



ASSOCIATION FOR  
WOMEN IN MATHEMATICS

# Newsletter

VOLUME 52, NO. 1 • JANUARY–FEBRUARY 2022

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

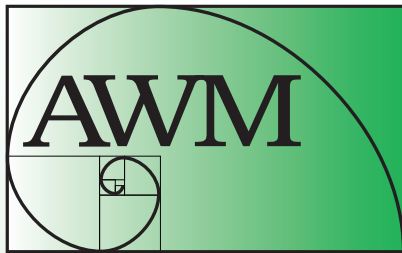
By the time you read this, we will have experienced the new JMM format and seen how the return to in-person meetings has played out. For now, I will say that I am very excited to see all you vaccinated and masked math people in person again, and I appreciate the work being done to provide us with vaccine passports. At the same time that I see the value in online meetings for people with various travel challenges, for global warming issues, and for reducing the life disruption of travel, I just don't like attending them. At all. So I am ready to rejoin the crush of mathematicians that JMM usually is. Here we come, Seattle! JMM will also have implemented its first instance of MathSafe, a program for addressing harassment at conferences. Several representatives from the Level A JMM partners, including several AWM folks, completed trainings in November on bystander intervention, survivor support, and how to handle reported incidents of harassment. I am extremely relieved to see this long overdue structure introduced.

By the time you read this, we will also be accepting registration for another in-person meeting, the AWM Research Symposium, to be held June 16–19 in Minneapolis, MN and hosted by IMA and the University of Minnesota (see <https://awm-math.org/meetings/awm-research-symposium/>). We will have plenary talks by senior mathematicians and emerging scholars, panels, special sessions, poster sessions and multiple receptions including a belated 50th birthday bash for AWM. I'll have more details in my next report. We hope to see you there!

**AWM mission statement:** The academic community is coming to terms culturally with the non-binary nature of gender, even as binary thinking typically defines our day-to-day experiences in the world, and even as women continue to be the marginalized gender within that binary. AWM, as a gender-based organization, wants to continue to support women and girls in their mathematical journeys but also to expand its scope to include a more comprehensive view of gender and gender identity. As a result, the AWM Executive Committee has unanimously approved a revised mission statement:

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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## 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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Alice Silverberg, Media Column

## PRESIDENT'S REPORT *continued from page 1*

This change in mission is currently aspirational—we recognize that we have substantial work to do as an organization to meet those expanded goals. But we are committed to that work and look forward to building a broader coalition and a more inclusive community. We are particularly thankful to organizations like Spectra and to specific individuals who have provided insight and input into these issues for AWM and the mathematical sciences more broadly.

**Institut des Hautes Études Scientifiques (IHES):** IHES was founded in 1958 on the outskirts of Paris as a kind of sibling institute to IAS in the US. This year, IHES hired its first woman permanent professor, Laure Saint-Raymond. IHES reached out to AWM earlier this year for ideas about how to improve its gender balance. I'll discuss two of the ideas that IHES adopted. The first was to highlight AWM and our 50th anniversary at its fundraising gala in Manhattan in mid-November. Emille Lawrence, chair of the 50th Anniversary Committee (among other roles), and I attended the event, which was emceed by Gioia De Cari and included a presentation of the French Legion of Honor to Marilyn Simons for the mathematical philanthropy of the Simons Foundation. The second idea was to host a Research Collaboration Conference for Women (RCCW) from a new or existing AWM Research Network at IHES. The institute will set aside some of the funds raised at the gala to support an RCCW. I visited IHES in early October and can vouch for the beauty of its setting and its facilities. Keep an eye out for information about the RCCW opportunity—or just apply to be a visitor!

**AWM's 50th anniversary year ends:** A tremendous amount of planning for AWM's 50th anniversary was set aside due to the pandemic. Despite that, the broader AWM community put on an impressive set of celebratory events, ranging from organizing day-long events at individual institutions, to special sessions at the major math conferences, to the internationally attended *We Speak* series, to publishing the first two articles in AWM's new journal, *La Matematica*. Some of these events are listed on our webpage: <https://awm-math.org/50th-anniversary/>. In addition, the MAA Board of Directors made a substantial donation to AWM to support the Mary and Alfe Gray Award for Social Justice in honor of AWM's 50th anniversary. Thank you, MAA!

We are tremendously grateful to all of you who helped us celebrate this big birthday, with special thanks to AWM's 50th Anniversary Committee: Georgia Benkart, Malena Español, Magdalena Luca, Mirjeta Pasha, Lauren Rose, and Emille Lawrence (chair). And thank you to everyone who has contributed ideas, time, and funds over the past 50 years to make AWM an organization to celebrate!

**More award announcements:** I end my report by congratulating those honored by our most recent collection of recognitions. Please join me in being inspired by so many women doing amazing work in our mathematical community.

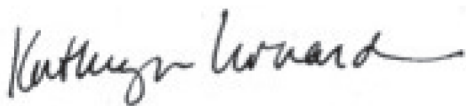
The 2022 class of AWM Fellows is Carme Calderer, Debra Carney, Daniela Ferrero, Pamela Harris, Anita Layton, Teri Perl, Jennifer Quinn, Beatrice Riviere, Lauren Rose, Mary Beth Ruskai, Renate Scheidler, Bianca Viray, and Elizabeth Yanik. If you know someone you believe should be on this list but is not, mark your calendar now to nominate them next year during the application period, April 1–May 15.

The Dissertation Prize recipients, recognized for outstanding dissertation work, are Jinyoung Park (Stanford University), Rita Teixeira da Costa (Princeton

University), and Heather Wilber (Oden Institute, UT Austin). If you know someone who has an excellent dissertation, consider nominating them by October 1.

The winner of the Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman is (Carina) Letong Hong (MIT), and the runner-up is Faye Jackson (University of Michigan). Honorable mention recognition goes to Alexandra Hoey (MIT), Simran Khunger (Carnegie Mellon) and Lily (Qiao) Li (UC Berkeley). Nominations for the Schafer Prize are due October 1.

M. Helena Noronha, California State University Northridge, has been awarded the Humphreys Award for her outstanding mentoring of undergraduate women in mathematics, and for her creation of programs and pathways for those underrepresented in mathematics to excel and thrive in the profession. Consider nominating someone making noteworthy contributions as a mentor by May 15.



Kathryn Leonard  
November 24, 2021  
South Pasadena, CA



Kathryn Leonard

## PRESIDENT'S REFLECTIONS

*Column Editors: Janet Beery, University of Redlands; Francesca Bernardi, Worcester Polytechnic Institute; Kayla M. Bicol, Sysco; Eva Brayfindley, Pacific Northwest National Laboratory; Cathy Kessel, consultant*

This is the nineteenth in a series of “Presidents’ Reflections,” articles by past presidents of the AWM that are intended to help us take stock of where we are and where we should be going, and to consider what we want the organization to be at its 50th anniversary. This article is a shorter version of “AWM and the genius of women: Reflections by AWM’s 22nd president” which will appear in *Fifty Years of Women in Mathematics: Reminiscences, History, and Visions for the Future of AWM*. As always, the *AWM Newsletter* welcomes your suggestions and comments in letters to the editor.

Kristin Lauter was the twenty-second president of AWM (2015–2017). For more about Lauter, see [https://en.wikipedia.org/wiki/Kristin\\_Lauter](https://en.wikipedia.org/wiki/Kristin_Lauter)

## AWM and the Genius of Women, Or: The Genius of AWM

*Kristin Lauter*

Genius is “where extraordinary talent meets celebrity,” writes Janice Kaplan in her recent book, *The Genius of Women*. Unfortunately, the “genius” notion creates a vicious cycle for women in any field where “genius” is a prerequisite for  
*continued on page 4*

### Membership Dues

*Membership runs from Oct. 1 to Sept. 30*

**Individual:** \$70 **Contributing:** \$160

**Family, new member, and reciprocal (first two years):** \$35

**Affiliate, retired, part-time:** \$30

**Student, unemployed:** \$20

**Outreach:** \$10

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

### Institutional Membership Levels

**Category 1:** \$325

**Category 2:** \$325

**Category 3:** \$200

**Sponsoring:** \$3000+

See [awm-math.org](http://awm-math.org) for details on free ads, free student memberships, and sponsorships.

### Executive Sponsorship Levels

\$500+

\$2500–\$4999

\$1000–\$2499

### 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.

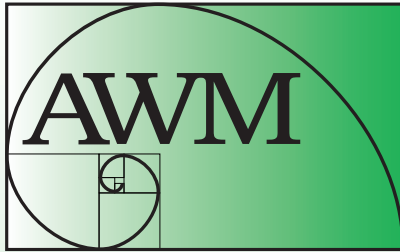
### Newsletter Deadlines

**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.

### Addresses

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

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## AWM DEADLINES

AWM Essay Contest: February 1, 2022

RCCW Proposals: February 1, 2022

AWM Mentoring Travel Grants:  
February 15, 2022

AWM Travel Grants:  
February 15 and May 15, 2022

Aligning Actions at Crossroads  
Workshop: March 15, 2022

AWM Research Symposium  
Poster Session: March 15, 2022

AWM-Birman Research Prize:  
May 15, 2022

AWM Fellows: May 15, 2022  
AWM Louise Hay Award:  
May 15, 2022

AWM M. Gwenyth Humphreys Award:  
May 15, 2022

AWM Student Chapter Awards:  
May 15, 2022

Mary and Alfie Gray Award for  
Social Justice: May 15, 2022

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## PRESIDENTS' REFLECTIONS *continued from page 3*

success: women are not perceived as geniuses because their work is not celebrated, and their work is not celebrated because they are not perceived as geniuses. Nowhere is this more true than in mathematics, the quintessential “genius” field, a field where the expectation of brilliance is inversely proportional to the participation of women.<sup>1</sup> The blogpost by mathematician and best-selling author Cathy O’Neil (aka mathbabe) summarizes the situation in math as follows:

[W]omen are discouraged to go into a field because that field is somehow reserved for “geniuses,” and women are rarely if ever bestowed with that label. Mathematics is definitely one of those fields; if you are exceptionally successful in mathematics, people call you a genius, and it’s pretty hard to be successful if people don’t think you’re a genius.<sup>2</sup>

In mathematics research, women have long been underrepresented and their contributions undercelebrated. But “celebrity” inherently involves community, a collection of people where news is spread. My own experience in the research mathematics community after graduate school led me to believe that indeed the “genius of women” in mathematics is severely undercelebrated, but that to fix that problem, we needed to *build community* for women in research, and to work together on *advocacy and recognition*.

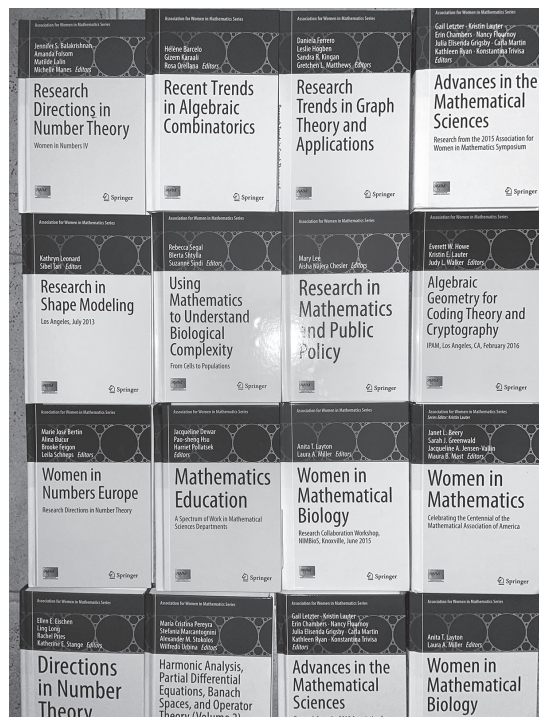
This belief led me into the leadership of the AWM to start (with Ruth Charney, Magnhild Lien, and Kathryn Leonard) the AWM ADVANCE program of research networks for women. My experience co-founding WIN, the research network for women in number theory, in 2006 with Rachel Pries and Renate Scheidler,<sup>3</sup> was the inspiration for spreading this model to other areas of mathematics. I was president of AWM from 2015 to 2017, and in 2015 AWM was awarded a five-year NSF ADVANCE grant to support research networks for women. We now have around 25 research networks for women in different areas of mathematics. As part of that initiative, we launched the AWM Springer series to publish volumes of research articles from the AWM research networks. The AWM Springer series also publishes volumes celebrating AWM events, collaborations, and milestones, such as the 50th anniversary volume (see pp. 22–23), history and education volumes, and the AWM research symposia volumes.

The AWM ADVANCE networks have, in effect, created a *community* of women in many areas of mathematics who are empowered to work on behalf of themselves and other women to change the system through proactively promoting each other’s work in a way which benefits everyone’s careers. During my term as president, I also worked to start an *advocacy* program: the AWM Hill visits to advocate for women and girls in mathematics on Capitol Hill. To increase *recognition* of women and their work in mathematics, I supported the launch of numerous new

<sup>1</sup> As documented for example in the study “Expectations of brilliance underlie gender distributions across academic disciplines,” Sarah-Jane Leslie, Andrei Cimpian, Meredith Meyer, and Edward Freeland, *Science* 347 (6219), 262–265. <https://www.sciencemag.org/news/2015/01/belief-some-fields-require-brilliance-may-keep-women-out>.

<sup>2</sup> <https://mathbabe.org/2015/01/16/representation-of-women-and-the-genius-myth/>

<sup>3</sup> <http://womeninnumbertheory.org/>



AWM Springer Series volumes

AWM awards during my term, such as the fellows program, the presidential award, the dissertation prizes, and the student chapter awards. The trifecta of community, advocacy, and recognition that AWM provides for women and girls in math is what I call the “Genius of AWM.”

I am thrilled that our fellows program gives a way to recognize all the hard work and leadership to support women in math. Many of our other prizes and awards are aimed at the early career stage: the dissertation prizes, the research prizes, student chapter awards, and poster prizes at workshops. The AWM fellows program recognizes sustained commitment to advancing women in mathematics. Part of the “Genius of Women” is helping each other: the designation of “Fellow” gives us a way to recognize and assign value to that work!

I benefited tremendously from AWM support early in my career. When I was on the job market, I was funded to attend the Joint Mathematics Meetings as a participant in the AWM workshop. As a Hildebrandt Assistant Professor at the University of Michigan, I received an AWM mentoring grant to work with Jean-Pierre Serre at the Collège de France in Paris for a month. I published two research articles, each with an appendix by Serre, in the *Journal of Algebraic Geometry* and *Compositio Mathematica*. This collaboration helped advance my research and my confidence. Serre has written letters of recommendation for me throughout my

career, which helped me obtain job offers, including my position at Microsoft Research.

While I was AWM president, I volunteered approximately 20 hours per week for AWM, on top of my full-time job in industry as a Principal Researcher and Research Manager of the Cryptography Group at Microsoft Research. I was one of the few AWM presidents from the high-tech industry, and there was no “release time” or staff support granted to me by my employer. In addition, my twin daughters were teenagers at that time. My husband took on a greater share of family responsibilities to enable my extra work and travel. Despite all these challenges, my four years as president-elect, president, and past president were the most invigorating and inspiring four years of my career. I had so many ideas for creating community and recognition for women in mathematics, and I could not bear the thought of missing my chance to launch them.

I have spent a large part of my career in the high-tech industry as “the only woman in the room” in most leadership team meetings. The technical workforce in the high-tech industry is about 10–15% women, even in the year 2021. When you are in a 10% minority, normal interactions are distorted, and hidden biases are at play. I often felt early on in such meetings in industry that I was irrelevant to the conversation, I had no opportunity to speak, I had nothing to say that anyone would listen to, or if I did finally speak, that my voice was not heard.

In contrast, my four years in the leadership of AWM were a breath of fresh air, offering the chance to launch

*continued on page 6*



Meeting with Congresswoman Eddie Bernice Johnson on the first AWM Capitol Hill Visit, 2015

many new programs and prizes to support, recognize, and advance women and girls in mathematics and to work together with women around the world. I was floored by an outpouring of energy and excitement from young women mathematicians who felt empowered by the support and opportunities AWM provided and immediately offered their time and commitment to help build these programs. This was particularly true in the research networks for women initiative.

Ironically, while I was trying to give back to the community and pay forward the support I had received early in my career, I ended up getting so much more than I gave, in terms of energy, motivation, and social capital. In addition, the confidence and leadership skills I acquired as AWM president helped me advance my career in industry, where I now lead the West Coast AI Research Labs for Meta (formerly Facebook) in Seattle, Bay Area, and Pittsburgh.

My service to AWM and the math community had a profound impact on me and my leadership style. The experience helped me to find my voice, and I started to speak up clearly and forcefully in leadership team meetings even when I was the only woman in the room or in the 10% minority. I now feel empowered to speak on behalf of the cause of promoting and supporting women and other diverse and underrepresented groups. In fact, I feel a *responsibility* to speak on our behalf. And I find that when I do I often get a very positive response.

In February 2017, when I started my new life as a former president of AWM, it was bittersweet. Some might say it is crazy to take on an extra, roughly half-time, unpaid job for two years in addition to full-time research career, management, and family (yes, it is!), but serving as president of AWM was also absolutely the best (and most rewarding) thing I have done in my professional career (ok, maybe besides starting WIN with Rachel and Renate).

My primary goal going into my term as president was to build community and support for women in research mathematics, in all three sectors—industry, government, and academia—primarily through the research networks initiative modelled on WIN and to obtain support for it through the AWM NSF ADVANCE grant.<sup>4</sup> But along the way, I found myself inspired by other initiatives to help students and girls to advance, and became a devotee of the AWM mission “to advance women *and girls* in the mathematical sciences.” It was an amazing journey and now



*Working with J.-P. Serre in a Parisian café supported by an AWM Mentoring grant in 1999. Drawing by E. Bombieri*

I am proud to look back at the many things we learned and accomplished together.

Looking forward, it is still my mission to transform our society by training and advancing women leaders in science, industry, and government, to achieve 50% representation. Imagine a world where women are represented 50/50 in the Senate and House, the White House, the leadership of major corporations, and all levels of government. Imagine how women could lead society through change by improving science communication and engaging the public in discussing and implementing policy change to solve important societal



*At the 2015 AWM Research Symposium banquet with first AWM Presidential Award winner Sylvia Bozeman and Keynote Speaker Shirley Malcom, former and future AWM Presidents Jill Pipher, Ruth Charney, and Talitha Washington [Rear: SB, KL, JP; Front: TW, SM, RC]*

<sup>4</sup><https://awmadvance.org/>

problems. Imagine that every leadership meeting includes 50% women, with women empowered to offer and discuss ideas in equal measure to men.

So in conclusion, I believe that “the Genius of AWM” is one part building community for women and other marginalized groups in the profession, one part changing the structures that hold women back through advocacy, and one part recognizing and celebrating “The Genius of

Women” in mathematics! Clearly, we need to continue our work in all these directions!

Read a more detailed history on the founding of WIN, the AWM ADVANCE research networks for women, the AWM Springer series, Hill visits, and awards in my article in the AWM 50th Anniversary volume in the AWM Springer series. Happy 50th Anniversary to the AWM!



*2016 AWM Capitol Hill Visit*



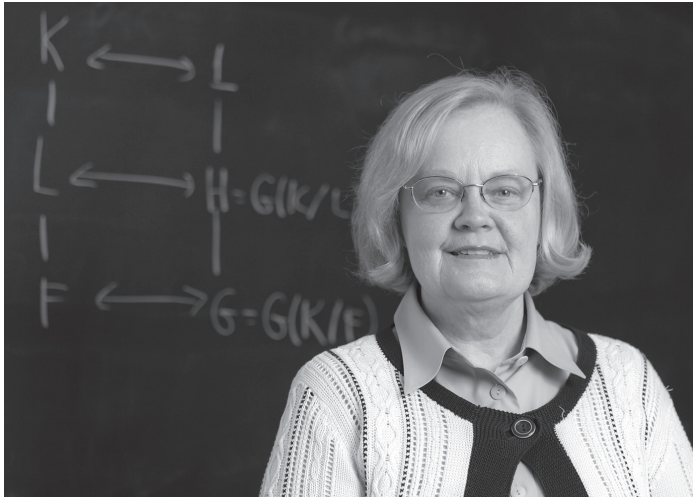
*2015 University of Maryland AWM Symposium group photo*



*2014 WIN3 conference photo at Banff International Research Station*

## 2022 AWM Service Awards

In 2012, AWM established the AWM Service Award to recognize individuals for helping to promote and support women in mathematics through exceptional voluntary service to the Association for Women in Mathematics, a nonprofit organization that depends largely on the work of its volunteer members. This year, we honor Ellen Kirkman and the EvenQuads committee.



Ellen Kirkman

**Ellen Kirkman** is recognized for her eight years of service (2012–2020) as AWM Treasurer and Chair of the Financial Oversight and Investment Committee, for her service on the Membership Portfolio Committee, and for her role

as an organizer and a research leader in the WINART (Women in Noncommutative Algebra and Representation Theory) Research Network.

As AWM Treasurer, Ellen made dramatic improvements in the budget process and was integral in developing and implementing an Investment Policy for AWM. She adhered to this Policy by rebalancing accounts annually to match investment goals. Ellen worked closely with the fiscal teams at both the former and current management companies to ensure that the quarterly financial reports provided were accurate and received in a timely manner. In 2017, her efforts were instrumental in reestablishing AWM's nonprofit status. For eight years (and beyond), Ellen worked tirelessly to provide AWM with conservative stewardship, allowing the Association to continue with a sound financial footing as we move into the next 50 years. Ellen also served on the Membership Portfolio Committee during the same time period. She closely monitored membership data of both individuals and institutions, another vital contribution towards sustaining the AWM.

An active member of the WINART Research Network, Ellen helped organize the special session “New Developments in Noncommutative Algebra & Representation Theory” at the 2017 Joint Mathematics Meetings and the WINART2 workshop at Leeds in 2019. WINART now connects more than 120 mathematicians. The main purpose of the WINART2 workshop was to bring together women and non-binary people to do research in various subfields of noncommutative algebra and in representation theory. This workshop was organized around eight research groups

### 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/awm-grants/travel-grants/>) for details on eligibility and do not hesitate to contact [awm@awm-math.org](mailto: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.**



consisting of four to six participants, each led by two research leaders. A variety of research topics were presented at the workshop; groups were formed several months before the workshop so that participants could prepare and also share ideas for projects.

Ellen has also served the broader mathematical community as a member of The Sylvia Bozeman and Rhonda Hughes EDGE Foundation Board of Directors, the AMS-ASA-MAA-IMS-SIAM Data Committee (2000–2007 and 2009–present), and coauthor of the CBMS 2010 and the CBMS 2015 surveys, *Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States*.

The AWM is grateful for Ellen’s service in these leadership roles, which are so vital to the long-term health of the Association. Congratulations, Ellen!

*Response from Kirkman:* I am honored to receive the 2022 AWM Service Award. I appreciate the help and support of the five awesome AWM presidents I served under: Jill Pipher, Ruth Charney, Kristin Lauter, Ami Radunskaya, and Ruth Haas, all of whom were extremely helpful as AWM worked to improve its financial position. I am also grateful to Marie Vitulli, Magnhild Lien, and Karoline Pershell, who served on the Financial Management Committee and contributed their astute expertise and advice. Finally, I want to thank Executive Committee members and other AWM members, who worked to provide the AWM with high quality programs and management, so that the AWM can attract members and financial support to continue its important role in the mathematical sciences community. Many thanks for this award!



The EvenQuads PMC

The **Notable Women in Math Playing Cards Project Management Committee (EvenQuads PMC)** is being honored for their collective service. The committee members are Sarah-Marie Belcastro (Chair), Sherli Koshy-Chenthittayil, Linda McGuire, Monica Morales Hernandez, Denise A. Rangel Tracy, and Oscar Vega.

The Notable Women in Math Playing Cards, also known as EvenQuads, is a project inspired by the Notable Women in Computing Playing Cards. The EvenQuads PMC is being honored for their role, via this novel and elegant project, in promoting women’s accomplishments in mathematics for the purpose of inspiring and encouraging future generations of mathematicians. With a little guidance from the initial proposers and a criteria committee, the Evenquads PMC took a seed of inspiration and turned it into amazing success in just under two years. The project, which currently enlists around 200 volunteers, began by compiling a list of 1400 mathematicians and seeking nominations from the community. Biographic and professional information was collected on these nominees, and at least two volunteers reviewed each nominee using a rubric, the results of which determined inclusion in the first deck of 64. Several new games were created, including the popular EvenQuads, and artists were called upon to illustrate the women whose biographies are featured on the playing cards. The volunteer list includes game creators, data collectors, reviewers, biographers, artists, a fact checker, and a statistician. A Kickstarter campaign to print the decks was launched in October of 2020 with a goal of \$3000. The campaign, in just six weeks, earned 414 backers pledging over \$17,000! Some pledges were for deck donations to secondary educators mainly from underserved schools. There was enough post-Kickstarter demand that the first shipment of EvenQuads Limited Edition decks that arrived at the AWM online store sold in a matter of hours.

These decks are the first of their kind, combining multifaceted text about women who have contributed to mathematics in many different ways with beautiful graphic design that evokes multiple professional mathematics organizations. The cards are dual educational resources, spreading mathematical concepts and exercising abstract thinking through the EvenQuads game and variants while also informing players about women mathematicians. Beyond this, the physical decks are supported by a website with full biographies augmented by stories told by the honorees.

Every member of the EvenQuads PMC is passionate, dedicated, and committed to this very complex project. Individual members were responsible for executing certain

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aspects such as logistics and planning, a Kickstarter campaign, webpage coding, editing text, translation of text into Spanish, and management of collections of volunteers. The members are described as being supportive of each other through the personal and professional challenges that arose with the COVID-19 pandemic, and through challenges to the project itself. The success of the project is attributed to the remarkable and true collaboration—built on consensus, flexibility and respect—that became the EvenQuads Project Management Committee. The entire mathematical sciences community benefits from this project, especially the AWM.

*Response from the Committee:* We are thrilled to receive an AWM Service Award for our work on the ongoing EvenQuads project. Even with only the first phase complete, we are pleased to have created a lasting contribution to the AWM and the larger mathematical community. It has also been a pleasure for us to work together, forging friendships

as we reach consensus. We have extensively debriefed our work on the first deck, discussed all feedback received, and made adjustments to streamline and improve the processes for the next three decks. Together, the set of four decks can be used for a 256-card EvenQuads game (and any two of the decks can be used for a 128-card game! Just you wait!). Finally, while we collectively direct the project, a great deal of work has been and will be done by many many additional volunteers. In addition to the aspects listed in the citation, some volunteers have assisted by doing statistics on the reviewing data, drawing multiple portraits of selected women, fact checking biographical information, consulting on marketing, creating photos and videos, liaising with other professional organizations, and dealing with production companies. We are grateful to all the volunteers for responding to our requests for assistance; the EvenQuads decks would not exist without them. Want to be one of these volunteers? Contact the committee at [playingcards@awm-math.org](mailto:playingcards@awm-math.org).

## The 2022 AWM Research Symposium Poster Session

AWM invites graduate students and recent PhD recipients to give a poster presentation at the 2022 AWM Research Symposium at University of Minnesota on June 16–19, 2022. This meeting will also feature 3 plenary talks, 3 emerging talent lectures, over 30 special sessions on a wide range of topics in the mathematical sciences, panels of broad interest, a banquet, and opportunities for discussion and networking.

**Open to:** Graduate students and recent PhD recipients in the mathematical sciences

**Funding:** AWM has funding provided by the National Security Agency (NSA) and the National Science Foundation to offer partial support for graduate students selected to present posters.

**Eligibility:** Applications are welcome from women and nonbinary mathematicians who have received their PhDs within approximately the last five years or who are graduate students who have made substantial progress on their doctoral thesis.

**Applications:** The deadline is **March 15, 2022**. Applications should be submitted at [MathPrograms.org](https://www.mathprograms.org): <https://www.mathprograms.org/db/programs/1195>.

All applications should include:

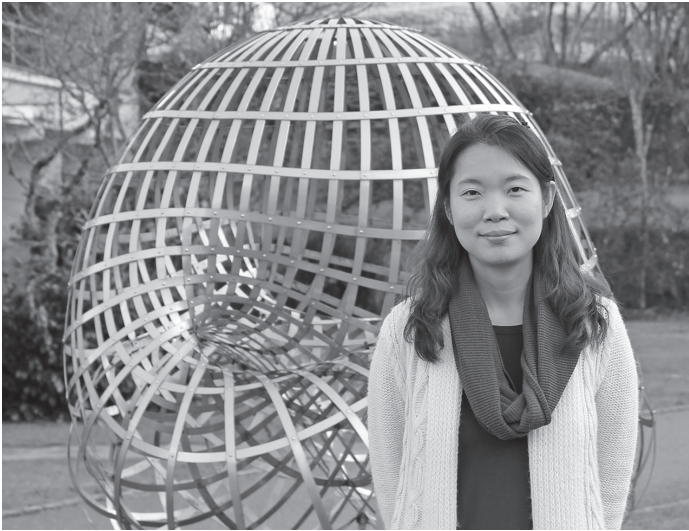
- Cover letter
- Curriculum vitae
- Title and abstract (no more than 1 or 2 paragraphs)
- A \*brief\* letter of recommendation from a faculty member or research mathematician who knows the applicant's research. In particular, a graduate student should have a letter of recommendation from their thesis advisor.

Late applications and/or recommendation letters cannot be accepted. Decisions on applications are expected to be made by April 30, 2022.

## 2022 AWM Dissertation Prizes

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 award is intended to be based entirely on the dissertation itself, not on other work of the individual.

**Jinyoung Park, Rita Teixeira da Costa and Heather Denise Wilber** will be presented with 2022 AWM Dissertation Prizes at the Joint Prize Session at the 2022 JMM in Seattle, Washington.



Jinyoung Park

**Jinyoung Park's** 2020 dissertation, written at Rutgers University under the supervision of Jeff Kahn, is comprised of five papers, published in: *Annals of Mathematics*, *Combinatorica* (in press), *Proceedings of the American Mathematical Society*, *Electronic Journal of Combinatorics*, and *Israel Journal of Mathematics*. The work settles major conjectures and runs the gamut from isoperimetric inequalities to random discrete structures. The results are deemed “spectacular” and her innovative techniques “groundbreaking” by expert letters supporting the nomination. In fact, the proof of the Talagrand conjecture (which had generated a great amount of work since being stated in 2010) “easily implies some of the most celebrated—and notoriously difficult—results in the subject” and allowed the solutions of problems “on which earlier (ingenious, difficult) work had made only

limited progress.” The result on isoperimetry in the cube “gives unexpected, simple proofs” of known facts that had been established by renowned researchers. It is also noted that Park’s outstanding achievements follow a career as a middle and high school teacher in the Republic of Korea. She is now a Szegö Assistant Professor at Stanford University.

*Response from Park:* I am thrilled and honored to receive the AWM Dissertation Award. I would like to express my deepest gratitude to my advisor Jeff Kahn for his years of guidance and support. I am also grateful to Bhargav Narayanan for his mentorship and support. I would like to thank Keith Frankston, whom I collaborated with for some of the work in my dissertation, for stimulating discussions. I was lucky to be surrounded by the friendly environment at Rutgers University math department. Finally, I would like to thank my husband and my daughter for their love and support.

**Rita Teixeira da Costa** received her PhD in 2021 at the University of Cambridge under the supervision of Mihalis Dafermos. She is now an NSF Postdoctoral Fellow at Princeton and a Junior Research Fellow at Trinity College in Cambridge.

Teixeira da Costa’s research is focused on differential equations arising in general relativity. Her work represents important rigorous mathematical progress on the celebrated black hole stability problem, a central question in the subject, at the intersection of mathematics, theoretical physics, and astronomy. Her thesis titled “Frequency space analysis in General Relativity” contains four major results, full of original ideas introducing new techniques to the problems.

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Rita Teixeira da Costa

## 2022 AWM DISSERTATION PRIZE

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According to the expert letter writers “Rita’s thesis is an outstanding piece of work that resolves a major problem in the field of general relativity.” Moreover, they praise her presentation and explanation as demonstrating that “besides a complete command of the mathematical techniques involved, Rita has a strong talent to make her work accessible and spends a lot of time thinking about the best way to present an argument.”

*Response from Teixeira da Costa:* I am very honored and happy to receive the AWM Dissertation Prize, and I would like to thank the AWM for providing this great opportunity to young academics like me. I am also very grateful to those who nominated me for this award, and who have supported my academic career in the past four years. I would like to especially thank my advisor, Mihalis Dafermos. Mihalis introduced me to the fascinating world of PDEs and general relativity, and he has an outstanding talent to create a positive, stimulating environment around him and his students. I am also grateful to the University of Cambridge and Trinity College for their support over my masters and PhD studies, and to Princeton University for its hospitality during several research visits.

**Heather Denise Wilber** received her PhD in 2021 at Cornell University under the direction of Professor Alex Townsend. She is currently an NSF postdoctoral fellow at the Oden Institute, University of Texas at Austin.

Wilber’s interests include approximation theory, numerical linear algebra, and scientific computing. In her beautifully written dissertation titled “Computing numerically with rational functions,” Wilber presents new numerical methods using rational functions for solving Sylvester and Lyapunov matrix equations whose right-hand sides have decaying singular values. She brings a tremendous breadth of mathematics together to do this, combining rational approximation theory in the complex plane, including associated conformal mapping problems, and numerical linear algebra, focusing on the important and hot topic of low-rank approximation. In addition, the thesis develops a rational approximation framework for adaptive computing in the context of signal processing.

As one letter writer noted, “Chapter 4 makes a very impressive contribution, a new solver for linear systems



*Heather Denise Wilbur*

with Toeplitz structure.... With deep insights from rational approximation and other tools, Wilber has found a completely novel, deterministic construction that offers the potential to outperform randomized algorithms.” Fittingly, this work has resulted in multiple papers in scientific journals. They include the *SIAM Journal of Scientific Computing*, *Linear Algebra and its Applications*, and *Constructive Approximation* (to appear).

*Response from Wilber:* I am deeply honored to have received the AWM Dissertation Award. I thank those who nominated me and supported my nomination with their letters. I am grateful to the many mentors and collaborators that I worked with during my time as a graduate student, including Nick Trefethen, Daniel Kressner, Bernhard Beckermann, Grady Wright, Anil Damle, Daniel Rubin, and my advisor Alex Townsend. I also thank the Cornell Center for Applied Mathematics. Their commitment to the support of women in scholarship has been especially instrumental to my success. The future of mathematics is shaped by the institutions that nurture it, and the mathematics community at Cornell has inspired in me a broad, inviting, and invigorating vision of that future.

**Renew your membership at [awm-math.org](http://awm-math.org).**

## 2022 AWM Schafer Prizes

In 1990, the Executive Committee of the AWM established the annual Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman. The prize is named for Alice T. Schafer (1915–2009), one of the founders of AWM and its second president, who contributed greatly to women in mathematics throughout her career.

The prize winner (**Carina**) **Letong Hong** is a junior mathematics and physics major at the Massachusetts Institute of Technology. She has contributed to REUs at the University of Minnesota-Duluth and the University of Virginia in addition to research projects at MIT and the Budapest Semesters in Mathematics, leading to three articles accepted for publication and numerous others submitted or in preparation. She has already taken extensive graduate mathematics courses, receiving the highest possible grades in each, and plans to graduate in Spring 2022 after three years at MIT.



(Carina) Letong Hong

Hong already has an impressive track record of completed research in many areas, including stack-sorting algorithms, pattern avoidance in inversion sequences, the Monstrous Moonshine Conjecture, L-functions of modular elliptic curves and K3 surfaces, and Markov chains on edge colorings of bipartite graphs; Hong's research addressed open questions posed by top mathematicians in their respective fields. Her mentors describe her as "headed to be a

superstar in mathematical research," "driven and overflowing with enthusiasm," and "extraordinarily active on both the research side and the broader community-building side." Hong recently received the Emerging Leader Award and Community Building Award at MIT, where she is the President of the Undergraduate Mathematics Association and the Advocacy and Outreach Chair of the First Generation and Low Income Students Coalition.

*Response from Hong:* It is an honor to have been selected as the recipient of the 2022 Alice T. Schafer Prize and I would like to extend my deepest gratitude to the Association for Women in Mathematics for their efforts in supporting young women mathematicians.

My experience has been shaped by the intellectually challenging and engaging academic environment that the MIT Mathematics Department fosters. I am especially grateful to my nominator and advisor Professor Pavel Etingof for his tremendous kind help. I am thankful to Professors Scott Sheffield and Wei Zhang for their recommendation, teaching, and mentorship. I thank Professors Gigliola Staffilani and David Vogan for important conversations that solidify my intention to be an academic.

I am extremely thankful to Professor Ken Ono for helping me realize my potential. He pushes my growth as a researcher not only at the University of Virginia REU but throughout my undergraduate career. I am deeply grateful to Professor Joseph Gallian for his dedication over the years to make the University of Minnesota Duluth REU a warm, belonging, and supportive family; in my utopia I hope to prove many conjectures with this family.

Furthermore I would like to thank Professor Daniel Shapiro at the Ross Mathematics Program, Dr. Simon Rubinstein-Salzedo at the Stanford University Mathematics Camp, and Dr. István Miklós and faculties at the Budapest Semesters in Mathematics for stimulating my early sparks in advanced math.

Finally, I thank my family and especially my mother for their unconditional love.

Runner-up **Faye Jackson** is a mathematics major at the University of Michigan. She excels in course work, in research, and in community engagement both within her department and in the broader Ann Arbor and surrounding areas. Her mentors and professors describe her as enthusiastically engaged in the classroom and an eager, insightful learner. Her instructors consistently describe Jackson as a top-achieving student, even as an undergraduate in PhD-level courses, and as "dedicated and passionate ... a clear-thinking, creative, and effective problem solver." In addition to research at

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## 2022 AWM SCHAFER PRIZES

*continued from page 13*



*Faye Jackson*

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the Lab of Geometry at Michigan, she participated in the SMALL REU where she worked on research questions on four distinct projects (Zeckendorf decompositions, discrete Erdős distance problems, random matrix theory, and “More Sums Than Differences” sets) and is now a co-author on six papers. (Three already on the arXiv and three more to come!)

In addition to these exceptionally strong academic accomplishments, Jackson has been an essential and incredibly reliable presence in the outreach programs of the University of Michigan Mathematics Department. She has participated in Math Mondays in Ypsi, Super Saturdays, the Michigan Math Circle, and the new Math Corps in Ann Arbor. In class, research, and outreach she makes significant contributions that delight all of her mentors, and they also seriously appreciate her ability to make space for other people to contribute. With middle school and high school students this takes the form of working “well with students of all backgrounds, abilities and interests, and help[ing] make sure everyone was heard and had something to work on that fit their strengths.” With her peers this becomes sharing her ideas freely to help spark lively discussion.

*Response from Jackson:* I want to sincerely thank the Association for Women in Mathematics for selecting me as a runner-up for the Alice T. Schafer Prize. More directly, I

want to thank all of my mentors and professors—in particular Stephen DeBacker, Sarah Koch, Steven J. Miller, and Jenny Wilson—who have provided me with so many opportunities for learning new mathematics, research, and contributing to the mathematical community and who have given me so much advice. I also want to thank my co-researchers from the SMALL REU as well as my classmates at the University of Michigan who have been such amazing collaborators and friends. Many of my qualities which were specifically pointed out in the citation do not just come from me as an individual. Instead, they are the result of talented and caring mentors combined with a vibrant and accepting mathematical community at the University of Michigan as well as the SMALL REU. I hope to channel the renewed energy and confidence that winning this award brings me back into my work, into my students, and into my outreach. One of the great lessons that my mentors have taught me is that when you do well you should share that success—both through appropriate thanks and pouring energy into your peers, students, and yes even your mentors. My goal is not just to do great things mathematically and in outreach. I am not sure I am equipped to do either alone. However, I can enable those around me to do greater things together than I ever could.

Honorable mention recipient **Alexandra Hoey** is a mathematics major at MIT. She has participated in the MIT Summer Program in Undergraduate Research and spent two summers at the University of Virginia REU. Her summer research has focused on arithmetic statistics—an active area of research that is closely related to many famous conjectures in number theory. In her first summer



*Alexandra Hoey*

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she worked on a project on class numbers of imaginary quadratic fields. In the second summer she and collaborators proved a strong theorem about the Sato-Tate conjecture. This work has led to two papers—one of which will appear in *Transactions of the American Mathematical Society*. This work is of such strong interest that it served as an introduction to a current mentor who first encountered her through one of her arXiv preprints and then learned she was an undergraduate at his own institution.

In addition to her summer research and many challenging math classes, Hoey has taken four reading courses on advanced topics in number theory and arithmetic geometry. One of these reading courses involved a computational project whose results will be included in the L-functions and modular forms database. Hoey is also a talented mentor herself and has been engaged in outreach through the MIT PRIMES Circle where she worked with two high school girls on a semester-long project. Through this work she helped these students gain serious understanding of a demanding topic, write a beautiful exposition of their topic, learn to give a strong talk, and gain confidence.

*Response from Hoey:* Thank you to the AWM for supporting women in mathematics. I would like to thank everyone who helped me along my mathematical journey, especially Professor Ken Ono for guiding me through the mathematical research process, and Professors Ju-Lee Kim, Gigliola Staffilani, and Drew Sutherland for their guidance and support. I would also like to thank the PROMYS program for inspiring me to pursue math. Finally, thank you to my friends and family who have supported me every step of the way.

Honorable mention recipient **Simran Khunger** is a senior mathematics major at Carnegie Mellon University. She has contributed to REUs at Williams College and Oregon State University and held a research apprenticeship studying algebraic topology; these have resulted in one published article, one submitted article, and another in preparation, as well as an impressive number of presentations and posters.

Khunger has excelled in her coursework, completing numerous graduate-level courses in mathematics, the Arizona Winter School, and the Connecticut Summer School in Number Theory. One mentor predicts that she will “greatly contribute wherever she is, and help foster an environment where others are involved as well.” Others describe how, in many research groups, Khunger took charge and made sure that everyone had a problem that they could make progress on and were invested in. She then showed an impressive ability to convert this work into written results.



Simran Khunger

With her ability to quickly dive into technical material, to convert ideas into usable results, and her infectious enthusiasm, Khunger is expected to excel in all areas of the mathematics profession.

*Response from Khunger:* I am honored to be recognized by the AWM as an Alice Schafer Prize Honorable Mention. I am deeply grateful to Professor Holly Swisher for her undying support, encouragement, and mentorship in our research; to Professor Steven J. Miller for nurturing and furthering my pursuit of number theory through a wonderful project on L-functions; and to Professor Florian Frick for enthusiastically supporting me through my varied interests as I grew mathematically in my undergraduate career. I also thank my friends, namely Trajan Hammonds for his perpetual guidance and Vanessa Jiang for endlessly believing in me, the Canada/USA Mathcamp community for sustaining my love of math, and especially my mom, who was the one who started it all. Finally, thank you to the Carnegie Mellon math department, where I have grown tremendously in the last four years, as well as my friends and family.

Honorable mention recipient **Lily (Qiao) Li** is a mathematics and computer science major at UC Berkeley. She has participated in two summer REUs at Georgia Tech. Her research work from the first summer was on totally symmetric sets in groups and led to two papers, already accepted at *Geometriae Dedicata* and *Involve*. Based on work done in the second summer REU, she is currently working with one other student on a completely different topic in complex dynamics; their work was described by one of her mentors as “good enough to earn a PhD thesis” at a research

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## 2022 AWM SCHAFFER PRIZES

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university. In addition, Li was part of the knot theory research group at the SMALL REU at Williams College. There, her research led to an impressive three papers on hyperbolic knot complements, two of which have been submitted for publication. Li's research work has thus touched on a great breadth of advanced mathematical topics.

Li has also taken several graduate courses on topology, algebraic topology and Lie groups, and has taken reading courses on advanced mathematical topics almost every semester. Many of her mentors stressed how, in both research and coursework, she "helped to create a particularly collaborative environment which substantially furthered the research." Li has also been very engaged with the mathematical community, by organizing events for incoming students interested in the math major and serving as president of the math undergraduate student association. She also oversees an undergraduate lecture series in her department and has co-founded the Berkeley Integration Bee.

*Response from Li:* Thank you to the AWM for the amazing work supporting women in math. I'm thankful for Professor Dan Margalit and his generous mentorship throughout my undergraduate career. I'm grateful for Professor Colin Adams, whose infectious enthusiasm made



*Lily (Qiao) Li*

Zoom SMALL a wonderful experience. I'm also indebted to Professors Ian Agol, David Nadler, Alexander Paulin, and Dmitry Vaintrob at Berkeley for their instruction and advice, as well as to my classmates and research collaborators, especially Caleb Partin, for their constant encouragement. Thank you to Patrick Rybarczyk, Marcus Neal, and Yue Zheng, who first introduced me to mathematics as a joyful endeavor. Finally, I'm thankful for my family and their steadfast support.

## 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](mailto: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**.



## BOOK REVIEW

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

**Sophie Germain: Revolutionary Mathematician, Second Edition**, by Dora Musielak, Springer Biographies 2020, 254 pages. ISBN 978-3-030-38374-9

*Reviewer: Shanna Dobson, Shanna.Dobson@calstatela.edu*

The purpose of this second edition is to explain in more detail Sophie Germain's mathematical work, based on details newly extracted from her correspondence, and to showcase new translations of Germain's letters exchanged with Gauss. The second edition features a new Chapter 3 titled "Sophie's Sublime *Arithmetica*," which addresses Germain's work in quadratic reciprocity, a global reorganization of subjects, and a restructured Chapter 9 featuring a rewrite of the first edition's exposition of Germain's contributions to Fermat's Last Theorem.

The author aims to provide a truthful, societally contextual, and inspiring recount of Germain's life, mathematical prowess and persistence, and multi-dimensional academic isolation. The book is purposely non-conventional in its breadth, being neither a standard biography nor a mathematical study for specialists. Rather than resorting to apocryphal speculation, the author devotes the entire Chapter 13 titled "Unanswered Questions" to raising and leaving for further review inquiries regarding Lagrange becoming Germain's teacher and Germain's ability to learn mathematics while the *École Polytechnique* did not admit women students. The author exceptionally achieves her aim, while providing a respectful analysis of the "Revolutionary Mathematician" behind the pseudonym M. Le Blanc, through the epistolary window into Germain's correspondences.

The book begins by setting the dynamic and tumultuous social and political context of 1776 Paris within which Germain grew up. Germain's primary education and mathematics training remain unknown and the author provides a nice array of reasonable explanations for how and why she took such a deep interest in mathematics, "finding refuge in her father's library ... immersing herself in books to build a protective shield against the chaos outside her window." The author reveals that Germain both impersonated a man and studied on her own to study mathematics, after encountering the extraordinary ideas and sad death of Archimedes in Jean Montucla's *History of Mathematics*. The history of the *École Polytechnique* is then discussed replete

with anecdotes of Sophie obtaining the lecture notes of Lagrange's analysis courses, their correspondences through her pseudonym M. Le Blanc, and members of the Parisian Academy supporting Sophie's self-directed study, upon learning her true identity. Chapter 3 commences with a detailed examination of Sophie's correspondences with Gauss, the first of which took place November 21, 1804. Gauss replied to four out of the eight letters, commenting on Sophie's work and appreciating her result that "2 is quadratic residue or nonresidue of primes of certain form," while revealing a few of his own ideas. The chapter is populated with lengthy sections on introductory number theory and analysis. Sophie's request for the protection of Gauss during the Napoleonic invasion eventuated in her revealing her true identity and explaining to Gauss her fear of her letter being rejected if she originally identified herself as a woman scholar. Gauss was pleasantly supportive, reminding her to "always be very happy, my dear friend, that your rare qualities of mind and heart deserve it," and providing feedback on her attempted contributions to the Law of Quadratic Reciprocity. Gauss shared with her glimpses into Gauss's Lemma and his newfound interests in calculating planetary orbits, which he pursued after publishing his *Disquisitiones* and over which he had disagreements with Legendre.

The author then describes Sophie's interest in developing a biharmonic equation to explain Chladni's vibrating surfaces, her correspondences with Legendre, and her competing in an academic competition to derive a theory of vibrating surfaces, where she won the grand prix of mathematics, yet failed to attend the award ceremony, the reason for which is unclear. The author revisits the overarching narrative of Sophie's struggle to get her work recognized, by explaining how Sophie's winning the grand prix was bittersweet and met with considerable opposition, criticism, and utter lack of validation. In 1821, Sophie self-published her theory of elastic surfaces. She had true mentors and friends in Legendre and Fourier, but since her work was not refereed and she had no membership to participate in the First Class of the Institut de France, her work remained unvalidated as there is no record of its being received in the minutes of the Academy of Sciences. Noting Germain's vital contribution to the biharmonic fourth-order partial differential equation modeling of vibrating plates, the author appropriately calls it the Germain-Lagrange Equation and devotes a chapter towards highlighting the work in elasticity theory of Germain's contemporaries Navier, Cauchy, and Poisson.

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Chapter 9 details Germain's work on Fermat's Last Theorem, the topic for the Institut's 1818 mathematics contest. Germain wrote to Gauss about her proof strategy but the mathematical contents of the letter remained hidden until 2005. However, Legendre, in a report on Dirichlet's memoir for  $n=5$ , notes Germain's proposition which was applied to Fermat's Last Theorem, eventually called Sophie Germain's Theorem:

For an odd prime exponent  $p$ , if there exists an auxiliary prime  $0^*$  such that there are no two nonzero consecutive  $p$ th powers modulo  $0^*$ , nor is  $p$  itself a  $p$ th power modulo  $0^*$ , then in any solution to the Fermat equation  $z^{0^*} = x^{0^*} + y^{0^*}$ , one of  $x$ ,  $y$ , or  $z$ , must be divisible by  $p^2$ .

Primes  $p$  where  $2p + 1$  is also prime, are called Germain primes. The largest Germain prime in the book is  $48047305725 \cdot 2^{172403} - 1$ , found in 2007. The chapter concludes with the Fermat-Wiles-Taylor Theorem, unsolved problems in number theory, and a note that Germain's manuscripts were never fully evaluated and analyzed.

The final chapters of the book detail Germain's philosophical memoir analyzing a proposed universal law uniting the beauty of scientific and artistic endeavors in the unity of faith and science, published by her nephew posthumously in 1833 after she lost her battle with cancer, and a comparison with Auguste Comte's positivism. Chapter 11 details Germain's collegiate friends (Legendre, Fourier, Cauchy, Delambre, Libri, and scholars from the École Polytechnique and Institut de France), her rivalry with Poisson, favorite mentors (Archimedes of Syracuse, Euler, Gauss), her own arrogance and quick-tempered disposition to condescending colleagues, and her overall perseverance to get her work noticed. Through Fourier, Germain had access to meetings held publicly at the Academy of Sciences. The Italian mathematician Libri described Germain in this way:

Her manner was graceful and she had a mild sense of humor, which concealed an exact and profound thought ... [she] could seize an original idea and immediately derive its final consequences, crossing over all intermediate concepts.

The author details the July Revolution of 1830, during which Germain met an impertinent Galois and the German mathematician Crelle, who published Germain's last two

memoirs, one related to an irreducible prime equation that Gauss derived, and the other to the curvature of surfaces. Germain suffered immense pain and passed away on June 27, 1831 amid a riot in her childhood neighborhood of rue Saint-Denis. The author remarks that no one at the Academy reported Germain's passing.

In Chapter 13, "Unanswered Questions," the author reviews the many unanswered questions about Germain and posits various possible answers. The many unanswered questions include: Germain's primary mathematics education; Lagrange's role as Germain's mathematical counselor even though no correspondence has been found; attending public lectures at the Collège de France; overprotective parents; was Germain a revolutionary, a royalist, or apolitical; her undocumented countenance with no known portrait or verbal depiction; the reason behind M. Le Blanc and corresponding with Gauss; the unusual arrangement with De Sacy; attending Chladni's public demonstrations; finding out about the grand prix of mathematics; not attending the public meeting to win the prize and the whereabouts of the gold medal won; the pursuit of mathematical physics research with a desire to work in number theory; the source of inspiration to compete in the acclaimed competition; why no contemporaries other than Legendre and Libri mentioned Germain's mathematical contributions; and the lack of historical documentation of her personal life or empathy for others. The book concludes with Sophie Germain's legacy, which takes the form of the grand prix in mathematics, the Lycée Sophie-Germain, a postage stamp celebrating the 240th anniversary of Germain's birth, and the Sophie Germain Foundation sponsored by the Institut de France.

Following Chapter 14, there is a highly detailed itemization of the 14 letters in the Germain-Gauss correspondence collection replete with a main topics summary, and, most excitingly, copies of letters 1, 2, 4, 5, A, B, 6, 7, 8, 9, and 14 and a Sophie Germain timeline, noting that in 1880 Germain's paper originally submitted to the Academy in 1824 was finally published.

The book's strengths are many. The book is well written, the author's thesis and aim are well achieved, and the information is accurate. The author deserves praise for her excellent care taken to translate 9 out of the 14 letters with Gauss and to assemble the Germain timeline. The book's weakness is that some of the biographical sections depicting Germain's collegiate social circles are quite lengthy and the overarching narratives are oftentimes repetitive, while the number theory and analysis review sections could be seen as too lengthy and most likely distracting and unnecessary to the aim of showing Germain's perseverance.

Overall, this book is an excellent contribution to the Springer Biographies. The letters are our window to otherwise inaccessible mathematical giants. The author does a fantastic job of constructing for the reader a visualization of Germain as a mysterious, brilliant inspiration to budding mathematicians; a mathematician working in isolation in an oftentimes politically charged Parisian climate who has many collegiate scholar friends, no one of which ever documented her countenance or her personal life. The mystery of Germain's deepest thoughts can only be glimpsed in her *Pensées Diverses*, but never fully revealed. It is all unknowable, forever so. The phenomenology of a record not existing is profound in itself, let alone for a highly contributing mathematician. She is as haunting as she is inspiring, given her death mask is her only physical portrayal. I praise the author for tactfully remarking that perhaps we should only honor Germain's intellectual prowess as her legacy, rather than pry into her personally.

This is a book suitable for any mathematical novice and/or avid reader curious about the revolutionary woman behind the mathematician M. Le Blanc, the artistry of mathematical thinking, and curating excellent mathematical prowess in a tumultuous societal context. The book invites experts and budding mathematicians to consider their own legacy and best practices of scholarship, to revisit implicit biases regarding identity in profound service to inclusivity, to mindfully reflect on the ever-dynamic socio-political context in which profound mathematical ideas are birthed, and to strive to continually validate all contributions of significance in amplifying variations in mathematical thinking.

The author deserves praise in that nothing is reified; the historicity of the book is not interpreted in a way that obviates Germain's struggles to prove an outside narrative. The account is raw. The correspondence is raw and there is no interpretation. This alone makes the work a significant contribution to the field of mathematical biographies.

## CALL FOR NOMINATIONS

### 2023 Class of AWM Fellows

The Association for Women in Mathematics Fellows Program recognizes members of any gender who have demonstrated a sustained commitment to the support and advancement of women in the mathematical sciences, consistent with the AWM mission: "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."

The following criteria are required for nominees to be considered for Fellowship.

- Nominees must have demonstrated an outstanding, sustained commitment to the support and advancement of girls and women in the mathematical sciences.
- Nominees should be a member of AWM at the time of their nomination.

In the majority of cases a nominee should be at least fifteen years into her/his/their career; graduate study counts as part of the career. Nominations will open on or before April 1 and close **May 15, 2022**, so please participate in this year's selection process by nominating someone who you think deserves this recognition. Self-nominations are permitted. Nominations for members of underrepresented minorities are especially encouraged. The primary nominator need not be a current member of AWM but if not should have been one at some point in the past. Anyone can write a supporting letter, whether or not they are AWM members. Nomination packages consist of:

- a nomination letter from the primary nominator of at most two pages
- two supporting letters of at most two pages each, of which at least one is from a current AWM member
- a CV of 3 pages or less
- a suggested citation (for use when the award is announced) of 50 words or less.

Further information will be posted at the AWM Fellows page. At the request of the primary nominator, nominations can remain active for one additional year, and the nominator can update the application materials. Questions? Phone 401-455-4042, email [awm@awm-math.org](mailto:awm@awm-math.org) or visit [awm-math.org/awards/awm-fellows/](http://awm-math.org/awards/awm-fellows/).

## EDUCATION COLUMN

*Education Column Editor: Jackie Dewar, Loyola Marymount University, [jdewar@lmu.edu](mailto:jdewar@lmu.edu)*

### The predicted K–12 teacher shortage may not materialize

*Jackie Dewar, Professor Emerita, Loyola Marymount University, [jdewar@lmu.edu](mailto:jdewar@lmu.edu)*

Some good news for once! In mid-November 2021, the news feed on my mobile phone displayed an article titled “Why There Hasn’t Been a Mass Exodus of Teachers.”<sup>1</sup> Not surprisingly, one had been predicted as an outfall of the pandemic. Before reading further, I encourage you to stop for a few moments and try to anticipate the reasons why it hasn’t happened.

The article I read was a collaborative effort of FiveThirtyEight<sup>2</sup> (<https://fivethirtyeight.com>), a website that focuses on opinion analysis, politics, economics, and sports blogging, and The Fuller Project (<https://fullerproject.org>), a nonprofit newsroom reporting on issues that affect women. Both of these sites were new to me. The article pulls data from reputable sources such as RAND Education and Labor<sup>3</sup> and Education Week.<sup>4</sup>

Because of the pandemic, K–12 teachers experienced a jolting shift to online instruction followed by a return to in-person learning under possibly unsafe conditions. Not surprisingly, teachers reported frequent job-related stress and symptoms of depression in a RAND survey<sup>5</sup> taken in January/

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<sup>1</sup> <https://fivethirtyeight.com/features/why-teachers-havent-joined-the-great-resignation>

<sup>2</sup> The name is a reference to the number of electors in the electoral college.

<sup>3</sup> <https://www.rand.org/education-and-labor.html>

<sup>4</sup> <https://www.edweek.org>

<sup>5</sup> [https://www.rand.org/pubs/research\\_reports/RRA1108-1.html](https://www.rand.org/pubs/research_reports/RRA1108-1.html)

February 2021. The survey also found nearly 1 in 4 teachers overall (and almost half of Black teachers) saying they were likely to leave their jobs by the end of the 2020–2021 school year, compared with 1 in 6 teachers prior to the pandemic. However, citing U.S. Bureau of Labor Statistics data, the FiveThirtyEight article states that “fewer public-education professionals quit their jobs between the months of April and August the past two years than did so during that same time immediately before the pandemic.” While full-time teachers made up the majority of this data, it also included support staff and higher ed employees. In an Education Week survey<sup>6</sup> released in October 2021, a greater percentage of principals and district administrators reported difficulty hiring substitute teachers (80%), bus drivers (77%), and paraprofessionals (55%), than full time teachers (48%).

FiveThirtyEight put forward several reasons for why teachers are not resigning at the high rates projected. While women have disproportionately suffered COVID-related job losses, teachers (the majority of whom are women) were not threatened by the mass layoffs that occurred in other professions and even among some types of public-school employees such as bus drivers. In general, teachers have more job stability and better benefits compared to other categories of jobs with an overrepresentation of women. People often become teachers because they want to make a difference in students’ lives, making them more likely to stay. Despite the difficulties and concerns, being back in the classroom with students brought joy to many teachers. Greater participation in recent union elections suggests that teachers in some cities (including Los Angeles where I live) are choosing to get more involved in workplace issues. Also, an increase in positions along with the availability of federal funding may be a partial explanation for the labor shortages that do exist. As with so many other situations during this pandemic, it is difficult to predict what the future holds for staffing in K–12 schools.

The websites and articles found in the footnotes provide many other links and avenues to explore on this topic.

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<sup>6</sup> <https://www.edweek.org/leadership/how-bad-are-school-staffing-shortages-what-we-learned-by-asking-administrators/2021/10>

**See [awm-math.org](https://awm-math.org)  
for the latest news!**

# Call for Participation: Aligning Actions at Crossroads

AWM is pleased to announce “Aligning Actions at Crossroads: An Intersectional Approach to Addressing Harassment in the Mathematical Sciences.” This workshop aims to address the impact of harassment on women and, in particular, on those who identify with multiple minority axes.

**Why participate?** When members of the community are ostracized, harassed, or made to feel unwelcome, then the success of mathematics as a whole is put into jeopardy. Recognizing that there are additional and particular hostilities faced by gender minorities, such as women mathematicians who identify as neuro-diverse, gender-diverse, or gender fluid; women mathematicians who identify as racial minorities; women with visible or invisible disabilities; and women with other minority identities and status, the workshop will incorporate the lived experience of individuals with multiple marginalized identities.

**What are the goals?** The interactive workshop will

- (1) establish the impacts of harassment and make recommendations for improving climate and institutional structures;
- (2) define a desired workplace climate and actions needed to achieve awareness and adoption;

- (3) provide tools, techniques, and training to respond to behaviors that undermine a welcoming environment; and
- (4) identify gaps in university policies that drive unwanted behaviors.

Workshop participants will develop individual action plans for implementing change at their institutions.

Speakers will include an expert in intersectional harassment—intolerance based on the interplay among race, ethnicity, sexuality, class and other social positions—as well as an expert knowledgeable about best practices in policy implementation in academia. Bystander intervention training by University of New Hampshire’s PowerPlay will be included.

**Where and when?** In conjunction with the 2022 AWM Research Symposium taking place at the University of Minnesota from June 16–19. This workshop will be an all-day event on Thursday, June 16, 2022.

**Who is eligible?** Thanks to the Division of Mathematical Sciences at the National Science Foundation, partial travel support will be provided for up to thirty participants. Everyone is welcome. To apply, visit <https://awm-math.org/meetings/aligning-actions-at-crossroads/>.

**Questions?** Contact the organizing committee at [ed.admin@awm-math.org](mailto:ed.admin@awm-math.org): Vrushali Bokil, Oregon State University; Elizabeth Donovan, Murray State University; Maeve McCarthy, Murray State University; Ami Radunskaya, Pomona College. and Emerald Stacy, Washington College.

**Deadline: March 15, 2022**

## 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](mailto: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/>.

# Fifty Years of Women in Mathematics

Dahlia Fisch, Springer

Springer is very excited to celebrate the 50th anniversary of the AWM with the publication of *Fifty Years of Women in Mathematics: Reminiscences, History, and Visions for the Future of AWM*, edited by Janet L. Beery, Sarah J. Greenwald, and Cathy Kessel. As the Springer editor for the AWM series, I was fortunate to be able to do a Q&A with the editors about this landmark volume.

**Q:** How did the idea and direction for the volume, and specifically with you three at the helm, come together?

**A:** Dimana Tzvetkova, then associate editor for mathematics at Springer, approached Janet Beery and Sarah Greenwald shortly after another AWM Springer volume they had worked on was published. Around the same time, Cathy Kessel was spearheading the presidents' reflections column in the *Newsletter* that had begun in connection with AWM's fiftieth anniversary. So, it made sense to us that we three would work together and that the presidents' reflections would be a part of the book. We had interesting discussions as we mapped out possibilities and put the proposal form together. Together, we have a wide knowledge of different aspects of AWM, many of its members (in and out of the US), and work related to women in mathematics.

In the end, the collection of articles in the book responds to various questions: What has it been like for women in mathematics? How has AWM supported women and girls? How have women and girls been supported in other ways? What leads people to dedicate themselves to an organization for short or long periods of time? What obstacles has AWM (and other organizations for women in mathematics) faced, how did it overcome them, and what challenges does it face today?

We view this book as the beginning of a conversation about these and other questions rather than the end of one—a conversation that we hope to see continued in later articles and books.

**Q:** There's an incredible number of contributions in the volume, from such a wide range of authors. How did you manage to reach out to such a wide network, and what was the response like from the contributors when asked to join the collection?

**A:** Overall, we planned for different types of contributions and we made an effort to contact appropriate authors

and reviewers. Many people we contacted were working in extraordinary conditions because of COVID-19. Some had overwhelming responsibilities such as full-time childcare while teaching online for the first time. Some were in poor health. Others did not always have access to the internet or a computer. Despite these problems, the response was amazing. Some of those unable to write for the volume reviewed articles, answered our questions about AWM, and suggested authors or ideas. We are immensely grateful to the hundreds of people around the world, both authors and reviewers, who helped us to bring this volume into being.

**Q:** What are some of the most interesting and unexpected contributions, in your opinion?

**A:** We were pleased to discover (by way of Lenore Blum) what seems to be the earliest known photo of AWM members at a meeting: Lenore Blum, Mary Gray, Vivienne Malone Mayes, Vera Pless, and Alice Schafer, reprinted from the 1975 *Kalamazoo Gazette*.

Many of the articles have details that were new to us. For instance, AWM and its programs have benefited participants in ways we might not have predicted. These are described in individual biographical accounts as well as in articles that focus on particular AWM programs. The articles from AWM student chapters describe a variety of different chapter activities that respond to undergraduate and graduate students' interests and needs. Individuals and chapters have adapted and expanded AWM programs such as the Essay Contest and Sonia Kovalevsky Days to various local contexts in creative and interesting ways.

**Q:** What was really important to you to be included in the volume?

**A:** Many things. We certainly wanted to include those who were there in the earliest days of AWM. We made a special effort to invite authors who have had various lengths and levels of involvement with AWM or with women in mathematics more generally. Although the book is a celebration of AWM, we asked authors not to shy away from topics such as criticisms of AWM or accounts of harassment and discrimination within mathematics.

We wanted the articles about early times—and all the others—to make sense to a general audience that included later generations. So, in addition to “standard types” of reviewers, we recruited undergraduates, graduate students, and recent PhDs by putting requests on AWM's social media, making it explicit that we wanted to include reviewers who weren't necessarily familiar with all the practices of academic or mathematical communities (e.g., people who are first-generation undergraduate or graduate students, or from another country).

Photos were also important, allowing more people to be represented in the book as well as illustrating the activities of AWM and other organizations for women in mathematics. We are grateful to the many people who dug into their closets and attics for photos. This has had the happy consequence of adding to AWM's digital archives. Anne Leggett and Darla Kremer were especially helpful in this regard.

**Q:** What can interested readers and association members expect to see in the collection?

**A:** The book begins with a chronology that gives an overview of AWM's five decades, allowing readers to locate events in the other ninety-three articles within the larger picture. Collectively, the articles touch on numerous topics and make many connections, reflecting personal and professional relationships that sometimes span decades or continents. Some of these connections can be traced via the index which lists names mentioned in articles and photos.

Many of the articles are personal accounts that describe the author's involvement with AWM. These include contributions from people involved in its early days that describe the context of its founding, amid the movements for civil rights and women's rights. Some describe decades-long involvement, and some describe brief (but life-changing) AWM experiences.

Some of these experiences occurred in the context of AWM programs. As it grew, presidents and volunteers initiated programs to support girls and women. There are now a large variety of programs, some of which have existed for decades. This seems amazing for an organization that's primarily run by volunteers. Along with these programs, AWM has had a longstanding Education Column in the *Newsletter* and an Education Committee. Several articles explain how all this happens, how individual programs and the Education Column are sustained, how they have grown, and some of their successes.

Not everyone agrees on how to support women and girls in mathematics, or is involved in AWM programs. Some authors explain their disagreements and some describe how they provide support outside the aegis of AWM, as part of departmental activity or as a separately funded program.

Other articles look more generally at historical and cultural aspects of AWM. These articles draw on historical records, such as statistics, archives (including the *AWM Newsletter*) or interviews, rather than personal experiences. Some intermingle the two, examining the question of whether the situation for women in mathematics has changed in fifty years, using statistics and personal accounts.

AWM has been fortunate in having a staff, albeit a small one, that plays a major role in sustaining its activities. Several contributions from past executive directors recount

their experiences and reflect on the staff needs of the organization.

After AWM began in 1971, other organizations that support women in mathematics arose. Leaders of national and international organizations for women in mathematics in Africa, Asia, Australia, Europe, North America, and South America have contributed articles about their organizations.

The book ends with reflections on concerns and aspirations for AWM by the president and president-elect, written shortly before the fiftieth anniversary.

**Q:** How have you personally been celebrating AWM's fiftieth anniversary?

**Cathy:** With Janet, Francesca Bernardi, Kayla Bicol, and Eva Brayfindley, I've been editing the presidents' reflections column in the *AWM Newsletter*. Working on the book, as well as editing those reflections and writing one myself (I was president from 2007 to 2009) has been an opportunity for me to think about how the organization and its programs have grown and developed. Reading about details of AWM's beginnings makes what we have now seem even more awe-inspiring.

Working on the book has also inspired me to think more about one of my long-time interests, the situation prior to AWM. This has resulted in an article about women in US mathematics between the 1920s and the early days of AWM in the 1970s.

**Janet:** With Cathy, the presidents' reflections in the *Newsletter*!

It has been so interesting and moving to work on articles and reflections for the book. I feel as if many of the contributors have opened up a piece of themselves for us and for our readership, sometimes a piece that's never been told before.

Being on the AWM Executive Committee (EC) for eight years has been interesting, too. I'm on my fourth president and all four have been amazing women and especially amazing users of time!

**Sarah:** For me, 2021 has been an opportune time to focus on women in mathematics. There's my work within AWM itself, of course—elected to the EC in 2008 and associate editor of the *Newsletter* since 2011. Externally, I've given some talks on celebrating the 50th Anniversary: How and why AWM was founded and why it's still needed. In addition, Judy Holdener and I are working on a special issue of *PRIMUS* about promoting women in mathematics, which arose out of a special session at the JMM that was co-sponsored by the AWM 50th Anniversary Committee.

# Getting to Know Ora Engelberg: Researcher, Immigrant, Mother

Yen Duong

*Claremont Graduate University has received a \$2-million gift to endow the Engelberg Fellowships in the Mathematical Sciences, in honor of the late mathematician Ora Engelberg Percus.*

*From their parents' New York apartment lined with thousands of books and yellowed papers accumulated over 56 years, Allon Percus (Professor of Mathematics, Claremont Graduate University) and Orin Percus (Professor of Linguistics, Université de Nantes, France) spoke to me about their mother Ora, her life in mathematics, and the fellowships in her memory that will be awarded starting next year. The Engelberg Fellowships will initially fund one new graduate student every year, offering four years of financial support at the university's Institute of Mathematical Sciences.*

*Note: this interview has been edited and condensed.*

**Yen Duong:** Before we start talking about your mom, tell me about the motivation for establishing these fellowships in her name.

**Allon Percus:** Part of it corresponds to an urgent need. There's an equity issue in the background. Claremont Graduate University has only very modest sources of financial support for students. The Engelberg Fellowships will expand opportunities to excellent students who otherwise might not be able to attend, particularly from underrepresented groups in the mathematical sciences.

The other part of it is that our mom has always been a little bit in the shadow of our dad, Jerome Percus, who taught for 62 years at the Courant Institute of Mathematical Sciences and Physics Department at NYU. He was an extraordinary scientist, but in many ways he also had a very privileged life and was always able to work on exactly what he wanted. In his later years, he admitted that he was quite spoiled in that sense. Our mom was not spoiled at all and had to face many large obstacles. From my perspective, this fellowship in honor of her is an attempt to restore some symmetry there.

**Orin Percus:** It makes her part of an institution in a way she never was.

**AP:** Also, her publications all used the name Percus after she was married. Had times been different, she

probably would not have used our dad's last name. The name Engelberg Fellowships is intended to recognize that.

**YD:** Your mother came to the US in 1961 from Israel, where her parents had been some of the first Jewish pioneers from the 1920s. In Israel, she'd become a lieutenant in the army engineering corps, staying an extra year after the mandatory two years of military service. What was it like for her coming to the US?

**AP:** It must have been a shock. She had grown up in a society that was just in the process of being structured. I suspect that, for women, it was much easier to be recognized in Israel than it was here. She must have felt a tremendous amount of conservatism when she came here.

**YD:** After getting her master's degree from the Hebrew University in 1959 and then lecturing at Tel Aviv University, she started her PhD at Columbia in 1961 and graduated in 1965. To me, that's pretty fast, but you said that she ended up delaying her defense.

**AP:** There's a whole story involving immigration difficulties that she had in the United States. She was under threat of deportation. This was in the aftermath of the McCarthy period—she was accused of voting in a Communist Party election.

**OP:** Not only voting in a Communist Party election but being a candidate herself! And it turns out that the year of that election was before she was even old enough to vote!

**AP:** The only way that she could stay in the country was to remain a student. Columbia hired a lawyer to help her. She defended December 15, 1964, which was intentionally past the deadline for a fall degree. That gave her until the spring, and then she and our dad got married on May 20, 1965.

**YD:** After defending, she taught at Columbia University's Teachers College and then at City College, part of the City University of New York System. That defense delay was just the first time that she went around bureaucracy, which you've told me she had "very little patience" for.

**AP:** When Orin was born, CUNY and many other institutions required pregnant women to take unpaid maternity leave without benefits. The assumption was that the husband would provide the benefits to cover pregnancy and childbirth.

When I was born, she decided just not to tell them that she was pregnant. She was very thin, and everyone was wearing big tent dresses anyway in the early '70s. So even in the third trimester, no one suspected anything. They found out she had a second baby because I was born on May 13 and our dad had to proctor the final exam in one of her classes.

They made her take off the following fall semester without pay, but she had already thought to coordinate this



with our dad's sabbatical. So we all spent the next year in London and our parents were visiting faculty at Middlesex Hospital in mathematical biology.

**YD:** Of course, that's what I think of when I have two small kids, that I should just move them to another country for a semester and do research! Since your parents were each other's main collaborators through their mathematical careers, was your house full of math conversations?

**OP and AP, laughing:** All the time. It got to be really annoying sometimes.

**OP:** We would go to conferences with them and go to universities with them; this was very much part of the culture.

**AP:** The social environment that we grew up in at home was very mathematical. Many jokes tended to be mathematically tinged.

**YD:** Please tell me a joke.

**AP:** There's a mathematician sitting outside a house and the house is empty. Someone walks into the house, and then all of a sudden two people walk out. And the mathematician says, "Oh, if one more person goes back into that house, it will be empty again."

**YD:** ....

**AP:** Anyway ... our mom was working on problems involving interpretations of clinical trials. It's a very timely topic right now, when you have vaccines with emergency use approval based on what are ostensibly incomplete clinical trial information. The valid interpretation of statistics was always her core interest.

**YD:** You got back to the US, and then she left City College in 1973, when the math department decided to close their graduate program and she was denied tenure. What happened next?

**AP:** She was determined to keep up her research career. After '73, she was basically doing mathematics as an independent, unaffiliated researcher. It's pretty mind-boggling when you think about it. There were some windows of opportunity, because both of us started preschool at a very young age.

**OP:** She wasn't really able to work when we were there. She would close the door to the living room....

**AP:** Closing a door is not always sufficient. I really don't think it was easy at all. Not surprisingly, there was a bit of a pause in her scientific productivity.

**YD:** (*screaming children in background*) Your mother's story is hopeful to me personally, as she gets more time and starts to adjunct when you are teenagers. What research was she working on then?

**AP:** She was trying to establish whether various pseudo-random number generator algorithms were valid for

particular applications. There are some scary stories about random number generators that were the default methods on mainframe computers at the time. The most famous nightmare story was RANDU, a random number generator that was used for a large number of physical simulations—basically, all of those results were suspect.

It was a class of random number generators called linear congruential generators.

**YD:** Linear congruential generators ... in this case that's when you multiply your previous output by a big number, then modulo some other integer. That process ensures that your previous output and your current output aren't too correlated. And you choose the big number and the modulo integer so that you don't have too much periodicity.

**AP:** But that's not good enough. You also care about what happens if you look at correlations between three or four successive supposedly random trials. She was working on that problem in the context of the NYU Ultracomputer, which was a DOE-funded project and one of the first attempts at building a large-scale cluster. That was how she got back into really active research and academia—she became a research faculty member at the Courant Institute and got her own large NSF grant.<sup>1</sup>

**YD:** Wow, so she went from academia, to home with the kids in 1973 doing independent research, then being an adjunct in the 1980s, and then back to academia in 1991. I just want to note that between those two professorships, between 1973 and 1991, she had 22 publications, which included a six-year stint as a senior research scientist at Courant. Then she ended up leaving academia just a few years later and retiring early, in 1995, when she was 61.

**AP:** Her grant was awarded in 1992, and it was recommended for renewal by the NSF program officer in 1995. But there were some hiccups involving negotiations with the university and disagreements about her benefits. It ended up with her asking the funding agency not to renew the grant, and then she retired.

**YD:** The benefits: Usually universities will apportion a percentage of researchers' grants for benefits for the employee. And for adjuncts, that percentage is higher than for tenure track faculty.

**AP:** Exactly. The issue was that, in addition to her continuing to receive benefits as our dad's spouse, the university wanted to charge the grant at that much higher benefit rate.

*continued on page 26*

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<sup>1</sup> [https://nsf.gov/awardsearch/showAward?AWD\\_ID=9121428&HistoricalAwards=false](https://nsf.gov/awardsearch/showAward?AWD_ID=9121428&HistoricalAwards=false)

## GETTING TO KNOW ORA ENGELBERG

continued from page 25

She saw this as double-billing and a money grab on the part of the university.

Our mom had a very clear view in her head of what was right and what was wrong. In this case, she drew her line in the sand. Given how much of her professional experience had been clouded by problems that she felt were not of her making, and difficulties that were imposed upon her in the academic setting, it must have given her a tremendous amount of personal satisfaction to thumb her nose at such a big institution!

**YD:** But true to form, she stayed active in research even after retiring in 1995. You mentioned an interest in mathematical and statistical paradoxes, like Simpson's paradox: that error of aggregation where you can get the opposite effect if you put two groups together.

**AP:** She and our dad published a paper on Parrondo's paradox, which is like a dynamic version of Simpson's paradox: Random selection of playing two asymptotically losing games can result in a winning game.

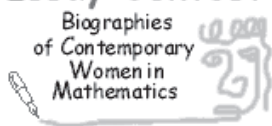
You start to see a new phase in her research career. She started new collaborations with people at Los Alamos and at the Santa Fe Institute, working on problems in combinatorics. These were also related to what she was doing earlier with the clinical trials, and involved screening the performance of a drug. You can perform experiments on well-chosen clusters of individuals that overlap in such a way that you can get meaningful and efficient results.

**YD:** Do you think the recipients of the Engelberg Fellowships will connect to Ora's story?

**AP:** We have a strong program in Claremont thanks, in part, to students who are not "conventional" in the math graduate school sense. I have quite a few students who have come back to school after years in the professional world. That's a powerful connection with my mom, who went back to a career in academia after an extended pause.

But above all, the goal of these fellowships is to bring in talent that we would otherwise not be able to. The Engelberg Fellowships are a way of honoring Ora's tenacity, helping our program thrive by rewarding merit no matter where it is found.

### 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 2022 contest is sponsored

by Math for America, [www.mathforamerica.org](http://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, the essay winning the grand prize will be published in the *AWM Newsletter*. For more information, visit <https://awm-math.org/awards/student-essay-contest/>. The deadline for electronic receipt of entries is **February 1, 2022**. To volunteer to be interviewed, please visit the website <https://awm-math.org/awards/student-essay-contest/> and sign up using the link at the bottom of the page.



## 2023 AWM Prizes and Awards Call for Nominations

AWM will accept nominations for the following prizes and awards between April 1 and **May 15, 2022** on MathPrograms.Org. They will be presented during the Joint Prize Session at the Joint Mathematics Meetings in Boston in January 2023.

### 2023 Joan & Joseph Birman Research Prize in Topology and Geometry

The AWM – Joan & Joseph Birman Research Prize in Topology and Geometry recognizes exceptional research in topology/geometry by a woman early in her career. The prize, awarded in odd years since 2015, is made possible by a generous contribution from Joan Birman who works in low dimensional topology and her husband Joseph Birman who was a theoretical physicist. For more information visit <https://awm-math.org/awards/awm-birman-research-prize/>.

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### 2023 Louise Hay Award

The Louise Hay Award for Contributions to Mathematics Education recognizes outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being. For more information visit <https://awm-math.org/awards/hay-award/>.

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### 2023 M. Gweneth Humphreys Award

The M. Gweneth Humphreys Award recognizes outstanding mentorship activities. This prize is awarded to a mathematics teacher who has encouraged women undergraduate students to pursue mathematical careers and/or the study of mathematics at the graduate level. M. Gweneth Humphreys (1911–2006) taught mathematics to women for her entire career, first at Mount St. Scholastica College, then for several years at Sophie Newcomb College, and finally for over thirty years at Randolph-Macon Woman's College. This award, funded by contributions from her former students and colleagues at Randolph-Macon, recognizes her commitment to and her profound influence on undergraduate students of mathematics. For more information visit <https://awm-math.org/awards/humphreys-award/>.

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### 2023 Mary and Alfie Gray Award for Social Justice

The Mary and Alfie Gray Award for Social Justice rewards the vigorous and imaginative application of the mathematical sciences to advancing the cause of social justice, defined as promoting a just society by challenging injustice and valuing diversity. Social justice exists when all people share a common humanity and therefore have a right to equitable treatment, support for their human rights, and a fair allocation of community resources. Mary Gray, Founder and Past President of AWM, has lived her life fighting for social justice and human rights, and Alfred Gray was devoted to working with mathematicians from around the world, and with students from underrepresented groups within the United States. Both Mary and Alfred were always concerned about securing human rights and equitable treatment in the profession and by governments. This award is funded by donations from the AWM community and friends of Mary and Alfie. For more information visit <https://awm-math.org/awards/gray-award/>.

# Announcements

## AWM Election Winners

The AWM Election ended on December 1, 2021. **Talitha Washington** was elected as President-Elect. **Alejandra Alvarado** was elected as Clerk. New Members-at-Large of the Executive Committee will be **Rebecca Garcia**, **Courtney Gibbons**, **Caroline Klivans** and **Shanise Walker**. Congratulations to all of them, and thanks to all the candidates for their willingness to serve. Those elected will take office on February 1, 2022.

## New Truth Values Website

In 2008 Gioia De Cari wrote *Truth Values: One Girl's Romp Through MIT's Male Math Maze*, based on her experiences in the 1980s as a graduate student in the MIT mathematics department. Presentations of *Truth Values* on tour sparked 75+ post-show discussions with leading experts on diversity, gender bias, and women in STEM, resulting in the development of an extraordinary network. The Truth Values Community is the result of De Cari's passion for sharing this network via art and conversation, offering the sense of community and support she wished for during her own STEM graduate studies. During the long pandemic pause, a new website was created for the play and for the associated community. You are invited to visit [TruthValues.org](http://TruthValues.org).

## L'Oréal USA For Women in Science

Applications for the 2022 L'Oréal USA For Women in Science program are now open and will close on Friday, **January 28, 2022**. This fellowship program honors female scientists at a critical stage in their careers with grants of \$60,000 each. Since 2003, 90 postdoctoral women scientists have received over \$4 million in grants. L'Oréal USA is seeking five exceptional female scientists looking to advance their research and serve as role models for the next generation of girls in STEM. Visit <https://www.loreal.com/en/usa/pages/group/fwis/>.

## Marie A. Vitulli Graduate Fellowship at MSRI

MSRI is pleased to announce a new fellowship opportunity. Beginning in academic year 2020-21, the Marie A. Vitulli Graduate Fellowship will support one advanced graduate student in mathematics, per academic year, to attend an MSRI program with their advisor.

**Eligibility:** Candidates are nominated by their advisor, who must hold a membership in one of MSRI's semester

long programs. Both the advisor and the candidate must commit to being in residence at MSRI for the entire semester. Nominations will be requested from advisors in early February of each year.

The fellowship is a gift of Marie A. Vitulli, University of Oregon professor emerita and director of the university's Women in Math Project. Vitulli is a Fellow of the Association for Women in Mathematics (Class of 2019). She was elected a Fellow of the American Mathematical Society (Class of 2020), for "contributions to commutative algebra, and for service to the mathematical community particularly in support of women in mathematics."

## Julia Robinson Film

The film *Julia Robinson and Hilbert's Tenth Problem* is available at Kanopy, a streaming service accessible via public libraries and universities. It's well worth watching.

## Mathematics Education for the Future Project

The 16th International Conference of The Mathematics Education for the Future Project, Building on the Past to Prepare for the Future, will be held at King's College, Cambridge University, UK, August 8–13, 2022. The old conference website is no longer operational; instead see <http://www.articulatetechnology.co.uk/math>. The Project Home Page, <http://math.unipa.it/~grim/21project.htm> has proceedings of the 2009 Dresden conference and earlier. Conference links after 2009 are inactive but will be restored.

This conference is being held in cooperation with: Budapest Semesters in Mathematics Education, Hong Kong Institute of Education, MUED, DQME3, MAV, AWM, ATM, AAMT, Wholemovement, MACAS, Mathematics Education Centre, Institute for Mathematics, Faculty of Sciences, Eötvös Lóránd University, Budapest, International Symmetry Association, AIMSSSEC and WTM-Verlag.

The Organizing Committee is: Alan Rogerson & Jasia Morska (with Project Advisory Body), while the Local Organizing Committee is: Alan Rogerson, Ronnie Lloyd and Toni Beardon. For registration and other information, write Rogerson at his new email address, [rogersona8@gmail.com](mailto:rogersona8@gmail.com).

## SIMIODE Expo 2022

Systemic Initiative for Modeling investigations and Opportunities with Differential Equations is hosting an international, virtual, conference SIMIODE EXPO 2022, February 10–13, 2022. Visit <https://qubeshub.org/community/groups/simiode/expo> for the complete description and registration, as well as videos from SIMIODE Expo 2021.

SIMIODE's Community of Practice and Expo 2022 are focused on helping teachers and students in teaching and learning differential equations through modeling.

This year's conference has expanded from two to four days and will include rich immediate conversation and gathering mode for one-to-one conversations and small group interactions or meetings, all due to the exceptional MathDept.org platform on which the conference is offered. Think hallway conversations and small group, focused engagements.

There will be a richly structured program to include keynote speakers, workshops, contributed papers, informal breakout sessions on themes offered by organizers and suggested by participants, a MathBowl trivia challenge and a Mathematical Escape Room event, Student Poster sessions, and much more. Themes include both student and faculty career paths, conversations about important (to attendees) curriculum issues, student course selection, career options, social justice issues, technology use, data sources, full cycle modeling, and pedagogical approaches, materials, and guidance.

While SIMIODE is about teaching differential equations in context with modeling the EXPO 2022 conference will offer a wider set of gatherings in support of broader mathematical studies and experiences for high schoolers through retired colleagues.

We look forward to you joining us and sharing your ideas and experiences, while listening to collegial wisdom and advice on how to improve teaching all mathematics with an emphasis for the conference on differential equations through modeling.

For inquiries contact: [Director@simiode.org](mailto:Director@simiode.org)

## AWM Conflict of Interest Policy

A conflict of interest may exist when the interest (financial or other) or concerns of any member of AWM, or the member's immediate family, or any group or organization to which the member has an allegiance or duty, may be seen as competing or conflicting with the interests or concerns of AWM.

When any such potential conflict of interest is relevant to a matter requiring participation by the member in any action by AWM or any of its committees to which the member belongs, the interested party shall call it to the attention of AWM or the committee and such person shall not vote on the matter. Moreover, the person having a conflict shall retire from the room in which the organization or its committee is meeting (or from a conference call) and shall not participate in the final deliberation or decision regarding the matter under consideration.

The foregoing requirements shall not be construed as preventing the member from briefly stating her position in the matter, nor from answering pertinent questions of other members, as her knowledge may be of great assistance.

The minutes of the meeting of the organization or committee shall reflect when the conflict of interest was disclosed and when the interested person did not vote. When there is a doubt as to whether a conflict of interest exists, and/or whether a member should refrain from voting, the matter shall be resolved by a vote of the organization (or its committee), excluding the person concerning whose situation the doubt has arisen.

*A copy of this conflict of interest statement passed by the AWM Executive Committee, Vancouver, 8/16/1993, shall be published once a year in the AWM Newsletter, and any member serving as an officer or on a committee shall be advised of the policy upon undertaking her duties.*



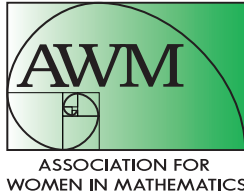
ASSOCIATION FOR  
WOMEN IN MATHEMATICS

**You can renew your  
membership at [awm-math.org](http://awm-math.org).**

## ADVERTISEMENTS

**THE INSTITUTE FOR PURE AND APPLIED MATHEMATICS (IPAM) AT UCLA — POSTDOCTORAL SCHOLARS** The Institute for Pure and Applied Mathematics (IPAM) at UCLA is seeking to recruit up to three Simons Postdoctoral Scholars (SPD) funded by the Simons Foundation. The appointment will be for one calendar year, beginning **August 1, 2022**. A PhD in Mathematics, Statistics, or a related field received in May 2017 or later is required. Women and minorities are especially encouraged to apply. To apply and learn more, go to <https://recruit.apo.ucla.edu/JPF07106>. Applications will receive fullest consideration if received by **January 1, 2022**. UCLA is an equal opportunity/affirmative action employer.

### DISPLAY AD RATES



Full-page	7 1/8" x 8 1/2"	\$638
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For further information, see [awm-math.org](http://awm-math.org).

# UConn

## UNIVERSITY OF CONNECTICUT

### Mathematics Faculty Openings

University of Connecticut, College of Liberal Arts and Science, Department of Mathematics is seeking candidates for the following non-tenure-track positions starting in fall 2022:

**ASSISTANT RESEARCH PROFESSOR  
FULL-TIME NON TENURE-TRACK  
Storrs, CT**

**VISITING ASSISTANT PROFESSOR  
FULL-TIME NON TENURE-TRACK  
Storrs, CT**

For details and to apply, please visit  
<https://www.mathjobs.org/jobs>

*UConn is an AA/EEO employer*

## Association for Symbolic Logic Student Travel Awards

The ASL offers modest student travel awards through its NSF grant to graduate students in logic to attend its annual meetings in North America and Europe. These awards are available to US citizens and permanent residents as well as to international students enrolled at US universities. You do not need to be an ASL member to apply for these awards. Air travel paid for with NSF funds must be in compliance with the Fly America Act.

The next two ASL meetings for which funding is available are the 2022 Logic Colloquium (currently set for June 27- July 1, 2022 in Reykjavik, Iceland) and the 2022 Simposio Latino American de Lógica Matemática (July 26-30, 2022 in San José, Costa Rica). Details for applying for student travel awards for these conferences will be posted at <https://aslonline.org> when they become available.

The ASL also offers student travel awards to ASL-sponsored meetings. These awards are open to all ASL student members. For a full list of ASL-sponsored meetings, see <https://aslonline.org>. Applications must be sent to the ASL Office at [asl@uconn.edu](mailto:asl@uconn.edu) at least three months before the start of the sponsored meeting.

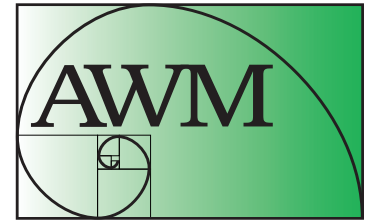
To be considered for a travel award for any of these meetings, please ask your thesis supervisor to send a brief recommendation letter. You must also submit a brief (1 page) letter of application that includes: (1) your name; (2) your home institution; (3) your thesis supervisor's name; (4) a one-paragraph description of your studies and work in logic; (5) a paragraph indicating why it is important to attend the meeting; (6) your estimate of the travel expenses you will incur; (7) (for citizens or residents of the USA) citizenship or visa status; and (7) (optional) an indication of your gender and minority status. Women and members of minority groups are strongly encouraged to apply.

ASL, Department of Mathematics,  
University of Connecticut  
341 Mansfield Road, U-1009 Storrs, CT 06269-1009  
Email: [asl@uconn.edu](mailto:asl@uconn.edu) Phone: (860) 486-3989  
Website: [aslonline.org](http://aslonline.org)

# 2021–2022 Individual Membership Form

JOIN ONLINE at [awm-math.org](http://awm-math.org)!

Please fill in this information and return it along with your dues to:  
AWM Membership, PO Box 40876, Providence, RI 02940



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AWM's membership year is from October 1 to September 30. Please fill in this information and return it along with your dues to: AWM Membership, PO Box 40876, Providence, RI 02940

The AWM Newsletter is published six times a year. If you have questions, contact AWM at [awm@awm-math.org](mailto:awm@awm-math.org), 401.455.4042, or visit our website at: [www.awm-math.org](http://www.awm-math.org).

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Position: \_\_\_\_\_

If student, check one:

Graduate  Undergraduate

If not employed, leave position and institution blank.

Institution/Company: \_\_\_\_\_

City: \_\_\_\_\_ State/Province: \_\_\_\_\_ Zip/Postal Code: \_\_\_\_\_ Country: \_\_\_\_\_

**DEGREES EARNED:**

Degree(s)	Institution(s)	Year(s)
Doctorate: _____	_____	_____
Masters: _____	_____	_____
Bachelors: _____	_____	_____

**INDIVIDUAL DUES SCHEDULE**

Please check the appropriate membership category below. Make check or money order payable to: Association for Women in Mathematics.  
NOTE: All checks must be drawn on U.S. banks and be in U.S. funds. AWM membership year is October 1 to September 30.

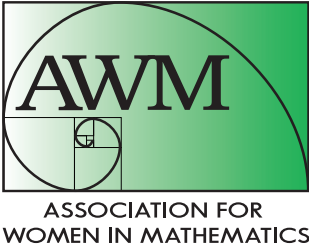
- Regular individual membership (*new members only*) ..... \$35
- Regular individual membership ..... \$70
- Regular membership (*3 year membership*) ..... \$210
- Family membership ..... \$35  
*please indicate family member who is a regular member of AWM: \_\_\_\_\_*
- Contributing membership (*includes designation of a free student membership*) ..... \$160
- Contributing membership (*3 year membership*) ..... \$480
- Retired or Part-time employed or KWMS Affiliate or AWM-SIAM Reciprocity (*circle one*) ..... \$30
- Student or unemployed membership (*circle one*) ..... \$20
- Outreach membership ..... \$10
- Contribution to the AWM annual giving campaign ..... \$ \_\_\_\_\_
- Contribution to the AWM Mary and Alfie Gray Award for Social Justice. .... \$ \_\_\_\_\_
- Contribution to the AWM Alice T. Schafer Prize fund ..... \$ \_\_\_\_\_
- Contribution to the AWM Anniversary Endowment fund ..... \$ \_\_\_\_\_
- I do not want my name to appear in annual lists of contributors to AWM's funds.

Please note that all student, unemployed, outreach, family, and KWMS affiliate members and members with non-US addresses receive only the electronic version of the newsletter.

If you wish to receive a print version, please check here

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## ASSOCIATION FOR WOMEN IN MATHEMATICS

Volume 52, Number 1, January–February 2022

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AWM  
PO Box 40876  
Providence, RI 02940

***or E-MAIL:***

[awm@awm-math.org](mailto:awm@awm-math.org)