



College of Letters & Science  
UNIVERSITY OF WISCONSIN-MADISON

*V<sup>3</sup>: a newsletter for alumni and friends  
of mathematics at UW-Madison*

2022



## CONTENTS

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- |   |   |                               |
|---|---|-------------------------------|
| 2 WORD FROM THE CHAIR                         | 5 THE VALUE OF GRADUATE STUDENT INTERNSHIPS     | 8 UNDERGRADUATE AWARDS & NEWS |
| 3 GIVING BACK TO TODAY'S WOMEN MATHEMATICIANS | 6 A DAY IN THE LIFE OF THE MATH LEARNING CENTER | 9 OUTREACH                    |
| 4 AMEP ALUMNUS BRANCHES OUT                   | 7 MATH LABS: MATH IN ACTION                     | 10 GRADUATE AWARDS & NEWS     |
|   |   | 12 FACULTY AND STAFF NEWS     |
|   |   | 14 IN MEMORIAM                |



*Van Vleck Vector ( $V^3$ )* was printed using gifts from alumni and friends.

Cover photo by Sara Nagreen

Department of Mathematics  
University of Wisconsin–Madison  
215 Van Vleck Hall, 480 Lincoln  
Drive, Madison, WI 53706

Chair: Timo Seppäläinen

math.wisc.edu • (608) 263-3054

## A Word from the Chair

### DEAR FRIENDS OF THE MATH DEPARTMENT,

It's nearly the start of a new academic year, and we look forward to welcoming a new cohort of students while staying in touch with our recent graduates. It's been 125 years since the Math Department granted its first PhD. Our graduates will always have the UW Math Department as their home, and we'll be ready to highlight their accomplishments on the new Math Alumni website. Our alumni are the reason we are able to do so much outreach and support of our students. We are especially pleased to showcase one of our alumni, Bung-Fung Lee Torng, MA 1960, and her support for graduate student research. Another alumnus, Nick Derr, BS 2015, writes about how his degree in the Applied Math and Engineering Physics (AMEP) program has helped him succeed. We are always pleased to get such feedback and support from our alumni.



Our work in improving access for undergrads to challenging math problems has driven our work to make math labs, such as the AMEP Lab and the Madison Experimental Math Lab (MXM), into a resource that has proved a big hit. In its very first year 36 students engaged in research under the auspices of MXM! Reaching out, we have greatly expanded our Math Learning Center (MLC) into our former library space to host even more tutorial opportunities, including a new Proofs Table and peer tutoring, undergraduate to undergraduate. As time goes on, we'll need to fund renovations to make that space even better, but under Director Leah Rineck's guiding hands, we are sure to see continued success. Already, it is the preferred tutoring spot for many of our students.

As always, we are proud to share the latest news about the success of our faculty and staff. This year, we had three mathematicians (David Anderson, Chanwoo Kim, and Jin-Yi Cai) named as Simons Fellows, two Sloan Fellows (Tetiana Shcherbyna and Andrew Zimmer), as well as one AMS Fellow (Leslie Smith) and one IMS Fellow (Sebastien Roch). Mariya Soskova won a Vilas Associate Award and Hung Tran won a Vilas Early Investigator Award. Daniel Erman won a UW System-wide Underkofler Excellence in Teaching Award. Ananth Shankar's important joint work on the 30-year-old André-Oort conjecture was featured in an article in *Quanta Magazine*. Tonghai Yang was part of a group of number theory researchers who won the Alexanderson Award for their big paper. All in all, another great year!

We had to say some tough goodbyes as well. This year saw the passing of Fred Brauer, Michael Voichick, and Georgia Benkart. It's never easy to see our friends go. They touched many lives, and I'm sure many alumni remember them fondly.

We are thankful for your support of the important work we do. I'm sure that the year ahead will be just as wonderful as this one has been.

Yours,

Timo Seppäläinen  
Department Chair

## Giving Back to Today's Women Mathematicians



Bung-Fung Lee came to the UW from sunny and warm Taiwan to study mathematics in 1960. It was cold and much unlike what she had been used to, but she came with a purpose, to study mathematics, something she'd always enjoyed.

She was one of only a few women in the graduate program, but in her second semester, she received a grant to cover her tuition. It made an impression on her. After receiving her MS in Mathematics from Wisconsin in 1960, she went to Cornell, where she became a teaching assistant, continued her studies, and married H. C. Torng, her high school

classmate. She always remembered how helpful that tuition grant was.

Years later, she resolved to help women graduate students studying math. She decided to fund the new Bung-Fung Lee Torng fellowships. There are now two graduate students focusing hard on their research with no distractions, thanks to her support.

They are: Ran (Ashley) Zhang, who is working with Professor Alexei Poltoratski; and Maya Banks, who is working with Professor Daniel Erman.

Zhang studies spectral analysis of differential equations, an area of mathematics closely related to problems in theoretical physics and other sciences. Banks studies commutative algebra with connections to algebraic geometry.

We would like to thank Bung-Fung Lee Torng for her support of graduate student scholarship and research!



## Help Us Build the New Math Alumni Site

When you come to Wisconsin to study math, you become part of the Wisconsin family. We'd love to hear back from you how your life is going and what exciting things are happening!

We've built a brand-new Math Alumni page to better sort and display the updates that our alumni provide, and we'd love to have your help in building it.

Your information is the most valuable part of this site. There's no account to create, just a form to tell us about your accomplishments. And then we'll take your post and make sure it is put on display to share with your fellow alumni.

Check it out: [mathalumni.math.wisc.edu](http://mathalumni.math.wisc.edu)



## MAKE A GIFT

To mail a donation to support the Mathematics Department, include the designation "Mathematics Annual Fund" in the check's memo line.

The check should be made payable to the UW Foundation.

Please send it to:  
 UW Foundation  
 US Bank Lockbox  
 P.O. Box 78807  
 Milwaukee, WI 53278-0807

To make a secure gift online using your credit card, please visit [supportuw.org/giveto/math](http://supportuw.org/giveto/math)

If you have any questions or would like information on other giving options, please contact Kim Bair at [kim.bair@supportuw.org](mailto:kim.bair@supportuw.org).

## AMEP Alumnus Branches Out



Nick Derr  
2015 AMEP Graduate

*Nick Derr graduated from UW–Madison with an Applied Math, Engineering, and Physics (AMEP) degree in 2015. We asked Nick for an update on where his undergraduate training has taken him since!*

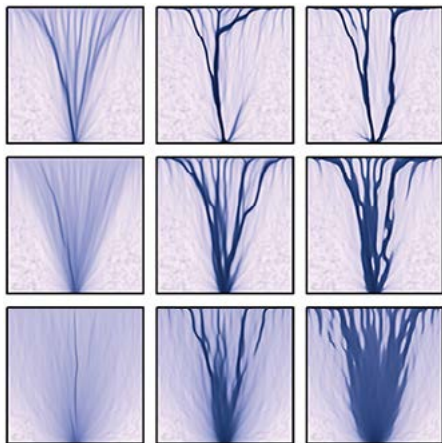
My name is Nick Derr. After I graduated, I went on to spend a year at the University of Cambridge completing Part III of the Mathematical Tripos. In 2016, I started a PhD in Applied Math at Harvard University in Chris Rycroft’s group, specializing in mathematical modeling and high-performance numerics. After I graduated this past spring, I moved on to an instructorship in the MIT Mathematics Department, where I teach and do research. I’ve been fortunate to learn and study fun and interesting math at each step along the way. AMEP was the major reason for that.

I spent my PhD modeling and simulating systems in physics and biology, and I made use of skills I learned from AMEP coursework every day. Learning to use Mathematica for eigenvalue problems with Professor Thad Walker in Physics 448 made it easy to use the software in research contexts, from solving for the dispersion relation of linearized systems of gel equations to computing flow fields around two spheres by summing over spherical harmonics. Math 321, from front to back, was a thorough preparation for completing a PhD in continuum mechanics, and my understanding of many techniques and concepts are still colored by the explanations offered by Professor Fabian Waleffe. Using Matlab to model vortex sheets in EMA 521 was great preparation for the wide world of numerical methods. And taking part in the Mathematical Modeling Contest with Professor Saverio Spagnolie was incredibly fun and engaging, and was an eye-opening experience as to how modeling gets done and how rewarding it can be.

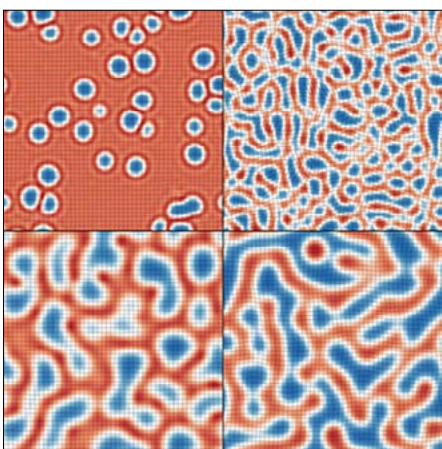
I’ve been able to work on projects in a wide variety of settings. I studied the creation of branching patterns through flow-driven erosion, which can be seen in nature from small biological systems (venation systems) to large geophysical settings (river systems). A simple mechanical model for erosion is capable of producing beautiful patterns (see picture). The work itself was a great opportunity to apply both analytical and numerical methods. Analytical approaches reveal a system’s primary drivers and give you an intuitive understanding of the system’s moving pieces. (I’ve appreciated their elegance since omitting negligible terms in Physics 320 with Professor Stefan Westerhoff!) In this case, a homogenized model stripped away some of the problem’s complexity and made clear a coupling between flow rates-of-change and slow, sustained (rather than “flash-flood”) erosion.

One of my current projects is the modeling of active gels such as developing tissue or cellular interiors. The cytoskeleton consists of a complex network of polymer filaments. This porous medium is subject to active stresses imparted by mechanical motor proteins. We’re developing coarse-grained, simplified models for this active stress that can give rise to the macroscopic actions observed. Approximate analysis allows us to draw analogies between these systems and a classical theory of equilibrium phase-separating gels, and numerical methods allow us to investigate how these analogies break down (see picture). This is especially exciting as we’ve developed new methods of high-performance, parallelized computational methods in order to look at the system in three dimensions.

Moving forward, I am excited to continue modeling active biophysical systems as I begin work at MIT. I am hoping to incorporate aspects of data science and machine learning into numerical approaches in order to connect with experiments on a deeper level, while preserving the intuition and clarity afforded by analytical approaches. I am so grateful for the practice and preparation that AMEP afforded me: I left UW–Madison with a wide breadth of familiarity across topics in mathematics, and that allowed me to hit the ground running with graduate studies and beyond. My interactions with Professor Waleffe and Professor Jean-Luc Thiffeault were invaluable, and they were trusted sources of guidance and advice as I started graduate applications. Thanks to all of the AMEP community!



model for erosion



model for active gels

# The Value of Graduate Student Internships

Many students nearing the end of their time at the UW look forward to the “real world” and wonder what it holds for them. A summer internship can show them how to start their career and help them gain essential experience in their field. We asked several students about their summer 2021 internship experiences and how it will help them in their future endeavors.



**Name:** Parvathi Madathil Kooloth

**Company/Institution of Internships:** National Renewable Energy Laboratory, Golden, Colorado

**What was your title?** Graduate Intern

**What drove you to apply for this internship?** I wanted to get a sense of what research outside of academia looks like and see if that was a good fit for me.

**What did you gain during your work on this project?** I collaborated with several other researchers at the lab on my project on data-driven computational fluid dynamics. Through these interactions, I was able to gain valuable experience in my field, and I also learned a lot about code development and maintenance. During the summer, the lab had several short workshops geared toward familiarizing interns and other early career researchers with various scientific computing tools and professional development that were very helpful.

**What type of job are you interested in pursuing after you graduate? How will this internship help you achieve this goal?** I hope to work as an applied mathematics researcher at a national lab. This internship has definitely supplemented my existing skill set by providing me with experience in writing code for large codebases and in effectively collaborating within a large team of researchers. In my experience (albeit limited), recruiters highly value research experience outside of academia.



**Name:** Jason Louis Torchinsky (They/Them)

**Company/Institution of Internships:** Sandia National Labs, New Mexico

**What was your title?** Computational Science Graduate Fellowship (CSGF) Practicum Fellow

**What drove you to apply for this internship?** It was a requirement of my fellowship, although I would have applied for it regardless of my fellowship.

**What did you gain during your work on this project?** I gained experience working for a national lab on part of a large-scale product — the Department of Energy’s Energy Exascale Earth System Model (E3SM). I worked directly on the code on a supercomputer (NERSC) under the tutelage of one of the top experts in the field (Mark Taylor, the chief computational scientist for the E3SM). I made connections with other scientists at the lab and will hopefully make deeper connections when I return this summer.

**What type of job are you interested in pursuing after you graduate? How will this internship help you achieve this goal?** I am interested in pursuing work in a research lab (i.e., not in academia nor industry), but I haven’t written off working in industry yet! This internship gave me strong letters of recommendation, personal connections to those in my field of interest (computational climate science), and a better view of the type of research happening in the world.

**Will you be returning to this company/program for further work?** Yes! I will be returning this summer (2022) to work there in-person for the first time.



**Name:** Robert M. Argus

**Company/Institution of Internships:** The partners for the program are the Institute for Pure and Applied Mathematics (IPAM) based at the University of California, Los Angeles (UCLA) and the Advanced Institute for Materials Research (AIMR) at Tohoku University in Sendai, Japan. The industrial partners for Graduate-Level Research in Industrial Projects for Students (G-RIPS) Sendai 2021 included:

Mitsubishi Electric Corporation, NEC Corporation, and TOYOTA Motor Corporation.

**What was your title?** I was a graduate researcher and team leader for Mitsubishi Electric Corporation, Project A. The title of the project was Development of a Mapping Space for Intuitive Teleoperation with Heterogeneous Devices of Multiple Types, and our industrial partner was the Advanced Technology R&D Center of Mitsubishi Electric Corp.

**What drove you to apply for this internship?** As an undergraduate, I participated in the Research in Industrial Projects for Students (RIPS) 2017 program at UCLA, and it was an immensely rewarding and wonderful experience, so I decided to apply again as an incoming graduate student. In addition to mathematics and science, traveling is a passion of mine, so really it was a no-brainer!

**What did you gain during your work on this project?** In addition to learning about new areas of mathematics such as distance geometry, information geometry, topological data analysis, and manifold learning and new areas of engineering such as control theory and signal processing, the most important skill I obtained was in the arena of interpersonal communication. Half of our research team was composed of students and mentors from Japan who were not native English speakers. Speaking little to no Japanese myself, overcoming the language barrier was challenging. Ultimately though, I believe being able to fruitfully collaborate with international students and researchers makes me a more diverse researcher and mathematician.

**What type of job are you interested in pursuing after you graduate?**

**How will this internship help you achieve this goal?** My primary focus is to remain in academia as a research mathematician and professor; however, participation in industrial programs such as RIPS and G-RIPS has opened to my eyes to opportunities outside of the more traditional academic route, which is something I would like to continue to explore as a graduate student at UW–Madison and beyond. I believe the G-RIPS program has helped me to establish some connections in both academia and industry, domestically and abroad, that would otherwise not have been afforded to me.

**Will you be returning to this company/program for further work?** As of right now, our team has plans to return to Sendai this summer (2022) to present our research as part of an international research symposium at Tohoku University. This was supposed to take place in the spring, but due to COVID and related travel restrictions we were forced to postpone. I have no plans at present to continue my research, but of course, it’s hard to say what the future will hold!

# A Day in the Life of the Math Learning Center



My office is organized as an oasis for students seeking help. I have candy on my desk, calm lighting, inspirational growth mindset quotes, and even comfortable furniture (coming soon). I set it up this way intentionally to promote a welcoming environment, a place where students can feel comfortable growing in their ability. Every day students walk through our door with a familiar look on their faces. *“I don’t get it, and I need to get it, soon.”*

In 15 years of teaching, I’ve helped people from all backgrounds and occupations build math skill and address that look. Traditional, first-generation, veterans, law enforcement, international, graduate-level, returning adult, people of color, disabled, and so many more. All students have a place at the Math Learning Center (MLC); our vision is “more people doing more math.” Here’s a glimpse into what that looks like on an average day.

**IT’S 9:00 A.M.** Frank is tutoring the first group—Calculus II students preparing for their next exam. He’s at the board giving problems, taking questions, and even giving a hint or two from past exams. When you think “Math Learning Center,” this might be the picture forming in your mind.

**IT’S 11:00 A.M.** A group of students meets to review math homework together; we know them as “regulars” every Monday and Wednesday. They’re working quietly at a group table on their own. This is one of my favorite groups because it shows the reciprocal relationship switching between tutor and learner.

**IT’S NOON** Students trickle in for drop-in tutoring in the Calculus Lab, no appointment necessary. Groups form organically around Calculus I/II/III topics and our tutors walk the floor. It’s a race for tutors to get to each table before students have answered each other’s questions on their own.

**IT’S 2:00 P.M.** A TA from Discrete Math is holding office hours in the MLC because the group is too big to fit in their office. I love to see what happens next, the “math glow” — three students keep going after the rest of the group has left, helping each other with the muddiest points.

**IT’S 3:30 P.M.** For our tutors, it becomes natural — tutors study together before their MLC shift starts. We’ll enhance what our tutors take beyond

this experience and build transferable skills. We serve tutors and students alike.

**IT’S 4:00 P.M.** Students show up for College Algebra Peer Mentoring, semi-structured sessions where undergrads help other undergrads. Today another group of our “regulars” has come in. They know each other but also welcome new people into their community of mistake-makers. The group works together to see connections between concepts. They stay regulars because they’ve accepted mistakes as part of the process, not the outcome.

**IT’S 5:00 P.M.** We’re one of the go-to destinations for math students, and the MLC is running low on open tables. More people doing more math need more space! The Math Library formerly occupied our location in Van Vleck. Our program has different needs, namely supporting a welcoming environment for active collaboration and interaction. We’ll pursue renovating our space to fit those needs.

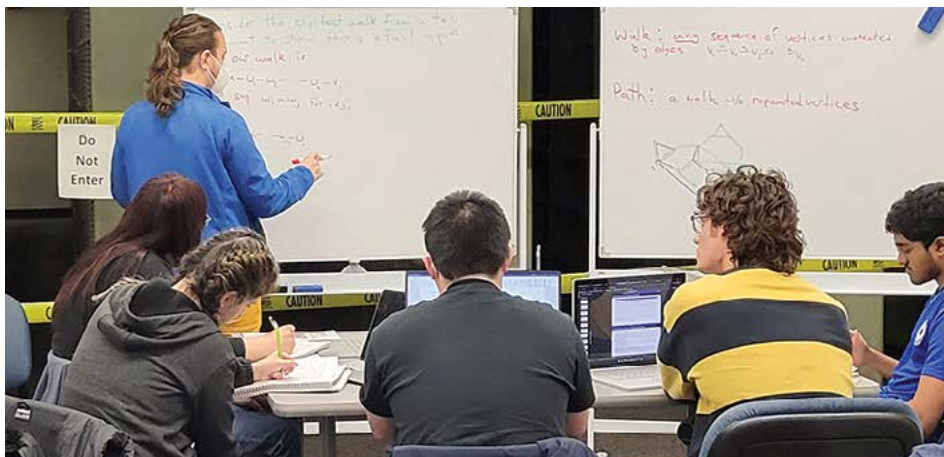
**IT’S 5:30 P.M.** I’m across campus presenting a workshop on math study skills; today is how to prepare for a math final exam. Around 200 students attend; survey results show several comments about learning something new. Sharpening the foundational literacy to practice math beyond students’ raw talent is one of our goals.

**IT’S 6:00 P.M.** Students are coming in for Course Assistant Hours on Real Analysis. Class schedule conflicts can make regular office hours inconvenient for students. Our Course Assistant Hours provide office hours–style assistance on an evening schedule. This is a great example of another key goal: *meeting students where they are.* We’ll continue to expand upon this.

**IT’S 7:00 P.M.** Students arrive for a Proof Table session on Linear Algebra. Proof Table is a new concept we started this year for upper-level courses requiring proofs. Students in the same course can gather and work on homework as a group. A TA or advanced undergrad math major facilitates the group. Group learning builds the community students need as they progress toward their degree and afterward.

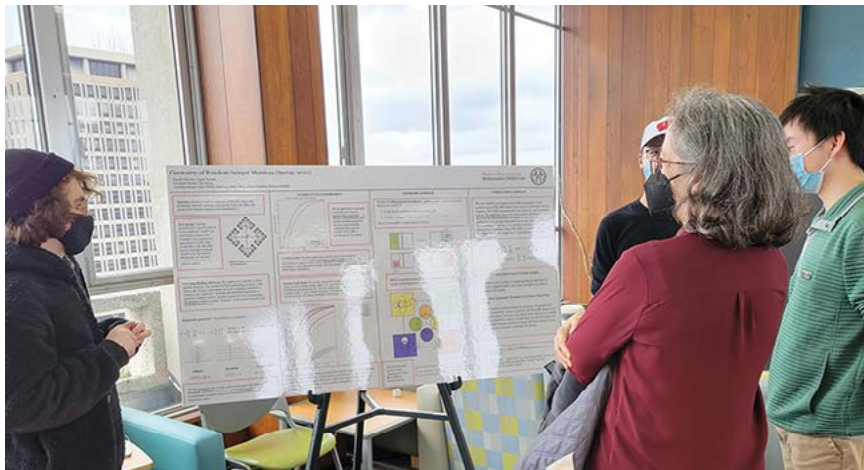
We’re ready to grow, but we’ll need funding and partnerships with the university, alumni, and industry to do it. Opportunities for growth include renovating our space, offering expanded hours, providing seminars to help math majors see possible futures for their using their skills in graduate school or employment, expanding math study skills workshops, providing leadership opportunities for our tutors, and building more research into our tutoring programs.

**IT’S 9:00 P.M.** Our doors are closed. We see another familiar look. Every time it happens it’s magical: *“I’ve got it!”*



## Are you interested in helping more students do more math?

Our Math Learning Center needs renovations! The former Kleene Math Library needs substantial changes to accommodate the crowds of students asking for help. Contact Kim Bair ([kim.bair@supportuw.org](mailto:kim.bair@supportuw.org)) for funding opportunities or designate “Math Learning Center” in your online donations.



SARA NAGREEN

Students present their MXM research to Associate Dean Gloria Mari-Beffa at the MXM Open House on May 3, 2022.

## Math Labs: Math in Action

Research laboratories in mathematics are very special and exciting spaces for research activity and student training, but they are just as unusual. Yet the Mathematics Department at UW–Madison has two! By engaging with such labs, undergraduates take part in foundation-building and career-forming research activity. Graduate students and postdocs are trained not only as excellent researchers, but as mentors and as communicators of critical and scientific thinking.

The **Madison Experimental Mathematics (MXM) Lab** is a new organization in the Mathematics Department at the University of Wisconsin–Madison, inspired by the Wisconsin Idea that the boundaries of the university extend to the boundaries of the state. The MXM Lab aims to broaden the horizons of undergraduate students by providing them with the opportunity to explore the beauty of mathematics outside the traditional classroom through participation in mathematical research. The first semester of the MXM Lab in spring 2022 saw nine collaborative research teams, each consisting of three to five undergraduate students, a graduate student mentor, and a faculty mentor. The goal for the future is to run 15–20 projects per semester providing research opportunities to 60–90 students. An additional goal of the MXM Lab is to raise enthusiasm and excitement around mathematics among the general public, and to initiate outreach programs associated with the MXM Lab to local schools and community centers.

Meanwhile in neighboring Sterling Hall, students in the **AMEP Lab** carry out physical experiments, devise mathematical models, and perform analytical and numerical analysis. Table-top experiments inform theory, and theory informs new experiments. Table-top designs constructed in the lab, from magnetic and springmass systems to viscous fluid experiments, have been used to revitalize undergraduate and graduate courses in Applied Math, Engineering, and Physics, and used in outreach presentations to K–12 students in the greater Madison metropolitan area. The lab also supports the annual COMAP Mathematical Modeling Contest. A recent initiative includes a connection to the Madison Ho–Chunk Youth and Learning Center, which is a central hub for educational initiatives for the Ho–Chunk community across all of Wisconsin.

## Vietnamese Video Interviews



Hung Tran

With the widespread adoption of remote communication technologies during the pandemic, Hung Tran decided to try to further the adoption of math and math research among Vietnamese high school students and undergraduate students. He experimented with a series of video interviews of Vietnamese mathematicians in Vietnam and did interviews with Fields medalist Ngo Bao Chao (Chicago), Xuan-Long Nguyen (Michigan), and Joe Neeman (UT–Austin). He promoted mathematics and long-term development of serious mathematics and sciences in Vietnam, especially to attract young talent to the basic sciences.

“Mathematics is surely very hard, but it is beautiful and natural if understood correctly. Many high school students and undergraduate students in Vietnam didn’t have chances to understand clearly what mathematics and mathematical research are really about, and through the interviews and discussions, we tried to break the barriers and create a welcome and supportive environment for them to explore and try further. The students are also encouraged to connect and contact the professors afterwards if they have questions or concerns.”

**View Hung’s interview series** (videos in Vietnamese):

- [youtube.com/watch?v=HYhDHFaaxSA](https://youtube.com/watch?v=HYhDHFaaxSA)
- [youtube.com/watch?v=rbViQe4yaZ8](https://youtube.com/watch?v=rbViQe4yaZ8)
- [youtube.com/watch?v=GUbPyvkLo-k](https://youtube.com/watch?v=GUbPyvkLo-k)

# undergraduate AWARDS & NEWS

## Undergraduate Student Awards

**David L. Young Mathematics Scholarship**  
Caden Pulley

**Department of Mathematics Talent Search Scholarship**  
Owen Hunt  
Ethan Yang

**Felice Michaels Levin Scholarship Fund for Mathematics**  
Jorge Gutierrez Aguilar

**Frank D. Cady Scholarship**  
Edgar Gevorgyan  
Alex Hentzen  
Josiah Locke

**Mark H. Ingraham Math Scholarship Fund**  
Binhao Chen

**R. Creighton Buck Prize Fund**  
Hanita Haller

**Terry Millar Memorial Fund**  
Clarence Harley

**Dowling Scholarship**  
Binhao Chen  
Hongjing Huang  
Xuzhou Liu  
Shourya Mohaniya

**I. L. Newman Mathematics Fund**  
Jordan McWilliams

**Mary Ellen Rudin Mathematics Fund**  
Yanli Liu  
Lina Liu

**Violet Higgitt Frank Scholarship**  
Kyle Boone  
Yufei Zhan

## Undergrad Sam Christianson Awarded Hilldale Fellowship



Sam Christianson

Undergraduate **Sam Christianson** has been awarded a **2021–2022 Wisconsin Hilldale Undergraduate/Faculty Research Fellowship**. Working in the AMEP Lab alongside PhD student (formerly VISP and MA) **Hongyi Huang** and Professor **Saverio Spagnolie**, Christianson is exploring the dynamics of bodies in gas-filled fluids using experiments and numerical simulations. The research aims to analyze and characterize the “dancing raisins” effect: raisins exhibit periodic dynamics when placed in carbonated water (try it!). While the motivation is a playful one, the tabletop-scale model allows for the accessible study of more complicated phenomena in natural settings (e.g., magma, blood, and tissues during decompression) and in engineering (production processes, oil extraction).



SAVERIO SPAGNOLIE

The AMEP Lab was hopping this summer! See related story on page 7.

# OUTREACH



Top problem solvers gather for the Math Talent Search Celebration on May 17, 2022.

## Wisconsin Math Talent Search Concludes Another Successful Year

The **2021–2022 Wisconsin Math Talent Search** has concluded. The top Wisconsin problem solvers were invited to write the **Van Vleck Scholarship** exam, which took place at the end of April. These students were also invited to a celebration at UW–Madison on May 17, the Talent Search Honors Day. Congratulations to the **2021–2022 Van Vleck Scholarship** winner: **Henry Coyle** (Whitefish Bay High School)! Do you want to know more about the Wisconsin Math Talent Search? Check out [talent.math.wisc.edu](http://talent.math.wisc.edu).

## A Global Math Meet

The Purple Comet! Math Meet is a free, annual, international, online, team mathematics competition designed for middle and high school students that has been held every year since 2003. Teams of one to six students compete by submitting solutions to a list of mathematics problems. There is a 10-day window during which teams may compete, choosing a start time most convenient for them. The problems range in difficulty from fairly easy to extremely challenging. In 2016 over 12,000 students competed on over 3,200 teams from 59 countries.

This began as an outreach program at UW–Whitewater, but for the last 10 years, its sponsor has been AwesomeMath, a Dallas-based company that runs math summer camps. Jonathan Kane (UW–Whitewater emeritus) is the main coordinator of the contest. He is an honorary fellow in the UW–Madison Math Department, also serving on the Talent Search program committee. Several UW–Madison math faculty and staff provide translations of our problems into a few of the two dozen languages in which we provide our problems.

<p><b>Oh Hoon Kwon</b> – Korean <b>Steffen Lempp</b> – German <b>Laurentiu Maxim</b> – Romanian <b>Mariya Soskova</b> – Bulgarian</p>
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We have just published a 20th anniversary book [awesomemath.org/product/purple-comet-math-meet-next-10-years/](http://awesomemath.org/product/purple-comet-math-meet-next-10-years/). Learn more at [purplecomet.org](http://purplecomet.org).



## UW–Madison Does Well in Putnam Competition

UW–Madison did very well during the annual MAA Putnam Competition. Our university ranked No. 25 nationwide, including Canada, out of 427 other institutions.

Our student **Ivan Hu** received honorable mention. **Joseph Cai** and **Nitit Jongsawataporn** ranked among the top 500.

View the results at [maa.org/math-competitions/putnam-competition](http://maa.org/math-competitions/putnam-competition).



# graduate student AWARDS &



## Graduate Student Instructional Excellence Awards

Each year, our department gives out awards in four categories to celebrate the contributions of our remarkable TAs.

**Early Excellence Award** is awarded to new TAs with exceptional teaching records. **Boyana Martinova, Haley Colgate**

**Exceptional Teaching Award** is awarded to TAs with exceptional teaching records across multiple semesters. **Karen Duffy, Nathan Nicholson, Ian Seong, Karan Srivastava, Peter Wei, Tejasi Bhatnagar, Allison Byars**

**Exceptional Service Award** is awarded to TAs who have demonstrated exceptional commitment and impact in their service to the department, university, or profession. This type of service has been especially valuable in building community in the face of the challenges imposed by COVID.

**Maya Banks** and **Yandi Wu** for organizing Women and Non-binary People in Mathematics at Wisconsin (WIMAW) and the AMS Donut Seminar, a grad-to-grad expository seminar.

**Evan Sorensen** for organizing the local SIAM chapter, which includes research seminars and speakers from outside of academia, as well as the Mega Math Meet, a math competition for local elementary school students.

**Hyun Jong Kim** for organizing the Directed Reading Program, where undergrads are paired with graduate mentors for a semester-long reading course.

**Capstone TA Award** is our department's most prestigious TA award, which is given to one TA per year in celebration of their tremendous contributions to our department's teaching and service mission.

**Bryan Oakley** for his spectacular record as a TA and his particular contributions to the teaching of our pre-calculus courses.

Finally, one department TA received a Campuswide TA honor, as **Ian Seong** was selected as an **L&S Teaching Fellow** for fall 2022.

## 2021–2022 PhD Graduates

Michel Alexis (Denisov)  
Geoff Bentsen (Seeger)  
Tejas Bhojraj (Miller)  
Beth Branman (Kent)  
Hongfei "Carrie" Chen (Thiffeault)  
Hongxu Chen (C. Kim, Q. Li)  
Wendy Cheng (Caldararu, Committee Chair)  
Zhiyan Ding (Q. Li)  
Enkhzaya Enkhtaivan (Cochran)  
Chun Gan (Gong)  
Xiao Hou (Q. Li/N. Chen)  
Jiaxin Jin (Craciun/C. Kim)  
Yingda Li (Chen)  
Yining Li (N. Chen)  
Yun Li (Valko)  
Adrian Tovar Lopez (V. Jog, Q. Li)  
Zheng Lu (Arinkin)  
Lorenzo Najt (Ellenberg)  
Brian Oakley (Thiffeault)  
Changkeun Oh (S. Guo)  
Jaeun Park (Denisov)  
Xiao Shen (Seppalainen)  
Vladimir Sotirov (Arinkin)  
Rajula Srivastava (Seeger)  
Son Tu (Tran)  
David Wagner (Caldararu)  
Niudun Wang (Ellenberg)  
Ben Wright (Kent)  
Liding Yao (Street)  
Jenny Yeon (Craciun)  
Polly Yu (Craciun)

## 2021–2022 MA GRADUATES

Cheng Chen	Zhenyu Huang	Jingyi Ma	Weizheng Wu
Chenghuang Chen	Jiaxiang Ji	Aditya Sarma Phukon	Yuehui Xu
Yu Chen	Jingyi Li	Qipeng Qian	Chen Yang
Zhaojun Ding	Ruoxi Li	Karthik Ravishankar	Dunbang Yuan
Yihui Dong	Deming Lu	Perry Strong	Weiman Yuan
Tingting Fang	Ruiyu Lu	Qifeng Tan	Guidong Zhang
Shilu He	Xiaoxuan Lu	Tianhua Wang	Yixuan Zhang

# NEWS

## Graduate Student Research Awards

**Excellence in Research Graduate Student Award** is an annual competition for awards, ultimately recognizing students making significant and substantial contributions to research in pure or applied mathematics, as part of their work toward a PhD.

**Zhiyan Ding, Qiao He, Julia Lindberg, Changkeun Oh, Rajula Srivastava, Liding Yao**

The **Early Career Graduate Student Award** is given to exemplary young students who have demonstrated excellence early in their studies.

**Asvin Gothandaraman, Jiaqi Hou, Jiaming Xu**

**John Nohel Prize in Applied Mathematics Award** recognizes graduate students who write an outstanding PhD thesis in applied mathematics at the University of Wisconsin–Madison.

**Hongfei Chen, Julia Lindberg, Shuqi Yu**

**Henry Schaerf Mathematics Graduate Award** is similarly given to graduate students who have demonstrated promise in their academic work.

**Ruofan Jiang, Connor Simpson, Yi Peter Wei**

## Master's Student Update

The Master of Arts: Foundation of Advanced Studies had an amazing graduation season. Among 28 spring graduates, 11 have been accepted to top-notch PhD programs and five have received job offers in the U.S. and China. This past academic year was the first year that we returned to in-person classes since spring 2020, due to the pandemic. Students were resilient and hardworking individuals, who are now prepared for their new academic and professional endeavors.



## Where are our graduates going?

Beth Branman (2022, Ph.D., Kent) Postdoctoral RTG, University of Virginia

Hongfei Chen (2022, Ph.D., Thiffault) Postdoctoral position, Tulane University

Hongxu Chen (2022, Ph.D., C.Kim, Q. Li) Research Scientist, Huawei

Yu Chen (2022, M.A.) Software Development Engineer, Bytedance

Zhiyan Ding (2022, Ph.D., Li, Q.) Morrey Visiting Assistant Professor, University of California, Berkeley

Enkhzaya Enkhtaivan (2022, Ph.D., Cochran) Software Engineer, Clever

Shilu He (2022, M.A.) Software Development Engineer, Amazon

Jiaxin Jin (2021, Ph.D., Craciun/C. Kim) Postdoctoral Researcher, Ohio State University, Department of Mathematics

Brandon LeGried (2021, Ph.D., Roch) Postdoctoral Fellow, University of Michigan–Ann Arbor, Department of Statistics

Yingda Li (2021, Ph.D., Chen N.) Research Scientist, Meta Platforms (Facebook)

Zheng Lu (2021, Ph.D., Arinkin) Machine Learning Scientist, Amazon

Lorenzo Najt (2021, Ph.D., Ellenberg) Data Scientist, Two Sigma

Bryan Oakley (2022, Ph.D., Thiffault) Postdoctoral Fellowship at Arizona State University

Changkeun Oh (2022, Ph.D., S. Guo) C.L.E. Moore instructor, MIT

Xiao Shen (2021, Ph.D., Seppalainen) Postdoctoral Fellow, University of Utah

Rajula Srivastava (2022, Ph.D., Seeger) Hirzebruch Research Instructor, Max Planck Institute for Mathematics and University of Bonn

Niudun Wang (2021, Ph.D. Ellenberg) Software Engineer, Google

Benjamin Wright (2021, Ph.D., Kent) Software Developer, Epic Systems

Liding Yao (2022, Ph.D, Street) Zassenhaus Assistant Professor, Ohio State University, Department of Mathematics

Jenny Yeon (2021, Ph.D., Craciun) Applied Scientist, Amazon (ASW)

Polly Yu (2021, Ph.D., Craciun) Independent Fellow, NSF-Simons Center for Mathematical & Statistical Analysis of Biological Systems, Harvard



# faculty and staff NEWS/AWARDS

**Andrei Caldararu** has received a Focused Research Group (FRG) grant from the National Science Foundation (NSF), joint with Benjamin Antieau (Northwestern), Max Lieblich (University of Washington), Akhil Mathew (University of Chicago), and Martin Olsson (Berkeley). The grant, worth \$1.5 million, will be used jointly to fund research, conferences, postdocs, and graduate students in the area of derived algebraic geometry.

**Tonghai Yang** together with a team of four other mathematicians have won the fourth Alexanderson Award for their paper “Modularity of generating series of divisors on unitary Shimura varieties” (*Asterisque* 421 (2020), pages 7–125).

The Alexanderson Award recognizes the best paper from an AIM workshop or SQuARE over the last three years. A prize ceremony takes place at the AMS Joint Math Meeting in Boston in January 2023. The award comes with a medal, a little pocket money, and a weeklong trip to a private island in the Bahamas!

**Hung Tran** has been awarded a Vilas Faculty Early Career Investigator Award. Through the generosity of the Vilas Trust, the Vilas Faculty Early & Mid-Career Investigator Awards recognize research and teaching excellence in early and mid-career faculty.

**Daniel Erman** has been awarded the Alliant Energy James R. Underkofler Excellence in Teaching Award. These awards, funded by an endowment from the Alliant Energy Foundation, are intended to recognize and reward extraordinary teachers at UW System universities within Alliant Energy’s service area.

**Sebastien Roch** has been named a Fellow of the Institute of Mathematical Statistics (IMS). IMS is the main scientific society for probability and the mathematical end of statistics. Among its various activities, IMS publishes the *Annals* series of flagship journals of probability.

In a March 23, 2022, *Washington Post* op-ed, **Jordan Ellenberg** discussed the alleged methods that Columbia used to game U.S. News and World Report’s College Rankings. He notes, “To the extent that universities chase rankings — whether through policy changes or sketchy numbers — they are declaring their real priorities. They are making clear that the imaginary students envisioned by the ranking algorithm are more important than the real-life students already present in the classrooms and the dorms.” Link: [go.wisc.edu/ellenbergcollegerankings](https://go.wisc.edu/ellenbergcollegerankings)

**Jordan Ellenberg** wrote an op-ed for the *Washington Post* that was published on August 31, 2021, “Coronavirus vaccines work. But this statistical illusion makes people think they don’t.”

“In Israel for a time, more vaccinated people were hospitalized for COVID-19 than unvaccinated people. There’s no reason to worry,” writes Jordan Ellenberg, a math professor at the University of Wisconsin, in an op-ed. “Simpson’s paradox is a warning that the whole of the data often looks weirdly different than the sum of its parts.” Link: [go.wisc.edu/ellenbergcovidisrael](https://go.wisc.edu/ellenbergcovidisrael)

**Jordan Ellenberg** continued on his tour to promote his new book,

*Shape: The Hidden Geometry of Information, Biology, Strategy, Democracy*, as a guest on BYUradio’s podcast *Top of Mind*. Link: [go.wisc.edu/ellenbergbyuradio](https://go.wisc.edu/ellenbergbyuradio)

We are pleased to congratulate **David Anderson**, **Chanwoo Kim**, and **Jin-Yi Cai** (CS/Math Affiliate) for being awarded Simons Fellowships. They are three of 38 announced 2022 Fellows. The Simons Fellows program extends academic leaves from one term to a full year, enabling recipients to focus solely on research for the long periods often necessary for significant advances. Link: [go.wisc.edu/2022simonsfellows](https://go.wisc.edu/2022simonsfellows)

Professor Emerita **Georgia Benkart** was honored by the AMS in March 2022 with an article titled “Gems from the Work of Georgia Benkart.” Since her retirement from teaching, she has provided tremendous service to the mathematical community, notably as president of the AWM and as an associate secretary of the AMS for more than a decade, up until this year.

From the article: “In this article we highlight a few selected gems from her extensive contribution to our field, organized in a roughly chronological sequence of vignettes and images (which can be read or viewed in any order). Our hope is that we can capture and transmit a snapshot of Georgia’s rich mathematics, beautiful style, and wonderful mathematical personality.” Link: [go.wisc.edu/georgiabenkartgems](https://go.wisc.edu/georgiabenkartgems)

*Unfortunately, two months after this article was published, Georgia Benkart died of lung cancer. See page 14 for our in memoriam tribute to her.*

Congratulations to **Tatyana Shcherbyna** and **Andrew Zimmer** for both being named 2022 Sloan Fellows. They are two of 118 early career scholars who represent the most promising scientific researchers working today. Their achievements and potential place them among the next generation of scientific leaders in the U.S. and Canada. Winners receive \$75,000, which may be spent over a two-year term on any expense supportive of their research. Link: [go.wisc.edu/2022sloanfellows](https://go.wisc.edu/2022sloanfellows)

**Mariya Soskova** was one of 26 faculty winners of the 2022–23 Vilas Associates Competition. The competition recognizes “new and ongoing research of the highest quality and significance.” Tenure-track assistant professors and tenured faculty within 20 years of their tenure date are eligible. Link: [go.wisc.edu/2022vilasassociates](https://go.wisc.edu/2022vilasassociates)

**Jose Rodriguez** is co-organizing a semester program titled Algebraic Statistics and Our Changing World: New Methods for New Challenges at the new NSF institute IMSI in Chicago fall 2023. The institute only holds two programs per year, and there are only seven such institutes in the country. It is an incredible honor for Jose and his group to be chosen.

Jose is teaching a related graduate course this semester, Applied Algebra: Algebraic Statistics, so our own students should have an opportunity to benefit from the program, too.

A team of mathematicians (that included our own **Ananth Shankar**) has solved an important question about how solutions to polynomial equations relate to sophisticated geometric objects called Shimura varieties. The work was reported in *Quanta Magazine* about the team’s participation on solving the Andre-Oort conjecture. Link: [go.wisc.edu/shankarootconjecture](https://go.wisc.edu/shankarootconjecture)

**Betsy Stovall** has been named the Associate Secretary for the American Mathematical Society (AMS)’s Central Section. She has taken over this job from **Georgia Benkart**, who had served in this capacity for the last 12 years. (Thank you, Georgia!) Each associate secretary is responsible for the scientific program and local logistics of two sectional meetings per year in their respective geographic section. Once every four years, an associate secretary has primary responsibility for the scientific program at the JMM. Associate secretaries are appointed by the council upon recommendation by the executive committee and board of trustees. Each associate secretary serves a two-year term, with possible reappointment. Link: [go.wisc.edu/stovallmssecretary](https://go.wisc.edu/stovallmssecretary)

**Justin Sukiennik**, associate faculty associate, has been named a recipient of one of the 2021 Forward in Access Awards. Justin, who serves as our co-director of the Precalculus Program, was honored for creating an inclusive educational experience for all students. He was recognized, among seven others, and awarded with a commemorative plaque. Link: [go.wisc.edu/sukiennikforwardaward](https://go.wisc.edu/sukiennikforwardaward)

Congratulations to **Leslie Smith**, the newest member of our department to be named a Fellow of the American Mathematical Society (AMS) for 2021. She was named for contributions to applied mathematics and particularly fluid mechanics.

The Fellows of the AMS designation recognizes members who have made outstanding contributions to the creation, exposition, advancement, communication, and utilization of mathematics. Link: [go.wisc.edu/2022amsfellows](https://go.wisc.edu/2022amsfellows)



## Alumni News

### Former Professor Alejandro Adem to Be Next Chief Editor of the Bulletin of the AMS



Alejandro Adem

**Alejandro Adem**, a professor of mathematics at the University of British Columbia (UBC) in Canada, and former professor at the UW–Madison Math Department, has been named the next chief editor of *Bulletin of the American Mathematical Society*. Link: [ams.org/news?news\\_id=6912](https://ams.org/news?news_id=6912)

**Wanlin Li** (Ph.D., 2019, Ellenberg) will start as an assistant professor at Washington University in St. Louis.

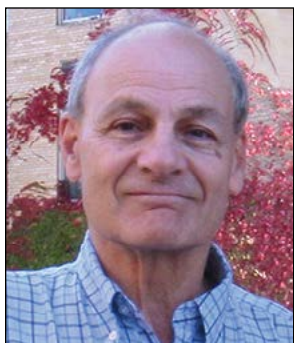
**Yuan Liu** (Ph.D., 2019, Boston) will start as an assistant professor at University of Illinois Urbana–Champaign.

**Ersin Ozugurlu** (Ph.D., 1999, Van den Broeck) has been appointed as a professor in the math department at Istanbul Technical University.

**Ruiwen Shu** (Ph.D., 2018, S. Jin) will start as an assistant professor at University of Georgia.

# In Memoriam

## Fred Brauer

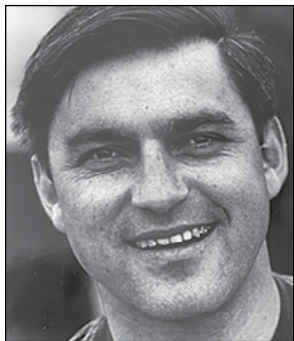


**Fred Brauer**, professor emeritus, died on November 17, 2021, in Vancouver, BC. Brauer obtained his PhD in 1956 at MIT and was a member of our department from 1960 to 1996. He served as department chair from 1979 to 1982. Mathematics Genealogy lists seven Madison PhDs advised by Fred from 1965 to 1997.

His interests were in the mathematical modeling of epidemiological problems and population systems, with emphasis on the dynamical system aspects and approaches.

Most recently Brauer and his wife, Esther, lived in Vancouver, where he was an honorary fellow at University of British Columbia, Vancouver. He continued to publish up until very recently, including papers on the spread of viral epidemiology and COVID-19, found at *Tablet Magazine*. (link: [go.wisc.edu/brauerviralepidemiology](https://go.wisc.edu/brauerviralepidemiology)) He also was co-author of *Mathematical Methods in Epidemiology* (link: [go.wisc.edu/brauermathmodels](https://go.wisc.edu/brauermathmodels)), written jointly with Carlos Castillo-Chavez and Zhilan Feng.

## Michael Voichick



Professor Emeritus **Michael Voichick** died on July 1, 2021.

Voichick received his PhD from Brown University in 1962 where his thesis was on function theory. He was the John Welsey Young Research Instructor at Dartmouth College from 1962 to 1964 before joining our faculty as an assistant professor in 1964.

He took on the job of undergraduate advisor coordinator in 1968 and continued with that job until his retirement in 1996. Voichick was the first undergraduate advisor coordinator and made it a vital position for the department. He learned the intricate graduation rules and met cheerfully with countless students. He put departmental rules into order and designed

a handbook for our majors. Career planning advice was another important aspect of his job. During his career, he received many accolades from students. In 1995, he won the Excellence in Student Advising Faculty Award from the College of Letters & Science. Dan Shea, who succeeded Voichick in this role, got off to a running start because of the excellent order Voichick maintained on the records and the files. Joann Elder, who was the Undergraduate Advisor Coordinator in the Department of Sociology and worked with Voichick in the Faculty Advising Service, noted, “Everything I knew about Mike — his amiability, attention to changing rules, openness to seeing students, giving them his time — he was a true professional and a really nice guy. The Math Department was lucky to have him.”

View his obituary at [go.wisc.edu/voichickobit](https://go.wisc.edu/voichickobit).

## Georgia Benkart



**Georgia Benkart**, emerita professor of mathematics at UW–Madison, died unexpectedly on April 29, 2022, in Madison, Wisconsin, leaving behind a worldwide network of colleagues and former students who considered her not only a gifted mathematician, but also a dear friend and mentor.

Benkart, who joined the UW–Madison Math Department in 1974 after earning her PhD from Yale University, was the second woman to join the department.

Originally from Youngstown, Ohio, Benkart attended Ohio State University for her undergraduate education and received her PhD from Yale University in 1974 under Professor Nathan Jacobson. She retired as a full professor in 2006.

“Georgia Benkart was internationally known for her contributions to mathematics, hugely popular among graduate students, and a really good friend,” says Gloria Mari-Beffa, former chair of the Department of Mathematics and now associate dean for the natural, physical and mathematical sciences in the College of Letters & Science. “Her impact continued to resonate in the math department long after her retirement. There are so many of us who were deeply touched by her. It is a great loss.”

Mari-Beffa points to a recent tribute to Benkart from the American Mathematical Society, “Gems from the Work of Georgia Benkart,” by former colleagues Tom Halverson (Macalester College) and Arun Ram (University of Melbourne), as an excellent summation of Benkart’s body of work.

Paul Terwilliger, professor of mathematics and a colleague of Benkart’s since 1985, remembers her elegant problem-solving abilities.

“To be sure, Georgia was profoundly competent and well organized,” he says. “But that description alone does not do her justice. For Georgia, a project was not just about getting it right; it was also about making it beautiful. Each of her papers was a polished gem, that would make any lawyer or poet proud. Each lecture was a work of art, that engaged the audience from beginning to end.”

Benkart made many important contributions around the study of Lie algebras, structure of algebras, quantum groups, representation theory, and combinatorics. Her work with UW–Madison Professor Emeritus Marshall Osborn and others in the 1970s and 1980s was fundamental in the classification of simple Lie algebras. In the 1990s she made numerous contributions in combinatorial representation theory (with significant joint papers with her graduate students) and in the structure and classification of root system graded Lie algebras. Bruce Allison, Yun Gao, Efim Zelmanov, and others collaborated with her in this work.

“Georgia and Marshall Osborn brought me to Madison and guided me in my new American life,” says Zelmanov, who was a professor of mathematics at UW–Madison from 1990 to 1994 and was awarded the prestigious Fields Medal in 1994. “Think how lucky I was, to have such guides! Georgia has always been literally an angel, with an incredible sense of humor and a lot of down-to-earth common sense. I still quote her on many occasions.”

As her career built momentum, Benkart continued with contributions in quantum groups and crystals (with Seok-Jin Kang, Masaki Kashiwara, Paul Terwilliger, and others) and in elemental algebras and deformation theory of algebras (with Tom Roby, Sarah Witherspoon, and others).

“Georgia’s research program always had many projects on many burners,” says Arun Ram, professor of mathematics at the University of Melbourne, who worked alongside Benkart at UW–Madison from 1999

to 2007. “Her impact as a mentor to young researchers, graduate students, and the community of women in mathematics was one of her greatest contributions. So many younger-generation mathematicians have benefited from the capability and inspiration that they received from Georgia’s mentorship and support.”

As the global community became more connected, Benkart led groups of early career researchers on projects at Banff International Research Station, Mathematical Sciences Research Institute (MSRI), and the Institute for Advanced Study. Two highlights from the last few years of Georgia’s research are her work on walks and dynamics from multiplying representations, with Persi Diaconis, Tom Halverson, Martin Liebeck, Pham Tiep, and others, and her work on tensor representations and Mackay quivers with WINART (Women in Noncommutative Algebra and Representation Theory) research groups.

Chelsea Walton, associate professor of mathematics at Rice University and one of the founders, along with Georgia Benkart and Ellen Kirkman (professor of mathematics at Wake Forest University), of the WINART network, says the group worked closely to build a supportive community.

“I distinctly remember first meeting Georgia and Ellen Kirkman at a conference at MSRI when I was a third-year graduate student,” recalls Walton. “Seeing them gave me hope that I could make it in our research field and could even be happy! Georgia was a clear inspiration early in my career, she was a pioneer, and she will be missed.”

Walton notes that Benkart’s career continued to be highly active even after retirement. Of her more than 130 published research papers, at least 45 appeared after 2007. Benkart served as president of the Association for Women in Mathematics (2009–2011), on the U.S. National Committee for Mathematics of the National Academies (2013–2020), on the Board of Trustees of the Mathematical Sciences Research Institute (2011–2022), and as associate secretary for the American Mathematical Society (2010–2022), as well as fulfilling many other service roles in the mathematics community. Among her many inspiring lectures, Benkart delivered the Noether Lecture at the International Congress of Mathematicians in 2014.

Benkart is survived by her sister Paula Benkart. To read and share remembrances of Georgia Benkart, please visit [go.wisc.edu/benkartremembrances](http://go.wisc.edu/benkartremembrances).



SARA NAGREEN

Van Vleck Professor Skylar Grey discusses a Madison Experimental Math project with a student during the MXM Open House on May 3, 2022. See page 7 to read more about the MXM Open House.