



ASSOCIATION FOR
WOMEN IN MATHEMATICS

Newsletter

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The purpose of the Association for Women in Mathematics is to create a community in which women and girls can thrive in their mathematical endeavors, and to promote equitable opportunity and treatment of women and others of marginalized genders and gender identities across the mathematical sciences.

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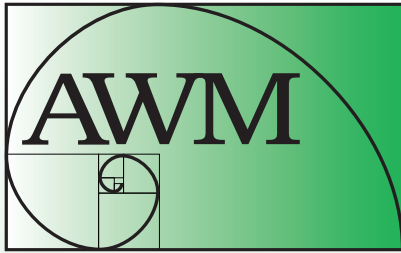
PRESIDENT'S REPORT

When we progress through our mathematical profession and thoughtfully cultivate the AWM community, we build on the legacy and strengths of those who came before us. On June 27, 2023, Evelyn Boyd Granville, the second African American woman to receive a PhD in mathematics, died. She attended Smith College, a women's college, and was elected to Phi Beta Kappa and Sigma Xi. She went on to get her doctorate in functional analysis from Yale University in 1949. Her career took her from being a professor at Fisk University to a position at IBM, where she wrote computer programs to track the orbital trajectories of rockets and satellites. One of her students, Etta Falconer, passed down her mathematical legacy to me through an abstract algebra course at Spelman College. Let us not lose sight of our mathematical legacy and the impact that will be felt in future generations.

Together with you, the AWM community builds new connections that welcome and encourage mathematical research and discourse. While attending the SIAM Conference on Optimization on May 31 – June 3, 2023, the AWM hosted many events that spurred connections and research innovations. The AWM Poster Session drew in female presenters who eloquently shared their mathematical expertise. The attendees asked questions and showed great interest in unraveling the many equations that appeared across the posters. At the AWM Workshop: Women in Inverse Problems, junior and senior speakers from AWM's Research Network for Women in Inverse Problems (WIP) shared scientific research and technological development. This workshop focused on women's contributions to modern mathematical and computational aspects of inverse problems. It is important that we celebrate the achievements of our mathematical colleagues and continue to provide spaces that cultivate opportunities for women researchers.

While the membership dues structure has changed, I hope you continue to keep connected with us as we advocate for women and girls in mathematics. Your dues are used to directly support AWM's vital work, and I feel fortunate to work alongside the AWM community. Our collective work includes advocating for policy that promotes equitable opportunities, supporting research and mentor networks, engaging student chapters, awarding excellence via prizes, publishing a journal and book series, and hosting sessions at workshops at meetings. We launched a new program, Chat With a Mathematician, that facilitates virtual and in-person visits by professional mathematicians, math graduate students, and undergraduate math majors to K–12 schools and classrooms. Together, we build opportunities and provide access to the world of mathematics.

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ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM was founded in 1971 at the Joint Meetings in Atlantic City.

The *Newsletter* is published bi-monthly. Articles, letters to the editor, and announcements are welcome.

Opinions expressed in *AWM Newsletter* articles are those of the authors and do not necessarily reflect opinions of the editors or policies of the Association for Women in Mathematics. Authors sign consent to publish forms.

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PRESIDENT'S REPORT *continued from page 1*

I hope to see you this fall at the 2023 AWM Research Symposium that will happen on September 30 through October 2 at Clark Atlanta University, Atlanta, Georgia. In the same year that Evelyn Boyd Granville earned her PhD, the first radio station owned and programmed by African Americans, WERD, was established here in Atlanta. The station was in a room right above Martin Luther King Jr.'s office, and he would tap the ceiling when he had an announcement to make. While Georgia is not immune to political happenings, let us "tap on the ceiling" of justice and carry the torch of Dr. Granville forward to bring mathematical enlightenment and encouragement to all.



Talitha Washington

Talitha Washington

Talitha Washington

July 31, 2023

Atlanta, GA

2024 AWM Service Awards

The Association for Women in Mathematics is pleased to announce that the 2024 AWM Service Awards will be presented to **Johanna Franklin**, Professor of Mathematics at Hofstra University, and **Karoline Pershell**, Chief Operating Officer and Director of Strategy and Evaluation for Service Robotics & Technologies Labs. Franklin is being recognized for her exceptional leadership as the coordinator of the AWM-MfA Student Essay Contest, as Chair of the Essay Contest Committee, and as Chair of the Education and Outreach Portfolio Committee. Pershell is being honored for the myriad of ways in which she served the AWM in her role as Executive Director, for the meaningful AWM programs she initiated and improved, for creating a warm, welcoming, and inclusive environment, and for continuing to generously share her time, her energy, her enthusiasm, and her wisdom as a volunteer.

Citation for Franklin: The AWM Student Essay Contest was inaugurated in 2001 with the purpose of increasing awareness of women's ongoing contributions to the mathematical sciences. Students in three categories, middle school, high school, and undergraduate, submit biographies of contemporary women



Johanna Franklin.
Photo credit: Dan Franklin

mathematicians and statisticians in academic, industrial, and government careers. The essays are based primarily on an interview with a woman currently working in a mathematical sciences career. In 2009, Math for America (MfA) joined AWM in co-sponsoring the contest. The AWM-MfA Essay Contest receives between 200 and 400 submissions each year.

As Essay Contest Organizer, Franklin is responsible for all aspects of the contest. She coordinates publicity for the contest, makes sure that the entry portal is ready to accept submissions, oversees the essay judging process, and ensures that prizes are awarded and winning essays are published on awm-math.org and in the *AWM Newsletter*. Along the way, she communicates with the contest participants, interviewees, the AWM staff and volunteers, contest judges, and prize winners. She ensures that the MfA knows the value of their sponsorship by supplying a yearly report. Franklin is efficient, well-organized, fair-minded, wise, and good-humored.

The AWM-MfA Student Essay Contest is one of AWM's most visible programs and Franklin's efficient leadership has ensured its ongoing success. In addition to her work on this program, Franklin has also taken on the role of Chair of the AWM Education and Outreach Portfolio and represents that committee at AWM Executive Committee meetings. The Education and Outreach Portfolio oversees AWM programs involving education at all levels and programs primarily focused on outreach to the community, including to young people and K–12 students and to other organizations. As Chair, Franklin has created policies and procedures for working with minors, provided support to the existing programs and helped bring the new Chat With a Mathematician Program to the AWM.

Response: I am honored and delighted to receive an AWM Service Award. To quote my alma mater's motto, "my heart is in the work." I am grateful to everyone who makes the Essay Contest such a joy to coordinate: my committee, first and foremost; the judges; the mathematicians who contribute their time to be interviewed; and, of course, the students who submit their essays to us. I am also grateful to the other members of the Education and Outreach Committee with whom I have worked on so many projects, and to Darla Kremer and Karoline Pershell, the Executive Directors who have been so supportive of me in so many ways. Finally, I would like to thank Heather Lewis, the previous Chair of the Essay Contest Committee, for her cheerfully given help and advice.

Citation for Pershell: AWM Hill Days were started in 2015 with a small group of dedicated participants going to Capitol Hill to advocate for legislation affecting underrepresented groups in mathematics. When Pershell joined the effort in 2016, she was able to bring her experience working at the State Department to help shape both the process and the presentation of information. She worked with the AWM Policy & Advocacy Committee to systematize the process by creating spreadsheets for tracking participants and schedules; documentation for training participants, tracking the legislation, and issues to be presented; and handouts for the meetings themselves. As the number of participants in the Hill Visits grew, this system was critical to the success of the events. She also proposed a subcommittee of the Policy & Advocacy Committee, the Government Advocacy Committee, to further establish these events. Pre-COVID, these

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Membership Dues

Membership runs from Oct. 1 to Sept. 30

Individual: \$70/\$100 **Family:** \$40

Contributing: \$160 /\$190

New member, affiliate and reciprocal members,

retired, part-time: \$35

Student: \$25 **Unemployed:** \$20

Outreach: \$10

AWM is a 501(c)(3) organization.

Institutional Membership Levels

AWM offers a tiered pricing structure for institutional memberships in six categories. Higher levels are:

Supporting Institutions: \$750+ and

Sponsoring Institutions: \$3000+

See awm-math.org for details.

Executive Sponsorship Levels

\$5000+

\$2500–\$4999

\$1000–\$2499

See awm-math.org for details.

Print Subscriptions and Back Orders—

Regular and contributing members living in the US may elect to receive a print version of the *Newsletter*. Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for \$75/year. Back orders are \$20/issue plus shipping/handling (\$5 minimum).

Payment—Payment is by check (drawn on a bank with a US branch), US money order, or international postal order. Visa and MasterCard are also accepted.

Newsletter Ads—AWM will accept ads for the *Newsletter* for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership, and other appropriate subjects. The Managing Director, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines. *All institutions and programs advertising in the Newsletter must be Affirmative Action/Equal Opportunity designated.* Institutional members receive discounts on ads; see the AWM website for details. For non-members, the rate is \$130 for a basic four-line ad. Additional lines are \$16 each. See the AWM website for *Newsletter* display ad rates.

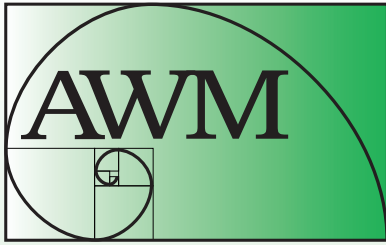
Newsletter Deadlines

Editorial: 24th of January, March, May, July, September, November

Ads: Feb. 1 for March–April, April 1 for May–June, June 1 for July–Aug., Aug. 1 for Sept.–Oct., Oct. 1 for Nov.–Dec., Dec. 1 for Jan.–Feb.

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Send all queries and all *Newsletter* material except ads and queries/material for columns to Anne Leggett, amcdona@luc.edu. Send all book review queries/material to Marge Bayer, bayer@math.ku.edu. Send all education column queries/material to Jackie Dewar, jdewar@lmu.edu. Send all media column queries/material to Sarah Greenwald, appalachianawm@appstate.edu and Alice Silverberg, asilverb@math.uci.edu. Send all student chapter corner queries/material to Malena Español, student-chapters@awm-math.org. Send everything else, including ads and address changes, to AWM, awm@awm-math.org.



ASSOCIATION FOR
WOMEN IN MATHEMATICS

AWM ONLINE

The *AWM Newsletter* is freely available online.

Online Ads Info: Classified and job link ads may be placed at the AWM website.

Website: <https://awm-math.org>
Updates: webmaster@awm-math.org

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AWM DEADLINES

AWM-AMS Noether Lecture: Sept. 15, 2023
AWM-MAA Falconer Lecture: Sept. 15, 2023
AWM-SIAM Kovalevsky Lecture:
September 15, 2023
AWM Alice T. Schafer Prize: Sept. 15, 2023
AWM Dissertation Prize: Sept. 15, 2023
AWM Travel Grants: October 1, 2023
and February 15, 2024
Ruth I. Michler Memorial Prize:
October 1, 2023
AWM Workshop at SIAM:
November 15, 2023
Proposals for 2025 AWM Research
Symposium: December 15, 2023
RCCW Proposals: Feb. 1 and July 1, 2024
AWM Essay Contest: February 1, 2024
AWM Mentoring Travel Grant:
February 15, 2024

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2024 AWM SERVICE AWARDS *continued from page 3*

bi-annual events drew a wide range of mathematicians (and fans of mathematicians!) from government, industry, and academia.

While it is very common to meet people and connect at AWM events, Pershell has an amazing ability to maintain those connections with people across time and space, helping to keep them anchored in the AWM network. She is able to track both people and organizational needs and puts in the effort to introduce people to others she thinks they should know and to invite people to participate and contribute to the AWM as a whole. When Pershell learned about the Notable Women in Computing card deck, she worked with then-President Ruth Haas to put together a rockstar team to produce the first EvenQuads Notable Women in Math deck, which is now in its second deck of four. When one AWM member suggested a T-shirt design to then-ED Pershell, she immediately invited that then-grad student to spearhead the whole design process. She then connected people who expressed interest in volunteering to run an actual store and online portal, resulting in AWM's online store. Our store supports a small woman-owned T-shirt print shop and provides high-quality shirts and onesies for all to show their support of AWM, not just those who happen to wander past our booth at a conference.

In 2020, Pershell co-organized an NSF-funded workshop called "Moving Towards Action," a day-long event the day before the JMM geared towards providing "actionable information and process change plans" to departments interested in improving their culture and climate. As a result, the participants obtained practical advice and information they could apply within their departments to create welcoming environments and drive cultural change. The successful workshop has been repeated at least once and it is expected that it will evolve into a program routinely offered at national meetings and beyond. The title "Moving Towards Action" could describe everything Pershell does: she has a phenomenal and impactful ability to recognize a need, refine the problem down to an atomic level, identify the actionable steps to address the issue, find the most qualified people to resolve the problem, and, on top of that, convince those people that they are excited to participate. How much of this is because of her experience across government, industry, and academia, versus her innate mastery of humor and approachability, is irrelevant. She is able to bring people together, reinforce the welcoming and inclusive environment AWM strives for, and also get so many things done at the same time.

Karoline Pershell served as Executive Director of the AWM from 2018–2020. Her position was half time, but she gave 150%. Amongst many things, she oversaw the revamping of the AWM website, moved AWM's files to a Google



Karoline Pershell

Drive for more transparency and flexibility, and transitioned the AWM to a new management company. Beyond the AWM, Pershell has been an Evaluation Coordinator for the Department of State as part of the AAAS Fellowship program, a Fulbright Scholar at the University of Hyderabad in India, and mathematics professor at the University of Tennessee at Martin and at Qingdao University in China. She continues her service to AWM by sharing her wisdom, humor, and empathy with the Policy & Advocacy Committee.

Response: Thank you to the AWM community for allowing me to serve. My greatest joy has been in connecting individuals to the community, providing pathways for

people to pursue their passions, and supporting people over unintended hurdles. A special thanks to Cymra Haskell and Ami Radunskaya who used their energy many years ago to help me navigate my own hurdles and inspired me to pass it forward.

The AWM Service Award, established by the AWM Executive Committee in November 2012, recognizes individuals for helping to promote and support women in mathematics through exceptional voluntary service to the Association for Women in Mathematics. The award is given annually to select AWM volunteers or groups of AWM volunteers in recognition of their extensive time and effort devoted to AWM activities.

STUDENT CHAPTER CORNER

Coordinator: Malena Español, student-chapters@awm-math.org

AWM Student Chapter Awards

The Association for Women in Mathematics is proud to announce the seventh annual AWM Student Chapter Award winners. We thank all who participated in this year's competition for the attention given to their proposals and congratulate them on the strength of the activities they have conducted to create productive environments for women in mathematics. The winning chapters were recognized at the Student Dessert Reception on Friday, August 4th at MAA MathFest 2023 in Tampa, Florida.

Western Ontario University, Community Outreach

The AWM Student Chapter at Western Ontario University is recognized for their successful programs aimed at attracting to and retaining students in the mathematics community. At the K–12 level, the group participated in Canada's national STEM outreach event, "Science Rendezvous," visited area high schools to talk about mathematical paths, and organized a high school math poster competition (with funding secured from several businesses). At the university level, the group hosted a mathematics career panel and a math art workshop, as well as a variety of social events. In planning these activities, chapter members took special care to account for the challenges and interests of students who are often marginalized in the mathematics community and worked to create inclusive and welcoming events.

University of Texas at Austin, Fundraising/Sustainability

The AWM Student Chapter at the University of Texas at Austin is recognized for successful fundraising from multiple sources: a student government fund, the Major League Hacking (a student hackathon league) Pizza Fund, and a T-shirt sale incorporating iconography that was special to the local math and science community. The chapter used these funds to support professional development events for undergraduate students at UT Austin that included an REU/internship workshop, a graduate student panel, and multiple technical workshops, and to run a variety of outreach events at the K–12 and undergraduate level.

Rutgers University, Professional Development

The AWM Student Chapter at Rutgers University is recognized for sustained and thoughtful professional development work over the course of the past year. The chapter hosted 11 professional development events on a variety of topics (including mentorship, study skills, gender bias, interdisciplinary mathematics) that addressed the needs and goals of their members at the undergraduate student, graduate student, and faculty/postdoc levels. The chapter also hosted a variety of social events throughout the year to help build their mathematical community at Rutgers.

University of Pittsburgh, Scientific Excellence

The AWM Student Chapter at the University of Pittsburgh is recognized for a number of endeavors, especially the Pitt AWM Student Seminar Series. This monthly series features two 30-minute talks from female graduate students from around the world, is attended by faculty and students,

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and is made publicly available (with permission) on YouTube. The seminar series has featured 38 different speakers since 2021; it represents a significant organizational undertaking and makes an important contribution to the research community. The AWM chapter at Pitt also supported their community through a mentoring program pairing graduate students with undergraduate students seeking advice about opportunities in mathematics, through organized “Coffee Meet-ups” with invited female math scholars who encouraged

the students by sharing their stories and academic journeys, and through a variety of social events.

The Executive Committee of the Association for Women in Mathematics established the Student Chapter Awards to be awarded annually at MAA MathFest. The purpose of these awards is to recognize outstanding achievements in chapter activities among the AWM Student Chapters. Awards are given annually in four categories: community outreach, funding and sustainability, professional development, and scientific excellence.

CALL FOR PROPOSALS

Host the 2025 AWM Research Symposium!

The Association for Women in Mathematics is seeking proposals from mathematics departments, institutes and other appropriate venues interested in hosting the 2025 AWM Research Symposium.

An AWM Symposium Organizing Committee—to include local coordinators—will be in charge of planning and scheduling the events, selecting speakers, session organizers and panelists. Proposals should contain the following information:

- Name of a local organizer: a mathematician with ties to the institution that will host the symposium. This person will become a member of the AWM Symposium Organizing Committee.
- The location and proposed dates.
- A written endorsement from the person who has the authority to provide the space and resources needed for the symposium.
- A description of the space available. The basic requirements are approximately as follows:
 - one large lecture room with a capacity of at least 350
 - 15 to 20 classrooms for special sessions and other gatherings (should each accommodate 30 participants) available throughout the meeting
 - space for poster sessions (should accommodate around 20 posters)
 - space for exhibits
 - space for registration, coffee breaks
- A description of the banquet facilities available (should accommodate 250–300 guests)
- A description of hotel space available within walking distance from the venue (or a plan for transportation to and from the hotel space).
- A list of support activities that will be provided by local staff (working with the AWM office and the Organizing Committee)
- AWM events adhere to the AWM Welcoming Environment and Diversity and Inclusion Policy (see <https://awm-math.org/policy-advocacy/welcoming-environment/>). Please describe steps you as local organizers will take and characteristics of your facilities that will ensure a welcoming environment for all participants.

Submit your proposal to the AWM Executive Director at ed.admin@awm-math.org before **December 15, 2023**. Feel free to contact us with questions and concerns before submission.

AWM at the SIAM OP23 Meeting

Noemi Petra (University of California, Merced) and Chrysoula Tsogka (University of California, Merced)

A version of this article first appeared on the SIAM website.

The SIAM Conference on Optimization (OP23) was held at the Sheraton Grand Seattle hotel in Seattle, WA between May 31st and June 3rd, 2023. During this conference, AWM hosted, sponsored, and endorsed a series of events held on May 31 and June 1. The 2023 AWM-SIAM workshop was made possible by funding from the National Science Foundation through the Division of Mathematical Sciences grant “Mathematical Connectivity through Research and Equity for Women” (NSF-DMS 2113506).

The AWM Workshop

The AWM Workshop was organized by the Women in Inverse Problems (WIP) Research Network. It consisted of a minisymposium with three sessions of research presentations, a mentoring luncheon and a “minisymposium” for graduate students and recent PhD recipients. Some of the slides and posters can be found at <https://sites.ucmerced.edu/ctsogka/awm-workshop-siam-op23-0>.

The first event on Wednesday evening was the poster session where previously selected graduate students presented their work in AWM’s Minisymposium. The event was very successful and highly attended; it fostered meaningful interactions among the poster presenters, workshop participants, and external poster judges that were invited to the event. The judges submitted a detailed rating for each poster and awards were given during the mentoring luncheon to the best poster presenters.



We would like to congratulate all the poster presenters and announce the following winners:

- 1st place:* Tongtong Li (Dartmouth College)
Using Bayesian Spectral Reprojection to Resolve the Gibbs Phenomenon
- 2nd place:* Jennifer Rangel Ambriz (University of Notre Dame)
Combined Modeling and Experimental Study of Shape Formation of the Drosophila Wing Imaginal Disc
- 3rd place:* Rachael Alfant (Rice University)
Multistage Stochastic Mixed-Integer Programming Using DSP; and
Shraddha Verma (George Mason University)
Data Assimilation for Quantum Nv Diamond Spectroscopy

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Special thanks to the judges: Harbir Antil (George Mason University), Andrea Arnold (Worcester Polytechnic Institute), Daniela Calvetti (Case Western Reserve University), Drew Kouri (Sandia National Laboratories), Malena Sabate Landman (Emory University), Milagros Loreto (University of Washington), Alison Malcolm (Memorial University of Newfoundland), Andreas Mang (University of Houston), Roummel Marcia (University of California, Merced), Shari Moskow (Drexel University), Mirjeta Pasha (Arizona State University), Fatma Terzioğlu (NC State University), Umberto Villa (UT Austin) and Stefan Wild (Lawrence Berkeley National Laboratory).

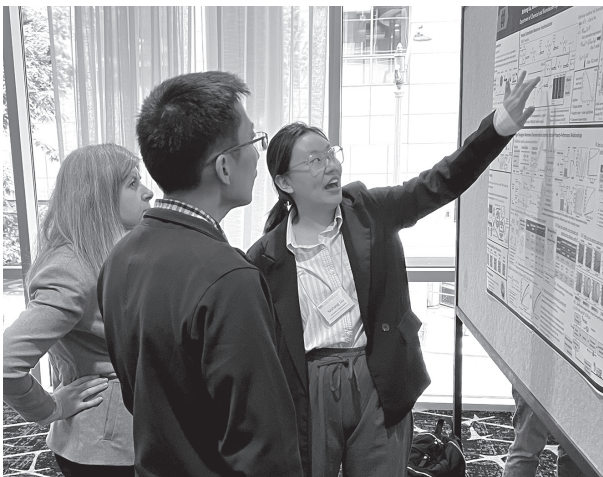
Moreover, all the poster presenters received funding for participation in a one-week workshop or event of their choice at one of the participating mathematical sciences institutes (American Institute of Mathematics (AIM), Institute for Advanced Study (IAS), Institute for Computational and Experimental Research in Mathematics (ICERM), Institute for Pure and Applied Mathematics (IPAM), Simons Laufer Mathematical Sciences Institute (SLMath)). Funding is provided by the Math Institutes diversity initiative.

The twelve poster presenters were:

- Rachael M. Alfant (Rice University)
Multistage Stochastic Mixed-Integer Programming Using DSP
- Jennifer Rangel Ambriz (University of Notre Dame)
Combined Modeling and Experimental Study of Shape Formation of the Drosophila Wing Imaginal Disc
- Teresa Chambers (Brown University)
The Computational Performance of Iterated Linear Optimization

- Maria Dascalu (University of Massachusetts)
Tropicalization of Graph Profiles for Some Classes of Trees
- Tongtong Li (Dartmouth College)
Using Bayesian Spectral Reprojection to Resolve the Gibbs Phenomenon
- Xinhong Liu (University of Notre Dame)
Data Analytics for Membrane Material Innovations
- Trang Nguyen (Wayne State University)
Optimization of Control Free Time Sweeping Processes and Applications
- Farjana Siddiqua (University of Pittsburgh)
Variable Time Step Method of Dahlquist, Liniger and Nevanlinna (DLN) for a Corrected Smagorinsky Model
- Alysha Toomey (University of California, Riverside)
Multicellular Model for Morphogenesis of Pavement Cells in Plant Leaves
- Awa Traore (The University of Alabama)
Dynamics of a Multi-Layer Fluid System
- Shraddha Verma (George Mason University)
Data Assimilation for Quantum Nv Diamond Spectroscopy
- Jialu Wang (University of Notre Dame)
Characterizing the Pareto Optimal Trade-off Between Model-Based Information Content and Measurements Cost

The next day the research minisymposium took place as well as the mentoring luncheon. The minisymposium focused on women's contributions to modern mathematical and computational aspects of inverse problems. It featured a selection of junior and senior speakers from AWM's Research Network for Women in Inverse Problems. During the luncheon junior researchers had the opportunity to interact with their mentors and ask questions about job applications and the tenure process, research labs, industry and academic careers and work-family balance. All the poster presenters, research talk presenters and judges participated at the



luncheon. The workshop organizers and participants had the pleasure also to meet and interact with Darla Kremer (AWM Executive Director), Talitha Washington (AWM President) and Suzanne Weekes (SIAM Executive Director) at the lunch.

“The posters not only covered algorithms and theory, but also multiple applications areas in materials science, chemistry, fluid dynamics, robotics, etc. It was encouraging to see the high-quality research and the speakers taking extreme pride in sharing their ideas. The luncheon proved to be an excellent opportunity for the students and poster judges to share their experiences and discuss career opportunities in academia, industry, and national labs. I firmly believe that this event will lead to several postdoctoral offers and new collaborations for these early career researchers,” George Mason University Professor and AWM poster judge Harbir Antil said.

The following women from the Women in Inverse Problems Research Network were invited to give 20-minute talks in the three-part research minisymposium:

- Andrea Arnold (Worcester Polytechnic Institute)
Bayesian Filtering Schemes to Estimate Time-Varying Parameters in Dynamical Systems
- Daniela Calvetti (Case Western Reserve University)
Bayesian Sparse Optimization for Large Scale Dictionary Learning
- Malena Sabate Landman (Emory University)
Regularization by Inexact Krylov Methods with Applications to Semi-Blind Deblurring
- Alison Malcolm (Memorial University of Newfoundland)
Normalizing Flows for Uncertainty Quantification in Seismic Imaging
- Shari Moskow (Drexel University)
The Lippmann Schwinger Lanczos Algorithm for Inverse Scattering Problems

- Mirjeta Pasha (Arizona State University)
Modern Challenges in Large-Scale and High Dimensional Data Analysis
- Fatma Terzioglu (North Carolina State University)
Optimal Parameter Design for Multi-energy Computed Tomography Technique
- Chrysoula Tsogka (University of California, Merced)
Phase and Absorption Contrast Imaging Using Intensity Measurements

We would like to thank everyone for their contributions and for serving as poster judges and mentors for the AWM graduate students at the conference. “I had a wonderful time at the AWM workshop in SIAM OP23 meeting with nice people and sharing with each other our research, work, and life experiences. The warm and belonging atmosphere was really enjoyable,” Tongtong Li, graduate student at Dartmouth College and AWM poster winner, said. We hope this experience is shared by all graduate student participants and that the mentorship established at this workshop will propagate beyond the conference.

We couldn't agree more with the hopeful and inspiring message that Daniela Calvetti, James Wood Williamson Professor at Case Western University and AWM workshop presenter and judge sent us about the workshop: “If I were to summarize what made the AWM-SIAM minisymposia on Inverse Problems at SIAM OP23, it would be the sense of community, support and professionalism that permeated throughout the entire session. The importance of feeling part of a supportive community cannot be overemphasized, in particular because the social distancing during the pandemic has deprived younger women of in-person networking. The high quality of the presentations, engagement of the audience and the energy that could be

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felt in the air filled me with hope that the community of women in mathematics is stronger than ever. As the senior member of the group, I particularly appreciated the opportunity to meet younger colleagues, and having a chance to talk about mathematics and the challenges and rewards of being a woman in mathematics. Everything was organized to strengthen the sense of community, including the presentations, the poster session, and the great lunch for the workshop attendees. It was a great way to remind everybody, and first of all ourselves, how much women in mathematics count!”

The AWM Booth. The AWM Booth was strategically located in the main reception area and served as a place to share information and promote opportunities for participation during coffee breaks. It was also a place for social interaction and informal conversation, where we were able to greet old friends and meet new ones. We encourage you to stop by the AWM booth at all meetings, and to use it as a place to gather, share, and belong. Volunteering at AWM booth offers a great opportunity to learn about AWM and to meet AWM members.

Special thanks go to the members of the AWM SIAM Committee: **Selenne Bañuelos** (IPAM), **Katherine Benson** (University of Wisconsin-Stout), **Lorena Bociu** (North Carolina State University), **Daniela Ferrero** (Texas State University), **Mary Ann Horn** (Case Western Reserve University), **Małgorzata Peszyńska** (Oregon State University), **Noemi Petra** (University of California, Merced) and **Chrysoula Tsogka** (University of California, Merced). The AWM presence at SIAM is critical in increasing our visibility in the community, and we are grateful to the

entire committee for planning and facilitating the array of AWM activities.

Get involved! AWM is a network of mathematicians who support women in the mathematical sciences, and you should be part of this family! To learn more about how to get involved with research groups, check out the AWM ADVANCE website (awmadvance.org). Don't see your research field? Consider starting a network. Do you attend SIAM meetings and are you interested in being a graduate student mentor or poster judge? Contact the AWM SIAM Committee chair. Social change doesn't just happen, and neither do the programs! If you are interested in developing or driving such programming for future meetings, contact AWM Executive Director, Darla Kremer at ed.admin@awm-math.org.



AWM at the SIAM OP23 Meeting

BOOK REVIEW

Book Review Editor: Margaret Bayer, University of Kansas, Lawrence, KS 66045-7523, bayer@math.ku.edu

Culturally Responsive Strategies for Reforming STEM Higher Education: Turning the TIDES on Inequity, by Kelly M. Mack, Kate Winters and Melissa Soto, eds. Emerald Publishing, 2019. ISBN 978-1787434066.

Reviewer: Marge Bayer

In 2014, the Association of American Colleges and Universities (AAC&U) began a program called TIDES: Teaching to Increase Diversity and Equity in STEM. The name indicates the main goal; the idea was to focus faculty development on “culturally responsive teaching,” particularly in computer science. They received proposals from almost 200 colleges and universities, and of these 14 received funding, with another 5 invited to participate with limited support. Over three years, the institutions engaged in faculty development on their campuses, redesigned course curriculum and teaching methods, and sent faculty to annual institutes and workshops. A consultant was assigned to each institution, and assessments were carried out by an outside agency.

Chapters 1 and 2 of the book describe the motivation, objectives and “theoretical underpinnings” of the project. The description of this theory, divorced from examples (and including at least one 56-word sentence), may not be accessible to all of the intended audience. Chapters 3 through 15 concern the experiences of individual institutions, eleven of the fourteen awardees and two of the other colleges. (Institutions listed below. I do not know why the other three awardees are not represented in the book.) The final chapter was written by representatives of the external evaluation agency.

The book describes the characteristics of culturally responsive pedagogy as: (1) incorporating the cultural heritages of racial and ethnic groups; (2) acknowledging how cultural heritage affects learning and linking learning to students’ lives; and (3) infusing curricula with “multicultural content, perspectives, resources, and instructional techniques” [p. 21]. What this means in practice becomes clearer in some of the individual chapters. Most of the institutions considered both underrepresented minorities and women, with varying emphasis. I was quite surprised to see that in the chapter on Morgan State University (an HBCU), there was no indication that the project addressed participation of women.

Courses described fall into two categories: computer science courses, some for majors, many for nonmajors, and
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CALL FOR NOMINATIONS

The AWM Dissertation Prize (**NEW DEADLINE!**)

In January 2016 the Executive Committee of the Association for Women in Mathematics established the AWM Dissertation Prize, an annual award for up to three outstanding PhD dissertations presented by female mathematical scientists and defended during the 24 months preceding the deliberations for the award. The Prizes will be given for those dissertations deemed most outstanding by the award committee. The award is intended to be based entirely on the dissertation itself, not on other work of the individual.

To be eligible for the award graduate students must have defended their dissertation within the last two years (September 15, 2021 to September 14, 2023). They must either be a US citizen or have graduated from a university in the US. The Prizes will be presented at the Joint Mathematics Meetings in San Francisco, CA.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted. Nominations of members of underrepresented minorities are especially encouraged. The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional mathematical research presented in the dissertation, 2) a copy of the dissertation and/or a URL address where it can be accessed, 3) two letters supporting the nomination, and 4) a curriculum vitae of the candidate not to exceed three pages. Nomination materials should be submitted online at [MathPrograms.org](https://www.mathprograms.org). The submission link will be available 45 days prior to the nomination deadline. Nominations must be received by **September 15, 2023**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit awm-math.org/awards/awm-dissertation-prize/ for more information.

courses in other disciplines with computer science content included. The computer science courses were generally introductory courses taken by a wide variety of students. In many cases, an explicit goal was to attract more students to the computer science major. It was recognized that this was not accomplished by a pure programming course in C++ or similar language.

To introduce coding several institutions started with the students learning to program robots and other physical devices. Young people today have grown up with computer-aided devices for many purposes, and this connected them to their experience. Fairleigh Dickinson University took advantage of this in redesigning their introductory courses. Examples of real-world applications they incorporated include the use of the BitPim program for use on cell phones (including the issue of cybersecurity) and Cyberlink assistive technology for people with disabilities. Students programmed EZ-Robots and learned about contributions of African Americans in cell phone and computer technology. A second course included components on speech recognition, virtual reality and nanotechnology, as well as mathematics and more general issues of computing.

The University of Dayton developed a new course called Creative Media Applications. A major project was to use programming to create an animation. While learning the programming skills, students were able to choose meaningful topics, including social justice issues.

Two universities specifically used music in their programs. California State University Northridge developed a collaborative program in a large introductory course for computer science, engineering and mathematics majors. The title of the project was “Learning to Code by Making Music: The Introduction of Computer Science Coursework with World Music Applications for the Retention of Underrepresented Students in STEM.” Students created a drum machine, which they could then program to produce beats common in musical genres from different cultures. In their Data Structures and Algorithms course, Fayetteville State University’s project used JEM (Jython Environment for Music) and the EarSketch Python library to create music based on text documents.

Queens College CUNY had, before the TIDES project, introduced an introductory course called Information and Intelligence, which dealt with information theory and artificial intelligence, as well as coding. Initial offerings had very low female enrollment, and a main goal was to

CALL FOR NOMINATIONS

The 2024 Etta Zuber Falconer Lecture (NEW DEADLINE!)

The Association for Women in Mathematics and the Mathematical Association of America (MAA) annually present the Etta Zuber Falconer Lecture to honor women who have made distinguished contributions to the mathematical sciences or mathematics education. These one-hour expository lectures are presented at the MAA MathFest each summer. While the lectures began with MathFest 1996, the title “Etta Zuber Falconer Lecture” was established in 2004 in memory of Falconer’s profound vision and accomplishments in enhancing the movement of minorities and women into scientific careers.

The mathematicians who have given the Falconer lectures in the past are: Karen E. Smith, Suzanne M. Lenhart, Margaret H. Wright, Chuu-Lian Terng, Audrey Terras, Pat Shure, Annie Selden, Katharine P. Layton, Bozena Pasik-Duncan, Fern Hunt, Trachette Jackson, Katherine St. John, Rebecca Goldin, Kate Okikiolu, Ami Radunskaya, Dawn Lott, Karen King, Pat Kenschaft, Marie Vitulli, Erica Walker, Izabella Laba, Talithia Williams, Pamela Gorkin, Tara Holm, Bonita Saunders, Suzanne Weekes, and Tatiana Toro.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be at least one additional letter of support. Nominations for members of underrepresented minorities are especially encouraged. The letter of nomination should include an outline of the nominee’s distinguished contributions to the mathematical sciences or mathematics education and address the nominee’s capability of delivering an expository lecture. A curriculum vitae of the candidates not to exceed three pages is also required. Nominations are to be submitted as ONE PDF file via [MathPrograms.org](https://mathprograms.org). The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **September 15, 2023** and will be held active for a total of two years (one year beyond the initial nominations). If you have questions, phone 401-455-4042, email awm@awm-math.org or visit <https://awm-math.org/awards/falconer-lectures/> to learn more.

increase the number of women in computer science. So, having cleared it with the college general counsel, they used “controlled enrollment.” When enrollment started, the course was open to all students. But when male enrollment reached 50% of the course’s capacity, subsequent male students were placed on a waiting list and told they could enroll in the following semester. This was combined with targeted recruitment of women students.

Most projects also introduced new teaching methods. Group projects, and even group quizzes, were common. Fairleigh Dickinson’s course included a “Problem-Based Learning” project where students were given real-world programs with errors inserted and asked to find and correct the errors. Guest lecturers from industry, either in regular courses or in a separate seminar, helped to motivate students. I was intrigued by a classroom exercise at Wright State University entitled “Is it cheating?” where students were asked for their perspectives on a series of scenarios from a data structures assignment [p. 207]. Cal State Northridge hired previous students to act as mentors in subsequent courses. This helped both the mentees and the mentors in creating a sense of belonging in the field.

For two of the universities the computer science course was part of a learning community: at Queens College it was paired with an English composition course, and at Westminster, three sections paired computer science with genetics, chemistry and sociology. Lawrence

Technological University introduced computer science modules in courses in psychology, biology and humanities. A couple of the institutions (University of Puerto Rico Humacao and Fairleigh Dickinson University) developed outreach programs to middle and high schools.

Throughout the book, it is clear that a major impact of the TIDES program was on the faculty members themselves. Each chapter begins with reflections by the participants. All described how the program changed their views. Often it was to change their “skeptical optimism,” as expressed by participants from the University of Dayton. From Lawrence Technological University: “The real enemy of diversity in computer science is not those who oppose diversity, but those who agree with the cause, but will not make the necessary changes” [p. 136]. The necessary changes include course content, teaching methods, and a change from the “geek culture” of computer science. It would have been nice to see what interventions were tried to address the geek culture issue.

Many faculty reflected on their growing understanding of unconscious bias and microaggressions. A common theme was overcoming the perspective that the failure of students was the fault of the students, either because of poor backgrounds or intellectual weaknesses. Replacing this perspective was a realization that the instructors could meet the students where they are, and engage them by

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NSF-AWM Travel Grants for Women

Mathematics Travel Grants. The objective of the NSF-AWM Travel Grants is to enable women mathematicians to attend conferences in their fields, which provides them a valuable opportunity to advance their research activities and their visibility in the research community. Having more women attend such meetings also increases the size of the pool from which speakers at subsequent meetings may be drawn and thus addresses the persistent problem of the absence of women speakers at some research conferences. The Mathematics Travel Grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant’s field of specialization.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians appointed by the AWM. A maximum of \$2300 for domestic travel and of \$3500 for foreign travel will be funded. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

Eligibility and Applications. Please see the website (<https://awm-math.org/awards/awm-grants/travel-grants/>) for details on eligibility and do not hesitate to contact awm@awm-math.org or 401-455-4042 for guidance. Applications from members of underrepresented minorities are especially welcome.

Deadlines. There are three award periods per year. Applications are due **February 15, May 15, and October 1.**

BOOK REVIEW *continued from page 13*

creating an environment that elicits more participation from students of different backgrounds and cultures.

Lilliam Casillas-Martinez of the University of Puerto Rico Humacao describes how, prior to her participation in the program, she had advised Latina students to play down their heritage and try to assimilate, in order to be accepted and respected as a scientist. Now she advises them to embrace their heritage, helps them overcome imposter syndrome, and works to educate colleagues about their implicit biases.

Many of the institutions created public web pages, where they shared some of their project materials. Unfortunately, these web pages were not always maintained, so a number of links in the book do not work.

The AAC&U continues professional development through its TIDES program. As far as I can tell from their web page, their current efforts consist of an annual Institute, a week-long program for STEM faculty and administrators (with a registration fee of \$3950). A related program, Project Kaleidoscope (PKAL) offers a week-long institute to cultivate leadership among STEM faculty and administrators.

College and University Participants: Bryn Mawr College, California State University Northridge, Fairleigh Dickinson University, Fayetteville State University, Lawrence Technological University, Montgomery College, Morgan State University, Pitzer College, Queens College, University of Dayton, University of Puerto Rico Humacao, Westminster College, Wright State University

CALL FOR NOMINATIONS

The 2024 Kovalevsky Lecture (**NEW DEADLINE!**)

AWM and SIAM established the annual Sonia Kovalevsky Lecture to highlight significant contributions of women to applied or computational mathematics. This lecture is given annually at the SIAM Annual Meeting. Sonia Kovalevsky, whose too-brief life spanned the second half of the nineteenth century, did path-breaking work in the then-emerging field of partial differential equations. She struggled against barriers to higher education for women, both in Russia and in Western Europe. In her lifetime, she won the Prix Bordin for her solution of a problem in mechanics, and her name is memorialized in the Cauchy-Kovalevsky theorem, which establishes existence in the analytic category for general nonlinear partial differential equations and develops the fundamental concept of characteristic surfaces.

The mathematicians who have given the prize lecture in the past are: Linda R. Petzold, Joyce R. McLaughlin, Ingrid Daubechies, Irene Fonseca, Lai-Sang Young, Dianne P. O’Leary, Andrea Bertozzi, Suzanne Lenhart, Susanne Brenner, Barbara Keyfitz, Margaret Cheney, Irene M. Gamba, Linda J.S. Allen, Liliana Borcea, Éva Tardos, Catherine Sulem, Lisa Fauci, Vivette Girault, Anne Greenbaum, and Annalisa Buffa.

The lectureship may be awarded to anyone in the scientific or engineering community whose work highlights the achievements of women in applied or computational mathematics. Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be an additional letter of support. Nominations of members of underrepresented minorities are especially encouraged. The letter of nomination should outline the nominee’s contributions to applied or computational mathematics and provide a list of some of their most important research papers. This letter must be accompanied by a citation of about 100 words that may be read when introducing the speaker and a curriculum vitae of the candidate not to exceed three pages. Nominations are to be submitted as ONE PDF file via MathPrograms.org. The submission link will be available 45 days prior to the deadline. Nominations must be received by **September 15, 2023** and will be kept active for a total of two years (one year beyond the initial nominations).

The awardee will be chosen by a selection committee consisting of two members of AWM and two members of SIAM. Please consult the award web pages <https://www.siam.org/prizes/sponsored/kovalevsky.php> and <https://awm-math.org/awards/kovalevsky-lectures/> for more details.

EDUCATION COLUMN

Education Column Editor: Jackie Dewar, Loyola Marymount University, jdewar@lmu.edu

The Messages We Send After We Listen

Yvonne Lai, Milton E. Mohr Associate Professor, University of Nebraska–Lincoln

Each time we teach, our students communicate to us. They talk, write, and draw. How do we take in their expressions of self and mathematics? How do we listen? In this column, I explore different ways we¹ as mathematics instructors may listen and how they contribute to a larger message of inclusion and induction into a mathematical community.

When we listen to judge

One way we might listen is to judge. When we hear someone say, “All numbers are prime or composite,” we might immediately think to ourselves: “That’s wrong. They haven’t said which numbers. And even if they meant positive integers, what about 1? Units are important in rings!” We judge for right and wrong.

Mathematics is sometimes said to be special because deductive logic is brittle to contradiction. If a statement has even one exception, then it is considered to be logically false. If a statement has any ambiguity, it is considered ill-defined. For a deductive argument to be solid, each statement must be entirely, unambiguously correct. We might listen for right and wrong because deductive beauty comes from knowing that your foundation is utterly, unbreakably solid.

Yet if we only ever listen to judge, and that is the only frame from which we respond, we might also send the message that participating in math is only about determining true and false. While understanding what it means to be true and false is important, this view of mathematics misses out on the sometimes exciting, sometimes frustrating, sometimes exulting messiness that is mathematical discovery.

There is a more insidious version of listening to judge as well. If we listen to judge whether a student is “worthy,” we also send a message that some students are

¹ Throughout this essay, I use *we/our/us* as a stand-in for the community of those who teach mathematics, particularly at the tertiary level. The pronoun *I/my/me* is reserved for my personal actions and arguments.

worthwhile and others are not. We need more students thinking that they can do mathematics, not fewer.

As mathematicians, we need to know how to assess the logical validity of a statement, and we want our students to know that too. At the same time, we need to be careful to use our judgment to help students rather than hurt students. We need to consider whether the way that we exercise our judgment supports students in building their mathematical experiences and selves.

When we listen to understand

Every year when I teach Geometry for Secondary Teaching,² I ask prospective high school mathematics teachers in the course to write definitions for *angle* and *angle measure*. Although I provide separate spaces on a worksheet to draft each, their definitions often blend together. I have the sense that the students see these concepts as so inextricably linked that they cannot untangle them to define them separately. Here are some sample drafts that groups have shared after comparing and building on individual group members’ drafts:

- (Draft definition of *angle*) “The 2-D circular rotation from a vertex where we look at the difference from one ray to another.”
- (Draft definition of *angle measure*) “The number that quantifies the circular path around the vertex of an angle.”
- (Draft definition of *angle*) “The space between two rays that start at the same vertex, where the rays might overlap.”

As you read these statements, you may be ready to judge. “That’s not the definition of an angle! Why didn’t they just say that an angle is the union of two rays with a common endpoint? Why doesn’t Yvonne just give them the definition already?” You might be judging both my students’ work and my pedagogical choices.

I want to suggest a different purpose for listening, even as we may still find ourselves judging. We can also listen

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² This course goes under many names depending on the institution, from Modern Geometry, to Geometry, to Geometry for High School Teachers. Patricio Herbst and Amanda Brown, who lead the GeT: A Pencil group (<https://getapencil.org/>), have documented wide variation in these courses in topic and pedagogy. When I teach this course, I begin with a unit on foundational geometric arithmetic focused on vectors, angles, and betweenness. Then I turn to isometries of the Euclidean plane and their group theoretic properties, and then to congruence and similarity from a transformation perspective.

to understand. We can set up situations where students can share their emerging ideas and practice communicating in writing what's in their heads. In other words, as mathematics educator Brent Davis (1997) wrote, we want to be “making sense of the sense [students] are making” (p. 365).³ I ask the prospective high school math teachers to draft definitions of *angle* and *angle measure* because I want to know the images of these concepts that they bring with them.⁴ Students are not blank slates. They come to us with all sorts of mathematical and emotional ideas of what mathematics and its concepts mean to them.

³ Davis (1997) contrasted “interpretative” and “evaluative” listening. He characterized interpretative listening in terms of listening to make sense of students’ own sense. He characterized evaluative listening in terms of a teacher who “already had a ‘correct’ answer in mind” (p. 360). Listening to judge is evaluative listening.

⁴ In using the term “image,” I allude to Vinner and Hershkowitz’s (1980) notion of concept image, which includes all mental pictures of a concept in a student’s mind, including associated processes and procedures, and how the pictures, processes, and procedures are connected.

Some years ago, I went to a presentation on language and mathematics learning. The speaker said that the research in language acquisition suggests that the hardest technical vocabulary terms to learn are the ones that already have a different familiar meaning. In fact, the term *mean* is an example. This word can ... mean ... to define; an unkind action; and a number that is used to summarize values in a dataset such as an arithmetic, geometric, or harmonic mean. Children find the term *mean* harder to learn than, say, *standard deviation*, because there are so many other definitions and images that come up, other than an arithmetic mean, when hearing the word “mean.” On the other hand, *standard deviation* likely holds no strong associations. Even though the term is a larger mouthful, its definition is easier to learn because the space that the term occupies in the mind is as close to a blank slate as one can get.

I used to teach *angle* and *angle measure* by presenting a textbook definition. I found that my students clung so tightly to their own prior images that there was little room for any other. After some years of this, I wanted to surface their ideas. When I listened to their definitions to understand, I learned how the textbook definitions differed from their notions. What I learned from my students’ drafts can be

CALL FOR NOMINATIONS

Alice T. Schafer Mathematics Prizes (NEW DEADLINE AND CRITERIA!)

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to undergraduate women for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominees may be at any level in their undergraduate careers, but must be undergraduates as of September 15, 2023. They must either be a US citizen or have a school address in the US. Starting in 2024, two Schafer Prizes and one runner-up will be awarded at the Joint Mathematics Meetings in San Francisco, CA.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be at least one additional letter of support. Nominations of members of underrepresented, underserved, and marginalized populations and of students attending institutions with limited resources are especially encouraged. One letter of nomination (at most three pages) should highlight the exceptional qualities of the candidate to be recognized. The letter of nomination may include (but is not limited to) an evaluation of the nominee on the following criteria: quality of performance in advanced mathematics courses, special programs, or mathematical competitions; mathematical growth of the nominee; nominee’s ability to overcome barriers in their mathematical journey; nominee’s ability to seek out and make the most of resources both at and outside of their institution; ability for independent work in mathematics or ability to work equitably in a team in mathematics. With the letter of nomination, please include a copy of transcripts that indicate expected graduation date. Any additional supporting materials (e.g. reports from summer work using math, copies of talks given, recommendation letters from professors, colleagues, etc.) should be included with the nomination. All nomination material is to be submitted as ONE PDF file via [MathPrograms.org](https://mathprograms.org). The submission link will be available 45 days prior to the deadline. Nominations must be received by **September 15, 2023**.

If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit <https://awm-math.org/awards/schafer-prize-for-undergraduates/>.

described in two recurring debates. First, students argue about whether an angle is the same thing as an angle measure. Some insist that the question, “What’s the angle?” could legitimately be answered “60 degrees” or another number of degrees. These students think of the angle as the measure, rather than as a physical object in and of itself. Second, students argue about whether the interior of an angle is part of the angle or not. Some students think an angle is just the rays. Other students think an angle is the rays and a region inside. Still other students think that the angle is only the interior. These debates came up because students compared and contrasted their conceptions with each other and the textbook. With a clear sense of the prior images held by students, I was able to say directly how their definitions and the textbook definition differed. We then talked about the utility of each, and a rationale for the textbook’s choice.

I want to understand prospective high school teachers’ personal concepts of *angle* and *angle measure* because I want future teachers to connect angles in geometry to angles in precalculus and trigonometry. To do so, I want to have a conversation about why the “inside” of an angle might be something included in the definition of an angle. Related to this, I also want to know whether they see angle measure as only non-negative quantities or whether they see angle measure as signed. By taking angle measure as signed rather than non-negative, geometry connects to trigonometry, and one can also define rotations precisely. Moreover, properties of compositions of reflections and rotations are more elegantly expressed with signed angle measures. The composition of two rotations has an angle measure that is simply the addition of their individual measures, rather than an addition with separate cases for clockwise and counterclockwise.⁵

In general, I believe that we should strive to know when we go against student intuitions, so that we can work with our students to develop new intuitions. The only way we can know whether we go against student intuitions is by listening to understand. The more we can help students develop new intuitions, the more learning possibilities we open.

⁵ This fact is beautifully true even if the rotations do not share the same center. For instance, if you have two points X and Y in the plane, and you compose a rotation of -30 degrees about X with a rotation of $+60$ degrees about Y , there is some point Z such that the result of the composition is a rotation of $+30$ degrees about Z . (The point Z is different depending on the order of composition.) If $X = Y$, then $Z = X = Y$.

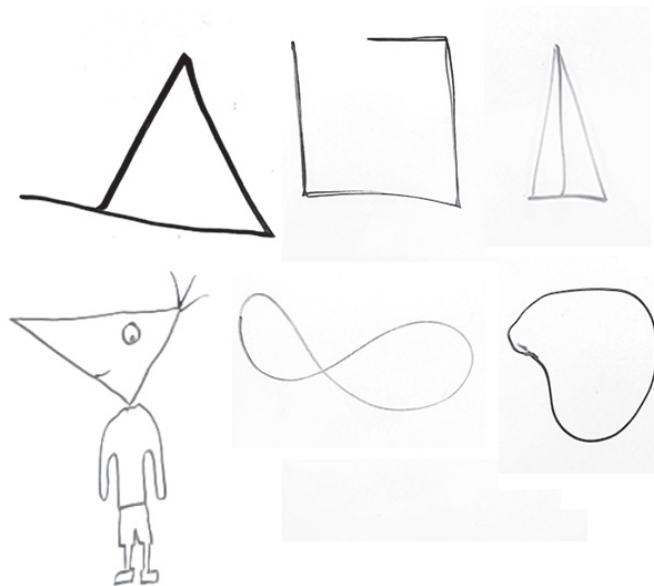


Figure 1. Drawings that students made along the way to creating a definition of closed.

When we listen to create

Here are some draft definitions of “triangle” written by students in the geometry class:⁶

- “A [closed] 2-dimensional shape with 3 vertices whose interior angle measures add up to 180 degrees.” (This group inserted “closed” after reading other groups’ definitions.)
- “A closed shape with three straight sides.”
- “A closed 2-dimensional shape made of exactly three straight edges that are joined endpoint to endpoint.”

As I looked around the room that day at students’ definitions, many were drawn to using the term “closed.” As I listened to understand, I asked them questions such as, “When you say ‘closed,’ what do you mean?,” “What’s a drawing of something else that’s ‘closed?’”, “What’s a drawing of something that’s not ‘closed?’”, “What made you think of using ‘closed’ in your definition?” Overall, students were not sure why, but they felt convinced that a correct definition needed that word.

I saw an opportunity to create a definition together. Although I had not planned to do so, I switched up the groups and asked the new groups to define “closed” and to draw examples of what “closed” meant. Each group claimed

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⁶ I wrote about this activity in the September-October 2022 Education Column (Lai, 2022). Here I share some more student ideas that came out of this activity.

a whiteboard. Our discussion focused on planar curves. The students pointed to existing figures in the room and drew new ones, as in Figure 1 [see page 17]. They began to bar some from being “closed” as though they were monstrous to the concept’s meaning.⁷ Using their suggestions and critiques, I drafted and revised a proposed definition. The class came to consensus on a definition based on being able to trace the entire shape and return to where you started, without any backtracking, and allowing for a finite number of isolated point overlaps in the tracing. Some students, who were taking a graph theory class concurrently, connected our conversation to circuits in graphs.

Listening to create means listening to spot opportunities to build mathematics together.⁸ That mathematics may take the form of a definition, conjecture, proof, mathematical model, or another way to communicate and advance the community’s knowledge.

⁷ Imre Lakatos (1963) described the process of excluding examples as “monster barring.”

⁸ “Listening to create” is my interpretation of Yackel et al.’s (2003) “generative listening” and Davis’s (1997) “hermeneutic listening.” Yackel et al. (2003) defined generative listening as improvising a revised lesson trajectory based on student contributions so as to “generate or transform one’s own mathematical understanding and ... generate a new space of instructional activities” (p. 117). Davis (1997) defined hermeneutic listening as negotiated and participatory, involving a “willingness to interrogate the taken for granted” (pp. 369–370).

When we listen through desire, and learning to listen past desire

Before closing this essay, I will issue a caution. Sometimes when we think we are listening to understand or create, we may be listening through desire. Once, when a student asked me about “0” in a ring theory class, I launched into a spontaneous lecture on aspects of the zero-product property. The student gaped. It turned out that due to using an old whiteboard marker, what I intended as an alpha, they read as a zero. They were confused why a zero would show up in the calculation. It is an enduring problem of teaching to learn to listen past desire.

Who gets to participate, and what does participation look like?

How we listen answers the question: *Who gets to participate in mathematics, and what does participation look like?* When we listen to judge for true, false, or well-definedness, we send the message that precision is important in doing mathematics. At the same time, if we only listen to judge in this way, we send the message that participating in mathematics can only be done with precise language. Those who falter with imprecise language are not participating. Yet inquiry in mathematics, whether we seek a proof or a mathematical model, relies on a place for inchoate ideas that are refined into more precise communication. Without space for imprecision, the precision would mean little.

When we listen to understand, we send the message that students’ concept images matter to where we go next. Participation in mathematics involves surfacing, comparing,

NSF-AWM Mentoring Travel Grants for Women

Mathematics Mentoring Grants. The objective of the NSF-AWM Mathematics Mentoring Travel Grants is to help junior women to develop long-term working and mentoring relationships with senior mathematicians. This relationship should help the junior mathematicians to establish their research programs and eventually receive tenure. Each grant funds travel, accommodations, and other required expenses for an untenured woman mathematician to travel to an institute or a department to do research with a specified individual for one month. The applicant’s and mentor’s research must be in a field which is supported by the Division of Mathematical Sciences of the National Science Foundation.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians appointed by the AWM. A maximum of \$5000 per award will be funded.

Eligibility and Applications. Please see the website (<https://awm-math.org/awards/awm-grants/travel-grants/>) for details on eligibility and do not hesitate to contact us at awm@awm-math.org or 401-455-4042 for guidance. Applications from members of underrepresented minorities are especially welcome.

Deadline. There is one award period per year. Applications are due **February 15**.

and contrasting conceptions of mathematical ideas. In doing so, we can analyze choices made in mathematical definitions and their implications for later results. When students discuss the choices made in mathematical definitions and assumptions, they are participating in defining the terms of justification in the class community. By listening to understand, we honor students' ideas and set them up to create new ideas.

When we listen to create, we draw on the skills we gain from listening for precision and listening to understand. We also go beyond these skills to show that the agenda of mathematics is determined not by the instructor's fiat, but by a community. We send the message that participation in mathematics means shaping fuzzy ideas into sharper questions and claims, understanding where each other come from, and seeing what we can build together.

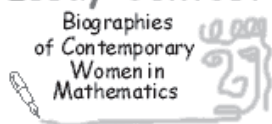
Acknowledgements: *The framework of listening to judge, understand, and create comes from a presentation by Gail Burrill at the 2019 Joint Mathematics Meeting, where she gave references to the frameworks of Brent Davis (1997) and of Erna Yackel and colleagues (2003). She spoke at a panel on Listening and Responding to Students in K–16, held by the Special Interest Group of the MAA on Mathematical Knowledge for Teaching (SIG-MKT). Ever since hearing her presentation, I have thought about how these modes*

of listening impact the messages we send to students about what it means to participate in mathematics. This essay is an expansion of these thoughts, which I first had an opportunity to discuss with others at a presentation in the National Museum of Mathematics' virtual QED series. I am grateful to Gail Burrill for introducing me to the framework, to Tim Chartier for the invitation to speak, and to Christopher Danielson and Francis Su for encouraging me to explore these ideas in writing.

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Essay Contest



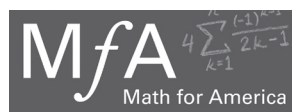
To increase awareness of women's ongoing contributions to the mathematical sciences, the Association for Women in Mathematics holds an annual essay contest for biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers. AWM is pleased to announce that the 2024 contest is sponsored by Math for

America, www.mathforamerica.org.

Essays will be based primarily on an interview with a woman currently working in a mathematical career. The AWM Essay Contest is open to students in the following categories: **grades 6–8**, **grades 9–12**, and **undergraduate**. At least one winning entry will be chosen from each category. Winners will receive a prize, and their essays will be published online at the AWM website. Additionally, a grand prize winner will have their entry published in the *AWM Newsletter*. For more information, visit awm-math.org/awards/student-essay-contest/. The deadline for electronic receipt of entries is **February 1, 2024**. To volunteer to be interviewed, please visit the website awm-math.org/awards/student-essay-contest/ and sign up using the link at the bottom of the page.



ASSOCIATION FOR
WOMEN IN MATHEMATICS



You can renew your membership at awm-math.org.

AWM Workshop at the 2024 SIAM Annual Meeting

Application deadline for graduate students: **November 15, 2023**

For many years, the Association for Women in Mathematics has held a series of workshops in conjunction with major mathematics meetings. The AWM Workshops serve as follow-up workshops to Research Collaboration Conferences for Women (RCCW), featuring speakers from one of the AWM Research Networks. An AWM Workshop is scheduled to be held in conjunction with the 2024 SIAM Annual Meeting happening in Spokane, Washington, July 8–12, 2024.

FORMAT: The workshop will consist of two research minisymposia focused on **Complex and Nonlinear Systems** organized by Heather Zinn Brooks, Nancy Rodriguez, and Alexandria Volkening, a **poster session**, and a **professional development session**. The research minisymposia will feature selected junior and senior mathematicians from the Research Network Women in Complex and Nonlinear Systems (WiCNS). This workshop follows the RCCW that took place in September 2022 at the Banff International Research Station for Mathematical Innovation and Discovery.

POSTER SESSION: The poster session is open to **all areas of research**; graduate students working in areas related to complex systems are especially encouraged to apply. Poster presenters will be selected through an application process to present at the workshop reception and poster session. With funding from NSF, AWM will offer partial support for travel and hotel accommodations for the selected graduate students. The workshop will include a luncheon and a mentoring session where workshop participants will have the opportunity to meet with other women and non-binary mathematicians at all stages of their careers. In particular, graduate students working in areas related to complex and nonlinear systems will have the opportunity to connect with the WiCNS Research Network.

ELIGIBILITY: To be eligible for selection and funding, a graduate student must have made substantial progress towards their thesis. Women and non-binary mathematicians with other sources of support are also welcome to apply.

All applications should be submitted on mathprograms.org and include:

- a title of the proposed poster
- an abstract (75 words or less) of the proposed poster
- a curriculum vitae
- a letter of recommendation.

Applications must be completed electronically by **November 15, 2023**. See <https://awm-math.org/meetings/awm-siam/> for details.

MENTORS: We seek volunteers to act as mentors for graduate students as part of the workshop. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by May 15, 2024.

Mathematicians of all genders are invited to attend the talks and poster presentations. Departments are urged to help graduate students and junior faculty who are not selected for the workshop obtain institutional support to attend the presentations.

MEDIA COLUMN

In addition to longer reviews for the Media Column, we invite you to watch for and submit short snippets of instances of women in mathematics in the media (WIMM Watch). Please submit to the Media Column Editors: Sarah J. Greenwald, Appalachian State University, appalachianawm@appstate.edu and Alice Silverberg, University of California, Irvine, asilverb@math.uci.edu.

Pretty Women and Famous Men? An Examination of Google Image Results for Mathematician and Related Gendered Terms

Jennifer Hall, Monash University

Over the years, I have conducted many searches in Google Images, including searches for pictures that I could use in my teaching and in conference presentations. When I was a PhD student, I researched elementary students' experiences with and views of mathematics and mathematicians, so I would often search for the term mathematician in order to find images to use in my presentations. Unfortunately, the images that came up in my searches at the time tended to be very stereotypical in nature: an old, White man in front of a chalkboard filled to the brim with nonsensical mathematical-looking scribbles.

Since I completed my PhD, I have always wanted to conduct a proper analysis of Google Image search results for the term *mathematician* and related terms, namely those involving gender, as that topic was a focus in my PhD research and continues to be a major research focus for me to this day. For the purposes of this column, in May of 2023 I conducted Google Image searches of the following terms: *mathematician*, *woman mathematician*, *man mathematician*, *female mathematician*, *male mathematician*, *girl mathematician*, *boy mathematician*, *non-binary mathematician*, and *trans mathematician*. I searched for each two-word term with quotation marks around the words in order to ensure that the words were kept together during the search process, thus ensuring that pages with the exact term were located (Jin, 2022). In order to minimize bias in the search algorithms, I cleared my cache and cookies, plus used an incognito browser tab in Google Chrome. I analyzed the first 10 results for each search term, considering variables such

as whether the image was in black and white or color, the gender¹ of the person in the image, and whether the person was a historical figure² or a present-day individual.

There were many problematic outcomes pertaining to gender in the results. In the search results for *mathematician*, there was only one image of a woman (#9), Maria Agnesi, from an article from *The Conversation* entitled, somewhat ironically, "Maria Agnesi, the Greatest Female Mathematician You've Never Heard of" (Gunderman & Gunderman, 2018). Eight of the results for *mathematician* were images of historical figures such as Euclid and Pythagoras (Note: One of these images was an actor playing Stanislaw Ulam, who is a historical figure), and half of the results were black and white images. Such results are indicative of an image of mathematicians as being people from long-ago times and thus mathematics as being an "old" field, rather than one with present-day developments.

In the gender-specific searches, there were also some concerning trends. The image results for *female mathematician*, *woman mathematician*, and *girl mathematician* were very similar, with the mathematicians shown nearly all being historical figures like Hypatia and Emmy Noether. Indeed, there were no image results for any of the three search terms that solely contained present-day mathematicians; such individuals were only featured in composite images of historical and present-day mathematicians (five results across the three search terms). Concerningly, there were no children or teenagers shown in the results for *girl mathematician*—only adult women. Such a result is indicative of general societal use of the term *girl* to refer to an adult woman, which is a highly problematic, belittling, and infantilizing practice (Madsen, 2021). Furthermore, when I searched for *woman mathematician*, the related searches that were shown were: "mathematician look alike female," "pretty girl mathematician," and "beautiful mathematician girl," highlighting a continued focus on girls'/women's appearances rather than their intellectual talents (Parker et al., 2017).

Although historical figures featured in many of the search results for the parallel terms of *male mathematician*,
continued on page 22

¹ The genders of the individuals were determined based on the use of gendered pronouns and/or the individuals' self-identification.

² Note: I use the term *historical figure* to refer to anyone who is not alive. In most cases, these individuals died well over a century ago (e.g., Pythagoras, Gauss), but in a few cases, the individuals died in the past century (e.g., Alan Turing, Paul Erdős).

man mathematician, and *boy mathematician* (20 of the 30 results), they were lesser in number than in those in the female/woman/girl searches, with several present-day mathematicians featured, such as Terence Tao and Cédric Villani. Strikingly, these present-day men mathematicians were always shown in individual pictures, in contrast to the present-day women mathematicians, who were only shown in composite images with historical women mathematicians. In contrast to the search results for *girl mathematician*, there were children featured in the results for *boy mathematician*; indeed, four of the images were children or teenagers. Notably though, these images were all stock images, either clip art or photos. In contrast to the appearance-focused related searches that were shown when I searched for *woman mathematician*, the related searches for *man mathematician* were “famous mathematician,” “mathematician male,” and “female mathematician”—none of which pertain to appearance, and the first of which may be indicative of the mathematician = man/male stereotype (Leder, 2019).

Unsurprisingly, there were far fewer results returned when *non-binary mathematician* and *trans mathematician* were the search terms, compared to the other seven search terms. Namely, there were 20 and 24 results, respectively, for these two search terms, compared to hundreds of results for the other search terms. All of the mathematicians featured in the search results for *non-binary mathematician* and *trans mathematician* were from the present day, with color images provided. Another indication of the more modern focus in these results was the type of sources in which the mathematicians featured: For the other search terms, the sources tended to be popular media articles or blogs, as well as Wikipedia, with no social media results. Conversely, many of the results for these two searches, particularly the *non-binary mathematician* searches, were social media pages (Reddit threads and Twitter posts/accounts, accounting for 6 of the 10 *non-binary mathematician* results). There were a few image results where the person was not part of the searched group. For instance, Eugenia Cheng and Tasarla Deadman featured in four of the search results for *non-binary mathematician*, but these mathematicians both use she/her pronouns on their social media accounts and/or websites. Notably, within the *trans mathematician* image results, there were only examples of trans women mathematicians, not trans men mathematicians.

Google is by far the most popular browser in the world (Salman, 2023), so it is fair to assume that most people, if they were searching for images of mathematicians, would

use Google Images as a resource. As shown by my findings, the images that were returned from the searches of the term *mathematician*, as well as terms for various gendered groups of mathematicians, were problematic in a variety of ways. Without any gendered adjectives provided, mathematicians were overwhelmingly portrayed as men (i.e., men as default), and most mathematicians shown, save for non-binary and trans mathematicians, were historical figures, presented in black-and-white images, giving the field an outmoded image. It is important to challenge these images in our teaching and research, in order to show that mathematics is a vibrant, developing field in which people of all genders belong.

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Melanie Matchett Wood Named 2022 MacArthur Fellow

<https://www.macfound.org/programs/fellows/strategy>
<https://www.macfound.org/fellows/class-of-2022/melanie-matchett-wood#searchresults>; links to a video and two newspaper articles are also available

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The MacArthur Fellowship is a \$800,000, no-strings-attached award to extraordinarily talented and creative individuals as an investment in their potential.

There are three criteria for selection of Fellows:

1. Exceptional creativity
2. Promise for important future advances based on a track record of significant accomplishments
3. Potential for the Fellowship to facilitate subsequent creative work.

The MacArthur Fellows Program is intended to encourage people of outstanding talent to pursue their own creative, intellectual, and professional inclinations. In keeping with this purpose, the Foundation awards fellowships directly to individuals rather than through institutions. Recipients may be writers, scientists, artists, social scientists,



Melanie Matchett Wood. © John D. and Catherine T. MacArthur Foundation – used with permission.

humanists, teachers, entrepreneurs, or those in other fields, with or without institutional affiliations. They may use their fellowship to advance their expertise, engage in bold new work, or, if they wish, to change fields or alter the direction of their careers.

Although nominees are reviewed for their achievements, the fellowship is not a lifetime achievement award, but rather an investment in a person's originality, insight, and potential. Indeed, the purpose of the MacArthur Fellows Program is to enable recipients to exercise their own creative instincts for the benefit of human society.

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CALL FOR PROPOSALS

Research Collaboration Conferences for Women

The AWM works to establish and support research networks for women in all areas of mathematics research. In particular, the AWM RCCW Committee provides mentorship and support to new networks wishing to organize a Research Collaboration Conference for Women (RCCW). The Committee offers help finding a conference venue, developing and submitting a conference proposal, and soliciting travel funding for participants. Thanks to a National Science Foundation grant, some funding may be available through the AWM to support new RCCWs, especially interdisciplinary proposals and proposals that bring together researchers from traditionally underrepresented populations.

Mathematicians interested in organizing the first conference of a new RCCW are invited to submit a proposal to the AWM describing the conference topic, potential co-organizers and project leaders, and potential participants. Proposals should be no more than one page (PDF files only, please) and should be sent to awm.rccw@gmail.com. Deadlines for submission: **February 1** and **July 1**.

More information about Research Collaboration Conferences for Women, existing RCCW networks, and related initiatives can be found at <http://awm-math.org/programs/advance-research-communities/>.

The Foundation does not require or expect specific products or reports from MacArthur Fellows and does not evaluate recipients' creativity during the term of the fellowship. The MacArthur Fellowship is a "no strings attached" award in support of people, not projects. Each fellowship comes with a stipend of \$800,000 to the recipient, paid out in equal quarterly installments over five years.

In September 2022, Melanie Matchett Wood, mathematician, Harvard University and Radcliffe Institute for Advanced Study, was named a MacArthur Fellow for "addressing foundational questions in number theory from the perspective of arithmetic statistics."

About Melanie's Work: Melanie Matchett Wood is a mathematician investigating foundational questions in pure mathematics. She specializes in number theory (the properties and relationships of whole numbers) and algebraic geometry (the study of geometric structures, such as curves and surfaces, that are described using polynomial equations).

By combining a breadth of mathematical approaches, she reveals new ways to see fundamental properties of numbers.

Wood's research is often motivated by questions in arithmetic statistics. Much of mathematics research focuses on developing proofs for conjectures, but in some cases, it is not feasible to check that a hypothesis is true for all possible cases. For example, determining some properties of prime numbers relies on the behavior of infinitely many numbers (such is the case, for example, for the twin prime conjecture, which posits that there are an infinite number of prime numbers that are 2 apart, such as 11 and 13). Wood takes an arithmetic statistics approach to such problems. She develops probabilistic models for number theoretic objects (such as prime numbers) to reveal how they will behave on average. Wood and collaborators developed such a model for the distribution of ranks of elliptic curves. The rank is a measurement that conveys information about how many of the solutions to that curve's equation are rational numbers. Curves with higher ranks have larger and more complicated sets of rational solutions. It has been previously assumed that rank is unbounded, meaning it should be possible to

CALL FOR NOMINATIONS

The 2025 Noether Lecture (NEW DEADLINE!)

AWM established the Emmy Noether Lectures in 1980 to honor women who have made fundamental and sustained contributions to the mathematical sciences. In April 2013 the lecture was renamed the AWM-AMS Noether Lecture and since 2015 has been jointly sponsored by AWM and AMS. This one-hour expository lecture is presented at the Joint Mathematics Meetings each January. Emmy Noether was one of the great mathematicians of her time, someone who worked and struggled for what she loved and believed in. Her life and work remain a tremendous inspiration.

The mathematicians who have given the Noether lectures in the past are: Jessie MacWilliams, Olga Taussky Todd, Julia Robinson, Cathleen Morawetz, Mary Ellen Rudin, Jane Cronin Scanlon, Yvonne Choquet-Bruhat, Joan Birman, Karen Uhlenbeck, Mary Wheeler, Bhama Srinivasan, Alexandra Bellow, Nancy Kopell, Linda Keen, Lesley Sibner, Olga Ladyzhenskaya, Judith Sally, Olga Oleinik, Linda Rothschild, Dusa McDuff, Krystyna Kuperberg, Margaret Wright, Sun-Yung Alice Chang, Lenore Blum, Jean Taylor, Svetlana Katok, Lai-Sang Young, Ingrid Daubechies, Karen Vogtmann, Audrey Terras, Fan Chung Graham, Carolyn Gordon, Susan Montgomery, Barbara Keyfitz, Raman Parimala, Georgia Benkart, Wen-Ching Winnie Li, Karen E. Smith, Lisa Jeffrey, Jill Pipher, Bryna Kra, Birgit Spohr, Marianna Csörnyei, and Laura DeMarco. The 2024 lecturer will be Anne Schilling.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be an additional letter of support. Nominations of members of underrepresented minorities are especially encouraged. The letter of nomination should include a one-page outline of the nominee's contribution to mathematics, giving four of her/their most important papers and other relevant information. A curriculum vitae of the candidates not to exceed three pages is also required. Nominations are to be submitted as ONE PDF file via MathPrograms.org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **September 15, 2023** and will be held active for a total of three years (two years beyond the initial nominations). If you have questions, phone 401-455-4042, email awm@awm-math.org or see the website <https://awm-math.org/awards/noether-lectures/>

find curves with arbitrarily high ranks. However, Wood and her collaborators predicted that there are a finite number of elliptic curves with rank greater than 21, making the set of ranks of elliptic curves over the rational numbers bounded.

In other work, Wood introduced new techniques to determine the behavior of sandpile groups (models of dynamical systems that self organize around a critical point) of random graphs. And her research on the Cohen-Lenstra heuristics (a set of conjectures about the distribution of class groups of quadratic number fields) has advanced understanding of the structure of these groups and for more general families of situations. Wood is revealing new properties of natural numbers that are relevant to other mathematical conjectures and theorems, thereby setting the stage for new discoveries in number theory in the future.

Biography: Melanie Matchett Wood received a BS (2003) from Duke University, a Certificate of Advanced

Study in Mathematics (2004) from the University of Cambridge, and a PhD (2009) from Princeton University. She was a researcher with the American Institute of Mathematics (2009–2017) and held faculty positions at Stanford University (2009–2011), the University of Wisconsin at Madison (2011–2019), and the University of California at Berkeley (2019–2020). In 2020, she became a professor at Harvard University and Radcliffe Alumnae Professor at the Radcliffe Institute for Advanced Study. Wood has published in a variety of leading journals, including *Inventiones Mathematicae*, *Journal of the American Mathematical Society*, *Duke Mathematical Journal*, and *Journal of the European Mathematical Society*.

In Melanie's Words: "Numbers and their properties are one of the most ancient and universal interests of humanity. Yet numbers hold more secrets that we are still working to reveal. Unlocking these mysteries requires new perspectives and often happens when we discover surprising connections between different parts of mathematics."

Ruth I. Michler Prize

The Association for Women in Mathematics invites applications for the Ruth I. Michler Memorial Prize.

A \$50,000 prize will be awarded to a woman, recently promoted to associate professor or the equivalent, for a semester of mathematical research without teaching obligations in the Mathematics Department of Cornell University.

A supplemental housing/subsistence stipend award of \$3,000 will be provided. Office space, library access, and computing facilities will be provided by Cornell.

The application deadline is October 1 for the award to be used during the 2024–25 academic year.



www.awm-math.org/michlerprize.html



Cornell University



Prairie Analysis Seminar

<https://www.math.ksu.edu/about/events/conference/pas/2023/>

The 19th Prairie Analysis Seminar will be held November 3–4, 2023, at Kansas State University, Manhattan, KS. This seminar is the latest in a sequence of yearly analysis meetings organized each fall by the departments of mathematics at Kansas State University and the University of Kansas. The goal is to provide an opportunity for scientific exchange and cooperation among analysts.

The Principal Lecturer is Ovidiu Savin (Columbia University), "Free boundary problems with interacting boundaries. The Invited Speakers are Donatella Danielli (Arizona State University), "Obstacle problems for fractional powers of the Laplacian" and Irina Mitrea (Temple University), "The Radon-Carleman Problem in Uniformly Rectifiable Domains."

There will be time allocated for short contributed talks and partial financial support will be available. In both cases, priority will be given to graduate students, postdocs and those in early stages of their careers. Register by **September 15, 2023**, for full consideration.

The Seminar is held in cooperation with the Association for Women in Mathematics (AWM) and supports the Statements on Diversity, Inclusion and Welcoming Environment of the AWM.

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- **Postdoctoral Fellowships:** Apply by Nov. 15

For details of funding and support, visit website.

msri.org/apply

2024 ADJOINT WORKSHOP

June 24 – July 5, 2024

SLMath, formerly MSRI, invites applications for the **2024 African Diaspora Joint Mathematics Workshop** taking place in Berkeley, California.

ADJOINT is designed to provide opportunities for in-person collaboration to U.S. mathematical and statistical scientists, especially those from the African Diaspora, who will work in small groups with distinguished African-American research leaders on topics at the forefront of mathematical and statistical research.

Full details of eligibility, applications, deadlines, funding and support, and 2024 research leaders and topics will be posted in September 2023. Applications are expected to open via MathPrograms.org beginning in October 2023. Questions: coord@slmath.org.

mathprograms.org/db/MSRI

PROGRAM ELIGIBILITY

Applicants must be a US citizen or permanent resident, possess a PhD in the mathematical sciences or statistics, and be employed at a U.S. institution.

msri.org/adjoint



SLMath strives to include a diverse community of mathematicians in its programs. Women, gender-expansive individuals, minorities, and recent PhDs are encouraged to apply. MSRI, now SLMATH, has been supported since its origins by the National Science Foundation, joined by the National Security Agency, over 100 Academic Sponsor departments, a range of private foundations, and generous and farsighted individuals.

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American Institute of Mathematics



The American Institute of Mathematics (AIM), at its new home on the campus of Caltech in Pasadena, California, sponsors activities in all areas of the mathematical sciences with an emphasis on focused collaborative research.

Call for Proposals

Workshop Program

AIM invites proposals for its focused workshop program, both in-person and online. AIM workshops are characterized by their specific mathematical goals. This may involve making progress on a significant unsolved problem or examining the convergence of two distinct areas of mathematics. Workshops are small in size, up to 28 people, to allow for close collaboration among the participants.

SQuaREs Program

AIM also invites proposals for the SQuaREs program: Structured Quartet Research Ensembles. This program brings together groups of four to six researchers for a week of focused work on a specific research problem with the opportunity to return for additional meetings in consecutive years.

Research Communities Program

AIM is excited to invite proposals for its new Research Communities program. Intended for larger collaborative efforts of 40+ researchers in a virtual setting, these communities receive access to a dedicated online platform with integrated tools to support long-term research collaboration.

More details are available at:

<http://www.aimath.org/research/>
deadline: November 1

AIM seeks to promote diversity in the mathematics research community. We encourage proposals which include significant participation of women, underrepresented minorities, junior scientists, and researchers from primarily undergraduate institutions.

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School of Mathematics

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With generous support from the National Science Foundation, the IAS School of Mathematics selects approximately 85 Members per year. The School welcomes applications from mathematicians and theoretical computer scientists at all career levels, and strongly encourages applications from underrepresented groups and mid-career scientists (6-15 years from Ph.D.). Competitive salaries, on-campus housing, and other resources are available for researchers in all



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Deadline is December 1, 2023.

PROGRAMS

Women and Mathematics

ias.edu/math/wam

Minerva Research Program

ias.edu/math/activities/programs/minerva-research-program

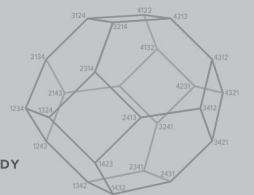
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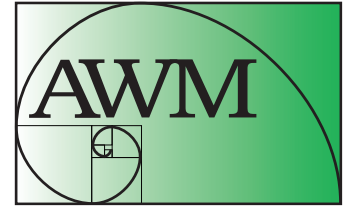
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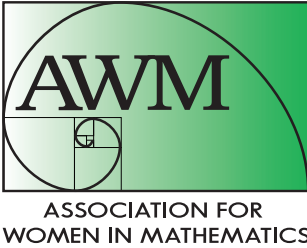
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