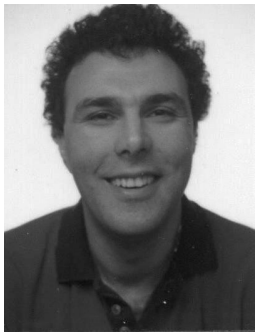
Autumn 2003, Vol. 12

Mathematics

Newsletter of the Department of Mathematics at the University of Washington

A MESSAGE FROM THE CHAIR

Undergraduate education is a central element of the mission of the Math Department. In addition to teaching of courses, we are constantly engaged in curriculum development, consultations with client departments, and a variety of special programs for our students. This newsletter contains articles on some of these programs, as well as reports on our activities in graduate education, research, and other areas. Some of our long-term efforts in undergraduate education gained recognition during the last twelve months; I would like to share with you some thoughts on how these efforts have come together.



Selim Tuncel

We have carried out an extensive revision of our curriculum, including all of our precalculus and calculus courses. The final piece of the reform, a multi-year project that focuses on our calculus sequence for science and engineering students, Math 124/5/6, is nearing completion. We have also revised our degree programs. We developed Math 310, Introduction to Mathematical Reasoning, to help students make the transition to the rigors of senior-level mathematics courses. We introduced Math 381, Discrete Mathematical Modeling, and a three-quarter sequence in topology and geometry that complements our senior-level analysis and algebra sequences. We entered into a partnership with the other mathematical science departments on campus in the Applied and Computational Mathematical Sciences (ACMS) degree program. The Mathematics and ACMS Bachelor's programs are both thriving; at the end of spring quarter there were 396 majors in the two programs, representing an increase of 50% since 1996. The economy is partly responsible for the increased demand, but I believe that the revisions have also played a large role: Students are happy with our entry-level courses, so more of them continue to take math courses. As this happens, the opportunities we have provided for transition to advanced mathematics attract students, including some of the best, into our majors.

Jim Morrow excels in bringing the excitement of mathematics to students. For his many contributions, Jim won the UW Distinguished Teaching Award in 2003. This is our department's third Distinguished Teaching Award in five years!

Speaking of attracting some of the best, Jeff Giansiracusa won the Dean's medal in the Sciences, and we had two teams among the outstanding winners of the Mathematical Contest in Modeling. In addition, one of the teams was awarded the MAA prize, and the other was awarded the INFORMS prize. One of our teams was similarly honored last year, but to have two teams win in the same year is unprecedented. The six students, three on each team, were featured in several UW publications, appeared on local radio and television, and were even the subject of a Seattle Times editorial. We received messages of support and congratulations from many alumni and friends. It is great to hear of your support for the work we do. With your support, we will continue to attract the brightest students and maintain the high standards we have set.

Selim Tuncel

MORROW WINS THE 2003 DISTINGUISHED TEACHING AWARD

Professor James (Jim) Morrow was one of seven UW faculty chosen to receive the 2003 Distinguished Teaching Award, the University's highest award for teaching. This is the third time in the past five years that a member of the Mathematics Department has received the award — Professor David Collingwood won in 1999, and Professor Ronald Irving in 2001.

The award was given in recognition of Jim Morrow's many outstanding contributions to education. The NSF-funded Research Experiences for Undergraduates (REU) program at the UW, which he and Ed Curtis started in 1988, is among the most successful such programs in the nation. Jim started the Math Study Center in 1991; the idea has since been adopted by other departments on campus as well as by other universities, and it has become a cornerstone of our calculus program. The UW modeling team, which Jim coaches, has achieved international recognition, winning three prizes in the Mathematical Contest in Modeling in the past two years. He has organized our annual Mathday event for a number of years; Mathday is regularly attended by over a thousand high school students from around the state. More recently, Jim was instrumental in crafting the proposal for funding the Summer Institute for Mathematics at UW (SIMUW) for high school students. In addition to all of this, Jim continues to be an inspiring teacher in the classroom, regularly teaching the second year of our honors advanced calculus course (Math 334/5/6) as well as a variety of upper-level math courses.

Jim Morrow

For more of an idea of the impact Jim Morrow has on the life of the department, see page 2 for more on the modeling contest; see page 5 for a description of last summer's REU program; SIMUW is on page 6; and Mathday is described on page 9.

Tom Duchamp

MATH MODELING CONTEST

Two groups of students in the UW Department of Mathematics were declared Outstanding Winners in the international Mathematical Contest in Modeling this spring, and they also won prizes awarded by the societies involved in the judging. It's only the third year in which the UW has participated in this contest, which is sponsored by the Consortium for Mathematics and its Applications (COMAP). Last year, one of the teams won the SIAM prize. This year one team won the INFORMS Prize and another team won the MAA Prize. The winning team members are Mark Blunk, Samuel Coskey, Luke Winstrom (INFORMS Prize); and Ernie Esser, Jeff Giansiracusa, and Simon Pai (MAA Prize). All were seniors except for Pai, who was a sophomore. (Esser and Giansiracusa were also on the winning team in 2002, along with Ryan Card; Blunk and Coskey were on a team last year with Erik Curre, and their solution received a

The modeling contest teams, with Jim Morrow

meritorious distinction.) This is the first time in the 19-year history of the competition that one university has had teams win prizes for both problems that comprise the contest. Their stunning success attracted a lot of attention, including an editorial in the Seattle Times — probably the first time the Math Department has been the subject of an editorial.

The contest began on February 6, when officials posted two problems on the COMAP website. The teams had until February 10 to select one and devise a solution. Competitors could access sources on the web or in the library, but could not consult with anyone outside the team. The two UW teams were in different rooms and had no contact with one another, so they considered the problems separately. By chance each selected a different problem.

The problem solved by Blunk, Coskey, and Winstrom was to find a method of targeting a tumor in brain tissue for radiation treatment. The problem solved by Esser, Giansiracusa and Pai involved a proposed movie stunt: they had to figure out how to use cardboard boxes to cushion the crash landing of a stunt motorcyclist who jumps over an elephant.

Jeff and Luke majored in Math and Physics; Sam and Simon were in Computer Science and Math; Ernie majored in Math and ACMS and Italian; Mark was a Math major. Jeff is currently a grad student at Oxford, Luke is a grad student at UC Santa Cruz, Sam is a grad student at Rutgers, and Mark and Ernie are grad students at UCLA. Simon is a junior here at the UW.

Information about the competition, including the problems contestants attempted to solve and overall results, can be found at `http://www.comap.com/undergraduate/contests/mcm/` — follow the link "Previous Contests." Information on the local teams, including the winning papers, is available at `http://www.math.washington.edu/~morrow/mcm/mcm.html` — this site also has links to news articles.

Jim Morrow

NEW FACULTY

This year the Department welcomes two new faculty members.

Charles Doran (Assistant Professor), PhD Harvard, 1999. Professor Doran works in string theory.

Vitaly Vologodsky (Acting Assistant Professor), PhD Georgia, 2003. Professor Vologodsky is an algebraic geometer.

PROMOTIONS

During the last academic year, the Department promoted Eric Babson, Chris Hoffman, and Rekha Thomas from Assistant Professor to Associate Professor, with tenure. Professor Babson works in algebraic combinatorics and topology; Professor Hoffman's research is in ergodic theory and discrete probability; and Professor Thomas does computational algebra.

Zhen-Qing Chen was also promoted, from Associate Professor to Professor; he works in probability and stochastic analysis.

NEW COLLOQUIUM SERIES

This year, the department is holding a new series of math talks, called "Great Ideas in Mathematics." The speakers are all faculty from the UW Math Department, and they will discuss influential ideas and open problems in mathematics, at a level suitable for a wide audience. The first of these talks was given by Professor Gerald Folland on October 21; he spoke on "The Uncertainty Principle." Upcoming talks: Professor Steffen Rohde on "The Loewner Differential Equation" at 4:00 on November 25, and Professor Anne Greenbaum on "Alternatives to Eigenvalues – Describing the Behavior of Nonnormal Matrices and Linear Operators" at 4:00 on December 9. Both of these talks will be in Smith 211.

Later this academic year, Professors Daniel Pollack, Sándor Kovács, and Steve Mitchell will speak in this series. Check the web page `http://www.math.washington.edu/~munz/coll.html` for further information.

Department of Mathematics

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

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`http://www.math.washington.edu/`

VIC KLEE AND ERNIE MICHAEL CELEBRATE 50 YEARS AT THE UW

Vic Klee and Ernie Michael arrived in the UW math department fifty years ago, in September 1953. To commemorate this, Professor Emeritus Ron Pyke has written a poem, and we have included some campus photos taken by Ron Pyke from 1953 to 1956; these illustrate some of the ways the campus has changed in the past fifty years.

Ernie Michael

Vic received his PhD in 1949 from the University of Virginia; his advisor was Edward McShane, and his thesis was called "Convex Sets in Linear Spaces." Ernie received his PhD in 1951 from the University of Chicago; his advisor was Irving Segal, and his thesis was on "Locally m-Convex Algebras."

Between them, Vic and Ernie have published over 300 books and papers. Under their supervision, more than 35 University of Washington graduate students have received PhDs. They have taught countless undergraduates.

Vic Klee

When they arrived in September 1953, the department's faculty numbered around 25. The UW had 813 faculty overall that year, and 13,048 students began classes that Fall. Total tuition and fees were $55 per quarter per resident student, and the average salary for assistant professors was $5,000. In 1953, the Math Department was housed in the south half of the Math-Physics Building (now Mary Gates Hall). Parking was available outside the building. Trains still came on campus bringing coal to the Power Plant. Red Square was then green.

See pages 10, 12, and 13 for campus pictures from the 1950s, to see how the campus has changed while Vic and Ernie have been here. You can see more of these pictures at the web page `http://www.math.washington.edu/~munz/1953/1953_pics.htm`

An Ode for Two Friends

For Vic and Ernie at the faculty gathering 9/28/03
which honored 50 years since their arrival

When Carl's faculty sought upgrades,
In nineteen hundred, fifty three,
They hired two outstanding blades,
Named Ernest Michael, Victor Klee.

From U. Virginia and Chicago,
This 'pa(i)r-a-compact' brains arrived.
In Northwest climes, where all things grow,
Their research outputs really thrived.

We cheer the wise selection theorem,
That then with optimality,
Became the hiring algorithm
That brought them to our faculty.

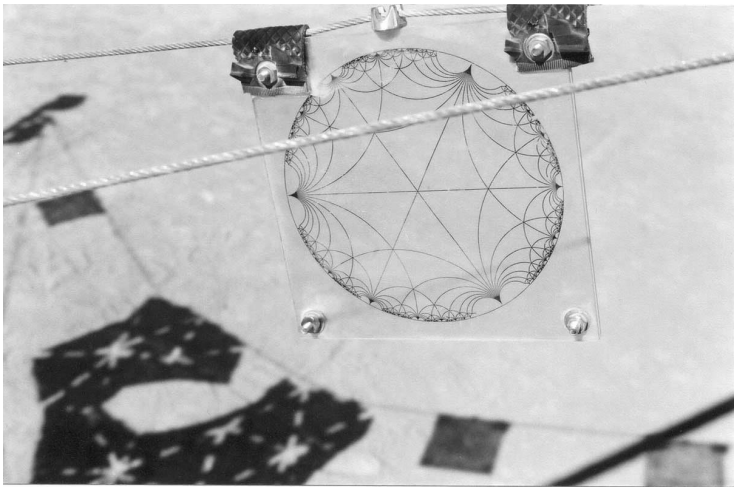
The para terms, compact, convex
Of sets and spaces, bodies too,
Were typed in purple without TeX
Without the aid of Starbuck's brew.

For fifty years they've been a plus,
In classrooms here and worldwide.
We wish them many more with us;
In health and joy on life's long ride.

[Should students from those early years,
Be asked to take a humble bow?
They polished shine on their careers,
As 'brasive sands on gems bestow?]

Ron Pyke (One of those 1953 students)

This picture shows detail from a sculpture by Zack Treisman, one of our graduate students. As Zack says, "The sculpture represents an isometric immersion of a subset of the hyperbolic plane into Euclidean 3-space." For more pictures and information, visit the web page `http://www.math.washington.edu/~treisman/hyperbolic_immersion/`



GRADUATE STUDENTS RECOGNIZED AT THE FOURTH ANNUAL GRADUATE AWARDS CEREMONY

The fourth annual Graduate Awards Ceremony, honoring outstanding graduate students in mathematics who received awards and fellowships during the past year, was held in the Mathematics Department lounge on November 13, 2003. Two Excellence in Teaching Awards and five Academic Excellence Awards were given. In addition to a certificate, each award includes a $1,000 supplementary academic stipend.

Mathematics students also received a number of fellowships and other awards, including two Achievement Rewards for College Scientists (ARCS) fellowships, a McFarlan fellowship, six Vertical Integration Grant for Research and Education (VIGRE) fellowships, a Graduate Opportunity Research Assistantship, five Top Scholar Awards sponsored by the Graduate School, and two Microsoft Scholar Awards.

Academic Excellence Awards recognize outstanding performance in both core graduate mathematics courses and the PhD qualifying exams. The Excellence in Teaching Award is given each fall to two of our Teaching Assistants for outstanding teaching performance in undergraduate mathematics courses. This year's Excellence Awards are funded by endowments created by Carl B. Allendoerfer, Z. William Birnbaum, and Edwin Hewitt, all of whom were distinguished mathematicians and members of the Department. Allendoerfer, who served as chair of this department from 1951 to 1962, is well-known for his research in differential geometry. Birnbaum served as an active and emeritus faculty member from 1939 until his death in 2000; he is widely recognized for his many contributions to both probability and statistics. Hewitt supervised 37 doctoral students during his forty-four years in the Department. He is best known for his fundamental contributions to analysis.

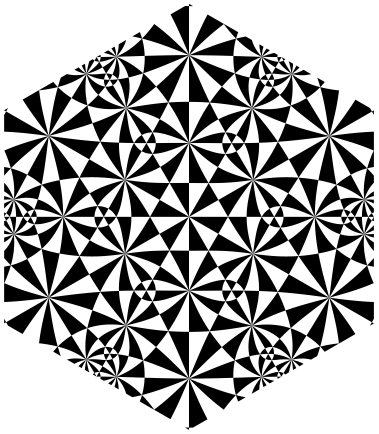
This year's Excellence in Teaching awardees are Chris Hanusa and Kelly Jabbusch. They were selected by the TA Advisory Committee from more than a dozen candidates. Chris Hanusa was nominated by Dr. Katia Vesztergombi for his work in one of our mathematical modeling classes, Math 381. Dr. Vesztergombi wrote that in "a very complex course . . . in every aspect of the class he was able to contribute." His student evaluations started about halfway between "very good" and "excellent" his first quarter at UW, and went up from there! Kelly Jabbusch was described by one of her supervisors as "a model TA .... Her classes should be videotaped for demonstration to other TAs." Our business calculus courses, Math 111/112, have a student clientele which is often demanding and more critical of instructors than in other courses, which reduces the popularity of these courses among TAs. Kelly has specialized in teaching these courses for the last five quarters. Even with these students, Kelly keeps her student evaluations in the "very good" to "excellent" range.

Academic Excellence Awards were presented to Matthew Ballard, Ryan Card, Matias Courdurier, Luke Gutzwiller, and Jun Zhang. All but Zhang, who is a first-year student, are beginning their second year of study at the UW. Having recently completed the qualifying exam for the PhD, these students are now beginning to specialize. Ryan, Matt, and Zhang are all considering working on problems related to probability theory. Matias is currently torn between his competing interests in optimization and inverse scattering, while Luke wants to work in the representation theory of algebras.

David Maxwell, a fourth year student studying differential geometry, is this year's McFarlan fellow. The McFarlan fellowship program, which began in 1992, provides support for graduate students through a bequest given for this purpose by the late Professor Lee McFarlan of the Mathematics Department.

Two of our entering students, Joshua Kantor and Troy Winfree, were awarded Achievement Rewards for College Scientists (ARCS) Foundation Fellowships this year, bringing to five the total number of ARCS fellowships currently held by mathematics students. Joshua Kantor, who graduated summa cum laude from Arizona State University, received the Ruth B. Clayburgh ARCS Founders Fellowship. Troy Winfree, who received his BS degree from UC Santa Cruz, is the recipient of an ARCS Designated Fellowship. They join Matthew Ballard, who holds the Jane & James Hawkanson Fellowship, Ryan Card who has a Simpson Family Fellowship, and Matt Kahle who has the Andrew Gavin Gaudette Fellowship. The ARCS Foundation is a national organization of women who raise funds for fellowships in science, medicine and engineering. ARCS Fellowships are $15,000 awards, funded over three years at the level of $5,000 annually. ARCS Founders Fellowships are $30,000 awards, introduced this year to improve recruitment results in programs facing exceptional levels of national competition.

Microsoft Scholar Awards were given to two entering students, Zsuzsanna Dansco from the University of Hungary and Leo Tzou from the University of British Columbia. They join Ilgar Eroglu, a third year student in complex analysis, Kris Kissel, a fourth year student in geometric analysis, Pablo Shmerkin, a third year student studying fractal geometry, Matias Courdurier, Luke Gutzwiller, and David Maxwell, bringing the number of Microsoft Scholars to eight. These $20,000 awards, in the form of four yearly supplementary stipends of $5,000, are funded by a gift from the Microsoft Corporation.



art by Daniel Meyer,
a math grad student

Ursula Whitcher, who received her BA in mathematics from Swarthmore College, is the recipient of a Graduate Opportunity Research Assistantship, sponsored by the Graduate Opportunity and Minority Achievement Program (GO-MAP), for the purpose of bringing outstanding women and minority candidates to our PhD program. The award provides support, without teaching duties, during three academic quarters.

Top Scholar Awards are $6,000 recruitment awards made available by the Graduate School to help with the recruitment of outstanding applicants. This year's recipients are Nathaniel Blair-Stahn (BS, University of Arizona), Qiuying Lin (MS, Xia-

men University, Tiantian Luo (BS, from Peking University, Beijing), Tak-Lun Koo (MS, Boston College), and Jun Zhang (MS, University of Utah).

Six Mathematics graduate students are VIGRE fellows this year. VIGRE fellowships are funded by a joint grant to the UW departments of Applied Mathematics, Mathematics, and Statistics from the VIGRE program of the National Science Foundation. Each award provides fellowship support, without teaching duties, during two academic quarters and the summer. This year's VIGRE fellows in the Department of Mathematics are Eric Bahuaud, a third-year student studying differential geometry; Matthew Blair, a second-year student studying hyperbolic partial differential equations; Anton Dochtermann, a third-year student in combinatorics; Matthew Kahle, a third-year student specializing in combinatorics; Travis Kopp, a first-year student interested in differential geometry, and Jason Swanson, a fourth-year student studying financial mathematics and stochastic partial differential equations.

Graduate students play a central role in all activities of our department: they share in the teaching of undergraduate courses, they are students in our graduate courses, and they are active participants in our research program. For the continued success of our program, it is vital that we continue to recruit from among the most talented students; these awards help us to compete successfully with other math graduate programs around the country. (See the article "Good Times for the Graduate Program" on page 9 for a report on how well our recruiting has been going.)

Tom Duchamp

[Note from the editor: your donations are crucial in helping to fund these awards. If you would like to help support our graduate program, visit our web site `http://www.math.washington.edu/` and click on "Giving to Math." Also, we usually include photos from the awards ceremony in the newsletter, but the ceremony was held too late this year to do so.]

REU PROGRAM AT THE UNIVERSITY OF WASHINGTON

The National Science Foundation supports Research Experiences for Undergraduates in various disciplines at selected universities. Readers of this newsletter are probably familiar with the fact that the University of Washington Mathematics Department has had an REU site since 1988, initiated by Ed Curtis and Jim Morrow, and directed for the past few years by Jim Morrow. Each year, undergraduates from universities throughout the United States apply for the program, and eight are selected to participate. They receive a stipend from the NSF REU grant to support an eight-week stay during the summer, in which they participate in research projects under the direction of Professor Morrow.

The students study the general area of "inverse problems for electrical networks." After a week of lectures and reading, students start to work on projects. They make interim oral reports and write a research paper about their project. Some of these papers eventually get published in professional journals and presented at national meetings. In addition to daily one-on-one sessions with faculty and assistants, students in the program engage in some planned social activities, including picnics, swimming parties, softball and frisbee games with the Physics REU, plays, and two trips to Mariners' games.

In the summers of 2002 and 2003, the NSF VIGRE grant supplied additional support for the program. In 2003 the VIGRE grant supported REU alumni Ernie Esser, Sam Coskey, and Jeff Giansiracusa as TAs for the program. The VIGRE grant also supported three additional undergraduate student participants, making eleven altogether. These additions made for an exceptional program. For example, the TAs created a new website — `http://www.math.washington.edu/~reu/` — which contains descriptions of the program, photos of the participants, and an archive of papers written by REU students, some dating back to 1988. This website will serve as a valuable resource for future participants and for anyone interested in discrete inverse problems.

The students in this program are always very strong. In the summer of 2003, students came from the University of Washington, Stanford University, the University of Alaska, Cornell University, the University of California at Berkeley, Utah State University, Gonzaga University, and Tufts University. There were three UW students in the program, in addition to the student assistants. The three TAs and one of the student participants were members of two winning Mathematical Contest in Modeling teams — see the article on page 2.

Jim Morrow

JEFF GIANSIRACUSA IS AWARDED DEAN'S MEDAL

For two years in a row, a math major has been named the Dean's medalist in the Sciences: Jeff Giansiracusa is the medalist for 2003. Thomas Carlson was the medalist last year. Jeff is a double major, math and physics, and has done research in both subjects. He has participated in physics REUs at the National Superconducting Cyclotron Laboratory at the University of Michigan and at CERN in Switzerland. In 2002 he was a student in the UW Math REU, and in the summer of 2003 he was a TA for the UW Math REU program. In 2001-2 and 2002-3, he was also a TA for the honors calculus sequence, Math 134/5/6. Jeff is a member of a graduating class that had many outstanding students; along with Ernie Esser, he was twice a member of a winning team for the Mathematical Contest in Modeling — see page 2. Jeff is a recipient of a National Science Foundation Graduate Research Fellowship which he will hold at MIT. He is spending the academic year 2003-4 at Oxford University, deferring his enrollment at MIT until 2004.

Jim Morrow

Jeff Giansiracusa

TERRY ROCKAFELLAR'S RETIREMENT

This past Spring the Department held a dinner to mark the retirement of Terry Rockafellar. Terry has long been one of the shining stars of UW mathematics. He is both a world-class researcher and an outstanding mentor and teacher, and he continues to teach courses, advise graduate students, and do research. Terry received his PhD in Mathematics from Harvard University in 1963, and after spending two years at the University of Texas in Austin, he joined the University of Washington. His international reputation grew rapidly, and he was quickly recognized as a rising star in the fields of optimization, control, and convex analysis. In 1970 Princeton University Press published his landmark text *Convex Analysis*. It is difficult to overstate the impact that this book has had on the development of convex analysis and optimization theory and practice. It is by far the most-cited text in the subject.

Terry Rockafellar

During his career Terry has published nearly 200 research articles and 7 books and monographs. His research continues at breakneck speed with over 10 preprints from 2002–2003 awaiting publication. His most recent book *Variational Analysis*, coauthored with Roger Wets in 1997, was awarded the Lanchester Prize for the "best contribution to operations research and the management sciences published in English."

Terry's research contributions lie at the very foundation of optimization theory and nonsmooth analysis. Over the years he has received many of the top national and international prizes in optimization and operations research. In 1982 he was corecipient with Michael Powell of the first Dantzig Prize from the Society for Industrial and Applied Mathematics (SIAM) and the Mathematical Programming Society (MPS); this is recognized as the top international prize in mathematical programming. In 1992, Terry was named the John von Neumann Lecturer by SIAM; this is the top North American honor in applied mathematics. In 1999 he received the John von Neumann Theory Prize from the Institute for Operations Research and Management Science (INFORMS); this is the top theory prize offered by INFORMS. Each of these three prizes is reserved for those who have made deep and innovative contributions that have had a far-reaching and sustained impact over a period of many years.

Terry has also been awarded honorary doctorates from the University of Groningen (Netherlands), the University of Montpellier (France), the University of Chile, and the University of Alicante (Spain).

Among students Terry has always been known to be a superb lecturer. His classes are always full, and his students are engaged and enthusiastic. He has the most enviable ability to inspire in his students the excitement he feels for the subject at hand. During his time at the University he has supervised 21 Doctoral students and over 30 Masters students. He has also mentored numerous postdoctoral students who have come to Seattle to learn from and work with him.

This past Spring the West Coast Optimization Meeting was dedicated in honor of Professor Rockafellar's lifelong seminal contributions to the subject. Each of the invited speakers reminisced about the formative impact of Terry's research on their past and current research. The list of speakers included several of the most influential researchers in optimization and variational analysis: Asen Dontchev, Mirjam Duer, Ivar Ekeland, Boris Mordukhovich, Jong-Shi Pang, Lucien Polak, and Roger Wets.

It was a truly joyous and inspiring event, full of lively mathematical discussion, as well as personal recollections of intellectual and wilderness explorations with Terry. Many of those in attendance recalled the thrill of collaborating with Terry while kayaking, cross-country skiing, or trekking in the wilderness. Now that Terry is retired, these mathematical back-country trips are sure to occur with greater frequency. Something about intimately experiencing mountain passes and riptides must inspire deeper insight into minimax theory and nonsmooth analysis.

On the occasion of his retirement we take this opportunity to thank and honor our esteemed colleague, mentor, and friend for his inspiration, intellectual gifts, and many years of service to the University of Washington.

Jim Burke

[Note from the editor: any donors wishing to commemorate Terry Rockafellar's retirement are encouraged to contribute to the Rockafellar Graduate Support Fund, a new fund which will be used to support graduate students in the math department. To do this, visit our web site `http://www.math.washington.edu/` and click on "Giving to Math."]

SIMUW DEBUTED IN SUMMER 2003

The Summer Institute for Mathematics at the University of Washington (SIMUW) is an exciting program for students who have not yet completed their final year of high school. It is funded entirely by a gift from an anonymous couple. The first class of twenty-four enthusiastic, talented students arrived at the campus of the University of Washington on June 22, 2003

for a six-week program of classroom activities, special lectures, field trips, social activities, and intense interaction with faculty,

TAs, and fellow students. The two dozen students studied topics ranging from elliptic curves to computer graphics in two-week segments, interspersed with special half-day sessions on topics like Markov chains, knot theory, and the mathematics of movement. They spent four days each week on the two-week topics, and one day on the special sessions; most of this time they worked together and with the staff, grappling with hard mathematical problems. On weekends, there were planned excursions to museums, science labs, and the beach.

Students in the program deepened their understanding and appreciation of many active areas of mathematics. Perhaps the most important aspect of the program was social — friendships and contacts were made that will last long after the final session.

The program was directed by UW faculty members Ron Irving, Sándor Kovács, Paul LePore, and Jim Morrow. In 2003 there were six faculty members from the UW, the University of Chicago, and Microsoft; ten special lecturers from the UW, Microsoft, and the University of British Columbia; and two graduate and five undergraduate teaching assistants.

SIMUW will take place again next summer. Students from Washington, British Columbia, Oregon, Alaska, and Idaho are encouraged to apply for SIMUW 2004.

Information about the 2003 program is available, and details about the 2004 program will soon appear, on the website `http://www.math.washington.edu/~simuw/`.

Sándor Kovács

NINTH NWMI BRINGS GEOMETRY TO TEACHERS AT THE UW

Each August, about 60 math teachers gather on the UW campus for a week of math courses and workshops called the Northwest Mathematics Interaction Summer Program; last year was the ninth annual meeting. The centerpiece is the week-long Summer Geometry Institute in which teachers are immersed in geometric investigations and experiences. The week includes plane geometry from perimeter and area puzzles to conic sections, experiments with spherical geometry, and lots of making and studying polyhedral models. There are also evening discussions, and teachers are encouraged to stay on campus for the week for a complete "math camp" atmosphere.

During the same week, teachers can instead choose from a menu of five two-day, 15 hour minicourses — in 2003, the topics were polyhedra, graph theory, teaching with data, visualization in middle school math, and geometry software. NWMI alumni stay connected with a weekend Alumni Reunion that features the building of a giant geometrical object.

The Northwest Mathematics Interaction doesn't just run these summer programs — it is an outreach program for secondary school math teachers that organizes events all year long. NWMI is headquartered in the UW Mathematics Department, with UW faculty sponsor James King. The instructors of NWMI are a team of college and university mathematicians and secondary teachers, including UW math graduate alumni Brian Hopkins, Philip Mallinson, and Will Webber. The Washington secondary teachers on the team come not only from nearby Puget Sound but also from Vancouver, Bellingham, and Oroville. Most NWMI participants come from around the state of Washington. Teachers pay a registration fee for some events, but the bulk of the costs have been borne by grant support.

NWMI hopes to offer a Tenth Summer Institute in 2004. To find out more about NWMI, its programs and instructors, its affiliation with the IAS/Park City Mathematics Institute, and a photo of a giant origami box, visit the NWMI web site, `http://www.math.washington.edu/nwmi/`.

James King

VISITORS

Each year, the Department welcomes many visitors; these visitors, who come for varying periods of time, teach classes and participate in our seminars and research. They make significant contributions to the life of the Department. These visitors come from all over the world, and this attests to the international nature of mathematics and to the Department's attractiveness as a center of mathematical research and teaching. Many visitors come for only a few days or a week, but some stay for a quarter or more. Here is a list of this year's long-term visitors:

Richard Downs, Visiting Lecturer (all year), visiting from South Seattle Community College. Professor Downs is a participant in our sabbatical program for community college educators.

Iain Gordon, Visiting Assistant Professor (Winter quarter), visiting from the University of Glasgow. Professor Gordon does research in quantum groups.

Deborah Nichol, Visiting Lecturer (all year), visiting from Skagit Valley College. Professor Nichol is a participant in our sabbatical program for community college educators.

Vladimir Sharafutdinov, Visiting Professor (Winter quarter), visiting from the Sobolev Institute for Mathematics and Novosibirsk. Professor Sharafutdinov is a frequent visitor to the department; his research is in differential geometry and topology.

Balázs Szendröi, Visiting Assistant Professor (Winter quarter), visiting from Utrecht University. Professor Szendröi is an algebraic geometer.

Marsha Weaver, Visiting Assistant Professor (Autumn quarter), visiting from the University of Alberta. Professor Weaver specializes in general relativity.

Jiangang Ying, Visiting Associate Professor (Autumn–Winter quarters), visiting from Fudan University. Professor Ying works in probability.

THE ACMS PROGRAM

The Applied and Computational Mathematical Sciences program is a multidisciplinary Bachelor of Science degree program at the University of Washington. The aim of the program is to provide a solid foundation in both applied and computational mathematical science, combined with a focus on an area of application.

The ACMS program is now running at almost full capacity — at the end of the Spring quarter, 2003, there were 191 ACMS majors, 9 shy of the target enrollment of 200. This is up from the previous year and continues the steady growth of the ACMS major over the six years of the program's existence. ACMS's success is a testament to the vision and creativity of the mathematical sciences departments in the University. Since the program itself has no faculty, offers no courses, and has an annual budget of only $6000, its success entirely depends on the cooperative spirit of the four participating departments: Applied Mathematics, Computer Science and Engineering, Mathematics, and Statistics. These departments work together to insure that the ACMS students receive core training in mathematics, statistics, modeling, and scientific computation. Students must also take advanced training in one of the following eight areas of specialization: Biological and Life Sciences, Discrete Mathematics and Algorithms, Engineering and Physical Sciences, Mathematical Economics, Operations Research, Scientific Computing, Social and Behavioral Sciences, and Statistics. Consequently, the program also owes a great debt to the many departments in the Colleges of Arts and Science, Business, Engineering, Forest Resources, and Ocean and Fisheries Sciences that have opened up their junior and senior level courses to ACMS majors. It is a great credit to the University of Washington that in times of enormous financial stress and constrained resources, such a diverse interdisciplinary program can thrive with virtually no resources of its own. The program relies entirely on voluntary contributions from the four mathematical sciences departments and the spirit of cooperation and sense of common purpose within the University academic community at large. A concrete demonstration of this spirit of cooperation comes from the Center for Statistics and the Social Sciences. This year CS&SS gave the ACMS program a much-needed boost by donating $2000 for an update to the ACMS website. The website is the main source of information on the ACMS program, so this update will have a huge impact on facilitating course planning for our majors, and publicizing the program both on and off campus.

The response and enthusiasm for the ACMS program across academic departments and colleges has been extremely encouraging: streamlined double major requirements have been established with numerous departments, many individual faculty have opened their majors-restricted classes to our students, and faculty across the University have mentored our students in undergraduate research projects. The ACMS Seminar has also acted as a focal point for interdisciplinary activity and to introduce students to the vast variety of mathematical research occurring at the cutting edge of science, business, engineering, and industry. The seminar has a theme for each quarter. Within the last year some of these have been "The Top Ten Algorithms of the Twentieth Century," "Mathematics in Industry," and "Undergraduate Research Opportunities in the Mathematical Sciences." This Autumn the theme is "Biology and the Mathematical Sciences." Speakers for the seminar come from all across campus and throughout the Puget Sound area. Not only do the ACMS students enjoy the seminar, but it is well attended by graduate students and faculty from a variety of disciplines. Indeed, on some occasions the audience overflows the room and we must move to a larger lecture hall. It is an exciting venue where students learn about the state of the art in current mathematical science research and applications at an accessible level. Perhaps this is why it is enjoyed by so many faculty and graduate students as well.

In the final analysis though, it is the commitment, talent, and creativity of the ACMS students themselves that have made the program a success. The program is sustained by their brilliant potential and hard work. Congratulations to this year's 57 ACMS graduates on a job well done!

Visit the ACMS web site `http://www.ms.washington.edu/acms/` for more information.

Jim Burke

UNDERGRADUATE AWARDS

Each year, the Mathematics Department holds a luncheon to honor some of our outstanding undergraduates in mathematics. This past year's event was held on May 29 at the Faculty Club on campus. To make the ceremony more meaningful, each award was presented by a faculty member well familiar with the work of the winner, who was presented with a book (chosen by the faculty member) as well as a cash prize. In addition — in what is becoming a tradition — the members of our championship math modeling teams were honored. This past year's winners were:

- Outstanding student in first year honors calculus: Nicholas Czajka
- Outstanding student in second year honors calculus: Carey Cherng
- Outstanding score on the Putnam Exam: Simon Pai
- Gullicksen Award: Terri Moore and Casey Schneider-Mizell
- Outstanding ACMS major: Ernie Esser
- Outstanding B.A. Teacher Preparation major: Joe Trahan
- Outstanding B.S. Standard major: Melissa King
- Outstanding B.S. Comprehensive major: Sam Coskey and Jeff Giansiracusa

Ethan Devinatz

MATHDAY

The fourteenth annual Mathday will be held on the campus of the University of Washington on March 22, 2004. On that day 1200 high school students and teachers from around the state will attend lectures and panel discussions, participate in hands-on activities, and go on field trips to labs on the campus. This year the plenary speaker will be Craig Hogan, Vice Provost for Research, and Professor of Physics and Astronomy; he will speak on "The Beginning of Space and Time." Guest lecturers will include Millie Johnson (Mathematics, WWU); Cliff Mass (Astronomy, UW); Carl Bergstrom (Biology, UW); Peter Hoff (Statistics, UW); Sara Billey, Sándor Kovács, Rekha Thomas, and Zack Treisman (Mathematics, UW).

The first Mathday was held in 1991. Students come from all over the state of Washington, and in recent years we have had representatives from Idaho, as well. In 2003 there were more than twenty activities and field trips, and lectures on topics ranging from weather forecasting to the traveling salesman problem to the physics of the internet.

Undergraduate students, graduate students, staff, and faculty all contribute to the success of this exciting, educational day in which students learn about the uses of mathematics in academic research and industrial research and development. Mathday has been partially supported by donations from George Kauffman and two anonymous donors.

Visit the Mathday website at `http://www.math.washington.edu/~morrow/mathday.html` for more information.

Jim Morrow

GOOD TIMES FOR THE GRADUATE PROGRAM

The UW graduate program in mathematics seems to be in high demand among graduating college seniors these days, judging from our large and growing pool of talented applicants from all over the world. It hasn't always been this way, though. In the mid-1990's, the number of applicants to our graduate program (and most others in mathematics as well) experienced a steep decline. From a 1992 high of more than 200 applicants, the pool plummeted to 110 in 1998. Nobody knew exactly why this was happening, but the best guess was that college students were responding to the joint pressures of a poor academic job market and a booming private-sector economy.

While some math departments responded to these pressures by downsizing their graduate programs, the UW Math Department responded with a combination of strategies designed to increase the quality and quantity of our applicant pool. Those strategies included improving our web site and publicity, incorporating more preparation for industrial and teaching careers into the program, and developing a support plan that supplements our TA offers with a variety of fellowships and cash recruitment awards. Due to some combination of our efforts and changes in the global economy, over the past five years the outlook has changed from dismal to downright rosy, and 2003 has been our best graduate recruiting year in almost a decade.

The first sign of improvement has been a steady increase in the number of applicants in each of the past five years, culminating in almost 180 fee-paying applications in 2003. But more importantly, the quality of the applicant pool has also increased. Each applicant to the graduate program is evaluated by our admissions committee, and those with the top rankings get our first offers of admission and financial support. The applicants in this top group also typically receive offers from other schools, though, often with significantly higher financial inducements than our TA salaries can provide. To attract these students to our program, we developed a comprehensive support plan to supplement the base TA salary. The plan became fully operational with the entering class of 2002–2003. We now offer five-year "Academic Merit Awards" to as many as possible of our top applicants. Funding this plan has not been easy in this time of tightening state budgets. To do so, we have to call upon all the sources of funding available to the Department, including Microsoft Scholar Awards, VIGRE fellowships, ARCS fellowships, "Top Scholar Awards" from the Graduate School, and departmental endowments.

Our approach appears to be working. Back in 1999, the top group contained 24 people. After seeing steady growth in this top group for the past four years, in 2003 we found ourselves with a top group numbering over 40, and for the first time in memory, we had so many top applicants that we were not even able to make first-round offers to all of them. In the end, we filled up our entire entering class with top-notch applicants, barely touching the waiting list. This bodes well for the success of this year's entering class, which has a total of 20 incoming graduate students: 14 PhD students, 5 Master's students, and one visiting exchange student; 8 women and 12 men; 11 US citizens and 9 international students (from Taiwan, Hungary, Hong Kong, China, Germany, India, and Canada).

Of course, the process of judging applicant files is an art, not a science, and we can never be sure to what extent the living, breathing human beings who join our department will match our assessments of them. But our high hopes for this class are already being borne out — five of the fourteen incoming PhD students passed one or more prelims before the start of their first year in the program, the highest percentage who have done so in recent memory. And the "buzz" from the instructors of the first-year graduate courses suggests that this is a very strong class indeed.

Attracting talented and successful graduate students is crucial to the success of the department as a whole, because it affects the atmosphere in our courses, the job satisfaction of our faculty, the success of our job placement efforts, and our ability to recruit first-rate new faculty members. If the recent trend is any indication, there are good times ahead.

John M. Lee

CALCULUS REFORM AT THE UW

The department has completed the second year of a three-year calculus reform project. As highlighted in previous newsletters, the first two quarters of our gateway science and engineering calculus course (Math 124 and Math 125) have been significantly restructured. Smaller lecture class sizes (now 81 students vs. 160 students), smaller quiz section sizes (now 27 students vs. 40 students) and increased quiz section time (now 130 minutes/week vs. 100 minutes/week) are key features of the reformed course.

But, as is well known, proposing change, implementing change and succeeding are three different pieces of the curricular reform puzzle. After several years of planning and two years of dedicated implementation, we have successfully put into action a "continuous improvement model," whereby feedback from instructors and students is used to continually fine-tune and improve the course. Instructor feedback comes primarily through weekly meetings, which have the side benefit of improved collegiality. Moreover, these weekly meetings insure a more uniform student experience from one instructor to another. Of course, the instructors maintain their own styles and approaches, but a certain degree of uniformity (homework, worksheets, number of exams, final exam) has proved very popular for everyone involved. Student feedback comes in the form of extensive assessment data obtained through our work with the Center for Instructional Development and Research (CIDR).

In the end, we have happily arrived at a model that is providing a satisfying experience for instructors, students and graduate teaching assistants. A full accounting of the second year of calculus reform, in the form of our report to the Dean of the College of Arts and Sciences, is available at this web page: `http://www.math.washington.edu/~m124/Reports/report_summer03_finalversion.html`

Dave Collingwood

Red Square, c. 1953 (when it was green)

SCHEDULING TUTORS IN THE MATH STUDY CENTER: AN UNDERGRADUATE RESEARCH PROJECT

The Math Study Center (MSC) at UW is a tutoring facility for freshmen and sophomores taking mathematics classes. Each quarter Dr. Patrick Perkins, the director of the MSC, is faced with the problem of creating work schedules for about 25 tutors and desk assistants. The employees are all students at the UW and the times they work must fit in with their classes. Beyond these rigid constraints, Dr. Perkins tries to optimize more complicated employee preferences which include the following: (1) employees prefer not to enter and leave the MSC more than twice a day, (2) they prefer not to work isolated hours, (3) they prefer not to work more than a certain number of hours in a row and (4) they usually prefer to work during a free hour between two classes. This is a complicated optimization problem for which an optimal solution is not apparent. Over the years, Dr. Perkins has written an ad-hoc program in C++ that finds "good" schedules for his workers.

In Spring 2003, Professor Rekha Thomas offered the MSC scheduling problem as an optional project to her undergraduate class on Discrete Optimization. Three students took on this project: Youngbae Lee, an undergraduate student in Applied and Computational Mathematical Sciences; Yoonsoo Kim, a graduate student from the Department of Aeronautics and Astronautics; and Caleb Z. White, an undergraduate Economics major. The two undergraduates were supported by the UW VIGRE grant during the summer. The three students met frequently with Thomas and Perkins during the Spring and Summer quarters and designed a sophisticated model of the problem as an integer program. They then solved the problem using CPLEX, which is a state-of-the-art commercial software package for integer and linear programming. The resulting schedules were computed in just a few seconds and were of very high quality.

Youngbae, Yoonsoo and Caleb have created a mathematically sound and computationally viable solution method that can be used by Dr. Perkins in the future. In fact, Caleb computed the Fall 2003 schedule at the beginning of this academic year. It took CPLEX less than seven seconds to produce the optimal schedule. This work resulted in a paper by the five collaborators: Caleb Z. White, Youngbae Lee, Yoonsoo Kim, Rekha R. Thomas and Patrick Perkins, "Creating Weekly Timetables for Maximizing Employee Preferences," 18 pages, August 2003, available at `http://www.math.washington.edu/~thomas/papers/articles.html`

Patrick Perkins & Rekha Thomas

THE MILLIMAN LECTURES

Our 2002–2003 Milliman Lecturer was Janos Kollár from Princeton University. Professor Kollár is one of the leading algebraic geometers of his generation, and the titles and content of his three lectures reflected his research activities: (1) What is the biggest multiplicity of a root of a degree d polynomial? (2) What are the simplest algebraic varieties? (3) Rationally connected varieties over finite fields. An article in our Autumn 2002 newsletter discussed Professor Kollár and his research — see `http://www.math.washington.edu/~jbaird/nwsltr02/nwsltr2002pg8.pdf` for more information.

Our 2003–2004 Milliman Lecturer, Professor Alain Connes, is scheduled to visit our department, and deliver three lectures, during the week of May 31–June 4, 2004.

Professor Connes, currently a professor at the College de France and at the Institut des Hautes Études Scientifiques in Paris, has been one of the world's most influential mathematicians since he received his PhD from École Normale Supérieure in 1973. His thesis "A classification of factors of type III" was a major, stunning breakthrough in the classification of operator algebras which play a central part in the modern formulation of quantum mechanics. For example, Heisenberg's Uncertainty Principle is expressed as the equation $PQ - QP = \hbar/2\pi i$, where P and Q are the momentum and position operators.

Alain Connes

Connes has since received almost all the awards and honors that are open to mathematicians. He was awarded the Fields Medal in 1982 for his contributions "to the theory of operator algebras, particularly the general classification and structure theorem of factors of type III, classification of automorphisms of the hyperfinite factor, classification of injective factors, and applications of the theory of C^*-algebras to foliations and differential geometry in general." The Fields Medal is the highest honor in mathematics, awarded every four years to a mathematician under the age of forty. In 2001, the Royal Swedish Academy of Sciences awarded Connes the Crafoord Prize "for penetrating work on the theory of operator algebras and for having been a founder of non-commutative geometry." This prize, worth half a million dollars, pays tribute to fields not covered by the Nobel Prizes.

He was awarded the Prix Aimée Berthé in 1975, the Prix Pecot-Vimont in 1976, the Gold Medal of the Centre National de la Recherche Scientifique in 1977, the Prix Ampere from the Académie des Sciences in Paris in 1980 and in 1981 the Prix de l'Electricité de France. When he was elected to the French Académie des Sciences in 1982 he was one of only thirteen mathematicians in the Académie. He has been elected a foreign member of the Danish Academy of Sciences (1980), the Norwegian Academy of Sciences (1993), the Canadian Academy of Sciences (1995), and the American National Academy of Science (1997).

At around the times Connes received the Fields Medal, his interests turned to differential geometry. He soon realized that operator algebras, particularly non-commutative ones, offered deep new insight into geometry. His primary occupation over the past two decades has been the creation, development, and application of non-commutative geometry. Major ingredients in the theory are differential geometry, cyclic cohomology (a concept he introduced), operator algebras, and K-theory. The naive idea is this. Given a geometric object, say a topological space X, one may consider continuous functions from X to the real or complex numbers. Such functions may be added and multiplied, giving the collection of all such functions the structure of a ring. The multiplication in this ring is commutative, meaning that if f and g are two such functions, then $fg = gf$. In "good" situations it is possible to recover the original space X from the ring. Thus, the algebraic object contains all the geometric information and one may pass back and forth between the algebraic and geometric worlds. Each of the two worlds, geometric and algebraic, has its respective advantages and limitations, but now one has a dictionary that allows one to apply algebraic ideas when geometric ideas alone are not sufficient, and conversely. This is an enormously powerful idea and is a theme that pervades mathematics.

Connes' idea is simply that when one has a noncommutative ring, meaning that a product fg need not be the same as a product gf, one should view this as if it were the ring of functions on some imaginary geometric object, a noncommutative space. At first this seems bizarre, but when one encounters "pathological" geometric objects, the dictionary referred to earlier breaks down. However, Connes' fundamental insight was that if one allows non-commutative rings, then by associating to the pathological space an appropriate noncommutative ring, the dictionary can now be extended to new geometric situations, albeit at the expense of having to accept that fg may not equal gf. To make this an effective tool one must translate into algebraic terms all the standard geometric ideas and methods, and then use these algebraic tools in a situation where the geometric tools are not directly applicable.

The development of this idea over the past 25 years has led, not only to solutions to outstanding problems in mathematics, but perhaps more excitingly, to new conceptions of space-time based on quantum field theory. Amazingly, these ideas of "non-commutative space" seem to be exactly what is called for in the development of string theory. Connes has applied these ideas to gravitational monopoles and the renormalization problem in quantum field theory, and has shown that the noncommutative torus, a basic example of noncommutative space, appears in the classification of BPS states of 11-dimensional supergravity.

Luis Caffarelli

Connes' book *Noncommutative Geometry* is a dazzling tour-de-force in which he lays out his vision, and illustrates it with a host of applications to operator algebra problems, theoretical physics, particle physics, and differential ge-

ometry. Connes has also used these ideas as a possible approach to math's most famous unsolved problem, the Riemann hypothesis (*Science*, 26 May 2000, p. 1328). He found a spectral interpretation of the zeros of the Riemann zeta function and a geometric interpretation of the explicit formulas of number theory as a trace formula on a natural noncommutative space related to adeles and to his previous work on the classification of factors. One reviewer of Connes' book said his work produced a "feeling of intense jubilation."

The 2004–2005 Milliman Lecturer will be Professor Luis Caffarelli from the University of Texas at Austin.

Paul Smith

Suzzallo Library, c. 1953

PIMS AT THE UW

The Pacific Institute of Mathematical Sciences (PIMS) was created in 1996 to foster the development of mathematics at all levels in Western Canada. The first five founding Universities are Simon Fraser University, the University of Alberta, the University of British Columbia, the University of Calgary, and the University of Victoria. The Departments of Applied Mathematics, Mathematics, and Statistics at the University of Washington joined PIMS in September 2000, making the UW the sixth PIMS university, and thus opening up a new era of scientific collaboration between the US and Canada.

PIMS is rapidly becoming a major international force. NSERC, the Canadian equivalent of the National Science Foundation, has recently dramatically increased the funding for PIMS. Also, the Banff International Research Station (BIRS) for mathematical discovery and innovation started operations in March of this year. BIRS was formed thanks to a partnership between the Mathematical Sciences Research Institute (MSRI) in Berkeley and PIMS, with funding provided by NSERC, the province of Alberta, and the US National Science Foundation. About 40 five-day workshops will be held this year; twelve of these are organized by faculty from the three mathematical sciences departments at UW. Other activities at Banff include two-day workshops, focused research groups, summer schools, and industrial problem-solving workshops. From all accounts BIRS has been a resounding success.

During 2003, PIMS has been holding a thematic year on Inverse Problems and Applications. Professor Gunther Uhlmann (UW) is the coordinator for this program. Inverse problems arise in many scientific fields, including geophysics, medical imaging, remote sensing, and non-destructive evaluation of materials. Several workshops on inverse problems have been held this year; for example, in Vancouver this August there was a workshop on inverse problems in medical imaging. The focus of this workshop was on the recent advances in mathematics which have allowed for a significant enhancement of widely used imaging techniques such as x-ray tomography, magnetic resonance imaging (MRI), and ultrasonic imaging. This was particularly topical because this year's Nobel Prize in Medicine was awarded for advances in MRI related to inverse problems.

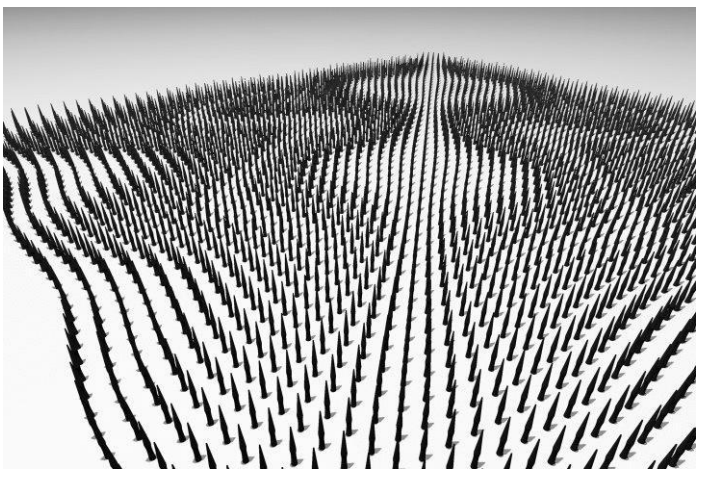
PIMS has identified about 30 Collaborative Research groups (CRGs) among the PIMS institutions. A new PIMS program will support workshops and other activities of half a dozen selected CRGs for a one to two year period. There are currently six CRGs having concentration periods: Dynamics, Number Theory, Mathematical Ecology, Probability and Statistical Mechanics, Scientific Computing, and String Theory. UW faculty have leadership roles in all six of these.

Since its founding in 1996, PIMS has become a world class institution, and is helping to strengthen the mathematical community in the Pacific Northwest. We are looking forward to an increased involvement of UW in the continuing development of PIMS as an international center of mathematics research, and industrial and educational outreach.

The PIMS website is `http://www.pims.math.ca/`.

Gunther Uhlmann

This piece is by Matthew Conroy, a member of our faculty; its title is "Forest I". For more of his art, visit the web page `http://www.sito.org/cgi-bin/egads/segads?idonly=MMC`



RECENT DEGREE RECIPIENTS

The following students completed their doctorates in math during the academic year 2002–2003:

Eduardo Chappa. His advisor was Gunther Uhlmann, and his thesis title was "The X-Ray transform of tensor fields." He is now a Visiting Assistant Professor at Texas A & M.

Dan Fox. His advisor was Robin Graham, and his thesis title was "Contact Projective Structures and Contact Path Geometries." He currently has a VIGRE postdoctoral position at Georgia Tech.

Jim Mailhot. His advisor was Ralph Greenberg, and his thesis title was "Selmer groups for elliptic curves with isogenies of prime degree." He has a postdoctoral position at Ohio State.

Robbie Mouat. His advisor was Selim Tuncel, and his thesis title was "Finitary Isomorphisms with Finite Expected Coding Times of Markov Chains". He is working for Microsoft.

Karthik Ramaseshan. His advisor was Gunther Uhlmann, and his thesis title was "Microlocal analysis of the Doppler Transform on $\mathbf{R}^3$." He has a postdoctoral position at the University of Rochester.

Many students also earned Master's degrees last year; here is a list of those who finished their work at the UW with a Master's degree in Mathematics, with each student's advisor listed in parentheses:

Teresa Anderson (Steve Monk)
Brian Blackmore (Ralph Greenberg)
Truman Buffett (Terry Rockafellar)
Amy Ehrlich (Don Marshall)
Audrey Gillant (Ralph Greenberg)
Cassie Graham (Ginger Warfield)
Jesse Groman (Krzysztof Burdzy)
James Harmon (Ralph Greenberg)
Eric Machorro (Ralph Greenberg)
Christina Merten (Anne Greenbaum)
Phillip Nguyen (Ken Bube)
Dawn Ring (Hart Smith)
Lauren Sandven (Judith Arms)
Michael Story (Rekha Thomas)
Rebecca Weinhold (Terry Rockafellar)
Hui Xu (Boris Solomyak)
Shengyu Zhang (Jim Burke)

GIFTS TO THE DEPARTMENT

Each year the Department receives gifts from its alumni and friends. These gifts, usually in the form of financial contributions, are of immense value to us. They permit us to carry on important activities for our students and our scholarly work; for instance, they provide money for scholarships, fellowships, and prizes for our students. They help to support events like SIMUW (page 6) and Mathday (page 9). They support visits to our Department by distinguished mathematicians from around the country and the world. They give the Department a much-needed element of flexibility to meet special needs as they arise. For these contributions we are truly thankful, and we hope to continue enjoying the support of our many alumni and friends. If you are thinking of making a gift to the Department, or remembering the Department in your will, we invite you to discuss the matter with Professor Selim Tuncel, the chair of the Department (206-543-1151 or `chair@math.washington.edu`) or with Dondi Cupp of the Development Office in the College of Arts and Sciences (206-685-6736 or `dcupp@u.washington.edu`). You can also visit our web site `http://www.math.washington.edu/` and click on "Giving to Math."

Attention Husky Fans!
Tyee program members supporting the University at the President's Club level ($2,000 and above) can receive one-fourth of a Tyee point for every $100 given to academic programs within the University. For details regarding Tyee points, go to the Husky homepage `http://www.gohuskies.com` — navigate the site by clicking on "Tyee Donor Program" and then "Priority Seating Opportunities," or call the Tyee office at 206-543-2234.

Savery & Gowen, c. 1953

The following is a list of our friends who have contributed to the Department between January 1, 2002, and October 25, 2003. 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 Mike Munz (206-543-1150 or munz@math.washington.edu).

Aaron Alberg
Robyn Aldrich
Cheol and Maria An
Teresa Anderson
Andrew and Galina Anschell
Loren and Elsie Argabright
Stan Sorscher and Judith Arms
Charles and Carol Austin
Hazen Porter Babcock
Jeffrey Price and Kathryn Barnett
Lynette Barstow
James Baxter
Alfred Beebe and Shauneen Giudice
Lisa Behmer
John and Tasoula Berggren
Bonnie Birch
Phil Bombino
Michael and Belinda Borden
John and Margaret Bossert
Michael Brown and Kathryn Renouard
James Burke
David Bushnell
Philip and Cassandra Carpentier
Andrew Chan
Laura Chihard
Eddie Chin
Gary and Cheryl Church
John Clavadetscher
Dona Costello
Jason Cross
James and Beverly Culpepper
Yun Davis
Thomas and Michelle Rae Brenden
Samuel Devlin
James and Betty Gillespie Dolan
Tom and Linda Duchamp
Gary and Jane Erickson
Estate of Edwin Hewitt
James and Holly Foley
Gerald Folland
Joseph and Joyce Frost
Joseph Gangler
Scott and Katherine Garland
Michael George and Susan Taylor-George
Owen Green
Ira and Wilma Green
Gary and Gail Grimes
Gerald and Kathe Griswold
Henry and Jo Ann Hanson
Henri Hartman
Lyle and Alice Hatfield
Tom Hedford
Ronald and Gail Irving
Allen and Jane Johnson
Brian and Deanne Kanekuni
Joseph and Jean Karpen
Sim Chee Khian
Bora Kim
James and Victoria King
Arthur and Marianne Kitzman
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Victor LaForest
Andrew Chan and Ling Leung
Douglas Lind
John and Barbara Weaver
Jerry and Marnita Magner
Stephen Mar
Craig McKibben and Sarah Merner
George and Neva McRae
Mark and Laurie Milodragovich
Polly Moore
Richard and Miyako Moores
Isaac and Lensey Namioka
Kathleen Naughton
Reginald and Renea Newbeck
Thomas Nicholson
Thomas Nims
William Norton
Gerald and Mary Ann Oberg
Kenneth Oien
M. Scott Osborne
Krzysztof Ostaszewski
Chris and Danielle Osting
Zi-Keh Peng
Robert and Elaine Phelps
Will and Peggy Jo Pirhonen
Daniel Pollack and Tatiana Toro
Frank and Judith Pollard
Glenn and Aileen Pruiksma
John and Natasha Pruss
Willis and Roberta Rasmussen
Vaho Rebassoo and Maura O'Neill
Michael and Debra Richer
Arnold and Arlene Roblan
Paul Rudnick
Donald and Linda Sando
Michael and Elizabeth Schmidt
Benjamin Knutson and Marilyn Scott-Knutson
Donna Seaman
Mark Sevonty
Marvin Sinderman
Antoinette Slavich
Hart Smith
Robert and Shelly Soderberg
Paul and Michelle Sorrick
Richard Spirtes
Thomas and Bronwyn Starostka
Mark and Caroline Stewart
Edgar Lee and Janet Stout
Leonard Swanson
Tinh Tang
Keith Taylor
Peter Blossey and Rekha Thomas
Ferdinand Dario and Barb Thompson
Bradley and Dena Thompson
Paul Tseng
Selim Tuncel and Karin Bornfeldt
Nader and Farideh Vakil
Alan and Virginia Van Boven
Lorraine Volpone
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Nancy Williams
Richard and Lynette Williams
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Trina Woo
Gerard Wright
Yeren Xu and Fan Wang
Michael Zimmerman

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