ASSOCIATION FOR WOMEN IN MATHEMATICS

Newsletter

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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.

IN THIS ISSUE

PRESIDENT'S REPORT

Dear AWM Friends,

A recent visit to the Pablo Picasso museum in his home town of Málaga crystallized for me the importance and discomfort that comes from experiencing several different perspectives simultaneously. For the cubist artist, the portrayal of an object, person or scene from several viewpoints at once allows the viewer to shift focus from one angle or fragment to another, putting each into a larger context. The right eye is a different window into the soul than the left; the sound of a guitar is created from the cooperation of sound box, strings and tuning pegs. As it so happens, I have been fortunate that my recent journeys have also allowed me to reconnect with several friends from graduate school days. As we reminisce, I am struck by the way each of us viewed our shared, simultaneous, experience from different perspectives. I arrived from Berkeley with all the somewhat frustrated energy built from past protests, demanding, expecting, hoping for change: where were the female professors? (There were none in the Stanford math department at that time.) Hala came from Lebanon, grateful to be away from the incessant bombings, uncomfortable with off-color "jokes" that she didn't quite understand. María-Jesús came from Spain, secure in her abilities and unaffected by the male-dominated department. At the time, I was so focused on my own struggle that I couldn't really appreciate the variety of experiences my women colleagues were going through. If we are to create a "welcoming environment" in the workplace, in academic departments, and at professional meetings we need to appreciate simultaneously different perspectives, to deconstruct the fragments of the environment that affect us each differently, elements that—together—form our communal experience.

As an organization, the AWM is currently working to consider this multitude of perspectives. Our Policy and Advocacy Committee is examining and overhauling our Welcoming Environment statement. We have formed a Strategic Task Force to gather information and suggest concrete steps to make our organization more inclusive. We are building up our website to include more resources, and we are supporting workshops at national meetings to foster open discussion.

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ASSOCIATION FOR WOMEN IN MATHEMATICS

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

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

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

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PRESIDENT'S REPORT *continued from page 1*

I am eager to hear your thoughts and concerns: please feel free to send them to me.

AWM News. The Northern Hemisphere's summer is a busy and exciting time for mathematicians. I hope to see many of you at AWM events at the SIAM annual meeting in Portland, July 9–13, and at the AWM events at MAA's MathFest in Denver, August 1–4. Hearty congratulations to **Kathryn Mann**, winner of the AWM – Birman Research Prize. Mark your calendars and save the dates **April 6–7** for the 2019 AWM Research Symposium at Rice University, which promises to be the best one yet. This gathering is the perfect place to bring together and to celebrate our many perspectives of mathematics and the mathematics community.

The AWM Springer Series continues with three new volumes: Volume 11: **Women in Numbers Europe II**, Volume 12: **Research in Shape Analysis** and Volume 13: **Research in Computational Topology**. For more details and a complete list of the entire series to date see the AWM Series website: https://www.springer.com/series/13764?detailsPage=titles

Renew and recruit! The Association for Women in Mathematics is the world's largest organization that specifically supports women and girls in the mathematical sciences. Don't forget to renew your membership, and encourage your departments to renew or become institutional members. Encourage students to join or form an AWM Student Chapter. Wear your AWM T-shirts and badgeholders at meetings and barbecues this summer: we are our own best advertisements! Help us create a more inclusive mathematics community by bringing multiple perspectives together.

Ami Radunskaya

Ami Radunskaya
May 26, 2018
Málaga, Spain

Kathryn Mann Wins Birman Research Prize

The Association for Women in Mathematics will present the third AWM – Joan & Joseph Birman Research Prize in Topology and Geometry to **Kathryn Mann**, Assistant Professor of Mathematics at Brown University, at the Joint Mathematics Meetings in Baltimore, MD in January 2019. Established in 2013, the AWM – Birman Prize recognizes exceptional research in topology and geometry by a woman early in her career. The biennial presentation of this prize serves to highlight to the community outstanding contributions by women in the fields of topology and geometry and to advance the careers of the prize recipients. The award is made possible by a generous contribution from Joan and Joseph Birman.

This year's research prize is awarded to Kathryn Mann for major breakthroughs in the theory of dynamics of group actions on manifolds. Her early paper "Homomorphisms between diffeomorphism groups" established the first case (dim(N) = 1) of a 25-year-old question, which was used as base case of induction and as structural foundation in Hurtado's classification of morphisms between diffeomorphism groups. Mann's recent paper, "Rigidity and geometricity for surface group actions on the circle" (with M. Wolff), especially stands out in Mann's work. There are natural geometric actions of surface groups on the circle that arise from discrete faithful representations into Lie groups. In Mann's *Inventiones Mathematicae* paper "Spaces of surface group representations" she proved that such representations are topologically rigid: any deformations are trivial (in the sense of topological dynamics). This capped a line of many related results over the previous decades. In Mann and Wolff's paper, they proved the remarkable theorem that the converse is true: any rigid representation must be geometric.

Mann is an independent thinker. She picked a subject—the structure of symmetries of manifolds—where an opening eluded others. She made it her own and proved breakthrough results in her field.

Mann earned her BS in mathematics and philosophy from the University of Toronto and a PhD in mathematics from the University of Chicago, then held a research postdoc at MSRI and an NSF Postdoctoral Fellowship while a Morrey Visiting Assistant Professor at UC Berkeley. Kathryn is the recipient of the 2016 Mary Ellen Rudin Young Researcher Award, and at Brown she was appointed Manning Assistant Professor—a junior endowed chair. She received a Distinguished Teaching Award from Berkeley and is currently co-organizing a national network supporting mathematics Directed Reading Programs (which match undergraduates with graduate student mentors) to facilitate best practices.

Kathryn Mann

The 2019 Joint Mathematics Meetings will be held January 16–19, 2019 in Baltimore, MD. For further information on the AWM – Joan & Joseph Birman Research Prize, please visit www.awm-math.org.

Membership Dues
Membership runs from Oct. 1 to Sept. 30
Individual: $70 **Family:** $35
Contributing: $160
New member, affiliate and reciprocal members, retired, part-time: $30
Student, unemployed: $20
Outreach: $10
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See www.awm-math.org for details on free ads, free student memberships, and ad discounts.

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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 $70/year. Back orders are $10/issue plus shipping/handling ($5 minimum).

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

Newsletter Ads—AWM will accept ads for the *Newsletter* for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership and other appropriate subjects. The Managing Director, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines. *All institutions and programs advertising in the* Newsletter *must be Affirmative Action/Equal Opportunity designated.* Institutional members receive discounts on ads; see the AWM website for details. For non-members, the rate is $116 for a basic four-line ad. Additional lines are $14 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 Kavita Ramanan, kavita_ramanan@brown.edu. Send everything else, including ads and address changes, to AWM, awm@awm-math.org.

Pamela Gorkin

Pamela Gorkin Named Falconer Lecturer

The Association for Women in Mathematics and the Mathematical Association of America are pleased to announce that **Pamela Gorkin** will deliver the Etta Zuber Falconer Lecture at MathFest 2018. Dr. Gorkin is Professor of Mathematics at Bucknell University.

Gorkin received a BA in mathematics, MS in statistics, and PhD in mathematics from Michigan State University. Gorkin has spent her career at Bucknell, with visiting positions at Universität Bern, MSRI, Universität Karlsruhe, Universidad de Zaragoza, Lunds Universitet, and Université de Metz.

Pamela Gorkin is a remarkably productive scholar with a passion for working with undergraduate students—especially students from underrepresented groups. In the classroom and in the public setting, Pam understands how to connect with her audience and is a master lecturer. Throughout her career, Pam has generously contributed her time and wisdom to the mathematics community at large. She recently completed a term on the Council of the American Mathematical Society and served as an Editor for the *Proceedings of the AMS*. She has contributed more than one hundred reviews to the AMS *Mathematical Reviews*. In the past, she has served on five panels for the National Science Foundation, on the AWM committee awarding the Alice T. Schafer Mathematics Prize for excellence in mathematics by an undergraduate woman, and on the AMS committee that selects the recipients of Awards for Mathematics Programs that Make a Difference. Pam has coauthored research papers with undergraduates, four of whom have won Goldwater Scholarships, and coauthored an undergraduate textbook on proof writing. She is also coauthor of the book *Finding Ellipses*, to be published by the MAA and AMS. She is a well-respected expert in functional analysis, complex analysis, and operator theory with 39 coauthors and more than 80 peer-reviewed publications.

Pam has a gift for seeing mathematical talent in her students, even in those who may be unsure of their own abilities. Dawn Lott, the 2011 Falconer Lecturer, once wrote this about being mentored by Pam: "She understood every tear and frustration, yet she made me persevere even when I felt defeated. She saw in me

something that no other person had ever seen … the ability to earn a doctoral degree in mathematics." Pam is part of the reason that for the last thirty years, half of the mathematics majors at Bucknell have been women.

After only five years at Bucknell, Pam was given the Lindback Award for Distinguished Teaching, the university's highest teaching honor, and in 2015 she received the Crawford Distinguished Teaching Award from the EPaDel section of the MAA. These awards recognized Pam's exceptional ability to reach students at all levels, and to help those students aim for higher goals.

Pam is an excellent expositor of mathematical ideas and is particularly adept at communicating with non-experts. Perhaps the most telling evidence of this is that in 2011 Pam was invited to speak at the Canadian Undergraduate Mathematics Conference on the topic "How to give a talk." Pam has been invited to speak in eleven different countries, including a 2014 lecture at the Sonia Kovalevsky Days for high school students held at Lund University in Sweden.

MathFest 2018 will be held August 1–4 in Denver, CO. The Falconer lectures were established in memory of Etta Zuber Falconer (1933–2002). Her many years of service in promoting mathematics at Spelman College and efforts to enhance the movement of minorities and women into scientific careers through many forums in the mathematics and science communities were extraordinary. Falconer lecturers are women who have made distinguished contributions to the mathematical sciences or mathematics education. Recent recipients of this honor include Rebecca Goldin, Pat Kenschaft, Karen King, Izabella Laba, Dawn Lott, Kate Okikiolu, Ami Radunskaya, Marie Vitulli, Erica Walker, and Talithia Williams.

BOOK REVIEW

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

A Guide for Dual-Career Couples: Rewriting the Rules, by Eve Sprunt, Praeger, 2016, ISBN-13 978-1440850097

Reviewer: Barbara Lee Keyfitz, The Ohio State University

Before I started reading this book, I wondered what it had to say that had not already been said in the Stanford study "Dual-Career Academic Couples: What Universities Need to Know" [by L. Schiebinger, A.D. Henderson, and S.K. Gilmartin, Michelle R. Clayman Institute for Gender Research, Stanford (2008)], or in other similar studies, duly quoted in Sprunt's book. It turns out that Dr. Sprunt has quite a lot to say, much of it very pertinent to young mathematicians starting their careers, and a fair amount of it relevant to women newly entering the professional job market, whether they are part of a couple or not.

Both books (and a number of others in Sprunt's reference list) contain analyses of various data-sets. The Stanford study comprised an analysis of faculty hiring at 13 research-intensive universities, while Sprunt, a PhD geophysicist, supervised large surveys conducted by SPE (the Society of Petroleum Engineers) and SEG (the Society of Exploration Geophysicists). Besides the obvious differences in the survey populations (US academics in one case, an international set of mainly private sector employees in the other; all fields of study—not confined to science or engineering—in one case, a rather narrow set of engineering disciplines in the other), there is a marked difference in the motivation for the studies and an interesting contrast in the conclusions. As its subtitle states clearly, the Clayman Institute study was designed to help universities handle the "thorny issue" of couple hiring. Sprunt, on the other hand, found early in her career that her road to advancement was frequently blocked, usually by a supervisor who could not comprehend how a woman, particularly a married woman, could be "serious" about a career. She concluded that until there was a better understanding among professional leaders of how couples negotiate their careers, the situation would not change. Her book, which is a popular version of the study reports she authored, enunciates a framework for these negotiations. Thus, in a sense, both publications have the same goal: To increase productivity in the enterprise by enabling employees to optimize their potential, and to allow the company/university to increase its market share by attracting a workforce whose diversity better reflects market preferences. The difference is that Stanford's recommendations are driven from above, Sprunt's from below.

As a handbook on how to conduct academic searches, the Stanford guidelines offer some good suggestions about best practices, but not much guidance for a young couple trying to make workable career choices. Sprunt's volume, on the other hand, gives some very good advice on this topic; at least it appears so on the surface. (It is not immediately helpful to this reviewer, who has by now completed most of her career, or at least finds the most difficult choices behind

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her. I found in it some valuable suggestions for family members, but I have yet to see if my children want their mother's advice on this sort of thing.)

One message came through clearly. Although I've always felt (along with many of my academic colleagues) that the differences between academic and private sector (a.k.a. industrial) jobs were so great that strategies for dealing with one must be completely different from strategies for the other, this book has made me see that, viewed from the perspective of managing a career, much advice is universal. A career-long view of what it means to manage a career is one of the principal strengths of this excellent book. Sprunt began her career in the mid-1970s, at a time when gender discrimination was widespread and the dominant attitudes about married women working were those of the immediate post–World War II generation (that cohort, almost entirely male, constituted the bosses, then) when a single wage-earner could support a family, and differential mortality rates between women and men dominated the news, prompting many middle-class women (such as my mother) to devote themselves to keeping their husbands alive. Sprunt is optimistic that in time dual-career professionals will take over the leadership of corporations (including universities). Until then, she emphasizes to her readers that women *need to have agency*. Women can ask for what they want, negotiate with awareness of their strengths, and if all else fails, vote with their feet. Her book contains thoughtful advice about managing negotiations—with bosses and with partners—and about coming to terms with what is really important to you.

The author wants to see women achieve equality in the workplace. Her argument, the focus of this book, is that a way to achieve this is for couples to take charge of the matter, and that a good way for women to achieve equality, in pay, career opportunities, and job satisfaction, is to frame our complaints as dual-career couple issues. After a while I felt that I'd got that point, and the story line did not need one more anecdote about an unsympathetic supervisor with a stay-at-home wife. On the other hand, Sprunt is very careful to point out that the seriousness of a person's career cannot be measured by their income, or even by the number of hours they work. This means that the couple needs to negotiate internally. Whose career takes precedence? To what extent is choosing to live apart, and how far apart, an option? And so on.

The long chapter on "balancing opportunity with sacrifice" considers the point that advancement in many companies is premised on willingness to take temporary assignments elsewhere, or even to relocate permanently. I lost count of how many times the word "relocate" appeared

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 (http://www.awm-math.org/travelgrants.html) for details on eligibility and do not hesitate to contact Steven Ferrucci at 401-455-4042 for guidance.

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

in the book. It is a reminder that in this respect academia and industry are somewhat different, although it's not difficult to come up with analogies that describe obstacles to career advancement at universities. (For example, it has been documented that women mathematicians are less likely than their male peers of comparable potential to seek postdoctoral positions. Possibly this is for reasons similar to the difficulties women find in relocating as a path to advancement in a company.)

The second half of the book could serve as a manual (and quite a good one) on how to run your career: goals, pitfalls, best practices. It offers advice, and even templates. For example, the author gives a checklist to use to convince an employer that telecommuting will work for you. Another section gives examples of how to strengthen your resume. She suggests that couples consider the relative weight they place on quality of personal relationships, meaningful work, contributing to society, spirituality, and wealth. I don't agree with all her priorities—for example, she feels quite strongly that couples should keep separate bank accounts—but she backs all her suggestions with data and incisive anecdotes. Much of her advice is good advice even for women who are and intend to remain single.

Interspersed with the professional observations and survey results, this book also gives a vivid portrait of a woman who was recognized as a pioneer in a man's field, who is honest about the professional disappointments she suffered, and gestures, poignantly, to roads not taken because the way was barred to her. She takes the occasional swipe (probably well deserved) at an unreasonable boss. A story about a teen-age child who turned out to be less responsible than her parents had assumed will strike a chord with many of us. But she is upbeat about the future for career-minded couples and concludes that her efforts (including writing this book) to make their lives better are an accomplishment she is very proud of.

So, did I learn anything new from this book? Yes, a good deal. Most of the advice, suggestions and best practices come too late for my career, but I recommend them to people still trying to make decisions. You may not agree with every recommendation, but you are likely to gain at least one new perspective. My "aha" moment came in the chapter on documenting achievement, where Sprunt explains why it is futile to ask "human resources" for help with a prejudiced supervisor: "HR is not there to help you as an employee. The primary function of HR is to serve and protect the company." If you have ever had any inclination to be soppy and sentimental about a job, think about that for a moment.

EDUCATION COLUMN

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

Breaking Boundaries for Interdisciplinary Collaboration

Anna E. Bargagliotti, Loyola Marymount University

Introduction

On April 7th, 2017, a conference focused on interdisciplinary collaboration in STEM education took place on the Loyola Marymount University campus in Los Angeles, California. The conference brought together approximately 100 faculty members from the Southern California region interested in transforming classroom practice with Discipline-Based Education Research (DBER) and through the Scholarship of Teaching and Learning (SoTL). The conference was funded by the National Science Foundation (NSF grant number 1644470), with Anna Bargagliotti (Mathematics), Jeff Phillips (Physics), and Dorothea Herreiner (Economics) as the PIs. It was entitled *Breaking the Boundaries in STEM Education* (referred to as Breaking Boundaries throughout this article).

A main goal of Breaking Boundaries was to bring together a variety of faculty from different STEM disciplines to have interdisciplinary conversations around the strands of equity, problem solving, and computing—all pressing issues in STEM education. The conference aimed to discuss how different disciplines approached issues within each strand as well as the differences and similarities across disciplines within the strands. As a result of the conference, a special issue of *J-STEM: Journal of Research in STEM Education*, slated to be published in the summer of 2018 (see http://j-stem.net), was assembled featuring manuscripts from conference attendees discussing primary issues within each strand. This column describes the structure of the conference and discusses how the outcomes of the conference contribute to the knowledge base on achieving productive interdisciplinary collaboration.

Conference Structure

The conference was designed as a one-day event. The vision for the conference was that it would serve as a catalyst for regional conversations about interdisciplinary collaboration surrounding the three strands. Conference

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organizers believed that keeping the conference regional would promote comradery and thereby result in a greater likelihood of collaboration post-conference by the attendees. Each strand had a parallel schedule that included a workshop, a contributed paper session, and a working group breakout session. In addition, plenary speakers addressed the entire group to start off the conference, after lunch, and at the end of the day after dinner (more details on the conference overview can be found in Bargagliotti, Herreiner, & Phillips, 2018). The conference began at 9 a.m. and ended at 8 p.m. A conscious effort was made in the schedule to ensure that participants had time to talk and exchange ideas and not be in a passive role throughout the day. The day unfolded in the following way:

Time	Schedule
8–9	Registration and Continental Breakfast
9–9:15	Welcomes
9:15–10:15	Plenary Speaker 1
10:15–10:30	Break
10:30–12:30	Workshop — 3 Strands
12:30–1:15	Lunch & Birds of a Feather
1:15–2	Plenary Speaker 2
2–2:15	Break
2:15–4:15	Contributed Paper Session — 3 Strands
4:15–5:15	Break & Poster Session
5:15–6:30	Working Groups — 3 Themes + NSF Workshop + Intro to SoTL
6:30–8	Dinner & Plenary Speaker 3

Post-Conference Reflection

After the conference, the PIs worked with Dr. Juliana Fuqua, a psychologist whose work focuses on evaluating transdisciplinary scientific collaboration, to investigate the factors that impacted interdisciplinary productivity for Breaking Boundaries. Since the main focus of the conference was to serve as an impetus for interdisciplinary collaboration, conference organizers wondered how, if at all, participants within each strand were going to collaborate post-conference. Because the conference had a dedicated special issue in a journal, conference organizers wondered, in particular, whether participants would publish and disseminate their work. The collaboration with Fuqua aimed to discern the barriers and facilitators to interdisciplinary collaboration through publication.

A few months after the conference, Fuqua conducted interviews with 10 conference participants (see Fuqua et al., 2018, for detailed information about the interviews). The interviewees were selected from different academic STEM disciplines, a variety of academic ranks, a variety of types of participants (conference organizer, group leader, non-leader), and variable knowledge of STEM education research (from minimal to extensive). Findings from her interviews revealed insights for promoting interdisciplinary collaboration in the form of publications.

Lessons Learned

Following a theory of active learning for participants, organizers hoped that ideas exchanged throughout the conference day would be developed enough that they would progress into a publication. The working group sessions were

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CALL FOR PROPOSALS

Research Collaboration Conferences for Women

Supported by an 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. Deadlines for submission: **January 1** and **July 1** annually.

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

Comparative table of antecedent conditions, processes, and outcomes for the three working groups

	GROUP A	GROUP B	GROUP C
Overall readiness to publish	High	Medium	Low
Antecedents and processes			
Disciplinary span: narrow vs. wide	Narrow	Moderate	Wide
Group has a paper champion	Yes	Somewhat	No
Group has a shared history	Yes	Yes	Not clear from interviews
Physical environment: collaborator offices are spatially proximal	At least two members' offices are proximal	Not mentioned in interviews	Not mentioned in interviews
Group leaders have published recently on topic (Note: Group leaders had great expertise in the topics, but some had not published recently on the topic)	Yes	Yes	No
Group leaders' conference organizing experience	Strong	Strong	Not consistently strong across leaders
Group size	Rather small	Medium	Rather large
Physical environment: meeting space characteristics	Small room with one table	Medium-size classroom	Large classroom
Leadership: oversight by organizers	High Conference organizers were at the working group	High Conference organizer was at the working group	Low No conference organizer was at the group
Outcomes			
Publication progress as of four months later	Major progress. Publications submitted.	Moderate progress. Publications in progress.	Minimal progress.
Potential for publishing transdiciplinary, collaborative papers	Unclear — analysis of papers needed	Unclear — Analysis of papers needed	Weak

placed last in the day's schedule in hopes that participants would be stimulated throughout the other sessions and come to the working group ready with ideas and ripe for collaboration. Organizers envisioned the working group as the session in which future papers or projects could be organized. Organizers also believed that having a publication outlet directly linked to the conference would provide participants with motivation as well as a structure to publish their work. Fuqua et al. focused on the working group productivity to investigate factors that impacted the success of the three strands. The table (used with permission of the publisher) on the preceding page is presented in Fuqua's paper.

In the table, the three strands were made anonymous and labeled A, B, and C. As seen in the Outcomes section of the table, the groups varied in their success with collaboration leading to publication. The table also illustrates that there were several differences among the groups in their Antecedents and Processes. This article draws attention to two of these factors: (1) Group has a paper champion and (2) Group leaders have published recently on topic.

During the pre-conference planning phase, conference organizers assigned group leaders for each strand. These leaders were part of the planning committee and helped recruit contributed papers, workshop leaders, and attendees. Each strand was led by two to three faculty members from varied disciplines who had a strong record of service, teaching, or research in the topics of equity, problem solving, or computing in STEM education. In addition, the leaders were, for the most part, well known and well established at the national level. While these qualities were certainly important for contributing to recruitment, they did not necessarily ensure that the strand was able to organize publications. Instead the two factors that stood out to the conference organizers in Fuqua's findings as being important to publication process were having a "paper champion" and having leaders who had recently published in the areas.

A paper champion is a person who is willing to take the leadership role in writing and organizing a paper (Fuqua et al., 2018). This person must have a clear idea about the type of paper s/he wants to produce and have the ability to organize faculty to do so. Group A and Group B but not Group C had paper champions. Group A had a paper champion who was not a group leader but took the initiative to organize a collaborative publication. Group B had a paper champion who was a group leader. This leader had a specific format in mind for a paper and throughout the working group meeting recruited authors to help fulfill the interdisciplinary objective for the paper. Although group C had very strong leaders, it did not have a paper champion. This made it difficult for group C to publish. This group also had the broadest participation, being the largest group at the conference. For a group beyond a certain size, it might be necessary to have multiple paper champions in order to work towards successful output that everyone could contribute to.

The second factor of interest is that of selecting people for leadership roles who have recently been active in publishing work on the topics of the conference. A person who is more active in scholarly work related to the strand might have a better sense of the literature base and thus be more likely to know where the group could contribute. Such a person could then become the paper champion or be able to identify paper champions within a working group and help them get started towards organization. The results showed that while very competent and quite accomplished people are often placed in leadership roles at conferences, this alone does not suffice to spur a successful post-conference collaboration. Instead, an invested interest in the literature base is an important factor that could lead to more productive collaboration.

Future Interdisciplinary Collaboration at the National Level

Throughout each academic year, many conferences, events, and workshops are organized within or across STEM education disciplines (e.g., Research in Undergraduate Mathematics Education, Physics Education Research Conference (PERC), American Society for Engineering Education, PKAL Regional Network Annual Meetings) as well as more broadly (e.g., International Society for the Scholarship of Teaching & Learning (ISSOTL), Lilly Conferences on College Teaching). At such events and beyond, it can be challenging to promote interdisciplinary collaboration. Oftentimes, results on successful teaching methods, successful problem types, and overall classroom practices in undergraduate STEM education are available in one discipline but other disciplines are unaware of the results.

At the heart of discipline-based education research is the necessity to answer research questions that are dictated by what is needed in the disciplines. However, there is a growing awareness of the potential offered by integrating ideas and developing shared frameworks across disciplines. Toward that end, AAAS and NSF are supporting an effort to build a cross-disciplinary STEM DBER community that

will advance and disseminate knowledge and theory that promote learning and success for all students across STEM fields: the DBER-Alliance (see https://www.aau.edu/sites/default/files/STEM%20Initiative%20Images/STEM%20PDFS/17-043%20AAAS%20STEMDBERAllianceflyer_rnd3.pdf). Readers interested in joining the STEM DBER Alliance can complete this google form: goo.gl/oECkXG.

Final Thoughts

Publications are an important source of communicating knowledge to the STEM community regarding best practices for teaching and learning. When planning collaborations, events, conferences, or workshops from which publications are to emerge, the findings from Breaking Boundaries urge us to think about who might be paper champions within a group. Because the role of a paper champion is crucial, the identification of paper champions prior to the conference or event might increase the likelihood of a publication. Breaking Boundaries also showed the importance of having people in leadership roles who are invested in the literature. Overall, in order to have successful interdisciplinary work be written and published, it is not enough to simply have a structure or publication outlet in place. Instead, the leadership needs to be invested and there needs to be at least one person with background and motivation to organize the work involved in publishing.

In the final analysis, Breaking Boundaries was successful on many levels. It brought together scholars from different disciplines and produced a full special issue of *J-STEM*, thereby adding to the literature base. In addition, an investigation of its outcomes provided insights into factors that promote successful collaborations across disciplines to publish and disseminate work in STEM education.

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CALL FOR NOMINATIONS

The 2019 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, and Talithia Williams.

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 **September 1, 2018** and will be held active for two years. If you have questions, phone 401-455-4042 or email awm@awm-math.org.

MEDIA COLUMN

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

Which women mathematicians get written about on Wikipedia, and why

David Eppstein, Computer Science Department, University of California, Irvine

If you're anything like me, you probably see too much self-promotion as a bit distasteful: occasionally necessary, but not how you really want to be spending your time and energy. You'd rather be doing mathematics. But I think we can all agree that we should celebrate and promote the accomplishments of our female colleagues. One way to make these accomplishments more visible to the public and to young mathematicians in search of role models is to create biographies of women mathematicians on Wikipedia.

Much has already been written about Wikipedia's coverage of women in mathematics [1–3, 7, 8]. Past publications on this topic document in more detail Wikipedia's poor treatment of women (both as subjects and as editors), suggest ways that its policies and culture can be improved, and encourage more women to become editors and more editors to write about women mathematicians.

However, in order for those contributions to be successful, it is important to understand Wikipedia's criteria for who among academics and scholars is worthy of an article [9]. Not every published academic meets these criteria, and unless the topics of new articles are chosen with these criteria in mind, they are likely to be targeted for deletion. In a nutshell, the criteria are:

1. Has her work been heavily cited? This is by far the most frequently-used criterion, but it works badly in pure mathematics where citation counts tend to be low. Still, in articles on women mathematicians, it is helpful to pay attention to which works have been cited and to say explicitly that the subject is known for her research on that topic.
2. Does she have a prestigious national-level or international-level award? This doesn't have to be the Fields Medal, but it should generally be for professional work rather than student awards or contest results. Larry Riddle maintains

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, 2016 to September 30, 2018). 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 Baltimore, MD, January 2019.

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, 2018**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit www.awm-math.org.

a collection of mathematical prizes and awards that have been won by women [5], most of which would qualify.

3. Is she a fellow of a major academic society for which this is a significant and selective honor? For instance this includes Fellows of AMS and SIAM, or National Academy membership. I think the new AWM Fellows program should also qualify, although its focus is less on scholarship and more on service to the profession.
4. Has she been influential in higher education? This criterion is rarely used, but it could be passed through authoring a widely used textbook or winning a major education award.
5. Does she hold a named chair, distinguished professorship, or similar title at a major institution?
6. Has she been the head of a university or of a major society? For instance, all past presidents of the AWM have Wikipedia biographies (17 of them created by 13 different editors from 2005 to 2014, and all but one of the remaining six created in 2015–2016 by me in a deliberate push to make the list complete).
7. Has her academic work had significant influence outside academia? Usually this would be documented by popular-press stories about her work.
8. Is she the editor-in-chief of a major journal? As well as the significance of the journal, the strength of this criterion also depends on whether the editorship is held singly or shared.
9. Is she notable as an artist or creative professional? This could include book authors, for instance, who are notable when their books are the subject of multiple independent published reviews.

Passing any one of these criteria is enough to justify an article, but I prefer (when possible) to choose subjects of new articles that pass at least two, so that their notability is clearer. Beyond these subject-specific criteria, Wikipedia also has a more basic criterion, applicable to any topic: something is considered notable (worthy of an article) when it is the subject of multiple in-depth independent publications. For instance, the March 2018 *Notices* featured a special section on Women's History Month featuring one-page profiles on 27 women [4]; these would certainly qualify as in-depth publications, but more than one such publication on a subject would be needed to meet this criterion.

So what can we do to encourage wider coverage of women mathematicians on Wikipedia? Many things!

- Learn about and recognize the accomplishments of your female colleagues. If you don't know about them, you can't promote them.
- Publish stories about the accomplishments of women mathematicians, the groups that support them (like the

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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, 2018. 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 2019 Joint Mathematics Meetings in Baltimore, MD.

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, 2018**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit www.awm-math.org.

AWM), and the awards they receive. These days, a lot of relevant information can be found on the web instead of through publications in newsletters and the like, but if it isn't published, it's much more difficult for Wikipedia to use that information. Articles on awards, in particular, (instead of just on the award recipients) can be very difficult to source, because even significant and famous awards are rarely the subject of in-depth publications that are independent of the organization giving the award.

- Continue establishing awards for significant accomplishments by women, and nominate your female colleagues not only for these awards but for the gender-neutral awards and society fellowships that they qualify for.
- Value teaching as well as research as a way of making significant contributions to mathematics. Post-graduate surveys have shown that hiring at bachelor-only institutions skews more heavily female than at research-level universities and in industry [6], so regarding teaching contributions as lesser than research contributions can be a cause of implicit bias against women. Both kinds of contributions are valuable, and teaching contributions should be publicly recognized in a way that can be used to include those contributions on Wikipedia (as they are, for instance, by the AWM's Hay Award and the MAA's Deborah and Franklin Tepper Haimo Award). In the not-too-distant past, teaching was the only mathematical career open to women. The combination of this with the bias towards researchers in who we think is important has led us to overlook many women who were leaders in mathematics education; the Hay award and Haimo Award, for instance, both have many female winners without Wikipedia articles.
- Keeping in mind the criteria for notability, help brainstorm a list of women who are notable enough that they should have articles, but don't yet have them, maintained by the Women in Red project at https://en.wikipedia.org/wiki/Wikipedia:WikiProject_Women_in_Red/Mathematics. Contributing to this list is much less complicated than contributing entire new articles to Wikipedia, and would be valuable service not only to editors like myself looking for content to add but also to the edit-a-thons and course projects held frequently as a way of attracting new editors to Wikipedia.

And of course, for those with the time and energy, please do join Wikipedia, and help us with the project of writing more about women in mathematics!

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AWM WORKSHOP AT THE 2019 JOINT MATHEMATICS MEETINGS

Application deadline for graduate students: August 15, 2018

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 Baltimore, MD, January 2019.

FORMAT: The workshop will consist of a Special Session focused on Computational Topology organized by Yusu Wang and Radmila Sazdanovic, and a Poster Session for graduate students. Selected junior and senior women from the Research Collaboration Conferences for Women (RCCW) WinCompTop, which was held at IMA in August 2016, will be invited to give 20-minute talks in the Special Session on Computational Topology. 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 Computational Topology 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, a 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 Computational Topology will have the opportunity to connect with the Women in Computational Topology (WinCompTop) Research Network.

All mathematicians (female and male) 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 workshop participants, in particular the graduate students. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by **September 15, 2018**.

ELIGIBILITY: To be eligible for selection and funding, a graduate student must have made substantial progress towards her thesis. 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 her thesis advisor.

Applications (including abstract submission via the Joint Mathematics Meetings website) must be completed electronically by **August 15, 2018**. See https://sites.google.com/site/awmmath/programs/workshops for details.

Introduction

Lillian Pierce is the Nicholas J. and Theresa M. Leonardy Associate Professor of Mathematics at Duke University. She earned her PhD in Mathematics at Princeton in 2009.

I have a dream, a recurring dream, and it goes something like this. I am visiting a collaborator at a math department in another university. At the end of the day, we leave the math building and happen to meet up with a group of her faculty friends, to whom she introduces me. I feel shy: these women are very impressive, clever, driven, no-nonsense. But they're friendly to me and we are soon chatting about our research areas; in my latest iteration of the dream, a tall woman told me she worked on "tort law" (something I'd be hard pressed to define, even when I'm awake). I realize these women are in the habit of walking together across campus to a university residential area where they all have various apartments. Discussing our work, we walk across campus in the deepening dusk, until we exit the main area of quadrangles.

In the distance I see the buildings where the women must live, but between here and there, there is no more lighting, and the cement sidewalk ends. Between the university and their homes, there is just a field, a very muddy field. The women don't seem to think anything of it: they start across the mud, each woman picking out her own path from one likely looking grass clump to the next. I am aghast: why isn't there a path? A nice paved sidewalk? Some safety lighting? Do they have to pick their way through the mud every night, ruining their work shoes? Why do the women just accept this? I stay behind, calling out "Does the university know about this? Why doesn't the university do something about this?"

I guess I think about institutional equity, even when I'm asleep.

It's 2018, and in many professions it can still feel that each woman has to make her own way across challenging territory, especially when in comes to liminal areas between work and home. Now don't get me wrong—I'm not saying that there should be one rigid path that we all follow across the field. Of course each person should be so lucky as to design work, and home life, and their interaction, to suit our individual wants and needs. But we can benefit from examples to smooth the way ahead.

For many years, within a relatively homogeneous math community, it is likely that people felt they had a sufficiently dense class of examples in front of them. But in these still early days of the full modernization of the community, any individual who is "other" may feel that the set of relevant examples is meager, and that they are slogging through unnecessarily boggy territory, improvising without institutional support. Thus it is in the spirit of demonstrating a few more potential paths in that area between "work" and "family," with the many possible meanings of those words, that we are reintroducing a series of interviews for Mathematics + Motherhood.

Note: A core motivation for this interview series is to support increasing diversity in the community of mathematicians, in particular by addressing aspects of motherhood, which are frequently a topic of concerned inquiry from young mathematicians. Yet readers may notice that the interviews in the series may not fully represent the diversity of individuals and families already present in mathematics. In the present times, there are many reasons that individuals may not feel comfortable describing their family in a permanent public venue. I am grateful for the candor of mathematicians who have spoken with me about the topics of this series, off the record or not. I strongly hope that we will reach a time when people of all races, nationalities, religions, ethnicities, genders, and orientations will be safely and comfortably included in our mathematical community and in the broader world.

Interview with Teena Gerhardt

Teena Gerhardt is an associate professor at Michigan State University who works in algebraic topology. She earned her PhD at MIT in 2007.

M+M: Tell me a bit about your work in math.

TG: Most of my research centers around algebraic K-theory and related invariants. Algebraic K-theory is an invariant of rings that has connections to many fields of mathematics, including topology, algebraic geometry, and number theory. I approach algebraic K-theory using tools from algebraic topology, and in particular, equivariant stable homotopy theory.

M+M: And tell me about this moment in your career.

TG: I am an associate professor at Michigan State University. I received tenure just this past summer. I feel comfortable in my career right now. I am working on research which I find very interesting, with collaborators I really enjoy working with. I have more research ideas than I have time

to pursue. While that is sometimes disheartening, I do like feeling surrounded by possible research directions. I've also had some interesting teaching opportunities over the last few years and feel that I have been able to contribute positively to my department and university through teaching, mentorship, and curriculum design. I'm enjoying my work a lot. That said, I do feel stretched very thin. I have young children at home and it is definitely challenging to have a very full workload and also three young children.

M+M: Congratulations on getting tenure! How did the development of your family align with your career progression?

TG: My husband is also a mathematician. We met at MIT when I was in my last year of graduate school and he was starting a postdoc there. We lived apart for most of the three years that I was a postdoc, but we traveled frequently to see one another, and we got married during those postdoc years. We were very fortunate to secure tenure-track jobs at the same institution, and now we are both tenured. We have twin daughters who are four years old. They were born the summer after my third year on the tenure track. We also have an eight month old son, who was born just three days before I was officially awarded tenure—that was a big week for me!

We have been lucky to be able to grow our family to the size that we wanted, but our path to that point included

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Teena Gerhardt

CALL FOR NOMINATIONS

The 2019 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 and Liliana Borcea.

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. 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 **November 1, 2018** 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 www.awm-math.org/kovalevskylectures.html for more details.

a long struggle with infertility and miscarriages. We knew having children could take some time for us. I have a benign pituitary tumor at the base of my brain, which can impact fertility. That turned out to be just one of several fertility/pregnancy issues we faced. I'm thankful that we started trying to have children soon after we were married. If we had waited until we both had tenure, we may not have been able to have children at all. But it did make for a very intense time on the tenure-track: years of struggle with infertility and loss, followed by a high-risk twin pregnancy, and then parenting young twins! On top of the usual stresses of being an assistant professor, it was definitely a lot.

M+M: When you describe this as a "very intense time," you are not joking! Thank you for sharing both the wonderful news of your three children, and also the fact that there were difficult times leading up to this point. I remember I first asked if you wanted to do one of these interviews right after your twins were born, and you said to ask you again in a few years! As you got used to being a professional + parent, how do you think you changed so that it started to feel manageable?

TG: That first year with the twins was difficult. The sleep-deprivation plus the physical demands of breastfeeding and caring for two infants definitely took a toll. I co-organized a semester-long program at MSRI that year, so when the twins were seven months old we moved the whole family to California for five months. It was a great mathematical experience to spend the semester surrounded by so many of my collaborators and other people in my field, but it was very strange to have such an intense time in my life personally collide with such an intense time in my life mathematically. The result was that I felt like I was failing on all fronts. Perhaps the biggest thing I've learned over the years about balancing my professional life with parenting is to not judge myself so harshly. In retrospect, that semester I was doing a perfectly fine job. I carried my weight with organizational responsibilities. I got research done with my collaborators. I cared for my children and spent time with them. I probably could have done any one of those things better if I had more time and energy to devote to it, but I didn't.

These days I have an infant again and am very much in the depths of sleep deprivation. It's not as overwhelming as it was with the twins though. Plus I have years of practice now when it comes to balancing parenting with academic work. That's not to say that it is easy. I would hesitate to even use the word manageable right now, as I am in the midst of a very demanding semester. When I feel overwhelmed by it all, I try to remember that this is a season of my life, and

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, and Jill Pipher.

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 15, 2018** and will be held active for three years. If you have questions, phone 401-455-4042 or email awm@awm-math.org.

my career. In this particular season, there is not a lot of time for things like self-care. I'm either with my children or working nearly 100% of the time. Thankfully, I enjoy both of those things!

M+M: I often hear questions from women who are early in their careers about how to guess whether they should be worried about infertility if they wait to get their career on a really solid footing, possibly tenure, before having children. It's really hard to answer these questions, but they are absolutely important questions. How would you recommend a young woman approach gathering information, or personal advice, and making such a decision?

TG: Part of the thing that's so frightening about infertility is that it is very difficult to predict who will be affected by it. I was lucky because I knew that I had a medical issue that can impact fertility. The reality though is that many people who struggle with infertility have no prior medical issues. Age is of course also a huge factor with fertility. Unfortunately the standard academic career path and tenure clock overlap quite significantly with the years women are most likely to be able to conceive without fertility problems. The piece of information a person really needs—will they personally be able to have children at some particular age without fertility issues?—is impossible to gather in advance.

When I was first facing potential fertility challenges, I found it helpful to learn about the assisted reproductive technologies that are available. I fortunately knew someone who had been through fertility treatments and was willing to talk about it, which was tremendously helpful. I also did a lot of reading on the topic and I found it very reassuring. It gave me a way to make a potential plan in the face of many unknowns, and it helped me think through what sorts of interventions I was and was not comfortable with. Throughout our struggle to have children the plan changed many times, for various reasons, but being knowledgeable about options and having a plan helped me feel more in control of the situation.

In terms of gathering personal advice, at the time I chose not to talk openly about my desire to have children or my struggles with infertility within my professional communities. As a pre-tenure faculty member I felt like it was risky to have those conversations with people who ultimately might play a role in my tenure evaluation. Instead I chose to talk with academic friends who are outside my field and my department about these issues.

The advice for women in academia has long been that if they want to have children they should wait until they have tenure. I think it's important for people to be aware of the potential consequences for fertility of heeding that advice. At the same time, I'm definitely not suggesting that anyone should feel pressured by the threat of infertility to have children before they are otherwise ready. Decisions about if and/or when to have children can be complicated. My advice would be that awareness about infertility should be one factor in those decisions.

I had three kids before tenure, which certainly flies in the face of every piece of advice I ever received on this issue. But that was the choice that was right for me, and my partner, and for how we envisioned our lives together. There are successful women in math who have had children at all different career stages. Not everyone wants to have children. For those that do, there is no one right time that works for everyone. As a community I think it would be helpful if we acknowledged that not all women in academia are the same, and that the standard "tenure then children" advice is not a good fit for everyone.

M+M: I'm interested in the role it plays that your husband is also not only an academic but a mathematician. Do you think this has an impact on how you organize the interaction of work and family, because he understands precisely the professional demands you face? (Or have you sometimes faced the same demands a little too precisely, so that you both face a work crunch, or travel, at the same time?)

TG: Our shared profession definitely impacts the way we organize the interaction of work and family. We have a very detailed understanding of the exact professional demands the other person is facing, which allows us to easily and fluidly determine who needs more work time and adjust our childcare split accordingly. In an overall sense we split family responsibilities very evenly, but what that exact split looks like can vary greatly week to week (or semester to semester) depending on whether one of us is traveling, or has a collaborator visiting, or a grant deadline, or a heavier teaching load, etc. As much as possible we try to arrange our teaching schedules so that in any given semester one of us has a lighter load, so that when a childcare emergency arises, there is someone who can handle that more easily. I think the fact that we work together is very positive for sorting out the day-to-day interactions of work and family.

Another thing I appreciate about being in the same department as my husband is that our colleagues and students are equally likely to see him with our children as they are to see me with them. Societally, women with children tend to face more skepticism about their level of professional commitment than men with children do. Our department is very supportive, but I have still always been a little wary about having any children with me at the office, for instance. However, this past

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fall when I was partially on parental leave, I did bring our infant son with me to a lot of committee and project meetings. I felt more comfortable doing that knowing that my husband did the same.

M+M: I want to come back to your comment that you and your husband met during graduate school and then did your postdocs in separate places. Anecdotally, I think many female mathematicians face a decision about whether to live away from a partner during some early career phase, before trying to "fix the two-body problem" at the point of taking a faculty position. Do you have any advice for how to lead such a decision process?

TG: For us it evolved very naturally. There wasn't much decision involved. We both had postdoc opportunities that we were excited about, and they happened to be in different states. It was clear to both of us that we wanted to take advantage of those postdoc positions. At the same time, it was also clear that we wanted to remain in a relationship with one another. It felt natural to us at that stage in our careers that we would each make the choices that were best for us professionally, and we would make our relationship work around those choices.

I found living apart as postdocs much more manageable than I thought it would be. We lived together in the summers and over breaks. During the semester one of us would fly to visit the other person for a weekend every few weeks. We were both very busy with work, so when we weren't in the same place the time passed quickly. Of course we didn't have kids at that point, which made it much easier to live separately than it would be now, for instance. It's a very personal decision whether to consider living apart during an early career stage. In my experience it was easier than I thought it would be, so I encourage people to be open to the idea. Each relationship is different though, and there are many different ways to navigate two-body problems.

We made the decision to get married while we were both postdocs, and we did not yet have permanent jobs lined up at the same institution. That was pretty frightening. We spent quite a bit of time talking through what we would do if we had trouble getting permanent jobs in the same place. While we were fine with living apart as postdocs, we knew that we did not want to live apart in the long run. In the end we were very fortunate that it worked out for us relatively easily.

M+M: Teena, thank you very much for these thoughtful reflections on the path you have traced to this point in your career.

Women and Mathematics (WAM) Turns 25!

Kristin Lauter, Microsoft Research

The 25th edition of the Women and Mathematics (WAM) Program took place May 19–25, 2018 at the Institute for Advance Study (IAS) in Princeton.

The Program Organizers were Sun-Yung Alice Chang (Princeton University), Dusa McDuff (Barnard College, Columbia University), Margaret Readdy (University of Kentucky), and Michelle Huguenin (IAS). The program this year was devoted to "The Mathematics of Modern Cryptography," with the Inaugural Terng Lecture on "Mathematics in Cryptography" given by Toni Bluher from the National Security Agency (NSA) and the Inaugural Uhlenbeck Lecture on "Mathematics of Post-Quantum Cryptography" given by Kristin Lauter from Microsoft Research. Toni brought along a WWII Enigma machine and showed participants how it worked. Review sessions for the beginning and advanced courses were held each afternoon by the teaching assistants, Emily Willson (NSA) for the beginning course and Sorina Ionica (Université de Picardie) for the advanced course.

Monday afternoon the WAM Colloquium Lecture was delivered by Jill Pipher (Brown University), AMS President-Elect and former AWM President, and described her work with Hoffstein and Silverman on lattice-based algorithms. Wednesday was Princeton Day, with a visit to the math department at Princeton University. There were three

WAM 2018 audience on the first day of lectures

WAM Organizers and others at the banquet

talks, given by Princeton junior faculty Oanh Nguyen, Ana Menezes and Yueh-Ju Lin. A computer workshop in the afternoon was taught by Alyson Deines (Center for Communications Research), with help from teaching assistant Linda Cook (Princeton).

The introductory course aimed to convey the evolutionary nature of cryptography and the central role of mathematics in this story. Topics included substitution ciphers and how to defeat them, WWII cryptography, symmetric cryptography and electronic codebooks, authentication, public key cryptography, mathematical underpinnings of internet security, and the future.

The advanced course covered some of the mathematics behind current proposals for Post-Quantum Cryptography (PQC). In 2017, the National Institute of Standards and Technology launched a multi-year international competition to select new postquantum cryptographic systems, based on hard problems in mathematics for which there are no known polynomial time quantum algorithms. The advanced lectures highlighted the mathematics of lattice-based cryptography, code-based cryptography, homomorphic encryption, and supersingular isogeny graphs, as well as some of the deep connections with number theory.

WAM is an intensive mentoring program run by the IAS and supported by the National Science Foundation, a generous grant from Lisa Simonyi, and Princeton University. The WAM program has the status "in cooperation with AWM" and supports an equal opportunity and non-discrimination statement honored by the IAS in addition to the AWM non-discrimination statement. There are three levels of participants: undergraduate students at the junior and senior levels, graduate students at all levels, and postdoctoral researchers and lecturers. Participants applied to the program in February, and 65 women were selected and funded to attend. Besides the main organizers, the other Program Committee members are Lisa Carbone, Maria Chudnovsky, Nancy Hingston, Robert MacPherson, Elizabeth Milićević, Linda Ness, Lillian Pierce, Peter Sarnak, and Karen Uhlenbeck.

On Thursday evening, a banquet was held to celebrate the 25th Anniversary and to honor founders Karen Uhlenbeck and former AWM President Chuu-Lian Terng, in honor of whom the two Lecture Series were named. The Director of IAS opened the evening and Peter Sarnak talked about the importance of the program to IAS. Program organizers Dusa McDuff and Margaret Readdy gave some history and introduced Karen and Chuu-Lian, who provided additional perspective in their remarks. Dusa also included a tribute to Antonella Grassi, who organized the precursor to the WAM program in 1993 at MSRI and then worked on the WAM committee for many years. A slideshow and video tributes from alumnae completed the festive celebration. Happy Birthday WAM! Here's to 25 more years!

1993 WAM precursor program at MSRI workshop on algebraic geometry

Karen Uhlenbeck's banquet talk

Karen Uhlenbeck, The University of Texas at Austin

The situation for women, while less than ideal today, is nothing like what it was in the early '90s. One of the things that happens when you get old, is you find that history has been made more politically correct, namely people and departments advertise how good they were in the past on various current issues, rather than remembering their sometimes terrible records in the past.

The Women and Math program started as the Mentoring Program for Women in Math. It was an outgrowth of the Park City Mathematics Program. I was one of the

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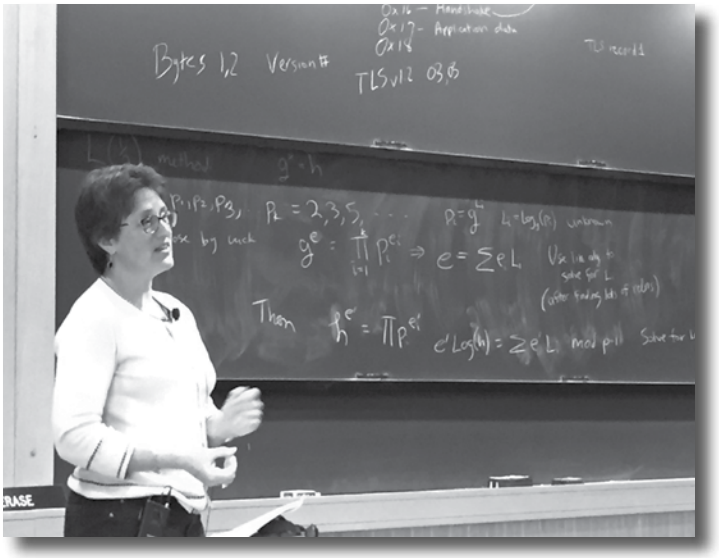
founders of that institute; one of my motivations for starting PCMI was my assumption that among the participants there would be quite a number of women who might be isolated in their home institutions, but who would meet each other in Park City and could form friendships and collaborations. This simply did not come to pass, at least not right away. One year, I taught the upper division undergraduates, and in the initial selection, there were no women … we recruited one, but this did little to mitigate my concerns.

At the same time, Chuu-Lian Terng and I became friends, and we noticed, as did other women, that while a number of women had been hired in the big state universities in the '70s and early '80s, these women remained the most recent female hires in their departments.

The first women's program was actually held at MSRI in response to NSF pressure to increase diversity at MSRI. It was put in the hands of a recent PhD, Antonella Grassi, who put together a program on the spot. It is disturbing to note that no senior woman appears to have been available to take on this job, but Antonella did a great job. She is a remarkable woman, but this proves to me that one should always give a lot of responsibility to younger women … and that includes all of you here. You have no idea what you can do unless you are given the opportunity to try.

During the next year, the organizers of PCMI began looking for a permanent home. We tried MSRI, but the director at the time, Bill Thurston, was not interested. Two of the organizers had ties to Phil Griffiths at IAS, and we sold ourselves to this institution, with what I think were marvelous consequences. I was approached to continue the mentoring program. The Institute offered not only prestige and funding, but food, housing and magnificent office support. I hate to work on these things alone, and immediately enlisted Chuu-Lian, who was at about that time president of AWM. We not only complimented each other, but we began a 20-year mathematical collaboration. Our office support, Anne Humes, not only did everything for us, she also taught us what we should do when running a program.

One of our principles was to get as many senior women involved as we could. Over the years, we had help in the form of reading application files, visits from senior faculty to the program, and various panels on various topics. I have to applaud the devotion of this group of women. I don't have a record of all of them, but I have to mention Nancy Hingston and Antonella Grassi, who have been constants over the years, as well as the more recent



Toni Bluher lecturing

contributions of Christine Taylor. I see Lisa Traynor in the audience. There were also the many lecturers, four a year! Throughout this time the program has had marvelous support from the senior women in the mathematics community. Only once was the request to give lectures in the program turned down when we asked. Sometimes the timing had to be changed, but the enthusiastic support has been there. I hope you all will respond to requests to volunteer with the same enthusiasm.

We also owe a debt of gratitude to IAS, both the director's office and the mathematics department, for their constant support in many different ways. WAM is in capable hands, and I hope to see many of the participants coming back at future stages of their careers.

Karen Uhlenbeck and Kristin Lauter

News from ICERM

ICERM Spring Newsletter

On behalf of the National Blackwell-Tapia Committee, ICERM is pleased to announce that the 2018 Blackwell-Tapia Prize will be awarded to **Dr. Ronald E. Mickens**, the Distinguished Fuller E. Callaway Professor in the Department of Physics at Clark Atlanta University.

ICERM is also delighted to host the 2018 conference and award ceremony (November 9–10, 2018), which honors the inspired leadership of David H. Blackwell and Richard A. Tapia. The conference showcases mathematical excellence by minority researchers, informs students and mathematicians about career opportunities, and provides networking opportunities for mathematical researchers at all stages of their careers. Funding to attend the conference is available. Register today! Learn more at https://icerm.brown.edu/events/btc2018/.

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