ASSOCIATION FOR WOMEN IN MATHEMATICS

Newsletter

VOLUME 50, NO. 3 • MAY–JUNE 2020

The purpose of the Association for Women in Mathematics is

- to encourage women and girls to study and to have active careers in the mathematical sciences, and
- to promote equal opportunity and the equal treatment of women and girls in the mathematical sciences.

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PRESIDENT'S REPORT

This issue of the *AWM Newsletter* has lots of normal happy news to report. Of this I am very glad. As I write this the world is shutting down as we battle the coronavirus. I hope, by the time you read this, we are already starting to see a glimmer of hope that normalcy is around the corner. I hope there might be a few positive outcomes from this difficult time. In the field of mathematics, everyone in the world has now gained a somber understanding of the mathematical concepts of small world networks and exponential growth. Perhaps, professionally, we will gain more understanding and acceptance of the diversity of our community.

In this period all of us have been asked to do things we never expected to do. Those of us teaching are learning the joys and pitfalls of online pedagogy. All of us are learning to work from home, perhaps surrounded by children and pets, causing us to blur the lines between our private and professional selves. Perhaps this will be an opportunity for all of us to feel we can bring more of ourselves to work in the future. As we watch both male and female colleagues briefly leave the Zoom meeting to tend to the children in the other room perhaps the lens through which we view these interactions will equalize. As we get a glimpse into the complexities of a colleague's or student's life we shall be inspired by their multifaceted existence. Let us hope we come through this time with increased understanding and compassion for humanness. Let us hope our professions will more strongly value work-life balance.

As you may have seen in an April email from AWM, due to the pandemic we of course had to cancel the April Hill Day, and as a courtesy our deadlines of May 15 were extended to May 30. Many decisions have not yet been made (it's late March at this writing), for example whether or not the SIAM Annual Meeting and the MAA MathFest will be held. We'll keep you as informed as we can, so keep your eyes open!

Things have been changing at AWM. By the time you read this we will have in place a new Executive Director, Darla Kremer. Darla brings to us a wide range of mathematical and administrative experience, from academic positions to work at Mathematical Reviews, NSF and AMS. We look forward to benefitting from her talents and energy. You can read all about Darla Kremer later in this newsletter. Darla and former ED Karoline Pershell implemented a great phase in/phase out transition plan to keep things rolling through the period. Karoline's contributions these last two years have been outstanding. We thank her for her flexibility in the transition, and indeed for all she's done.

Our management team is now headed up by Robin Nelson. While previously this position was called Managing Director, we re-evaluated the expectations of

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ASSOCIATION FOR WOMEN IN MATHEMATICS

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

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

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

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PRESIDENT'S REPORT *continued from page 1*

the position and determined a more accurate title would be Administrative Specialist. Robin has taken over for Steven Ferrucci and the two of them have worked hard to make that transition seamless for us. We once again thank Steven for all he's done and welcome Robin to our team!

AWM has grown tremendously in the number of programs and initiatives we mount each year. As is typical for advocacy nonprofits, the Executive Director has often been simultaneously a paid staffer and unpaid volunteer, putting in far more hours than we compensate her for. Recently it felt as if this imbalance was getting out of hand—that we were requiring too much volunteerism from a paid staffer. As appropriately recognizing and compensating women with PhDs in mathematics is one of the core goals of AWM, we must do our best in compensating our staff. To this end, we have increased the expectation of work and the compensation for the ED going forward. While this was not an easy decision to make from a financial standpoint, we deemed it necessary to support our organization and recognize the professionalism of our paid staff. We remain an organization overwhelmingly run by volunteers, and that remains a key part of our vision. We call on our members for their continued support through donations and most especially time. The expertise of our staff, both Executive Director and Administrative Specialist, will help enable the most effective use of the time and energy of our volunteers.

Ruth Haas

After many years of incredible service to the AWM in so many capacities, Marie Vitulli has announced that she is stepping back from the organization. We deeply value all the good work she has done for AWM over the years. A great big thank you to Marie. Denise Rangel Tracy will be taking over the role of media coordinator starting April 1 (no joke!).

As always, I appreciate hearing what's on the minds of our members. I look forward to hearing your thoughts and working with our community.

Ruth Haas
March 26, 2020
Mānoa, HI

AWM Will Be *50* in 2021!

Can you believe that the AWM is approaching its 50th anniversary?! From its small but powerful beginning in 1971, to the expansive network in the mathematical sciences that it is today, AWM has a lot to celebrate in 2021! The AWM 50th Anniversary Organizing Committee has kicked off, serving to coordinate activities to celebrate where we have been and where we are going. Interested in joining the committee? Email Emille Lawrence at edlawrence@usfca.edu if you want to lend your energy and expertise.

PRESIDENTS' REFLECTIONS

Column Editors: Janet Beery, University of Redlands; Francesca Bernardi, Florida State University; Kayla M. Bicol, University of Houston; Cathy Kessel, consultant

This is the ninth 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. As always, the *AWM Newsletter* welcomes your suggestions and comments in letters to the editor.

Carol Wood was the tenth president of AWM (1991–1993). Her article mentions Louise Hay and ninth and eleventh presidents Jill Mesirov (1989–1991) and Cora Sadosky (1993–1995). For more about Wood, Hay, Mesirov, and Sadosky see their Wikipedia entries and https://medschool.ucsd.edu/about/leadership/Pages/jill-mesirov.aspx.

1991–1992 plus and minus ε

Carol Wood

Combining mathematics and a young family filled my life in 1990. However, fate was cruel to the wonderful Louise Hay, who would have become AWM president in 1991 but for the recurrence of breast cancer. She died in October 1989. (Those of us of a certain age are led often to reflect on losses due to breast cancer, many of which current medical treatments would have prevented.)

At the time I was on the AWM Executive Committee and Jill Mesirov was president. Previously I had worked with AWM president Rhonda Hughes to bring about her great idea of travel grants for women, one of the best things AWM has done. The NSF couldn't make such small awards, but we were happy to do so, and to witness their positive impact.

My PhD was granted in 1971, the year AWM was founded. When asked to step in for Louise, I felt I had no choice but to give back to an organization that had been important to me for two decades. I quickly saw the consequences, good and bad, of being the "official" woman in mathematics—not the one that the top schools wanted to hire but a spokesperson for women. There was an increase in awareness that women should be included at the table. While I had come to understand that AWM was largely a single issue organization, one in which the AWM president was expected to be strongly engaged in the organizational work, it seemed to me that other larger organizations were seeing an increase in the level of engagement of their leaders. Certainly the two with whom I interacted often, Michael Artin as president of the AMS and Deborah Haimo of the MAA, were much more than figureheads. Mike told me that doing his job right required him to travel at least every other weekend. The two of them were very welcoming to me, as was Lida Barrett, past president of MAA, and they included me in policy matters, including some delicate ones. This meant more work for me, but I also had some fun at the table. Almost every woman has had the infuriating experience of making a suggestion at a meeting which is ignored until the same suggestion is made by a man. I read the claim that men do not tolerate being interrupted by women. In a particularly boring policy meeting involving someone I regarded as full

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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

See awm-math.org for details on free ads, free student memberships, and ad discounts.

Executive Sponsorship Levels
$5000+
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$1000–$2499

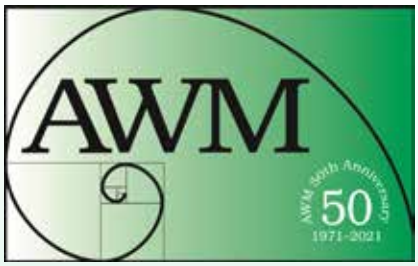
Print Subscriptions and Back Orders—Regular and contributing members living in the US may elect to receive a print version of the *Newsletter.* Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for $75/year. Back orders are $20/issue plus shipping/handling ($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 Administrative Specialist, 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. Send all book review queries/material to Marge Bayer, bayer@math.ku.edu. Send all education column queries/material to Jackie Dewar, jdewar@lmu.edu. Send all media column queries/material to Sarah Greenwald, appalachianawm@appstate.edu and Alice Silverberg, asilverb@math.uci.edu. Send all student chapter corner queries/material to Emek Kose, student-chapters@awm-math.org. Send everything else, including ads and address changes, to AWM, awm@awm-math.org.



ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM ONLINE

The *AWM Newsletter* is freely available online.

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

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

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AWM DEADLINES

AWM Fellows: May 30, 2020
AWM Louise Hay Award: May 30, 2020
AWM M. Gwenyth Humphreys Award: May 30, 2020
AWM Student Chapter Awards: May 30, 2020
AWM Travel Grants: May 30 and October 1, 2020
RCCW Proposals: July 1, 2020
AWM Workshop at JMM: August 15, 2020
AWM-AMS Noether Lecture: October 1, 2020
AWM-MAA Falconer Lecturer: October 1, 2020
AWM-SIAM Sonia Kovalevsky Lecture: October 1, 2020
AWM Alice T. Schafer Prize: October 1, 2020
AWM Dissertation Prize: October 1, 2020
Ruth I. Michler Memorial Prize: October 1, 2020

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PRESIDENTS' REFLECTIONS *continued from page 3*

of himself for little reason, I decided to test this claim. It took only a couple of tries before my clueless victim was red in the face and sputtering with rage!

The AWM presidency is a four-year commitment, with first year as president-elect and final year as past president. Thus I gained the friendship of Jill Mesirov and Cora Sadosky, my successor as president. My first task, in a deal with Jill Mesirov, was to organize a panel at the International Congress of Mathematicians of 1990 in Kyoto. Some of the women mathematicians from Asia whom I approached to serve on the panel declined, citing vulnerability to prejudice, but ultimately the panel represented women from around the world and was well attended. Getting AWM's panel a venue at ICM was made possible by the Kyoto staff, my first lesson about the warm support AWM received from women working behind the scenes in mathematical organizations. A special shout out goes to the memory of the AMS's Hope Daly, the head of the AMS meetings departments, who never said no and helped AWM in many, many ways.

As part of our deal, Jill organized an AWM workshop at the JMM in 1991, a lively celebration of our 20th anniversary which included lectures by prominent women, as well as recognition of the extraordinary service of Anne Leggett (newsletter editor) and Bettye Anne Case (meetings coordinator). The AWM workshops at the JMMs grew out of this 1991 celebration and continue to showcase the work of early-career women mathematicians.

I also inherited the *Careers That Count* booklets from Jill. This booklet proved to be a widely popular and useful description of possible careers in mathematics (with all the examples just happening to be women). Requests flew in from mathematics programs, and—again with the help of women—packets of the booklets were mailed regularly from my Wesleyan office.

Practical matters resulting from AWM's expansion occupied much of my time. Wellesley College, longtime home of Alice Schafer, the second president of AWM, had provided AWM with free office space for years, mostly in the Wellesley infirmary, and ultimately in a temporary arrangement with the Wellesley mathematics department. Time ran out. I have an indelible memory of taking my daughter to college and standing on a campus corner at a public phone (remember those?) deciding where to send the moving truck. The AMS would have hosted us, but I was reluctant for AWM to be seen as too cozy with another organization. At the eleventh hour, Richard Herman, mathematician and dean of the College of Computer, Mathematical and Physical Sciences at the University of Maryland, offered us space, and the truck headed south. Also, we had four treasurers in rapid succession, including one overwhelmed by the expansion, and another deciding it was not the great career move she had anticipated, leaving me as *de facto* treasurer for some months. By 1992 the job landed in the steady hands of Judy Green, one of the founders of AWM and my sister-in-law. The executive director position also changed hands after the move to Maryland, and Dawn Wheeler brought her administrative energy to us, working alongside Judy to get AWM's records into a professional state. AWM has always depended on volunteer efforts, and almost everyone said yes to AWM. However, AWM was being asked to do many things, and the notion that women should be self-sacrificing for the good of the organization struck me as outdated and counterproductive for careers. Thus arose the necessity of including staff support funds in our proposals to various

agencies. Creating appropriate budgets and producing and copying proposals for my successor Cora Sadosky was work I could do, not glamorous but essential. Since Jill had provided essential support for me during a family crisis in summer 1991, I was happy to be able to pay help forward to Cora.

Another singular moment for AWM came in early 1992 when the EC was being pressured to weigh in on a high-profile tenure case, one on which the community was badly divided and which threatened the health of our "one issue" organization. A court action threatened, something many of us felt would work against future hiring of women. It was with profound admiration that I witnessed the drafting of AWM's statement on dispute resolution. The statement was informed by the wisdom and experience of EC members, most especially Mary Gray and Eleanor Jones. It articulates the important considerations, while noting that it was not appropriate for AWM to take a stand on a case. While I do not know, and never asked to know, the details, the hot tenure case was resolved favorably for the candidate by her mathematics department after consultation with an external committee of mathematicians, an outcome consistent with AWM's resolution. The forging of this resolution was by far the finest instance of a committee in action I have ever witnessed! The policy statement has survived and has been reaffirmed over the years.[1]

AWM has always been concerned with how women mathematicians are portrayed, and especially with debunking the stereotypes presented to young girls. An example arose during my presidency when Talking Barbie dolls arrived on toy store shelves early in 1992. Each talking Barbie came with four phrases, selected randomly from a pool of 270. Some examples: "Let's go to the mall" and "Put on music": fine. "Math class is tough": *not* fine. The president of Mattel was a woman, making it all the more frustrating to be stonewalled in my attempts to reach her. An outcry came from multiple quarters; according to news reports, the American Association of University Women got through to Mattel and the math class phrase was removed.

In preparing this article, I reread the AWM newsletters of 1990–1993. This was a trip down memory lane for me, as well as a bittersweet reminder of my dear friend Cora Sadosky who died in 2010. There are many things I recall about Cora and AWM, but here is the most indelible one. Cora was a fierce advocate for young women, and an elegant role model. Her response to a recurring life-style question was firm and on point: fine if you want to marry, but take care *whom* you choose to marry! To me, she was emphasizing something which, like the dispute resolution statement, has stood the test of time.

[1] See https://awm-math.org/policy-advocacy/policy-statements/.

ADVERTISEMENT

The Institute for Computational and Experimental Research in Mathematics

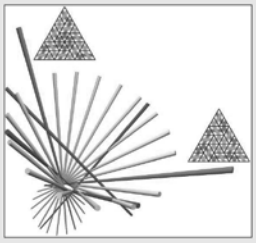
SPRING 2021 SEMESTER PROGRAM

Combinatorial Algebraic Geometry
February 1 – May 7, 2021

Organizing Committee

Anders Buch, Rutgers University
Melody Chan, Brown University
June Huh, Institute for Advanced Study and Princeton University
Thomas Lam, University of Michigan
Leonardo Mihalcea, Virginia Polytechnic Institute and State University
Sam Payne, University of Texas at Austin
Lauren Williams, Harvard University

Program Description:



Combinatorial algebraic geometry comprises the parts of algebraic geometry where basic geometric phenomena can be described with combinatorial data, and where combinatorial methods are essential for further progress.

Research in combinatorial algebraic geometry utilizes combinatorial techniques to answer questions about geometry. It also uses geometric methods to provide powerful tools for studying combinatorial objects. Much research in this area relies on mathematical software to explore and enumerate combinatorial structures and compute geometric invariants. Writing the required programs is a considerable part of many research projects. The development of new mathematics software is therefore prioritized in the program.

This program will bring together experts in both pure and applied parts of mathematics as well as mathematical programmers, all working at the confluence of discrete mathematics and algebraic geometry, with the aim of creating an environment conducive to interdisciplinary collaboration.

Details at: https://icerm.brown.edu/programs/sp-s21/

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Darla Kremer. Image © 2020: Andrew Whelan

AWM Welcomes Darla Kremer and Robin Nelson

AWM is pleased to welcome Dr. Darla Kremer as its new Executive Director to succeed Karoline Pershell, who has served as AWM Executive Director since 2018. Kremer will assume the role on May 1, 2020.

Kremer's PhD is in algebraic and enumerative combinatorics from the University of Iowa. She has been a faculty member at Murray State University and at Gettysburg College. She held visiting positions at the University of Michigan, at Massachusetts Institute of Technology and at the George Washington (GW) University, where she taught in the GW Summer Program for Women in Mathematics. Before joining the AWM, Darla worked for the AMS in various capacities. She spent ten years working as an Associate Editor and Managing Editor for Mathematical Reviews, where she led efforts to modernize the workflow in response to an increase in electronic publications and edited reviews in almost every subject area listed in the MathSciNet database. After serving two years as a program officer in the Division of Mathematical Sciences at the NSF, she moved to North Carolina and took a position on the governance side of the AMS, working as Program Director for the office of AMS Secretary Carla Savage. In this role, Darla managed many of the committees of the AMS, including governance, prize, policy and program committees, and participated in the establishment of policies and procedures of the Society and its membership. Darla's AWM office will be located in the Mathematics Department at North Carolina State University.

She says:

> I am excited to join the AWM leadership team as the Association marks its first fifty years. I look forward to learning from and supporting the community of volunteers committed to building a just and equitable community for women and girls in the mathematical sciences. I have always tried to support my colleagues, especially women and girls, by recognizing their successes and assisting them in attaining their goals. It's nice to have the opportunity to bring my administrative experience to bear on an organization whose mission is so closely aligned with my own interests.

AWM is also pleased to welcome Robin Nelson as its new Administrative Specialist (AS) to succeed Steven Ferrucci, who has served as AWM Managing Director since 2018. Nelson has already assumed her role.

Nelson comes to the AMS/AWM community with a diverse multi-industry expertise in operations, project and process management. As a seasoned Office Manager/Office Administrator, she enjoys providing "behind the scenes" organizational support.

As the AS for the AWM, she looks forward to providing great customer service support to the various programs, committees, and members of the AWM community.

She's a graduate of UMass Boston with a BA in Community Studies.

In her spare time, she is an avid shopper and LOVES to cruise! (And will again when the world is no longer suffering from a pandemic.)

Robin Nelson

Letter to the Editor

Here are two facts. (1) Increasingly, new math PhDs taking first jobs in the US do so outside math departments. (2) Although enrollments in undergraduate mathematics are growing, the full-time doctoral tenure-track faculty is not. I hope that a reader of this *Newsletter* will be moved to explore further what these facts mean for women in math, and for early-career women in particular.

I use acronyms and abbreviations to save space. "TT" and "NTT" stand for tenure-track and non-TT. "Math" will refer to both math and applied math, but not to statistics or biostatistics.

Topic 1: The AMS Annual Surveys provide data on PhDs from US math departments known to have taken their first jobs in the US (about 73% of all US math PhDs) [EN]. During the years '11–12 through '15–16, the percentage of these new PhDs not going to math departments grew steadily from 38% to 46%. (More recent data is not yet available.) Absolute numbers also increased steadily. These jobs outside math departments were in business, industry, and government (BIG); in "other academic" departments (OA), and in research institutes (R)—henceforth "BIGOAR." The OA departments were in universities or medical schools, but not in math, stat, or biostat. Jobs in OA were in a broad variety of fields, e.g., genomics, robotic prosthetics, nutrition, and pharmaceuticals.

Women comprised about 25% of the new PhDs from US departments taking first jobs outside math departments. This fraction is close to the 26% of new PhDs awarded in the US to women in 2016. Two questions (among many) worth exploring: What considerations lead women to enter jobs outside math departments? What will enhance women's preparation to thrive in such careers?

A few considerations I've heard mentioned: A desire to apply mathematical knowledge and habits-of-mind to benefit society directly. The overlap of a long "apprenticeship" in academia (college, grad school, postdocs, and winning tenure) with optimal child-bearing years. The possibility that some jobs in BIGOAR, although certainly not all, offer better pay, better work-life balance, more respect and chances for professional advancement.

Topic 2: The current faculty structure in math departments impacts not only early-career women but also women students. How should early-career faculty, especially those off the tenure track, be prepared and mentored so that they and their students can succeed in the classroom?

My assertion (2) is based on AMS Annual Reports over the years '11–12 through '16–17. Full-time tenure-track employment of math PhDs in doctoral and bachelors math departments has been nearly constant. It shows a slight downward trend in masters departments [DP]. Enrollment in math courses at and above the level of calculus increased sharply after the recession of 2008 [CBMS]. AMS surveys do not report separately on lower-division and upper-division enrollments. They do, however, report the increasing numbers of students who have completed requirements for an undergraduate mathematics major. Hiring of full-time NTT doctoral faculty reflects, in part, the demand for instruction in upper-level math courses by students pursuing math majors and strong math minors.

Postdocs bring "new blood" for research groups as well as for instruction. Although traditionally postdoc jobs were understood to provide training for research careers in doctoral departments, only 25% get such a TT job immediately after completing their postdoc. About another 18% take a second postdoc. The rest are scattered among the following: TT jobs in non-PhD departments, NTT jobs, jobs outside the US, BIGOAR, and "other/unknown" [CBMS]. We don't know whether women thrive as postdocs or in subsequent jobs.

Women PhDs hold about 20% of postdoctoral positions and about 37% of other full-time non-tenure-track jobs in US math departments. (Postdoc jobs are filled by new and not-new PhDs from the US and around the world.) Many departments have "career ladders" for full-time teaching-focused (FTTF) faculty. We have little reliable qualitative or quantitative information about these tracks or about FTTF faculty on short-term appointments. While their focus is teaching, FTTF faulty also advise, develop courses, train TAs, mentor peers, and may participate in department and campus governance [CBMS]. Policy made by TT faculty without broad input may have bad outcomes, however unintended.

Postdocs and FTTF faculty may not be able to advise undergrads, especially women, effectively about graduate study and later math-based employment. Not all undergrads can take courses from senior faculty or enroll in REUs. Graduate admissions committees may not respect letters from NTTs. Changes in faculty structure may unintentionally restrict the flow of women into math.

Personal Concluding Statement[1]: Our profession bases its claims for funding (or should!) not only

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[1] I hope to place an article with data tables and a fuller discussion of these and related issues somewhere online.

LETTER TO THE EDITOR *continued from page 7*

on brilliant theorems but also on our education of our nation's workforce. Mathematical habits-of-mind (clarifying assumptions and technical vocabulary, teasing out feasible research problems, exploring special cases analytically and numerically, justifying results rigorously, identifying the range of applicability of results) are crucial for getting and keeping jobs in both math departments and BIGOAR. AWM has done outstanding work in promoting the participation and advancement of women in math. Success leads to further challenges. We need more information than we currently have about early career paths of women. Let's get it and use it for further progress. If AWM cannot undertake this task, I hope an individual will do so. My age and eyes prevent me doing so alone.

References

[EN] Employment of New PhDs, ams.org/profession/data/annual-survey and links by topic & years

[DP] Departmental Profiles, ams.org/profession/data/annual-survey and further links by topic & years

[CBMS] Conf. Board Math. Sciences, ams.org/profession/data/cbms-survey/cbms2015, pp. 80–84.

Amy Cohen
Professor Emerita
Rutgers University

CALL FOR NOMINATIONS

2021 M. Gweneth Humphreys Award

The Executive Committee of the Association for Women in Mathematics has established a prize in memory of M. Gweneth Humphreys to recognize outstanding mentorship activities. This prize will be awarded annually to a mathematics teacher (of any gender) who has encouraged female undergraduate students to pursue mathematical careers and/or the study of mathematics at the graduate level. The recipient will receive a cash prize and honorary plaque and will be featured in an article in the *AWM Newsletter*. The award is open to all regardless of nationality and citizenship. Nominees must be living at the time of their nomination.

The award is named for M. Gweneth Humphreys (1911–2006). Professor Humphreys graduated with honors in mathematics from the University of British Columbia in 1932, earning the prestigious Governor General's Gold Medal at graduation. After receiving her master's degree from Smith College in 1933, Humphreys earned her PhD at age 23 from the University of Chicago in 1935. She 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 Woman's College, recognizes her commitment to and her profound influence on undergraduate students of mathematics.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted. Nominations for members of underrepresented minorities are especially encouraged. The nomination documents should include: a nomination cover sheet; a letter of nomination explaining why the nominee qualifies for the award; the nominee's vita; a list of female students mentored by the nominee during their undergraduate years, with a brief account of their post-baccalaureate mathematical careers and/or graduate study in the mathematical sciences; and supporting letters from colleagues and/or students. At least one letter from a current or former student of the candidate must be included.

Nomination materials for the Humphreys Award shall be submitted online. See the AWM website at awm-math.org for nomination instructions. Nominations must be received by **May 30, 2020** and will be kept active for three years at the request of the nominator. For more information, phone 401-455-4042, email awm@awm-math.org or visit https://awm-math.org/awards/humphreys-award/.

STUDENT CHAPTER CORNER

Coordinator: Emek Kose, student-chapters@awm-math.org

Women in Math Strategize Success

Cammie Newmyer, Emily Randono, and Danielle Belter, Officers of the UCCS AWM Student Chapter

The University of Colorado Colorado Springs Mathematics Department conducted a Women in Mathematics Panel on November 1, 2019. The event was organized by Professor Oksana Bihun. As a successful woman in mathematics, Bihun seeks to improve the experiences of all female mathematicians through collaboration and support. In this vein, she not only organized the panel, but also recruited several female mathematics undergraduate and graduate students to start the UCCS student chapter.

The panel was moderated by Jessi Smith, a Professor of Psychology and Associate Vice Chancellor for Research. Her research specializes in social psychological aspects of gender and culture that advance the success of people at risk in education, business, and health. Her work includes longitudinal analyses of Native American and Latino student experiences in STEM; cross-sectional analyses of women's motivation for STEM; and experimental interventions designed to change situations to foster diversity, equity, and inclusion.

The panel consisted of three women mathematicians:

Jenny Dorrington earned her PhD in algebraic topology from Northwestern University. Her current interests include geometry, differential geometry, and the history of mathematics. As the director of the Excel Mathematics Center at UCCS, she has many opportunities to mentor undergraduate and graduate students. She works to promote an environment of inclusivity in the center, making it a space where everyone interested in mathematics can work together.

Jane McDougall studied complex analysis at Northwestern University. After earning her PhD, she began teaching at Colorado College where her interests expanded to include geometry, modeling, and statistics. In 2012, McDougall contributed chapters and a cover design to a text titled *Explorations in Complex Analysis.* In 2014, she proved a generalization of Ptolemy's theorem, now known as McDougall's Circle Theorem.

Theresa Killebrew earned her MA in mathematics at Arizona State University and her MAS in applied statistics from Colorado State University. Her interests include undergraduate education and data analysis. After teaching mathematics at Mesa Community College in Arizona for 10 years, she moved to Colorado Springs to become an instructor at UCCS. Most recently, she has been consulting with a local software company to provide data analytics training.

This strong group of local women mathematicians addressed issues concerning the career paths women mathematicians have in common, the motivations of women to persevere in the field of mathematics, and ways women help themselves and other women to pursue excellence in mathematics. AWM UCCS student chapter officers Cammie Newmyer, President, Emily Randono, Vice-President/Treasurer, and Danielle Belter, Secretary, provided the following panel summary.

The panel focused on one idea: how to succeed as women in the field of mathematics. The first step is choosing to study mathematics. Each of the panelists shared the gravitation they felt toward mathematics because of its challenging nature. As Theresa Killebrew explained, "There is something unique about the way that math makes you think in a different way than you would have at first." The panelists were asked about their relationship to mathematics during their studies, and each spoke of the hurdles they had to overcome.

Jane McDougall mentioned Imposter Syndrome, which is common among students studying mathematics

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Women in Mathematics Panel; photo by Cammie Newmyer

WOMEN IN MATH STRATEGIZE SUCCESS

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precisely because of the nature of the subject. Contrary to popular belief, mathematical skills are not innate and must be worked on consistently. Dorrington's statement rang as profound: "The nature of solving problems is fail and fail again" and to allow your failures to shape you, "as within any aspect of life, it is not the failure that defines us, but rather our response to failure." McDougall added her perspective of celebrating errors, something she did in her graduate work instead of succumbing to discouragement. Possessing a growth mindset and looking at failures from a value-added perspective both play a large part in long-term success and persistence in the field.

Each panelist described the importance of finding an effective mentor early in her career. Theresa Killebrew advised attendees that students should never be afraid to open up and ask a faculty member for help. The importance of networking, interviewing skills, and leveraging allies were also mentioned as ways for students to positively impact their learning goals and future careers.

The overwhelming consensus of the panel was to be bold and to be real. It is important to "be authentic, know yourself, and have the confidence to stand up for your convictions." To students who are told they are not good enough or that they "can't do it," the panelists gave the following advice: "You are not always going to be able to change someone's mind, but you can change yourself while remaining authentic." Women in mathematics tend to face particularly difficult situations with institutions, professors, and authority. The panel mentioned several strategies to have an asset-based approach to build success and resolving conflict: listen to hear, leverage groups to assist, remain authentic, seek out opportunities, and speak for more than just yourself when working toward systemic change.

As with many math problems, there is not one single road that will lead all aspiring mathematicians to success. Each person will have their own unique challenges they must overcome. The panel expressed uniformity in emphasizing the importance of self-care along the journey. Staying true to yourself, staying the course, and developing your own road to success will be the pathway that leads to the most fruitful outcomes.

CALL FOR NOMINATIONS

The Association for Women in Mathematics Dissertation Prize

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

To be eligible for the award a graduate student must have defended her dissertation within the last two years (October 1, 2019 to September 30, 2021). She must either be a US citizen or have a school address in the US. The Prizes will be presented at the AWM Reception and Awards Presentation at the Joint Mathematics Meetings in Washington, DC.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted. Nominations for members of underrepresented minorities are especially encouraged. The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional mathematical research presented in the dissertation, 2) a curriculum vitae of the candidate not to exceed three pages, 3) a copy of the dissertation and 4) two letters supporting the nomination. Nomination materials should be submitted online at MathPrograms.org. The submission link will be available 45 days prior to the nomination deadline. Nominations must be received by **October 1, 2021**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit awm-math.org/awards/awm-dissertation-prize/ for more information.

AWM Essay Contest

Congratulations to all the winners of the 2020 AWM Essay Contest: Biographies of Contemporary Women in Mathematics! Many thanks to Johanna Franklin, Hofstra University, contest organizer, and to the other members of the committee, along with the many volunteer judges. We are also grateful to Math for America for their sponsorship of this contest.

The 2020 Grand Prize essay appears after the list of this year's winners. To see the other prize-winning essays, visit https://awm-math.org/awards/student-essay-contest/2020-student-essay-contest-results/.

GRAND PRIZE WINNER

"A Lonely Road to Loving Math," Lu Paris, Head-Royce School (The essay is about Marissa Kawehi Loving, Georgia Institute of Technology.)

Undergraduate Winner

"From Mexico to the World: Dr. Villafuerte's Mathematical Adventure," Ximena Mercado García, The University of Texas at Austin (The essay is about Laura Villafuerte Altúzar, The University of Texas at Austin.)

Undergraduate Honorable Mentions

"For the Love of (Sharing) Math," Mary Versa Clemens-Sewall, Dartmouth College (The essay is about Nadia Lafrenière, Dartmouth College.)

"Cindy Lawrence: Leading a Math Museum & Leaving a Legacy," Vanessa Sun, Hunter College, CUNY (The essay is about Cindy Lawrence, National Museum of Mathematics.)

Grades 9–12 Winner

Same as Grand Prize Winner.

Grades 9–12 Honorable Mention

"Numbers and Expressions that Dance in the Sky and Kiss Your Lips," Savannah Mercedes Hernandez, Marietta High School (The essay is about Tynisha Robinson, Marietta City Schools.)

Grades 6–8 Winner

"Orange Crocs are the New Pocket Protector," Farren Stainton, Woodstock Union High School and Middle School (The essay is about Heather Vonada, Woodstock Union High School and Middle School.) Note: Stainton also won this category in 2019.

Grades 6–8 Honorable Mentions

"Mapping Climate Change with Math," Leigh Grace Eggleton, Frances C. Richmond Middle School (The essay is about Lori Siegel, Climate Interactive.)

"Joeanna McPherson: Beyond the Walls of the Classroom," Maren Irizarry, Pierce School (The essay is about Joeanna McPherson, Pierce School.)

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 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 1**, **May 30**, and **October 1**.

A Lonely Road to Loving Math

Lu Paris, Head-Royce School

Dr. Marissa Kawehi Loving studies the topology of surfaces, and, in her own words, "the properties of naturally associated groups," but, growing up, she never had to question whether she belonged to the groups around her. Homeschooled with her family and then studying as an undergraduate at the University of Hawai'i at Hilo, Loving had always felt like she was welcome among her peers. "Hawai'i is often called the minority majority state," she chuckles, "and so, growing up and in college, I never felt 'othered.' There were always lots of brown women, always lots of brown people."

She was quickly recruited and floated off to the PhD program in mathematics at the University of Illinois Urbana-Champaign on a bubble of optimism and success, buoyed by having earned a prestigious National Science Foundation fellowship. But as soon as she arrived at the largely white campus, people made it clear she was less than welcome. Her classmates were incredulous and derisive about her presence and grant, claiming her race and gender, not her talent, had gotten her where she was. And it wasn't just classmates. When she told a trusted professor she wanted to pursue a career in research, he scoffed at her. "He said that he didn't think I had it in me to write a thesis good enough to do research," Loving admits. "I believed him," she states somberly. In this new realm, faculty and fellow grad students alike questioned her, belittled her, and worst of all, ignored her.

Plagued by feelings of shame and illegitimacy and feeling like she did not belong there, she turned to her department's chapter of the AWM for support, but discovered that the white women who dominated the club didn't want to hear about issues exacerbated by racial prejudice. "There was no room to talk about the intersection of my identities," Loving states, and she left the club feeling more isolated than ever.

But then, at a conference one day, a voice reached through the isolation that surrounded her. Piper H, a black, female mathematician, gave a talk about mathematics and racism, and for the first time, Loving felt heard. "I was just seeing all of these events as indicating how terrible I was, and how bad I was at math," she confesses. "[The talk] gave the

CALL FOR NOMINATIONS

The 2021 Etta Zuber Falconer Lecture

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

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

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted. Nominations for members of underrepresented minorities are especially encouraged. The letter of nomination should include an outline of the nominee's distinguished contributions to the mathematical sciences or mathematics education and address the nominee's capability of delivering an expository lecture. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **October 1, 2020** and will be held active for two years. If you have questions, phone 401-455-4042, email awm@awm-math.org or visit https://awm-math.org/awards/falconer-lectures/ to learn more.

experiences I was having names and made visible to me the underlying structures that were manifesting all these things that I just assumed were isolated incidents happening to me. It just felt like a relief."

Loving had realized she was not alone, but she still struggled. She tried to make progress on her thesis, but the critical voice of her professor echoed in her head, and she found herself unable to open up to her thesis advisor and get real work done. The self-doubt and stymied progress were overwhelming, and she left for winter break unsure if she was coming back. She might not have, if it weren't for what her department's graduate director sent out on Martin Luther King Day: a speech originally written and delivered by Francis Su, entitled "Mathematics for Human Flourishing." As soon as she got back to campus, Loving burst into her thesis advisor's office. "I need to read you something," she said, dizzy with hope and fear. She read him this excerpt from Su's speech:

> Because we are not mathematical machines. We live, we breathe, we feel, we bleed. If your students are struggling, and you don't acknowledge it, their education becomes disconnected and irrelevant. Why should anyone care about mathematics if it doesn't connect deeply to some human desire: to play, seek truth, pursue beauty, fight for justice? You can be that connection.

With those words, the barrier broke. She told him about all the prejudice she'd faced from other students and about the near-shattering blow to her confidence delivered by her professor's dismissive comment. He believed her. He refuted the crushing comments, telling her, "No one can tell what kind of mathematician you can be until you become it."

The prejudice and harm Loving and other women of color face did not end that day. But a new chapter opened for Loving. With a newfound feeling of belonging as a mathematician, she completed her thesis and was awarded an NSF Postdoctoral Research Fellowship to work at Georgia Tech. Now, she doesn't just limit group theory to her research. Instead, she works with Justin Lanier on SUBgroups, online support groups that connect first-year math graduate students in order to help them break through the same feelings of inadequacy and isolation Loving suffered. "Mathematics is based on the connections you have with other people," Loving states. "Almost all math today is done collaboratively. I'm a Native Hawaiian woman. I'm the first Native Hawaiian woman to get a PhD in mathematics. A big value of mine, as a Hawaiian, is community, and so I see this very much as a coming together of my values as a person and as a mathematician."

"The idea of rehumanizing mathematics in every way encompasses what I want to be ... and what I want my community to look like." Loving's journey shows one way to do just that: embrace groups, but don't let anyone define you by them. Wherever you can find connection, you can belong.

CALL FOR NOMINATIONS

2021 Louise Hay Award

The Executive Committee of the Association for Women in Mathematics has established the Louise Hay Award for Contributions to Mathematics Education, to be awarded annually to a woman at the Joint Prize Session at the Joint Mathematics Meetings in January. The purpose of this award is to recognize 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.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted. Nominations for members of underrepresented minorities are especially encouraged. The nomination documents should include: a one to three page letter of nomination highlighting the exceptional contributions of the candidate to be recognized, a curriculum vitae of the candidate not to exceed three pages, and three letters supporting the nomination. It is strongly recommended that the letters represent a range of constituents affected by the nominee's work. Nomination materials for the Hay Award shall be submitted online. See the AWM website at www.awm-math.org for nomination instructions. Nominations must be received by **May 30, 2020** and will be kept active for three years. For more information, phone 401-455-4042, email awm@awm-math.org or visit https://awm-math.org/awards/hay-award/.

BOOK REVIEW

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

Invisible Women, by Caroline Criado Perez, Abrams Press, NY, 2019.

Reviewer: Barbara Lee Keyfitz, The Ohio State University, keyfitz.2@osu.edu

The subtitle of this book, "Data Bias in a World Designed for Men," gives a brief abstract of its subject. Data bias has been in the news recently. For example, the February 2020 issue of *Consumer Reports* has an article titled "Why Cars are Less Safe for Women," which quotes some of the same sources given in the book under review. The explanation, given clearly in both places, is that crash-test dummies are not built to women's specifications. If you are not sure why this might matter, then Caroline Criado Perez lists a number of ways in which women's bodies react differently from men's to crash impacts: It's not just height and weight but distribution of tissue and muscle mass, and even the relative length and strength of women's legs compared to men's. Who knew? And who cared? According to Criado Perez, safety standards for automobiles do not currently require performance tests using anatomically female crash-test dummies, except, sometimes, in the passenger seat. "Too expensive."

I already knew this, from reading *Consumer Reports*, and perhaps many readers of this review know it also, but I use it as an example of Criado Perez's thesis: One sense in which women are "invisible" is that data is not collected and hence not available on topics in which women might be expected (or might even not be expected, because no one has thought about it) to differ from men. There are many more examples. One of the first presented, which I found quite charming because in this case the problem has been solved, concerned priorities for clearing the streets of snow in Karlskoga, a small town in the middle of Sweden. It turned out, when the town administration looked at it in detail, that the policy in use, to clean the streets first and footpaths second, was a disadvantage to women, who were more likely to move on foot, often pushing a stroller. When

CALL FOR NOMINATIONS

The 2020 Kovalevsky Lecture

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

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

The lectureship may be awarded to anyone in the scientific or engineering community whose work highlights the achievements of women in applied or computational mathematics. Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be an additional letter of support. Nominations for members of underrepresented minorities are especially encouraged. The nomination must be accompanied by a written justification and a citation of about 100 words that may be read when introducing the speaker. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be received by **October 1, 2020** and will be kept active for two years.

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

the town changed its policy, it actually saved money because there were fewer injuries caused by falling on icy and slippery paths.

Needless to say, most of the examples in this book are not as cheery as this one. The evidence, though, is well-documented and well-organized, with 70 pages of endnotes (about equally divided between written material and information available on the Web) and a 20-page index, which I found quite useful. The overarching theme that unites the five sections is that, over and over, studies on issues, big and small, in which males and females are affected differently do not collect data on women, or do not present their results disaggregated by gender. As a result the efficacy of medications, occupational safety, and many other things related to health fail to give women the information and the support women need.

The arguments in the book are most compelling when they stick to this sort of misuse of data and of data collection. Other chapters focus on the fact that women contribute a good deal more to civilization through unpaid labor than do men. Through childcare and housework, caring for family and looking after the household shopping, women may put in many more hours a week than men in just keeping things going. This doesn't seem primarily to be a question of data; the data are there. Criado Perez does present arguments that measuring GDP solely by the paid labor that goes into products and services distorts the value of a country's economy, and this can be seen as a question of data, though the bias is less in what is measured than in what is valued. In the same vein, Criado Perez, who is British, argues that the US tax code, which encourages couples to file jointly, discriminates against women. (I found the reasoning in this argument somewhat tendentious, but it might resonate with someone whose partner makes fun of them for being in a disadvantageous tax bracket.)

In presenting its thesis, the book examines first "Daily Life," exemplified by the snow-clearing story, and then "The Workplace." Here the themes, familiar to most of us, are, first, that work that is primarily done by women is regarded as less valuable. (I think we all have been taught that in the early days of computing, programmers were mainly women and were poorly paid; now they are mostly male "software developers" and are paid much better.) Then, second, we have experienced the pressure that if we wish to succeed then we should behave more like men. (Criado Perez calls this the "Henry Higgins Effect"; you should be able to figure out why.) Much of this chapter, which also discusses the discovery of hidden bias (such as learning that blind auditions resulted in many more women being hired into the New York Philharmonic), is not specifically about data bias.

The third section, "Design," is particularly interesting. I learned that voice-recognition systems like Siri are programmed to more easily recognize tones in the male register and have difficulty understanding women's speech unless women disguise their voices. This sort of failure seems to me (I didn't know it because I don't use Siri) simply weird. In fact, this is the area in which the commercial world is now finally becoming aware of data bias. A number of examples recount how products brought to market have failed to win acceptance because their designers, male, did not take into account some fundamental requirements of the women who would be buying and using them. Emergency housing without kitchens was one example; stoves designed (or mis-designed) for village households in India was another. In the last year, the point has been taken up in the popular press, possibly as a result of the exposure in this book. My reaction is somewhat cynical. Finally, when data bias affects the bottom line, the world may take note.

A fourth chapter gives many examples of the medical phenomenon noted above: in testing new drugs, clinical trials often either omit women altogether from their studies or fail to note whether the efficacy of a drug depends on the sex of the patient. A horrifying example, familiar to my generation growing up in Canada, was the failure to discover the effect of thalidomide on fetal development. The US was spared this tragedy because the more conservative FDA did not approve the drug. On the other hand, at a somewhat earlier time, it seems that no one predicted that DES would render the daughters of the pregnant women taking it susceptible to cancer when they reached adulthood. This chapter is not cheerful reading.

Finally, in the last two sections, the book turns to the perception of women in public life, and the particular victimization of women by violence, war and even natural disasters. Why natural disasters? Some of the examples verge on the unbelievable. Why, in Bangladesh, a country subject to frequent flooding, would there be a social prejudice against women learning to swim? But it is all documented in this book.

In a few, very few, examples, I feel that the author misses the point. There is quite a long discussion of Hillary Clinton's presidential campaign in 2016. It well may be the case that a woman is viewed as too ambitious for pursuing goals that seem appropriate in a man, but the evidence from 2020 suggests that the public's view of Clinton is considerably more complicated than that and, in any case, the *Onion* might not be the best authority.

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One hopes that many people will read this book. It was a bestseller in the UK. Certainly the author has been recognized, having been named Liberty Human Rights Campaigner of the Year in 2013 and awarded an OBE (Order of the British Empire) in 2015. Perhaps the best way to close this review is to quote the last paragraph of the book, ending the chapter on the particular plight of women refugees:

> Closing the gender data gap will not magically fix all the problems faced by women, whether or not they are displaced. That would require a wholesale restructuring of society and an end to male violence. But getting to grips with the reality that gender-neutral does not automatically mean gender-equal would be an important start. And the existence of sex-disaggregated data would certainly make it harder to keep insisting, in the face of all evidence to the contrary, that women's needs can safely be ignored in pursuit of a greater good.

EDUCATION COLUMN

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

A Model of a Mathematical Life: In Tribute to Dr. Karen D. King (1971–2019)

Erica N. Walker, Clifford Brewster Upton Professor of Mathematical Education, Teachers College Columbia, ewalker@tc.edu

I work at Teachers College (TC) in what is widely regarded to be the oldest mathematics education program in the United States. Founded by David Eugene Smith, the first doctorates in mathematics education were awarded here in 1906 on the history of arithmetic and the "history of teaching of elementary geometry with reference to present day problems" (Donoghue, 2001, p. 13). A rich tradition of attention to both mathematics and pedagogy is a hallmark of this program, reflected in its leadership in mathematics education initiatives throughout its 100+ years of existence, including the 1960s Secondary School Mathematics Curriculum Improvement Study (SSMCIS). Our program faculty include mathematicians and mathematics education researchers, who collaborate to strengthen the education of prospective K–12 mathematics teachers as well as college mathematics instructors, conduct research in mathematics education, prepare mathematics education researchers, and support the teaching and learning of mathematics in a variety of settings. Our graduates, perhaps not surprisingly, hold a variety of positions in a wide number of fields: as curriculum developers, K–12 teachers, researchers, college professors and administrators, school leaders, and assessment specialists.

Through my work at TC, I've had the opportunity to participate in a number of collaborations and initiatives designed to bring mathematicians and mathematics educators together. It was through one of these projects that I first met the wonderful Dr. Karen King. If there is a Venn diagram that can be made of people who are mathematicians, mathematics educators, mathematics education researchers, and policymakers—Karen would sit comfortably in the intersection of all four of those groups. In her career as a professor (at San Diego State, Michigan State, and NYU), researcher (author of numerous publications and principal investigator of several grants), policymaker (member of several influential policy setting committees, including the RAND Mathematics Study Panel), and grants program director (at NSF from 2002–2005, and again from 2012 until her passing), not only did Karen exhibit the perfect intersection of these roles, but she was a dedicated supporter of good mathematics and good mathematics education. Honored by AWM and MAA as the Etta Z. Falconer Lecturer in 2012, Karen is responsible for many important efforts to establish and maintain ties between researchers and practitioners in both the mathematics and mathematics education communities. Always a presence at the Joint Mathematics Meetings and the National Council of Teachers of Mathematics (NCTM) Annual Conference, as well as an active member of many mathematical organizations including MAA and NCTM, attending events, meetings and conferences in both worlds, Karen was a great connector of people and ideas.

Karen was always encouraging people to attend more conferences and to get involved in national organizations supporting mathematics and STEM. She was especially committed to improving mathematics teaching and

learning for everyone, and incredibly supportive of and engaged in initiatives around equity in mathematics. I can't exactly nail down how or where I first met Karen about 15 years ago—it could have been when we were both on a Math for America selection committee for new teacher fellowships; through our mutual friend Dr. Dorothy White at an American Educational Research Association (AERA) annual meeting reception; or at a Benjamin Banneker Association reception at NCTM in Atlanta, introduced by the then-President, Dr. Lou Matthews. The point is that all of these involved intriguing intersections of mathematics and mathematics education, and what I remember most about each meeting were the rich conversations and multiple connections that followed and were tremendously helpful to my own research and career, largely facilitated by Karen. As we got to know each other better over the years, our paths delightfully intersected and I suspect Karen's hand in many of the professional opportunities I had subsequent to our meeting. Although we were roughly the same age, Karen was an incredible mentor: so many of our mutual colleagues and friends can share numerous stories about receiving the benefits of her support, wisdom, advice, and advocacy.

Karen's own research interests demonstrate this attention to connecting the mathematics and mathematics education communities, and thinking deeply about how we best bring quality mathematics to a wide and inclusive audience. Undoubtedly, she was inspired by her undergraduate years at Spelman College, an institution widely regarded for its success in steering women into STEM careers and where she counted the great Dr. Etta Falconer among her mentors, and her PhD dissertation study at the University of Maryland, *Instructor Decision-Making in Reform-Oriented Undergraduate Mathematics Courses*, reflects sustained engagement with these issues. In a recent paper exploring definitions of *mathematical knowledge for teaching* (MKT), first proposed by Ball and colleagues (e.g. Ball & Bass, 2000), Karen and her colleagues examined two key aspects of this construct, common content knowledge (CCK) and specialized content knowledge (SCK). In particular, they were keenly interested in how different constituencies (elementary teachers, advanced mathematics degree holders, undergraduates) make sense of these knowledges and how they use them in their mathematical work. Noting that MKT arose from work with elementary teachers, Karen and her colleagues posited that there might be different MKT and its subconstructs for secondary and postsecondary education, and in the work of mathematicians as researchers and teachers of mathematics.

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CALL FOR NOMINATIONS

The 2020 Noether Lecture

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

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

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be an additional letter of support. Nominations for members of underrepresented minorities are especially encouraged. The letter of nomination should include a one-page outline of the nominee's contribution to mathematics, giving four of her most important papers and other relevant information. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **October 1, 2020** and will be held active for three years. If you have questions, phone 401-455-4042, email awm@awm-math.org or see the website https://awm-math.org/awards/noether-lectures/.

I include here a key passage from the article, which explores these ideas:

> Our second question is, "What is the relationship between the type of work mathematicians do in their research and while teaching mathematics?" Researchers have distinguished between CCK and SCK by saying that SCK is "Specialized because it is not needed or used in settings other than mathematics teaching" (Ball et al. 2008, p. 396 ...). In other words, there is mathematical work that is required while teaching that is not required in the other contexts. This distinction is relatively clear in the context of elementary school teaching where the work required (e.g., determining whether a solution strategy is generalizable) goes beyond what a mathematically literate person might do in their day-to-day lives.
>
> When we consider the day-to-day lives of mathematicians, however, the distinction seems less clear. Consider as an example the teaching task of examining, evaluating, and formulating a response to a student-generated solution. This is a type of work that researchers of elementary teachers assert necessitates (and enables the development of) SCK. Now consider the nature of the work of mathematicians. In the course of their typical activities, mathematicians evaluate their peers' solutions and provide feedback about those solutions. This occurs informally as colleagues share ideas and possible solutions to problems. It also occurs more formally when mathematicians examine proofs and solutions while listening to their colleagues' presentations and while reviewing manuscripts for publication. Even for mathematicians whose jobs are outside of academia and are, for example, employed as industry analysts, their activities still include reviewing and determining the validity of mathematical solutions and arguments.
>
> In both the teaching and research contexts, the mathematician needs to make sense of the mathematical ideas and reasoning presented by someone else and determine whether the reasoning is correct. In both contexts, the mathematician must also formulate a response about the proposed solution, either to the student or (directly or indirectly via a journal editor) to their peer. (Speer, King, & Howell, 2015, pp. 115–116)

An active and engaged member of NCTM, having served as associate editor of the *Journal for Research in Mathematics Education* and as NCTM's director of research, Karen also pushed us to work to make mathematics education research more accessible to practitioners and to better connect the critical work of practitioners with our research agendas. She coedited a collection of papers with a focus on deepening and challenging our understandings of the links between research and practice (Tate, King, & Anderson, 2011). One position paper coauthored with members of the NCTM Research Committee developed six principles for reporting research for practitioners (Heck, Tarr, Hollebrands,

CALL FOR PROPOSALS

Research Collaboration Conferences for Women

Supported by a National Science Foundation ADVANCE grant, the AWM is working to establish and support research networks for women in all areas of mathematics research. As part of the grant, the AWM will provide mentorship and support to new networks wishing to organize a research collaboration conference for women (RCCW), including: help finding a conference venue, help developing and submitting a conference proposal, and help soliciting travel funding for participants.

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. Deadline for submission: **July 1, 2020**.

More information about the ADVANCE Grant, Research Collaboration Conferences for Women, existing RCCW networks, and related initiatives can be found at http://awmadvance.org/.

Walker, Berry, Baltzley, Rasmussen, & King, 2012); this article also reports on the creation of an award program by the Research Committee, beginning in 2010, for NCTM publications coauthored by practitioners and researchers to encourage more sustained collaborations of this type. Karen was, as aforementioned, also an active presence in the MAA and related organizations, serving for a time on the editorial board of the *DOCEAMUS* ("let us teach") feature in the *Notices of the AMS*.

We have lost a number of giants in our mathematics professional community in recent years—Karen was one of them. I am grateful for the opportunity to write this column in tribute to her work and lasting legacy—there is not enough space here to highlight all of her many accomplishments and contributions. May we all be inspired by her commitment to mathematics and mathematics education, wherever we situate ourselves in the profession. Please see more about King at https://mathematicallygiftedandblack.com/honorees/karen-king/.

References

Ball, D. L., & H. Bass (2000). Interweaving content and pedagogy in teaching and learning to teach: Knowing and using mathematics. In J. Boaler (Ed.), *Multiple Perspectives on Mathematics of Teaching and Learning.* (pp. 83-104). Westport, CT: Ablex Publishing.

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NOTE: Additional remembrances of Karen King appear in pages 27–28 of this issue.

CALL FOR NOMINATIONS

Alice T. Schafer Mathematics Prize

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominee may be at any level in her undergraduate career, but must be an undergraduate as of October 1, 2020. She must either be a US citizen or have a school address in the US. The Prize will be awarded at the AWM Reception and Awards Presentation at the January 2021 Joint Mathematics Meetings in Washington, DC.

Anyone can be a nominator, whether or not they are AWM members. Self-nominations are permitted, in which case there must be at least one additional letter of support. Nominations for members of underrepresented minorities are especially encouraged. The letter of nomination should include, but is not limited to, an evaluation of the nominee on the following criteria: quality of performance in advanced mathematics courses and special programs, demonstration of real interest in mathematics, ability for independent work in mathematics, and performance in mathematical competitions at the local or national level, if any. With the letter of nomination, please include a copy of transcripts and indicate undergraduate level. Any additional supporting materials (e.g., reports from summer work using math, copies of talks, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. All nomination material is to be submitted as ONE PDF file via MathPrograms.Org with a copy of transcripts included at the end of the file. The submission link will be available 45 days prior to the deadline. Nominations must be received by **October 1, 2020**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit https://awm-math.org/awards/schafer-prize-for-undergraduates/.

AWM Workshop at the 2021 Joint Mathematics Meetings

Application deadline for graduate students: August 15, 2020

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings. Beginning in 2016, the workshop talks are supported by the AWM ADVANCE grant. The AWM Workshops serve as follow-up workshops to Research Collaboration Conferences for Women, featuring both junior and senior women speakers from one of the Research Networks supported by the ADVANCE grant. An AWM Workshop is scheduled to be held in conjunction with the Joint Mathematics Meetings in Washington, DC, January 2021.

FORMAT: The workshop will consist of a Special Session focused on Analysis and PDEs organized by Danielli Donatella and Irina Mitrea and a Poster Session for graduate students. Selected junior and senior women from the Research Collaboration Conferences for Women (RCCW) WoAN, which was held at BIRS in June 2019, will be invited to give 20-minute talks in the Special Session on Women in Analysis and PDEs. The speakers will be supported by the National Science Foundation AWM ADVANCE grant: Career Advancement for Women Through Research Focused Networks. The Poster Session will be open to all areas of research; graduate students working in areas related to Analysis and PDEs are especially encouraged to apply. The graduate students will be selected through an application process to present posters at the Workshop Reception & Poster Session. With funding from NSF, AWM will offer partial support for travel and hotel accommodations for the selected graduate students. The workshop will include a reception, luncheon and a mentoring session where workshop participants will have the opportunity to meet with other women mathematicians at all stages of their careers. In particular, graduate students in analysis and PDEs will have the opportunity to connect with the Women in Analysis and PDEs (WoAN) Research Network.

All mathematicians (of any gender) are invited to attend the talks and poster presentations. Departments are urged to help graduate students and junior faculty who are not selected for the workshop to obtain institutional support to attend the presentations.

MENTORS: We also seek volunteers to act as mentors for graduate students as part of the workshop. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by **September 15, 2020**.

ELIGIBILITY: To be eligible for selection and funding, graduate students must have made substantial progress towards their theses. Women with grants or other sources of support are welcome to apply. All non-US citizens must have a current US address.

All applications should include:

- a title of the proposed poster
- an abstract in the form required for AMS Special Session submissions for the Joint Mathematics Meetings
- a curriculum vitae
- one letter of recommendation from the thesis advisor.

Applications (including abstract submission via the Joint Mathematics Meetings website) must be completed electronically by **August 15, 2020**. See https://awm-math.org/meetings/awm-jmm/ for details.

AWM's Capitol Hill Days: Poking Those in Power Since 2015

Kassie Archer, Lindsey-Kay Lauderdale, & Michelle Snider

"AWM Hill Day was invaluable. It was amazing to be able to speak with legislative staffers on the Hill and even Rep. Andy Kim! I was also able to attend the captivating AMS MSRI briefing on cryptography with Jill Pipher. Overall, getting to experience these rewarding opportunities while networking with others in STEM culminated in a day I'll never forget. As a high schooler, I've never been more excited to go further into the world of STEM!"
— Carmelli Leal, Junior at Eastern Tech High School, Baltimore, MD

The AWM has been doing Capitol Hill visits biannually since 2015, but they are never routine events. Gathering participants from across the Washington, DC metro area, many of whom have not met before, and having them jump feet-first into a full day of meetings with the offices of their elected officials is always an adventure. While most have never done anything like this before, we prepare our participants by providing them with materials on the AWM's mission, on the systemic issues facing underrepresented groups in STEM fields, and on how our elected officials can help. We have a "one-pager" that we take to every meeting, which summarizes the talking points. We have sample scripts to build on, to help participants weave in their own stories to personalize the narrative. We even have "cheat sheets" on legislation supporters, just in case the staffer we meet with doesn't know.

Our fall visit this year took place on a sunny Thursday in early December, with local participants including students and faculty from Stevenson, Towson, and George Mason Universities and high schoolers from both Loudon County, VA, and Baltimore, MD. We were joined by AWM President Ruth Haas, who is faculty at the University of Hawai'i at Mānoa. Our 29 participants broke into 6 groups and did a total of 31 meetings in one day. The choice of offices we visit are based on what states/districts the participants are from—although the AWM is an international organization, elected officials much prefer to meet with their own constituents. This means that over the course of the day, AWMers can meet with offices from both sides of the aisle, and from different parts of the country. They may be treated with a bag of peanuts from North Carolina Representatives, cranberries from Massachusetts, or macadamia nuts and kona coffee from Hawai'i (our favorites!).

The goal of these visits is twofold: for offices that have historically not been supportive of STEM, we hope to convince them to be; for offices that have, we get the chance to tell them that we appreciate all their work, so that they will continue. Most of our meetings take place with staffers, who cover portfolios such as Education, or Women's Issues, or Science & Technology (or some combination), and these are the people who really dig deep on the issues. These offices rely on the information and expertise that is brought to them. They always need more informed voices at the table, and we need to be those voices.

Sometimes we are lucky enough to sit down with a Senator or a Representative as well, if they aren't busy voting. This time, Ruth's group got to meet with Hawai'i Representative Ed Case, and another group met with New Jersey Representative Andy Kim. It is important to keep an open mind about every meeting, as legislators are much more complex than the media caricatures and often surprise us.

The AWM also endorses legislation when it aligns with our mission, so we have meetings with the offices who sponsor that legislation. This year, we endorsed the Federal

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Staffer Sara Barber, Representative Eddie Bernice Johnson, and AWMers Divya Sharma and Riya Krishna

CAPITOL HILL DAYS *continued from page 21*

Funding Accountability for Sexual Harassers Act (H.R.5328), sponsored by California Representative Jackie Speier, which would require universities and colleges to report ongoing investigations of discrimination allegations to the appropriate federal funding agencies.

The current chair of the House Space Science and Technology (SST) Committee is Texas Representative Eddie Bernice Johnson, and she sponsored the Combating Sexual Harassment in Science 2019 House Bill (H.R.36), and the Hidden Figures Gold Medal Congressional Act (S.3321/H.R.1396 and signed into law in November!), both endorsed by the AWM. On this Hill Visit, she graciously spent a chunk of her valuable time talking to one group of AWMers in her office, hearing their stories and sharing words of wisdom.

Earlier this year, the Federal Government established the Joint Committee on the Research Environment (JCORE) to address issues across the research and development enterprise, and to provide recommendations to the National Science and Technology Council (NSTC), which coordinates science and technology policy across government entities. Of particular interest to the AWM is the subcommittee on Safe and Inclusive Research Environments (SIRE). One of our Hill Day groups was able to take a trip over to the White House complex and meet with two women at the Office of Science and Technology Policy (OSTP): Deputy Director of STEM Education Marlene Kaplan, and Senior Policy Advisor Tracie Lattimore (on JCORE-SIRE). They were (unsurprisingly!) very familiar with our presentation of the so-called "leaky pipeline" for underrepresented groups in math. We were impressed by how genuinely interested they were in our opinions about policies they are considering.

AWM President Ruth Haas, Kyra Padam, Larina Yu, Representative Ed Case (HI), Michelle Snider, and Zainab Koreshi

In addition to advocating for a scientifically literate population, we also take advantage of other events coincid-

CALL FOR NOMINATIONS

The Association for Women in Mathematics Student Chapters Awards

In September 2016, the Executive Committee of the Association for Women in Mathematics established the Student Chapter Awards, to be awarded annually at the MAA MathFest. The purpose of these awards is to recognize outstanding achievements in chapter activities among the AWM student chapters.

Awards will be given out in up to four categories: (1) scientific excellence, (2) outreach, (3) professional development, and (4) funding/sustainability. More details about each category can be found on the AWM website awm-math.org.

Any chapter may nominate itself for awards. The nomination should include: 1) A cover letter: The cover letter should summarize the chapter's qualifications for the award category to which it is nominating itself. If the chapter is applying in two categories, it should ensure that both categories are clearly included in one cover letter. 2) An activities report: The activities report, 500–1000 words in length, should give a detailed description of the particular work for which it is seeking an award. If the chapter is applying in two categories, a separate activities report is required for each. Nomination materials should be submitted online at MathPrograms.org. The submission link will be available 45 days prior to the nomination deadline. Nominations must be received by **May 30, 2020**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit https://awm-math.org/awards/awm-student-chapter-awards/.

ing with our visit. The AMS and MSRI jointly host two Congressional Briefings a year, where they bring mathematicians to DC to present. This year's fall briefing took place on the same day as our visit, and the presenting mathematician was none other than AWM past president and AMS (current) President Jill Pipher, speaking on "Cryptography in the Quantum Era." This event was quite popular, but they were able to squeeze in a few of our AWM participants. For more on this event, see the post on the AMS blog Capital Currents.

Serendipitously, the House SST Committee was having a Holiday Party on the day of our visit, so a few of us stopped by to thank friends who had helped us with planning several of the day's events. As introverted mathematicians, some of us are intimidated by a room full of strangers, but our high schoolers fearlessly introduced themselves to everyone they could—including the Director of the NSF Dr. France Córdova! Virginia high school sophomore Divya Sharma said, "It was an amazing opportunity to be able to support girls in STEM and network with so many inspirational leaders!"

The AWM Capitol Hill Visits are personally enriching and rewarding, as well as demonstrably effective at building relationships with our elected officials. On top of that, we hope that what our AWMers really get out of these visits is a feeling of connectedness—both to a larger community of mathematicians who care enough to take a whole day to do advocacy, and to our representative government. Lanah Pheng, a high school sophomore from Virginia, said "I am grateful that I had the chance to advocate for girls in STEM. Going to Capitol Hill with AWM has inspired me to keep fighting for what I believe in and to do so in the future." There is value to seeing first-hand that many in positions of power are actually working to address the systemic problems that affect mathematicians' learning and working environments. We have allies, and they have snacks.

To get involved, send an email to hillvisit@awm-math.org, and visit our website to find out more about upcoming visits in 2020, and in conjunction with the 2021 Joint Mathematics Meetings in Washington, DC: https://awm-math.org/policy-advocacy/hill-day-visits/.

References

Find out more about AWM's Endorsements here: https://awm-math.org/policy-advocacy/endorsements/

For more on SIRE and and other areas that the JCORE is addressing, see: https://www.whitehouse.gov/wp-content/uploads/2019/11/Summary-of-JCORE-Summit-November-2019.pdf

The AMS' Capital Currents blog: https://blogs.ams.org/capitalcurrents/2019/12/10/ams-president-jill-pipher-to-congress-no-longer-secure-cryptography-in-the-quantum-era/

Notable Women in Mathematics Playing Cards

Denise A. Rangel Tracey

In celebration of AWM's 50th anniversary in 2021, we would like to announce the Notable Women in Math Playing Cards Project in cooperation with the MAA. At the 2021 Joint Mathematics Meeting we will be premiering a new card game designed by AWM member Lauren Rose. These cards will feature 64 women mathematicians that will showcase the breadth and diversity of our community. We will be highlighting women who have made notable contributions to the various fields of mathematics from research to education, pure to applied, academia to industry, and historical to modern-day.

The game is intended for people of all mathematical and non-mathematical backgrounds. The goal is to collect cards with an even number of properties in common. We hope the game play (and of course the information about the women!) will appeal to upper elementary students, parents, card game enthusiasts, and college students of all levels and majors—not to mention graduate students and professional mathematicians. Look out for a Kickstarter campaign in the near future where you can preorder a deck that should be available for pick up at JMM 2021 in Washington, DC.

Information has been gathered on over 1300 women from the websites:

Biographies of Women Mathematicians, https://www.agnesscott.edu/lriddle/women/women.htm

Lathisms, http://lathisms.org/

MacTutor History of Mathematics Archive, http://mathshistory.st-andrews.ac.uk/

Mathematically Gifted and Black, https://mathematicallygiftedandblack.com

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NOTABLE WOMEN PLAYING CARDS

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Mathematics of the African Diaspora, http://www.math.buffalo.edu/mad/index.html

and Wikipedia, https://en.wikipedia.org/wiki/List_of_women_in_mathematics.

Additional sources consulted include the following books: *Pioneering Women in American Mathematics: The Pre-1940 Ph.D.'s* by Judy Green and Jeanne LaDuke, *Power in Numbers* by Talithia Williams, *Women of Mathematics: A Bio-Bibliographic Sourcebook* by Louise S. Grinstein and Paul J. Campbell and *Women Who Count* by Shelly M. Jones. The review process has started, but we could always use more reviewers. If you are interested in learning more about some of these amazing women please email us at PlayingCards@awm-math.org.

Do you know of a notable female mathematician? Is she not listed on any other above references? Then you can nominate her at https://awm-math.org/publications/playing-cards/. Updates on this project will be posted periodically on the webpage as well.

CALL FOR NOMINATIONS

2021 Class of AWM Fellows

The Association of 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 encourage women and girls to study and to have active careers in the mathematical sciences, and to promote equal opportunity and the equal treatment of women and girls in 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 April 1 and close **May 30, 2020**, 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 another 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 or visit awm-math.org/awards/awm-fellows/.

FUNDAPROMAT

Karoline Pershell and Michelle Snider sat down with Dr. Jeanette Shakalli, the International Mathematical Union (IMU)'s Committee for Women in Mathematics (CWM) Ambassador for Panama, to find out more about her brand-new foundation.

Q: Tell us a little about the Foundation's purpose.

The mission of the Panamanian Foundation for the Promotion of Mathematics (FUNDAPROMAT) is to promote the study of mathematics in the Republic of Panama. It is quite rare to find a Panamanian who loves math. In fact, we are only eight PhDs in mathematics in the entire country. Through various activities, including presentations open to the general public given by international speakers, Math Carnivals, MathsJams, Julia Robinson Mathematics Festivals, Celebration of Mind events, and origami workshops, the Foundation aims to inspire Panamanian youth to study math and to convince the general population that math is not only fun but it also has many interesting applications.

Q: How did you get here?

As the Executive Assistant to the National Secretary of Science, Technology and Innovation of Panama of the previous government, I organized more than 38 math outreach activities all around my country, inside and outside of the capital city. Due to the change of government last year, and since I was technically a political appointee for science under the last administration, it is common for positions like mine to rotate out of office. However, as a mathematician who wants to make a difference, and who had first-hand experience designing, developing and implementing programs that create change on a grand scale, I knew that I wanted to continue running my math outreach activities so as to reach as many people as possible and improve the perception of mathematics as both a viable career option, and as something for everyone! Therefore, I decided to create a private non-profit foundation in Panama.

Q: How do you show people that math is everywhere?

I organized 22 math presentations open to the general public given by international speakers on topics such as "Art and Math," "Magic and Math," "Music and Math," and "Origami and Math." The purpose of these presentations was to inspire kids and adults of all ages to rejoice in the beauty of science and math. Amazing mathematicians such as Arthur Benjamin, Tim Chartier, Eugenia Cheng, Michael Dorff, and Jennifer Quinn have travelled to Panama to share their joy for mathematics.

Q: In the AWM, we know that role models play a crucial role in helping girls see themselves as mathematicians. How will this be a part of your Foundation?

I created Math Carnivals with the objective of inspiring Panamanian youth, in particular girls, to study math by showing them real-life examples of Panamanian female mathematicians who are successful in their careers. They include Angela García, a financial analyst in the Bank Superintendency of Panama, Yolanda Mariscal, a high school mathematics teacher in the Episcopal School of Panama, Iveth Martinez, a mathematics professor at the University of Panama, and Karel Vergara, a high school mathematics teacher in the Adolescent Training and Development Center in Panama. The first Math Carnival took place on May 12th, 2019 at the Biomuseum to celebrate the International Day for Women in Mathematics, and it was meant to be a one-time event. However, the Math Carnival was such a success that the Biomuseum invited us to repeat the event once a month. As a consequence, we did a total of six Math Carnivals over the course of 2019 at the Biomuseum. In 2020 I am restructuring the Math Carnivals to take place in different museums, parks and malls all around the country to reach even more people.

Q: Carnivals certainly sound like a lot of fun! Do you have other Festivals as well?

Definitely! In 2019 I organized the Julia Robinson Mathematics Festival, eight MathsJams, and one Celebration of Mind event, as well as several origami workshops. The Julia Robinson Mathematics Festival is a fun math event with the goal of inspiring kids to explore the richness and beauty of mathematics in a collaborative, non-competitive environment, through creative problem-solving (visit https://jrmf.org/). The MathsJam is a gathering of math enthusiasts at a bar once a month with the purpose of sharing puzzles, playing games, solving problems, or just networking with like-minded individuals (visit https://www.mathsjam.com/). The Celebration of Mind is a fun math event in which kids and adults of all ages come together in the spirit of fun and curiosity to celebrate the puzzles, games, math and magic

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that delighted the mathematician Martin Gardner (visit https://www.celebrationofmind.org/). I am also a huge fan of origami. As a member of OrigamiUSA, I have learned so many origami designs that I love to share with my fellow Panamanians and (of course) connect them with mathematics. And I have several innovative ideas of new math outreach activities that I would like to run sometime!

Q: What other ways do you reach out to the community as a whole?

I have also given fun math talks at conferences, universities and schools for different audiences (basically to whoever invites me). I have written multiple articles and spoken on various radio programs about the beauty of mathematics. I also belong to the Board of Directors of the Panamanian Association for the Advancement of Science (APANAC) and of IEEE Panama Section, where I try to always get them more involved in math. I am also the Executive Coordinator of the Panama Pod of 500 Women Scientists, whose mission is to give a local voice to women in science and to serve society by making science open, inclusive, and accessible. In fact, the Panama Pod of 500 Women Scientists is a sponsor of the Math Carnivals, IEEE Panama Section is a sponsor of the Julia Robinson Mathematics Festival, and the APANAC has sponsored an origami workshop.

Q: How can we get involved?

We welcome everyone who wants to get involved with the Foundation. You can volunteer to come to Panama and give an exciting math talk open to the general public. If you do not speak Spanish, it is okay since we hire a simultaneous translation service. You can sponsor a math outreach event in Panama, inside or outside of the capital city. You can donate funds to pay for the infrastructure the Foundation requires to function. You can send us fun math toys which will serve as raffle prizes for our activities. You can donate engaging math puzzles which can be used at our Math Carnivals. You can even share your favorite magic trick.

Some of the great volunteers who have participated in our math outreach events and who have supported the creation of the Foundation in Panama.

Q: I heard that if I visit you in Panama to give a math talk, you will take me out for liquid-nitrogen ice cream. Is this true?

Definitely! In fact, that was the first stop we made right after David Kung and his adorable daughter Ellie landed in Panama City. We went straight to get liquid-nitrogen ice cream at Nelados, which is a fabulous experience since you get to choose what ingredients you want in your ice cream and they make it for you right there on the spot. We even tried their delicious dragon breath cookies. Yum!

Q: What else can I expect to see or do if I were to visit you in Panama?

We would certainly stop by the Visitor Center of the Miraflores Locks of the Panama Canal, which is one of the highlights of Panama. The Presidency of the Republic of Panama is also a historic landmark. If you feel adventurous, we could take a boat ride to see the abundant wildlife on Gatun Lake and visit the orchid, frog and sloth exhibits at the Gamboa Rainforest Resort. Also, the Smithsonian Tropical Research Institute operates the Punta Culebra Nature Center, which includes a marine exhibition. If you have more time, we could travel to the province of Colon, which is about one hour away from the capital city, and there we could see the Visitor Center of the Agua Clara Locks, which were built for the extraordinary Panama Canal expansion. In Panama we have beautiful beaches and we also have mountains with cool temperatures. You can even see dolphins in the crystal clear waters in the province of Bocas del Toro. There is so much to explore in Panama!

Q: Where can I find out more about FUNDAPROMAT? Is there a website I can visit?

You can visit our website at www.fundapromat.org and you can follow our social media accounts on Instagram @fundapromat and our public Facebook page called Fundapromat. You can also contact me directly at info@fundapromat.org.

In Memoriam

Dr. Karen Denise King (1971–2019)

Jackie Dewar

AWM member Dr. Karen Denise King passed away on December 24, 2019 after being diagnosed with cancer in the fall. A graduate of Spelman College, King received her PhD in mathematics education in 1997 at the University of Maryland, where she conducted research on mathematics teacher thinking. She held faculty positions at NYU, Michigan State, and San Diego State universities.

After serving as Director of Research at NCTM, she became a Program Director in the Division of Research on Learning in Formal and Informal Settings in the Education and Human Resources Directorate. She specialized in promoting science, technology, engineering and mathematics education. Over the years, she served the mathematics and mathematics education community in many different capacities: PI or co-PI on major NSF grants, part of the writing team for *The Mathematical Education of Teachers II*, associate editor of the *Journal for Research in Mathematics Education*, and member of the RAND Mathematics Study Panel, which made recommendations to the U.S. Department of Education about future research funding in mathematics education.

She participated on a number of national committees focusing on research in mathematics education and teacher education. AWM and the wider mathematics community benefitted from her work on the AWM Education Committee from 2014 to 2017. She published numerous articles, contributed to books, and coedited *Disrupting Tradition: Research and Practice Pathways in Mathematics Education*.

She gave the 2012 AWM–MAA Etta Z. Falconer Lecture, "Because I Love Mathematics: The Role of Disciplinary Grounding in Mathematics Education." In the abstract for her lecture, she reflected: "Much like my mentor, Etta Falconer, I enjoy mathematics but have devoted a career to ensuring that students of all walks of life have opportunities to learn important mathematics."

When announcing King's death to the RUME listserv December 28, 2019, Hortensia Soto (MAA Associate Secretary and SIGMAA RUME Coordinator) wrote, "Karen was an advocate for mathematics teacher education and an active member of our professional community. She mentored students and colleagues by opening doors, elevating voices, and embracing transformative change."

In a beautiful tribute to King (http://kamaubobb.com/2020/01/spelman-college/), Kamau Bobb described her "as an intersection of sets," referring to the many communities to which she belonged and which were represented at her memorial service in Washington DC where they spoke of her "high achievement and personification of grace": National Council of Teachers of Mathematics, National Science Foundation, National Science Board, Delta Sigma Theta sorority, and Spelman College alum.

• •

April Ström, Linda Braddy, Jackie Dewar, and Annie Selden

In 2014, through funding from the National Science Foundation (DUE-1938495, DUE-1553278, DUE-1823571, DUE-1457785, and DUE-1352990), women leaders in mathematics education established a seminar called MPWR (pronounced as "empower")—Mentoring and Partnerships for Womxn in RUME. The seminar continues to be held

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Some of the 2015 MPWR Speakers (S) and Leaders (L): Front row, left to right: Stacy Musgrave (L), Amy Ellis (S), Jess Ellis Hagman (L), Elise Lockwood (S); Back row: Nadia Hardy (S), Linda Braddy (S), Marilyn Carlson (S), Megan Wawro (L), Jackie Dewar (S), Rina Zazkis (S), Shandy Hauk (L), Eva Thanheiser (S), Karen King (S)

each year the day before the RUME Conference. The goal of this seminar is to stimulate growth in partnerships involving women and "foster a sustainable support system for women at all career stages in undergraduate mathematics education research." (See https://www.mpwr-seminar.com/.)

With her connections to the NSF, King not only supported the organizers of this initiative, but she also participated in the annual MPWR seminars. Pictured on page 27 are the 2015 MPWR leaders and speakers. That year, the organizers had the idea to assign attendees to small follow-up MPWRment groups. Each group's charge was to schedule regular "virtual" meetings throughout the coming year to check in with one another other, discuss the challenges the members were currently facing in their respective roles, and support one another in ways only that MPWRment group could do. The four of us were fortunate to be assigned to an MPWRment group that included King.

Our MPWRment group had the privilege of meeting for three years, far exceeding the organizers' expectations of checking in virtually for a year until the next MPWR seminar. We found the advice King always provided extraordinarily helpful for us and even for others. For example, we learned about the organizational system she used to track tasks and projects, information that one of the group later passed on to Project NExT participants.

We were truly a support group—one that evolved over time where we trusted each other to discuss sensitive topics and provide candid advice. King was the glue that held our group together as she was the one who would schedule our meetings (via Blue Jeans Network) and she participated regularly even as her work at the NSF expanded. In our MPWRment group meetings, we laughed, we vented, we regrouped, and we moved forward. As we reflect on our time together with King, we encourage everyone reading this to take a moment to reflect—to laugh, to vent, to regroup, to move forward. King would wish that for all of us. Her presence in the field of mathematics is greatly missed, but we know King would want us to keep moving forward and do things differently. For the better.

Pao-sheng Hsu

I had known Karen since she was a graduate student, attending meetings of the then Association for Research in Undergraduate Mathematics Education—which later became an MAA Special Interest Group, RUME. After that, I continued to get email updates from her on her whereabouts. In late 2005 she emailed me that she was going to take a position at New York University. She later contacted me with the news that she was relocating to the NCTM.

She became a member of the AWM Education Committee in 2014–2017 when I was co-chairing the committee with Jackie Dewar. She was then with the NSF. Even with her hectic schedules, some health issues, she always tried to join our discussions (in person, by email, or in phone conference), offer specific information, or give her perspectives. She was dedicated to improving the practice of mathematics education.

She left us too soon.

Note: Another memorial to Karen King appears in the Education Column in this issue (pp. 16–19).

Katherine Johnson: A Lifetime of STEM, 1918–2020

https://www.nasa.gov/audience/foreducators/a-lifetime-of-stem.html; written by Heather S. Deiss, Educational Technology Services; edited by Flint Wild. See the website for some lovely photos from Johnson's collection and a listing of weblinks.

Katherine Johnson loved to count. "I counted everything. I counted the steps to the road, the steps up to church, the number of dishes and silverware I washed … anything that could be counted, I did." And so it began for this young girl from West Virginia. Born in 1918 in White Sulphur Springs, WV, Johnson's love for mathematics was inherent, an inclination she had from birth. At a young age, she was ready and anxious to go to school. She could vividly remember watching her older siblings go to school and wishing so much that she could go with them. The opportunity to attend school finally did come. Johnson so excelled that she began her studies in the second grade, then moved into advanced classes. By age 10, Johnson was in high school.

Lesson: Love learning.

In school, one teacher stood out to Johnson. Miss Turner taught geometry, and Johnson couldn't wait to take her class. The teacher was a great encourager to the students and a strong mentor to many of them. Johnson did so well in her classes that she graduated early from high school, and at age 15 she entered West Virginia State College. She had two years before having to declare a major, so Johnson

wavered between English, French and mathematics. One of her professors at West Virginia State College helped Johnson with her choice. She told Johnson, "If you don't show up for my class, I will come and find you." And so it was, through part threat and part joke, Johnson steered her way into what was already her first love: mathematics.

Lesson: Follow your passion.

At West Virginia State College, Johnson became immersed in academia and the mathematics program. She loved being surrounded by smart people, she said, and knew all of the professors and students on campus. One of her professors, the renowned Dr. William W. Schiefflin Claytor, recognized the bright and inquisitive mind that Johnson had. "You'd make a great research mathematician," he told her. Then Professor Claytor did something else. He told Johnson that he would help her become one. Johnson said, "Many professors tell you that you'd be good at this or that, but they don't always help you with that career path. Professor Claytor made sure I was prepared to be a research mathematician." He saw that Johnson took all of the mathematics classes listed in the catalog that were needed to pursue her life's passion, and even went so far as to create a class in analytic geometry of space just for her. At age 18, Johnson graduated summa cum laude with Bachelor of Science degrees in mathematics and French. Johnson recalled of her professor, "Claytor was a young professor himself, and he would walk into the room, put his hand in his pocket, and take some chalk out, and continue yesterday's lesson. But sometimes I could see that others in the class did not understand what he was teaching. So I would ask questions to help them. He'd tell me that I should know the answer, and I finally had to tell him that I knew the answer, but the other students did not. I could tell."

Lesson: Accept the help you're given, and help others when you can.

Johnson ended up teaching after college; at that time, teaching was the only option for her in her community. She left teaching to marry and start her family. When her husband fell ill in 1952, she began to teach again. And then one day, at a family function in the 1950s, a relative mentioned to Johnson that the National Advisory Committee for Aeronautics, the predecessor to NASA, was hiring. They were specifically looking for African American females to work as "computers" in what was then their Guidance and Navigation Department. In the 1950s, pools of women at NACA did calculations that the engineers needed worked or verified. Johnson immediately applied for the job, but the agency already had filled its quota for the year. By the time the next year rolled around, Johnson had applied again and found herself with two contracts on her table. One was a contract to teach, and one was to work for NACA. Remembering what Professor Claytor had always told her about becoming a research mathematician, she took the job at NACA.

Lesson: Follow new leads and don't give up. Keep trying.

Johnson began working for NACA in 1953. Her work in the agency was a day-to-day progression. She started as one of the women who worked on problems assigned from the engineers in what was then the Guidance and Control Branch. As Johnson worked on the problems, she would ask questions. She didn't want to just do the work—she wanted to know the "hows" and the "whys" and then the "why nots." None of the other women had ever asked questions before, but by asking questions, Johnson began to stand out. She was told that women didn't participate in the briefings or attend meetings; she asked if there were a law against it. The answer, of course, was no, and so Johnson began to attend briefings. NACA was just beginning its work on space. Space itself may be perceived as a series of plane surfaces, and as Johnson became known for her training in geometry, she began to work with the team more and more. Eventually, she became known as a leader, and the men increasingly relied on her. She remembered quite clearly her experience at the time. "The women did what they were told to do," she explained. "They didn't ask questions or take the task any further. I asked questions; I wanted to know why. They got used to me asking questions and being the only woman there." It was this inquisitive nature that made her a valuable resource to the team and the only woman at the time to ever be pulled from the computing pool to work on other programs. Then in 1962, President John F. Kennedy charged the country to send a man to the Moon. Johnson became part of the team, and she began to work on calculating the trajectory for America's first space trip with Alan Shepard's 1961 mission, an early step toward a Moon landing. She went on to do the calculations for the first actual Moon landing in 1969.

Lesson: Go beyond the task at hand; ask questions; be inquisitive. Let yourself be heard.

Johnson worked at the agency until 1986, when she retired after 33 years of service. During her tenure at NASA, Johnson received many prestigious awards. Among them

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were the NASA Lunar Orbiter Award and three NASA Special Achievement Awards. She was named Mathematician of the Year in 1997 by the National Technical Association. In addition to these NASA awards, Johnson was honored with an honorary Doctor of Law degree from the State University of New York and honorary Doctor of Science degrees from Capitol College in Maryland and Old Dominion University in Virginia. At the degree ceremony in New York, Johnson discovered at the last minute that not only was she an honoree, but she was also the keynote speaker. With her esteemed career to draw upon, Johnson rose to the occasion and spoke with the audience. She referred to it as a "chat" with the graduates. A 45-year-old relative of a graduate told Johnson after the ceremony that, because of her "chat," she was returning to school the following fall to complete her degree.

Lesson: Do what you love, and love what you do.

After retirement, Johnson liked to travel, play bridge, watch sports and spend time with her family. She participated in many panels and conferences, including the NASA Trailblazers and Legends STEM Conference in Cape Canaveral, Fla., in 2010. She often spoke to students about her own extraordinary career and encouraged all of them to pursue STEM careers. Johnson told them, "We will always have STEM with us. Some things will drop out of the public eye and will go away, but there will always be science, engineering and technology. And there will always, always be mathematics. Everything is physics and math." Johnson served on different panels and would hear from students who told her they decided to go into a STEM career after listening to her talk. She kept in touch with NASA employees and would call on them, when needed, to help drive home the importance of STEM to audiences. In 2011, Johnson was honored at the dedication of the Katherine G. Johnson Science Technology Institute at Alpha Academy in Fayetteville, N.C.

Lesson: Pay it forward and encourage the younger generation.

When asked if she still counts things, Johnson said, "Oh, yes. And things have to be parallel. I see a picture right now that's not parallel, so I'm going to go straighten it. Things must be in order." Geometry was still an important part of who she was, a fact evident as she began to talk about her father. She recalled him as "the tallest, straightest man in the area." She loved her father a great deal, and he was a big influence in her life, teaching her many things. One lesson she carried everywhere, taught to her own children, and let be a guide throughout her education, career and every other aspect of her life.

Lesson: You are as good as anyone in this town, but you are no better than any of them.

She was a simple girl from West Virginia who loved to count. Her love of mathematics took her well beyond her small world; some could say it even took her from Earth all the way to the stars. She was a trailblazer, forging a path that would allow many others to follow in her steps. Her spirit and determination helped lead NASA into a new era, and for that the agency is grateful.

Lesson: NASA would not be what it is if not for you, Mrs. Johnson.

Katherine Johnson passed from this life on the morning of February 24, 2020. She was 101 years old.

Ruth I. Michler Prize

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

A $47,000 prize will be awarded to a woman, recently promoted to associate professor or the equivalent, for a semester of mathematical research without teaching obligations in the Mathematics Department of Cornell University.

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

The application deadline is October 1 for the award to be used during the 2021–2022 academic year.

www.awm-math.org/michlerprize.html

Cornell University

AWM ASSOCIATION FOR WOMEN IN MATHEMATICS

MSRI 2020-21 Scientific Workshops

The Mathematical Sciences Research Institute in Berkeley, California announces the following workshops scheduled for the 2020-21 academic year. *(Pending ongoing COVID-19 disruptions, some workshops may be held online.)*

AUGUST 20-21, 2020: **Connections Workshop: Decidability, Definability and Computability in Number Theory**

Organizers: Valentina Harizanov* (George Washington University), David Marker (University of Illinois, Chicago), Russell Miller (Queens College, CUNY; CUNY, Graduate Center), Jennifer Park (Ohio State University), Alexandra Shlapentokh (East Carolina University)

AUGUST 24-28, 2020 : **Introductory Workshop: Decidability, Definability and Computability in Number Theory**

Organizers: Maryanthe Malliaris (University of Chicago), Russell Miller (Queens College, CUNY; CUNY, Graduate Center), Jonathan Pila* (University of Oxford), Alexandra Shlapentokh (East Carolina University)

SEPTEMBER 3-4, 2020: **Connections Workshop: Random and Arithmetic Structures in Topology**

Organizers: Ursula Hamenstädt* (Rheinische Friedrich-Wilhelms-Universität Bonn), Fanny Kassel* (Institut des Hautes Études Scientifiques (IHES))

SEPTEMBER 8-11, 2020: **Introductory Workshop: Random and Arithmetic Structures in Topology**

Organizers: Jeffrey Brock (Yale University), Michelle Bucher (Université de Genève), Alan Reid* (Rice University)

NOVEMBER 30 - DECEMBER 4, 2020: **Structure and Randomness in Locally Symmetric Spaces**

Organizers: Nicolas Bergeron (École Normale Supérieure), Lewis Bowen (University of Texas, Austin), Yizhaq Gelander (Weizmann Institute of Science), Alan Reid* (Rice University), Abigail Thompson (University of California, Davis)

DECEMBER 7-11, 2020: **Topical Workshop: Decidability, Definability and Computability in Number Theory**

Organizers: Julia Knight (University of Notre Dame), François Loeser (Université de Paris VI (Pierre et Marie Curie)), Maryanthe Malliaris (University of Chicago), Thomas Scanlon* (University of California, Berkeley)

JANUARY 20-21, 2021: **Connections Workshop: Mathematical Problems in Fluid Dynamics**

Organizers: Hajer Bhouri (Université Paris-Est Créteil Val-de-Marne; Centre National de la Recherche Scientifique (CNRS)), Juhi Jang (University of Southern California), Anna Mazzucato* (Pennsylvania State University), Sijue Wu (University of Michigan)

JANUARY 25-29, 2021: **Introductory Workshop: Mathematical Problems in Fluid Dynamics**

Organizers: Nicolas Burq (Université de Paris XI), Anne-Laure Dalibard (Université de Paris VI (Pierre et Marie Curie)), Jean Marc Delort (Université de Paris XIII (Paris-Nord)), Mihaela Ifrim* (University of Wisconsin-Madison), Irena Lasiecka (University of Memphis), Vladimir Sverak (University of Minnesota Twin Cities)

APRIL 12-23, 2021: **Recent Developments in Fluid Dynamics**

Organizers: Thomas Alazard (Ecole Normale Supérieure Paris-Saclay; Centre National de la Recherche Scientifique (CNRS)), Hajer Bhouri (Université Paris-Est Créteil Val-de-Marne; Centre National de la Recherche Scientifique (CNRS)), Mihaela Ifrim (University of Wisconsin-Madison), Igor Kukavica (University of Southern California), David Lannes (Université de Bordeaux I; Centre National de la Recherche Scientifique (CNRS)), Daniel Tataru* (University of California, Berkeley)

MAY 3-7, 2021: **Hot Topics: Topological Insights in Neuroscience**

Organizers: Carina Curto (Pennsylvania State University), Chad Giusti (University of Delaware), Kathryn Hess* (École Polytechnique Fédérale de Lausanne (EPFL)), Ran Levi (University of Aberdeen)

** Denotes lead organizer(s)*

Funding awards are typically made eight weeks before the workshop begins. Requests received after the funding deadlines are considered only if additional funds become available. MSRI is pleased to be able to offer a private room for nursing mothers.

msri.org/workshops

MSRI Mathematical Sciences Research Institute

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