



Giving Undergraduates a Head Start

by Gloria Mari-Beffa

The Undergraduate Research Scholars program is a campus program that provides research experiences for freshmen and sophomores on campus. Professors are often weary of working with freshmen: not enough preparation or maturity. But this year I decided to jump in with a project on the study of coordinates in the moduli space of polygons in flat Lorentzian and Galilean Geometries and their relationship. It is well known that if the speed of light (c) is considered infinite (as in our usual everyday world), the Lorentzian model approaches the Galilean one. Students needed to find discrete invariants (or curvatures) of polygons in both geometries and connect them as c goes to infinity.

I selected **Adrien Bossoyo-Egoume**, **Thomas Hameister** and **Phu Nguyen**, three students with plenty of enthusiasm and energy. Their first semester was a rough one; there was a lot to learn: linear algebra, groups, Lie groups, Lie algebras, manifolds, homogeneous spaces, Cartan geometries and moving frames. There was a little of a lot of things—years in a few months—and the trio was not used to moving ahead without having mastered well what they just learned. Still, they soldiered on, opened their minds, and learned about group actions, transformations and how we algebraically describe the geometries associated with our real world. During the second semester they plunged into the problem, creating discrete moving frames along polygons in

both geometries. Some calculations were tough, but they paused and thought and interpreted things geometrically so they would make sense. They read books in relativity, applied factorizations that I had never heard of and did a most terrific job! They indeed solved the problem, finding discrete curvatures in terms of hyperbolic cosines, torsions in terms of volumes, and proving that as c grows, the Lorentzian curvatures and torsions approached those in the Galilean model. The hours I spent with these students have been some of the best this year as I watched them transform from a somewhat intimidated group, lost in a sea of definitions and theorems, into a team eager to “prove the general case!”

Great job, team! ■

A Word from the Chair

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Dear Friends:

This is my first year as Chair, and what a year it has been! From the many awards and achievements of our faculty and staff, to the budget upheaval and, yes, the Badgers’ Final Four run, this year has not been for the faint of heart! In the middle of it all, the Mathematics Department has continued to do what it does best: first-rate research, effective and innovative teaching and far-reaching outreach activities showing that our beloved “Wisconsin Idea” is alive and kicking in Van Vleck Hall.

One of the main pieces of news in 2015 has been the projected cut of ~13% to the budget of the UW system. This comes on the heels of a previous 8% cut just a few years ago, and a much longer period of stagnant salaries and decreasing support. In the face of these very difficult times, the answer from Van Vleck has been to aim even higher: we now have budget-neutral plans to both increase the salary of our TAs by 25% to give them a pay raise and to reduce the teaching load of our postdoctoral Van Vleck Assistant Professors. These changes will allow us to compete more effectively for the very top talent. We also recruited four of the best mathematicians in the market; two of them joined us this year and two will join us in 2015–16. And, of course, our faculty, students and staff continue to accumulate honors and recognitions, all of which you will be able to read about within these pages.

Giving us a helping hand during these uncertain times is our VISP/Masters program. The program has expanded to include agreements with Shanghai Jiao Tong, Nanjing, Nankai and Sun Yat-Sen Universities. The program has been very successful: the first cohort graduated this year, with 11 of the 14 students admitted into graduate schools at the level of UW–Madison or higher! We wish them the very best for a successful career, and we also welcome the new incoming class.

If one word defines these times it is change: campus and the College are moving to a new budget model where teaching and research metrics will guide investment decisions. I am happy to report that Mathematics’ metrics are through the roof. We are the department with the highest teaching metrics on campus (while at the same time being a leader in teaching innovation). We are also in the top group of research units, and stand out as having the youngest department among peers. Our department is indeed very well positioned for the future.

The year 2014–15 has also been a sad one due to the loss of many of our emeriti: Hans Schneider, Howard Conner, Anatole Beck and Arnold Johnson. Some of them were truly iconic names in our department and we will miss them. We also lost Alec Johnson, a former student of James Rossmann, to a tragic accident. Alec graduated in 2011 and was well known to many of us for his continuous dedication to helping those in need.

Finally, I would like to thank our many alumni and friends who have contributed to the department. You are truly crucial to the department’s excellence and we very much appreciate your support. ■

Gloria Mari-Beffa, Chair

Laura May, Class of 2015: Why Math?

By Alex Hanhart

The majority of undergraduate majors will not continue their academic studies upon graduation. Most are looking forward to a career and wondering what they have to offer the world. If the average major is using their college experience as a stepping stone to a career outside of the academy, then why choose to major in math? What value does our program have?

“The way that I think is different,” says Laura May (2015). “I approach problems in a much different way than my classmates in my operations management courses.” Laura is a mathematics major whose interest is in applications to decision theory, management, and optimization. She takes coursework in the school of business as part of her major program. Her eventual goal is to work in health administration.

“In class projects, I often take the lead in the technical aspects. I typically find myself explaining details to non-experts.” In particular, Laura seems to enjoy the yin-yang relationship between our department and others: “In the business school we use models to solve problems, whereas in the math department we see where the models come from and what the assumptions are.”

This, perhaps, is the most valuable skill that our majors will possess after graduation: A deeper understanding of



the way in which mathematics is used to model the world. Recent times have shown us that poorly understood (or even willfully misapplied) models can lead to financial and social trouble. Current issues are replete with examples of models applied to areas outside the “hard sciences” with widespread social impact including financial instruments, recidivism, teacher evaluation, public health policies, and political elections.

Some pundits go so far as to claim that mathematical knowledge is an issue of social justice. If this is true, then the students of UW–Madison are doing their part, as mathematics continues to increase in popularity among our undergraduate population. The number of declared math majors has increased from

266 in the spring of 2010 to 427 in the spring of 2014 (for reference, the total undergraduate student body increased by about 3% in the same time span). In the academic year 2014–15 there have been nearly 200 new declarations of math majors and certificates.

“You’ve got to be able to evaluate your model,” says Laura. A great lesson for all of our undergraduate students soon to become members of a mathematically savvy population with much to offer future employers and society in general. “Mathematics has opened a lot of doors for me and I’m looking forward to what happens next!” ■

Welcome Alex Hanhart

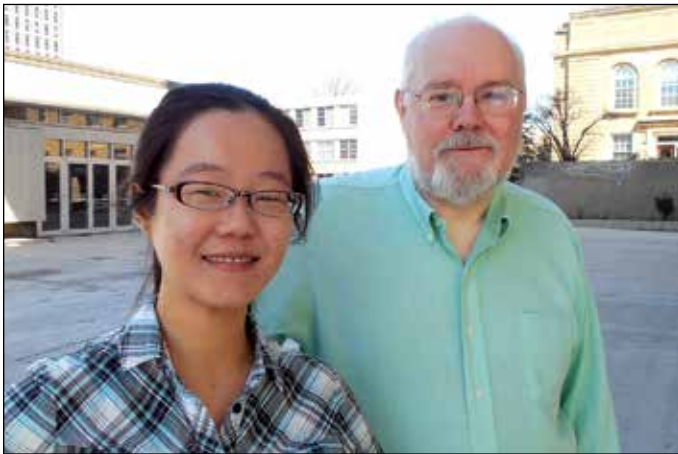
Alex Hanhart joined our department as the Assistant Director of Undergraduate Studies in 2014. He graduated from the University of Minnesota in 2009, under the supervision of Alexander Voronov. He comes to us via New York University, where he worked as a Clinical Assistant Professor, working to coordinate and manage undergraduate instruction in the Math Department. We created Alex’s position in order to give greater focus to our undergraduates in terms of planning, instruction and advising. Alex will also be teaching Calculus 1 (221) in the fall. ■



UNIVERSITY COMMUNICATIONS

Advisor and Student Journey: Graduating and moving to industry.

Our graduate students have plans for what to do after they leave and their advisors help them reach their goals. Ting-Ting Nan joined Google after obtaining her Ph.D. this spring and she discusses how her degree has helped her. Nigel Boston talks about what it means to advise a student, no matter where they may go.



Ting-Ting Nan and Nigel Boston

Student Perspective: Ting-Ting Nan

It is my pleasure to share my experiences in the Math Department at UW–Madison. There are many ways in which the Math Department has helped me accomplish my career goal.

My thesis research with professor Nigel Boston concerns a conjecture in information theory and network coding. Surprisingly, this conjecture appears in many areas in math, ranging from probability theory, matroid theory, group theory, to optimization, and the list goes on. The point of view of information theory can be further applied to solve questions in different fields, such as communication, statistics, signal processing, genetics and bioinformation.

The Math Department offers many cross-listed courses, in which I have found many fascinating topics in non-mathematical fields that are worth exploring. These courses are the stepping stones for advanced inquiries in interdisciplinary fields, and they have given me ideas about how mathematics can be applied in industry.

The training from our department enables us to think critically and then frame the most effective solutions. The process of problem solving is what leading companies value most in promising future employees.

We're looking for people who have a variety of strengths and passions, not just isolated skill sets ... We're less concerned about grades and transcripts and more interested in how you think ... Show us how you would tackle the problem presented (don't get hung up on nailing the "right" answer). (Google Inc., *How We Hire*)

In my opinion, such processes of creative and critical thinking is why we stand out from peers in computer science and engineering. It is also fundamental for building up effective algorithms and debugging. Strong coding skills, though, are a basic requirement for most job positions, yet those skills

can be acquired through intensive exercises. However, analytical mind-processing cannot be obtained in a short period of time and, fortunately, we have that skill already.

The most difficult part of my job search was getting the first phone interviews after submitting resumes. When I reached the final round of the interview process, one of Nigel's past students shared with me how to prepare for on-site interviews. From my own experience, social networks are indeed helpful for people who are seeking or will be seeking industry jobs because they provide potential jobs via employee referral or offer insiders' views of interview preparation and work circumstances.

I am truly grateful for everything the Math Department has provided me throughout my time as a Ph.D. student, and I hope my experience is helpful in presenting a possible trajectory for a life career.

Advisor Perspective: Nigel Boston

I first got into applications of algebra in 1993 because the newly built Newton Institute in Cambridge, UK, had very few books in its library—one of which, on coding theory, I read. My then-student, Judy Walker, asked for a problem to work on; I suggested a coding theory one. Through her I started talking with electrical engineers at UIUC, where I then was, and she is now a professor and chair of coding theory at Nebraska. When the opportunity arose to move to UW–Madison as a cluster hire, I took a split appointment and am now 50% in Math and 50% in ECE, which allows me to work on many aspects of pure and applied algebra.

I have graduated 30 Ph.D. students, many working on applications, which includes coding theory, cryptography, network information theory, face and pattern recognition, digital watermarking, and control theory.

Historically, engineers have applied complex analysis, PDEs, and probability, but in recent years algebra has found growing uses. Coding theory and cryptography for the accurate and secure transmission of information, respectively, have the longest pedigree, but the time is ripe for broader applications of algebra. For example, with Yu Hen Hu of ECE and Charles Dyer of CS, I applied new invariants of Lie groups to perform face recognition. Invariants such as curvatures are too sensitive to noise, whereas our more robust invariants led our team to 2nd place in 3D in the national Face Recognition Grand Challenge.

Most recently I have been working with Ting-Ting Nan on the entropic region, a region of fundamental importance that can be described using probability or finite group theory. Her Ph.D. work describes this mysterious region better, with potential applications to computing network coding capacities, which give by convex optimization on the region the maxi-

mum rates at which information can travel through networks.

My students have taken jobs with industry, finance, the government, and academia. The government, in the form of NSA and CCR/IDA, is the biggest recruiter of mathematics Ph.D.s. Financial companies, such as Credit Suisse and McKinsey, also like to hire mathematicians, often preferring to teach them finance rather than teach mathematical thinking to finance students. Industry can be the trickiest for mathematics Ph.D.s, since hiring is often managed by human resources groups that are more familiar with CS and ECE

backgrounds. As in other venues, being a known quantity, such as through an internship, helps your chances of later employment. As the value of algebraic methods continues to increase in industry, I look forward to my applied algebra students being in greater demand. Our \$2M RTG proposal, recently recommended by NSF for funding, has an emphasis in applied algebra, with provisions for students to work in Wisconsin Institutes of Discovery (WID), where we recently held the second Applied Algebra Days conference. The future for the area looks bright. ■

Advisor and Student Journey: Graduating and moving to academia.

Much like Ting-Ting, Balázs Strenner's work at the Math Department helped form his career plan, and working with his advisor, Richard Kent, he was able to make great strides in his research and obtain his next job in academia, a prestigious postdoctoral position at Princeton.

Advisor Perspective: Richard Kent, Assistant Professor

As I write this, I have just returned from a mentoring workshop at Tufts University for Ph.D. advisors in mathematics. The workshop was quite informative and stimulating, and I feel better equipped in this aspect of my job having attended. The advising of Ph.D. students is an intimidating task. On the face of it, one must guide students into mathematics and train them to be autonomous mathematicians capable of carving out paths of research that breach the frontiers of knowledge. In addition to that lofty goal, one must also guide students professionally as they become educators, writers of research papers, public speakers, and further still as they build professional networks and seek employment in academia or industry. And all of this must be done in a few short years. I am just completing this process for the first time, as my first student, Balázs Strenner, completes his degree.

Balázs studies homeomorphisms of surfaces, particularly their stretch factors. This can be understood quite practically via the familiar problem of mixing. If a vat of liquid needs mixing, a simple method is to insert several rods into the liquid and move them around. Different movements yield different rates of mixing, and these rates (suitably idealized) are the subject in Balázs's research. If the liquid is very thick, like caramel or taffy, then one may imagine mixing as a sequence of stretches and folds, which is why the term stretch factor is used.

With coauthor Hyunshik Shin of UIC, Balázs has proven a beautiful theorem on stretch factors resolving an old problem known as Penner's conjecture—the conjecture posits that the most efficient movements for mixing are all made from simple movements in a particular way, and Shin and Strenner show that this is not the case. Their proof is remarkably beautiful, elegant, and swift (shorter than this essay). A colleague has remarked that theirs is the proof from The Book—the Book being the book in which God, according to mathematician Paul Erdős, keeps the best proofs of all theorems.



Richard Kent and Balázs Strenner

Balázs has subsequently proven several other important theorems, but here I would like to say more about how he works. Balázs is occasionally taken by flashes of insight (the rare experience we all cherish), and spends much time in contemplation as we all do, but he also often takes a scientific approach. By this I mean that he approaches problems the way a biologist might. He begins with selected examples and his computer collects data and observes behavior, and, after informed—often enlightened—contemplation, he discerns the general behavior and proves his theorems. This may sound a reasonable method to a general scientific audience, but in mathematics it is a rare approach that is even more rarely successful. Given that I work in a completely different (more wholly meditative) fashion, I find it completely remarkable that anyone can work this way, and I have learned quite a bit from Balázs by observing the process in him.

Balázs is also very quick with technical details, whereas I am not. I tend to think very slowly in intuitive, visual, often cloudy, geometric terms, my thoughts coming into focus over long periods of time. After much meditation of this

Advisor and Student Perspectives continued

kind, I am on rare occasions gifted with cherished flashes of insight, but more commonly find myself grappling with technical detail to wrench the picture into focus. Throughout our relationship, I have found that our styles of working are complementary, and I hope that I have had some influence on his thinking.

Balázs has distinguished himself early on as an exceptional scholar and award-winning educator, and I have learned a great deal from him on both fronts. He is leaving Wisconsin with several theorems of an unusual caliber, and will continue his work in the fall as a postdoctoral member of the Institute for Advanced Study in Princeton, New Jersey. I will have the distinct pleasure of following him there, as I will be visiting the Institute for its special year on Geometric Structures.

Balázs has come quite far from the student I first met a few years ago. At first he was the student in my topology course solving the difficult supplementary problems, then the student hungry for more foundational material to read, then the one hungry for problems, the one bringing problems to me, and finally the one bringing me solutions and theorems. I have done my best to give him my most thoughtful guidance in mathematics, education, profession, and life, but his remarkable achievements are due to his own insight and dedication. As we move into the future, I will continue to provide the guidance I can as he moves from the postdoctoral role to the professorial one and becomes an advisor himself. He is now my colleague, and I hope that, with work, I can cultivate in my future students a fraction of the success I have seen in him.

Student Perspective: Balázs Strenner

I was born and raised in Hungary and lived there until I started my graduate studies at UW–Madison in 2010. I participated in a lot of math contests in elementary, middle and high school, and it was pretty clear to me that I wanted to become a mathematician (although I also thought about becoming a physicist or computer scientist for some time). While completing my undergraduate degree at the Eotvos Lorand University in Budapest, finding my specialty within mathematics was quite a meandering path: I remember being excited about combinatorics, followed by number theory, then algebra, and finally analysis. In the last two years of the 5-year program, I took courses in complex, real and functional analysis, and the topic of my master's thesis ended up being what in Hungary we called real analysis, but what in the U.S. counts as the descriptive set theory branch of mathematical logic.

Given my background, it may be a bit of a surprise that my current research interests are in low-dimensional topology; when I met my undergraduate topology professor a few years ago, he said he would never have imagined me doing topology. Low-dimensional topology is a branch of mathematics that studies shapes of dimension 2, 3 or 4. Such shapes include the surface of a ball, the surface of a doughnut, or the 3-dimensional space minus a knotted piece of string. My work focuses on deformations of shapes that can be described as surfaces of doughnuts with more than one hole. Certain such deformations can be assigned stretch factors that describe how much shape gets stretched. Not every number can be the stretch factor of such a deformation, and determining exactly which numbers can be stretch factors is a difficult question. For instance, 2, $4/3$, π or $\sqrt{2}$ cannot be stretch factors, but $1+\sqrt{2}$ can. In my dissertation, I am proving a result about how complicated these stretch factors can get.

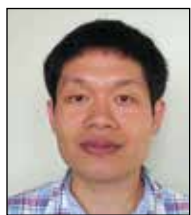
I became interested in low-dimensional topology in my second year after my advisor, Richard Kent, gave me some books on William Thurston's pioneering work and some problems to think about. I really appreciated that Richard gave me complete freedom in choosing my research questions, and was willing to advise me on topics that were not strictly related to his own research. I also had inspiring conversations with Jean-Luc Thiffeault whose primary research area is applied mathematics and fluid dynamics, but he also did work on stretch factors that have applications to the efficiency of mixing of fluids.

Because of its size and diversity, the UW–Madison Math Department should be seriously considered by any student applying to graduate school, especially those not yet certain about his or her research interests. I came to Madison to study analysis, and changed my mind on the way; it is great that the department has the flexibility and resources to allow for such a change. I would also highlight the great teaching opportunities one encounters here. I had the opportunity to teach courses of various levels, and on several occasions I had the experience of teaching a course as a primary instructor.

Although I have thought about continuing my career in industry (software engineering or finance), I have decided to stay in academia because I like both the research and teaching aspects. I am continuing my research next year at the Institute of Advanced Studies in Princeton as a participant of the year-long special program on Geometric Structures on 3-manifolds. After that, I am hoping to find a postdoctoral position either in North America or back in Europe. ■

Departmental Updates

New Tenure-Track Assistant Professors



Changwoo Kim joined the Math Department in 2014 as a tenure-track Assistant Professor. His research is in the field of partial differential

equations. He studied at Brown University with Yan Guo and graduated in 2011. From 2011–2014, he was a postdoctoral fellow at the University of Cambridge.



Simon Marshall joined the Math Department in 2014 as a tenure-track Assistant Professor. His research is in the area of analytic number theory. He is particularly interested in the properties of arithmetic manifolds, such as their cohomology, and how much their eigenfunctions can concentrate. He graduated from Princeton University in 2010, studying under Peter Sarnak.

Simon Marshall joined the Math

New IT staff



Henry Mayes joined the Mathematics Department in August 2014. He was part of a joint Math-Botany IT initiative aimed

at extending our resources to cover both departments in Help Desk duties. Henry came to Wisconsin from California, with experience helping people with their computers via the Geek Squad at Best Buy in Madison. Henry's been immersing himself in both departments and has been invaluable in our operations.

New Van Vleck Assistant Professors



Bobby Grizzard is a Van Vleck Assistant Professor who joined the department in 2014. He studied at the University of Texas-Austin under

Jeffrey Vaaler and graduated in 2014. He is interested in the solutions of polynomial equations in one variable (the theory of algebraic numbers), and in the algebraic solutions to polynomial equations in several variables.



Manuel Gonzales Villa joined our department as a Van Vleck Assistant Professor in 2014. He graduated from Universidad Com-

plutense de Madrid in 2010, studying under Ignacio Luengo Alejandro Melle-Hernandez. His research involves quasi-ordinary hyperspace singularities.



Jessica Lin joined our department as a Van Vleck Assistant Professor in 2014. She graduated from the University of Chicago in 2014,

studying under the supervision of Takis Souganidis. Her research is about partial differential equations, including regularity theory for PDEs and qualitative properties of PDEs in random media.



Christine Bartholemew Offerman joined us as a Van Vleck Assistant Professor in 2014. She studied at Tufts University, graduat-

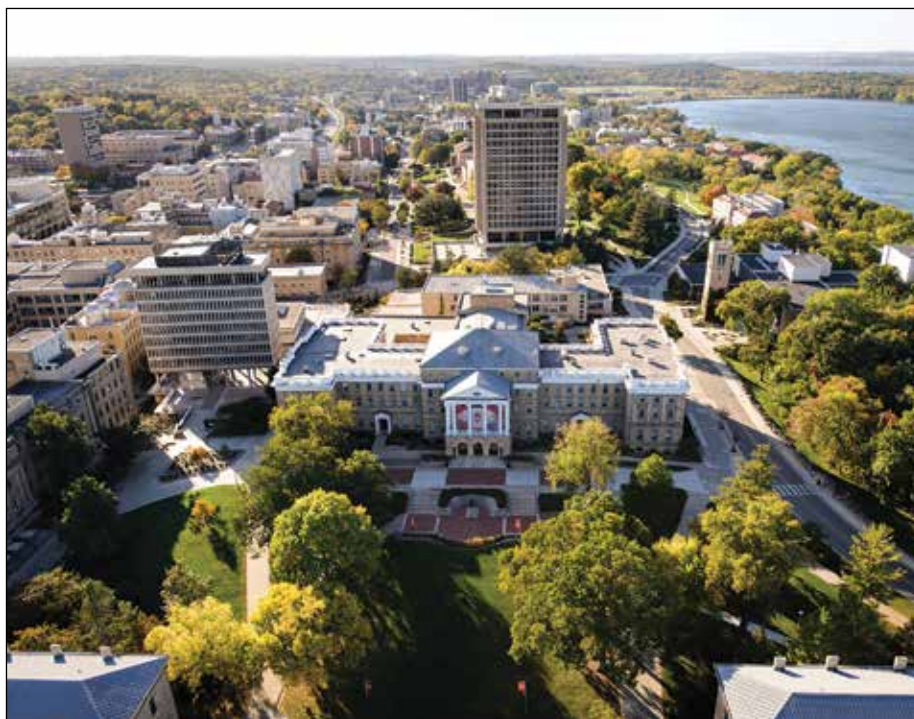
ing in 2014, under the supervision of Fulton Gonzalez. Christine's research deals with abstract harmonic analysis and partial differential equations.



Soledad Benguria joined us as a Van Vleck Assistant Professor in 2014. She graduated from our very own graduate program in 2014,

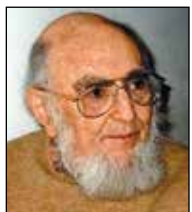
working under Alex Nagel. She's interested in partial differential equations, harmonic analysis, and several complex variables.

UNIVERSITY COMMUNICATIONS



In Memoriam

Anatole Beck



Anatole Beck was born in New York City and received his undergraduate education at Brooklyn College. He received the M.A. and Ph.D.

degrees from Yale University where he was a student of Shizuo Kakutani. He spent most of his career in the Math Department at UW–Madison, but also had visiting or semi-permanent positions at Tulane, the London School of Economics (where he was the chair of their department of mathematics for several years), Cornell, Gottingen, Warwick, and at least half a dozen other institutions. He had seven successful Ph.D. students from UW–Madison.

His research covered many diverse topics, including Banach-space value random variables, topological dynamics, game theory, and operations research. He authored or coauthored more than 50 papers between 1956 and 2000. His book *Continuous Flows in the Plane* was described in the *Bulletin of the American Mathematical Society* as the “complete book as of 1975” on the subject. The book *Excursions in Mathematics* (written jointly with Don Crowe and Mike Bleicher) is a fascinating book aimed at non-mathematicians; it was first published in 1969 and recently republished, an indication of its continuing relevance. His more recent works dealt with economics, law, and social policy.

He was well known for his role in faculty governance, serving on the University Committee and extensively in the UW Faculty Senate. In the latter role he has been described as the “conscience of the university.”

Joel W. Robbin

Howard Connor



Howard was a professor in the Mathematics Department from 1962 until he became Emeritus in 1996. He was raised in Watertown, Wisconsin, and

graduated from high school in 1948. He then joined the Navy and became an electronics technician, attaining the rank of Petty Officer First Class. After the service, he attended UW–Madison from 1952–56, becoming one of the first to graduate in the Applied Math and Engineering Physics (AMEP) program. He had advanced calculus from Buck. Howard then went to MIT and Lincoln Labs where he earned his Ph.D. under Norman Levinson in 1961. His early research was in applied probability and the application of stochastic processes to Boltzmann-type equations.

In 1961, he had an appointment at the UW Mathematics Research Center. In 1962, he was appointed Assistant Professor in the Mathematics Department. He soon became involved with the AMEP program, which he guided skillfully and with great care for nearly 30 years. He spent two years at Rockefeller. Howard’s later interests shifted to linear algebra and matrix theory, but he retained his interest in physics. He performed physical experiments, and computer experiments with MATLAB. He (with others) helped to develop the computing facilities of the Math Department and led the MATH COMPUTING ENTER for many years, almost until he retired. (At UW, the word center has a restriction and he was asked to remove it; his solution brings a smile.) After retirement, he was active in the Math Olympiads at Randall School.

Howard was a good storyteller; most were believable. Howard had active duty in the Korean War. His destroyer received a commendation for picking up a downed pilot; he played a key role in that he fine-tuned the equipment so that the pilot could be located. He had a papal visit (with others) when in uniform he was picked out of a crowd in St. Peter’s square. Howard was a keen handball player and played with many members of the department. He took interest in his children’s careers and this led to many new friends. This summer his family hosted a party for family and friends in his honor. It was a very diverse group.

Howard is survived by his children

Daniel (Marla), Geoffrey (Alison Rice), Susan Conner-Dieter (Daniel), five grandchildren: Martin; Isabel and Hannah; Julie and Lauren, and special friend Evelyn Gerry. He was preceded in death by his wife Shirley and his daughter Juliee.

We have known Howard for about 50 years and we love and respect him. For the past 10 years we have had lunch with him most Fridays. He will be sorely missed.

S. Bauman, D. Crowe, P. Orlik,
R. Smart, M. Voichick

Hans Schneider



Hans Schneider, a research mathematician who devoted his life to the revival of the classical field of linear algebra, which would later be a basis for the algorithms leading to the development of Google, died on October 28, 2014, at the age of 87. The cause was cancer of the esophagus.

From 1959 to 1993, Mr. Schneider taught at UW–Madison, where in 1988 he was named the James Joseph Sylvester Professor of Mathematics. But it was as the longtime editor-in-chief of the prestigious journal, *Linear Algebra and Its Applications (LAA)*, and later as a co-founder of the International Linear Algebra Society, that he became instrumental in giving new stature to a branch of mathematics once regarded as old-fashioned and unworthy of serious investigation.

“The different areas of linear algebra to which Hans Schneider has made fundamental contributions are too numerous to mention but the one he is most closely related to is the Perron-Frobenius theory on non-negative matrices,” says Richard Brualdi, Mr. Schneider’s colleague at UW–Madison and current editor-in-chief of the *LAA*. “The development of Google would not have happened without this basic knowledge in linear algebra and matrix theory, and Hans has been a catalyzing force in its revival for the past fifty years.”

“Hans Schneider is one of the most

influential mathematicians of the 20th Century in the field of linear algebra and matrix analysis,” said Daniel Hershkowitz, President of Bar-Ilan University, Israel, and former Minister of Science and Technology of Israel. “Through his editorial guidance, rigorous teaching of applied mathematics, and development of a cohesive community of researchers, Hans Schneider has made significant contributions to the breakthroughs in robotics and the theory of stability, a theory that in turn has played an important role in everything from the economy to ecology.”

Mr. Schneider was the author of more than a hundred influential research papers which covered many aspects of theoretical linear algebra, submitting his first at the age of 24, and his last within a year of his death. But it was as editor of the *LAA* that he was able to redress the neglect of this field by established national mathematical societies. When he was named editor in 1972, the publication was obscure and struggling with few submissions. By the time he retired from the position forty years later, the journal was considered the leading journal in its field, receiving approximately 1200 submissions annually and leading to about 5,000 pages of print.

Together with some colleagues, Mr. Schneider established the International Matrix Group in 1987, which three years later was incorporated as the International Linear Algebra Society (ILAS). He was its first president from 1990 to 1996. Mr. Schneider realized that groups in the mathematical culture—which tended to form around distinguished individuals—flourished for a time and then disappeared. In order to give the society permanence, he established a formal structure with annual elections. Currently ILAS has about 400 members in more than 20 countries and publishes two journals. The 19th meeting of the Society was held in Korea in August 2014.

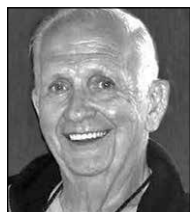
Hans Schneider was born in Vienna, Austria, on January 24, 1927, as the only child of two dentists, Hugo and

(Isa)Bella (Saphir) Schneider. The family fled the Nazi occupation in March of 1938, eventually settling in Edinburgh in August 1939, where Hans attended George Watson’s Boys’ College and Edinburgh University. He graduated from the latter with First Class Honors and furthered his studies there under the idiosyncratic mathematical genius, A.C. Aitken. He later taught at Queens University, Belfast, before arriving in 1959 at his position at UW–Madison, where he stayed for the rest of his career. In 1966, Mr. Schneider was named Chairman of the Mathematics Department at UW–Madison, becoming one of the youngest, at 39, to reach that position at a major American research university. During his tenure, he held visiting positions at several universities including the Technion, Israel, the Technical University of Munich and the University of Birmingham (UK). He retired from his tenure position as J.J. Sylvester Professor in the year 1993.

In 1948, Hans married Miriam Wieck, a professional violinist, and their marriage lasted more than 66 years until his death. He is survived by his wife Miriam; their three children, Barbara Schneider (Caswell), Peter Schneider, and Michael Schneider; and their six grandchildren, David and Dan Caswell, Hannah and Rebecca Schneider, and Carson Rose and Kurt Schneider. In 1993, The Hans Schneider Prize of the International Linear Algebra Society was established in his name.

Hans Schneider

Arnold A. Johnson



Arnold A. Johnson, 76, of Madison, WI, passed away on November 28, 2014. Arnold worked as a Professor of Mathematics at the

University of Wisconsin–Madison for more than 40 years. He received his Ph.D. from the University of Notre Dame in 1959, under the supervision of O. Timothy O’Meara. He joined the

faculty of the University of Wisconsin in 1966 and was promoted to Professor in 1978. He became Professor Emeritus in 2006.

Arnold was an expert in Classical Groups and wrote several fundamental papers on the automorphisms of unitary and orthogonal groups. His main contribution concerned the orthogonal groups in degree ≥ 5 . This involved building on the involution-free residual space method to obtain a new and uniform approach to the problem of determining automorphism groups. He was active in the Algebra Caucus and served as an active contributor to the undergraduate program.

Compiled with assistance of the University of Wisconsin Archives

Alec Johnson



Alec Johnson, an astrophysicist and mathematician and a dedicated servant of the poor and needy, died on Dec. 23, 2014, five days after

his 40th birthday.

Alec graduated from Menomonie High School in 1992, and received his Ph.D. in Applied Mathematics from the University of Wisconsin–Madison in 2011. He was currently working at the Catholic University of Leuven, Belgium, on computer modeling to predict the timing and strength of the effect of solar flares on Northern Lights, the power grid, computers, and satellites.

He gave back to needy students throughout the world, sponsoring primary students in China, and primary, secondary, and university students in Africa. He also worked with Ugandan farmers on sustainable farming in the Erussi Farmers Association.

Services were held at Trott Brook Gospel Hall, Ramsey, MN, the church of his grandparents, on Saturday, Dec. 27, 2014.

REUs

(Research Experiences for Undergraduates)

Since 2013, summer research opportunities have been made possible by funding from the National Science Foundation in the form of both individual grants and a grant for the Research Training Group in Analysis and Applications.

2015

This summer, another twelve UW undergraduates and one local high school student will conduct original research in Analysis and Applied Math, supervised by faculty members **Gheorghe Craciun, Saverio Spagnolie, Jean-Luc Thiffeault, and Andrej Zlatos.**

2014

The Mathematics Department hosted a Research Experience for Undergraduates in Fourier Analysis. Faculty members **Brian Cook, Brian Street, and Betsy Stovall** and graduate students **Chandan Biswas, Laura Cladek, and Aaron Peterson** guided three groups of UW undergraduates working on original research projects connected to the faculty members' work. Some of these projects culminated in new results which the undergraduates are now writing up, with plans to publish!

2013

The Math Department hosted a Research Experience for Undergraduates program, with the participation of 20 undergraduate students from UW–Madison and eight other universities. The students attended lectures and performed original research in the areas of Analysis and Partial Differential Equations under the supervision of our faculty **Sergey Denisov, Alexander Kiselev, Saverio Spagnolie, and Andrej Zlatos.**

Undergraduate Honors

Congratulations to **Solil Shah, William Mulligan, and Meghan A. Turner** on winning Goldwater Scholarships. Mulligan majors in Biochemistry, Turner in Biochemistry and Mathematics, and Shah in Chemistry, Mathematics and Economics.

The Barry Goldwater Scholarship and Excellence in Education Program was established by Congress in 1986 to honor Senator Barry Goldwater. The purpose of the Foundation is to provide a continuing source of highly qualified scientists, mathematicians and engineers by awarding scholarships to college students who intend to pursue research careers in these fields.

Putnam Exam Results are in:

11 of our students took the exam. Huge congratulations to our three team members, **Killian Kvalvik, Thomas Hameister, and Zhaoyi Liu**, who placed 32nd in the team competition. (Last year we placed 27th.)

We had three students in the top 500 individually: **Sohil Shah, Zhaoyi Liu, and Thomas Hameister**. Besides the top-scorers, several students did very well, and the median score of the 11 UW students was 22.

Great job to everyone who took the exam!

This year five teams successfully competed in the annual **COMAP** mathematical contest in modeling, where teams of three students have 96 hours to research

one of four topical, open-ended problems, develop a mathematical model, and write a paper. **Kin Hang Wong, Qingquan Wang, and Yumo Zhang** received a Meritorious ranking for their paper on sustainable growth in Sudan in the face of finite resources, placing them in the top 10% of more than 7,500 teams worldwide. **Nick Derr, Jacob Johnson, and Alex Kocher**, shown below actively engaged in field research, developed a model for locating airplanes lost at sea and won an Honorable Mention ranking.



Top: Kin Hang Wong and Qingquan Wang working hard during the international mathematical contest in modeling. Bottom: Nick Derr, Jacob Johnson, and Alex Kocher lost at sea.

Undergraduate Student Awards, awarded on May 6, 2015.

Higgitt Scholarship

Romin Abdolazadi, Azeem Zaman, Kvalvik Zahid, James Killian, Zijian Tao, Mikayla Kelley

David L. Young Memorial

Lauren Mather

Dowling Scholarship

August Jensen

Irman Newman Scholarship

Eric Koepcke

Mary Ellen Rudin Scholarship

Rebecca Eastham, Guangqing Tang, Han Yu

Wallace J. Hilliard Fund

Samuel Enerson

Graduate Student Awards 2015

by Andreas Seeger

Excellence in Research Awards

Our graduate students contribute to mathematics and its applications through their thesis work. The department recognized five of those students for especially significant contributions.

Xianghong Chen works in harmonic analysis and studied with Andreas Seeger. Much of his work is concerned with measures on fractal Salem sets. There is an extension by Mockenhaupt of the classical $L^p \rightarrow L^2(\mu)$ Fourier restriction theory to Salem measures but the precise range is often unknown. Xianghong significantly strengthened examples by Hambrook and Laba showing the essential optimality of the range in Mockenhaupt's theorem in the fractal setting, but then also established new—and in some cases, optimal—estimates for a large class of Salem measures.

Meng-Che Ho works on random nilpotent groups. He is advised by Uri Andrews and Tullia Dymarz, and his work combines methods from logic and from combinatorial and geometric group theory. In the study of random groups, it is rare to find a natural property whose probability of being true on a random group is not zero or one. Meng-Che and his co-authors, Matthew Cordes, Moon Duchin, Yen Duong and Andrew Sanchez, showed that the property of a random group dropping rank has probability strictly between zero and one, and proved formulas for this probability in terms of the zeta function.

Rohit Nagpal studied with Jordan Ellenberg. He first worked on a problem on **FI** modules, a concept introduced by Church, Ellenberg and Farb who had proved the Noetherian property of **FI** modules over a field of characteristic zero. Rohit, in joint work with these authors, managed to remove the restriction on the base field and proved the Noetherian property for **FI** modules over general base rings. He went on to prove even stronger results in his thesis. Church, Ellenberg, and Farb had used theorems on **FI**-modules to prove results in homological stability, especially for homology with rational coefficients. But for cohomology in characteristic p , the stability statements are often just false, and the original results say nothing. Rohit was able to show that

the technology of **FI**-modules can be used to prove periodicity results for cohomology in characteristic p , which is a result of a completely new kind.

Ting-Ting Nan worked with her advisor Nigel Boston on topics in network information theory. Among other things they managed to produce, in a systematic way, were counterexamples to the Four-Atom Conjecture of Dougherty, Freiling and Zeiger. Their approach combines various tools from algebra and optimization theory.

Balázs Strenner is a student of Richard Kent working in topology. He has obtained several significant results on the structure of pseudo-Anosov homeomorphisms of surfaces. One of these results concerns a 1988 conjecture by Robert Penner. Generalizing work of Thurston, Penner had given a construction of pseudo-Anosov homeomorphisms, and conjectured that virtually all pseudo-Anosov homeomorphisms arise from his construction. In joint work with Hyunshik Shin, Balázs has produced a short and elegant argument disproving Penner's conjecture. Extending the work begun here, Balázs has also established that bounds (due to Thurston) on the algebraic degrees of stretch factors of pseudo-Anosov homeomorphisms are sharp, thus settling claims of Thurston's that have remained open since the 1970s.

John A. Nohel Prizes in Applied Mathematics

John A. Nohel (1924–1999) worked as a professor for applied mathematics at UW–Madison from 1961 to 1991. The award recognizes UW graduate students who write an outstanding Ph.D. thesis in applied mathematics.

David Dynerman worked with Shamgar Gurevich on topics in applied algebra. His thesis uses tools from real algebraic geometry, optimization and group theory to study the geometry of data sets produced in cryo-electron microscopy, a technique used in structural biology to produce three-dimensional models of proteins from very noisy two-dimensional projections.

Lei Li is a student of Saverio Spagnolie, working in the interactions of fluid flows and immersed structures. He has co-authored two papers on the sedimentation

of flexible filaments in viscous fluids, two papers on the swimming and pumping of helical bodies in viscous and viscoelastic fluids, and has recently submitted a paper on a novel locally gradient-preserving reinitialization scheme for level set functions. Lei used asymptotic analysis in a variety of settings to derive analytical solutions which were then compared to the results of full numerical simulations.

Elizabeth Hirschfelder Scholarship

Elizabeth (Stafford) Hirschfelder (1902–2002) received a Ph.D. in mathematics from UW–Madison in 1930 and taught for almost twenty years in the Math Department. In the 1990s, she established a scholarship fund for graduate women in mathematics, chemistry and physics.

Carolyn Abbott is the recipient of a 2015 Hirschfelder scholarship in the Mathematics Department. She works with Tullia Dymarz on topics in geometric group theory.

Campus TA Awards

Three math graduate students were recognized with TA awards for the high quality of their teaching performance.

Balázs Strenner received a *Capstone Ph.D. Teaching award*. He was one of 15 TAs selected for the campus-wide TA awards, representing the contributions of more than 1,700 teaching assistants employed by UW–Madison.

Carolyn Abbott and **Yun (Suky) Su** were selected as *L&S Teaching Fellows* for the year 2015. They will play a leading role in the workshops organized by L&S to train TAs in the year 2015.

The recipients of the 2014–2015 Departmental TA awards are Christopher Breden, Zachary Charles, Xianghong Chen, Edward Dewey, Silas Johnson, Ahmet Kabakulak, Jeff Poskin, Jonathan Schroeder, Quinton Westrich, Rachel Zachariah.

Congratulations to all award winners!

Alumni News

David Dynerman (Ph.D., 2015, Gurevich) will join UC-Berkeley as a Morrey Assistant Professor in the fall of 2015. He will work with Prof. Bernd Sturmfels (mathematics) and Prof. Eva Nogales (molecular biology) on problems at the interface of algebra, scientific computing, and cryo-electron microscopy.

Sarah Bockting-Conrad (Ph.D., 2014, Terwilliger) was a Visiting Assistant Professor at Oberlin during 2014–2015 and will be a tenure-track professor at DePaul University in September 2015.

Andrew Bridy (Ph.D., 2014, Bach) is a Visiting Assistant Professor at the University of Rochester.

Yongtao Cheng (Ph.D., 2014, Rossmanith/Waleffe) is a postdoc at Hong Kong University, Department of Electrical Engineering.

Evan Dummit (Ph.D., 2014, Ellenberg) is a Visiting Assistant Professor at the University of Rochester.

Mushfeq Khan (Ph.D., 2014, J. Miller) is a Temporary Assistant Professor at the University of Hawaii-Manoa.

Masanori Koyama (Ph.D., 2014, Anderson) works as a post-doctoral researcher at Kyoto University, Department of Systems Science, Isii Lab.

Marton Hablicsek (Ph.D., 2014, Caldararu) is a postdoc at University of Pennsylvania, Philadelphia.

Diane Holcomb (Ph.D., 2014, Valko) is a Postdoctoral Research Associate at the University of Arizona.

Sara Jensen (Ph.D., 2014, Isaacs) is an Assistant Professor of Mathematics at Carthage College, Kenosha, WI.

Ashutosh Kumar (Ph.D., 2014, A. Miller) is a Postdoctoral Fellow at Hebrew University of Jerusalem.

Jae-Ho Lee (Ph.D., 2014, Terwilliger) is a JSPS Postdoctoral Fellow at Tohoku University, Japan.

Aaron Peterson (Ph.D., 2014, Nagel/Street) is an Instructional Postdoctoral Fellow at Northwestern University.

Brian Rice (Ph.D., 2014, Lempp) is an Assistant Professor of Mathematics at Huntington University.

If you have alumni news, we'd love to hear about it!

<http://go.wisc.edu/9do819>

Visit this link for a survey that collects alumni updates at all times of the year.

Elizabeth Skubak-Wolf (Ph.D., 2014, Anderson) is an Assistant Professor at St. Mary's College.

Zhennan Zhou (Ph.D., 2014, Jin) is an Assistant Research Professor at Duke University.

Qian You (Ph.D., 2014, Angenent) is now a quantitative analyst at Quantifi in New York.

Christelle Vincent (Ph.D., 2012, Ono) will be starting a tenure-track position at the University of Vermont in January 2016.

Junwu Tu (Ph.D., 2011, Caldararu) is a tenure-track professor at the University of Missouri-Columbia.

Ekin Ozman (Ph.D., 2010, Ellenberg) has joined Bogazici University in Turkey as a tenure-track professor.

Guillermo Mantilla-Soler (Ph.D., 2010, Ellenberg) has joined Los Andes in Bogota, Colombia, as a tenure-track professor.

Nicolas Addington (Ph.D., 2009, Caldararu) is a tenure-track professor at the University of Oregon.

Patrick Rault, (Ph.D., 2008, Ellenberg), an associate professor at SUNY-Geneseo, received the Henry L. Alder Award for Distinguished Teaching from the Mathematical Association of America.

David Kung (Ph.D., 2000, Seeger) has become the new Director of Project NeXT (New Experiences in Teaching) at St. Mary's College of Maryland. This highly successful professional development program of the Mathematics Association of America is for early-career mathematicians, and addresses all aspects of an academic career: teaching, research and scholarship, service, and participating in professional activities. While a student at UW-Madison, David played violin in the Madison Symphony Orchestra. His 12-lecture DVD course, "How Mathematics and Music Relate," describes the process of doing both (which he does very well!).

Tom Halverson (Ph.D., 1993, Benkart) was recently named DeWitt Wallace Professor of Mathematics, Statistics, and Computer Science at Macalester College and gave his inaugural lecture on "Transformational Symmetry" in March 2015. He received the 2011 Distinguished Teaching Award from the Mathematics Association of America's North Central Section and currently serves as chair of his department at Macalester. He earned his Ph.D. from UW-Madison in 1993 under the direction of Georgia Benkart.

Jenny Quinn (Ph.D., 1993, Brualdi) recently became the chair of the Mathematics Association of America's (MAA) Council on Publications and Communications. Jenny was chosen for this position because of her extensive experience with publications of the MAA. From 2004–2008, she co-edited MAA's *Math Horizons* with Arthur Benjamin. Over the years she has served on the boards or steering committees of the Spectrum Book series, *Mathematics Magazine*, *Math Horizons*, Phi Beta Kappa Alpha Alumni Association of California, and Oregon Public Broadcasting's production, "Mathematics Illuminated." She received the MAA's 2006 Beckenbach Book award for *Proofs That Really Count: The Art of Combinatorial Proof*, co-authored with Benjamin.

Chao-Nien Chen (Ph.D., 1988, Rabinowicz) has moved from the National Changhua University of Education (Changhua, Taiwan) to Tsinghua University (Hsinchu, Taiwan).

The Mathematical Association of America (MAA) honored **Shahriar Shahriari** (Ph.D., 1986, Isaacs) with the 2015 Deborah and Franklin Tepper Haimo Award for Distinguished Teaching of Mathematics on January 11, 2015, at the annual Joint Mathematics Meetings, where Shahriar also spoke on "Access to Mathematics: Does it Matter? What Can We Do About It?"

Our Alumni Historical Ph.D. Database now includes recent thesis titles and is searchable by year. Check it out!
<http://go.wisc.edu/zx59c6>

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DONOR UPDATE

In 2014, the department received an increase in donations of 37% over 2013. We were honored to see several contributions in memoriam for our departed emeriti as well as contributions aimed at our AMEP, Talent Search, and scholarships programs.

Thanks to all of you for your continued interest in the university and the Mathematics Department, and for your continued contributions. You can make a gift online at supportuw.org/giveto/math. Or, if you prefer, make a check payable to UW Foundation and note "Mathematics Annual Fund" in the memo line. Please mail checks to **UW Foundation, US Bank Lockbox, Box 78807, Milwaukee, WI 53278-0807**.

If you have any questions or feedback, memories or offerings, contact **Rebekah Sherman** at (608) 572-2077 or Rebekah.sherman@supportuw.org. Please visit our website at math.wisc.edu for updates, events, newsletters and links to our Facebook page and our donation page. We want to recognize our generous donors to the Mathematics Department and say thank you. It is through private gifts that we can continue to run programs that continue challenging minds and impacting lives. ■

Faculty and Staff News, Awards and Honors

Congratulations to those faculty, staff and TAs named **Spring 2015 Honored Instructors** by the Department of Housing. They were Andrej Zlatos, Brian Street, Diane Rivard, (TA) Dongxi Ye, Gloria Mari-Beffa, Jennifer Beichman, (TA) Judith Andrus, Shirin Malekpour, Soledad Benguria, Yao Yao, (TA) Zheng Lu, Christine Offerman, David Sondak, and (TA) Kaashyapee Jha. They were honored at a reception on April 24, 2015.

Jeff Viaclovsky, Jennifer Beichman, Robert Grizzard, Christine Offerman, Yao Yao, Anakewit Boonkasame, Gloria Mari-Beffa, (TA) Jayer Fernandes, (TA) Carolyn Abbott, (TA) Christian Geske, (TA) Edward Dewey, (TA) Jie Zhao, (TA) Lei Li, (TA) Paul Tveite, (TA) Ting-Ting Nan, (TA) Cullen McDonald, (TA) Di Fang and (TA) Silas Johnson won **Fall 2014 Honored Instructor** awards.

Andreas Seeger was made a Fellow of the American Mathematical Society, Class of 2014.

Georgia Benkart gave the ICM Emmy Noether Lecture at the International Congress of Mathematicians 2014 in Seoul, South Korea. This was the first time that the lecture was a plenary ICM lecture chosen by a committee appointed by the Executive Committee of the International Mathematics Union (IMU). A specially designed bronze plaque was presented to her before the lecture by IMU President Ingrid Daubechies. In the citation, Georgia was recognized for fundamental and sustained contributions to Lie theory. This was her second Noether lecture of the year, as she was invited to give the AWM Noether Lecture at the Joint Mathematics Meeting in January 2014 in Baltimore. She also was one of five delegates chosen by the U.S. National Committee on Mathematics of the National Academies to represent the U.S. at the IMU General Assembly in Gyeongju, South Korea.



It's been a busy year for **Jordan Ellenberg**:

Jordan Ellenberg has been awarded the John D. MacArthur Chair by the Chancellor and Provost offices. This is considered to be one of the most prestigious endowed chairs on campus, with only a few of them given each year. It is a great honor, not only for Jordan, but also for our department. We are all very proud of Jordan and fortunate to have him in Madison.

He has been awarded a Guggenheim Fellowship. A Guggenheim Fellowship is a highly prestigious mid-career award; only two of them were awarded this year in mathematics nationwide. It is awarded by the John Simon Guggenheim Memorial Foundation to those "who have demonstrated exceptional capacity for productive scholarship or exceptional creative ability in the arts." The official announcement can be found here: <http://go.wisc.edu/9d9e5b>.

He was featured as part of the "Fueling Discovery" insert (March 22, 2015) in the *Wisconsin State Journal*. This highlighted our amazing L&S faculty and their research. Jordan's article was "New Math is Needed to Explore New Networks." (<http://go.wisc.edu/s2338a>)

He discussed Big Data and its impact on business in this Wisconsin Institute for Discovery video short: <http://bit.ly/1xumqKF>.

He spoke at the Joint Mathematical Meetings in San Antonio, TX, on January 10, 2015, as the MAA-AMS Invited Address (<http://go.wisc.edu/vy638m>). He also serves as co-chair of the selection committee for the Mathical Book Prize, a new prize for kids' books about math (<http://mathicalbooks.org/about-us/>).

David Sondak was the featured professor in the March 2015 *Wisconsin Engineer* magazine, produced by UW Engineering students. The article hails



his ability to engage with students in his classes, stating "lecture is enough to become ensnared in his contagious passion for math and its relationship with the world." (<http://go.wisc.edu/7dr90c>)



Saverio Spagnolie has been awarded the second annual Award for Mentoring Undergraduates in Research, Scholarly and Creative Activities. This campus-wide award is a very competitive one, and it speaks very highly of his work.



Paul Rabinowitz was awarded the Julius Schauder Medal by the Center for Nonlinear Studies at the Nicolaus Copernicus University in

Toruń, Poland. The Schauder Medal is awarded to individuals for their significant achievements related to topological methods in nonlinear analysis. See the announcement here: <http://go.wisc.edu/68gi8n>

Timo Seppäläinen has been awarded a Vilas Faculty Mid-Career Investigator Award. This is a campus-wide award that recognizes exceptional scholarly accomplishments. It is funded by the William F. Vilas Trust Estate.

At the 2014 International Congress of Mathematicians, held in Seoul, Korea, August 13–21, **Timo Seppäläinen** was an invited speaker in the Probability and Statistics Section.



Andrew Barbour (University of Zürich), right, introduced Timo's medallion lecture and handed him the medallion.

At the 2014 Annual Meeting of the Institute of Mathematical Statistics in Sydney, Australia, July 7-11, **Tom Kurtz** delivered the Wald Lectures and **Timo Seppäläinen** gave a Medallion Lecture.

Nigel Boston and **Timo Seppäläinen** have been named Simons Fellows for 2015–16. (The complete list can be found at <http://go.wisc.edu/g703bp>) The Simons Fellows Program provides funds to faculty for up to a semester-long research leave from classroom teaching and administrative obligations. Such leaves can increase creativity and provide intellectual stimulation. The goal of the program is to make it easier to take such leaves, or to extend sabbatical leaves by an extra half-year.



Melanie Wood has been awarded a Sloan Fellowship for 2015. The Sloan Research Fellowships seek to stimulate fundamental research by early-career scientists and scholars of outstanding promise. These two-year fellowships are awarded yearly to 126 researchers in recognition of distinguished performance and a unique potential to make substantial contributions to their field.



Shamgar Gurevich was selected as a Vilas Associate. This competition recognizes new and ongoing research of the highest quality

and significance. Recipients are chosen competitively by the divisional Research Committees on the basis of a detailed proposal.

Shamgar would like to thank his Ph.D. students, David Dynerman and Jeff Poskin, who helped greatly with the writing of the grant proposal.



Sebastian Roch was selected as a Kavli Fellow of the National Academy of Sciences and was invited to participate in the annual Kavli

Frontiers of Science symposium, sponsored by the Kavli Foundation and the National Academy of Sciences, which brings together 50 early-career scientists across scientific disciplines to discuss exciting advances in a broad range of topics.



Michael C. Ferris spoke on the “Mathematical Moments” podcast offered by the American Mathematics Society on smart grids and the

mathematical models involved in understanding our modern power structures. (<http://go.wisc.edu/yv9919>)



The IMA awarded **David F. Anderson** the inaugural IMA Prize in Mathematics and its Applications. The prize was given at the opening of

the fourth annual Abel Conference on October 31, 2014. (<http://go.wisc.edu/g5mw2f>)

The research of **Fabian Waleffe** has led researchers in new directions when it comes to studying turbulence in fluids. An article in *Nautilus* magazine (MacKenzie, Dana, “*To Predict Turbulence, Just Count the Puffs*,” *Nautilus*, Nautilus Ventures LLC, July 3, 2014; <http://go.wisc.edu/rlo33v>) discusses new experiments and understanding

of the onset of turbulence in pipe flow that built on Dr. Waleffe's discoveries of traveling wave solutions of the Navier-Stokes equations.



Shi Jin has been awarded a Vilas Distinguished Achievement Professorship. The Professorship “recognizes professors whose

distinguished scholarship has advanced the confines of knowledge, and whose excellence has also included teaching or service.” The Professorship is awarded by the Provost's Office and Vilas Distinguished Achievement Professors carry the title for the duration of their career at UW–Madison.



Congratulations to **Oh Hoon Kwon** (left) on his Early-Career Academic Staff Award and **Shirin Malekpour** (right) on her Mid-Career Academic Staff Award. Oh Hoon is the Math 13X course supervisor for the mathematics content courses for elementary education and special education majors who want to be elementary and middle school teachers. Shirin Malekpour manages our Instruction Excellence Program, which mentors and monitors our teaching assistants as they learn what it means to teach.



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Undergraduate Yue Zhao and graduate student Will Mitchell in the Applied Math Lab studying the settling of bodies near a wall in a highly viscous fluid. “Glancing” and “reversing” trajectories of spheroids observed in the lab were derived using model partial differential equations, and the work inspired the development of a novel numerical method. The work, done with Assistant Professor Saverio Spagnolie, was published this year in the *Journal of Fluid Mechanics*.

