College of Letters & Science
UNIVERSITY OF WISCONSIN–MADISON

(V3) Van Vleck Vector

V3: a newsletter for the space of alumni and friends of mathematics at UW–Madison

JULY 2021

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Cover photo by Mark Castillo

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A Word from the Chair

DEAR FRIENDS OF THE MATH DEPARTMENT,

What a strange year it has been! Despite doing some in-person instruction, we ended up with mostly virtual classes again, and we've managed to perfect them. We, of course, miss seeing our students' faces in person and are looking forward to a full return to campus in August 2021.

That doesn't mean our department has been quiet! We've had scores of activities aimed at keeping our virtual classes engaged, our grad students able to connect with each other, and our faculty and staff able to reach out and transform our work.

On the fundraising front, we've seen contributions in memoriam of two of our treasured emeriti, Terry Millar and Louis Solomon. It's been a particularly tough year for our emeriti, as we lost Ken Kunen and Joshua Chover as well.

We have big awards and recognition to be proud of, too. Among campus prizes, Laurentiu Maxim won a Vilas Associate Award and Daniel Erman won a prestigious Romnes Mid-Career Award. Three young colleagues, Hao Shen, Shaoming Guo, and Chanwoo Kim, brought home National Science Foundation Career Awards. Hung Tran's sabbatical is supported by a Simons Fellowship.

Our commitment to engage with the world was not paused by the pandemic. Several of our faculty are deeply involved in the emerging field of data science. Elsewhere in this newsletter you can read about the renewal of a large interdisciplinary data science grant co-led by our Sebastien Roch. Our Clare Boothe Luce Professor Mihaela Ifrim has just concluded co-organization of a special fluid dynamics semester at the Math Sciences Research Institute in Berkeley.

As we transition back to campus, your contributions help our graduate students return to their studies, fund trips they could not take this year, and award their scholarship over this tough period. Our undergraduates benefit from scholarships funded by your donations. We hope to use the newly established Terry Millar Fund to help minority students thrive in mathematics and science. Your donations make a difference!

I wish you all out there a happy return back to normal. As always, let us know how you are doing.

Yours,

Timo O. Seppäläinen

Timo Seppäläinen
Department Chair

JEREMY SOLOMON'S GIFT IN HONOR OF HIS PARENTS

Elsbeth and Louis Solomon

When Emeritus Professor **Louis Solomon** died late last year, his son, Jeremy Solomon and his daughter-in-law, Karen Solomon, decided to honor his parents, Louis and Elsbeth Solomon, with a $5,000 gift to the Department of Mathematics annual fund.

When asked about his father, he said, "My father loved mathematics, and he loved the UW. After having worked at several universities, he found a home. While he did lots of research, I know he also enjoyed teaching."

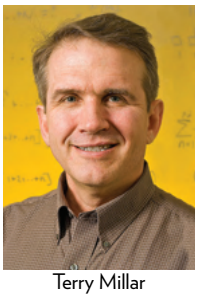
In research, Louis Solomon is perhaps best known for his descent algebra. Several papers with Peter Orlik and Hiroaki Terao pioneered the study of hyperplane arrangements. He was named a Fellow of the American Mathematical Society in the inaugural class of 2013.

Jeremy and Karen made this gift in honor of both his parents, noting, "My mother, Elsbeth, was his everything. They were married for 60 years." Elsbeth has survived Louis, and she is 98.

"My dad felt lucky and grateful to be able to be a mathematician. To be paid to do what he loved."

The department will be funding graduate student awards with these funds, and we feel lucky and grateful to be able to do so.

ESTABLISHMENT OF TERRY MILLAR MEMORIAL FUND



Terry Millar

As many of you are aware, our very own **Terry Millar** passed away March 9, 2019, following a battle with pancreatic cancer. Since his passing, the Department of Mathematics has been working closely with Terry's family, friends, and the UW Foundation to continue his legacy and impact here at UW–Madison. After over a year of tireless work, we are proud to announce the official launch of the Terry Millar Memorial Fund.

Remembered as a mathematician with a mind that never hit pause, Terry's life at UW–Madison and beyond was shaped by his belief that mathematics lies at the heart of all STEM fields and that all students should have effective opportunities to learn. Terry was also a tireless advocate for students and faculty in STEM departments who are members of underrepresented groups, and for initiatives to improve STEM learning outcomes for all students. As such, the fund will be used to support undergraduate students in the Department of Mathematics, with a preference for students from underrepresented groups or populations.

During the month of December 2020, the department promoted the new fund with a series of online videos from professors in the Math Department. Jordan Ellenberg[1], Steffen Lempp[2] and Gloria Mari-Beffa[3] all shared their remembrances of Terry and how thrilled they were to see a new fund that benefits math students in his name. This campaign, matched with emails and social media posts, was able to provide a generous start to Terry's fund, with 63 donations totaling $11,725. This will be joined with $14,000 provided by Terry's family and friends.

Donations can always be made online at **http://supportuw.org/giveto/mathmemorial** or by mailing a check to: **UW Foundation U.S. Bank Lockbox 78807, Milwaukee, WI 53278. Please be sure to designate all physical checks to the "Terry Millar Memorial Fund #132550006."**

[1]Link to Jordan Ellenberg's video: https://youtu.be/2ynm-kg-KiA
[2]Link to Steffen Lempp's video: https://youtu.be/CfryQ-OA9RM
[3]Link to Gloria Mari-Beffa's video: https://www.youtube.com/watch?v=hh9dEgprJCw

UNIVERSITY COMMUNICATIONS

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 http://supportuw.org/giveto/math

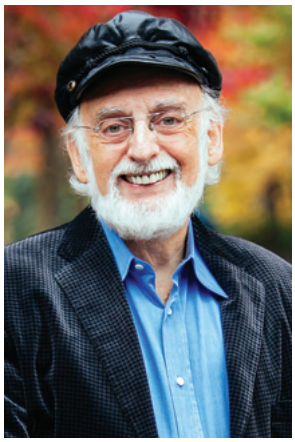
If you have any questions or would like information on other giving options, please contact Kim Bair at kim.bair@supportuw.org.

ISTOCK: METAMORWORKS

Tripods Grant Renewed

The Institute for Foundations of Data Science (IFDS), in an expanded partnership with the University of Washington, the University of California Santa Cruz, and the University of Chicago, has been awarded a five-year $12.5 million grant from the NSF TRIPODS program, one of only two institutes nationwide to receive Phase II funding. Several Math faculty are affiliated with the IFDS, which fosters interdisciplinary collaboration in data science through weekly informal meetings, special interest groups, workshops, and summer schools. The IFDS also supports a number of Math graduate students who benefit from mentoring by faculty outside the department. Professor **Sebastien Roch**, co-PI on the grant, serves on the institute's executive committee.

Math Alum Speaks at Spring Commencement



John Gottman, PhD, an alumnus of UW–Madison, is world-renowned for his work on marital stability and divorce prediction. He was awarded an honorary doctoral degree during spring commencement. As is the tradition for recipients of honorary doctoral degrees, he spoke at the ceremony for graduate students.

Gottman earned a master's degree in clinical psychology and mathematics from UW–Madison in 1967 and a doctorate in clinical psychology from UW–Madison in 1971. Prior to that, he earned a bachelor's degree in mathematics–physics from Fairleigh Dickinson University in 1962 and a master's degree in mathematics and psychology from the Massachusetts Institute of Technology in 1964.

After holding faculty positions at Indiana University and the University of Illinois, Gottman joined the Department of Psychology at the University of Washington in 1986. In 1996, he co-founded The Gottman Institute in Seattle with his wife, Dr. Julie Schwartz Gottman. Its mission is to "create and maintain greater love and health in relationships."

"Dr. Gottman was the first to develop rigorous mathematical analyses of behavior to objectively describe relationships in couples," says Professor Janet Hyde, chair of the UW–Madison Department of Gender & Women's Studies and a professor of psychology. "His background in mathematics was the key to the development of this, which at the time was a groundbreaking experimental approach. These analytical methods have since had great relevance to many other areas in the study of human behavior."

UNIVERSITY COMMUNICATIONS

New Training Grant in Analysis and PDE

The Mathematics Department has been awarded a large training grant in Analysis and PDE, as part of the NSF Research Training Groups (RTG) program. This five-year award will provide funding for stipends for undergraduate, graduate, and postdoctoral researchers in analysis and PDE; annual workshops in analysis and PDE; and a seminar exchange program with other midwestern math departments.

Virtual Office Hours Increases Student Engagement with 'Hybrid' Approach

When the pandemic forced **Betsy Stovall** to move her large calculus class online last spring, she wondered how it would affect her office hours, which also became entirely virtual.

The answer came soon enough.

"I sat there alone staring at the walls," says Stovall, Associate Professor of Mathematics. "Even with in-person office hours, students often feel they need a good reason to come in or it's awkward. I think that was especially true online."

Colleagues in the Department of Mathematics reported similar experiences, leading to some collective brainstorming. For Stovall, the solution was a hybrid approach to office hours this past fall—partly scripted, but flexible enough for lots of give and take.

She let students know that, during the course's regularly scheduled lecture times, she would hold live office hours online and work through math problems. (Her lectures were all asynchronous.) She always came to the sessions with enough problems to fill the time, but usually students brought some of their own math problems they wanted to see solved.

The approach reduced the intimidation factor, especially for shy students.

"Knowing that they could just show up and benefit passively from the office hours was really helpful to some students," Stovall says.

There were a few hiccups early on. For the first couple of sessions, all of the students—some 250—showed up because they thought attendance was mandatory. The format didn't work too well with so many students, even with the help of seven TAs. Soon, though, the sessions settled into a nice rhythm, averaging about 30 attendees.

The sessions built a strong class community and provided Stovall with valuable insights.

"The students were quite active in the chat and often helped answer each other's questions," Stovall says. "Often they would explain things in a different way that made sense to them—you could see they'd get it when a classmate explained it. They also gave me feedback about what was happening in the course, so they helped all of the students in the class, not just those in the meetings."

Stovall recorded and posted the sessions so that all students had access to them.

Stovall credits colleague **Melissa Lindsey**, among others, with helping her land on the approach. Lindsey, the associate director of instructional support for the Department of Mathematics, says it has been interesting to see how instructors can take the same idea—structured office hours—and implement it in a way that best suits who they are as a teacher and who their students are as learners.

Lindsey, an instructor herself, uses a brief survey at the beginning of class to gauge where students are at with the material. She then uses the responses to decide what problems to do from a list she creates in advance.

"In general, I think the main benefit to what Betsy and I and many others in the department are doing is that it's allowing students to have a voice in how time with the instructor is spent," Lindsey says. "It empowers them to be responsible for their own learning."

Stovall realized the popularity of the approach when she asked students whether they wanted to meet the day before Thanksgiving. Not one wanted to cancel.

UW–Madison Expands Activities with the Math Alliance

Toward strengthening and growing a partnership with the Math Alliance, members of the Math Department will join with representatives from the Center for Academic Excellence for expanded recruitment of Math Alliance Scholars in the mathematical sciences.

The Math Alliance is a program started by mathematics and statistics faculty at the three Iowa Regents Universities: Iowa State University, the University of Iowa, and the University of Northern Iowa. Its goal is to build a national community of educators to promote educational opportunities for underserved and underrepresented students with a talent for the mathematical sciences. One of the founders and current Director Emeritus, Philip Kutzko, is an alumnus of UW–Madison who earned his PhD in Mathematics in 1972.

Now a self-sustaining center at Purdue University, the Math Alliance is one of the most successful national organizations aimed at identifying and supporting a diverse talent pool for participation in advanced mathematical sciences. Their initiatives include increased access to networking and REUs, as well as one-on-one mentoring for undergraduate Alliance Scholars by local and external mentors at institutions across the country. The UW–Madison Math Department is a Gold Member of the Alliance, currently with 15 faculty and staff mentors.

Professor **Leslie Smith** describes the new recruitment effort as "essential to provide opportunity for all UW–Madison undergraduate students interested in pursuing the mathematical sciences, and to evolve our department and our profession toward a more equitable and inclusive community." Leslie will work together with Associate Dean **Gloria Marí Beffa**, Assistant Dean **José Madera**, Director of the Math Learning Center **Leah Rineck**, Professor **Mariya Soskova**, and Instructional Support Specialist and Academic Advisor **Bob Wiedenhoeft**.

Modeling the Past and Present

The pandemic required creative ways to get out of the house—one faculty member found a way in his down time to step out not only in space but in time, and designed a historical board game. **Saverio Spagnolie**, who studies partial differential equations and their applications in fluid dynamics, soft matter, and biology by day, participated in a three-day competition with three teammates to design a board game in October 2020. His team won and was offered the chance to publish a more developed version by a prominent historical games publisher, GMT Games. In "Vijayanagara: The Deccan Empires of Medieval India (1290-1398)" players take on the roles of the Delhi Sultanate, the Bahmani Kingdom, and the Vijayanagara Empire during the century-long rise and fall of medieval kingdoms in India over two dynastic periods.

When asked about the experience, Professor Spagnolie said, "It was a wonderful and much needed distraction to read about the history of this period, and to come up with a model for the aims of these kingdoms and the asymmetric means by which they could achieve them. It also reminded me how nice it is to work on physical problems, where experimental data can be called upon to settle a physical model's value. Humans, their behaviors, and their history are much, much harder!"

Professor Spagnolie couldn't help but include a small easter egg in the game as a nod to the history of Indian mathematics. The card below references the 14th century figure Narayana Pandita, believed to have authored an arithmetic treatise called the Ganita Kaumudi in 1356 and whose "cow sequence" reveals the supergolden ratio; and the Kerala School of Astronomy and Mathematics, founded by Madhava of Sangamagrama, where infinite series representations of functions appeared over 200 years before the birth of Isaac Newton.

In other modeling news, our undergraduates once again competed in the annual worldwide Mathematical Contest in Modeling, a 96-hour-long competition which left this year's 10,000+ teams (!!) developing models and writing a research paper on topics ranging from wildfire fighting strategies to predicting the spread of Asian giant hornet nests in the Pacific Northwest. Professors **Amy Cochran** and Saverio Spagnolie and postdoc **Prerna Gera** ran virtual training sessions over Zoom for the 15 badgers who participated. The team of Ruochong Fan, Richard Li, and Xiaoning Shi earned an honorable mention with their paper "Who Cleans the Litter" which investigated the role of fungi on the global carbon cycle. Since the Math Department started sending teams to compete in the COMAP contest in 2013, nearly 50 teams from UW–Madison have participated, providing valuable practice in modeling complex systems, abstraction, time management, and mathematical communication.

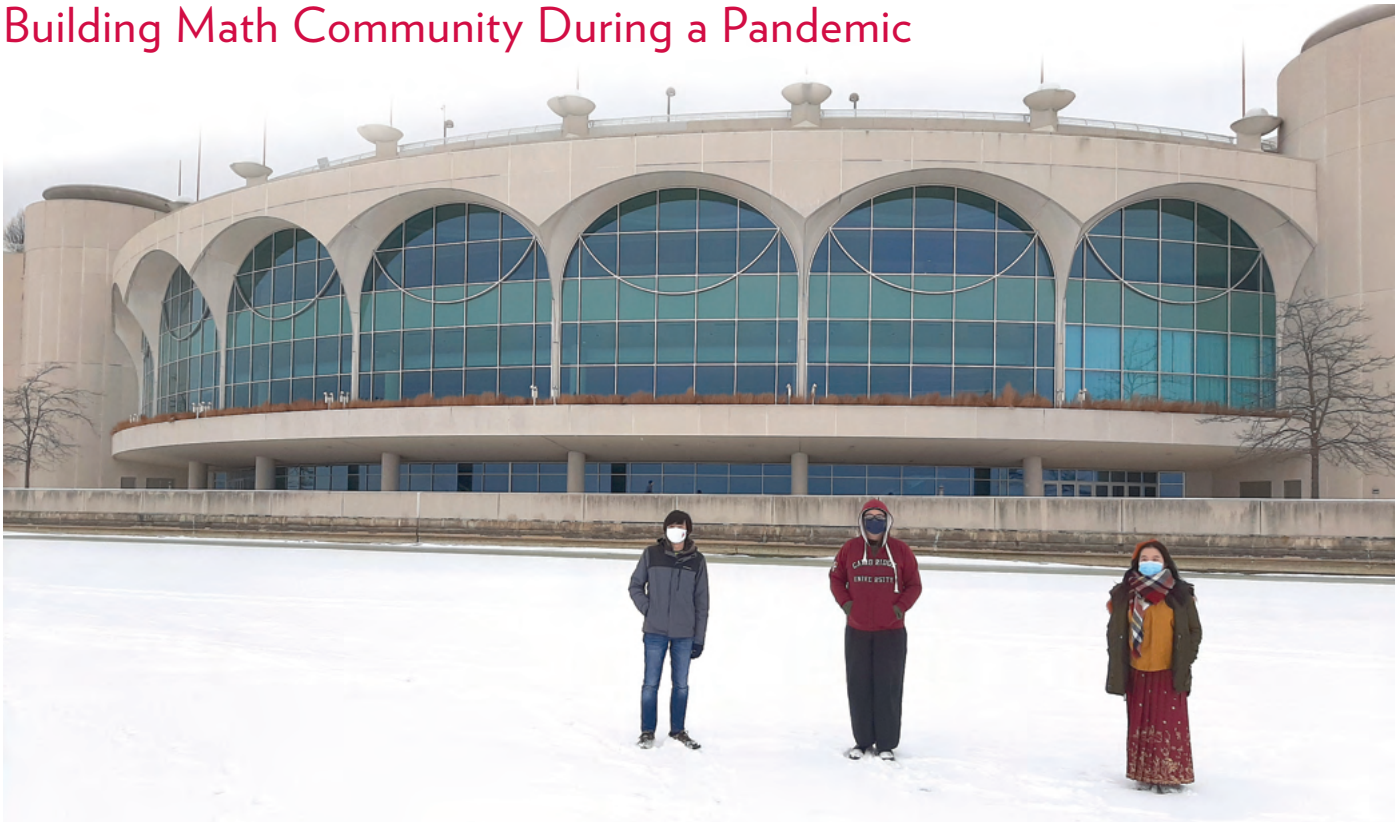
Big Changes for Tutorial Program and Mathlab

In July 2020, the Math Department's tutorial program and Mathlab service joined into a single entity, the Math Learning Center. While still providing the same small-group and just-in-time tutoring services, the new center is adding peer tutoring as well for its pre-calculus students. While the last year has been entirely virtual, the tutors are slated to return to Van Vleck this fall, offering in-person and online tutoring services.

Heading this is the new director of the Math Learning Center, **Leah Rineck**. Leah received her PhD in 2020 from UW–Milwaukee in Urban Education with an emphasis in Math Education. She's spent almost 15 years teaching at UW–Milwaukee, coordinating and creating curriculum for helping struggling students get up-to-speed to succeed in college math.

The Math Learning Center is slated to expand into our old Kleene Math Library space after renovations take place in the coming years, transforming that space into a true student learning utopia. Expect to hear more soon!

Building Math Community During a Pandemic



Education had to make a major shift to remote learning last year due to the pandemic. The building was closed. Gone were the happy accidents of seeing someone you know in the elevator, or hanging out in your office with your fellow graduate students. The 9th floor lounge was a ghost town. How could we welcome our new graduate student population, or undergraduate students, or even our new faculty and staff without actual face-to-face interaction?

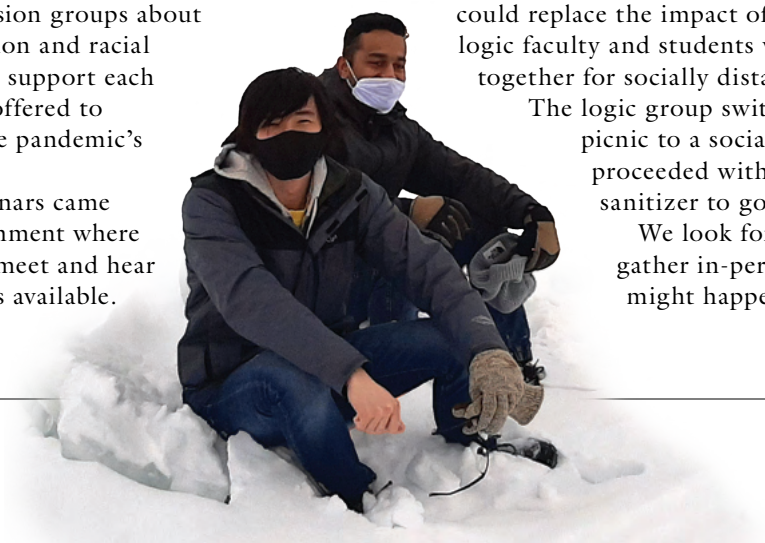
Organically, social events started to emerge online. **Simon Marshall** organized a twice-monthly online game night. Two graduate students, John Yin and Alex Hof, organized a virtual ice cream social, going so far as to offer themed nights such as cheese, boba tea, sorbet, or chocolate pairing suggestions. Movie nights were organized using Zoom to screen favorite films. To celebrate our math graduates this spring, faculty recorded their own well wishes and words of wisdom, which was then posted to YouTube. (https://youtu.be/Hake6G_pp_w)

There were more socially conscious online meetings, such as discussion groups about questions of discrimination and racial justice. Meetings to help support each other emotionally were offered to those suffering under the pandemic's restrictions.

In Fall 2020, our seminars came back to an online environment where individual groups could meet and hear the best seminar speakers available. Indeed, the virtual world meant that speakers from all over the world could be invited to speak at no cost on whatever topics were needed. That sometimes meant talks would be rescheduled to evenings or mornings depending on the speaker's time zones. The Partial Differential Equation and Geometric Analysis seminar relied on pre-recorded talks for its seminar, posting two talks a week for people to view at their leisure. The American Mathematical Society (AMS) seminar has always been known as the "Donut Seminar" due to the treats offered during it. Now, participants were encouraged to buy their own donut and keep the receipt for reimbursement, and enjoy that while participating in the online seminar. The idea of having cookies before the weekly colloquium came back, too, again with the suggestion to buy your own treat and save the receipt for reimbursement. Our department meetings switched to Zoom, bringing us together to meet the challenges of departmental governance.

Virtual social gatherings were one step, but nothing could replace the impact of actual interactions. Several logic faculty and students would occasionally get together for socially distanced walks and activities. The logic group switched its normally scheduled picnic to a socially-distanced picnic and proceeded with plenty of masks and hand sanitizer to go around.

We look forward to a time when we can gather in-person again, and see that it might happen very soon.



undergraduate AWARDS & NEWS

Math Student Among Three to Win Goldwater Scholarship

Gage Siebert, of Fremont, Wisconsin, was among three UW–Madison students named as Goldwater Scholars. He is majoring in physics and mathematics. As a freshman, he studied the origins of life in Professor David Baum's lab at the Wisconsin Institute for Discovery. Siebert then interned at the Arecibo Observatory in Puerto Rico, studying the radio emission from several of the millisecond pulsars used in the search for gravitational waves. He later presented this work at a meeting of the American Astronomical Society. For the past two years, Siebert has worked in Professor Peter Timbie's observational cosmology lab on the Tianlai Array, a radio astronomy experiment built to map hydrogen. He plans to pursue a PhD in physics.

Link: https://go.wisc.edu/1phc06

Senior Math Major Among Finalists for Rhodes Scholarship

University of Wisconsin–Madison senior **Alex Plum** competed this year as a finalist for the Rhodes Scholarship, the oldest and most celebrated college award for postgraduate international study.

The 32 American winners of Rhodes Scholarships were chosen recently. Dozens of others, including Plum, made it to the final stage of the prestigious competition.

"The Rhodes Scholarship is the very pinnacle of undergraduate achievement, and to be among the finalists is a huge honor," says Provost Karl Scholz. "During his time with us, Alex has been a scholar of extraordinary ability and a leader inside and outside the classroom. He is poised to become an intellectual leader who makes a broad impact on the world."

Link: https://go.wisc.edu/0336ow

Undergraduate Awards & News

The **Violet Higgitt Frank Scholarship** was established through a bequest from Violet Frank. This fund provides annual scholarship assistance to one or more students in the College of Letters & Science with special preference to be given to a student or students majoring in mathematics. Our winners were **Alex Menzia**, **Austen Fan**, **Lucas Clark**, and **Shirui Chen**.

The **Irma L. Newman Fund** was established December 31, 1976, through a bequest from Irma L. Newman. The fund supports research and programs of the Department of Mathematics. The fund is used for scholarships for graduating math majors who are a targeted minority. Our winners were **Samuel Garcia** and **William Ortola Leonard**.

The **Dowling Scholarship** was established to recognize and encourage mathematics majors who have demonstrated promise in their academic work. Our winners were **Evan Davis**, **Haotian Qu**, **Isabel Allen**, **Mostafa Hassan**, **Sivakorn Sanguanmoo**, **Xiaohan Zhu**, and **Yvette Ren**.

The **David L. Young Scholarship** was established in memory of David L. Young through donations from friends and family. The scholarship is awarded to a graduating math major whose primary interest is mathematics education. Our winner was **Alexander McMiller**.

The purpose of the **Mary Ellen Rudin Mathematics Fund** is to support bright and talented female students in mathematics. Awards are given to a graduating female math major. Preference is given to students planning for graduate study. Mary Ellen Rudin was one of the leading topologists of our time. Besides solving a number of well-known outstanding open problems, she was a pioneer in the use of set-theoretic tools. She was one of the first to apply the independence methods of Cohen and others to produce independence results in topology. Mary Ellen Rudin received her PhD in 1949 at the University of Texas-Austin under the supervision of R.L. Moore. Our winners were **Elisabeth Lichtie**, **Diya Yang**, and **Shiqi Dong**.

JOHN COBB AND ABRA SCHLUB

Math Graduate Student John Cobb and Artist Abra Schlub Win Delta Beer Lab Design Contest

Catalysts for Science Policy collaborated with local Madison brewery, Delta Beer Lab, to feature art inspired by active research at the University of Wisconsin–Madison on the 2021 spring New England IPA label. Math graduate student **John Cobb** and artist Abra Schlub collaborated to create the winning label, melding art and algebraic geometry.

Their submission notes, "Born out of collaboration between artist and mathematician, this gallery showcases mathematical concepts you might see if you pursue research in algebraic geometry. Algebraic geometry is a highly active and central field in mathematics which relates questions about polynomials with questions about shapes. Besides conceptually unifying seemingly disparate areas of math, algebraic geometry has direct applications in robotics, genetics, and string theory. It is our hope that our design communicates a shared sense of creativity and passion between art and mathematics."

Link: https://casp.wisc.edu/delta-beer-lab-competition/

John Cobb
Math graduate student

Abra Schlub
Graphic artist

Spotlight on VISP

Our Visiting International Student Program (VISP) had a stellar year, headed by its new coordinator, **Xin Cui-Downling**. This year, she rolled out our first VISP/MA Mentor program which was launched in the fall of 2020. New students were paired with second-year students in order to help new students adapt to the program and life in the US. Student mentors provided academic, personal, and professional help and served as a source of support. Mentees gained valuable skills from their mentorships including tips for studying and program information. This program provided students an opportunity to connect with one another, especially during a time when most of them were isolated because of COVID restrictions and taking online classes.

The VISP/MA Committee also agreed to offer a merit-based scholarship to second-year VISP/MA students from Fall 2021. Approximately 10% of students in this program can receive a $5,000 scholarship which will be used toward their second-year tuition.

graduate student CAMPUSWIDE

Graduating Phd Students

2020–2021 PHD GRADUATES

David Marsico (Stechmann), *Atmospheric Dynamic with Moisture and Phase Changes*

Soumya Sankar (Ellenberg), *Arithmetic Statistics of Algebraic Curves*

James Hanson (Andrews), *Definability and Categoricity in Continuous Logic*

Yeyu Zhang (Smith), *Fast-wave averaging with phase changes: Asymptotics and application to moist atmospheric dynamics*

Brandon Boggess (Ellenberg), *On the Number of Points of Small Height in Thin Sets and on Modular Curves*

Liban Mohamed (Denisov), *Schrodinger Scattering: Perturbative Theory and Menchov-Rademacher Theorem Application*

Yida Ding (Craciun), *Mathematical Analysis of Low-Dimensional Reaction Network Systems*

Ying Li (Stechmann), *Predictability of Multiscale Waves and Tropical Rainfall and the Impact of Averaging*

Yu Feng (Thiffeault), *Stir the thin-films*

Shengyuan Huang (Caldararu), *Lie structures in algebraic geometry and its application in Hochschild cohomology*

Xiaocheng Li (Marshall), *An estimate for spherical functions on SL(3,R)*

Benjamin Bruce (Stovall), *Topics in Fourier restriction theory*

Ilyas Khan (Angenent), *Rigidity for Self-Similar Solutions of Mean Curvature Flow*

Geoffrey Bentsen (Seeger), *Regularity of Generalized Radon Transforms with One-Sided Fold Singularities*

Michel Alexis (Denisov), *The Steklov Problem for Orthogonal Polynomials on the Unit Circle and Krein systems*

Solly Parenti (Yang), *CM Fields, The Colmez Conjecture, and Theta Lifting*

Tung Nguyen (Anderson), *Biochemical Reaction Networks: Network Structures and Dynamical Properties*

Campuswide Awards

Jenny Yeon, TA in the Math Department, has won a **Continuity of Instruction Award** for her efforts to support instruction during the COVID-19 pandemic. Jenny served as a Head TA in Math 221 in Spring 2020, successfully crafting an online strategy for the tough change to all online instruction. She served as a Technical TA in Summer 2020, and worked as a lecturer in Math 114 in Fall 2020. We are very proud of the work that Jenny was able to lead and are extremely pleased to see her recognized. Link: https://go.wisc.edu/8arxto

Graduate Student Thesis/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 thesis work toward a PhD.

Benjamin Bruce (Stovall), **Shengyuan Huang** (Caldararu), **Jiaxin Jin** (Craciun), **Ilyas Khan** (Angenent), **Yun Li** (Valko), **Tung Nguyen** (Anderson), **Xiao Shen** (Seppalainen), **Son Tu** (Tran), **Yeyu Zhang** (Smith)

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.

Jiaxin Jin (Craciun), **Tung Nguyen** (Anderson), **Yeyu Zhang** (Smith)

Elizabeth Hirschfelder Scholarship Award is given to outstanding female graduate students who are making exemplary progress toward their PhD.

Maya Banks (Erman), **Caitlyn Booms** (Erman), **Anjali Nair** (Li)

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

Shi Chen (Li), **Josiah Jacobsen-Grocott** (Soskova), **Liding Yao** (Street)

2020–2021 MA GRADUATES

Tianyu Zhu	Yuxin Liu	Yue Zhang	Yu Luo
Wooyeon Kim	Rui Wang	Jiachen Deng	Dewei Yu
Eiki Norizuki	Zijie Zhang	Yize Jiang	Yinling Zhang
Yifan Wei	Fusheng Zhang	Yanghongbo Zhou	Zhenyi Zhang
Worapon Piyapun	Zhen Liu	Xin Wen	Chonghan Li
Xuanning Liu	Jiahao Chang	Ziyi Liu	Zhiwei Wang
Hongyi Huang	Shiyu Ji	Kechun Wang	
Jiayi Yu	Ying Zhang	Hong Zhao	

AWARDS

Graduate Student Instruction Awards

We are pleased to announce and congratulate the recipients of Math Department TA awards for this particularly challenging 2020–2021 academic year.

There are, of course, many other TAs who performed their duties admirably under difficult circumstances and we hope to be able to reward them in future semesters. It was difficult to choose the recipients of these awards, since there were so many TAs nominated for their great work in this difficult year.

In addition to the list at right, **Geoff Bentsen** and **Tung Nguyen** were selected last fall for Math Department Capstone awards, and **Vladimir Sotirov** for a Math Department Service award.

Special thanks to **Alex Schaefer** for all his work on behalf of our graduate students and managing to stay on top of the vast amounts of underlying data! None of this would be possible without his skilled and dedicated work.

2020–21 TA AWARD RECIPIENTS

Michel Alexis
Maya Banks
Allison Byars
Caitlin Davis
Varun Guidbanda
Will Hardt
Alex Hof
Aiden Howells
Amin Idlehaj
Jeremy Johnson
Andrew Krenz
Daniel Levitin
Xiaocheng Li
Yun Li
Harry Main-Luu
Bryan Oakley
Solly Parenti
Jaeun Park
Erika Pirnes
Connor Simpson
Evan Sorensen
Ben Wright
Yandi Wu
Liding Yao

Upcoming Plans

David Marisco (PhD, 2020, Stechmann) is a postdoctoral fellow at UC-Davis, starting in September 2020.

Soumya Sankar (PhD, 2020, Ellenberg) is a postdoctoral fellow at Mathematical Sciences Research Institute, starting in August 2020.

James Hanson (PhD, 2020, Andrews) is postdoctoral fellow at Institut de Mathématiques de Jussieu–Paris Rive Gauche, starting in January 2021.

Yeyu Zhang (PhD, 2020, Smith) is an assistant professor at Shanghai University of Finance and Economics, starting in February 2021.

Brandon Boggess (PhD, 2020, Ellenberg) is a software developer at Epic Systems, starting in January 2021.

Liban Mohamed (PhD, 2020, Denisov) is a machine learning engineer at MITRE, starting in January 2021.

Yida Ding (PhD, 2020, Craciun) is a quantitative investment researcher at Ping'an Bank, starting in February 2020.

Ying Li (PhD, 2020, Stechmann) is a data scientist at Shopee Singapore Private Limited, starting in December 2020.

Yu Feng (PhD, 2021, Thiffeault) is a postdoctoral fellow at Beijing International Center for Mathematical Research, starting in September 2021.

Shengyuan Huang (PhD, 2021, Caldararu) is a postdoctoral fellow at University of Birmingham, starting in September 2021.

Xiaocheng Li (PhD, 2021, Marshall) is a postdoctoral fellow at Beijing International Center for Mathematical Research, starting in July 2021.

Benjamin Bruce (PhD, 2021, Stovall) is a postdoctoral fellow at University of British Columbia, starting July 2021.

Ilyas Khan (PhD, 2021, Angenent) is a postdoctoral research associate at University of Oxford, starting in September 2021.

Geoffrey Bentsen (PhD, 2021, Seeger) is a postdoctoral lecturer at Northwestern University, starting in September 2021.

Michel Alexis (PhD, 2021, Denisov) is a postdoctoral fellow at McMaster University Mathematics Department, starting in September 2021.

Solly Parenti (PhD, 2021, Yang) is a software developer at Epic, starting in June 2021.

Tung Nguyen (PhD, 2021, Anderson) is a visiting assistant professor at Texas A&M-College Station, starting in August 2021.

Jiaxin Jin (PhD, 2021, C. Kim) will be an Zassenhaus Assistant Professor at The Ohio State University this fall.

Yu Luo (MA) has been accepted into UW–Madison's PhD program in Mathematics.

Yifan Wei (MA) has been accepted into UW–Madison's PhD program in Mathematics.

Dewei Yu (MA) has been accepted into UW–Madison's PhD program in Mathematics.

Yinling Zhang (MA) has been accepted into UW–Madison's PhD program in Mathematics.

Hongyi Huang (MA) has been accepted into UW–Madison's PhD program in Mathematics.

Ziyi Liu (MA) has been accepted into the University of Toronto's PhD program in Statistics.

Xin Wen (MA) has been accepted into the Shanghai Jiaotong University PhD program in Mathematics.

Hong Zhao (MA) has been accepted into Purdue's PhD program.

Kechun Wang (MA) has been accepted into the University of Science and Technology of China's PhD program in Information and Computational Science.

Zhenyi Zhang (MA) has been accepted into the University of Washington PhD program.

Jiayi Yu (MA) has been accepted into the JD program at the University of Minnesota Law School.

Rui Wang (MA) has found a job at Shanghai Bank.

Zijie Zhang (MA) has found a job at Huawei as an Algorithm Engineer.

Fusheng Zhang (MA) has found a job as a management trainee at the Agricultural Bank of China.

Yuxin Liu (MA) has found a job at China Merchants Bank.

Chonghan Li (MA) has found a job at Sugon.

Wooyeon Kim (MA) is joining the PhD program at ETH Zurich.

Tianyu Zhu (MA) is joining the PhD program at the University of Chicago.

faculty and staff NEWS

Congratulations to our newly promoted professors!

Botong Wang: Assist. Prof. to Assoc. Prof.

Mariya Soskova: Assoc. Prof. to Full Prof.

Betsy Stovall: Assoc. Prof. to Full Prof.

Shamgar Gurevich: Assoc. Prof. to Full Prof.

Welcome!

Ananth Shankar: Asst. Prof.

Tetiana Shcherbyna: Asst. Prof.

Chenxi Wu: Asst. Prof.

Alex Waldron: Asst. Prof.

Andrew Zimmer: Asst. Prof.

Erik Bates: Van Vleck Asst. Prof.

Dohyun Kwon: Van Vleck Asst. Prof.

Harry Lee: Van Vleck Asst. Prof.

Antoine Remond-Tiedrez: Van Vleck Asst. Prof.

Skylar Burton: Van Vleck Asst. Prof.

Aleksandra Sobieska: Van Vleck Asst. Prof.

Melissa Lindsey: Assoc. Dir. of Instructional Support

Xin Cui-Dowling: VISP-MA Coordinator

Lauren Levy: Payroll and Benefits Specialist

Leah Rineck: Math Learning Center Director

Mikhail Ivanov: Lecturer

Faculty News

Mihaela Ifrim is one of the organizers of Spring 2021 semester's program on Mathematical Problems in Fluid Dynamics at MSRI. Her outstanding research contributions span a broad range of topics in nonlinear partial differential equations, including nonlinear dispersive equations and fluid mechanics, with connections to harmonic analysis and general relativity. Right now, with the ongoing MSRI program running virtually, Mihaela is the heart of the program and a key part of everything, whether mentoring and doing research with graduate students and postdocs, running and participating in seminars, and keeping us all connected.

Chanwoo Kim has been awarded a Brain Pool Fellowship of the Ministry of Science and Technology of South Korea. This program is designed to invite outstanding scientists for the enhancement of research competence through joint research in R&D fields in Korea and to build a global cooperative research network.

Daniel Erman has won a Romnes Fellowship. The Romnes is viewed as one of the more significant awards here at UW–Madison. The H. I. Romnes Faculty Fellowship awards are made possible by the impressive research efforts of UW–Madison faculty and staff.
Link: https://go.wisc.edu/a27415

In May, **Jordan Ellenberg** unveiled his most recent project, a book about geometry, titled *Shape*. In a few weeks, he managed a positive *New York Times* review for the book, noting Ellenberg is "rather spectacular" at analyzing the mathematic foundations of what we do, and how we think. As part of the media tour, he unveiled articles in *The Atlantic* (on pandemic risk assessments), in *The Wall Street Journal* (on Lincoln's use of geometry in building his skills in rhetoric), and discussed his views on geometry with Wisconsin Public Radio. He also was profiled by *Quanta* magazine.
(Links: Atlantic: https://go.wisc.edu/o1y94a, WSJ: https://on.wsj.com/3oQ9v63, WPR: https://www.wpr.org/geometry-world-around-us, Quanta: https://go.wisc.edu/f10149)

In an April 2021 Marketplace podcast, a question came up about the ethics of billionaires. Among several experts, Jordan Ellenberg took a stab at it, suggesting a comparison instead. "How much wealth has that person amassed relative to the sum total of everybody who works for them?" Ellenberg said. "That's a ratio that's much closer to a humanly understandable ratio."

The Atlantic published an interview by Derek Thompson with Jordan Ellenberg about politics, election forecasting, and how to think about the future like a pro.
Link: https://www.theatlantic.com/ideas/archive/2020/11/election-probabilities-are-emotional-nonsense/616916/

On March 24, 2021, CS Prof (and affiliate Math Professor) **Michael Ferris** was part of a panel discussing COVID-19 vaccines in Wisconsin. Ferris had been applying optimization theory to determine how to allocate vaccines (Pfizer, Moderna, and Johnson & Johnson) across the state, implementing some fairness strategies.
Link: https://go.wisc.edu/y863fh

Georgia Benkart, Emerita Professor, has coauthored an article on the 50th anniversary of the Association of Women in Mathematics (AWM) in the *Notices of the American Mathematical Society*.
Link: https://go.wisc.edu/6vw066

Hung Tran has been named a Simons Fellow. 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. The foundation is proud to support the work of distinguished scientists.

Hao Shen, **Shaoming Guo**, and **Chanwoo Kim** have been awarded National Science Foundation (NSF) Career Awards. The Career awards are the NSF's most prestigious awards in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization. Activities pursued by early-career faculty should build a firm foundation for a lifetime of leadership in integrating education and research.

Laurentiu Maxim has been selected as a Vilas Associate. The Vilas Associates Competition recognizes new and ongoing research of the highest quality and significance. Recipients are chosen competitively by the Divisional Research Committees of the Office of the Vice Chancellor for Research and Graduate Education on the basis of a detailed proposal.

Henry Mayes, an IT specialist, has won a University Staff Excellence Award. This award is extremely competitive and staff in technical fields such as information technology rarely win. This was a joint award coordinated between the Botany and Math departments, as Henry works part-time in each department.

Assistant Professor **Leonardo Zepeda-Nunez** was part of this new method to expand the theoretical limit on the complexity of simulations. Computer simulations of waveforms are essential tools for researchers in many fields, from earth science and the energy industry to medical imaging. A new mathematical method developed by MIT researchers eliminates a theoretical limit on the complexity of the simulations these fields can create as they work with increasingly powerful supercomputers.
Link: https://erlweb.mit.edu/announcements/waveforms-without-limits

Joseph Miller was a co-organizer of a virtual workshop on algebraic randomness at AIM (the American Institute of Mathematics).
Link: https://aimath.org/workshops/upcoming/algorandom/

Mariya Soskova revitalized the CiE Women in Computability Mentorship Programme. The mentorship program aims to team up young researchers with more senior women researchers in the Computability in Europe (CiE) community, giving them an opportunity to learn from experience and develop a network. The program originally operated only during the CiE conferences and was available to conference participants. The time of the pandemic helped us realize that mentoring does not need to be restricted to in-person communication. Furthermore, the need for developing a support system for young researchers in our community became pressingly clear. More information about the program is available at https://www.acie.eu/women-in-computability-mentorship-programme/.

Alumni News

Carolyn Abbot (PhD, 2017, Dymarz) has been hired as an Assistant Professor at Brandeis University, starting in Fall 2021.

Eric Ramos (PhD, 2017, Ellenberg) has been hired as an Assistant Professor at Bowdoin College, starting in Fall 2021.

David Seal (PhD, 2012, Rossmanith) is a newly tenured faculty member (Associate Professor, 2020) at the United States Naval Academy.

DaeWoo Kim (BS, 2009) is part of a product team in a Korean securities firm.

Rodrigo Smith (BS, 2019) has been accepted into the PhD program at Clemson University.

Amanda L. Folsom, a Van Vleck at UW–Madison from 2007 to 2010, will receive the 2021 Mary P. Dolciani Prize for Excellence in Research from the American Mathematical Society (AMS). Folsom is a Professor of Mathematics at Amherst College. She was awarded the prize for her outstanding record of research in analytic and algebraic number theory, with applications to combinatorics and Lie theory, for her work with undergraduate students, and for her service to the profession, including her work to promote success of women in mathematics.
Link: https://www.ams.org/news?news_id=6424

Song Sun (PhD, 2010, Xiu-Xiong Chen) has won a New Frontier Award from the Breakthrough Foundation for many groundbreaking contributions to complex differential geometry, including existence results for Kahler-Einstein metrics and connections with moduli questions and singularities. Song Sun currently is at UC-Berkeley. Link: https://breakthroughprize.org/News/60

Former Van Vleck Assistant Professor **Malabika Pramanik** has been appointed as Director of the Banff International Research Station as of July 1, 2020. She was in Madison between 2001 and 2004. She joined the University of British Columbia in 2006. A mathematical analyst, her research interests cover Euclidean harmonic analysis, geometric measure theory, partial differential equations and several complex variables. Link: https://www.birs.ca/announcements/2020-05-25/malabika-pramanik-appointed-director-of-birs

Gabrielle Meyer Retires

Gabrielle Meyer has retired from the Math Department this year, after joining it in 2002. She received her PhD from Cornell in 1988.

She's been a lecturer in a multitude of classes, including every calculus course, discrete math, linear algebra, history of math, and topology, but lists the Quantative Reasoning course as her favorite because she could bring in examples from computer science or discrete mathematics.

Gabi's contributions to the Math Department went well beyond classroom teaching. Gabi was a popular advisor to countless math majors and certificate students. From 2004 to 2020 she led our drop-in Math Lab help room. In March 2020 she pivoted on a dime to put the operation on Canvas, in order to continue the service during the pandemic. Gabi organized our course assistant program that provides additional office hours to upper-level undergraduate math courses with high enrollment and no TA support.

Gabi was a member of UW's system-wide Math Placement Committee, 2008–2015. This committee develops questions for the math placement exam that is used statewide.

Gabi has served UW with valuable outreach efforts. Her award-winning mathematical art, hyperbolic surfaces created by crocheting, has been exhibited in galleries, conferences, and magazines. For 10 years Gabi participated in the Math Department's weekly outreach program to high school girls, Girls' Night Out. She was also involved in providing feedback on Wisconsin's state mathematics standards.

Gabi won the L&S Academic Staff Midcareer Award in 2018. In addition to letters from faculty and staff colleagues, her nomination was supported by heartfelt testimony from students who praised her ability to convey the intuition behind difficult mathematics, her concern for her students' success, and her generous advice in both academic and career matters.

In Memoriam

Ken Kunen

Ken Kunen died peacefully on August 14, 2020. He was born in New York City in 1943 and got his undergraduate degree at Caltech. He received his PhD from Stanford University in 1968, under the direction of Dana Scott, and came to Wisconsin that same year. He was quickly promoted to Associate Professor in 1970 and Full Professor in 1972. Except for a year visiting the University of California, Berkeley, and two years visiting the University of Texas, Austin, Ken had been in Madison ever since, retiring in the summer of 2008. Ken was married to Anne Kunen and they had two sons, Adam and Isaac.

His many honors included an Alfred P. Sloan Fellowship and H.I. Romnes Fellowship. Ken had been an editor for the *Annals of Mathematical Logic*, the *Journal of Symbolic Logic*, the *LMS Journal of Computation and Mathematics*, and the *AMS Transactions*. He, with Jerry Vaughan, edited the influential *Handbook of Set-Theoretic Topology*. Ken also edited the set theory section of the *Handbook of Mathematical Logic*. Ken had given an enormous number of invited lectures in the US and throughout the world, and he had helped to organize many math conferences.

In over 150 research papers, Ken had contributed fundamental knowledge to set theory and its applications to various areas of mathematics, such as set-theoretic topology and measure theory. In addition, he had worked in the area of non-associative algebraic systems and used computers to derive theorems. His seminal textbook *Set Theory: An Introduction to Independence Proofs* has been an influential force and inspiration to countless numbers of graduate students and others working in the field of mathematical logic.

Ken had been one of the central figures in the UW–Madison logic group. He had directed the doctoral dissertations of over 25 graduate students. This includes many who have gone on to great careers and had students of their own, such as William Fleissner, Ali Enayat, Boban Velickovic, and Mirna Džamonja, to name only a few.

Ken was not just a brilliant and productive mathematician but what we really admired most about him was his generosity with his mathematical ideas, conjectures, and problems. Plus, he was always affable and always unflappable.

In the Mathematics Department, he had served on several of our more important committees, e.g., chair of the committee on future needs in computing and technology, graduate advising committee, chair of the academic staff review committee, salary committee, and hiring committee. Ken was legendary for the creative but fair problems he set in the logic qualifying exam committee.

A popular teacher for both undergraduate and graduate courses, he was particularly well known for his eloquent and incisive style of lecturing. Ken was also famous for the mountainous heaps of model polyhedra which overflow his office. These models were made for him over the last 20 years by the students in his Math 131 class (Geometry for Elementary School Teachers).

Louis Solomon

Emeritus Professor **Louis (Lou) Solomon** passed away November 18, 2020, at his home. He attended Harvard for his undergraduate education, and after two years of service in the Army, returned for graduate study, receiving his PhD from Harvard in 1958 under Professor Richard Brauer. Following positions at the Rockefeller Institute, Haverford College, and New Mexico State University, two summers at Los Alamos National Laboratory, and a year as a visiting scholar at the Institute for Advanced Study, he joined the Mathematics Department at the University of Wisconsin–Madison in 1969 and retired in 2000. A week-long meeting "Combinatorics of Lie Type," hosted by the University of Wisconsin Mathematics Department in June 2000, drew 130 participants from all over the world to celebrate his career, mathematics, retirement, and birthday.

Lou made many important contributions to the study of reflection groups and Coxeter groups. Solomon's descent algebra is a mainstay of the theory. His series of influential papers in the 1980s with Peter Orlik, and later together with Hiroaki Terao, pioneered the study of hyperplane arrangements. The Orlik-Solomon algebra that resulted from these papers is closely related to the shuffle algebra used by Diaconis and others in the study of card shuffling. Lou was named a Fellow of the American Mathematical Society in the inaugural class of 2013.

He is survived by his wife of 60 years Elsbeth Aellig Solomon, son Jeremy Solomon, daughter Susan Solomon, and three grandchildren.

See our related story on Page 3 about Louis Solomon's son, Jeremy, and his donation to the Math Department in honor of his parents.

Josh Chover

Josh Chover died on October 11, 2020. He received his PhD from the University of Michigan in 1952. After three years at Bell Labs and one year at the Institute for Advanced Study in Princeton, he joined the UW–Madison Math Department in 1956. He was Chair of the Department from 1977 to 1979. Josh started our probability group by hiring Peter Ney.

He officially retired at the end of the 1992 calendar year and took up post-retirement employment which ended in 1993. Josh had served the department for 36 years, plus five additional part-time years as an emeritus professor.

Josh's research had centered on probability theory and stochastic processes. More recently he had turned his attention to the study of mathematical models in biology, studying the brain via neural networks with random connections. Five graduate students completed dissertations under his supervision.

Josh was devoted to teaching and curriculum development on both the undergraduate and graduate level, and wrote *The Green Book of Calculus* in 1972 for a course he developed here. He was the originator of the idea of the Wednesday Noon Talks and brought many lively and informative lectures to Van Vleck Hall from around campus.

His entire life he enjoyed painting and his work was exhibited at the Pyle Center in 2016.

Walter Rudin Centenary, May 2, 2021

May 2, 2021, marks what would have been **Walter Rudin**'s 100th birthday. Walter Rudin was one of the preeminent mathematicians of his generation. He worked in a number of different areas of mathematical analysis, and he made major contributions to each. He came to UW–Madison in 1959 and stayed until his retirement in 1991. He and his wife, the distinguished mathematician Mary Ellen (Estill) Rudin, were popular teachers at both the undergraduate and graduate level and served as mentors for many graduate students. The duo were active in the daily life of the Math Department, and enjoyed collaborating with their colleagues as well.

Walter Rudin is also known to generations of undergraduate and graduate students for his three outstanding textbooks: *Principles of Mathematical Analysis* (1953), *Real and Complex Analysis* (1966), and *Functional Analysis* (1973). His books have been reprinted in several different languages. In 1993 he was awarded the American Mathematical Society's Leroy P. Steele Prize for Mathematical Exposition. He received an honorary degree from the University of Vienna in 2006.

Link: https://www.ams.org/notices/201303/rnoti-p295.pdf

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The Logic Picnic in Brittingham Park continued despite the pandemic, with a bit more space between each person. Photo by Karthik Ravishankar.