

School of Mathematics

Newsletter Volume 20, Spring 2014



Head Lines

Peter Olver



| | |
|--|-----------|
| Head Lines | 1 |
| Peter Olver | |
| Welcome to New Faculty | 2 |
| Christine Berkesch Zamaere Yu-Jong Tzeng Craig Westerland | |
| Featured Colleagues | 3 |
| Garrett, Paul Gray, Lawrence Richard McGehee | |
| Symposia | 5 |
| Riviere Fabes Symposium Workshop & Conference on Topology & Invariants of Smooth 4-Manifolds Meeting Held in Tribute to James Serrin Graduate Student Combinatorics Conference | |
| Remembering Former Colleagues | 6 |
| George Brauer Robert Ellis Charlotte Striebel | |
| Awards and Recognition | 8 |
| Retirements | 8 |
| David Frank | |
| MathCEP | 9 |
| MCIM | 9 |
| MCFAM | 9 |
| Math Library | 10 |
| IMA | 10 |
| Undergraduate Program | 10 |
| Graduate Program | 11 |
| Graduate Student Fellowship Awards Ph.D. Graduating Students | |
| Contacting Us | 12 |

As this interminable Minnesota winter draws to a merciful close, I can reflect back on a year filled with many successes and some disappointments. Of special note is the range of prestigious awards received by our distinguished faculty, particularly our junior colleagues. Most notable is that fact that all three National Science Foundation Career Grant applicants, Assistant Professors Jasmine Foo, Kai-Wen Lan, Pavlo Pylyavskyy, were awarded this highly prestigious and highly competitive honor. It is fair to say that such a "hat trick" is extremely rare, if not unprecedented, in any mathematics department! In addition, Kai-Wen Lan received a Sloan Research Fellowship. Assistant Professor Craig Westerland is the winner of this year's Australian Mathematical Society Medal, while Professor Sergey Bobkov received the German Humboldt Research Award. Meanwhile, Anar Akhmedov and Yoichiro Mori were both promoted to the rank of Associate Professor with tenure. Professor David Frank, a long time member of the department and former Director of Undergraduate Studies, whose research area is algebraic topology, will retire at the end of this academic year. I was disappointed to learn that Assistant Professor Hoai Minh Nguyen has decided to leave Minnesota for a position at the École Polytechnique Fédérale de Lausanne in Switzerland. In sad news, Emeritus Professors George Brauer, Robert Ellis, and Charlotte Striebel all passed away during the course of the year. Their presence in the department will be greatly missed; obituaries outlining their careers and contributions appear later in this issue.

I am pleased to report that our graduate programs, directed by Dick McGehee, and undergraduate programs, directed by Bryan Mosher, continue on their upward trajectories. The work of the department is supported by our centers, MathCEP, MCFAM, and MCIM, and complete reports on all of their wide-ranging activities can be found within the newsletter. I must also highlight how active our various student organizations have become,

including the Math Club, the Women in Mathematics (WIM), the American Mathematical Society Student Chapter, the Society for Industrial and Applied Mathematics Student Chapter, the Actuary Club, and the Financial Mathematics Student Association. The WIM has helped cosponsor a now annual event, the College of Science and Engineering Distinguished Women Speaker program. Last year, Prof. Anna Mazzucato from Penn State University delivered an inspiring lecture on her latest research in partial differential equations, and we are now looking forward to April's visit of Prof. Suncica Canic from the University of Houston, a renowned researcher in fluid mechanics and applications in biology.

I have recently started an ongoing series of lunches to meet with alumni and donors for the School of Mathematics, to share and discuss developments and news within the Department and the University, as well as the world of mathematics at large. If you are interested in joining us during a future gathering, please send me an email at dept@math.umn.edu.

One significant personal development is that my undergraduate textbook, *Introduction to Partial Differential Equations*, finally appeared this year! It has been published by Springer in their *Undergraduate Texts in Mathematics Series* and is accompanied by a *Selected Solutions Manual*. As I suspected, my duties as Department Head had a noticeable delaying effect on its completion, but persistence and working many late nights finally paid off, and it is thus a great relief to see it finally appear in print.

Since 2011, I have devoted a significant fraction of my time serving as Chair of the International Mathematical Union (IMU)'s Committee on Electronic Information and Communication (CEIC). One major initiative of the CEIC has been the reinvigoration of the World Digital Mathematics Library whose goal is the establishment of an accessible, online, searchable, and computable compendium of the world's mathematical literature in order to foster research advances and new applications. In June, 2012, the CEIC organized a symposium on "The Future World Heritage Digital Mathematics Library: Plans and Prospects" at the National Academy of Sciences in Washington, DC, and funded by a grant awarded to the CEIC by the Sloan Foundation. Around 50 participants attended, including Mathematicians, Librarians, Digital Technology Pioneers, Representatives from Granting Agencies, and others from around the world. The conference Wiki http://ada00.math.uni-bielefeld.de/mediawiki-1.18.1/index.php/Main_Page contains full details.

Subsequently, I was appointed to serve on a National Academy of Sciences (NAS) Committee, also funded by the Sloan Foundation, for the purpose of reviewing the status and prospects for a World Digital Mathematics Library and outlining a plan for its realization. The committee's report was issued by the NAS in March, 2014, and is available at http://www.nap.edu/catalog.php?record_id=18619.

The IMU organizes the International Congress of Mathematicians (ICM) which, among many other activities,

awards the Fields Medals. The CEIC is now organizing three panel discussions at the upcoming ICM in Seoul, Korea, August, 2014. The first will be on Massively Open Online Courses and Online Education, and their impact on research, teaching, and education throughout the world; the second on the Future of Mathematical Publishing, including such topics as journal rankings and metrics, open access, publishing costs and ethics, the cost of knowledge boycott, new models of publishing, and related developments; the third will be on the aforementioned World Digital Mathematics Library,

Finally, two personal notes — one very happy and one very sad. In welcome news, I became a grandfather when my daughter, Pari Olver Parchi, gave birth to a baby boy on July 6, 2014, named Tolemei, after the renowned Greek scientist and cartographer. The sad news is that, three months earlier, I lost my father, Frank W.J. Olver, who died on April 23, 2013. He was also a mathematician, at the University of Maryland and the National Institute of Standards and Technology, whose research in asymptotics and special functions was world renowned. He will be sorely missed, not just by his family, but the entire world of mathematics. Indeed, many mathematicians from around the globe wrote encomiums to his impact on mathematical research and applications. A Reading and Lecture Room in his memory was dedicated at the University of Maryland on April 21, 2014.

As always, thank you for your continued interest in and support of the School of Mathematics at the University of Minnesota. If you have any comments, questions, or suggestions, please don't hesitate to stop by, call, or send me email.

Mathematically yours,

Peter Olver
olver@umn.edu
 612-625-5591

Welcome to New Faculty

Christine Berkesch Zamaere

Christine Berkesch Zamaere grew up in Indiana and attended Butler University for her undergraduate studies. She then joined the Mathematics department at Purdue University, where she completed her Ph.D. in 2010. She received an International Postdoctoral Fellowship from the NSF to work with Mikael Passare at Stockholm University and attended a program at the Institut Mittag-Leffler. She then spent two years as a postdoc at Duke University, with one semester spent at MSRI. Her research focuses on homological questions at the interface of algebra, geometry, and combinatorics. She has worked with hypergeometric systems on toric varieties, as well as with monomial ideals, multiplier ideals, and free resolutions.



Yu-Jong Tzeng

Yu-jong was born in Taipei, Taiwan and lived in Taiwan until twenty-two years old. Her parents are both businesspersons.



Because her mother came from a family of musicians, Yu-jong started to take music lessons when she was four and received professional training for eleven years. During high school, she found that her math talent is better than her musical talent, so she started to learn more math on her own and participated in many math competitions. In 2000, she won the bronze medal in the international math Olympiad in Korea.

Since Yu-jong's parents studied engineering and business, they didn't appreciate pure math very much. After she majored in math her parents still tried to persuade her to move to physics, engineering or biotechnology. The attempt lasted a while until her father visited a Lab in Massachusetts and was convinced by the female director of the Lab that mathematics can be an ideal career for women.

She earned her Bachelor's Degree in math from National Taiwan University and became interested in algebraic geometry. In 2004, she left Taiwan and started to pursue a Ph.D. degree at Stanford under the guidance of her advisor Jun Li. Besides doing math, she also enjoyed beautiful weather in California and played in local softball and basketball teams. In her thesis she solved a conjecture of Goettsche, which claimed that the number of nodal curves on any smooth algebraic surface should be a universal polynomial of Chern numbers.

After getting her degree she got a 3-year postdoctoral position at Harvard University. She continued her work on enumerative geometry, at the same time expanding her interests under the influence of the many outstanding mathematicians there and the activities in the greater Boston area. She joined the School of Mathematics in the fall of 2014

Craig Westerland

Craig Westerland joined the School of Mathematics in August 2013 as an Assistant Professor. Craig was an undergraduate at Williams College. After pursuing astrophysics there for several years, he ended up in grad school in math, when it became apparent that a career in lab sciences would be a danger to himself and his colleagues. He completed a PhD in algebraic topology at the University of Michigan under the supervision of Igor Kriz.



In the following years, Westerland held postdocs and visiting positions at the Institute for Advanced Study, the University of Wisconsin, the Mathematical Sciences Research Institute, and the University of Copenhagen, before settling down at the University of Melbourne, Australia. His five years in Melbourne were an amazing opportunity, where he explored new developments in

chromatic homotopy theory, distributional problems in arithmetic, and awkward trans-Pacific accents. He is delighted to have recently moved to Minneapolis, and is happily exploring the thermodynamic idiosyncrasies of a midwestern winter.

Featured Colleagues

Paul Garrett

Paul Garrett was born in Bluffton, Indiana to a family of high school teachers. He started learning math rather early, along



with a number of other things like piano, chess and baseball. When he was younger, Paul didn't really understand that the profession of 'mathematician' existed. The profession of math teacher in school didn't particularly appeal to him, so he expected to pursue a related profession like engineering. These plans were slightly altered by the Vietnam War.

After pulling an unlucky number in the draft Paul spent a year in the Air Force academy to avoid being drafted. He remembers this time as a torment, due to the extreme boredom of life in the academy. Still, there were some fun activities even there, and Paul soon discovered he was rather good at boxing. Unfortunately, he quickly came to realize that boxing is a sport in which both the winner and the loser get beaten up, and decided to abandon the hobby. One of Paul's most gratifying memories from this time was an incident in which he was brought before a disciplinary board on suspicion of cheating, after performing too well on a calculus advanced placement exam.

After the academy Paul went to Purdue, and then to graduate school in Princeton. He particularly enjoyed that the atmosphere of the Princeton department was "not sleepy," which may or may not say something about Purdue. At Princeton, Paul felt like "the race was worth running" because of the amazing research environment. Students weren't assigned grades for their course work, which gave him the sense that mathematics isn't simply a school subject but something "more alive."

During Paul's time at Princeton, Weil, Selberg, Langlands, Bombieri and Wigner were in the department. Bernard Dwork was a big influence, being both a very down-to-earth person, and a very good mathematician. Paul fondly remembers how Dwork was able to make mathematical machinery easily solve problems that looked hard at first. However, it was Goro Shimura's book on automorphic forms that led Paul to his choice of field and advisor.

One noteworthy event that Paul remembers from this time was an incident in an excruciatingly boring lecture during which he dropped a large, steel ball-bearing on the floor only to discover that it bounced. Paul does not mention any reason for bringing a large steel ball-bearing to class, but it clearly made the lecture more memorable!

After graduate school Paul got a nice postdoc at Yale, where he spent time with Serge Lang. He found it surprising to suddenly be treated like an expert in his area because he didn't feel like he was at that point yet. After Yale, he spent time at Berkeley and Stanford and eventually found himself in Minnesota. Paul never expected to end up here, but has found himself enjoying it for the last thirty-two years nonetheless.

The mathematical work Paul is most happy with was conceived while listening to an argument between Atle Selberg and Paul Cohen at Stanford sometime in 1980. Later the same issue was discussed by (our colleague) Dennis Hejhal and Y. Colin de Verdiere. Very roughly, the underlying question could be stated as follows: how do automorphic forms decompose when restricted to a subgroup? About thirty years later in the Summer of 2011, Paul finally arrived at an understanding sufficient to be applied to the situation discussed by Selberg and Cohen. In response to this work, Paul received an e-mail from Bombieri congratulating him on "finally explaining the mechanism involved!" and from that a collaboration with Bombieri stemmed, which work he is still involved with today.

Lawrence Gray

Lawrence (Larry) Gray was born in Santa Monica, CA in 1949. He grew up in Escondido, which was a small town back then, twenty miles north of San Diego. As early as middle school and high school, he realized that he had a great interest in mathematics, and took advantage of many opportunities including math competitions and courses at the local college. At the same time, Larry also cultivated several other interests that would become life-long hobbies, which included playing chess, piano



and tennis. He went on to attend UCSD for his undergraduate degree, where he majored in mathematics and was also a varsity tennis player. After his sophomore year, Larry became intrigued by probability theory, and started to study the subject both in graduate courses and by reading books on his own.

This interest led him to Cornell for graduate studies in mathematics, and specifically probability theory (following a 2-year stint in Germany as a Mormon missionary). At Cornell, Larry was very active in the probability community, participating in lively reading groups with his fellow students and even presenting in the probability seminar as an intrepid first-year graduate student. He became particularly interested in the theory of interacting particle systems, and went on to conduct his thesis research on this topic under the direction of Frank Spitzer.

While writing up his thesis work in 1977, Larry applied for faculty positions and interviewed at 10 different universities. Travel reimbursement was slow back then, but luckily his advisor lent him the money to travel to interviews in the form of a \$1000 check. During his interview at Minnesota, Larry instantly clicked with the mathematics department faculty and when the offer came from UMN, he accepted it on the spot. In fact, he liked the math department at UMN

so much that the next day he received and turned down an offer to return to his native California at UC Berkeley.

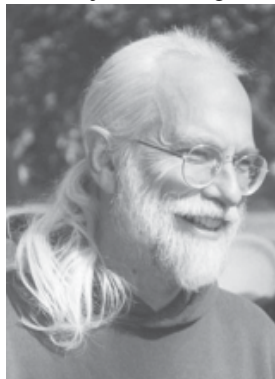
At Minnesota, Larry continued to work in various interacting particle systems, sometimes motivated by questions in traffic and computer science. In recognition of his work, he was made a Fellow of the Institute of Mathematical Statistics in the 1980s. He became the director of undergraduate studies from 2000-2003, and head of the department from 2003-2008. During his tenure as head, one of Larry's goals was to increase diversity in the faculty by hiring more women faculty. One of the changes he implemented was to adapt department hiring practices to be inclusive of all fields when hiring female faculty. In addition, Larry introduced the idea of contract faculty within the department. The financial math masters program was spearheaded and developed by Scot Adams during Larry's time as head of the department. Here, Larry played an important role in clearing administrative hurdles and fighting opposition within the university, helping pave the way for the thriving master's program in place today.

In 2001, the state of Minnesota was considering reforms in high school mathematics education standards. Larry, who was Director of Undergraduate Studies at the time, became interested in learning more about the current curriculum and proposed reforms. As he became more involved in the issues, he began receiving invitations to speak at numerous school board meetings and conferences about MN state education standards and reforms. Eventually, through his involvement, Larry and Bert Fristedt were invited by the state commissioner of education to be part of a committee of 40 that was to rewrite the state education standards in 2003. Although this was a massive task, Larry collaborated with a team of 5 other people to do the actual writing of a completely new set of K-12 standards for mathematics curriculum in the state; this was approved by the legislature and eventually adopted throughout Minnesota. Larry continued his involvement in state education over subsequent years, and helped produce a further thorough math standards revision as co-chair of the committee in 2007. In addition, he played an important role nationally in writing and evaluating the use of the Common Core math standards. Over a period of almost a decade, Larry's work had a tremendous impact on mathematics education in the state of Minnesota, from the way the standards are written to the way they are tested in Minnesota high schools.

These days, Larry continues to enjoy teaching and research as well as several hobbies including astronomy, running, chess set collecting and gardening. Over the years, he has enjoyed many opportunities to perform service to the profession, the department, and to impact education in the state. Some parting words from Larry which reflect upon his remarkable career: "I hope that people feel as they contemplate their own careers that there can be more than one dimension to their contributions over time."

Richard McGehee

Dick McGehee grew up in San Diego, where if it rained he stayed indoors. He spent his college years at Caltech with four subjects battling for his interest: mathematics, geology,



chemistry, and physics. During his junior year, he was offered an internship via the Scripps Institute of Oceanography that involved sailing to the Indian Ocean in search for the Mohorovicic Discontinuity, the boundary between the crust and the mantle of the Earth. During this voyage, Dick, the only undergraduate student on the trip, worked as a "grunt" alongside graduate students and researchers collecting

evidence that India had moved from Antarctica, took a course on Vulcanism (volcanoes), and he became one of the few people to visit St. Paul Island, a 2.3 square mile island that is coincidentally enough the antipodal point to St. Paul, Minnesota. Dick chuckles that he might be the only person to have been to both St. Pauls, as St. Paul Island is mostly inhabited by penguins.

Ultimately it was this internship that led Dick down his career path in mathematics, as out of the four aforementioned departments, the mathematics department was the only one flexible enough to allow him time-off Fall quarter for this trip and still graduate with his class. After enjoying the good weather of Southern California but not the smog of Pasadena of the early 1960's he decided to go to graduate school in mathematics at Madison, Wisconsin. When asked why he choose mathematics instead of science for graduate school, he replied that it was evident from the times that one could do damage with science, but with mathematics it was easy to do no harm. Dick received a three year fellowship to fund his graduate school.

Early in his graduate school career, one of the senior professors at Madison recommended he enroll in a dynamical systems course being given by the then newly hired Assistant Professor Charles Conley. For Dick, this course was the first time a topic really clicked with him. He received his Ph.D. under the mentorship of Conley in 1969, and after also interviewing for a geology job at the Office of Naval Research, followed his advisor's advice and took a postdoctoral fellowship at the Courant Institute. After working with Jürgen Moser on dynamical systems such as celestial mechanics for a year, he began his position here at Minnesota in 1970.

Though first classified by the department as a topologist, and even writing preliminary examinations in topology, Dick continued his pursuit of celestial mechanics. When he became department head from 1986-1990, it was quite a turbulent time. Despite working with a dean of Institute of Technology who thought that mathematicians should either work with scientists and engineers or look for funding from the National Endowment of the Arts, Dick's goal was to make the department more collegial and democratic. This involved the genesis of a hiring strategy that involved more faculty meetings than previous years, giving faculty more

voting power on big decisions for the department, and encouraging the involvement of younger faculty in developing the department. Another success was allowing the Associate head to have more duties in hiring and allowing the directors of undergraduate and graduate studies work together on assigning teaching. On a less serious note, he also rearranged Vincent 127 to make sure that you did not have to walk through "the head" to see the head.

Dick attempted to escape the tumult of department politics when he took a sabbatical leave in Boulder, CO the year after his time as head, only to find a recently divided pure and applied mathematics department when he arrived. Ironically, Dick was an Ulam Chair at Colorado, which was a chair offered by pure mathematics, but he spent his time there working with the applied mathematicians. Fortunately things were better when he arrived back in Minnesota.

Dick's work for the department has continued since his time as head. He was the director of the Geometry Center, founded by Al Marden, for many years, and has been director of graduate studies for the last few years. As director of graduate studies, he has made a concerted effort to recruit American and female students. The Smith Center for Women in Mathematics post-baccalaureate program started up early on during Dick's tenure as director of graduate studies, and has been a great source of incoming graduate students. Dick has also been happy with successful recruiting efforts working with local Carleton College.

Dick will continue doing his best to improve our graduate program and our department. Additionally, Dick's mathematical interests have more recently returned to those of his college days as he has been studying climate modeling for a good part of the last decade.

Symposia

Riviere-Fabes Symposium

The 16th Rivière-Fabes Symposium on Analysis and PDE was held April 19-21, 2013, at the School of Mathematics, University of Minnesota. The two-hour speakers were Mihalis Dafermos (Princeton University) and Assaf Naor (Courant Institute) and one-hour talks were given by Marianna Csörnyei (University of Chicago), Andrea Nahmod (University of Massachusetts), Fedor Nazarov (Kent State University) and Peter Topalov (Northeastern University). The Symposium was sponsored by the NSF, the Rivière-Fabes Fund at the University of Minnesota, and the IMA through their Participating Institution Conference Program.

For more detailed information, see the website:
http://www.math.umn.edu/conferences/riv_fabes_13/

Workshop and Conference on the Topology and Invariants of Smooth 4-Manifolds

The workshop and conference took place from July 31 to August 10, 2013 at UMN School of Mathematics. The workshop and conference brought together leading researchers from around the world working in the fields of low dimensional topology and symplectic geometry. The workshop occupied the first 5 days and consisted of 7 of mini-courses intended primarily for graduate students. This was followed by a research conference during the second week at which over 20 people spoke.

The workshop and conference were well attended, with over 120 registered participants. A majority of them were graduate

students and young researchers. The participants were partially supported for their expenses, thanks to the funds made available by the National Science Foundation. Women and minorities were especially encouraged to apply. For more detailed information see the website:

<http://www.math.umn.edu/conferences/topology/>

Meeting Held in Tribute to James Serrin

On November 14-16, 2013, the Department hosted the 51st Meeting of the Society for Natural Philosophy on the topic "Mathematics and Mechanics in the Physical Sciences". The meeting was organized by Profs. Peter Olver (Mathematics), Roger Fosdick (Aerospace and Mechanics), and Chi-Sing Man (Mathematics, University of Kentucky). It was designated as a special tribute to Regents Professor Emeritus James Serrin (1926–2012), whose deep and profound



contributions in partial differential equations, calculus of variations, real analysis, fluid mechanics, and foundations of thermodynamics exemplify the unity of mathematical and physical science. The talks emphasized the creation and development of new mathematical methods and rational physical concepts to address critical problems arising in the modeling, analysis, and prediction of material behavior. The meeting brought together researchers of international and national stature as well as recent Ph.D.'s and graduate students who share the common experience of having been immensely influenced by Serrin's teachings, writings, and other scientific activities, and deeply value his work to promote the dialogue and interaction between mathematics and mechanics. For more detailed information see the website: <http://www.ms.uky.edu/~snp/SNP51-IMAPICConf-Serrin>

Graduate Student Combinatorics Conference

The 9th Annual Graduate Student Combinatorics Conference took place at Minnesota April 19-21, 2013, returning home to its origins. Since Minnesota graduate students Dan Drake, John Hall, Ning Jia, Sangwook Kim, and Muge Taskin started this tradition in 2005, the GSCC has been organized by graduate students for the purpose of bringing together graduate students in combinatorics, letting them practice giving talks, learn about new topics, and get to know other graduate students in their field.

Last year's conference was organized by Alex Csar, Kevin Dilks, Al Garver, Emily Gunawan, Jia Huang, Thomas McConville, Alex Miller, Becky Patrias, and Nathan Williams, showcasing a full schedule of twenty minutes talks by graduate students in parallel sessions, along with three hour-long talks from our distinguished plenary speaker, Adriano Garsia of University of California, San Diego. Garsia is well-known as a gifted expositor, educator, and champion of combinatorics. He is the master of manipulatorics, a co-discoverer and explorer of the mysteries of diagonal harmonics, and has made many other deep contributions to representation theory, symmetric functions, and algebraic combinatorics. We were honored that Adriano Garsia agreed to be the keynote speaker for last year's GSCC.

In spite (or perhaps because) of the snow-filled April weekend, which delighted many of the Californians, the conference was a great success with about 100 attendees, approximately 80 of whom were out-of-town graduate students. Topics presented during the conference included combinatorial representation theory, matroids, permutation statistics, polytopes, posets, Ramsey theory, spectral theory of graphs, symmetric functions, tiling enumeration, tropical varieties, and numerous others.

Remembering Former Colleagues

George Brauer

George Brauer passed away on July 31, 2013. A memorial service was held for him on September 27 in the Mathematics



Department Library, attended by many from the department and also some family members. His brother Fred Brauer who is also a mathematician, now retired from the University of Wisconsin at Madison, provided fascinating insight into their earlier life. George was born on March 18, 1927 in Königsberg, Germany. His father was Richard Brauer, one of the giants of twentieth century algebra, and his mother was also a mathematician.

According to his brother, George did not have an easy time at school in Königsberg, where he was bullied. Things were not made easier when their father was dismissed from his position at Königsberg in the Spring 1933 and came to the United States to take up a position at the University of Kentucky for the year 1933-4. The rest of the family followed a few months later in 1934. George then experienced a number of moves in a short time, going to Princeton for the year 1934-5 and then Toronto from 1935 onwards. Fred reported that George had a hard time in school during all this. Richard Brauer took up a position at the University of Michigan in 1948, and it was at this university that George took his Ph.D, in 1954. He then immediately came to the University of Minnesota where he taught until he retired in 1996.

Everyone who spoke at his memorial service recalled that those who got to know George found him to be the nicest person you could hope to meet. They reminisced about his individual habits and style, which were indeed memorable. Several speakers mentioned that there had been an article in the Minnesota Daily at one point about George's office, illustrated by a photograph showing his desk under a pile of papers several feet high, this aspect being so remarkable that it merited the article. Less well known to those in the department were George's activities as a volunteer, especially after he retired. He volunteered every Wednesday at the University Retired Volunteer Center, and his job there was to match people who were available to tasks they might do, which he did by telephoning the people.

George was surely one of the department's more individual characters. He was a kind and considerate person who cannot be replaced.

Robert Ellis

Robert Mortimer Ellis was born in Cleveland, Ohio on September 16, 1926. He died on December 6, 2013.



Bob grew up in Philadelphia, and after a brief stint in the army studied in the Moore School of Engineering at the University of Pennsylvania. It was while he was there that he learned that his calling was mathematics. He received his Ph.D. at Penn in 1953, under Walter Gottschalk, and went on to a post-doctoral position at the University of Chicago where he met Elizabeth Wood, his future wife, who was then studying at the Divinity School there. They married and remained partners for the next fifty years.

After Chicago, Bob returned to the east coast and first taught at Pennsylvania State University between 1955 and 1963 where he was appointed Assistant Professor, and then in 1957 Associate Professor. He left Penn State to become a Professor at Wesleyan University in 1963. In 1967 he moved to Minnesota where he became a Professor in our department until his retirement in 1995.

Bob's life-long research interest was in the area of Topological Dynamics. In pioneering work from the 1950s he laid the foundations of an algebraic approach to this area, shaping many instruments that proved to be powerful tools. A particular example is the notion of an 'enveloping semigroup', which is now known as the 'Ellis semigroup', of a dynamical system. With such algebraic machinery he developed a deeper understanding of several fundamental relations in Topological Dynamics, such as the equicontinuity structure relation and the distal structure relation. This study resulted in what is now known as Ellis's Galois theory of distal extensions. The work leads to an alternate approach to proving deep structure theorems such as Furstenberg's structure theorem.

Altogether Bob was the author of about 40 research publications, which include a highly cited book from 1969 on topological dynamics in which he gave an exposition of his algebraic theory. The most recent publication is a book written with his son David entitled, 'Automorphisms and equivalence relations in topological dynamics', to be published by Cambridge University Press this year. David is Professor of Mathematics at Beloit College and has been a long-time collaborator. At the time of his retirement a conference was held in Bob's honor, on April 5-6 1995, at the University of Minnesota. The proceedings of this conference appeared as volume 215 in the AMS series Contemporary Mathematics.

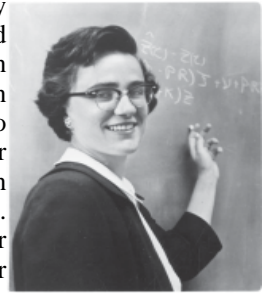
In addition to his research, Bob was a dedicated teacher. He was the advisor of five Ph.D. students, one at Wesleyan and four at Minnesota and he is remembered fondly by these, as well as by undergraduates and graduate students who took his courses. Although he was dedicated to his research, he always believed in the importance of education

and frequently gained solace in it when he felt his own work was not going well.

Bob lived in Minnesota for several years after retirement until he moved to Madison WI, where he continued to be active in research in retirement. He was elected a Fellow of the American Mathematical Society in the inaugural list of Fellows. He was involved in the care of his wife Betty until her death. He is survived by his son, a daughter and one grandchild.

Charlotte Striebel

Charlotte Striebel passed away on Wednesday March 12, 2014 at the age of 84. She was born on July 30, 1929 in Columbus, OH and attended Ohio State University as an undergraduate, where she obtained an M.A. degree in 1952. She went on to University of California Berkeley for graduate school and got her Ph.D. in 1960, working on stochastic processes. This remained the main area of her published research throughout her career. Between 1958 and 1964 she worked at Lockheed Missiles and Space Company in Sunnyvale, CA where she developed the initial workings of the GPS system in wide use today. She also analyzed satellite tracking data as well as statistics associated with Polaris missiles and the recovery of manned space capsules from the Gemini space program. After some time at the University of Chicago she joined the University of Minnesota in 1965, initially in the Statistics Department where she was an Associate Professor. She transferred to the Mathematics Department in 1966, again as Associate Professor. She retired at the end of the academic year 1995. She was the author of 14 published papers.



Charlotte was notable as a strong advocate for equal rights for women. She started a University group called WAMS, (Women Against Male Supremacy) which successfully agitated against the Minneapolis Star and Tribune for their "help wanted" ads listing jobs separately for men and women. She was a long-time member of NOW, the National Organization for Women, where she wrote the first report about the role of women in state employment in 1976. NOW subsequently named an annual award for her: the Charlotte Striebel Long Distance Runner Award, which recognizes a person who has demonstrated persistence, courage, initiative, cooperation and dedication on behalf of women's rights.

One of her most significant achievements was on behalf of girls and athletics. In the early 1970s there were few athletic opportunities for young women in the schools. Charlotte's daughter was a swimmer, but was refused the opportunity to swim for her school. Charlotte took the case to the Human Rights Department in St Paul, filed a lawsuit, and won the case. She subsequently worked with Representative Phyllis Kahn to pass a state law that required equal opportunity in athletics for girls on a state level. We now take it for granted that girls can be athletes as well as boys. At the same time as all this Charlotte became a law student and was awarded a law degree by the University of Minnesota in 1981.

Charlotte put her statistical expertise to good use in a couple of ways in the cause of pay equity for women and in the hiring of women. She made an analysis of statistical models of pay equity, using data from between 1968 and 1994, and this culminated in a statistical method for determination of local government compliance which is still used. She also made a statistical analysis which she used in support of a chemist, Shamala Rajender, who had been denied tenure at the University of Minnesota. That case was settled with a consent decree, and her work has continued to have an impact on the hiring of women faculty at higher education institutions.

After her retirement Charlotte divided her time between South Padre Island, TX, where she enjoyed sailboarding until the age of 82, and Bellaire, MI, where she spent the summers. She is survived by her son and daughter, her brother, and three grandchildren.

Awards and Recognition

Sergey Bobkov has been elected the recipient of a Humboldt Research Award. The award is granted in recognition of a researcher's entire achievements to date to academics whose fundamental discoveries, new theories, or insights have had a significant impact on their own discipline and who are expected to continue producing cutting-edge achievements in the future.

Kai-Wen Lan, Jasmine Foo and Pasha Pylyavskyy have each been awarded an NSF CAREER grant. The Faculty Early Career Development (CAREER) Program of the NSF offers the foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research. The fact that three candidates from our department have received these awards this year is quite unusual, and is perhaps unprecedented among mathematics departments.

Kai-Wen Lan has also been selected as a 2014 Alfred P. Sloan Research Fellow in Mathematics. These highly competitive awards are made to early-career scientists from the United States and Canada.

Mitch Luskin has been named a Fellow of the Society for Industrial and Applied Mathematics. The citation reads "For contributions to multiscale numerical methods for materials with microstructure and defects and atomistic to continuum models."

Peter Olver has been named a Fellow of the Society for Industrial and Applied Mathematics. The citation reads "For developing new geometric methods for differential equations leading to applications in fluid mechanics, elasticity, quantum mechanics, and image processing."

Alexander Shapeev, a postdoc working with Professor Mitch Luskin, has been awarded one of the 2013 SIAM Outstanding Paper Prizes for his paper 'Consistent Energy-Based Atomistic/Continuum Coupling for Two-Body Potentials in One and Two Dimensions'. The award was presented at the 2013 SIAM Annual Meeting in San Diego.

Craig Westerland is the winner of this year's Australian Mathematical Society Medal. The medal is awarded to a member of the Society under the age of 40 years for distinguished research in the mathematical sciences. A significant portion of the research work should have been carried out in Australia

Retirements

David Frank

Our colleague David Frank, who is retiring this year, was born in Kearny, New Jersey. He was an undergraduate at Columbia



University from 1960 to 1964. He so impressed the department chairman that he was made a teaching assistant while still an undergraduate. David went to graduate school at the University of California, Berkeley, from 1964 to 1967. His adviser was Morris Hirsch; he also profited from contact with the late Emery Thomas. This was a turbulent time

at Berkeley, and David became very active in the Free Speech movement. He was influenced by the leader of that movement, the late Mario Savio. After graduate school David was an N.S.F. postdoc at Oxford, and then a Moore Instructor at M.I.T. from 1968 to 1970. He then joined the faculty of the State University of New York at Stony Brook. David came to our department as an associate professor in 1975. David's work was in algebraic and differential topology. His most famous result was to show (independently with G. Brumfiel) that the well-known exact sequence of M. Kervaire and J. Milnor was actually a split exact sequence. He also attracted attention when he corrected an error of C.T.C. Wall (FRS). David played a role in the connection between number theory (particularly irregular primes) and differential topology, and also contributed to the solution of the problem of when a closed manifold admits two linearly independent tangent vector fields.

David served as Director of Undergraduate Studies for a total of 9 years and was the Director of Lower Division Programs in I.T. (now C.S.E.) from 1991 to 1994. He played a key role (along with Dean Hobbie) in creating the I.T. Honors Program which brought together the top entering students for a unified series of beginning courses in Math, Physics, Chemistry, Geology, and Computer Science, even before choosing a major. David was the first Director of that program from 1985 to 1989. He has also been Faculty Director of Individualized Degrees in the College of Continuing Education for more than a dozen years. We wish him the best of luck in his retirement.

Minnesota Center for Industrial Mathematics (MCIM)

The Minnesota Center for Industrial Mathematics (MCIM) develops and maintains the department's ties to mathematicians and researchers working in industry and national laboratories.

The centerpiece of the MCIM is the joint IMA/MCIM Industrial Problems Seminar. This seminar series, which has been running since 1987, gives students, postdocs and faculty members the

chance to learn about mathematical problems arising corporate research labs. This year the seminar hosted many speakers including Yigang Wang (Eaton Corporation), Jack Douglas (NIST), Jiaqi Yang (Schlumberger-Doll Research), Jeremy Brandman (Exxon-Mobil), Daniel Reich (Ford Motor Company), and Marina Brockway (VivaQuant). Many common issues were touched upon, including the need for sophisticated mathematical techniques that simplify the large amounts of data, help understand complex geology, and predict the behavior of materials.

Along with bringing leading researchers working industry, MCIM aims to help graduate students get summer internships. This year our students have been selected for internships at Exxon-Mobil, Schlumberger-Doll Research, Numerica Corporation, Cargill and at national labs.

School of Mathematics Center for Educational Programs (MathCEP)

MathCEP's flagship program, the University of Minnesota Talented Youth Math Program (UMTYMP), enrolled over 550 students this year in courses ranging from algebra through multivariable calculus and enumerative combinatorics. This year marked the return of UMTYMP to Rochester, where Jered Bright (who earned his masters degree in our department) has been teaching UMTYMP algebra. We have our sights set on other locations throughout the state in coming years.

Both UMTYMP and our enrichment programs rely heavily on MathCEP postdocs, who infuse our program with new ideas and energy. This spring we completed a successful job search by hiring two new postdocs, Daniel Schultheis and Bevin Maultsby. Schultheis earned his PhD in algebraic geometry in 2012 and is currently a Richard Pierce Postdoctoral Fellow at the University of Arizona. Maultsby finished her PhD in dynamical systems this spring at the University of North Carolina; she is already known to many people in our department through her participation in the Mathematics and Climate Research Network (MCRN).

Their arrival means we must also say farewell to two of our colleagues who are moving on from the postdoc position. Jane Butterfield has accepted an appointment of Assistant Teaching Professor at the University of Victoria, British Columbia, and David Clark will be an Assistant Professor at Grand Valley State University in Michigan. Both have been invaluable during the past few years in improving our programs, and will be missed.

Two students, Scott Flancher and Nikki Ness, will earn the MS in Math with an Emphasis in Math Education degree this year. The program has traditionally combined an MS in Mathematics with a secondary teaching license, but many of our past graduates have taken positions at community colleges instead of public high schools. This year we worked with Normandale Community College to create a new track within the degree program specifically for students are interested in that career path; public school observations and student teaching are replaced with work experience at Normandale. Ness volunteered to be the pilot case for this

new track, and will be the first student to earn the new variant of the degree.

Our enrichment and teacher professional development programs continue to be strong, and include new collaborations this year. In conjunction with the IMA, we are offering a Math Modeling Camp for High School students in July. We are also offering a program for high school teachers in cooperation with both the IMA and MCIM in June, supported by a grant from Toyota and the Rochester Institute of Technology.

Minnesota Center for Financial & Actuarial Mathematics (MCFAM)

MCFAM has 344 students this year - 236 Actuarial students and 88 MFM (Master of Financial Mathematics) students. The same trends as last year continue. The number of actuarial students grew again versus a year ago but at a lesser rate. The number of MFM students remained steady.

This was another stimulating year for the MCFAM Distinguished Lecture Series. The fall lecturer was Dr. Renee Carmona, the Paul M. Wythes '55 Professor of Engineering and Finance at Princeton University, who lectured on "High Frequency Trading: New Challenges for Mathematicians" on 12/6/2013. Dr. George Papanicolaou, the Robert Grinnett Professor in Mathematics at Stanford University gave a lecture on 2/21/14 regarding "Systemic Risk". At the end of April, 2014 Dr. Hans Leida, a principal at Milliman and PhD in Mathematics from the University of Wisconsin-Madison, gave a lecture called "Healthcare Reform: Actuarial Problems and Solutions".

MCFAM also launched some new activities and expanded existing ones in 2013. The first annual MCFAM Symposium was funded by Securian Financial Group and held in mid-July. The Symposium theme was Modeling Risk in Banking and Insurance: Catching the Next Crisis. It attracted about 80 practitioners and students from the Twin Cities area and included 11 lectures and panels that were presented over the weekend by local and international practitioners and professors.

The Actuarial Mentoring Program grew from 26 pairs of mentors/mentees in 2011-2012 to 61, as it was incorporated into the CSE Mentoring Program during 2013-14. In this program students get to know their mentors and learn what it takes to be an actuary in insurance and consulting firms. The Actuary Club and The Financial Mathematics Student Association (FMA) each ran their own career fairs with successful turnouts. The FMA held its first "Chicago Trek", organizing a day in Chicago to visit practitioners at the Chicago Mercantile Exchange, a hedge fund, a trading firm and a clearing corporation.

MCFAM started an annual panel called "How I Became a Quant" sponsored by the International Association of Quantitative Finance (IAQF). Students considering a career in Financial Mathematics from MCFAM, Statistics, Economics, Computer Science and Carlson/Finance at the University of Minnesota were invited to attend the MFM networking event on March 28, 2014. About 95 people were in attendance and came away very excited about the profession after hearing from 6 local/regional quants. All but one of the panelists were alumni of the MFM program. The moderator was Professor Carlos Tolmasky.

Finally we are happy to report the new additions to the MCFAM academic team. In January 2014, Dr. Carlos Tolmasky, after being in industry for 17 years, joined the University full time and began splitting his duties between the IMA and MCFAM. He is continuing to teach in the MFM program and is also doing research within MCFAM. Last fall Dr. Kaisa Taipale, who got her PhD in Mathematics at the University of Minnesota, began teaching the preparatory sequence for MFM.

Math Library News

Spring semester provided a nice example of the pay-off from the Libraries' ebook subscriptions: students in Prof. Carme Calderer's Math 5588 had no-cost online access to their textbook, *Introduction to Partial Differential Equations* by Prof. Peter Olver. Additionally, since the subscription also activates Springer's MyCopy program, they could opt to buy their own paperback copy for \$25—saving 2/3 off the (comparatively moderate) list price. This benefit is available from a few other publishers: the library's subscription to SIAM's ebooks similarly qualifies UMN students for a discount on print copies. Such cases provide significant savings to students and represent one strategy for counteracting high textbook costs, estimated by the College Board to average \$1200 per student per year.

The Mathematics Library's Reserve Collection also makes print copies of all math and statistics textbooks available for short check-out; this specific focus of a library's traditional lending role has long been supported by the School of Mathematics supplying instructor copies and by monetary donations to the Library's gift fund, as well as by regular library purchases. It can be simply a convenience, so that students can spend an hour on a problem set without having to carry their heavy textbook around all day; but occasional access to the Library's copy of the student solutions manual, for example, may actually be enough to spare a student from having to purchase their own. It is with such cost-avoidance in mind that the Library updated its holdings of actuarial exam study guides, in consultation with the Minnesota Center for Financial and Actuarial Mathematics.

Open textbooks represent another solution: not only are they available free online to anyone, but they can be tailored to a specific course by re-mixing and revising their content. Prof. Victor Reiner has taught from one of the first open textbooks, the single variable calculus book written at Whitman College. Now there are enough of them, in various subjects, that the Open Textbook Library website was created by UMN's College of Education and Human Development to review them; the UMN Libraries are collaborating with CEHD in a grant-funded project to support adoption of high-quality open textbooks at partner institutions across the country. It will be interesting to see how this emerging approach fits into the various efforts to limit students' costs

IMA News

The IMA thematic annual program for the 2013-2014 academic year is on "Scientific and Engineering Applications of Algebraic Topology". When the organizers conceived of this program nearly four years ago, the goals they set were to bring recent developments in algebraic topology to the engineering and scientific community, and to make the IMA the gathering place for mathematical scientists, engineers and other scientists who are developing research in applied algebraic topology. The research areas receiving attention include data analysis, computational biology, dynamical systems, communication and networks. The program has been really successful. Nearly every workshop has been "sold out". The IMA has been bustling with many long-term visitors, postdocs, and faculty and students from the School of Mathematics faculty and student participants. One year-long visitor is Irina Kogan who received her PhD under Peter Olver in 2000. She is currently Associate Professor of Mathematics at North Carolina State University. As part of the year's activities, Doug Arnold is teaching a semester long course on Finite Element Exterior Calculus.

As the annual program winds down, the IMA is preparing for a busy summer. The IMA is offering a three-week course on "Topics in Control Theory" in June. The program previews the 2015-16 annual thematic year in Control Theory. The six-week REU with Macalester College is again taking place this summer. The popular Math Modeling in Industry workshop will take place in Vancouver, Canada, this year. The IMA is also organizing a collaborative workshop for women in numerical analysis and scientific computing. In this workshop, aptly named WhAM!, participants will work in teams under the mentorship of senior women mathematicians. The goal for each team is to start on a project on which they will continue working remotely after the workshop.

This summer, the IMA is joining forces with MathCEP to offer a week-long camp on mathematical modeling. High school students will work in teams under the supervision of math teachers on open-ended word problems in the style of the Mathematical Contest in Modeling. The demand for this kind of activity has been overwhelming – we received more than 50 applications for the 30 or so slots.

The Fourth Abel Conference, in honor of Yakov Sinai, is being organized for the Fall of 2014. This conferences series, which celebrates the work of the Abel laureate, is a collaboration between the IMA and the Norwegian Academy of Science and Letters. Sinai is recognized for his contributions to dynamical systems, ergodic theory, and mathematical physics.

Undergraduate Program

From the Director of Undergraduate Studies

Teaching assistants Robert Hank, Daniel Hess, and James Melbourne won the 2012-13 Outstanding Teaching Assistant Award. Students in mathematics courses submitted more than 600 nominations in support of their TAs.

Twenty-six of our more than 600 math majors were awarded merit scholarships from the department totaling \$45,000 through the Thorpe, Lando, Richards, and Hart funds. In addition, five math

majors were awarded merit scholarships from the College of Science and Engineering.

Students at the University of Minnesota performed very well in mathematical competitions this year. The Putnam competition hosted 4113 contestants from 557 schools. Ten students from our school participated and three finished in the top 500: Ankan Ganguly (95th place), Andrew Senger (136th place) and Yao Rui Yeo (333rd place). The University of Minnesota (Twin Cities) team placed 18th overall.

Six teams from the University of Minnesota (Twin Cities) competed in the North Central Team Mathematics Competition of the Mathematical Association of America. All of our teams finished in the top 20, out of a total of 83 teams. There was a 2-way tie for first place between teams from UMNTC and Carleton College. Another of our teams placed third, and a third of our teams tied for fifth place.

Graduate Program

Graduate Student Fellowship Awards

Richard McGehee, Director of Graduate Studies in Mathematics and The Graduate School congratulates the following graduate students who received fellowships.

Andrew Binder, 2013 National Defense Science & Engineering Graduate (NDSEG) Fellowship, Mitchell Luskin, advisor.

Steven Collazos, 2013 National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP) Fellowship, Victor Reiner, advisor.

Alexander Gutierrez, 2013 National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP) Fellowship and College of Science & Engineering (CSE) Graduate Fellowship, Richard Moeckel, advisor.

Katherine Meyer, 2013 College of Science & Engineering (CSE) Graduate Fellowship, Richard McGehee, advisor.

Bryan Poling, 2013 Doctoral Dissertation Fellowship, *Exploiting Dimensionality Constraints to perform Joint Segmentation and Tracking in Motion Video*, Gilad Lerman, advisor.

Joshua Wilson, S2013 College of Science & Engineering (CSE) Graduate Fellowship, Vladimir Sverak, advisor.

Ph.D. Graduating Students

Richard McGehee, Director of Graduate Studies in Mathematics and The Graduate School congratulate our recent graduating Ph.D. students (February, 2013 to February, 2014).

Ching-Hao Chang, *Isotopy of nodal symplectic spheres in rational manifold*, Tian-Jun Li, advisor; Postdoc, Academia Sinica, Taipei, Taiwan.

Haojie Chen, *Generalized complex structures on 4-manifolds*, Tian-Jun Li, advisor; Teaching Specialist, University of Minnesota, School of Mathematics, Minneapolis, MN.

Haoran Chen, *A Dynamic Model of Polyelectrolyte Gels*, Yoichiro Mori, advisor; Teaching Specialist, University of Minnesota, School of Mathematics, Minneapolis, MN.

Hao Feng, *On three-dimensional Navier-Stokes equations with axi-symmetric vortex rings as initial vorticity*, Vladimir Sverak, advisor.

Xiaoqing He, *The effects of diffusion and spatial variation in the Lotka-Volterra competition-diffusion system*, Wei-Ming Ni, advisor, Postdoctoral Fellow, National Tsing Hua University, Hsinchu, Taiwan.

Jia Huang, *0-Hecke algebra actions on flags, polynomials, and Stanley-Reisner rings*, Victor Reiner, advisor; Postdoctoral Associate, School of Mathematics, University of Minnesota, Minneapolis, MN.

Hao Jia, *On some regularity problems in the theory of Navier Stokes equation*, Vladimir Sverak, advisor; Dickson Instructor, Department of Mathematics, University of Chicago, Chicago, IL.

Christopher Kim, *Contracting Convex Torus by its Harmonic Mean Curvature Flow*, Robert Gulliver, advisor; Postdoctoral Fellow, School of Mathematics, University of Minnesota, Minneapolis, MN.

Ji Hee Kim, *Concentration of Empirical Distribution Functions for Dependent Data under Analytic Hypotheses*, Sergey Bobkov, advisor.

Xu Li, *On fully nonlinear elliptic and parabolic equations in domains with VMO coefficients*, Nicolai Krylov, advisor; AVP, Risk Analytics, Risk Modeling, Citi, Elmhurst, NY.

Baiying Liu, *Fourier Coefficients of Automorphic Forms and Arthur Classification*, Dihua Jiang, advisor; Wylie Assistant Professor/Lecturer, The University of Utah, Salt Lake City, UT.

Gang Liu, *On manifolds with Ricci curvature lower bound and Kahler manifolds with nonpositive bisectional curvature*, Jiaping Wang, advisor; Morrey Assistant Professor, University of California Berkeley, Berkeley, CA.

Alexander Miller, *Reflection arrangements and ribbon representations*, Victor Reiner, advisor; Visiting Teaching Assistant, School of Mathematics, University of Minnesota, Minneapolis, MN.

Xin Shen, *Unramified computation of tensor L-functions on Symplectic groups*, Dihua Jiang, advisor; Postdoctoral Fellow, University of Toronto, Ontario, Canada.

Robert Thompson, *Applications of Moving Frames to Group Foliation of Differential Equations*, Peter Olver, advisor; Postdoc, Visiting Assistant Professor, Macalester College, St. Paul, MN.

Nathan Williams, *Cataland*, Dennis Stanton, advisor; Postdoc, LaCIM, Montreal, Quebec, Canada.

Qiliang Wu, *Defects and Stability of Turing Patterns*, Arnd Scheel, advisor; Visiting Assistant Professor, Michigan State University, East Lansing, MI.

Guowei Yu, *Homoclinic and Heteroclinic Orbits in Lagrangian Dynamical Systems*, Richard Moeckel, advisor; Postdoctoral Fellow UTM, University of Toronto, Ontario, Canada.

Yifei Zhu, *The power operation structure on Morava E-theory of height 2 at the prime 3*, Tyler Lawson, advisor; Lecturer, Northwestern University, Evanston, IL.

School of Mathematics

University of Minnesota
127 Vincent Hall
206 Church Street S.E.
Minneapolis, MN 55455
<http://www.math.umn.edu>
dept@math.umn.edu
Telephone: (612) 625-5591
Fax: (612) 626-2017

Department Head:

Peter Olver
olver@math.umn.edu
Telephone: (612) 625-5591

Graduate Studies

Richard McGehee, Director
mcgehee@math.umn.edu
Telephone: (612) 624-6391

Undergraduate Studies:

Bryan Mosher, Director
Telephone: (612) 625-4848
mosher@math.umn.edu

Minnesota Center for Financial & Actuarial Mathematics (MCFAM)

Rina Ashkenazi, Academic Director
Laurie Derechin, Executive Director
Telephone: (612) 626-8057
mcfam@umn.edu

Institute for Mathematics and its Applications (IMA)

Fadil Santosa, Director
Jiaping Wang, Deputy Director
Richard Braun, Associate Director
Carlos F. Tolmasky, Associate Director
Chehrzad Shakiban, Associate Director for Diversity
400 Lind Hall
207 Church Street S.E.
Minneapolis, MN 55455-0463
<http://www.ima.umn.edu>
Telephone: (612) 624-6066
Fax: (612) 626-7370

Minnesota Center for Industrial Mathematics (MCIM)

Daniel Spirm, Director
<http://www.math.umn.edu/mcim>
mcim@umn.edu
Telephone: (612) 625-2004
Fax: (612) 624-3333

School of Mathematics Center for Educational Programs (MathCEP)

Jonathan Rogness, Director
4 Vincent Hall
206 Church Street S.E.
Minneapolis, Mn 55455
<http://www.mathcep.umn.edu/>
Telephone: (612) 625-2861
Fax: (612) 626-2017

The Newsletter Committee is composed of Peter Webb (Chair), Bonny Fleming, Jasmine Foo, Gregg Musiker, Peter Olver, Pavlo Pylyavskyy, Harry Singh.

©2014 Regents of the University of Minnesota. All rights reserved.
The University of Minnesota is an equal opportunity educator and employer.

School of Mathematics

University of Minnesota
127 Vincent Hall
206 Church Street S.E.
Minneapolis, MN 55455