berger** was elected vice president of the International Society for Computational Biology. **Ankur Moitra** and **Jared Speck** each received NSF CAREER Awards. **Jörn Dunkel** and **Emmy Murphy** received a Sloan Research fellowship. **Vadim Gorin** was awarded the Moscow Mathematical Society Prize for a cycle of works titled "Asymptotic problems in combinatorics and representation theory." **Alexei Borodin** gave a plenary lecture at ICM 2014 and the Minerva lecture series at Columbia University. **Bjorn Poonen** gave three distinguished lectures in 2014: the Serge Lang undergraduate lecture at U.C. Berkeley, the Maxson lecture series at Texas A&M, and the Niven Lecture at the University of British Columbia.

2014 Promotions

Laurent Demanet, to Associate Professor.
Jacob Fox, to Associate Professor with tenure.
Jonathan Kelner received tenure.
Alexander Postnikov, to Professor.

Research Staff Award

Vladislav Voroninski, Instructor in Applied Mathematics, was awarded a SIAM Outstanding Paper Prize for his paper, "Phase Retrieval via Matrix Completion," co-authored with **Emmanuel Candès**, **Thomas Strohmer**, and **Yonina Eldar**. The prize is awarded to authors of papers that offer a fresh look at an existing field or open up new areas of applied mathematics.

Staff Distinction

Barbara Peskin received the School of Science Infinite Mile Award, for exceptional service, far beyond assigned roles and duties, to the math department.

From Associate Head Gigliola Staffilani

Beginning this academic year, several of our classes received new numbers in the course catalogue. This may come as a surprise to alumni who have known certain fundamental classes by number for half a century or more. But the numbers assigned to classes had become disassociated from their content; we wanted to adopt a numbering system that would reveal not just the level but also the area of mathematics that each class would be based upon. For example, 18.310 (Principles of Discrete Mathematics) will now be 18.200; we adopted the previously unused 18.2xy digits to denote classes dealing with discrete applied math, keeping 18.3xy for continuous applied math. We expect the transition from the old to the new system to be bumpy at first, but we hope the change will result in more clarity overall.

We are also moving ahead with our classes offered through the MITx platform. We are successfully using MITx to deliver the material for 18.03 and 18.06 to residential students, allowing students to work on computational problems online and obtain instant feedback. We are also developing our 18.01 Calculus class completely online for the outside world. The first part, Differentiation, went live as our first MOOC last June. David Jerison and I are grateful for the generous support we received from the Class of 1960 Fund for Innovation in Education to make this possible.

My service as associate head came to an end in June, and John Bush is my successor. Good luck, John!

In Remembrance: Richard D. Schafer

Richard D. Schafer, emeritus professor and former deputy head of the MIT Department of Mathematics, died on Dec. 28, 2014. He was 96.

Schafer joined the MIT mathematics faculty in 1959 as deputy head under department head William Ted Martin. The department had seen a period of rapid growth of faculty and post-doctoral programs in the ’50s, with expanding demands in teaching and graduate supervision. As deputy head, Schafer was instrumental in organizing the application and review processes of the relatively new CLE Moore instructorship program, and in systemizing the assignment of teaching and the scheduling of classes with the Office of the Registrar. He stepped down as deputy head when Ted Martin ended his tenure as department head in 1968, but he stayed on at MIT until his retirement in 1988 as professor emeritus.

Schafer was an algebraist, an expert in non-associative algebras. He did collaborative work with fellow mathematician Claude Chevalley on Lie algebras and extensive work on Jordan algebras. In 1966, Schafer published *Introduction to Nonassociative Algebras* (Academic Press), a book that has served as a standard reference for many years.

Schafer was born in Buffalo, New York, in 1918. He received both a BA and an MA from the University of Buffalo, and a PhD in mathematics from the University of Chicago in 1942. Between 1942 and 1945 he served in the U.S. Naval Reserve.

Upon his return to academia in 1945, Schafer took a yearlong appointment as an instructor at the University of Michigan. He was a member of the Institute for Advanced Study from 1946–48 and later from 1958–59. He joined the faculty at the University of Pennsylvania in 1948, and moved to the University of Connecticut as a full professor in 1953, where he served as department head until joining MIT in 1959. From 1955–58, Schafer also served as associate secretary of the eastern region of the American Mathematical Society.

In 2013, Schafer was elected to join the inaugural class of fellows of the American Mathematical Society. He had been active for 50 years in the Mathematical Association of America and Phi Beta Kappa.

A lifelong opera fan, Schafer regularly traveled to the Metropolitan Opera in New York City and to the Salzburg Festival in Germany. For 67 years, he was married to the late Alice T. Schafer — a fellow mathematician and longtime professor at Wellesley College, and a co-founder of the Association for Women in Mathematics.

Schafer is survived by sons John D. Schafer of Turner, Maine, and Richard S. Schafer of Concord, Massachusetts; grandson Scott D. Schafer of Philadelphia, Pennsylvania; granddaughters Tania Murray of Frankfort, Illinois, and Stephanie Altavilla of Chelsea, Massachusetts; and two great-grandchildren, Mikayla and Grant Murray.

Photo Credit: MIT Museum

Building 2 Takes Shape

As the comprehensive renovation and expansion of Building 2 nears completion, the faculty have participated in hard-hat tours and on-site discussions. We thought you'd like to get a taste of the construction behind-the-scenes, before the paint, the shine, and new furnishings. Building 2 will definitely be the star attraction at the 2016 centenary celebrations of the Main Group Complex!

Progress on 2-190:

The New 4th floor Seminar Room:

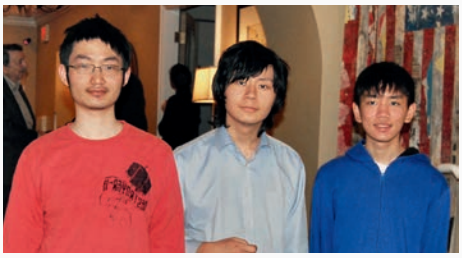
Putnam Triumph!

The MIT team placed first place for the fourth time since 2000, and MIT had a record year of individual ranking with four out of five Fellows, in the December 2013 William Lowell Putnam Mathematical Competition. Team members **Benjamin Gunby**, **Mitchell Lee**, and **Zipei Nie** were mentored by **Richard Stanley**, **Abhinav Kumar**, and **Henry Cohn**, with 35/81 top individual scorers. Our nearest "competition," Harvard, had 11/81 top scorers.

Putnam Fellows: 4/5. Mitchell Lee, Zipei Nie, Bobby Shen, and **David Yang**.

Next twenty: 11/20. Matthew Brennan, Michael Cohen, Benjamin Gunby, Brian Hamrick, Travis Hance, Jiaoyang Huang, Qinxuan Pan, Ka Yu Tam, Szu-Po Wang, Victor Wang, Tianyou Zhou.

Honorable Mentions: 20/55. Dhroova Aiylam, Joshua Alman, Robi Bhattacharjee, Yongyi Chen, Ping Ngai Chung, Alexander Cole, Carlos Cortez, Vlad Firoiu, Yibo Gao, Supanat Kamtue, Carl Lian, Jeffrey Shen, Lawrence Sun, Jonathan Tidor, Max Timmons, Georgios Vlachos, Tianqi Wu, Patrick Yang, Qian Yu, Alex Zhu.



MIT Putnam Fellows Zipei Nie, David Yang, and Bobby Shen

MIT Putnam honorees

Donor Profile — Bob and Lisa Reitano

Bob (PhD '76) and Lisa Reitano have decided to support the math department with an endowed fellowship in honor of Professor Gilbert Strang and a classroom in memory of his advisor, Professor Alberto Calderón.

"It's been on my mind for most of my career to make a gift to MIT," Bob told us. "I came from a state university, applied to grad school at MIT, and didn't get in. But I was passionate and determined and went to see Professor Gil Strang, a top mathematician and educator, who was then director of math admissions. He could have said no—no today, no tomorrow. But he encouraged me, and also encouraged me to take an MIT course, then another with the late Professor Alberto Calderón, one of the foremost mathematicians of his time, whom I aspired to work with and who later took me on as a grad student.

"The MIT environment made me aware of the human potential for greatness. It changed me, motivated me to be my best. Now our gift will support renovation of the math building by naming a prominent classroom to honor Professor Calderón, and it will provide graduate fellowship support in math to honor Professor Strang. Now, as an educator myself, I know that it's not only ability but also passion that is needed to succeed."

Bob earned bachelor's and master's degrees in math from the University of Massachusetts and a PhD in math from MIT in 1976. He was executive vice president and chief investment strategist of John Hancock/Manulife, where he led the Global Investment Strategy Group. He is now Professor of the Practice in Finance at Brandeis University's International Business School.

Lisa earned a bachelor's degree in math from Wesleyan University and was an actuary at John Hancock/Manulife, where she met Bob. They married in 1987 and have three children. They enjoy hiking, biking, and European travel. (This profile was originally published in *Technology Review* magazine.)

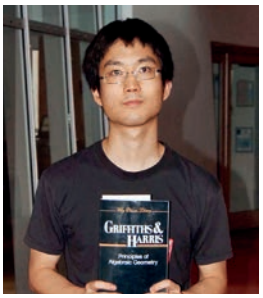
For more information on making a gift to the Mathematics Department, please contact Director of Development for Mathematics,
Erin McGrath
emcgrath@mit.edu or 617-452-2807.

MathROOTS

MathROOTS is the department's new summer math mentoring program for promising high school students from underrepresented backgrounds or underserved communities. Dean Mike Sipser suggested the idea and raised the initial funding. The goal is to engage young mathematicians in creative problem-solving outside the standard curriculum and immerse them in an academic and cultural community of like-minded peers and mentors. The program is run by faculty advisor Pavel Etingof, academic director Slava Gerovitch, head mentor Tanya Khovanova, academic coordinator Yi Sun, and program director Quinton McArthur (MIT Admissions). In addition, eight graduate students and undergraduates of diverse backgrounds serve as academic mentors and residential counselors.

Students of MIT's first MathROOTS program: (L-R) Antonio Monreal, Sofia Dudas, Brent Avery, Kalyn Younger, and Trajan Hammonds

2014 Student Awards



Dennis Tseng '14 received the Jon A. Bucsela Prize in Mathematics for distinguished scholastic achievement, professional promise, and enthusiasm for mathematics.

Sheela Devadas '15 received the 2015 Alice T. Schafer Prize for excellence in mathematics by an undergraduate woman, and **Jessie Zhang** '15 received an Honorable Mention in the 2014 Alice T. Schafer Prize, given by the Association for Women in Mathematics.

Carl Lian '15 and **Daniel Kang** '15 each received the Barry Goldwater Scholarship, given to those intending to pursue careers in mathematics, the natural sciences, or engineering disciplines who exhibit outstanding potential.

One of our former graduates, **Noam Angrist** '13, a double math and economics major, was selected for a Rhodes Scholarship.

Math majors **Anne Kelly** '17, **Jason Liang** '16, and **Eric Wang** '16 made up the MIT team that received the Meritorious Winner distinction in the 2014 Mathematical Contest in Modeling (MCM).

Among our Graduate Students: Ailsa Keating and **Kestutis Cesnavicius** received the Charles W. and Jennifer C. Johnson Prize for an outstanding paper accepted for publication.

Michael Donovan and **Jennifer Park** received the Charles and Holly Housman Award for excellence in undergraduate teaching.

Gigliola Staffilani, Charles and Holly Housman, and awardee Michael Donovan

Ailsa Keating and Kestutis Cesnavicius, with Alexei Borodin (center)

PRIMES, RSI & SPUR: Mentored High School and Undergraduate Research

The Department's PRIMES and RSI programs for high school students, mentored by our graduate students, continue to earn numerous awards for their research projects. PRIMES and RSI students **Peter Tian**, **Joseph Zurier**, **Noah Golowich**, **Brice Huang**, and **Shashwat Kishore** swept five top prizes in all fields of science and technology at Siemens 2014 and Intel STS 2015 competitions, winning the first and second prizes at Siemens and the first-, second-, and third-place medals of distinction for basic research at Intel STS 2015, respectively.

Among other PRIMES students, **William Kuszmaul** earned the third prize at Intel STS 2014; **Ravi Jagadeesan** became a Davidson Fellow laureate; and **Uma Roy**, **Junho Won**, and **Kavish Gandhi** earned outstanding presentation awards at the 2014 and 2015 MAA undergraduate poster sessions. Five new research papers based on PRIMES projects were published in high-level mathematical journals.

Other RSI students received multiple honors. **Rumen Dangovski** won the second prize at Intel ISEF 2014, and **Sarah Shader** placed second in the Karl Menger Award at Intel ISEF 2014. **Jessica Shi** received a finalist award at Intel STS 2014 and a 2014 MAA outstanding presentation award, and **Yelena Mandelshtam** became a finalist at Intel STS 2015.

PRIMES-USA for out-of-state students has greatly expanded, from five to sixteen students, between 2013 and 2015. **Ritesh Ragavender** received the first prize in the mathematical sciences and placed third in the AMS Menger Award at 2014 Intel ISEF. He also won the Yau HS Math Competition bronze award and a Davidson fellowship. **Ragavender**, **Bryan Oh**, and **Shyam Narayanan** received the MAA outstanding presentation awards for 2014 and 2015.

PRIMES Circle, for talented sophomores and juniors from local urban public high schools, also grew from eight to fifteen students over the last two years. Its current enrollment is 60% female, 27% Hispanic, and 13% African-American. Circle students study advanced topics, prepare expository papers, and make presentations at a mini-conference at MIT.

Regarding the summer mentoring program for undergraduate research (SPUR), the 2014 Hartley Rogers Jr. Prize for the best SPUR paper went to undergraduate **Saarik Kalia** (a former PRIMES student) and his mentor, graduate student **Ben Yang**.

Pavel Etingof and **David Jerison** served as RSI & SPUR faculty advisors; Pavel also continues as the PRIMES chief research advisor, and **Tanya Khovanova** as the PRIMES & RSI head mentor. **Slava Gerovitch** is the director of research and reading programs in the mathematics department.

Participants of the 2014 PRIMES program

Interview with Recent MIT Undergraduate Sheela Devadas

by Susan Ruff

SR: Congratulations for receiving the Alice T. Schafer prize for Excellence in Mathematics!

SD: Thank you. It was a surprise when my advisor, Professor Etingof, told me. The initial e-mail went to my spam folder.

SR: The criteria for the prize include interest, performance, and independence in mathematics. What fostered these for you?

SD: In middle school I had a really good math teacher who encouraged me to participate in programs like PRIMES at MIT and PROMYS (Program in Mathematics for Young Scientists) at BU. In these programs, the research is guided: you have regular meetings with your advisor to report progress, ask questions, and get suggestions if you're stuck. But the work is your own, which really develops confidence.

SR: How did being in PRIMES affect your thinking about the future?

SD: By the end of my first year of PRIMES, I realized that math research was definitely what I wanted to do. With math research, I might be the first person ever to have understood a particular concept in a novel way, and if I can

articulate that understanding, I'm increasing the knowledge pool of the world in some sense. Nothing stands between you and your ideas: you aren't relying on physical substances that can and will go wrong. I had an experience growing plants for a science fair that did not go well: most of the plants died, so we couldn't draw any conclusions. In math the things you're researching don't generally keel over.

SR: The Schafer Prize is awarded by the Association for Women in Mathematics. Do you have any suggestions for how MIT can encourage girls in math?

SD: It's important to have women mentors and a peer group of girls. It really helped that my middle school math teacher was a woman, because it told me, "Wow, it's actually totally normal for girls and women to be into math." My UROP advisor, who was female, was able to tell me things men just don't necessarily know about the experience of women in academia. MIT's Undergraduate Society of Women in Mathematics is an important peer group, as was the Math Prize for Girls competition. Things like those should be supported.

June 2014 Degree Recipients

Joshua Batson, *"Splitting Links and Slicing Surfaces,"* under Peter Ozsváth (Princeton). Joshua is now writing for *Wired* Magazine.

Rosalie Belanger-Rioux, *"Compressed Absorbing Boundary Conditions for the Helmholtz Equation,"* under Laurent Demanet. Rosalie is now a lecturer at Harvard University.

Kestutis Cesnavicius, *"Selmer Groups as Flat Cohomology Groups,"* under Bjorn Poonen. Kestutis is now a Miller Research fellow at U.C. Berkeley.

Lucas Culler, "*The Blowup Formula for Higher Rank Donaldson Invariants,"* under Tom Mrowka. Lucas is now an instructor at Princeton.

Alan T. Deckelbaum, *"The Structure of Auctions: Optimality and Efficiency,"* under Constantinos Daskalakis (EECS). Alan is now a researcher at Renaissance Technologies.

Mario DeFranco, *"The Unramified Principal Series for P-Adic Groups: The Bessel Function,"* under Benjamin Brubaker (Univ. of Minnesota). Mario is currently an instructor at MIT.

Alexander Dubbs, *"Beta-Ensembles with Covariance,"* under Alan Edelman. Alex is now a postdoc at Columbia University.

David Jackson-Hanen, *"Symplectic Cohomology of Contractible Surfaces,"* under Paul Seidel.

Ailsa Keating, *"Symplectic Properties of Milnor Fibres,"* under Paul Seidel. Ailsa is now a Simons fellow at Columbia University.

Daniel Ketover, *"Min-Max Minimal Surfaces in 3-Manifolds,"* under Toby Colding. Daniel is now a postdoc at Princeton University.

John Lesieutre, *"Negative Answers to Some Positivity Questions,"* under James McKernan. John is now a postdoc at the Institute for Advanced Study.

Mark Lipson, *"New Statistical Genetic Methods for Elucidating the History and Evolution of Human Populations,"* under Bonnie Berger. Mark is now a postdoc at Harvard Medical School.

Tiankai Liu, *"On Planar Rational Cuspidal Curves,"* under James McKernan. Tiankai is now a postdoc at the University of Utah.

Anand Oza, *"A Trajectory Equation for Walking Droplets: Pilot-Wave Dynamics on a Vibrating Fluid Bath,"* under John Bush. Anand is now a postdoc at the Courant Institute NYU.

Jennifer Park, *"Effective Chabauty for Symmetric Powers of Curves,"* under Bjorn Poonen. Jennifer spent one year as an NSERC fellow at McGill University, and since September 2015 she has been a Hildebrandt postdoc at the University of Michigan.

Oleksandr Tsymbaliuk, *"The Affine Yangian of gl(1) and the Infinitesimal Cherednik Algebras,"* under Pavel Etingof. Oleksandr is now a postdoc at the Simons Center for Geometry and Physics at Stony Brook.

George Jay Tucker, *"Statistical Methods to Infer Biological Interactions,"* under Bonnie Berger. George is now a machine learning scientist at Amazon.

Conference luncheon

Mike and his students

Mike with his dad

MikeFest

MikeFest: A day-long symposium honoring the 60th birthday of Michael Sipser, the Barton L. Weller Professor of Mathematics, former mathematics department head, and now dean of science. Several leading theoretical computer scientists gave their perspectives on the past and future of computational complexity, an area shaped by Mike in his research. During the banquet that followed, a number of Mike's former students, family members, and colleagues remembered, often with a bit of humor, Mike as a teacher, mentor, researcher, leader, and friend.

Family, colleagues, and friends listen as Mike talks

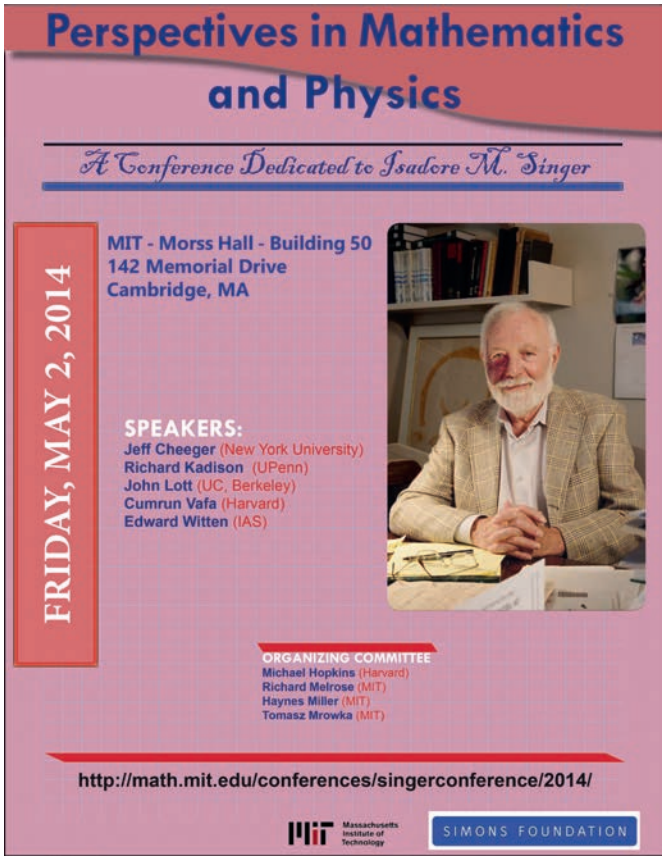
Mike addresses the dinner guests

MikeFest attendees

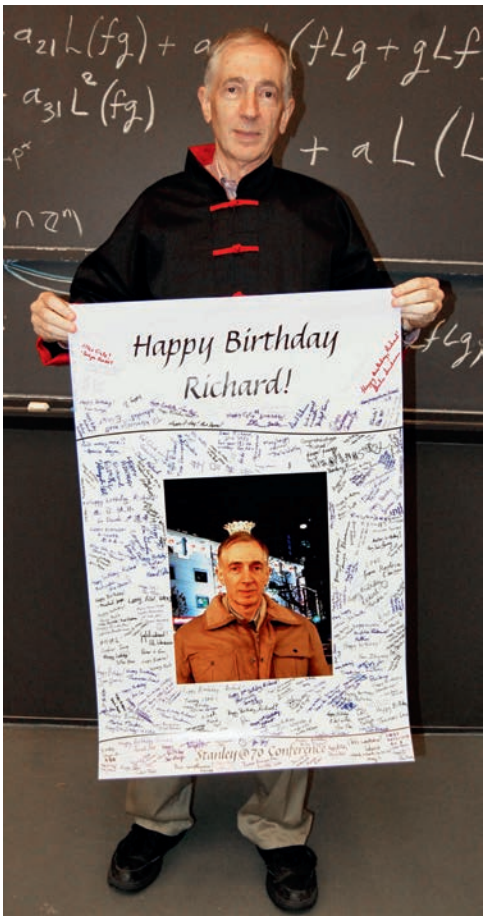
Isadore Singer's 90th Birthday Conference

On May 2, 2014, the department hosted a conference dedicated to Isadore M. Singer on his 90th birthday, Perspectives in Mathematics and Physics. Leading mathematicians and theoretical physicists spoke in the morning and afternoon, followed by remembrances of family, friends, and colleagues at a reception and banquet at the Physics Department atrium. The dinner speeches are available at **http://math.mit.edu/~jorloff/singer-may2014/Singer-may2014.html**. Visit **http://math.mit.edu/~jorloff/singer-may2014/singervideos.html** to view the conference talks.

Professor Isadore Singer (top left), joined by colleagues Michael Hopkins, John Lott, Orlando Alvarez, Cumran Vafa, Edward Witten, and Tom Mrowka



Conference in Honor of Richard Stanley's 70th



Birthday card

Over 300 mathematicians from around the world gathered at MIT June 23–27, 2014, to honor Professor Richard Stanley at his 70th birthday conference, Stanley@70. The program included 34 talks (both historical and cutting edge with reminiscences by colleagues and former students, a banquet at Walker Memorial (including a new song immortalizing Stanley's "EC1" book), and a ping-pong tournament in celebration of Richard's favorite sport.

Richard with former students

Richard with Ron Graham

Richard winning at ping-pong

Conference Celebration of David Vogan's 60th

MIT hosted Representations of Reductive Groups on May 19–23, 2014, to honor David Vogan's 60th birthday. With over 200 attendees and 23 talks, this international conference highlighted the broad range of areas influenced by Vogan's work. Many colleagues and former students shared inspiring and wonderful stories of David, particularly at the Wednesday night banquet at the Royal East restaurant, traditional venue for the Lie Group seminar dinner.

Ali, Lois Corman, David Vogan, and Ann Kostant

George Lusztig addresses the dinner guests

David Vogan and his students

David talking with guests

Department Retreat 2014

A record number of 185 participated in the 2014 Department Retreat, continuing the tradition at the Purity Spring resort in New Hampshire. Thanks as always to our graduate students of the retreat committee:

Chief organizers: **Alisa Knizel** and **Nina Holden**
Bus leader: **Sam Hopkins**
Drinks pickup: **Boris Hanin** and **Alex Moll**
Wine and cheese: **Boris Hanin**
Hikes: **Susan Ruff**, **Hans Zihan Liu**, and **Ruthi Hortsch**
Mushroom hike: **Pavel Etingof**
Trivia: **Alisa Knizel**
Basketball: **Daniel Thompson**
Soccer: **Carlos Sauer** and **Francisco Unda**

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