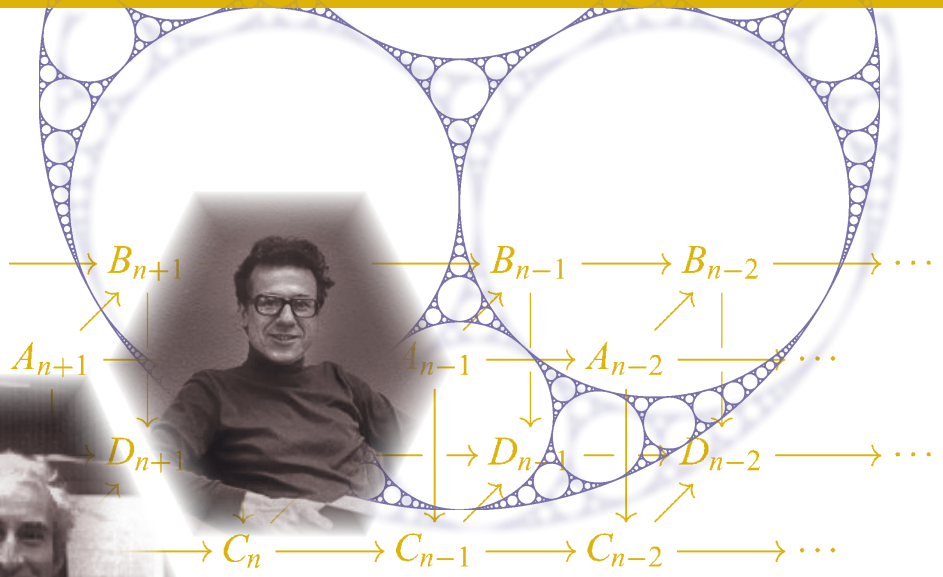
AUTUMN 2013

NEWSLETTER OF THE DEPARTMENT OF MATHEMATICS AT THE UNIVERSITY OF WASHINGTON

Mathematics NEWS



DEPARTMENT OF MATHEMATICS NEWS

Message From The Chair

I made a cameo appearance on this page twelve years ago, during a one-year stint as chair before I headed across the street to the dean's office of the College of Arts and Sciences. Leaving the department was difficult, what with mathematics being at the center of my intellectual life since childhood and my social life for all of adulthood. But I survived-prospered even-to the point that I returned to the department in 2008 with trepidation, all the more as we were soon enmeshed in severe university-wide budget cuts as fallout of the nation's economic downturn. What I found was a department as vibrant as ever, testimony to the dedication of our faculty and staff to our mission of research, education, and service.

The size of our faculty has shrunk precipitously during the past five years. I fear that it may continue to do so, a situation of grave concern and one I have discussed in detail with our deans. Yet this has not resulted in any slowdown in our achievements, as recent editions of this newsletter have highlighted and as this one does in the pages that follow. Let me mention just a few.

The Simons Foundation, founded by mathematician, hedge fund manager, and philanthropist Jim Simons, is now the largest private supporter of mathematical activities in the US. Last year it introduced a fellows program that enables recipients to take extended sabbatical leaves in order to concentrate on their research. In the program's first two years, three of our faculty have become Simons Fellows: Tatiana Toro, Hart Smith, and Gunther Uhlmann. A fourth, Dan Pollack, is being funded under a Simons Collaboration Grant. In the realm of public funding, three of our associate professors currently hold National Science Foundation CAREER grants. These are early career development awards for "junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research," an apt description of Ioana Dumitriu, Max Lieblich, and Julia Pevtsova.

Jack Lee is another model of the teacher-scholar. Witness his recent award of the American Mathematical Society's Stefan Bergman Prize for research done jointly with co-recipient David Jerison of MIT in differential geometry. In addition to continuing his research and teaching, Jack has taken on the university's largest role in shared governance, that of the chair of our Faculty Senate.

Our undergraduate majors continue to amaze. Last spring, Sam Hopkins became our tenth student in the past twelve years to receive the Dean's Medal in the Natural Sciences. I've been following Sam's career since he was a child, and so it was a special pleasure to have him in my algebra class two winters ago. He is now studying computer science at Cornell, with funding from an NSF graduate fellowship. See also mention on a later page of the awarding to two additional math majors, David Jekel and Eric Lei, of the university's Freshman and Junior Medals. And speaking of NSF fellowships, Ioana Dumitriu's student Elliot Paquette received an NSF postdoctoral fellowship last year, as did acting assistant professor Brent Werness.

A potential highlight for next year's newsletter is an experiment in online calculus instruction that we began on a small scale last spring and are now offering in earnest. Each quarter this year we have online options for the three components of our first-year calculus sequence. Dave Collingwood is teaching Math 124, Ken Bube Math 125, and Max Lieblich Math 126, each with the help of a graduate student teaching assistant. It is too early to report on the program's success. More next year.

This past year we lost three faculty whose careers were tightly woven into our department's history: Bob Blumenthal, Bob Phelps, and Ernie Michael. All three led rich, fascinating lives, of which mathematics was just one part. I think of the countless people whom Bob B. taught to ski, of Bob P.'s ham radio interests and contributions to the Shoreline Historical Museum, and of Ernie and Erika's astonishing Judaica and modern art collections. But of course these three colleagues will be remembered especially for their mathematical contributions, from the classic Blumenthal-Getoor text on Markov processes to the Bishop-Phelps Theorem and the Michael Selection Theorem.

I close with thanks to Selim Tuncel for his eleven years of service as chair, characterized by unwavering commitment to the department and never-ending ingenuity in strengthening our programs and financial position. We are all beneficiaries of his stewardship and innovation, the rewards of which I now get to reap as chair.

– Ron Irving

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Pictured (front cover):

Top: Jack Lee, Ernie Michael

Middle: Sándor Kovács, Bob Blumenthal, Bob Phelps

Bottom: Sam Hopkins

FEATURED STUDENT

Sam Hopkins

Arts & Sciences Dean's Medalist

This year's featured student was profiled in the July 2013 issue of the College of Arts & Sciences publication, *Perspectives*.

We thank *Perspectives* and Nancy Joseph for permission to include the article.

A Triple Threat in Math, Philosophy, and Computing

When UW students are curious about philosophy, they often start with a 100- or 200- level course to test the waters. Not Sam Hopkins (BS, Mathematics, Computer Science, 2013). Hopkins, recently named 2013 A&S Dean's Medalist in the Natural Sciences, dove right into a 400-level epistemology course. "I'm not easily intimidated," he says.

Hopkins, who entered the UW at age 15 through the Early Entrance Program, loved the course. He took more philosophy courses, envisioning a major in philosophy. But an epiphany during his second year led him in another direction. "I realized I missed math," says Hopkins. "I missed it quite a bit." An honors course in advanced accelerated calculus, taught by Professor James Morrow, sealed the deal. "He gets people hooked," Hopkins says of Morrow, Sando-Rebassoo Professor of Mathematics.

Hopkins also took computer science courses. Through an NSF Research Experiences for Undergraduates (REU) summer program at Rutgers University, working with computer science professor Eric Allender, he focused on complexity theory, an area of computer science research that dovetails with mathematics and philosophy, bringing together all his interests.

"In philosophy, my focus has been the philosophy of mathematics and logic," explains Hopkins, who earned a minor in philosophy. "My computer science research is very mathematical, raising questions that are philosophically motivated. I do feel that I work at the intersection of all these fields. I find theory of computation and logic extremely beautiful."

Hopkins explains that, unlike computer scientists who stare at computer screens all day, much of his mathematics-based research in computer science takes place in his head and on a chalkboard. "Mathematical research is an odd thing," he says. "There are no petri dishes moving around, no detailed logs of experiments. You start by reading papers in areas that interest you, then pray that they lead to an idea to work on. When I was at Rutgers, I would hole up with a chalkboard for a day, writing what I knew and trying to inch a little further."

Upon his return from Rutgers, Hopkins continued in the same research vein with UW computer science professor Paul Beame, working with him for two years. "I spent the first year

reading papers," says Hopkins. "It takes a lot of time getting to the front, finding a problem that you want to work on. A lot of research goes into framing the problem correctly, so you'll be able to find a solution. The biggest role of a mentor in math is helping with that."

Curious about his next step after graduating, Hopkins spent last summer interning at Google to see what an industry job would be like. He worked on a programming language design team alongside PhDs, which was a perfect fit. "Sam immediately grasped very subtle concepts," recalls Vijay Menon, a Google staff software engineer who supervised Hopkins. "Since he left, the team has…[been] building upon his initial design and implementation."

Menon was equally impressed with Hopkins' communication skills. "Sam could articulate his work and the overall effort better than most full-time Google engineers," comments Menon. "We were confident enough in Sam to ask him to present intermediate work internally, to one of our vice presidents, and externally, to the broader engineering community in a webcast. His end-of-project write-up was also exceptional. He evaluated different options, made recommendations, and found hard data (even when we did not ask for it) to back up his conclusions. We have gone back to his write-up several times since he left to guide our further decisions."

That Hopkins held his own working collaboratively with PhD computer scientists is no surprise to his UW professors. After all, he's been taking graduate courses for several years, thriving despite the challenging material. Yet Hopkins also enjoys working with younger - *much* younger - mathematicians as a Math Circle volunteer. UW Math Circle is a Department of Mathematics program through which UW students meet weekly with elementary and middle school students to explore math problems they would not encounter in their K-8 classrooms.

"I do math for aesthetic reasons, and I want to share that with people," says Hopkins. "A lot of K-12 math makes it such a grinding bore. I want to open people's minds to see that math is beautiful - complex and interesting and challenging. I'd love to create an environment for elementary school students to see the same wonderment and discovery that I feel when doing a research project."

Hopkins also served as a teaching assistant for a UW computer science course and worked as a tutor in the Philosophy Writing Center for two years. "The Socratic approach is a big part of philosophy," says Hopkins. "That means that, as a tutor, you have to be on your toes. You have to be as engaged with the material as the student is. When you can be, it's really fun."

This fall, Hopkins heads for Cornell University as a graduate student in computer science. Asked whether he will choose a career in academia or industry, he just smiles. "Two years ago, if you asked me to predict what I'd be doing now, I'd give all the wrong answers," he says. "It's the same thing now. If I were to predict where I'll be in five years, I'd probably be wrong again."

Story Courtesy of
Nancy Joseph

Director of Publications,
College of Arts & Sciences

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Photos by
Isaiah Brookshire

Marketing & Communications Specialist,
College of Arts & Sciences

View From The Faculty Senate

by Jack Lee

Picture this: a brand new PhD in his first postdoctoral position, at Harvard. He notices that there is a University faculty meeting scheduled, and goes to it. In the meeting, chaired by president Derek Bok, the faculty debates serious issues: graduation requirements, promotion and tenure criteria, whether to create a Women's Studies degree. After vigorous debate on each of the issues, all of the faculty members in attendance vote (including this very junior member), and the result of that vote becomes University policy.

I was that new PhD, of course, and I was awestruck by the responsibility placed in our collective hands. I was probably a bit naïve about how much power the faculty really had (it's possible that the real decisions were made behind closed doors before or after they came to faculty votes), but in any case I came away with the idea that universities are governed by their faculties.

Flash forward a few years. When I arrived at the University of Washington as a new assistant professor, I quickly learned that things are different here. Although there are faculty votes about important issues, every decision is subject to approval or nullification by the president and ultimately by the Regents. I felt as if I had moved from a democracy to a monarchy.

After being here for a few years and participating in a few faculty governance activities, I learned that the reality is considerably more subtle. What we actually have at UW (as at most universities) is a delicately balanced system known as "shared governance."

The best articulation of the ideal of shared governance comes from the introduction to the UW Faculty Code (Section *13–20*):

> "*A university is a community of scholars contributing, each according to his or her own talents and interests, to the transmission and advancement of knowledge. Because of its diversity of interests, a university is a complex organization, not quite like any other in its management, which requires the understanding and good faith of people dedicated to a common purpose. A university administration must seek wisely and diligently to advance the common effort, and the strength of a university is greatest when its faculty and administration join for the advancement of common objectives. Much of the faculty-administration relationship has been established through long experience, and has the weight and good sense of academic form and tradition. But the terms of this relationship are essentially those of spirit, mutual respect, and good faith, and thus must be flexible to meet changing needs*"

The Faculty Code was adopted in 1956. It was the culmination of a long negotiation between the faculty and administration in the wake of the Canwell hearings, which resulted in the firing of three tenured UW faculty members for being suspected Communists. It was signed by then-president Henry Schmitz and by the Faculty Senate leadership of the time, headed by Carl Allendoerfer, the first math professor to serve as senate chair.

At UW, the focal points of university-wide shared governance are the Faculty Senate and the Faculty Councils. The Faculty Senate is a representative body that currently has about 115 elected faculty members, approximately one for every 40 voting faculty members in the university. There are eleven faculty councils, appointed by the senate and charged with formulating policy on subjects ranging from academic standards and student affairs to libraries and research. Most policy changes result from careful collaboration and negotiation between the administration and faculty and, when appropriate, students and staff; when everyone takes these negotiations seriously, they can result in policies and procedures that have wide support.

The math department has participated in this process in some

significant ways. After Allendoerfer's term as senate chair (1954–55), the position was held by math professors Ross Beaumont (1958–59) and Ed Hewitt (1974–75). And now me. In addition, Ethan Devinatz currently serves as the senator from the math department, and we have two math department members serving on faculty councils: Jim Burke (Student Affairs) and Jenni Taggart (Academic Standards). Jenni also serves on my "cabinet," an informal group of fourteen faculty members whom I chose to advise me on policy and strategy.

When I was asked by the nominating committee two years ago to consider running for the Senate vice-chair position (which automatically leads into the chair position the following year), my answer was easy and immediate: no! But when they came back again and tried to convince me, I started thinking about the people I'd be working with most closely: the 2012–2013 chair Jim Gregory and provost Ana Mari Cauce, both of whom I knew and liked very much; our president Mike Young, who showed signs of taking shared governance very seriously; and secretary of the faculty Marcia Killien and faculty legislative rep Jim Fridley, both of whom I had seen in action and had enormous respect for. I decided that this would be as good a time as any to do my part in trying to make shared governance work well, so (as I sometimes say, in a moment of temporary insanity), I agreed to let myself be nominated. And here I am.

Having served on the Faculty Senate for more than ten years, I know that it can sometimes get bogged down in trivial or boring discussions. But this year's senate meetings are likely to be anything but boring, because we have some momentous issues before us. One of those has already come to a vote: on October 24, the Senate gave overwhelming first approval to a new policy on academic freedom and responsibility. The old policy, written as part of the original 1956 Faculty Code and unchanged since then, had a lot to say about academic responsibility but almost nothing about freedom. The new policy gives faculty members robust protection of their right to speak and write. Assuming it passes the senate on its second vote on December 5, it will go to the full faculty for a vote, and President Young has already indicated he will approve it.

Another issue we will be dealing with is the status of lecturers at UW. Across the three campuses, there are far too many lecturers who are hired repeatedly on one-year contracts, with little or no opportunity for substantial raises, promotions, or job security. We are exploring ways to strengthen the protections for lecturers and to push departments to view lecturers as professional faculty members who can make a career at UW, because this will strengthen our academic offerings and thus the university as a whole. In all of these discussions, I hold up the math department as an example of how lecturers can be incorporated into a department as valued and integral members of the faculty.

Later, the Senate will be dealing with the most important issue of the year: faculty salary policy. A joint administrative-faculty task force has been working for the past year and a half to craft a new salary policy to combat our persistent salary compression, which has kept most senior faculty salaries far below those of our peers even as new faculty are hired in at competitive market rates. With luck and some hard work, we'll be able to bring a radically new salary policy proposal to a faculty vote by the end of spring quarter.

The most surprising thing I've learned about this job is that it's mostly fun! At least while there are good people to work with. When this job is over, I'll be happy to get back to teaching differential geometry, writing textbooks, and proving the occasional theorem; but I won't regret having done it.

1956 Accord

The following accord, signed by President Schmitz and the 1956 Faculty Senate leadership, affirmed the ideals of shared governance at the University of Washington and was instrumental in restoring trust between the University faculty and the administration:

"A university is a community of scholars contributing, each according to his own talents and interests, to the transmission and advancement of knowledge. Because of its diversity of interests a university is a complex organization, not quite like any other in its management, which requires the understanding and good faith of people dedicated to a common purpose. A university administration must seek wisely and diligently to advance the common effort, and the strength of a university is greatest when its faculty and administration join for the advancement of common objectives. Much of the faculty-administration relationship has been established through long experience, and has the weight and good sense of academic form and tradition. But the terms of this relationship are essentially those of spirit, mutual respect, and good faith, and thus must be flexible to meet changing needs. Some of the traditions of the University of Washington are given expression in the pages that follow. Yet these and other common understandings have meaning only to the extent that they reflect the integrity and faith of administration and faculty in the day by day accomplishment of their joint effort."

Carl Allendoerfer Brents Stirling
Alfred Harsch William S. Hopkins
E. Roscoe Wilcox, on behalf of the faculty
Henry Schmitz President, on behalf of the administration

RESEARCH HIGHLIGHT

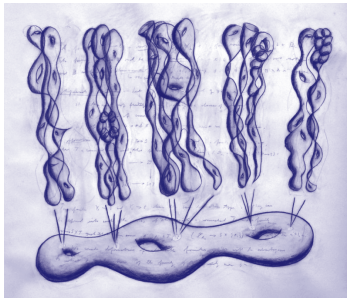
Sándor Kovács
Craig McKibben and Sarah Merner Professor

Sándor Kovács joined the UW faculty in 2000 after holding positions at the Massachusetts Institute of Technology and the University of Chicago, and has directed twelve PhD theses since then. Currently he is working with four graduate students. He is the academic director of and a frequent instructor in the Summer Institute for Mathematics at the University of Washington, a math camp for talented high school students. Since 2006 Kovács has held the McKibben-Merner Endowed Professorship. He has also given several public lectures on topics ranging from the mathematics of internet security through the geometry of higher dimensions to the similarities in artistic and mathematical creativity. Kovács and his wife, Tímea Tihanyi, an artist and a lecturer at the UW School of Art, jointly gave a lecture at the A&S Dean's Club in 2010 entitled *Opposites Attract*. The title refers to the phrase they often hear regarding their seemingly opposite professions. In fact, the main point of the lecture was that making art and doing mathematics are not so different after all. This year, Tihanyi and Kovács taught a *Discovery Seminar* in the UW's Early Fall Start program under the same title.

Sándor Kovács always liked puzzles, or just about anything that tested his brain. Once he realized that there is such a profession as "mathematician" it was the only thing he wanted to do. In college he was mesmerized by the beauty of abstract algebra. After a detour studying finite group theory, he discovered algebraic geometry, which comprises many of the things he learned to love about abstract mathematics. It was hence natural that he decided to do his PhD in algebraic geometry and that decision soon led him to work with János Kollár, one of the premier algebraic geometers then and today.

Kovács's PhD thesis contained two independent results. One concerned the geometry of curves on K3 surfaces. A K3 surface is a simply connected complex projective manifold of complex dimension two with a tangent bundle whose determinant is trivial. These surfaces are important in both classification theory and other parts of algebraic geometry. They also play a prominent role in the mathematics of string theory. Kovács's result was simple, yet it was unexpected, surprising the experts enough that one of them wrote to Kovács, "When I first saw your result, I tried to find a counterexample, but now I am convinced that your result is actually correct."

The other result in his thesis was the first in a long line Kovács obtained in the next 15 years related to a conjecture of Shafarevich about families of curves made at the 1962 International Congress of Mathematicians that still drives important research today. Although it can be formulated as one statement, the conjecture naturally breaks up into a geometric and an arithmetic case.



Lun-Yi Tsai, "Shafarevich's Conjecture," 2007, charcoal and graphite on paper, 35 x 40 in (courtesy of the artist)

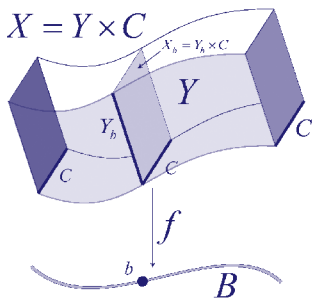
Soon after its formulation, Aleksei Parshin noticed that this conjecture implies the Mordell Conjecture, which states that on curves of high genus (for instance, high degree smooth plane curves), there are only finitely many rational points. This conjecture also breaks up into a geometric and an arithmetic case. The geometric case had been proved by Yuri Manin just prior to Parshin's observation, while the arithmetic case remained open for more than another two decades. This case is a generalization of a variant of Fermat's Last Theorem (proved by Andrew Wiles in the mid-1990s after being an enigma for 350 years). Fermat's Last Theorem states that the equation $x^n + y^n = z^n$ with $n \geq 3$ has no non-trivial integer solutions, which is the same as saying that there are no non-

trivial solutions among rational numbers. In contrast, the Mordell Conjecture predicts less, but about many more equations. It states that any homogenous equation $f(x, y, z) = 0$ of degree at least 4 such that at least one of the partial derivatives of f is not zero at any given point other than (0, 0, 0) has at most finitely many solutions whose coordinates are rational numbers. The equation $x^n + y^n - z^n = 0$ is easily seen to satisfy the requirement about the partial derivatives.

The Shafarevich Conjecture in the geometric case was proved by Parshin and Suren Arakelov in the late 1960s and early 1970s, and in the arithmetic case by Gerd Faltings in the early 1980s. At that time, this was the strongest result on the way to proving Fermat's Last Theorem, and earned Faltings a Fields Medal.

In the early 1990s, Fabrizio Catanese raised the question whether the Shafarevich Conjecture had a reasonable generalization to families of surfaces. Luca Migliorini achieved partial results, and in response Kollár asked whether Migliorini's results would hold in arbitrary dimensions. The other part of Kovács's thesis answered Kollár's question in the affirmative.

Soon this led to the formulation of the higher dimensional Shafarevich Conjecture. Parshin and Arakelov had already split the original conjecture into three sub-problems: *Boundedness*, *Hyperbolicity*, and *Rigidity*. These sub-problems were generalized to arbitrary dimensions and the last 15 years have seen an abundance of results related to these conjectures. The *Boundedness* part of the conjecture was completely solved a few years ago by Kovács and Max Lieblich of UW, and the *Hyperbolicity* part over one dimensional bases was proved by Kovács in his thesis and in a subsequent article. This case has been further generalized to include the case of higher dimensional bases. This generalization is called Viehweg's Conjecture, which is now known over bases of up to three-dimension due to joint work of Stefan Kebekus and Kovács. The *Rigidity* part is different from the other two. The obvious higher dimensional generalization is easily seen to fail, so the problem is to find additional conditions under which the statement holds. This led to results that prove *Rigidity* under various conditions, but it remains unclear what an all-inclusive set of sufficient conditions would be. The best results in this area are due to Eckart Viehweg and Kang Zuo, and independently to Kovács. A closely related result was obtained by Zsolt Patakfalvi in his 2011 UW PhD thesis written under the direction of Kovács.

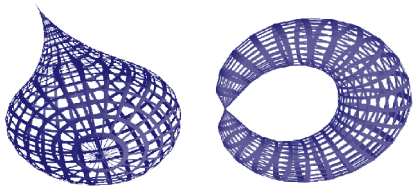


The Shafarevich conjecture is best framed in terms of moduli spaces. A *moduli space* is a parameter space for a class of objects. For example, if one wants to parametrize all conics in a projective plane, then the appropriate moduli space is a five-dimensional projective space with the six coordinates corresponding to the six coefficients of the defining equation

$$a_0x^2 + a_1y^2 + a_2z^2 + a_3xy + a_4yz + a_5xz = 0$$

of a conic. The geometry of this five-dimensional space informs us about the way conics may be deformed into one another. A curve in this space corresponds to a one-dimensional family of conics. Similarly, in general, if we understand the geometry of a given moduli space, then we gain a lot of information about the objects it parametrizes. In particular, both the original and the higher dimensional generalizations of the Shafarevich conjecture can be stated in terms of moduli spaces.

Kovács's current research focuses on moduli spaces of higher dimensional objects, including questions related to the Shafarevich Conjecture, but also more fundamental questions about the very construction of these spaces. In particular, in order to construct compact moduli spaces one needs to understand the singularities that can occur on stable degenerations of smooth algebraic manifolds.



In higher dimensional algebraic geometry one is forced to work with singularities. A singularity is a point in a geometric object where it looks significantly different from the neighborhoods of other points. For instance, on a sphere any point looks locally the same as any other point. This is, however, not true on a cone since the neighborhood of the vertex is nothing like the neighborhood of any other point. This vertex is, therefore, a singular point.

A recent result of Kollár and Kovács established that the singularities that occur on stable models have a certain strong complex analytic/topological property. This led to other surprising and useful results and applications.

RAINWATER

The Legend of John Rainwater

It all started one rainy afternoon in 1952 as a student prank, but led to one of our department's most enduring traditions. The fictional UW mathematician John Rainwater has published many research papers, and there is a weekly seminar named after him that is still going strong after fifty years. Yet he never existed!

Back in the 1950s students enrolled for classes by filling out a registration card. One graduate student accidentally received a second blank card for Professor Maynard Arsove's analysis class. He and a fellow student decided to use it to enroll a fictional student as a joke. Since it was raining at the time, they called him "John Rainwater." They handed in Rainwater's homework regularly, so it wasn't until the first exam that Prof. Arsove caught on. He was a good sport about it, even after falling victim to an "exploding" fountain pen engraved with John Rainwater's name that had been left on the lecture table. "I guess I'll never see Rainwater except in a barrel," Arsove remarked. Rainwater's fame spread throughout the department.

The early 1960s saw the arrival of a group of energetic and talented analysts, including Bob Phelps, Isaac Namioka, Irv Glicksberg, and John Isbell. During lunches at the HUB, they and graduate students would solve problems from the American Mathematical Monthly. Since these were joint efforts, they decided to submit their solutions under John Rainwater's name. The Mathematical Association of America (which publishes the Monthly) invites problem solvers to join their organization. However, as a prospective member, Rainwater needed endorsement by a current member. This didn't seem like a problem, since the department chair at the time, Carl Allendorfer, was the President of the MAA! However, Allendorfer was not the sort of person to participate in a joke on the MAA. The solution was simple: Allendorfer's secretary was persuaded to mix the endorsement form into a pile of papers requiring the chair's signature on a busy day, and the deed was done. As an MAA member, Rainwater continued to publish problem solutions.

These lunch discussions started to involve serious mathematics research as well. On one occasion Bob Phelps needed a "folk" theorem that had been observed more or less independently by five other mathematicians. It would have been silly to write a short paper with so many authors, and so he published it under Rainwater's name (acknowledging "extremely useful conversations" with those five people). One of Rainwater's most cited papers contained a theorem for

which six people provided various parts of the proof, and so using a pseudonym was quite relevant (citing "helpful discussions" with six researchers). Edgar Asplund published a conference paper in 1969 using Rainwater's name, with the phrase "Garbage Collector" under it, referring to a Seattle newspaper story he read during a Seattle visit about a garbage collector named John Rainwater who was arrested for drunk driving after crashing his truck into a police cruiser.

In all John Rainwater has written sixteen research papers, involving about two dozen mathematicians, both at the UW and elsewhere. There is even a Rainwater Theorem, an important result in Banach space theory, cited in textbooks.

In the late 1960s this core group of faculty started running a weekly seminar, initially in functional analysis, and naturally called it the Rainwater Seminar. Through the years the topics covered morphed and expanded to meet current developments and faculty interests. Just this year, the Rainwater Seminar was broadened to include geometric measure theory and related topics, together with a new format to make talks more accessible to students, and has become even more popular.

Bob Phelps was the mainstay of John Rainwater's impacts. To celebrate Bob's career at the UW, we presented a leather bound copy of the Collected Works of John Rainwater to Elaine Phelps at Bob's memorial service. She has generously agreed to donate this volume to be part of the permanent collection in the Mathematics Research Library. At a recent ceremony during the Rainwater Seminar, our librarian Anya Bartelmann accepted this gift from Elaine.

Anya mentioned that for cataloging purposes, the UW Library needs certain biographical information about the author, including date of birth. We recommended April 1, 1952!

– Douglas Lind

Reminiscences of Friends Lost

We lost three colleagues during 2013.

The penalty for survival is to witness the loss of friends.

The heart hangs heavy, but the recollection of pleasant times spent with those that are no more lightens it just a little.

Bob Blumenthal

Bob Blumenthal was one of the reasons I came to the University of Washington in 1962. In the five or six years before 1962, he had published a number of interesting papers (jointly with Ron Getoor), and Getoor had lectured on these when he was visiting MIT in 1960-61. I was then a graduate student at MIT, and had attended Getoor's lectures. When the time came for me to apply for a position in 1962, I applied to the University of Washington, was offered a position and readily accepted it.

It was natural for me to fall into the Blumenthal-Getoor orbit. I attended their seminar regularly, and learned a lot of very good analysis from those sessions. They would choose a recent research paper (not necessarily theirs) and that would be the topic for study in the seminar for a while. Bob or Ron would lecture to start off and then others, including some graduate students, would continue. There was informal camaraderie that enabled everyone to get to know one another quite well. My long friendship with Bob began in this way.

Bob was very meticulous in almost everything he did. I remember him standing at the blackboard, thinking about exactly how he was going to phrase something. In such situations he had a mannerism - he used to narrow his eyes and lightly scratch the side of his head. He would proceed, after a pause that could be short or long, to express whatever he was thinking about with great clarity. This mannerism stayed with him in many things he did. In the sixties, he and Sarah were in the process of remodeling their house in Lake Forest Park. The basic construction was done by a contractor but most of the finishing was done by Bob and Sarah, both being incorrigible do-it-yourselfers. Moreover, they had also started to landscape the rather large yard. We were regaled with many funny "remodeling" stories that were funny only because they were not happening to the listener. His remodeling expertise paid off for many colleagues. For a couple of years we had a crew of department members who poured and finished several concrete patios for various colleagues. Bob was the planner for the pour and the finisher for exposed aggregate concrete. I was one of the beneficiaries of that skill, when that crew helped me to pour a patio at our house in Ravenna. I learned to finish exposed aggregate under his guidance, and helped in three or four pours which that team undertook. I clearly remember Bob standing there planning the pours, and scratching his head in exactly the same way as when he was lecturing in his seminar!

In the seventies, Bob received a diagnosis of probable Multiple Sclerosis, which could ultimately affect his balance. He was an expert skier and mountain climber, and far from allowing the specter of this diagnosis to curtail those activities, he honed them (especially his skiing) to a sharper edge, exactly in order that his balance mechanism would be much better conditioned thereby. I think the result was that the MS really never affected him as severely as it would have.

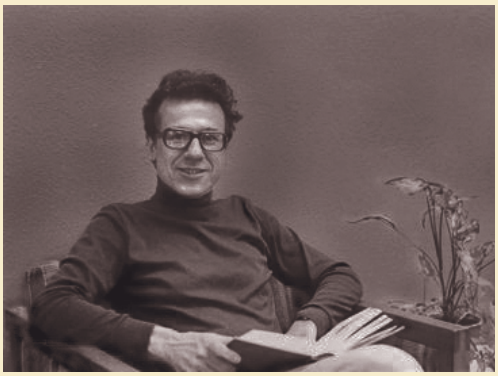
Bob served as department chair in the early 1970s, and did a very effective job of representing the department's interests. In the 1960s, the College of Arts and Sciences had a salary policy that could only be described as a "cowboy" policy. When money was available, in most departments raises were determined by the chair (who might occasionally consult with someone if it was convenient) and the dean. Money was not abundant, and the ruling paradigm was "get an offer to get a raise." Several members of the department who were either unwilling or unable to enter the rodeo had suffered in the '60s from the policy. In 1972 I got a very lucrative outside offer, and Bob (abetted by me) decided to use it as a grand-stand play to get the dean to acknowledge the need for instituting a more rational system. George Beckman was dean at the time and Bob represented my position simply as a demand for an acknowledgement that a system of salary steps or, failing that, a merit pool that is distributed with serious departmental input was a better method than the cowboy method into which we had fallen. Bob did a masterful negotiation and salaries of several colleagues in the department were raised. Similar sentiments were expressed by other departments also, and eventually the present system of allocating a merit pool that would be distributed with departmental input came into being. (Unfortunately a step system such as the one in the UC system was never adopted.) One could say that perhaps that such a change was in the wind, and would have happened anyway. But I think that Bob's efforts had a lot to do with it.

Bob's last years were the most trying that I have seen anyone go through. He was totally incapacitated, and unable

to communicate. It was a situation from which there was only one escape. His ordeal was inordinately long, and tested every ounce of fortitude that Sarah had. When the end came and I called Sarah to express my sympathy, she said "*We lost him years ago, Ramesh. We have to fall back on the memories of all the years when we had him.*" Sad words, but so true, and so illumined by the light of the truth that they contain.

Ernie Michael

Ernie came to the department several years before I did. I met him first at the "eternal" bridge table in the coffee room of the Engineering Annex building (now demolished) which stood approximately where Loew Hall is today. This was a ramshackle two-storied wooden building (considered fit only for equally ramshackle-looking mathematicians, I suppose) with offices on either side of a central corridor on each floor. Young faculty members and graduate students had offices in the building. At the "eternal" bridge table, which stood in the coffee room, a bridge game went on at all times. Only the players changed - whoever came in for a cup of coffee stayed for a couple (or a score or more) of hands of bridge.Kibitzers weighed in with their comments at the post-mortem of each hand. In those days, there was no separate Statistics department, and there were several statisticians in the Mathematics department. Bob Tate was one of them. He was an outstanding bridge player, and spent more time playing bridge than was good for him or anyone else. Ernie was a good friend of Bob Tate and enjoyed playing bridge with him; and although he did not have an office in the Engineering Annex, he often came by around lunch time to share in the easy camaraderie of the coffee room and the freely available "bridge forum" of the eternal table. I was a reasonable bridge player in those days, and generally played three or four hands around lunch time over a brown bag lunch. Ernie and I became friends in the process and our friendship lasted till he died last year.



Ernie and I had very little in common mathematically. I had no interest in the type of topology he did, and he reciprocated by having no interest in the kind of mathematics I did. So our contact was at a social level. Ernie had an active mind, and was interested in gathering information on a variety of topics of general interest and discussing them. In discussing some topic, he would have an almost rabbinical mannerism, setting out the pros and cons of an argument with great precision. Other than current events, his favorite topics used to be geography and travel, history, language (especially etymology and usage), and Judaica. He was very interested in trains and preferred them to airplanes as a mode of travel whenever he could. Those were the days when passenger trains were voicing out their last hurrah, and Ernie enjoyed ose train journeys that were still available in the US. Europe was a different matter; trains were far from decline there, and Ernie enjoyed his occasional trips to Europe. He knew a lot about the system, and enjoyed his trips almost more for the opportunity they gave him to work out optimal itineraries for train journeys, whether he embarked on all of them or not. In 1973, I was going to spend three months in Zurich, and Ernie gave me long lectures about the Swiss railway system and its superb interconnection with other equally efficient systems in Europe. Although I did not absorb all the details, I found that the understanding of the overall system that I got from his eager instruction was extremely useful. Indeed, on one occasion, a caveat he had mentioned in passing (that on German railways, there was often a change of tracks announced at the last minute) saved me and my family from missing a train to Bielefeld, being delayed very inconveniently, and being marooned somewhere in the boonies in Germany. We were waiting to make the connection when an announcement in rapid German seemed to say something about the train for Bielefeld and track number 3. We were waiting on track 5. With my shaky knowledge of German, we would surely have missed the train, because the track had indeed been switched to track 3. But Ernie's caveat had hit home, and I intuited that there might have been a last minute switch. I hurriedly asked a railroad employee who luckily happened to be nearby, got a confirmation that my suspicion was correct, and we all (self, wife and three children with backpacks) ran and just made the connection.

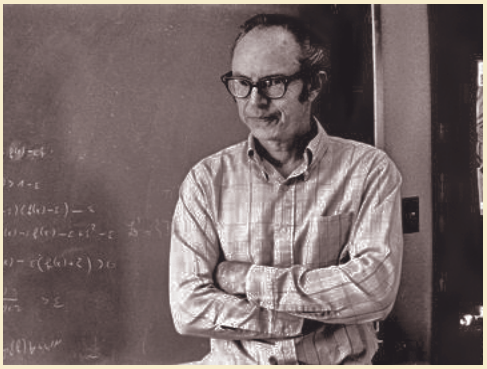
Ernie had a superb collection of Judaic objects, and loved to talk about them. He was fascinated by the fact that Jewish traders had come to the west coast of India as early as two or three centuries BCE. Whenever my trips to India took me to Kerala, a region which had a continuous Jewish settlement for 2000 years, I made it a point to bring him some small memento from there, and greatly enjoyed seeing his childlike delight in receiving it, no matter how modest it was. Talking about such objects would lead to discussions about artistic objects. To these discussions, Erica always contributed a lot from her knowledge of art history.

After our retirement, Ernie and I shared an office, but the timing of our visits to the campus was such that we would see each other there only occasionally. More often, we saw each other socially. Lensey and Isaac Namioka, Ernie and

Erica, Shanta and I often got together for an informal meal and plenty of talk. Until a couple of years before he died, Ernie had lost none of his acuity of mind and zest for lively discussion. But age is the enemy of us all; it was hard to see Ernie incapacitated in his last couple of years, during which Erica was his main and trusted solace.

Bob Phelps

Bob joined our department as a faculty member the same year I did (*1962*), and it was natural for us to get acquainted through this coincidence. Bob had been at UW as a graduate student till 1958 when he had received his PhD under Vic Klee's guidance, had gone away to the Institute for Advanced Study for two years, followed by a two year stint as an instructor at Berkeley. During his Berkeley stay, he proved his famous theorem in collaboration with Erett Bishop (the Bishop-Phelps Theorem). It was our good fortune that he had liked Seattle sufficiently so that he chose to come here for his first tenure track position and stayed happily ever after.



Although Bob must have been clearly attracted by the presence of Vic Klee, a major figure in Bob's area of interest, I am sure that the outdoor opportunities that Seattle offered (especially the mountains) had a lot to do with Bob's decision to come here. He was a passionate rock climber, hiker and runner. He had incredibly strong hands and fingers, and was familiar with many different kinds of knots, some of them picked up (no doubt) during his year as "sparks" in the Merchant Marine at the end of World War II.

He and I saw a fair amount of each other during 1962-63, when we had offices close by. During some of those conversations, he told me about how he had signed up as a radio officer in the Merchant Marine in order to earn part of his way through college. He also told me many stories of his experiences, including some quite dangerous ones. I cannot adequately describe how impressed I was. Having been raised in India, I was accustomed to thinking of the path to an academic career as an orderly, linear, predictable path - first degree, graduate studies, PhD, post-doc, faculty position, tenure, recognition, fulfillment, joy, rapture, nirvana and so on. Although I had a subliminal understanding that the American system allowed for a very diverse set of paths into every imaginable career, Bob's example was the first significant one that I had come across first-hand. That someone could join up in the Merchant Marine essentially straight out of high school, work in that and other capacities for some years, return to college after a considerable hiatus to complete one's degree, go on to a PhD, earn a respectable post-doctoral appointment, prove a decent theorem, and enter academic life - this was for me a wonderful illustration of the flexibility and fairness of the US system of higher education. It was something that one would hardly ever come across in India. For me, the lesson was a reinforcement of my own predilection that one must never cut off someone's opportunity based on judgments arising from preconceived ideas. Now I saw that this was splendidly possible in the US system, at least as far the profession of Mathematics was concerned.* In later years Bob and I drifted apart in interests, but remained good friends.

Bob was an enthusiastic and active member of the department. He had a great rapport with graduate students, due to his no-nonsense affability. We all know about Bob's famous colleague, John Rainwater, who not only had a seminar named after him, but also authored many papers on an impressively diverse set of subjects without ever making a corporeal appearance. Bob was the steward of this seminar in which Rainwater remained *l'eminence invisible mais essentiel* for many years.

Bob was passionate about fairness and justice, and anyone who knows his wife Elaine knows that she shared his liberal inclinations at least as passionately. They were both committed Democrats and worked indefatigably in helping to elect liberal office-bearers at every level of government. They truly thought globally and acted locally. Bob was also active in a number of civic activities in the City of Shoreline. His infectious and slightly mischievous smile is unforgettable.

– Ramesh Gangolli

*Many years later, I was able to apply this lesson without a second thought in a situation that called for such flexibility.I am referring to our colleague Steve Mitchell and his entry into graduate studies in our department. Steve was applying for admission to the graduate program, but did not have an undergraduate degree. Bob Warfield was department chair and I was the chair of the Graduate Committee. I feel very happy that I strongly supported Bob's decision to admit Steve, and reinforced his arguments when some questions came up from the graduate dean.

For details about this cryptic reference, see Steve's article "*How I became mathematician*" on his webpage (www.math.washington.edu/~mitchell/Misc/bio.pdf).

STUDENT HONORS

Graduate Award Recipients

Academic Excellence Awards:

Qiyang Han, Jonathan Swenson, *and* Riley Casper

ARCS Foundation Fellows (2013-2016):

Candice Rosenberg Peterson ARCS Endowment Fellow:

Gabriel Dorfsman-Hopkins

Seattle Chapter ARCS Fellow:

Tim Mesikepp

Barbo Family Fellow:

Travis Scholl

Excellence in Teaching Awards:

Kristin DeVleming *and* Austin Roberts

Z.W. Birnbaum Memorial Research Fellow:

Lindsay Erickson

McFarlan Fellows:

Gautam Sisodia *and* Jair Taylor

McKibben and Merner Fellows:

James Cameron *and* Josh Swanson

Microsoft Scholars (2013-2017):

Connor Ahlbach, Rebecca Hoberg, Lorenzo Prelli,
Jose Samper Casas, *and* Zihui Zhao

Tanzi-Egerton Fellow:

Camil Aponte

Undergraduate Award Recipients

College of Arts & Sciences
Dean's Medal in the Natural Sciences:

Sam Hopkins

Honors Calculus Award:

William Li *and* David Jekel

Gullicksen Award for Outstanding Junior in Mathematics:

Reid Dale

Outstanding Graduating Senior in Mathematics
(Teacher Preparation):

Sam Ruppel

Outstanding Graduating Senior in Mathematics
(B.S. Comprehensive Major):

Sam Hopkins *and* Jerry Li

Outstanding Graduating Senior in Mathematics
(B.S. Standard Major):

Laura Veith

Outstanding Graduating ACMS Major:

Adibah Abdulhadi

NSF Graduate Fellow:

Sam Hopkins

Paul Tseng Fellow:

David Jekel

Putnam Exam Outstanding UW Score:

Stephen Portzer

UW Freshman Medal:

David Jekel

UW Junior Medal:

Eric Lei

UW Freshman & Junior Medalists for 2011-12

Each year the UW recognizes the top student in the previous year's freshman, junior and sophomore classes as class medalists. David Jekel and Eric Lei were awarded the Freshman Medal and Junior Medal, respectively. David majors in Classics and Math, Eric in Computer Science, Economics, and Math.

With Eric's and David's awards, Math majors have received 11 (over 40%) of the UW medals awarded during the past six years. Congratulations to Eric, David, and all the other outstanding Math students.

David A. Jekel of Woodinville is the freshman medalist. He attended Providence Classical Christian School in Lynnwood and is in the Honors Program.

"The UW was the only in-state school I applied to, and in the end, I realized I wanted to live at home so I could see my family, save money by not paying for housing and prepare healthy food more easily," he said. *"Also, the large campus, full of diverse people and beliefs and well-staffed with expert researchers, seemed better suited to expanding my mind than small private schools."*

Jekel received a National Merit Scholarship as well as other need-based financial aid. Outside of class he enjoys writing poetry, stories and music. He attends church regularly and usually swing dances weekly. His volunteer activities have included a weeklong service/mission trip to Yakima with the Reformed University Fellowship and a summer trip to Japan working with relief teams dealing with the effects of the 2011 tsunami.

His career plans remain fluid, but they are likely to include graduate school and an eventual teaching career, either in high school or college.

Eric Lei, junior medalist, is majoring in computer science, economics and mathematics. He entered the UW after 10th grade through the Robinson Center's UW Academy. He is currently conducting research on algorithmic game theory – the intersection of game theory and computer science. Lei is involved with the student organization Husky Traders, an investment club with its own stock portfolio.

As a freshman he tutored third-graders in math and science. "I enjoyed trying to predict which students would grow up to enter math or science careers," he said.

His plans include eventually going to graduate school to obtain a doctorate in computer science. Lei also was the freshman medalist in 2010-11.

- student exerpts from Bob Roseth's January 2013 article in *UW Today*

RECENT DEGREES

PhD Recipients

The following students completed their doctorates in Mathematics during the academic year 2012-2013.

Chris Aholt (*Rekha Thomas, advisor*) - thesis entitled "*Polynomials in multiview geometry*." Chris is currently working as a *software development engineer* at **Microsoft**.

Jie Chen (*Gunther Uhlmann, advisor*) - thesis entitled "*Hybrid Inverse Problems.*" Jie is currently a *research scientist* in the Department of Industrial and Physical Pharmacy at **Purdue University**.

Daeshik Choi (*Anne Greenbaum, advisor*) - thesis entitled "*Estimating Norms of Matrix Functions Using Numerical Analysis.*" Daeshik is currently an *assistant professor* at **Southern Illinois University-Edwardsville**.

Nathan Grigg (*Max Lieblich, advisor*) - thesis entitled "*Deformations of categories of coherent sheaves and Fourier-Mukai transforms.*" Nathan is currently working as a *software engineer* at **Google-LA**.

Ilker Kocyigit (*Gunther Uhlmann, advisor*) - thesis entitled "*A Hybrid Inverse Problem Arising from Acousto-Electric Coupling.*" Ilker is currenlty a *postdoc* at the **University of Michigan**.

Lee Patrolia (*Gunther Uhlmann, advisor*) - thesis entitled "*The radiative transfer equation in photoacoustic imaging.*" Lee is currently employed at **Epic Systems** in Madison, WI.

Justin Tittlefitz (*Gunther Uhlmann, advisor*) - thesis entitled "*Thermoacoustic tomography in elastic media.*" Justin is currently a *postdoc* at **Purdue University**.

Guangbin Zhuang (*James Zhang, advisor*) - thesis entitled "*Hopf algebras of finite Gelfand-Kirillov dimension.*" Guangbin is currently an *assistant professor* at the **University of Southern California**.

Weiyang Ning (*Chris Hoffman, advisor; formerly Yuval Peres*) - thesis entitled "*Markov chain mixing time, card shuffling and spin systems dynamics.*" Weiyang is currently employed at the **China Development Bank** in Beijing.

Elliot Paquette (*Ioana Dumitriu, advisor*) - thesis entitled "*Eigenvalue fluctuations of random matrices beyond the Gaussian universality class.*" Elliot is currently an *NSF postdoc* at **The Weizmann Institute of Science** in Israel.

Graduating MAs

Farhan Abedin, under the supervision of *Robin Graham*.

Bachelor's Degrees

293 Bachelor's degrees were awarded during the 2012-2013 academic year, 186 in Mathematics and 107 in ACMS.

DEPARTMENT NEWS

New Faculty

Six faculty members and postdoctoral fellows have joined the Department this year.

Thomas Rothvoss
Assistant Professor

PhD from École Polytechnique Fédérale de Lausanne, 2009.

Research area: Theoretical computer science and discrete mathematics.

Richárd Balka
Acting Assistant Professor

PhD from Eötvös Loránd University, 2012.

Research area: Geometric measure theory, random fractals, fractal dimensions, and real functions.

Benjamin Antieau
Acting Assistant Professor

PhD from the University of Illinois at Chicago, 2010.

Research area: Algebraic geometry and the Brauer group.

Shawn Baland
Acting Assistant Professor

PhD from the University of Aberdeen, 2012.

Research area: Modular representation theory and algebraic geometry.

Ebru Bekyel
Lecturer

PhD from Brown University, 2002.

Jonah Ostroff
Lecturer

PhD from Brandeis University, 2013.

Staff Changes

Mary Sheetz retired in October 2012 after 27 years of service to the math department. **Michael Munz** has since taken on the role of Department Administrator, with **Rose Choi** joining the department in November 2012 as the Assistant to the Chair.

Julie Martinson retired in January 2013 after serving as the department's academic counselor for 21 years. **Katharine Swigart-Harris** has since transitioned into this position.

Faye Christenberry returned to her previous role as English Studies Librarian in October 2013. **Anya Bartelmann** will be serving as the interim Math Librarian.

FACULTY HONORS

Jack Lee co-recipient of AMS Bergman Prize

Jack Lee and his co-author **David Jerison** of ***MIT*** were jointly awarded the ***2012 Stefan Bergman Prize*** by the **AMS** "*for their pioneering works on the CR Yamabe problem, which led to finding canonical metrics in a given conformal class, for strictly pseudo-convex manifolds.*"

Additional information may be found in the *April 2013* edition of the *Notices of the AMS*.

William Stein awarded 2013 ACM/SIGSAM Jenks Prize

The ***2013 Richard Dimick Jenks Memorial Prize for Excellence in Software Engineering applied to Computer Algebra*** was awarded to **William Stein** for his ***Sage Project***. This prize recognizes outstanding software engineering contributions in the field of computer algebra, and is awarded every two years by the ***Association for Computing Machinery's Special Interest Group on Symbolic and Algebraic Manipulation*** at the *International Symposium on Symbolic and Algebraic Computation* (ISSAC).

Krzysztof Burdzy elected into the Washington State Academy of Sciences (WSAS)

Krzysztof Burdzy has been elected as a member of the ***WSAS***, an organization of Washington scientists "*dedicated to serving the state with scientific counsel*" and formed as a "working academy" on the model of the ***National Research Council***.

He was inducted at the *6th Annual Meeting and Symposium* at the Museum of Flight this September.

Zhenqing Chen named a Fellow of the American Mathematical Society (AMS)

Zhenqing Chen was one of the fifty mathematical scientists from around the world to be named a ***Fellow of the AMS*** for 2014.

This designation recognizes members who have made outstanding contributions to the creation, exposition, advancement, communication, and utilization of mathematics. Among the goals of the program are to create an enlarged class of mathematicians recognized by their peers as distinguished for their contributions to the profession and to honor excellence.

Jim Burke receives the 2013 Excellence in Teaching Award

Jim Burke was honored with the ***2013 Excellence in Teaching Award*** from the University of Washington's Tolo Chapter of the ***Mortar Board National College Senior Honor Society***.

Undergraduate students are invited annually to nominate an outstanding professor who has inspired and has made exceptional contributions towards the education of UW undergraduates. Mortar Board's ***Excellence in Teaching Award*** recognizes an extraordinary professor who has proven to be particularly dedicated to the intellectual success of undergraduates.

Mathematics Faculty Fellowships

The Mathematics Faculty Fellowships are intended for research faculty below the rank of professor, or professors who are less than fifteen years past the PhD, and recognize the importance and impact of research support for these colleagues.

Ethan Devinatz

Ethan Devinatz has been selected as the 2013 recipient of this two-year award.

Devinatz works in stable homotopy theory. More specifically, there is a framework, sometimes called the chromatic approach, for organizing stable homotopy theory into what might be called layers of periodicity. Motivated by this approach, Devinatz studies periodic and global phenomena in stable homotopy.

William Stein, who was selected in 2012, continues as a faculty fellow this year.

William Stein

NSF Postdoctoral Fellows

In January, **Elliot Paquette** and **Brent Werness** received NSF Postdoctoral Fellowships. **Paquette** was completing his PhD in the spectral theory of random matrices under the direction of Ioana Dumitriu. He is taking advantage of the award to continue his research at The Weizmann Institute of Science in Rehovot, Israel. **Werness**, who completed his PhD at the University of Chicago in 2012, was in his first year in the department as an acting assistant professor. As an NSF postdoc, he continues to be a member of the department, where he is doing research on Schramm-Loewner evolution and related processes

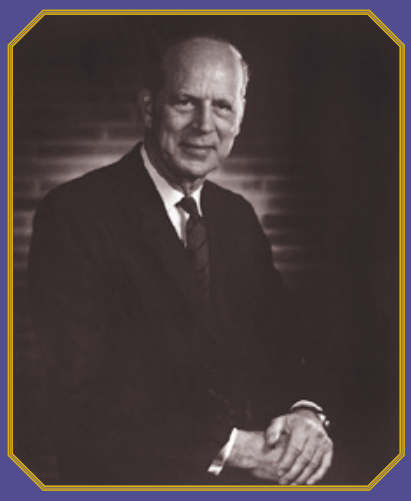
MILLIMAN FUND

Wendell Alfred Milliman

In 1968, the University of Washington received a gift from Grace Milliman Pollock and her husband, S. Wilson Pollock, to endow a fund in the Mathematics Department in honor of Mrs. Pollock's brother, Wendell Alfred Milliman.

Wendell Milliman received his degree in mathematics from the University of Washington in 1926.

He entered the actuarial profession and founded the firm of Milliman and Robertson, based in Seattle, one of the largest actuarial firms in the world. Wendell Milliman served as President of the Academy of Actuaries in 1968 and of the Actuarial Society of America in 1969.



The income of the Milliman Fund furthers the scholarly objectives of the Mathematics Department by supporting the visits of distinguished mathematicians.

Most prominently, the Fund supports the annual Milliman Lectures, a highlight of the academic year.

Michael Hopkins, Professor of Mathematics at ***Harvard University***, will be our distinguished speaker this December 2013.

Hopkins received the ***Veblen Prize*** in *Geometry* from the **AMS** for his work on homotopy theory and the ***National Academy of Sciences*** Award in *Mathematics* for his work on algebraic topology leading to the resolution of the Kervaire invariant problem for framed manifolds.

His work has been a major force in algebraic topology and homotopy theory and in its links to elliptic curves and modular forms in number theory, and to string theory in physics.

Bernd Sturmfels, Professor of Mathematics, Statistics, and Computer Science at ***UC Berkeley***, was the 2012 Milliman Lecturer, and an alum of the UW math department. He received his PhD under the guidance of Vic Klee in 1987.

His honors include an ***Alexander von Humboldt Senior Research Prize***, the ***SIAM von Neumann Lecturership***, and a ***Sarlo Distinguished Mentoring Award***. Recently, he served as Vice President of the **American Mathematical Society**.

His current research focuses on algebraic statistics and computational algebraic geometry.

OUR DONORS

The following is a list of our friends who have contributed to the Department between September 1, 2011, and October 15, 2013. Should you notice an error or omission in this list, please draw it to our attention by a telephone call or e-mail message to Rose Choi at 206-543-1151 or rosechoi@math.washington.edu.edu.

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This newsletter is published annually for alumni and friends of Mathematics at the University of Washington.

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