#### Indiana University Department of

# Mathematics Alumni Newsletter

College of Arts & Sciences Alumni Association

Chair's Corner ELIZABETH

Housworth



I write this knowing it is the last newsletter I get to open as Chair. In the fall, our faculty will elect my successor. So even though almost a year remains in my second term, I will take this opportunity to reflect and reminisce about the tough, rewarding, and fun aspects of leading the Department of Mathematics.

**Being chair is tough.** It often feels like I'm taking the SAT or GRE:

Three faculty members, Bobby, Joe, and Sue, are qualified to teach course X. Bobby and Sue prefer to teach at 11:00 am on Tuesday and Thursday. Constraints on Bobby's schedule make teaching in other time-slots difficult for him. Sue is similarly constrained but could teach at 1:25 pm on Mondays, Wednesdays, and Fridays. Joe likes to teach at 8:00 am on Monday, Wednesday, and Friday. Students who take course X also tend to take courses Y and Z, to

which instructors and times have already been set. Y will be offered at 11:00 am Tuesdays and Thursdays, while Z will be offered at 1:25 pm on Mondays, Wednesdays, and Fridays. Students in course X dislike 8:00 am courses so much that many will choose not to take it if we schedule it at that time, in which case we might have to cancel it.

<u>Problem:</u> Assign course X an instructor and time slot so as to maximize the satisfaction of all parties.

<u>Solution:</u> First find a way to shift the instructors and times for Y or Z (again) in hopes of making all parties reasonably happy.

Tough, like I said, but...

Being chair is rewarding. When I do find good solutions to problems like the one above, or find scheduling flexibility that lets colleagues travel to important conferences and workshops in their areas, or find funding sources for visitors, conferences, and workshops here, or figure out how to replace the department's espresso machine so that departmental mathematicians have delicious coffee to turn into theorems, thus improving departmental scheduling and teaching and outreach and advancement—all this is not just challenging: it is

rewarding! And the challenges themselves have spurred me to grow personally in rewarding ways—to grow more patient, for instance (though some colleagues may dispute that!). Another example: since I have to make public presentations several times a year, I am learning the art of public speaking. It still makes me nervous—but it no longer makes my voice quake, and I am even starting to enjoy it, which leads into the next item...

Being chair is fun. I have met many new and fascinating people across campus and at other institutions in my capacity as Chair. I have learned many things about how other departments and universities deal with all kinds of issues. (Such learning often makes me be grateful for being in this department on this campus!) By handling the department's tenure and promotion cases, and putting forward various award nominations, I also get to see first-hand how valued my colleagues are by our profession nationally and internationally.

And—because it is a key responsibility of the Chair, and crucial for the good humor of the department—I have learned the art of April Fool's Day jokes.

The thing I will miss least: working with the University Architect on furniture and renovations. The thing I will miss most: the master key that gives after-hours access to all the goodies - papers, pens, cookies, sugar, coffee, etc.

I am deeply grateful to all our faculty, staff, students and alumni, for all they—you—have done, and continue to do, to make this department such a wonderful place for working and learning. I look forward to working with my successor to ensure a smooth transition next summer.

## **Department News**

As this is written, the International Congress of Mathematics (ICM) is scheduled for the first week of August 2018, in Rio de Janeiro. Held just once every four years, the ICM is attended by thousands of mathematicians from around the world. and hosts the presentation of the Fields Medal—the most prestigious award in Mathematics. The conference schedule also includes a menu of about 150 talks, in almost 20 different subject areas. To be invited to deliver one of these talks is an honor reserved for the world's top tier of mathematicians, and signals that one's research has earned substantial international recognition and respect. At past ICM's, three of our current faculty have been honored this way: Professors Sergei Pinchuk (1983 and 1998), Vladimir Touraev (1990), and Russ Lyons (2006), along with two of our living emeriti: Ciprian Foias (1970, 1978) and Eric Bedford (1990).

#### Demeter to speak at ICM

The 2018 ICM will add another one of our colleagues to the elite group above: Prof. Ciprian Demeter is slated to give an invited talk at the ICM in Rio de Janeiro this August, in the Analysis and Operator Algebras Section. He plans to focus on the impact of a Fourier analytic tool, "decoupling" on other disciplines such as number theory and PDEs. Two of his publications on the topic, collaborating with Jean Bourgain of the Institute for Advanced Study in Princeton and Larry Guth of MIT, have appeared in the preeminent Annals of Mathematics. In 2016, their work settled the Vinogradov Mean Value Conjecture—a result concerning the number of solutions of a system of Diophantine equations. That conjecture appears to be purely number-theoretic, so its resolution using analytic tools from outside number theory came as a complete and beautiful surprise.



Ciprian Demeter

Demeter, who grew up in Romania, has not previously attended an ICM; he expects the experience to be exciting: "I will be able to attend high quality talks in virtually all major areas of mathematics, and to witness the Fields medal ceremony. And then of course, it's gonna be in Rio!"

#### **Outstanding Junior Faculty**

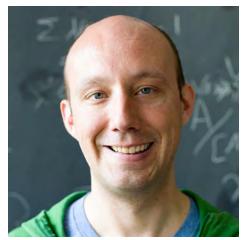
Nam Le joined our department in 2014, and got a well-deserved promotion to Associate Professor this year. Along the way, Nam also received one of just five Outstanding Junior Faculty awards given on the entire Bloomington Campus this year. That award includes a \$15,000 grant, and the campus hosted a special reception for all five winners on April 16. Nam works in PDE. Collaborating with Ovidiu Savin of Columbia University, he was able to settle questions about the global regularity of Monge-Ampère eigenfunctions that had been open for 30 years.



Nam Le

Nam is the second Outstanding Junior Faculty awardee from our department in the last three years: Associate Prof. **Noah Snyder**, who joined us in 2012 and works at the interface of low-dimensional topology and algebra, received the award in 2016.

In 2015, incidentally, Snyder was also recognized with an NSF CAREER Award for his research on tensor categories—and for outreach activities he undertook as an NSF Postdoctoral Fellow at Columbia University from 2009 to 2012.



Noah Snyder

# Prestigious Fellowship for Ph.D. Alum Toan Nguyen

One of our graduate alumni was recognized with a prestigious award too: **Toan Nguyen**, who earned his Ph.D. at IU in 2009 under Prof. Kevin **Zumbrun**, won the 2018–19 AMS Centennial Fellowship. The award includes a full year of financial support: a \$93,000 grant and a \$9,300 travel expense allowance. It goes to a single early-career mathematician each vear, based on excellence in research. Toan, now an Associate Professor at Penn State, works in PDE especially wave and fluid dynamics. Check out his blog, called Snapshots in Mathematics! at https:// nttoan81.wordpress.com.

#### Davis elected AMS Fellow

The AMS also honored our longtime colleague Prof. James Davis. Last fall, Davis was named an AMS Fellow, a title that "recognizes members who have made outstanding contributions to the creation, exposition, advancement, communication, and utilization of mathematics." Davis is a topologist, and in selecting him as a Fellow, the AMS cited his "contributions to geometric

topology especially through surgery theory, and for exposition." Jim is the 16th member of our department (including emeriti) so honored, and we can truly be proud of that number: Only 25 other math departments have as many AMS Fellows as we do, and most of those have larger (often much larger) faculties.



Jim Davis

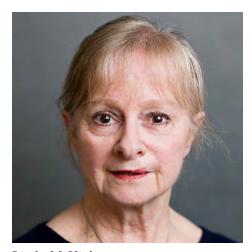
#### Gordon Award goes to Linda McKinley

In April, Senior Lecturer Linda McKinley received the *Gordon Faculty Award*. That award, named for Michael Gordon, a former Vice Chancellor and Dean of Students, is given by the IUB Dean of Students for outstanding contributions to the Division of Student Affairs.

Linda began her outstanding service to the Mathematics Department as our "Basic Skills Coordinator" in 1985, and has won numerous teaching awards within the math department—including an *IU Trustee's Teaching Award* this year. Beyond being a master teacher herself, however, she oversees much of the instruction others provide to students at the 100-level. She annually mentors an army of two to three dozen graduate students who teach our basic-skills courses every year.

She also coordinates our courses for first-generation college students, and in the last few years, has taken on the task of teaching our graduate students how best to carry out their own instructional duties.

Linda has also become the go-to expert for advisors across the Bloomington campus. They rely on her experience and judgement throughout the year to assess and advise students on their readiness for our lower-division math courses. We have been truly lucky to have Linda's consummate skill and tireless dedication for so many years. She richly deserved the Gordon Faculty Award and has our hearty congratulations.



Linda McKinley

#### IUB Math at Bourbaki

The Séminaire Bourbaki is an eminent mathematics seminar that has met on a regular basis in Paris since 1948. It is, as Wikipedia puts it, "one of the major institutions of contemporary mathematics, and a barometer of mathematical achievement, fashion, and reputation." To have one's work discussed at one of these seminars is an enviable distinction, and in the last year or so, no less than three of our faculty members have had that honor:

- In June of 2017, the work of Prof. Ciprian Demeter, Jean Bourgain, and Larry Guth on the Vinogradov Mean Value Conjecture (see above) was presented at Bourbaki by Lillian Pierce. You can see her lecture at https://bit.ly/2KCxzHZ.
- Prof. David Fisher's recent breakthroughs on the Zimmer conjecture (work he did jointly with Aaron Brown and Sebastian Hurtado Salazar; see last year's newsletter) was presented at the Séminaire Bourbaki in October of 2017.
- In this year's June 23 Bourbaki seminar, Alessio Figalli of ETH Zürich highlighted Prof. Nam Le's joint work with Ovidiu Savin on the smoothness of the first Monge-Ampère eigenfunction (see above).

#### The Elegance of Probability

In September, at Tel Aviv University, Prof. Russ Lyons was feted with a conference honoring his 60th birthday (see last year's newsletter for details). Lyons reports that the conference title The Elegance of Probability, was aptly reflected in the talks themselves. The opening speaker, Benjamin Weiss of Hebrew University, gave an unusual introduction that culminated in a lovely warm wish for Russ. You can enjoy Weiss' introduction, at https: //bit.ly/2KEe2qn, where links to the other conference talks can also be found.

#### Distinguished Visitors.

Finally, our list of departmental highlights has to include the talks

given here by some highly accomplished guests. Our weekly colloquium features a steady stream of stimulating visitors, but we also bring in especially acclaimed visitors for select occasions.

• In September, Prof. Sylvia Serfaty of NYU's Courant Institute gave the year's first Sherman Memorial Lecture, Microscopic description of Coulomb-type systems. Professor Serfaty, who is French, won the EMS Prize in 2004 for her contributions to the Ginzburg-Landau theory, the Henri Poincare Prize in 2012, and the Mergier-Bourdeix Prize of the French Academy of Sciences in 2013. As this is written, she is also slated to give a plenary lecture at the August 2018 ICM.

Readers of this newsletter will surely enjoy the interview Serfaty gave to *Quanta* Magazine in 2017. Check it out at www. quantamagazine.org/sylvia-serfaty-on-mathematical-truth-and-frustration-20170221.

- In late October, Serfaty's NYU colleague Prof. Robert Kohn gave our second Sherman Lecture, speaking on Prediction without probability: a PDE approach to a two-player game from machine learning. Kohn has upwards of 150 publications over a career spanning four full decades—and at least 25 Ph.D students, including our own Peter Sternberg. Kohn gave an ICM plenary lecture in 2006, and his many other honors include the 2014 AMS Steele prize and a Sloan Fellowship.
- The very next week, we hosted our first Distinguished Lecture Series of the year. Prof. Marc Burger

- of ETH Zürich (Switzerland's premier engineering university) gave a series of three lectures on Higher Teichmueller Spaces: Geometric, Arithmetic, and non-Archimedean aspects. Burger is a wide-ranging, widely-cited mathematician who has served on the editorial boards of Inventiones Math. and Commentarii Math. Helvetici—two of the most prestigious journals in mathematics.
- In early March, Prof. Alex Lubotzky of Hebrew University in Jerusalem and the Courant Institute gave our final Sherman Lecture of the year: Highly dimensional expanders: from Ramanujan graphs to Ramanujan complexes. Our invitation to Lubotzky was unpredictably welltimed: Just a few weeks prior to his visit, Lubotzky won the 2018 Israel Prize—that country's highest cultural honor—for "research in finite and infinite group theory...that has had influence in many fields, most especially expander graphs." Lubotzky was only 23 when he earned his Ph.D, and has also won the Erdös prize (1990), the Sunver Balaguer Prize (1992), the Rothschild Prize in Mathematics (2002)—and even served for 3 years in the Knesset (Israel's parliament)!
- Capping off the year's embarrassment of riches, Prof. Amie Wilkinson visited from the University of Chicago to grace us with a Distinguished Lecture Series on The Ergodic Hypothesis and Beyond. Wilkinson collaborated in solving the C<sup>1</sup> version of Problem 12 on Stephen Smale's list of mathematical problems for the 21st Century. One of the world's foremost experts on stable ergodicity, she

gave an invited talk at the 2010 ICM, and won the AMS Ruth Lyttle Satter Prize in 2011 "for her remarkable contributions to the field of ergodic theory of partially hyperbolic dynamical systems." Amie is a truly gifted expositor who gave us a beautiful series of talks.

Her expository gifts extend beyond the lecture hall too: last vear, she published an essay in the New York Times Science section, memorializing two recently deceased colleagues. Her essay, With Snowflakes and Unicorns, Marina Ratner and Maryam Mirzakhani Explored a Universe in Motion, is well worth searching out on the NYT website. You can also hear her discuss the Fundamental Theorem of Calculus on a Scientific American podcast: https: //blogs.scientificamerican. com/roots-of-unity/amiewilkinsons-favoritetheorem/.

#### New Faculty

The mathematical muse is famous for preferring the young, and a good mathematics department must strive to maintain a steady influx of early-career talent. We did well on that front this year, with two promising tenure-track hires and a diverse incoming group of five new Zorn Post-doctoral Fellows.

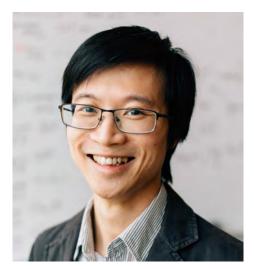
#### Tenure Track

After years of searching for the right person to inaugurate the Charlotte Ann Griffin Assistant Professorship, we are delighted to report that Prof. **Julia Plavnik** will be assuming that title. Originally from Spain, Prof. Plavnik got her Ph.D.

in 2013 under the direction of Sonia Natale at Argentina's Universidad Nacional de Córdoba. She works on category theory and noncommutative algebra, and their applications to physics. Her nascent career has already produced an impressive list of publications, and she has organized numerous workshops and AMS special sessions. She comes to IU after postdoctoral stints at the Santaló Institute in Buenos Aires and, most recently, Texas A&M.



Julia Plavnik



Louis Fan

We are also excited about hiring Wai Tong (Louis) Fan, a probabilist coming from the University of Wisconsin in Madison. A 2014 Ph.D. from the University of Washington in Seattle,

Fan describes himself as passionately interested in understanding complex systems that arise in nature and applied sciences: growing tumors, viral infections, cooperation and conflicts in ecosystems and social systems, pattern formation in reactiondiffusion systems, etc. He develops and analyzes stochastic models that connect phenomena across different scales of observation: from the molecular scale to a continuum description; from gene level to single-cell level, tissue level, organelle level and ecosystem level. Doing so requires not only in-depth mathematical analysis of well-designed models, but also collaboration with experts in other fields and integration of empirical data. Fan calls it "both an art and a science."

He and Plavnik will each arrive with NSF-supported research programs. We look very much forward to welcoming them this fall.

#### Zorn Postdocs

Our Zorn Postdoctoral Fellowship is a 3-year position targeted at mathematicians no more than 2 or 3 years into their careers. Not everyone we hire stays for the full 3-year term, so the number of openings varies year to year, but we had five positions to fill this year, and we're very pleased with the talent we were able to recruit:

- Andrea Giorgini recently earned his Ph.D. at Politecnico di Milano. He has already collaborated with several experts in PDE's (specifically the Cahn-Hilliard equations, and variations on them) as well as nonlocal models of fluid mechanics (e.g. material with memory). Andrea will be mentored by Distinguished Prof. Roger Temam.
- Ching-Wei Ho just graduated

from UCSD, but has already published a paper in the IU Mathematics Journal (with Robert Strichartz of Cornell), intriguingly titled, *Energy measures of harmonic functions on the Sierpinski gasket*. His mentor here will be Prof. Hari Bercovici.

- Artem Kotelskiy describes his work as being at the crossroads of symplectic geometry and low-dimensional topology. He earned his 2018 Ph.D. at Princeton, and Prof. Paul Kirk will mentor him at IU.
- Bartosz Langowski got his Ph.D in 2016 at the Wroclaw University of Technology. He comes to IU to work with Prof. Ciprian Demeter. His interests focus mainly on real harmonic analysis in the context of non-trigonometric orthogonal expansions. He is excited about the chance to work with Demeter... and perhaps to play a little basketball.
- Asilya Suleymanova spent last year as a postdoc at the Max Planck Institute in Bonn after getting her PhD at Humboldt University of Berlin in 2017. She likes to use the heat kernel to study spectral geometry, and will be mentored here by Prof. Chris Judge, who has been known to share that predilection.

#### **Farewells**

Two of our Senior Lecturers—boasting over 20 years of service between them—will move on to new challenges this fall.

Will Orrick joined us in 2002 as a Visiting Assistant Professor. In 2004, he successfully applied for one of our newly created Lecturer positions, and since then, has taught thousands of IU students as one of our most versatile and valued lecturers. Aside from the standard big service courses M118 (Finite Math) and M119 (Intro to Calculus) Will has led Statistics (K301), Math History (M380), Discrete Math (M380), and honors sections of M118. Outside the classroom, he helped to lead our Math Circles program for kids, and he played a key role on the team that developed our newest math modeling course, M106: The Mathematics of Decision and Beauty. He was single when he came to Bloomington, but will be leaving with the wife he met here—IU Ph.D. Jayoung Nam, soon to be an Assistant Professor in the Business School at Southern Methodist University in Dallas, which will be their new home—along with their Bloomington-born 5-yearold twins.



Will Orrick

Shabnam Kavousian arrived here in 2011 to serve as both a lecturer and as our Ed School liaison. In the latter capacity, she has been responsible for coordinating the "T" courses we offer for Elementary Ed students. A Math Ed Ph.D. herself, Shabnam has not only taught, but also mentored the instructors

of those courses. She has done outreach to nearby public schools and experimented with clickers in her own classes. She also developed a curriculum for V118 —a variant of M118 that features some graph theory—and (like Will) helped with the creation of M106 and worked with talented local youngsters in Math Circles. Unlike Will, however, Shabnam won't be going far. Next Fall she starts a new position with SICE—IU's School of Informatics and Computer Engineering—here on the Bloomington campus.



Shabnam Kavousian

Shabnam and Will both brought commitment and passion to their work here, and we are deeply grateful for all they contributed to us during these past years. We will miss them, and we wish them the very best of luck in the next chapter of their careers.

#### Remembering Bill

This year marked the passing of a beloved and central figure in the history of our Department: Bill Ziemer.

Bill joined the Department in 1961 and remained a fixture until his retirement in 2003. Few figures, if any, can match his lifetime impact on this Department.

The 1960's were a time of great expansion and change for the IU Math Department and Bill was at the center of it as soon as he arrived. Along with colleague Maynard Thompson, who arrived in 1962, he undertook a drastic overhaul of curriculum and departmental protocol that put the Department on a steady course for the future. Then in the 1970's and again in the 1980's, Bill was elected Chair of the Department. He also served a stint as Associate Dean of the Graduate School.

His first term as Chair came at a tumultuous time when different factions within the Department were at odds. Bill was able to make peace by healing a potentially disastrous schism—ushering in a harmonious atmosphere that has endured. In his second term, he hired many outstanding new faculty, and took the Department into the computer age by introducing mathematical word processing software (TeX) and spreadsheets into our daily workflows.

Bill also played a crucial role in the rise to prominence of our inhouse journal, the Indiana University Mathematics Journal. During his years as managing editor he greatly enhanced the refereeing process, and together with former assistant editor Elena Fraboschi, began to computerize the journal. The IUMJ now enjoys international prominence thanks in no small part to Bill's innovative and steady leadership.

As a researcher, Bill had a stellar international reputation as an expert in the area of geometric measure theory (GMT). He got his PhD in 1961 under the direction of Wendell Fleming at Brown University when GMT was a burgeoning young field, two of its founding developers being Fleming and Herbert Federer, also at

Brown. Bill emerged as a leader in the application of GMT techniques to elliptic regularity theory, showing that various classes of nonlinear partial differential equations possessed smooth solutions. In addition to dozens of highly regarded papers in this area, Bill wrote two graduate texts on the subject: "Weakly Differentiable Functions," which sits on the shelf of nearly every researcher in regularity theory, and "Fine Reqularity of Solutions of Elliptic Differential Equations," the latter coauthored with Jan Maly. He also wrote two analysis textbooks, one at the introductory undergraduate level and the other at the introductory graduate level.



Bill Ziemer (1934–2017) in 1979.

As a teacher, Bill was a master in his craft. He constructed lectures meticulously, taking the utmost care to stress key points and present illuminating examples. Outside the classroom, he was known as a warm mentor whose door was always open and whose office hours were always full. He also directed eleven PhD students. In recognition of his great contributions in the classroom, for his research contributions and for his administrative skills, he was awarded the Indiana University Distinguished Faculty Award in 1996.

Bill had numerous interests outside Graduate Director Mike Mandell

mathematics. An accomplished athlete, he excelled in tennis, squash and racquetball. He was also an avid sailor, frequently spending weekends with his family on his Thistle-class boat, and racing in local and regional competitions. He loved music and was a talented singer, belonging to the Bloomington Chamber Singers as well as the "Bloomingtones," a barbershop quartet,

Bill was a cherished friend and model colleague. He is survived by his wife of over 60 years, Suzanne, his three children Bill, Laura and Sarah, and six grandchildren, to whom he was a devoted and loving husband, father and grandfather.

—Peter Sternberg

# **Graduate Program**

his two-year Completing term as Director of Graduate Studies, Prof. Mike Mandell has guided our graduate program through another successful year, recruiting a good incoming class, signing off on 34 new graduate degrees (11 of them Ph.D.'s) and overseeing the progress of our continuing students.



#### Recruiting class

Twenty new students are slated to join our program in Fall 2018, with a 50/50 split between domestic and foreign. Four of the domestic students actually hail from Indiana: one each from Ball State, Notre Dame, Rose-Hulman, and IU. The foreign students on the other hand, come mostly from the other side of the world: Three each come from China and South Korea, and one each from Taiwan, Indonesia, India, and Greece. All of them qualified for full financial support and most have fellowships for at least one semester.

#### Current students

- During this past year, Prof. Mandell's student Calvin Woo, had the benefit of a President's Diversity Dissertation Fellowship. Calvin works in Algebraic K-Theory, Stable Homotopy Theory, and Algebraic Geometry.
- Zhao Yang, a student of Prof. Kevin Zumbrun, won the College of Arts and Sciences Dissertation Research Fellowship for 2018–19. The award will relieve Yang from some teaching responsibilities, allowing him to focus more fully on his research into Applied Analysis and PDE.
- Our annual William B. Wilcox award, recognizing an outstanding current graduate student, went to **Shizuo Zhang**, who is hard at work on his dissertation. Indeed, in nominating him for the Wilcox award, Zhang's advisor Prof. **Valery Lunts** wrote: I have never seen such enthusiasm from one of our grad students—he can spend literally day and night working on a problem!

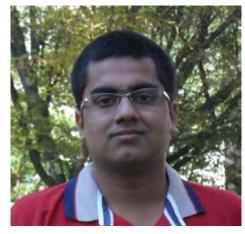
• Our best first-year grad students are recognized each year by the Williams award, named in memory of the late Prof. James P. Williams, who was particularly devoted to our graduate program. This year, we had a three-way tie: the Williams award went to Daniel Freese, Sean Sanford, Aric Wheeler, and Zuyi Zhang.

#### **New Graduates**

Many of our newly minted Ph.D.'s finished with distinction and will start new positions next fall.

- Our chair, Prof. Elizabeth Housworth minted two new Ph.D's this past year. Chen Xu, who was coadvised by Walter Professor of Economics Todd Walker, worked on Wavelet Analysis of Economic Data and now heads for a job in industry. Ruiyu Yang was coadvised by Prof. Predrag Radivojac of the Computer Science department. Yang wrote a thesis entitled Methods for Phylogenetic Reconstruction and Their Properties, and has now been hired by J.P. Morgan in New York City.
- Raghavendra (Raghav) Venkatraman, advised by Prof. Peter Sternberg won the department's Outstanding Thesis award for his dissertation "Periodic Orbits to the Gross-Pitaevskii System and the Analysis of a Model for Nematic Liquid Crystals". Raghav enjoyed a College of Arts and Sciences Dissertation Research Fellowship in his final year, allowing him to focus fully on completing his dissertation. He put that fellowship to good use, winning our departmental award for the year's best thesis. Raghav is now headed

for a 3-year postdoc at Carnegie-Mellon in Pittsburgh.



Raghavendra Venkatraman

- Prof. Sternberg also advised Andres Zuñiga, who, like Raghav, wrote a double-barreled thesis: Heteroclinic Connections for Multi-Well Gradient Systems and a Generalized Least Gradient Problem. Andres will continue his research as a 1-year postdoc at Paris Dauphine University in France, followed by a 2-year stint at McMaster University.
- Samantha Allen, whose thesis in Topology dealt with the non-orientable four-genus of knots, will take up a postdoc position at Darmouth College in New Hampshire. Samantha was advised by Prof. Charles Livingston.
- WonTae Hwang and Zhipeng Lu both wrote theses under Prof. Michael Larsen this year. Hwang, who worked on the possible automorphism groups of 2-dimensional abelian varieties, will be a postdoc at KIAS (Korea Institute for Advanced Study). Lu wrote his thesis on the number of commutators in the general linear group  $GL(n, F_q)$  that can equal a fixed element of determinant 1. He too got a postdoc position for next year—in Göttingen, Germany.

- Hongming Nie earned Ph.D. with Prof. Kevin Pilgrim on iteration at the boundary of Newton's maps. After spending some time this summer with a collaborator in Chile, he will assume a postdoctoral job at Hebrew University of Jerusalem.
- Not all our graduates are staying in academia. Justin Cyr virtually wrote a double thesis (450 pages!) that included work in Probability (Stationary determinantal processes in  $\mathbf{Z}^d$ ) supervised by Prof. Russ Lyons), and work in Stochastic PDE's (Existence results for SPDE's with Levy noise) supervised by Prof. Roger **Temam**). Justin has taken a job with Wells Fargo.

We congratulate all our new masters and doctorates—and take great pride in their accomplishments.

# **Undergrad Program**



Undergrad Director Jee Koh

Our undergraduate majors shined again this year. Here are a few of their most notable achievements:

- Eighteen math majors were elected to Phi Beta Kappa.
- Our Putnam team—Baptiste Dejean, Andrew Henderson, and Manasse Kwete—placed 81st in the 2017 national Putnam Competition.
- Locally, the team of **Anthony** Coniglio, Baptiste DeJean, and Nathanial Lowry earned a firstplace finish at this year's Indiana College Mathematics Competition (ICMC) held by the Indiana section of the Mathematical Association of America (MAA). Starting in 2010, we have won ICMC every year that we competed.
- The team of Nanjie Chen, Alexandra Embry, and Xutao Hu earned a strong score to place 21st among 52 competing teams from Indiana, Michigan, and Illinois. (This year was a "trisection" meeting of the MAA, drawing faculty and students from these neighboring states too.)
- Math majors Jeffrey Ting and Runxia Zhao teamed up reach the semi-final round of the 2018 Society of Actuaries' (SOA) Case Competition (see Kevin Pilgrim's account in "Math Career News").
- Juniors Anthony Coniglio and Alexandra Embry each presented their REU research work in the Rose-Hullman Undergraduate Math Conference (special thanks to Lecturer James Hendrickson for driving them there).

Several of our graduating seniors will now head to graduate programs:

• Nanjie Chen (Math BS) will start a graduate program in Math at Boston University. Baptiste Dejean, who earned his Math BS in Kevin Pilgrim, Alumni/Career Liaison

- just three years, will stay at IU for one more year to complete his Math MA degree.
- Thomas Frye, an Econ minor, will seek his Ph.D. in Economics at Florida State University.
- Andrew Henderson (treasurer of our math club and president of the IU Physics club (he doublemajored in physics) heads for Law School at Notre Dame in the fall.
- The Math Club president was **Jor**dan Lenchitz (Math BA, French BA, and Music BM). He will pursue a Ph.D. in Music Theory at Florida State University.

Finally, I want thank all faculty, staff, and students who made my work as Director of Undergraduate Studies easier and enjoyable these past two years. I now hand the job over to Prof. Ayelet Lindenstrauss, who is off to a running start. Our undergraduate program is sure to extend its strong record under her leadership.

—Jee Koh

### **Careers**



#### Alumni Giving Back

After Dr. Gail Homan Adele (B.A. '62, M.A. '63) earned her Ph.D. in Math at Michigan State University in 1968, she enjoyed a long career at Western Washington University and at the University of Idaho, teaching and mentoring math students over several decades. Inspired by the strong foundation and encouragement she got at IU, Dr. Adele has now endowed the Gail Homan Adele Mathematics Scholarship to support new generations of women in Mathematics. Renewable for up to three years, it offers support to one sophomore, one junior, and one senior each year in the form of a generous monetary grant. This year's recipients are listed with the other 2018 undergraduate award winners toward the end of this newsletter.

Over the past year, our students benefited from the time and energy of several other alumni too, as their stories illuminate possible career paths after graduation:

Dionissi Aliprantis '04 is a Research Economist at the Federal Reserve Bank of Cleveland. During a virtual visit via Skype, he shared a rich collection of stories related to his research, from evaluating the effectiveness of water delivery programs in Haiti, to gun violence in Cleveland.

Local resident (and my new next-door neighbor) Joshua Cisney '11 is a project developer for Renewable Energy at local provider Hoosier Energy. His answer to a student's question about his typical day was wonderful: Last week I wrote up legal contracts, analyzed models using complex spreadsheets—and put on my boots and jeans to go into the field.

Neuroscientist Garry Cooper '07 (pictured below) is the CEO of Chicago-based IT startup Rheaply,

Inc. He met with a diverse group of students, both graduate and undergraduate, from a variety of majors and programs. He described the complexity of finding the right graduate program, the pitfalls of succeeding too well in your lab (*They want you to stay!*), the excitement of his doctoral research into Alzheimer's, and the challenges of running a startup company. Rheaply, recently featured in *Nature*, provides IT infrastructure for research networks to buy, sell, trade, donate, and rent resources.



Garry Cooper, founder of Rheaply

Daniel Oates '10 works as a Foreign Affairs Officer at U.S. Department of State, and returned to campus with other STEM-major alums for a well-attended forum hosted by the College's Walter Center for Career Achievement.

Thomas Whalen '89, an Economist for the Antitrust Division at the US Department of Justice, described how his math training prepared him to dive in and learn new things early in his career.

Do you have a story? Our students and faculty would love to hear from you! Visit our "share your story" portal at https://math.indiana.edu/forms/alumni-stories.html

#### Math career news

Our student-led active **Actuary Club** got a valuable boost this year from **Edward Robbins**, retired former president of the Society of Actuar-

ies (SOA). In the late fall, Mr. Robbins presented a fascinating introduction to the profession, and some typical actuarial problems. In the spring, working with Prof. Russell Lyons, he helped mentor students Jeffrey Ting and Runxia Zhao as they prepared a report for entry into the 2018 SOA Case Competition. The SOA received 70 unique submissions from universities all over the world, including the U.S. Canada, and many Asia/Pacific and European countries. Teams were tasked with analyzing the future solvency of a long-term health care program in a fictitious small nation. Undergrads Ting and Zhao did extremely well in the competition, earning semifinalist honors with a report that the SOA judges said "was extremely well-done and brought to light many important ideas and analyses."

Supported last fall (as in past years) by a donation from alumnus Anne Koehler (B.A. '62, M.A. '63, Ph.D. '68), five Math majors joined a contingent of Econ students—and Economics Department chair Gerhard Glomm—for the 2017 Fall Careers in Econ & Math field-trip to St. Louis. Lukas Graham, Li Liu, Forsythia Pezel, Jue Wang, and Duohong Xia networked with alumni at a reception at the St. Louis Federal Reserve Bank, attended panel discussions at the Brown Shoe Company and at Buckingham Financial, and took in the Black Repertory Theatre's production of "Dot", by Colman Domingo, at the Edison Theater. Their itinerary also squeezed in a visit to the Cahokia Mounds State Historic and UNESCO World Heritage site just east of the Mississippi, in Illinois.

Another trip is planned for Fall 2018. Chicago, here we come!

Are you curious about what our

math majors do after graduation? Statistics about their career paths are now available online at https://careers.college.indiana.edu/career-outcomes/. Though small, the Mathematics dataset is striking for the large proportion of students heading to graduate programs and the breadth of the industries hiring math majors.

-Kevin Pilgrim

# **Directed Reading**

In Fall 2015, Zorn Postdocs Corrin Clarkson and Jeffrey Meier proposed a Directed Reading Program (DRP) for IU math majors. The idea: To pair math-hungry undergrads with graduate students eager to share expertise. The Math Department would introduce the partners to each other, who would then choose and study a topic of interest together, with guidance provided by the graduate partner.

Clarkson and Meier had seen similar programs at other universities, and Department Chair Elizabeth Housworth embraced their proposal. Our department already had an established summer program of faculty-supervised research for undergrads, but, as Housworth puts it, "... another important tool is the ability to learn mathematics through books and papers, and this program helps to teach those skills." She incentivized participants with grants to five grad student mentors, and by providing topical books for their undergraduate mentees. So began our DRP.

During the semester-long program,

students and their mentors meet for an hour each week. The undergraduates are expected to spend at least four additional hours weekly engaging with their topic, and to give a 15-minute end-of-semester talk to a general audience from the department. After 3 years, the program has proven to be a winner. About a dozen graduate students and equally many undergrads apply each term for the five available pairings, and the program now has an official faculty advisor in Rothrock Lecturer Vladimir Eiderman.



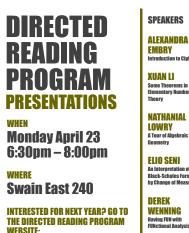
Vladimir Eiderman

Eiderman credits Corrin Clarkson for getting the program off to a strong start. She moved on when her postdoc ended, but her work has been ably continued by graduate student **Josh Edge** under Eiderman's guidance. Next semester, Josh will be aided by fellow grad student **Dylan Spence**.

Edge emcee'd the most recent evening of final presentations, which took place on April 23, 2018, and made full use of the 50-seat classroom where it opened with free pizza and breadsticks.

The room was buzzing with conversation before the first of the five speakers took the podium. The talks themselves ranged from pure number theory to the financial math.

and the presenters had all clearly explored deeply into their topic. Each spoke with obvious enthusiasm for what they had learned, and all the talks seemed well-organized, well-rehearsed, and made their points without going overtime, which—as anyone who has given a short math talk knows—is tough to do. When the evening ended, it had made its own point very clear: the Directed Reading Program is a great idea and, for students with initiative and ambition, an elective gem of our undergrad program.



This year's DRP Program Flyer

# Awards

FOOD AND DRINK WILL BE

On April 27, we held our annual awards ceremony, followed by a reception for the recipients and their families. We're proud to list the winners here:

#### Undergraduate Awards

THELMA ABELL PRIZE (Recognizing students interested in teaching who

have high scholastic merit and financial need)

- Laekin Allen
- Seth Lehman
- Marissa Moon
- Trenton Moorhead
- Jacquelyn Parkes



Abell winners Lehman, Allen, and Moorhead

Gail Homan Adele Scholarship (Supports women and other underrepresented groups)

- Kelli Michaels
- Hannah Sakaluk
- Elizabeth Saunders

CIPRIAN FOIAS PRIZE (Given to an outstanding math major):

Gavin Whelan

RUTH E. GILLIATT SCHOLARSHIP Alexandra Embry and Leah Schiefer

TRULA SIDWELL HARDY SCHOLAR-SHIP

#### **Bharat Gummalla**

CORA B. HENNEL SCHOLARSHIP (For worthy students demonstrating high ability)

- Matthew Denney
- Thomas Frye
- Nathanial Lowry

#### • Thomas Sweeney

JEFFREY & DEBORAH KING SCHOLARSHIP

Chase Abram and Julian Gass

Rainard Benton Robbins Prize (For a student who shows promise)

Baptiste Dejean

SHABANI BOOK FELLOWSHIP (Supports Africans, African-Americans, or International math majors)

Marc Enokou

DONALD OTTO KOEHLER SCHOLARSHIP

Gavin Whelan



Gavin Whelan

MARIE S. WILCOX SCHOLARSHIP

- Nanjie Chen
- Anthony Coniglio
- Baptiste Dejean
- Miriam Mingyue Hu
- Xuan Li
- Emma McCardwell
- Yanting Wan

WILLAM P. ZIEMER FUND
Timothy Vincent

M118 Undergraduate Intern Award

**Andrew Henderson** 



#### **Graduate Awards**

HAZEL KING THOMPSON FELLOW-SHIP:

Hayley Bertrand, Montana Earle, Joshua Edge, Patrick Haggerty, Zachery Lindsey, Didac Martinez-Granado, Michael Novack, Robert Rose, Maxime Scott, Kursat Sozer, Raghavendra Venkatraman, Calvin Woo, Chen Xu, Zhao Yang

COLLEGE OF ARTS AND SCIENCES FELLOWSHIP:

Hayley Bertrand, Christopher Bonnesen, Christian Cofoid, Montana Earle, Daniel Freese, Akash Jena, Hongki Jung, Somi Kang, Noah Kaufmann, Pavel Kovalev, Peter Lamm, Nguyet Le, Aolong Li, Peter Marek, Vinh Nguyen, Noah Riggenbach, Mark Ronnenberg, Samanwita Samal, Kai Smith, Aric Wheeler, Zuyi Zhang

ROBERT E. WEBER AWARD: **Zuyi Zhang** 

James P. Williams Award:

Daniel Freese, Sean Sanford, Aric Wheeler, Zuyi Zhang ROBERT K. MEYER FELLOWSHIP (For a student in logic demonstrating the potential to make major breakthroughs):

Praveen Narayanan

Joseph & Frances Swain Fellowship:

Samantha Allen

WILLIAM B. WILCOX AWARD (For an outstanding student):

Shizhuo Zhang

GLENN SCHOBER TRAVEL AWARDS:

Sanjana Agarwal, Seok Hyun Byun, Ji Hoon Chun, Aranya Lahiri, Dami Lee, Geunho Lim, Michael Novack, Emily Rudman, Brady Thompson, Chen Xu, Shizhuo Zhang

COLLEGE OF ARTS AND SCIENCES
TRAVEL AWARD

Hongming Nie

ROTHROCK TEACHING AWARD:

Vinicius Ambrosi, Yining Cao, Patrick Chu, Daniel Condon, Geunho Lim, Dylan Spence, Ryan Stees

OUTSTANDING THESIS AWARD
Raghavendra Venkatraman

President's Diversity Dissertation Fellowship

Calvin Woo

COLLEGE OF ARTS AND SCIENCES DISSERTATION RESEARCH FELLOW-SHIP

Raghavendra Venkatraman

#### **Faculty Awards**

ROTHROCK FACULTY TEACHING AWARD

Kent Orr

GORDON FACULTY AWARD (Given by the Dean of Students)

Linda McKinley

IU TRUSTEE'S TEACHING AWARDS

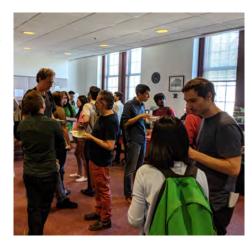
Nam Le, Linda McKinley, Peter Sternberg

DISTINGUISHED DEPARTMENTAL SERVICE AWARD

Will Orrick

ZORN POSTDOC TEACHING AWARD

Carmen Rovi



#### Acknowledgements

This newsletter is a department-wide effort. Thanks to all the colleagues who supplied ideas, facts, and even wrote articles for it—and to Elizabeth Smith for some of the photos.

—Bruce Solomon, Associate Chair

\*\* Do you prefer to read this Newsletter on a computer, tablet, or smartphone? You can view or download it in PDF format at https://math.indiana.edu/documents/newsletters/
AlumniNewsletter2018.pdf



# Giving

The Department of Mathematics is grateful for all of the support it receives from its generous donors. The Department has several funds to which you can give. Donations may be made using the attached Indiana University Foundation Donation Form or through About -> Alumni+Giving at thtp://www.math.indiana.edu/

- Mathematics Enrichment Fund (I380008688): Gifts to this fund will be used for the general support of the Mathematics Department, in the College of Arts and Sciences.
- William P. Ziemer Student Assistance Fund (P370013557): Gifts to this endowment are used to support both undergraduate and graduate students in the department.
- Glenn Schober Memorial Fellowship Fund (I380008692): Gifts to this fund support outstanding advanced graduate students, including travel and registration fees for national meetings.

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