



MATHEMATICS

2008-2009



Prof. Edward N. Wilson Retires As Grand Marshal for Commencement 1995-2008

“With the skills of an accomplished mathematician, Ed helped to facilitate a celebration of enormous scale...”

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A Message of Appreciation To Professor Edward N. Wilson

THE COMMENCEMENT CEREMONY of May 16, 2008 was a day of great celebration for Washington University. Friends and families gathered together in the Quadrangle on a glorious spring morning to celebrate the wonderful accomplishments of our graduates. In a time-honored tradition rich with symbolism and great optimism for the future, new graduates of Washington University listened to the insights provided by the day’s speakers and received commendation and congratulations from our trustees, faculty, and administration.

Commencement is a time when we not only celebrate the past, but also look ahead to a promising future. It is the end of one era, and the beginning of a new one. For Washington University, on May 16, 2008, another significant era came to a quiet close.

Edward N. Wilson, distinguished Professor of Mathematics, after over a decade of service, stepped down from his post as the Grand Marshal for Commencement.

Most will remember Ed for his great skill as a facilitator and orator. His deep, clear, baritone voice presided over the Commencement Ceremonies of thousands of Washington University Alumni. But it was his strong leadership behind the scenes for which I am most grateful. With the skills of an

accomplished mathematician, Ed helped to facilitate a celebration of enormous scale involving complex details and never-ending minutiae—making an intricate process appear effortless to the outside observer. He would take careful notes each year following the ceremony and make needed changes for subsequent commencements. And he accomplished the impossible in St. Louis—Ed presided over 13 May Commencement Exercises and somehow managed to keep inclement weather at bay.

Professor Wilson now becomes an alumnus of a fellowship of valuable Washington University leaders—those who have borne the important responsibility of serving as Grand Marshal for Commencement. On behalf of all of us at Washington University, I extend my most heartfelt thanks to you, Professor Wilson, for serving your University and our graduates. It is in large part due to your steadfast dedication and commitment that each of those graduates will remember their Commencement as the perfect conclusion to their time at Washington University.

Mark S. Wrighton
Chancellor

Letter from the Chair



David L. Wright
Chair, Mathematics Department

WELCOME TO THE 2008-2009 academic year. A number of satisfying events have graced our 2007-2008 year. The Fall 2007 Roever Lectures consisted of a series of wonderfully lucid talks by John Morgan (Columbia) and Gang Tian (Princeton) speaking on the recent solution by Perelman of the Poincaré Conjecture. The Spring 2008 Roever Lecture was given by Yakov Eliashberg (Stanford) in honor of Professor Emeritus Bill Boothby on his 90th birthday. The Taibleson Lecture was given by the venerable Elias Stein (Princeton). Funds were received from our dean for two joint colloquia between our department and the School of Engineering. They were organized by Victor Wickerhauser, Al Baernstein, and Eliot Fried (who had a courtesy appointment with us) of Mechanical, Aerospace & Structural Engineering.

The Rochfest Conference, sponsored by Washington University and the NSF, was held in honor our col-

league Richard Rochberg on his 65th birthday. It was a remarkable success, featuring 16 principal speakers and attracting 80 participants, including a large number of our former graduate students. We congratulate Richard, and thank John McCarthy and Al Baernstein, as well as former students Nicola Arcozzi (University of Bologna) and Zhijian Wu (University of Alabama) for their roles as co-organizers.

During 2007-2008 we were joined by Stefan Richter from the University of Tennessee, who collaborated with Richard Rochberg and John McCarthy, and by Marcus Sundhall, a 2006 Ph.D. from Gothenburg University in Sweden, who worked primarily with Richard. We also had numerous short-term visiting researchers: Eugenio Hernandez (Universidad Autónoma de Madrid, Spain) and Marco Peloso (Politécnico di Torino, Italy) working with Guido Weiss and Ed Wilson; Emilio Musso (Università di L'Aquila, Italy), Lorenzo Nicolodi (Università di Parma, Italy), Rodrigo Montes (Universidade Federal da Paraíba, Brazil), all working with Gary Jensen; Baoxue Zhang (Laboratory for Applied Statistics of MOE, China) working with Nan Lin; and Artur Nicolau (Universitat Autònoma de Barcelona, Spain) working with Al Baernstein.

We graduated four Ph.D.s: Brian Maurizi (McCarthy), who is now Senior Quantitative Analyst for Ameren U.E. in St. Louis, Jeffrey Blanchard (Weiss & Wilson), who became VI-GRE Postdoctoral Fellow, University

of Utah, Lina Lee (Krantz), who took a position at University of Michigan, and Bo Zhao (Weaver). We also had 41 graduating math majors.

After quite an ordeal we were joined in fall 2007 by Roya Beheshti, who works in the field of Algebraic Geometry. When the fall semester began Roya was stranded in Canada awaiting the approval of her visa. She was not able to join us until well into October, so the Algebraic Geometry class Roya was slated to teach had to be covered first by me then by Mohan Kumar. We welcome Roya into our ranks.

Congratulations go to John Shareshian who was promoted to the rank of full Professor in a case that soared through the Dean's committee. John is certainly one of our best teachers and researchers, a fine colleague, and graduate student advisor.

Russ Woodrooffe became our new Chauvenet Instructor this fall. Russ is a 2005 graduate of Cornell who then spent two years in Qatar. He is by now a familiar face around the department, since he joined us as a visitor in the spring of this last school year. Russ is a combinatorialist and group theorist and will be working primarily with John Shareshian. We regret the early departure of Joost Berson, who needed to join his wife Susan in The Netherlands. They are expecting their first child very soon. Joost's stay here was very productive, nonetheless, and quite beneficial to me personally.

We were briefly joined again in

Letter from the Chair *(Continued from previous page)*

the fall by Eugenio Hernandez, of Madrid, who received his Ph.D. here in 1981 under Richard Rochberg and Guido Weiss. It was a pleasure to have Eugenio, and it looks like he may be with us in future fall semesters as well. Also it is good to have back with us former Chair Steve Krantz, who spent the last two years as Deputy Director of the American Institute of Mathematics in balmy Palo Alto, California. Welcome back to wet and humid Missouri.

The External Review Committee conducted their review this past fall. The committee consisted of John Morgan (Columbia), Chair, John Benedetto (Maryland), Jay Kadane (Carnegie Mellon), and internal member Steve Fazzari from Economics. This was an important event which we hope will launch a major program for the replenishment of our department with the advent of upcoming retirements.

Our search for a senior statistician has temporarily been put on hold. I want to thank the appointed search committee comprising John McCarthy (Chair), Ed Spitznagel, Stanley Sawyer, Jeff Gill (Political Science and Director of the Center for Applied Statistics), and Arye Nehorai (Chair of Electrical and Systems Engineering) committee, for the hard work it has already put forth toward this multiyear search.

My role as Chair involves attending periodic meetings with the Chairs of the Natural Science departments.

Such meetings can be rather arid but I must tell you that lately they have been quite stimulating and I have developed a special relationship with my counterparts in the other departments. I mention in particular Ken Kelton of Physics, Joe Ackerman of Chemistry, and Ralph Quatrano of Biology (until recently, as you probably know - if not read on). Ralph has put forward a bold general proposal for an integrative approach to freshman calculus, physics, and chemistry. The idea is in the formative stage and the particulars are still being bandied about, but I think it is an innovative approach that deserves our consideration. I hope to tell you more about this soon and to solicit your views.

Beginning July 1, 2008 we have two new deans. The new Dean of the Graduate School is Richard Smith, who is the Ralph E. Morrow Distinguished University Professor in Arts & Sciences and Chair of the Department of Anthropology. Stepping in as Dean of Arts and Sciences is Ralph Quatrano, Spencer T. Olin Professor and Chair of Biology, who will serve as interim dean until July 1, 2009, when Gary S. Wihl, will take over as dean of the faculty of Arts & Sciences.

It was a pleasure to welcome our nine new graduate students in August. A big thanks to our Graduate Committee headed by Mohan Kumar, who sorted through some 120 applications. (A list of our new students can be found on page 12).

Once again Gary Jensen conducted the special orientation class for our incoming graduate students in August 2008. This proved to be very successful the previous year, as both an academic and social introduction to doing graduate work in mathematics.

As always, I want to thank and compliment our office staff for continuing to make the department run smoothly. Shar, Mary Ann, Corine, and Marie, you are all wonderful and you make my job so much easier. I am also pleased to welcome Leslie Smith who joined our department's office staff last November. Also, I want to recognize and thank our computing manager Steven Xiao, who continues to manage our computer systems, and our undergraduate coordinator Blake Thornton, for continuing to go beyond the call of duty in many ways to make our curriculum run smoothly. Marie's duties have now changed to take on management of our website and the ordering of textbooks. Congratulations to former staff member Sara Quigley and her husband Chad on the birth of their son Jack last June. (Please see "Farewell to Sara Quigley on page 16).

On a personal note, I spent Christmas in India, where I gave an invited talk at the Conference on Affine Algebraic Geometry in Bangalore. (Oh the things we do for mathematics). This was the second Christmas I've spent in India. I saw former Chauvenet Instructor G. V. Ravindra who has returned to St. Louis to take a tenure track position at UMSL this spring.

2007-2008 William H. Roever Lectures

"It will be quite a special event and the chance of a lifetime to have two of the world's experts on the subject do their best to explain it to us in four hours or so."

One of the most famous problems in mathematics was discussed at the Fall 2007 William H. Roever Lectures in Geometry, a two-day event hosted by the Department of Mathematics in memory of its longtime chair.

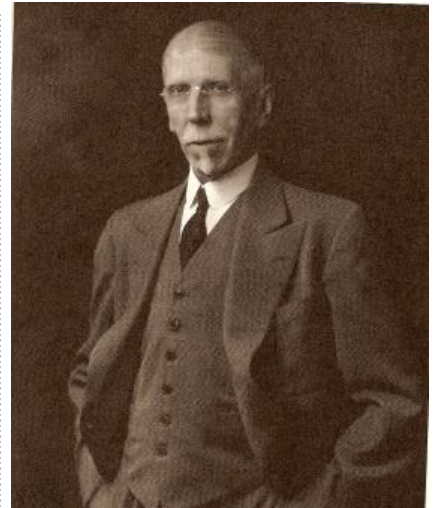
Free and open to the public, the lectures were a series of four talks held Oct. 19-20, 2007 in Lopata Hall on the Danforth Campus. The topic: the solution of the famous Poincaré Conjecture. John Morgan, Ph.D., professor of mathematics at Columbia University, and Gang Tian, Ph.D., professor of mathematics at Princeton University, gave these lectures based on their recently published book, "Ricci Flow and the Poincaré Conjecture."

The book gives a detailed exposition of the solution posted as manuscripts on the Web server arXiv in 2002 and 2003 by the Russian mathematician Grigory Perelman. The conjecture, named after French mathe-

matician Henri Poincaré (1854-1912), states that a three-dimensional manifold with the homotopy of the sphere is the sphere. Or, stated differently: in three dimensions, any space that has the geometry of a sphere actually is a sphere. Poincaré posed the question in 1904, but it only has been in the past four years that an offered solution has survived the scrutiny of the experts.

WU Mathematics professor and host of the Roever Lectures, Professor Gary R. Jensen said of the lectures, "It will be quite a special event and the chance of a lifetime to have two of the world's experts on the subject do their best to explain it to us in four hours or so."

The program began on Oct. 19 as Prof. Morgan delivered the first lecture, "The Poincaré Conjecture and the Geometrization Conjecture." Prof. Tian gave the second lecture titled, "Singularity Development in Finite Time." On Oct. 20, Morgan started off with "Ricci Flow with Surgery" followed by Tian's lecture, "Completion of the Proofs."



William H. Roever

The William H. Roever Lectures in Geometry were established in 1982 by his sons William A. and Frederick H. Roever and members of their families. It is a lasting memorial to their father and is a continuing source of strength for the mathematics department, which owes so much to his long career.

For more information on the Roever Lectures, please check:

<http://www.math.wustl.edu/roever.html>

Article adapted from the "Record" 10/11/07 article titled "Roever Lectures to explain famous mathematical problem: Sometimes a sphere is just a sphere" by Tony Fitzpatrick



FALL ROEVER BANQUET: **Front (left to right):** Lisa Roever, Douglas Roever, Anne Roever, Jen Jensen, Prof. Gang Tian (speaker). **Back (left to right):** Pro. John Morgan (speaker), Prof. Gary Jensen, Su-Mei Chi, Prof. Quo-Shin Chi, Chair David Wright, Sandi Wright

On the evening of October 19, 2007, the speakers and participants of the Fall Roever lectures enjoyed a grand banquet organized by Professor Quo-Shin Chi at the Mandarin House Restaurant. William H. Roever's great grandson Douglas Roever and his wife Lisa came from Cincinnati to attend the lectures. They were joined at the banquet by their Aunt Anne Roever, whose father Fred Roever, established the endowment for this valuable lecture series.

Please continue to "Professor Boothby" on page 6 for the Spring '08 continuation of the Roever Lecture Series.

Faculty Spot



CHAUVENET LECTURER

Russ Woodroffe received his Ph.D. from Cornell University in 2005, with Ken Brown. He was a visiting scholar in our department in Spring 2008. Before that, he spent 2 1/2 years teaching pre-medical calculus in the State of Qatar. His research interests include

combinatorics, group theory, and the interplay between the two. He is especially interested in the topological combinatorics of the subgroup lattice. At various times, Russ has been a volunteer firefighter, a rock star, and a seeker of the perfect taco; but just now he is focused on taking part in the Washington University Mathematics Department.

FORMER CHAUVENET LECTURER JOOST BERSON WRITES:

The 2008 spring semester was my last semester at Wash.U. Although the 18 months that I spent here went by very fast, this has been a great experience. First, I needed to get used to the teaching style. I'm not only talking about the amount of work in making the webwork and all the exams, but also about the course material. When I myself was a freshman, everything we saw was proved in class, and this was always the focus of the courses. But I must say that I can now also see the benefits of the "method-teaching" that's being practiced here in lower division undergraduate teaching. And the interaction with undergraduate students was really fun! I greatly enjoyed this department as a workplace, and being around wonderful and enthusiastic people.



Prof. Joost Berson & wife Susan

I really need to thank David here, for inviting me for this position, for providing me with his great former office, and for his warm hospitality! Although his chair responsibilities took a lot of his time, we did some great things together. David and Mohan: I wish we could have had more time for interesting discussions, but I really enjoyed your company (including the occasional drinks in Blueberry Hill)! I would like to thank everyone in the Math Department, faculty and staff. It has been great working with you! I will also never forget the valuable time spent with my Scandinavian friends, and with the grad students. I will always remember all the awesome parties. All in all, I felt very welcome here, and my stay was an unforgettable one!

Department of Mathematics Faculty 2008-2009

CHAIR AND PROFESSOR

David Wright

ELINOR ANHEUSER PROFESSOR OF MATHEMATICS

Guido Weiss

PROFESSORS

Albert Baernstein, II

Quo-Shin Chi

Renato Feres

Ron Freiwald

Gary R. Jensen

Steven G. Krantz

N. Mohan Kumar

John McCarthy

Rachel Roberts

Richard Rochberg

Stanley Sawyer

John Shreshian

Edward Spitznagel

Nik Weaver

M. Victor Wickerhauser

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Roya Beheshti

Jimin Ding

Nan Lin

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WILLIAM CHAUVENET LECTURERS

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ADJUNCT INSTRUCTOR

Jonathan Corbett*

COORDINATOR OF LOWER DIVISION TEACHING

Blake Thornton

PROFESSORS EMERITI

William M. Boothby

Lawrence Conlon

James A. Jenkins

Robert H. McDowell

A. Edward Nussbaum

*New in Fall 2008

Professor Boothby

by Professor Renato Feres

In April the Mathematics Department helped to celebrate the 90th birthday of Professor Emeritus William M. (Bill) Boothby. The celebration was held in conjunction with the 2008 Roeber lecture by Stanford Professor Yakov Eliashberg on April 10. Professor Eliashberg spoke on “Symplectic geometry of affine complex manifolds,” a topic closely related to Professor Boothby’s long-time research interests in the field of contact geometry.

A dinner at Whittemore House honoring both Professors Boothby and Eliashberg was held after the lecture. Attendees included Bill’s wife Ruth, their son Tom, and Professor Peter Kokotovic, a

long-time close friend of the Boothbys who is now on the faculty of the University of Santa Barbara. At the dinner, congratulatory letters were read from many of Bill’s friends and former Ph.D. students.

Professor Boothby received his Ph.D. from the University of Michigan in 1949. After serving on the faculty of Northwestern University, he joined the Washington University Mathematics Department in 1959. He later enjoyed visiting appointments at the Institute for Advanced Study and the University of Strasbourg. Bill’s joint work with H.C. Wang on homogeneous contact manifolds received widespread recognition among differential geometers. His book “An Introduction to Differentiable Manifolds and Riemannian Geometry” was quickly adopted as a graduate text



Prof. Bill Boothby
Washington University



Prof. Yakov Eliashberg
Stanford University

by many institutions and has been heralded for the clarity of its exposition and numerous illuminating examples and problems. In the 1970s, Bill became interested in geometry questions arising from systems science. He continued to work in this field for many years and was awarded a joint appointment in the Department of Systems Science and Mathematics. He retired from the University in 1988.

Wavelet Activity

There is considerable activity in the area of wavelets in our department. Professors Guido Weiss and Edward Wilson are Principal Investigators of two grants that support this activity. One is an NSF grant that involves collaboration between our department and the Mathematics Department of the University of Zagreb in Croatia. This grant supports two workshops per year, one here and another in Croatia. In addition, it funds visits to Zagreb by members of our department’s wavelet group and visits to St. Louis from members of the University of Zagreb.

The other grant supports “Illinois-Missouri Applied Harmonic Analysis” (IMAHA) seminars. It is also supported by the Institute for Mathematics and its Applications (IMA). Professors Weiss and Wilson, along with Professor Rick Laugesen, of the University of Illinois at Urbana-Champaign, are Principal Investigators. IMAHA supports two

meetings during an academic year and allows us to invite well-known investigators in the wavelet area that are from areas outside the Illinois-Missouri neighborhood.

The grants and funding from our department have helped Weiss and Wilson form a very active group of researchers that work together and participate in our Wavelet Seminar that takes place each Friday during the academic year. This group included, in the 2007-8 academic year: E. Hernandez, D. Labate, M. Nielsen, H. Sikic, S. Xiao, B. Currey, B. Johnson, D. Speegle (St. Louis University), M-S Song (SIUE), K. Guo (Southwest Missouri State). Occasionally members of the University of Missouri-St. Louis and short term visitors would attend the seminar. R. Houska (who is finishing his Ph.D. requirements with Weiss and Wilson) also spoke in and attended the wavelet seminar.

Weiss and Wilson collaborated with members of this group and also mentored

two undergraduate students, Jon Swenson and Justin Gilmer, who were engaged in wavelet research.

Other activities of Weiss and Wilson include talks presented at the University of Zagreb, a colloquium talk by Wilson, and a talk in the above mentioned workshop by Weiss. In September 2007, Professor Weiss presented three one hour talks in a meeting sponsored by the Technischen Universität München: New Trends and Directions in Harmonic Analysis, Approximation Theory, and Image Analysis. He was one of five such speakers. His lectures will be included in a book published by Birkhauser titled, “Short Courses in Harmonic Analysis.” The meeting was attended by 60 mathematicians from all over the world.

In June 2008, Weiss was an invited speaker in the “El Escorial Meeting in Spain” sponsored by the Universidad Autónoma de Madrid.

Our Joint Colloquium with MASE

by Professor M. Victor Wickerhauser

In August 2007 former Department of Mechanical, Aerospace, and Structural Engineering (MASE) Professor, Eliot Fried, proposed a series of four talks on matters of mutual interest to him and some of us in the Mathematics Department. As the colloquium chairman, I had the happy duty of agreeing to this and helping to pick the speakers. Part of the pleasure stemmed from the large overlap between Eliot's interests and mine. Most of the speakers he proposed were outstanding investigators in fluid dynamics. That field is hot in part because of the Clay Mathematics Institute's Millennium Prize of one million dollars, offered for settling the question of existence and smoothness of solutions to the Navier-Stokes equation of fluid flow.

Step One was to secure funding for this extraordinary colloquium series. A letter was sent to former Dean Macias (Arts and Sciences, our home college) and Dean Sansalone (Engineering and Applied Science, home of MASE), asking for extra funds. Dean Macias said yes to two speakers, and Chairman Kevin Truman of MASE offered to support one. Eliot agreed to speak for free, and so we were set.

Step Two was to invite the speakers. Even though the money was pledged in early October, all of the invitees were committed through the Fall semester. Scheduling was also complicated by the richness of our own Spring colloquium schedule, and by the various obligations of the invitees. It was agreed that all talks would be in our Kirk Seminar Room (Room 199). Two of the talks were shoehorned into the regular collo-

quium schedule on Thursdays, one was granted the Analysis Seminar's time on a Monday, and one got the Wavelet Seminar's Friday slot.

Professor Fried spoke first, on Saint Valentine's Day (Feb. 14th, 2008). His recent work on a generalization of the Navier-Stokes equation lent itself to an introductory first half-colloquium on fluid dynamics, followed by an illuminating discussion of the engineer's perspective. The Millennium Prize will be awarded for a solution modeling flows without any boundaries, whereas most practical problems involve walls or obstacles which induce turbulence. A first stab at including such features is to add some parameters describing their size, called "characteristic scales," then seeing how the vorticity of the flow changes as these parameters are varied. Rather than worry about existence and uniqueness for his more complicated model equations, which are probably million-dollar questions in themselves, Eliot performs direct numerical simulations of the resulting flows and compares the results with experiments.

In her 1997 dissertation, my first Ph.D. student Suzanne Tourville showed existence and smoothness of solutions to another modification of the Navier-Stokes equation, one used in experimentally-verified two-dimensional numerical simulations of turbulence in the Earth's atmosphere. It may be just a matter of time before someone tackles Eliot's equations in this way, as we are drawn to understand completely all equations that describe Nature well.

Professor Peter Constantin, of the University of Chicago Mathematics Department, gave the second colloquium on February 25th, 2008. His title, "Some mathematical problems related to complex flu-

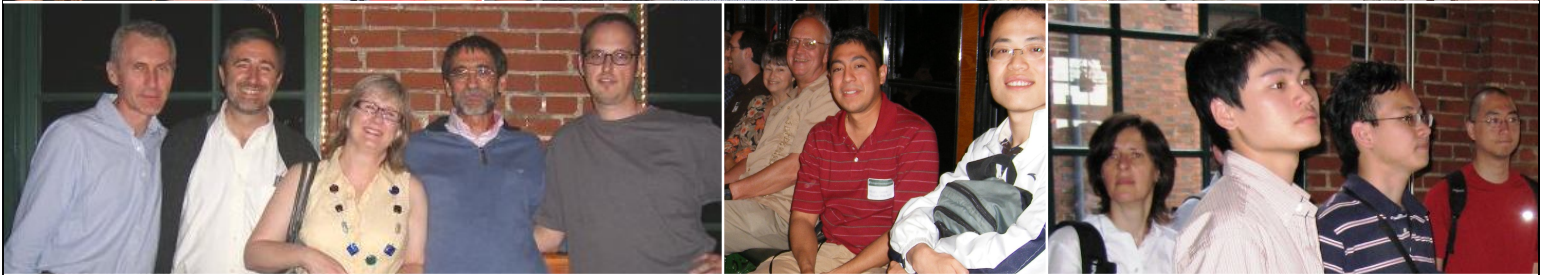
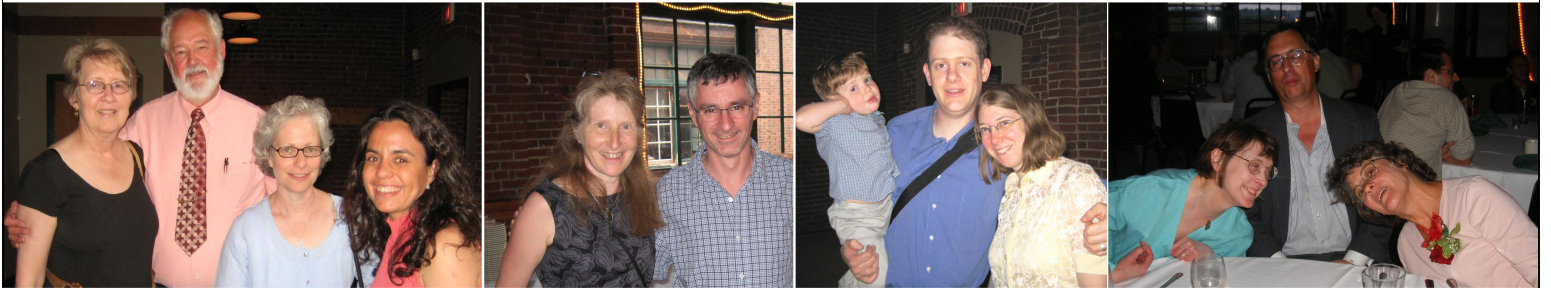
ids," hid the deep connection with Eliot's talk, namely that he was considering a generalization of the Navier-Stokes equation to cases where the fluid is transporting interacting particles. Two such generalizations are the Onsager equation and the coupled Fokker-Planck equations, and both are used to predict how chemical reactions influence fluid flows. Think rockets, jets, and internal combustion engines, plus chemical plants of all sorts. The complete mathematical solution of such equations is beyond us, so the talk focused on their derivation from physical principles and some discussion of what we can prove. Some of our university colleagues, such as Professor Milorad Dudukovic in the Chemical Reaction Engineering Laboratory (CREL), are devising experimental methods that can test numerical predictions from such model equations. When the dust settles, we will have another huge source of dissertation problems in fluid dynamics.

Professor Fabian Waleffe, of the University of Wisconsin Department of Mathematics and Department of Engineering Physics, gave the third colloquium on March 7th. His answer to his title question "What is fluid turbulence?" focused on some particular solutions to the Navier-Stokes equation found through the inspiration of numerical simulations. He presented videos showing the time evolution of zero-velocity level surfaces for numerically simulated flows between two plates moving in opposite directions. Think of oil preventing friction between moving parts. As turbulence develops, these level surfaces curl up in visually interesting ways, but what is more important is that these surfaces

(Continued on page 10)



ROCHFEST 2008

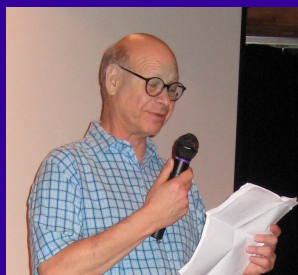


"Function Spaces and their Operators" Conference

Hosted by the Washington University Department of Mathematics

May 29-31

A Conference in honor of
Professor Richard Rochberg's
65th birthday

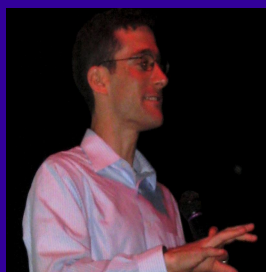
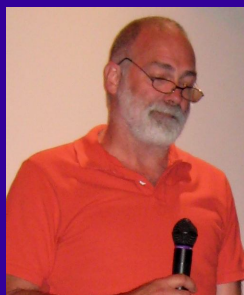


by Professor Al Baernstein

On May 14, 2008 Professor Richard Rochberg turned 65 years old. To celebrate this occasion, the Department organized a conference focused on his research, entitled "Function Spaces and their Operators." The conference took place at Wash U on May 29-31. It featured fourteen 50-minute lectures by analysts from Italy, Israel, Czech Republic, Canada and the USA, and also a panel discussion on future trends in analysis. Funding was provided by the National Science Foundation and Wash U.

In addition to the rich scientific program there was also a lively evening social program: on May 29 Nan and Richard hosted a beautiful party at their home to which all conference participants were invited. The next night, a marvelous conference banquet was held at the Schlafly Tap Room.

Approximately 100 persons attended, a number of whom- colleagues, collaborators, and family- provided testimonials and fond reminiscences of Richard.



are relatively simple compared to the complete solution of the Navier-Stokes equations. One can answer the vague question, "is the flow turbulent?" quite precisely and with good agreement with our native intuition by specifying types of these level surfaces.

My collaborations with Professor Marie Farge of the École Normale Supérieure in Paris, and two students from École Polytechnique who visited Washington University as stagieres, had a similar goal. We assigned a number, the "theoretical dimension" of a turbulent flow, by counting the large-amplitude discrete wavelet components of the vorticity field as a proxy for vortices. Above a certain number, we could assert that the flow was turbulent, in good agreement with intuition.

Theoretical dimension appears to decrease with time in Navier-Stokes flows due to energy dissipation and the breakup of large vortices. Although this suggests a way to prove global existence, it proved intractable to compute in general and we settled for publishing the method as an aid to computation. Professor Irene Fonseca of the Center for Nonlinear Analysis at Carnegie Mellon University gave the final colloquium of the series on April 17th, 2008. She departed from the Navier-Stokes-and-generalizations theme and spoke instead on variational methods for computing the shape and other properties of foams. At equilibrium, foam minimizes energy coming from surface tension and other molecular interactions, such as those due to surfactants like soap. In this situation, all is still and there is no flow velocity or vorticity to predict, even though the ma-

terial being modeled is a mixture of fluids. The problem is to use chemistry to predict shape and density, solving partial differential equations derived by way of the calculus of variations. Similar variational methods are used to improve digital images corrupted by noise, or random errors in pixel values. The effect depends on the functional being minimized, and Professor Fonseca discussed her own favorite choices. Once again, we were treated to some nice videos on the Room 199 data projector. One of the benefits of organizing colloquia is enjoying dinner afterwards in the company of the distinguished speakers. We patronized Seki's and Riddles in the Loop, Michalis' in Dogtown, and the Whittemore House. We came away sated, refreshed, and reassured that the supply of interesting mathematical problems inspired by fluids will never dry up.



Mathematics around the world

Professors Guido Weiss and Ed Wilson were in Zagreb, Croatia from March 9 through March 17. Their trip was part of the ongoing collaboration

between the Washington University wavelet group headed by Guido and Ed and the Croatian wavelet group headed by Hrvoje Sikic. Also attending the gathering in Croatia was Ilya Krishtal, formerly a post doc at Washington University and now on the faculty of Northern Illinois University and Leo De Michele from the University of Milano in Italy. Ed gave a Colloquium lecture for the Zagreb Mathematics Department. Guido and Ilya presented lectures in the Zagreb Analysis Seminar.

Ph.D. Candidate Brian Maurizi writes: Me and Krista (his fiancée) took a 3 week trip to India over winter break, and saw all sorts of crazy things, including: the Taj Mahal; a backwaters tour on a canoe where we saw nutmeg and pepper trees and rope-making; the "pink city" Jaipur and its palaces, forts,

and kite enthusiasts; a New Years Day parade in southern India, complete with elephants; lots of camels, cows, pigs, dogs, cats, goats, everywhere, and; Sooraj's wedding at the home where he grew up in Calicut!

Professor M. Victor Wickerhauser's Visit to the Norbert Wiener Center:

For the past three years, the Norbert Wiener Center for Harmonic Analysis and Applications at the University of Maryland has sponsored a conference called the February Fourier Talks, or FFT, in homage to the common acronym for the fast Fourier transform. Professor John Benedetto is the director and organizer, but it turns out that my student Wojtek Czaja (Ph.D. 2000) provided the initial inspiration during his first stay there as a postdoc from 2002-2004. Wojtek left for Wroclaw and Vienna, got married, had a baby daughter, wrote 18 papers and a couple of books, and now is back at Maryland. He and John invited me to give the colloquium talk at the end of the 2008 February Fourier Talks, and I gladly accepted this honor.

Mathematics around the world (Continued from previous page)

FFT 2008 was a Thursday-Friday affair, from February 21-22. Leo Grady of Siemens Corporation gave a fantastic talk on Thursday Morning. Grady has written a segmentation algorithm for images and volumes based on random walks. With a computer mouse, he designates a few points that are inside (red) and others that are outside (blue) of a region to be outlined automatically. His program then computes the red-hitting probability for an inhomogeneous random walk starting at each pixel, slowed by a potential function that is big where the image has edges. All pixels with red-hitting probabilities greater than $1/2$ are also marked as red. The level set at $1/2$ thus outlines the region.

The genius of this idea is that the probabilities are solutions to a Dirichlet problem for the Laplace equation on the complement of the initial red and blue points, where the red boundary values are 1 and the blue boundary values are 0. That follows from a deep connection between random walks, or Brownian motion as first explained by Einstein, and the harmonic functions that solve Laplace's equation. Shizuo Kakutani saw this connection in the 1940s, and I had the privilege of learning it directly from him as a graduate student in the 1980s. There are good fast numerical methods for solving the Dirichlet problem, and Grady's algorithm produced a segmentation almost instantly even on the ancient laptop he brought to the conference.

I was stoked by this excellent application of a profound idea, and also by the strong coffee that flowed nonstop outside the lecture hall. It was also stimulating to get reacquainted with old friends, and in many cases their students as well. Demetrio Labate came north from UNC for this conference, but spent much of his time working on a paper with one of the other attendees.

I had lunch with Jon Sjogren at an Anglo-Indian buffet called "Tiffen." Jon is with AFOSR and sponsors some of the research discussed in the talks. Also with us was Professor Birsen Yazici, who had moved from sunny Istanbul to frozen Rochester, NY to study radar as a mathematician in an electrical engineering department.

The last talk on Thursday was by Professor Peter Lax of the Courant Institute. The younger speakers earlier in the day had prepared elaborate computer presentations, but Professor Lax hand-wrote his lecture on overhead transparencies. He

writes more legibly than most, though. He gave a delightful false proof of a true result, based on the argument that $f(x)=1/x$ is "almost" integrable at zero and at infinity. Harmonic analysis is full of such things, intuitively appealing but insufficient arguments --- "hogwash," in Lax's words. Lax then gave a correct proof, only slightly more technical than the hogwash to anyone familiar with interpolation in function spaces.

After Professor Lax's talk there was a talk by Peter Carr of Bloomberg and the Courant Institute, on financial mathematics, aimed at a general audience. I learned that investment banks prefer to hire people with Ph.D.s in mathematics or physics over those with M.B.A.s.

There was a banquet after Carr's talk featuring a selection of sausages ("Norbert wieners") and other dishes from all over the world. This was sponsored by several companies that have an interest in applied and computational harmonic analysis. We ate under the dome of the Maryland Mathematics and Physics building, a spot that once featured a four-story-high Foucault pendulum. The pendulum was removed some time ago, in part because it was a magnet for fraternity pranks like "riding the pendulum."

My colloquium was the last talk of the conference, but the room was packed. Peter Lax was in the front row with John Benedetto and Serguei Novikov, and hosts of graduate students filled the middle and back of the room. I was glad I had spent a little extra time preparing my lecture. It would be cruel to force the audience to read my handwriting off transparencies. My current practice is to place the graphics in a PDF file on my web site, in this case <http://www.math.wustl.edu/~victor/talks/nlift.pdf> and then download it to a computer in the lecture room. That way there is nothing heavy for me to carry or scary for airport security.

My talk began with a tutorial on Sweldens and Daubechies' lifting scheme for wavelet transforms, then went on to discuss my student Wei Zhu's results on "nearest neighbor" implementations. It concluded with my confession that one of the original advantages of nearest neighbor transforms, namely the reduction of costly fetches from distant memory, has been rendered less important by improvements in computer hardware. However, it is still much easier to handle boundary conditions when writing software based on nearest neighbor algorithms. (The audience murmured sympathetically).

Graduate News

Haley Abel
Jeffrey Battaglia*
Kelly Bickel*
Joe Bohanon
Josh Brady
Robert Brieler
Jonathan Browder
Timothy Chumley
Scott Cook
Wei Deng
Michael Deutsch
Marina Dombrovskaya
Chunlin Fan
Sara Gharahbeigi
James Gill
Adam Hafdahl
Michael Hamm
Michael Brad Henry
Robert Houska
Xiao Huang
Jeffrey Langford
Andrew Lewis
Qing Li
Yonhow Larry Lin
Hien-Haw Liow*
Tim Lott
Benjamin Manning
Bailli Min
Raphael Murden*
Jasmine Ng
Safdar Quddus
Brady Rocks*
Emily Ronshausen
Nic Sedlock
Bennett Standeven
Matthew Wallace*
Jia Wang*
Qingyun Wang*
William Ward*
Andrew Womack
Ruibin Xi
Ji Yan
Lin Yan
Wei Zhu

*New in Fall 2008

Welcome Note



Prof. N. Mohan Kumar

ON BEHALF OF THE MATHEMATICS DEPARTMENT, I welcome the first year graduate students to our graduate program. I hope that you find the department and its various activities enjoyable and satisfying. I have always found the students and faculty a very closely knit group and hope you will strengthen the group further.

I wish you the very best in your new venture and remember that all of us are here to help you achieve your dreams and goals. I welcome the returning students back into the fold and hope you have had a fabulous summer. I request you to take our fresh graduate students into your fold and teach them the ropes as and when necessary. Wish you all a very successful and scholarly academic year.

Professor N. Mohan Kumar
Graduate Chair

2008-2009 New Graduate Students

Jeffrey Battaglia, Florida A&M University
(Advisor: Professor Nik Weaver)

Kelly Bickel, Centre College
(Advisor: Professor Guido Weiss)

Hein-Haw Liow, USTC
(Advisor: Professor Xiang Tang)

Raphael Murden, Morehouse
(Advisor: Professor John Shareshian)

Brady Rocks, NMSU
(Advisor: Professor Rachel Roberts)

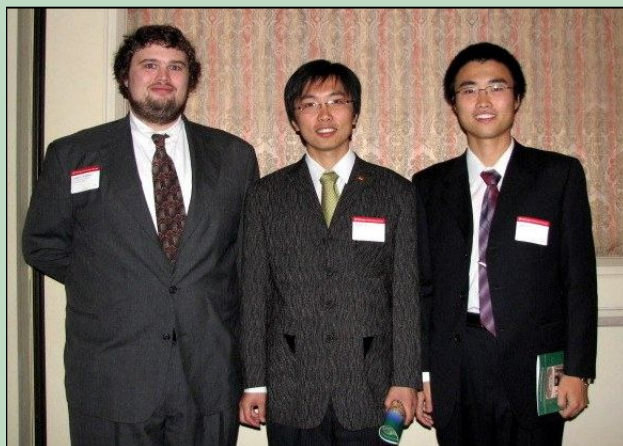
Mathew Wallace, Saint Louis University
(Advisor: Professor Victor Wickerhauser)

Qingyun Wang, China Agricultural University
(Advisor: Professor Rachel Roberts)

William Ward, Stamford University
(Advisor: Professor Xiang Tang)

Jia Wang, Zhejiang University
(Advisor: Professor Rachel Roberts)

Judith Ross 2007-2008 Scholarship



SCHOLARSHIP RECIPIENTS: (Left to Right:) A. Womack, R. Xi & Q. Li

Ph.D. candidates Andrew Womack, Ruibin Xi and Qing Li were named the 2007-2008 recipients of the Judith Ross Scholarship in Mathematics & Physics. The donor, Mrs. Judith Ross, is deceased but this scholarship continues to exist through the donor's support and the support of family and friends. Our recipients attended a reception and dinner at the Ritz-Carlton Hotel on October 11, 2007 to celebrate their accomplishments.

The following students received M.S. degrees during the 2007-2008 academic year.

Spring 2008 Master's:

Joseph P. Bohanon

Robert A. Brieler

Adam S. Fiddler

Sara Gharahbeigi

James T. Gill

Robert Houska

Xiao (Emma) Huang

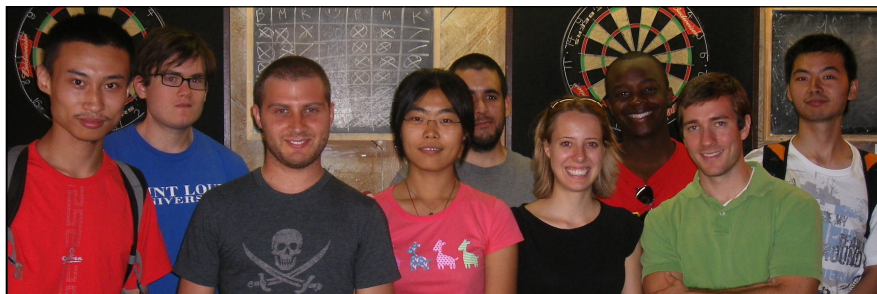
Jeffrey J. Langford

Andrew M. Lewis

Joseph J. Marincel

Baili Min

Brady L. Ng



NEW GRADUATE STUDENTS AT MATH ORIENTATION LUNCH MEETING: (Front, left to right): H-H. L. J. Battaglia, J. Wang, K. Bickel, W. Ward (Back, left to right): M. Wallace, B. Rocks, R. Murden, Q. Wang

PROSPECTIVE GRADUATE STUDENTS VISITED the Mathematics Department during one of our two day orientation sessions in March 2008. The students attended an orientation program, sat in on classes, met with faculty in their mathematical areas of interest and went on a tour of the campus. This year we had 10 prospective visitors and we received over 125 graduate applications for Fall 2008.

Undergraduate Studies

Director of Undergraduate Studies, Professor Ron Freiwald writes:



Prof. Ron Freiwald

THE DEPARTMENT GRADUATED a total of 41 majors (13 female, 28 male) during the 2007-2008 academic year. This constitutes the largest group in at least 15 years.

This year, the majors following the probability/statistics track were clearly the largest group (25). There were 8 majors in the traditional track and 7 in the applied track.

Here are some additional facts about this year's class: 31 had a second major (3 completed a third major as well); 2 majors simultaneously completed an AM in mathematics (and in addition, 2 others earned master's degrees in other areas); 12 (29%) graduates were entering some kind of graduate/professional school in fall 2008 (two of these were in mathematics); 4 more intended to enter a graduate program (2 in math) after taking a year off doing something else.

Two of the May graduates entered Ph.D. programs in mathematics in fall 2008: Joe Marincel (Michigan) and Eric Wofsey (Harvard). In addition, May 2007 graduate Erik Carl is entering a Ph.D. program at UCSD after taking the past year off.

Several 2007-2008 majors are entering other graduate programs: chemistry (Wisconsin), economics (Cornell, UCLA), medical school (SIU), MBA/MS (Chicago), education (Stanford), public health & social work (Michigan), and finance (Duke).

Others landed jobs with companies including McKinsey & Company Consulting, Susquehanna International Group (SIG), International Marketers Combination (Chicago), Analysis Group (Boston), DE Shaw Group, Lehman Brothers, Merrill Lynch, Buck Consultants, DC Energy, Epic Systems, Jones Lang Lasalle (NY), in addition to Teach for America and a job teaching English for a year in China.

Two majors graduated with Latin honors degrees, summa cum laude. Their honors theses were titled: "Polygonal Billiards and Markov Chains" (Brian Garnett, advised by Professors Renato Feres and Al Baernstein) and "On the Algebraic Topology of Finite Spaces" (Eric Wofsey, advised by Professor John Shareshian).

The recipients of this year's departmental awards were:

Ross Middlemiss Award

Justin Gilmer

Joseph Marincel

Eric Wofsey

Martin Silverstein Award

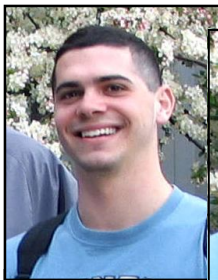
Stuart Webb

Putnam Prize

Eric Wofsey



Congratulations to math competition teams!



A. Brodie



J. Diepenbrock



A. Cloninger



E. Wofsey



I. Konfisakhar



H. Wang



J. Gilmer

Putnam Competition

The William Lowell Putnam Mathematical Competition was held on Saturday, December 1, 2007.

This nationwide competition consists of a 6 hour exam (12 problems). Students take the exam as individuals. Three of the students are designated ahead of time as the school's team, and the team score is the sum of their individual scores.

Congratulations to The W.U team
(Jeremy Diepenbrock, Huajia Wang, and Eric Wofsey)
which ranked 12th
(out of 413 teams from the United States and Canada).

Participants are also assigned individual ranks.
Congratulations to senior Eric Wofsey who placed
in the top 100 (out of 3753 contestants).

WU student results also included:

- 1 additional major in the top 200
- 1 additional major in the top 300
- 1 additional major in the top 400, and
- 9 additional majors at various levels
among the top 1000.

In the competitions from 1976-2007,
Washington University teams have placed in the "top ten"
in 19 of 32 competitions, including eleven
"top five" performances.

Missouri MAA Collegiate Mathematics Competition

The 13th Missouri MAA Collegiate Mathematics Competition was held Thursday/Friday April 17-18, 2008, on the campus of Missouri State University (Springfield, MO). Congratulations to our teams which took both first and second place:

First Place WUSTL Team B:

Alon Brodie, Igor Konfisakhar, and Huajia Wang

Second Place WUSTL Team A:

Alex Cloninger, Jeremy Diepenbrock, and Justin Gilmer

A total of 36 teams from across the state, representing 15 colleges and universities, took part in the competition.

The contest consisted of two sessions, each with 5 problems, lasting two and a half hours.

WU teams have earned a total of 7 first places and 9 second places in the this competition since it began in spring 1996.

Next year's Missouri MAA Competition will be held on the campus of Truman State University in Kirksville, MO.

Alumni News



'60 Undergraduate Major Bob & Wife Maxine Scheibe

The Mathematics Department has been reacquainted with two loyal friends who have for many years been committed to the enrichment of Washington University: Dr. Bob Scheibe, a 1960 undergraduate math major, and his lovely wife Maxine.

Bob has retired as an attending urologist at Missouri Baptist Hospital and Maxine has been a psychotherapist in the past.

Proud and loyal members of our university community, the Scheibes can be found attending lectures throughout campus on topics from religion, art, literature, language and philosophy- not to mention science and mathematics. Bob grew up in Webster Groves in an environment filled with art. His father was interested in classical music and collected records. His mother exposed him to acting, instruments, symphonies and art museums. Bob believes that it is very important to learn about things beyond the sciences. Maxine grew up in a small farm community in Illinois. She moved to St. Louis to pursue an education in nursing. Although they both lived in St. Louis, Bob and Maxine met in Aspen in a St. Louis ski club through mutual friends.

When asked what he recalls about his undergraduate experience as a math major, chuckling, Bob said that math students are a "breed of their own," as he remembered always forgetting his pencils. And as an "oldie but goodie," he recommended that our mathematicians think back to the days of the "slide rule." According to Bob, math students would carry this instrument around campus as a status symbol.

Recently, Bob has had a revived goal to awaken passion for mathematics, a field he believes seems to get so little public glory. Thanks to this desire, Bob and Maxine have attended several of our departmental functions this past semester. Those of us who have had the pleasure of meeting them have very quickly been drawn to their warmth, humor, humility, and sincerity as it becomes obvious that the Scheibes are passionate about giving and sharing with others. It is also amusing to learn that Maxine does not share the same passion that Bob has for mathematics, "I find it boring," she says. Her tolerance of mathematics can be attributed to the Scheibe's genuine commitment to the cultivation of well-rounded individuals.

One thing that all who love math have in common is that they all find beauty in mathematics. Although the words "beauty" and "mathematics" in the same sentence would confuse a non-mathematician, Bob defines beauty as "something you really enjoy." Mathematics through Bob's eyes is like abstract art and mathematicians are the private and reflective craftsmen who, working alone, use their tools to make patterns of great beauty. Luckily, Bob won't have to be alone in his world of mathematics as he will always have Maxine to keep him balanced.

We look forward to seeing the Scheibes at many of our future mathematics activities.



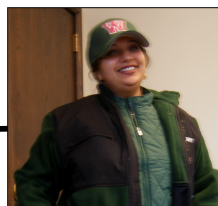
Sara, her husband Chad, & Baby Jack

Farewell to Sara Quigley

It is with sadness that we say goodbye to staff member Sara Quigley. Sara left the Mathematics Department last October in order to be at home with baby Jack, who was born last June. She has not left the Washington University community, however, as she has taken a part-time position with the Sam Fox School of Design & Visual Arts.

Sara served our department with distinction for 4 years, during which time she took on greater responsibilities, eventually being in charge of undergraduate duties as well working on budgetary and visa matters.

Sara has been a positive and uplifting influence in the office and throughout our department. We will miss her very much, and we certainly wish her well.



'02 Undergraduate Major Adam Marcus Writes:

I just wanted to write and update you on how things have gone. I will be graduating from Georgia Tech this August 2008 with my Ph.D. and I have accepted a position as a Gibbs Asst.

Prof. in Applied Mathematics at Yale.

Coincidentally, this is the same position that Phil Gressman (with whom I stayed when I came to visit as a Compton finalist) is just finishing (though his appointment was in the "proper" math department).

I am also excited to let you know that I have been chosen among all junior researchers as the first recipient of the Konig Prize in Discrete Mathematics. The official announcement (and a link to the details, like what "junior researcher" means) is here: <http://www.siam.org/meetings/dm08/>.

I hope you will share in these honors with me, as I am proud to say that Wash U provided the basis for my mathematical career.

Sincerely, Adam Marcus

Thank You

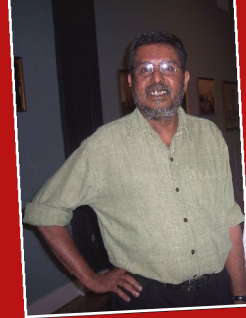
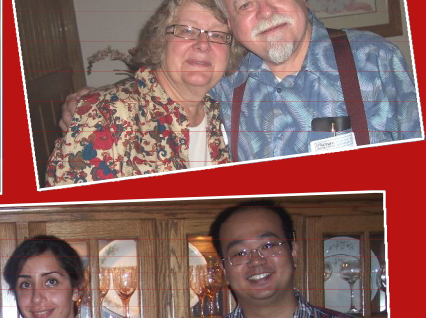
The Department of Mathematics would like to thank Diana Bose and Leslie Smith-Moreland for temporarily joining our math office staff during the summer and part of the fall of 2008. We want to thank them for their good work and hospitality during their time with us. Their assistance helped keep the Mathematics Department running smoothly.

We would also like to welcome Leslie who officially became a permanent member of our staff last November.

Leslie worked as an administrative assistant at the St. Louis Community College Forest Park Art Department from 2002-2007.

Leslie joins us as our new receptionist and she will be taking over the publishing of our departmental newsletter starting in the fall.

Welcome Leslie!



Washington University Math & Teacher Circle



Math Circle

This last year was our 6th year of the Washington University Math Circle. Math Circles is a program for middle school students who enjoy mathematics and are looking for more. We want to help students develop their problem solving skills while seeing new and interesting mathematics. Our approach is to engage the student with discussion, participation and interaction.

This past year was one of our most successful years with an increased attendance and increased interest. Our attendance was often over 20 students from the entire St. Louis area. These students were able to participate in 21 presentations from 14 different mathematicians.

One of our challenges this year was the diversity of ages and mathematical abilities of the students. To meet this challenge in the coming year, we will have two circles---one for middle age students and one for high school students. Circle meetings will still be every Sunday, but the two different circles will each meet on alternating weeks.

We encourage you to recommend any students who you believe would benefit from this program. We are happy to answer any additional questions you might have.



Math Circle presentations 2007-2008

Modular Arithmetic and Doomsday
Slide Rules
The Amazing Theory of Morley
Rational Tangles
Large Numbers
The Shape of Space
Cryptographs
The Octonion Slide Rule
Matchbox Computers
Zomes!
Coloring Pascal's Triangle
Coloring Maps
Problem Solving Methods
How to win at games
Euclidean and Non-Euclidean Geometries
The Difficult Task of Ensuring Fair Elections
Mathematical Card Tricks
Rep-Tiles
Fractals
Topological tomfoolery: math party tricks
Game Theory

Blake Thornton
Brian Maurizi
Andy Womack
Blake Thornton
Joe Bohanon
Brad Henry
Scott Cook
Chris Niemann
Geir Arne Hjelle
Richard Lodholz
Eugenio Hernandez
Michael Deutsch
Blake Thornton
Scott Cook
Andy Womack
Brad Henry
Blake Thornton
Lisa Kuehne
Geir Arne Hjelle
Tim Lott
Rob Houska



Mathematics Library

The Mathematics Library welcomes virtual or in-person visitors. The Math Library is located in Cupples 1, room 16. Many services are available through the web at <http://library.wustl.edu/units/math>, including hours and links to the catalog and catalog services (such as, book request/renewal, MOBIUS request), online databases, and services (such as, interlibrary loan and Ask Us!). After-hours access is available to math department graduate students and faculty.

News from the Mathematics Library is distributed at <http://wulibraries.typepad.com/mathnews> with a monthly email summary.

This past year we added full-text online access to all books classified by Springer as mathematics or statistics, 2005-2008, sent journals available in JSTOR to West Campus Library, and successfully experimented with shorter public hours at the math library. Ruth Lewis, Biology & Math Librarian, and Chris Goodman, Math Library Assistant, welcome your questions, requests, suggestions and complaints! They can be sent via email to rlewis@wustl.edu or ctgoodman@wustl.edu or math@wumail.wustl.edu.

Teacher Circle

Spring 2008 was our very first Washington University Math Teachers' Circle. Teachers' Circles are collaborations between research mathematicians, middle school math teachers, and school administrators. They are motivated by the principle that mathematics is better taught as a part of the process of problem solving and critical thinking.

This has been a successful approach for engaging the interest of young people in the classroom.

The main activities of a Teachers' Circle are lively discussion sessions led by mathematicians and math educators. The first Teachers' Circle was started in August, 2006. This first Circle brought together 25 middle school mathematics teachers and 5 professional mathematicians for an intense week of work at the American Institute of Mathematics (AIM) followed by monthly meetings.

In the summer of 2007, a team from St. Louis went to AIM to participate in a week-long workshop at AIM to learn how to start a Teachers' Circle in St. Louis. The St. Louis team, headed by Blake Thornton consisted of Dr. Blake Thornton (Washington University), Dr. Richard Lodholz (independent consultant and retired Parkway Schools Math Coordinator), Dr. Ann Podleski (Harris Stowe University), Amy Swartman (Hancock Place Middle School), Wendy LaRose (Webster Groves Sixth Grade Center) and Vicki Adams (The Metamo4ic Math Center).

Upon return from the summer 2007 workshop, the St. Louis Teachers' Circle team went to work planning and recruiting. With help from the Washington University Science Outreach office, we had a group of 34 middle school teachers representing a diverse range of schools and districts in the St. Louis area. These teachers met eight times over the spring 2008 semester---4 full day meetings and 4 evening meetings. During these eight meetings the teachers were able to participate in a range of mathematics discussions from a variety of mathematicians from the St. Louis area. In addition to the mathematics they were able to learn, the teachers were able to form relationships, with other teachers and with mathematicians that will be able to serve them in their teaching.

Due to generous funding by Boeing and the National Science Foundation, the program was completely free to all teachers. This meant that not only were we able to provide meals and materials for the teachers, but all participating teachers were able to obtain graduate credit for this course.

Presentations from Teacher Circle Spring 2008:

Problem Solving Strategies	Blake Thornton (Wash U)
Mathematics: Science of Patterns. Figurative Numbers	Richard Lodholz
Euler Characteristic	John McCarthy (Wash U)
Building Brick Walls: Counting Techniques, Number Patterns	Ann Podleski (Harris Stowe)
Non-deterministic Mathematics, Weird Dice	Richard Lodholz
Rational Tangles	Blake Thornton (Wash U)
Modular Arithmetic and Doomsday	Blake Thornton (Wash U)
Map Folding	Bryan Clair (SLU)
Algebra and Problem Solving	Al Otto (Illinois State)
Matchbox Computers	Geir Arne Hjelle (Wash U)
Zomes and Geometry	Richard Lodholz
Prime Numbers	Blake Thornton (Wash U)
Name Game and Permutations	Ann Podleski (Harris Stowe)
Monty Hall	Ann Podleski (Harris Stowe)
Pascal and Pizza	Richard Lodholz
Wythoffs Game	Richard Lodholz
Map Coloring	Michael Goldwasser (SLU)
Chaos	Brody Johnson (SLU)
Mathematical Card Tricks	Blake Thornton
Elementary Number Theory	Bob McDowell (Wash U)
M.C. Escher: an introduction to hyperbolic geometry	Anneke Bart (SLU)
Magic Squares	Richard Lodholz
Pythagorean Triples	Richard Lodholz
Rubik's cube and other puzzles	Rajan Mehta (Wash U)
The Difficult Task of Ensuring Fair Elections	Brad Henry (Wash U)
Coloring Pascal's Triangle	Ann Podleski
Greatest Common Divisor	Blake Thornton
Cryptography	Fr. Mike May (SLU)



Have Math/Teacher Circle Questions?
Please contact Math Circle Director Blake Thornton:
blake@math.wustl.edu
<http://www.math.wustl.edu/mathcircle/>

Department of Mathematics 2008 Colloquium Schedule

SPRING SEMESTER 2008

Thursday, January 31, 2008

Professor Yong-Geun Oh

Department of Mathematics, University of Wisconsin-Madison

Floer homology in symplectic topology and mirror symmetry

(Host: Professor Xiang Tang)

Thursday, February 7, 2008

Professor Josh Sabloff

Department of Mathematics, Haverford College

Symplectic Rigidity for Lagrangian Cylinders

(Host: Professor Rachel Roberts)

Thursday, February 14, 2008

Professor Eliot Fried

Mechanical, Aerospace & Structural Engineering (MASE), Washington University in St. Louis

A conjectured hierarchy of length scales in a generalization of the

Navier-Stokes- α equation for turbulent fluid flow

(Host: Professor Victor Wickerhauser)

Monday, February 25, 2008

Professor Peter Constantin

Department of Mathematics, University of Chicago

Some mathematical problems related to complex fluids

(Hosts: Professors Victor Wickerhauser & Eliot Fried (MASE))

Friday, March 7, 2008

Professor Fabian Waleffe

Department of Mathematics & Department of Engineering Physics, University of Wisconsin-Madison

NA

(Hosts: Professors Victor Wickerhauser & Eliot Fried (MASE))

Thursday, March 20, 2008

Professor Troy Story

Department of Chemistry, Morehouse College

Navier-stokes dynamics on a differential one-form

(Hosts: Professor Gary Jensen /Joint with Chemistry Department)

Tuesday, March 25, 2008

Professor Artur Nicolau

Department of Mathematics, Autonomous University of Barcelona

Differentiability of functions in the Zygmund Class

(Host: Professor John McCarthy)

Thursday, March 27, 2008

Professor Betül Tanbay

Department of Mathematics, Bogazici University (Istanbul)

A recent remark on the Kadison-Singer conjecture

(Host: Professor Nik Weaver)

Thursday, April 3, 2008

Professor Hongkun Zhang

Department of Mathematics, Northwestern University

Decay of correlations for nonuniformly hyperbolic billiards

(Host: Professor Renato Feres)

ROEVER LECTURE

Thursday, April 10, 2008

Professor Yakov Eliashberg

Department of Mathematics, Stanford University

Symplectic geometry of affine complex manifolds

(Host: Professor Renato Feres)

Tuesday, April 15, 2008

Professor Dongchu Sun

Department of Statistics, University of Missouri, Columbia

Objective Bayesian Analysis for the Multivariate Normal Model

(Host: Professor John McCarthy/Joint with James O. Berger of Duke University)

Thursday, April 17, 2008

Professor Irene Fonseca

Department of Mathematics, Carnegie Mellon University

Variational Methods in Materials and Imaging

(Host: Professors Victor Wickerhauser & Eliot Fried (MASE))

Friday, April 18, 2008

Professor Alex Powell

Department of Mathematics, Vanderbilt University

Schauder bases and the Balian-Low uncertainty principle

(Host: Professor Ed Wilson)

Thursday, April 24, 2008

Professor Richard Gundy

Department of Statistics, Rutgers University

Taming the Twin Dragon: tilings, number systems, and some ergodic theory

(Host: Professor Guido Weiss)

Thursday, May 1, 2008

Professor Jason Starr

Department of Mathematics, Stony Brook University

Continuous sections of topological fibrations vs. algebraic sections of algebraic fibration

(Host: Professor Roya Beheshti)

TAIBLESON LECTURE

Thursday, May 8, 2008

Professor Elias Stein

Department of Mathematics, Princeton University

Singular integrals and several complex variables: some new perspectives

(Host: Professor Al Baernstein)

FUNCTION SPACES AND THEIR OPERATORS CONFERENCE

IN HONOR OF RICHARD ROCHBERG ON THE OCCASION OF HIS 65TH BIRTHDAY

Thursday, May 29 - Saturday, May 31, 2008

Principal Speakers: J.M. Anderson, M. Bownik, R. Coifman, M. Cwikel, M. Engliš, P. Gorkin, T. Iwaniec, K. Jarosz, N. Kalton, K. Nowak, E. Sawyer, K. Seip, S. Semmes, C. Sundberg, A. Tabacco, D. Zheng

Organizers: N. Arcozzi, A. Baernstein, J.E. McCarthy, Z. Wu [<http://www.math.wustl.edu/jstor/>]

(Hosted by the Washington University in St. Louis Mathematics Department)

FALL SEMESTER 2008

Thursday, September 18, 2008

Professor Wang-Q Lim

Department of Mathematics, Lehigh University

The Discrete Shearlet Transform: An efficient geometric multiscale analysis

(Host: Professor Guido Weiss)

LOEB LECTURE

Thursday, September 25, 2008

Professor Michael Aschbacher

Department of Mathematics, California Institute of Technology

Modern Permutation Group Theory

(Host: Professor Al Baernstein)

Friday, September 26, 2008

Professor Akram Aldroubi

Department of Mathematics, Vanderbilt University

Invariance of Shift-Invariant Spaces

(Host: Professor Guido Weiss)

Friday, October 3, 2008

Professor Jack Sonn

Technion-Israel Institute of Technology

Abelian extensions of global fields with all local degrees equal to n and the n -torsion subgroup of the Brauer group

(Host: Professor Jack Shapiro)

Thursday, October 23, 2008

Professor David Futер

Department of Mathematics, Temple University

From combinatorics to geometry for knots and 3-manifolds

(Host: Professor Rachel Roberts)

Thursday, October 30, 2008

Professor Guoliang Yu

Department of Mathematics, Vanderbilt University

Geometric complexity and the stable Borel conjecture

(Host: Professor Xiang Tang)

Thursday, November 13, 2008

Professor Javier Soria

Department of Mathematics, University of Barcelona

Hardy's Inequalities and Function Spaces

(Host: Professor Edward Wilson)

Thursday, November 20, 2008

Professor Alberto Candel

Department of Mathematics, California State University, Northridge

Dynamics in Gromov-Hausdorff spaces

(Host: Professor Renato Feres)

Mark Your 2009 Colloquium Calendar!

Thursday, December 4, 2008

Professor Scott Holan

Department of Statistics, University of Missouri-Columbia
Hierarchical Bayesian Markov Switching Models with Application to Predicting Spawning Success of Shovelnose Sturgeon
 (Host: Professor Jimin Ding)

Monday, December 15, 2008

Professor Maggy Tomova

Department of Mathematics, University of Iowa
Thin position for knots
 (Host: Professor Rachel Roberts)

SPRING SEMESTER 2009

Thursday, January 15

Professor Kang-Tae Kim

Department of Mathematics, Pohang University of Science and Technology
Functions holomorphic along a holomorphic vector field
 (Host: Professor Steven Krantz)

Thursday, February 5

Professor Josh Sabloff

Department of Mathematics, Haverford College
Invariants of Legendrian Knots and the Legendrian Mirror Problem
 (Host: Professor Rachel Roberts)

Thursday, February 19

Professor Svitlana Mayboroda

Department of Mathematics, Purdue University
Harmonic analysis and elliptic equations in non-smooth domains
 (Host: Professor Steven Krantz)

KIRK LECTURE

Thursday, March 5

Professor Robin Hartshorne

Department of Mathematics, University of California, Berkeley
 TBA
 (Host: Professor John Shreshian)

Thursday, March 19

Professor Robert Azencott

Department of Mathematics, University of Houston
 TBA
 (Host: Professor Edward Wilson)

ROEVER COLLOQUIUM

Tuesday, March 24

Professor Robert Osserman

Mathematical Sciences Research Institute
An inverse problem in the calculus of variations, tube-like domains, and compressed catenaries
 (Host: Professor Gary Jensen)

Thursday, April 2

Professor Shuangge Ma

Department of Biological and Biomedical Sciences, Epidemiology and Public Health, Yale University
 TBA
 (Host: Professor Jimin Ding)

LOEB UNDERGRADUATE MATHEMATICS LECTURE

Thursday, April 2

Professor Ravi Vakil

Department of Mathematics, Stanford University
The Mathematics of Doodling
 (Host: Professor Ronald Freiwald)

HIRSCHMAN LECTURE

Thursday, April 9

Professor Steve Wainger

Department of Mathematics, University of Wisconsin
The circle method of Hardy, Littlewood and Ramanujan
 (Hosts: Professors Guido Weiss & Edward Wilson)

Thursday, April 16

Professor Ji Zhu

Department of Mathematics, University of Michigan
 TBA
 (Hosts: Professors Jimin Ding & Nan Lin)

<http://www.math.wustl.edu/talklist/TalkList.html>

JANUARY 2009

Sun	Mon	Tue	Wed	Thu	Fri	Sat
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4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
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FEBRUARY 2009

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MARCH 2009

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APRIL 2009

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MAY 2009

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JUNE 2009

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JULY 2009

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AUGUST 2009

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SEPTEMBER 2009

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OCTOBER 2009

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NOVEMBER 2009

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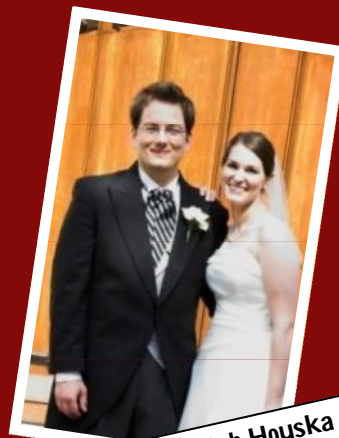
DECEMBER 2009

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LOVE & MATHEMATICS



'07 Ph.D. Sooraj Kuttykrishnan married Rebecca, an MD/PhD student, who defended her thesis in April 2008 and now is back in clinics.



Ph.D. Candidate Rob Houska married Anne Wolf. They got married on May 31, 2008 at Graham Chapel. They met in 2001 here in St. Louis through a mutual friend.



Ph.D. candidate Josh Brady met Suzanne Hill here in St. Louis. In fact, they lived in the same apartment building! Suzanne got her Bachelor's degree in psychology at Oberlin College. Josh proposed to her on March 15th by taking her to Stone Hill Winery in Hermann, MO. They got married on September 7th, 2008 in Hermann, MO.



Ph.D. Candidate Andrew Lewis married Chrystal Sullivan on June 28, 2008. They'd been dating since high school. Now she's a staff nurse at Barnes and working on her Ph.D. in nursing at UMSL.



Professor Blake Thornton married Enbal Shacham, Ph.D. on March 15, 2008. Enbal works at the WU medical school where she studies the behavioral and environmental factors associated with HIV infection.



Ph.D. candidate Michael Brad Henry met Meghana K. through mutual friends. Meghana is from NJ and is studying neuroscience at Wash U. and the two expect to wed summer 2009.



Library Assistant Chris Goodman met his fiancée Sarah as an undergrad at Lindenwood University through some mutual friends. They quickly struck up a friendship. Their love of music and books provided hours of conversation and many mutual points of interest. One Thanksgiving holiday finally brought them together and they since have bonded over snow storms, pumpkins, old movies, and cheesecake. Their engagement started beautifully after Chris proposed on a sunny July day in a paddle boat next to a fountain in Forest Park.



'08 Ph.D. Brian Maurizi married Krista Seymour. Although Brian didn't know who she was at the time, Krista remembers being a groupie of his band during her freshman year of college. Seven years later in St. Louis, she was at Joe's Cafe listening to music with friends. Brian approached Krista asking, 'Don't I know you?' They've been together ever since.





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TO OUR ALUMNI: Please keep in touch. We would like to hear from you!

PLEASE CONTACT: Leslie Smith-Moreland, leslie@math.wustl.edu,

if you would like to submit an article or would like to receive a copy of the Mathematics Newsletter.



SPECIAL THANKS TO: Chancellor M. Wrighton, G. Richman, & R. Wild;
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& S. Xiao; WU Math faculty spouses; ALUMNI/FRIENDS: A. Marcus,
A. Podleski (Rochfest photography), the Scheibes, & A-J. Sakasamo:
for contributing to this edition of our newsletter.

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HAPPY 2009! IT'S FINALLY HERE! THANK YOU to all our alumni, faculty, staff, students and friends for your patience
in the later publishing of the Fall 2008 edition of the math newsletter! -C.K. Jones