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,

I write to you from Colorado in the middle of summer: a season of weddings and annual conferences. As I take a pause for a family wedding sandwiched between the SIAM Annual Meeting and MathFest, I am moved to reflect on the organizations and networks that I belong to, and on the role of the AWM in particular. At last count, I am a member of six mathematics associations. This might seem excessive, but—let's face it—I like to *belong*. Why do we join a professional association, and how does the AWM, in particular, satisfy these needs?

One of the main reasons for joining a professional organization is to develop professionally through networking opportunities, mentoring during career transitions, educational opportunities and resources. The AWM has a variety of programs that support professional development: travel grants, workshops at national meetings, a mentoring network and research collaboration networks. I just put together an email list for our WIMB (Women in Mathematical Biology) network and was joyfully surprised to count over 120 names on the list. These network not only connect mathematicians in a specific subfield, fostering collaborations and mentoring, they also promote visibility by providing a database of speakers, reviewers and panelists. Our AWM website provides resources for educators, students and researchers, and our recent panels at the annual meetings provide opportunities for us to learn about non-academic career options, mathematics and activism, and math education. AWM Student Chapters create a space for local events with customized programming, forming their own nation-wide network that supports its members through webinars and shared resources. Being an active member of a committee can give you leadership experience, as well as help advance your own career while helping others. The AWM has plenty of committees waiting for you to join!

I join organizations to stay on top of what is happening in my field and to broaden my knowledge. Most professional associations disseminate and highlight work done in the field by hosting conferences and symposia and by producing publications that distribute knowledge. The AWM organizes sessions at all the national meetings and holds its own research symposium every other year. Just a few weeks ago, the AWM workshop at SIAM featured eight speakers from the WISH (Women in Shape) network. The newsletter you are reading now, along with our social media posts, keeps members up to date on events in our community. The successful AWM Springer Series now boasts fifteen volumes containing original

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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*

research articles, review articles, social and historical perspectives on women in mathematics, and proceedings from AWM Research Symposia.

We often want to reach out, effect change, and have our voices heard. As an individual, this can be an overwhelming set of goals. As a member of a professional organization, we can give back to our community by mentoring others or by participating in outreach activities. The AWM mentoring network and national workshops provide opportunities to connect with younger mathematicians. AWM programs provide multiple ways to reach out to our community through the high school essay contest, regional one-day conferences, and national events for young people. By supporting the recent "How to Be a Better Ally" workshop at SIAM, the AWM is supporting positive change in departments and workplaces. There is strength in numbers: an established association can help us fight important battles. The AWM has put out or endorsed statements on the travel ban, diversity, and the imperative to create a welcoming environment. The AWM Hill Visits are a vehicle for us to speak with a louder voice about legislation that affects our community.

Finally, belonging to an organization helps us stay inspired and motivated. Through meetings and committee work we make new friends who share our objectives. You may have noticed that most of the benefits provided by the AWM that I just described are there for *everyone*; you don't need to be a member to apply for our grants or go to our workshops. But membership means knowing that you contributed to making these programs happen. We show our loyalty and gratitude to those who helped us by sustaining the organization through our membership. Is the AWM a perfect organization? Of course not. Referring to Hirschman's essay "Exit, Voice and Loyalty,"[1] I encourage you to be a voice in AWM: What should we do differently? What do we need to change? How can you help us implement that change? We value your loyalty and appreciate your renewed membership this coming year.

[1] *Exit, Voice and Loyalty,* Albert O. Hirschman (Harvard University Press, paperback 1972)

AWM Booth at SIAM

AWM news. The AWM Springer Series has two new volumes coming out. Volume 14: *Understanding Complex Biological Systems* showcases work resulting from the Research Collaboration Network held at MBI in April 2017; Volume 15: *Advances in Mathematics* contains highlights from the most recent AWM Research Symposium held at UCLA, also in April of 2017. Both volumes contain original research as well as survey articles—check them out and order them for your library! For more information, and for other titles in this series, see https://www.springer.com/series/13764?detailsPage=titles.

Once again, the AWM was well represented at the SIAM Annual Meeting, this year held in Portland, Oregon. On Monday, I, along with a large audience, enjoyed **Éva Tardos'** Sonia Kovalevsky lecture exploring the effect of learning behavior in dynamically changing games. The AWM Workshop talks organized by **Megan Owen** and **Cindy Grimm** kicked off the first day of the conference, with eight talks on Shape Analysis and Modeling. Congratulations to **Stephanie Dodson**, winner of the AWM poster prize, entitling her to a week at one of the math institutes. A mentoring lunch and career panel rounded out the official AWM activities. Thanks to **Suzanne Sindi**, **Laura Ellwein**, **Giseon Heo**, **Hala AH Shehadeh**, and **Malena Español** for organizing and overseeing all AWM SIAM activities, to **Deanna Needell** for organizing the panel and to **Joyati Debnath** for coordinating the poster judging. The AWM, along with EDGE, BDIS and SIAM, co-sponsored two events in line with our continued commitment to supporting diversity and inclusivity. The two-hour workshop "Difficult Dialogues: How to Be a Better Ally," facilitated by **Rebecca Renard**, gave participants background and resources to take concrete steps to create a more inclusive workplace. On Thursday evening, **Christine Darden** returned to speak about her experiences as an engineer at NASA, and **Shelby Wilson** moderated a discussion with **Erica Graham**, **Candice Price** and **Suzanne Weekes** at the panel "Hidden Figures: The Women Behind the Space Program." See pages 19–22 for more about AWM activities at SIAM.

I am delighted to announce that **Bryna Kra** (Northwestern University) will be the 2019 Noether Lecturer at the Joint Meetings in Baltimore in January. See the press release on pages 4–5. And on that note, please send us your nominations for the AWM Lecturers: Falconer (at MathFest), Kovalevsky (at SIAM) and Noether (at JMM). Who would you like to see honored?

In closing, I wish you the best for the coming fall months. I thank you for your continued involvement with the AWM: I am proud of all that we are doing, and look forward to hearing your voices as we move ahead.

Ami Radunskaya

Ami Radunskaya
July 27, 2018
Buena Vista, Colorado

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

Institutional Membership Levels

Category 1: $325
Category 2: $325
Category 3: $200

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

Executive Sponsorship Levels

$5000+
$2500–$4999
$1000–$2499

Print Subscriptions and Back Orders—Regular and contributing members living in the US may elect to receive a print version of the *Newsletter.* Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for $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.

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: http://www.awm-math.org
Updates: webmaster@awm-math.org

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AWM DEADLINES

AWM-MAA Falconer Lecture:
September 1, 2018
AWM Alice T. Schafer Prize:
October 1, 2018
AWM Dissertation Prize:
October 1, 2018
AWM Travel Grants: October 1, 2018
and February 1, 2019
AWM-AMS Noether Lecture:
October 15, 2018
AWM-SIAM Sonia Kovalevsky Lecture:
November 1, 2018
Ruth I. Michler Memorial Prize:
November 1, 2018
RCCW Proposals:
January 1 and July 1, 2019
AWM Essay Contest: January 31, 2019
AWM Mentoring Travel Grants:
February 1, 2019
AWM-Microsoft Research Prize:
February 15, 2019
AWM-Sadosky Research Prize:
February 15, 2019

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Bryna Kra

Bryna Kra Named Noether Lecturer

The Association for Women in Mathematics and the American Mathematical Society are pleased to announce that Bryna Kra will deliver the Noether Lecture at the 2019 Joint Mathematics Meetings. Dr. Kra is the Sarah Rebecca Roland Professor of Mathematics at Northwestern University. She has been selected as the 2019 Noether Lecturer for her profound impact on mathematics, both through her work in the fields of dynamical systems and ergodic theory and through her service to the profession.

Kra received her AB from Harvard University and both her MA and PhD degrees in mathematics from Stanford University, under the guidance of Yitzhak Katznelson. Before joining the Northwestern University faculty in 2004, Kra was an assistant professor at Pennsylvania State University, an NSF-NATO Fellow (University of Marne-la-Vallée), a Raymond and Beverly Sackler Fellow (Institut des Hautes Études Scientifiques), a Golda Meir Postdoctoral Fellow (Hebrew University of Jerusalem) as well as a postdoc at the University of Michigan and The Ohio State University.

Kra is best known for her fundamental contributions to ergodic theory. Her 2005 paper joint with Bernard Host titled "Nonconventional ergodic averages and nilmanifolds" (*Annals of Mathematics*) settled a long-standing open problem on the existence of the limit of certain multiple ergodic averages, uncovering the role of nilpotent groups and their homogeneous spaces in analyzing configurations in sets of integers. The work inspired many further developments, including structure theorems in ergodic theory, in topological dynamics, and in combinatorics, convergence results for numerous multiple ergodic averages, and the uncovering of recurrence phenomena that imply the existence of patterns in sufficiently large sets of integers. In further work joint with Vitaly Bergelson and Host, they introduce the notion of a nilsequence and use it to provide further structural results in dynamics. It has been adapted

to the combinatorial setting, playing an important role in studying patterns in smaller subsets of the integers, for example the set of primes. Continuing her work at the intersection of dynamics and combinatorics, Kra's more recent research lies in topological and symbolic dynamics, studying systems of low complexity. In joint work with Van Cyr, she has the strongest work to date on Nivat's Conjecture, relating a global property of periodicity of a two dimensional configuration to a locally checkable property on the complexity.

In addition to becoming a recent Fellow of the American Academy of Arts and Sciences, Kra is also an AMS Fellow and was awarded an AMS Centennial Fellowship as well as the AMS Levi L. Conant Prize. She was an invited speaker at the International Congress of Mathematicians (2006) and has given numerous invited lectures, including an AMS-MAA Invited Address (2007), Arnold Ross Lecture of the AMS (2013), National Museum of Mathematics (2014), Bartlett Lecture (2015), Dresden Lectures (2015), and the Coven-Wood Lectures (2017).

Kra is currently on the Board of Trustees of the AMS and has previously served on the AWM Executive Committee, the Council and Executive Committee of the AMS, the Board of Trustees of the Institute for Pure and Applied Mathematics, the Advisory Board for the Young Mathematicians Conference, and the Steering Committee for the Park City Mathematics Institute. She holds several editorial positions, including those with *Ergodic Theory and Dynamical Systems* and *Discrete Analysis*.

The 2019 Joint Mathematics Meetings will be held January 16–19 in Baltimore. The lecture honors Emmy Noether (1882–1935), one of the great mathematicians of her time. She worked and struggled for what she loved and believed in. Her life and work remain a tremendous inspiration. Recent Noether Lecturers include Barbara Keyfitz, Raman Parimala, Georgia Benkart, Wen-Ching Winnie Li, Karen E. Smith, Lisa Jeffrey, and Jill Pipher.

STUDENT CHAPTER CORNER

Coordinator: Kavita Ramanan, kavita.ramanan@brown.edu

AWM Student Chapter Awards

AWM gave four Student Chapter Awards recently at MathFest, August 1–4, Denver, CO. Awards were given in the four categories of community outreach, fundraising/sustainability, professional development, and scientific excellence. Thanks to all who participated in this year's competition. We congratulate them on the strength of the activities they are pursuing to create productive environments for women in mathematics, whether or not they won an award this year. We are pleased to present this year's winners.

University of Illinois at Urbana-Champaign, Winner of the Community Outreach Category

The AWM Student Chapter at UIUC received its award in recognition of its outstanding work in sharing research level mathematics with people in the community. Their program is notable in highlighting active research projects of female mathematicians. They have built a comprehensive program for all ages and all members of their various communities and have raised over $40,000 to invest in building a self-sufficient and sustainable program. Their annual Sonia Math Day targets high school girls, while for middle school girls, the chapter developed Girls Engaged in Math and Science (GEMS) workshops comprised of three sequential weekend events. Finally, they co-host a math carnival for the entire Urbana-Champaign community that serves over 1000 people. Their community work provides an extraordinary model for AWM outreach, and we congratulate them for their efforts, imagination, and great success.

Florida Atlantic University, Winner of the Fundraising/Sustainability Category

The AWM Student Chapter at Florida Atlantic received its award in recognition of its initiative in researching funding opportunities and its successful application for an NSF INCLUDES "Watch Us" mini-grant. This grant "aims to broaden participation in STEM by reaching populations traditionally underserved in science and engineering." Florida Atlantic's grant "Dare to Bee" supports, among other activities, their Big Bee/Little Bee mentoring project which pairs graduate students with undergraduates and promotes student/faculty interaction. The primary objective of the grant is to provide a support system for female students, enhancing the professional skills of graduate students and encouraging undergraduates to continue their academic and professional training in the mathematical sciences. With funds from their grant, the chapter brought a visiting mathematician to campus for a research lecture and extended discussion with students, hosted an AAUW Salary Negotiation Workshop to address salary discrimination

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against women, and supported travel by chapter members to the Joint Mathematics Meetings to recruit talented graduate students to FAU. We applaud the chapter's enterprise in seeking and finding resources to support its ambitions to expand participation by women in mathematics and science.

Purdue University, Winner of the Professional Development Category

The AWM Student Chapter at Purdue received its award in recognition of the depth and success of its program to develop students' professional involvement in mathematics. Their signature program began by matching prospective graduate students with volunteer graduate students, introducing them to each other at the prospective student event held annually by the department. This program has now matured, but it was immediately so effective that the mathematics department used it as a model for a similar program which has helped to recruit and retain graduate students. The Chapter has played a key role in encouraging the recruitment and support of female graduate students and faculty in the mathematics department and has been one of the driving forces behind the administration's efforts at the departmental level to support the careers of women in mathematics. We congratulate them for their outstanding work in promoting the goals of the AWM in their own institution.

University of Oregon, Winner of the Scientific Excellence Category

The AWM Student Chapter at the University of Oregon received its award for its highly distinguished Speaker Series and for its innovative reading programs that cultivate and encourage student interest in mathematics. The Speaker Series invites two female mathematicians each year to give talks accessible to graduate students and upper-level undergraduate students. Speakers spend several days on campus interacting with students in both formal and informal settings. The Chapter also sponsors an Undergraduate Reading Program that pairs undergraduates with graduate student mentors. In addition, the chapter has begun to create a library of books on professional women to provide resources for female mathematics students to thrive in and beyond the university boundaries. The Chapter's exceptional efforts in broadening the access of students to top-rank female mathematicians and to work in the mathematical sciences make it a most deserving recipient of this award.

Student Chapter Awards 2019: What projects, events, or programs could your student chapter undertake in this new school year? We love hearing about and featuring these programs, so be sure to nominate your institution by April 15, 2019 for the 2019 Student Chapter Awards.

We are also interested in receiving photos and articles about your activities to include in the Student Chapter Corner.

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**.

BOOK REVIEW

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

Code Girls: The Untold Story of the American Women Code Breakers of World War II, by Liza Mundy, Hachette Book Group, hardcover 2017. Coming 2018: paperback edition and also Young Readers Edition, hardcover and e-book, pitched to grade levels 3–7.

Reviewer: Bettye Anne Case, Olga Larson Professor Emerita of Mathematics, Florida State University

Even among Rosie-the-Riveter tales,[1] this dust jacket copy surprises:

> Recruited from small Southern towns and posh New England colleges, 10,000 American women served the US Army and Navy as code breakers during World War II.

Code Girls is a joy to read—a dramatic "success against the odds" tale of the value and cost of US World War II code-breaking efforts.

This "popular history" recounts facts and portrays excitement, despite the hurdles journalist Liza Mundy faced and overcame. Not an expert in cryptography or war history, she examined available written documentation, contemporaneous notes, and oral histories. Relevant material was still embargoed. Mundy brings information to life with action vignettes, many chosen from interviews with nonagenarian code girls who began this work young. The reader is elated and proud to see these women leap boundaries set by tradition. With its many characters and narrative threads, *Code Girls* can be a challenge to follow (I wished for a better index!). Mundy's Introduction carefully sets the stage. The Epilogue's clarity is welcome despite many examples where successful war work was not parlayed into progress toward the women's post-war goals. Mundy's explanation: "The nation lost talent that the war had developed." [p. 344]

The *Code Girls* narrative mirrors recurring themes in today's action literature. There is *youth* with its energy, enthusiasm, and optimism. There are *secrets* and the delicious feeling of guarding them. Understanding requires *time travel* back to times before current technologies and enlightened views on racism and sexism. *Accelerate-and-improvise* was the directive to achieve mission success.

Youth. Some recruits had worked a few years but most were teenagers or in college. Only the young could be transplanted in large numbers to cramped workplaces and poor living conditions with confidence they would adapt and be productive. Few women in Mundy's cameos hold the doctorate. I verified only one in mathematics: Elizabeth Sherman Arnold, "a Vassar-educated mathematician … 'brighter than anyone' " [p. 181] had earned a Berkeley PhD.[2] Likely the youngest average age for a unit was that of a mostly enlisted women unit of WAVES that helped build, then ran, "bombes" to break the German Enigma cipher.

Mundy shows that even with this young cohort, the pain from work stress, uncertainties, and deaths took its toll. Effects followed Louise Pearsall through much of her life.[3] Jimmie Lee Hutchinson, still a teenager, was recruited at Southwestern Bell to enlist in the WAVES, following four brothers and her pilot-fiancé into military service. By mid-war, recently married, she managed operation of one of the 120 bombes—supervising an assistant and four operators. Nearing D-Day, message traffic, and hence their already-heavy work load, dramatically increased as Germans reacted to both preparations and the decoy messages of Operation Bodyguard. A few days after D-Day, Jimmie Lee got the message that her glider-pilot husband, Bob Powers, was missing in action. At age 22 she was a widow. She asked for leave for the funeral. However, "her request was denied. There were other bombe operators getting the same telegrams and they could not all be allowed to leave." [pp. 264, 281–283, 309–311]

Secrets. Doing secret work was exciting, but the elation was spoiled because secrets could not be shared with loved ones. Work was not discussed outside official duties, then or ever; to do so was espionage. An armed officer usually supervised signing of required loyalty and secrecy oaths. Dot Braden told Mundy of a letter after the war reminding her that information she was privy to "should not now, or at any future time, be revealed." [p. 335] When their post-war children asked, the women hedged about "war work." Seventy years later, Mundy found them still hesitant to talk.

You could have a connection to one of the 10,000 code girls but know little or nothing about their work. Mundy found she knew a teacher at her children's school. Dorothy Ramale, who worked for the Army, later joined the WAVES and then used the GI bill to earn her MS; she taught math in the Arlington County schools. [Index: Ramale] An Amazon reviewer realized that a fellow student in a recent Italian class must have been a code girl. From *Code Girls*, I was surprised to learn that I knew a Wellesley recruit, the wife of my husband's cousin. [pp. 181, 190]

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Time Travel. Chapter datelines suggest time travel to understand the observations, whether about DC area geography, day-to-day life, family expectations, or available technology. The Chapter 2 dateline "June 1916" indicates the need to understand US coding successes and personnel from 1916 through 1940. "As crushing as Pearl Harbor was, it was thanks in large part to Driscoll's[4] decades-long detective work—and to the example Elizebeth Smith Friedman set for other women—that America did not enter the Second World War quite as blind as it might have seemed." [p. 83] Time travel helps when societal or on-the-job interactions reveal discrimination out of step with 2018.

Racism. Mundy's anecdote of an encounter between a coder and a civilian Nisei translator is a poignant demonstration of propaganda's evil powers: A code girl, hand-delivering intensive JN-25 codebook recovery efforts to a high-priority translation section, was met by a Japanese-appearing man; she was clearly startled. "'I'm an American' [he said]; 'You don't look like one' she blurted … and felt sorry about that remark for the rest of her life." [pp. 186–187] Many US citizens of Japanese descent were held in prison-like conditions even though others were serving with distinction in the armed forces; they were essential for translating. Before, during, and after WWII, racist practices were the norm by law, custom, or the result of official propaganda. With the excitement over the book *Hidden Figures*, Mundy looked for black code breakers; she found that African Americans were prohibited from work at the Naval Annex, but that the Roosevelt Administration mandated the hiring of African Americans at Arlington Hall. Most of the latter were custodial or service workers but Mundy found a mostly female African American unit analyzing intercepts from commercial Japanese traffic; their intelligence found who sold to Mitsubishi or Hitler. [pp. 194–195, 208–209; photo essay p. 5]

Sexism. Mundy does not shy away from examples of sexism faced by coders, including many actions now illegal, or which today's #MeToo lens would punish. The Chapter 2 title, "This is a Man's Size Job, but I Seem to Be Getting Away with It," quotes Genevieve Young Hitt, indicating her reluctant acceptance. She and husband Parker, like Elizebeth and William Friedman, both had coding experience. Parker ran the Fort Sam Houston code room but Genevieve took over when WWI called him overseas. [pp. 67–68] Similar accounts describe reactions when emergencies give women opportunities; mathematician Mabel Barnes describes her realization thusly: "Desperation again overcame prejudice."[5] Virginia Gildersleeve, then Dean of Barnard College, "acidly" remarked, "If the Navy could possibly have used dogs or

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.

ducks or monkeys, certain of the older admirals would probably have greatly preferred them to women." [p. 161]

Women's breakthroughs were often passed off as being attributable to women being better suited to detailed boring work. [p. 21] Men and women had different published salary scales for the same work. "If you were a woman, you had three strikes against you. One of the officers had a hair-raising collection of graphic pornography." [p. 148] From a biography of Agnes Meyer Driscoll: "[The woman] could expect to be patronized, condescended to, and, probably, sexually harassed to an extent a woman of today would find shocking."[6]

Accelerate-and-Improvise. The rapid buildup from 1940 through 1942 of code-breaking capabilities in the US, followed by even faster buildup, inspired interesting solutions to problems. No space? Take over another building. Young men headed overseas? Revive women's branches of the armed services! No chair? Turn over that wastebasket and sit! No shampoo? Use laundry soap! Not enough beds? Sleep in shifts! The Navy hiring all the women elite colleges produce? Send handsome officers to small towns; recruit college women and dissatisfied teachers. Ask: "Do you like crossword puzzles? Are you engaged to be married?" If she answers "yes, no," vet and send her to Washington! Senior officers cultivated anyone they knew who reached young women. Repeated requests besieged women college professors. By September 1942, from a tiny southern women's school, Winthrop College, Ruth W. Stokes reports recruiting and job offers for students as well as women joining the WAVES.[7] Mundy quotes Stokes' proud acceleration: "… I had a telegram and a letter last week from Rear Admiral H.S. Howard, literally begging me [for math majors]…." From a new cryptography course, "33 were offered employment with the Signal Corps.… the mathematics department has trained and placed in essential war work more than 50 young women." [pp. 232–233]

Success. Secrecy and inability to share information tempered feelings of elation that the work deserved. On VE Day, as the country celebrated, coders were reminded of the continued need for secrecy; the heavy workload continued at both DC coding facilities. [p. 321] Even so, Mundy describes successes of many types, sweet and steady.

Sometimes success was one elusive step: Interwar coders broke a Japanese machine ciphering system dubbed Red code. A 1939 intercept encountered a new code; it was dubbed Purple. The Navy and other units failed to break it; in September 1940 only William Friedman's civilians persevered. Genevieve Grotjan, "a junior mathematician armed with a college degree, an uncompleted master's thesis, and less than a year of on-the-job training …" made one observation that enabled cracking

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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.

Purple. [pp. 89–101, photos p. 1] Purple was used on both Japanese and European fronts throughout WWII and yielded valuable information for D-Day planning: visiting Japanese officials boasted about Germany's fortifications on the French coast. [pp. 297–299]

Sometimes success was an immediate big win like an enemy convoy blown up or one of ours saved. Groups working on Japanese codes JN-25 and JN-20 pieced together a travel itinerary for Admiral Isoroku Yamamoto, who had planned the Pearl Harbor attack. Using that itinerary, his plane was shot down. [pp. 200–201; photos p. 5] For each coding system, not just Purple and Enigma, there was an assembly line, with translators linking code breakers and military intelligence. [p. 325]

Mission success—surrender! Mundy's description of the order of events leading up to Japanese surrender is a compelling page-turner. Over a day, intercepts suggested the Japanese ambassador should expect an important message in an old code, JAH. It was to be communicated to the allies through the neutral Swiss. Before it got to Bern our coders had intercepted, translated, and sent it to be typed for President Truman. All afternoon: "The giddy truth surged inside the place, bubbling to come out. But they kept it in." At 7 p.m., the President announced Japan's unconditional surrender. [pp. 323–329]

After World War II. Like other Rosies, and obeying the patriotic propaganda of the day, most code girls left those jobs. Many married returning soldiers and followed them. In her Epilogue, Mundy traces some of the women all the way to retirement homes. She thumbnails the Army and Navy coding merger, and notes, "A few [code girls] stayed on.… Within the NSA many of the early 'supergrades' … were female." Juanita Morris (Moody), who had solved an extremely challenging German code, ran the Cuban section. Gene Grabeel, who back at Arlington Hall helped launch the Venona project to break Russian codes, continued to work on it at NSA until Venona's conclusion in 1980. The outstanding example of a former code girl rising through the NSA ranks is Ann Caracristi. She was the 19-year-old bobby soxer using laundry soap for shampoo, but she became a brilliant code breaker and late in life she was awarded the National Security Medal and the Department of Defense Distinguished Civilian Service Award. [pp. 207, 338–339] Genevieve Grotjan (Feinstein) made an early

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, Liliana Borcea, and Éva Tardos.

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.

breakthrough on Venona, as she had with Purple; soon after, she stopped working as did many of the other top women. Mundy observes, "Motherhood was the dividing line between [similarly] brilliant women who stayed working and those who did not. For a woman with children, there were few resources to make a career feasible." [pp. 342–344]

Readers of this *Newsletter* are likely to agree with this reviewer that some of these women showed themselves well suited to pursue math doctorates, perhaps an academic career. Few did: The percentage of the PhDs awarded to women in mathematics dropped sharply from the 14 percent over 1900–1939; it was not that high again until the early 1980s.[8] A Berkeley snapshot of ladder math faculty positions is revealing: In 1928, women held 20% of those positions; at subsequent ten-year intervals it dropped to [11%, 7%, 3%, 0%].[9] Mundy describes a GI Bill–PhD–professor–then–divorcee but she was not in mathematics. Under the influence of postwar patriotism, sexism was as rampant as ever. WAVE Elizabeth Bigelow, intending to use the GI Bill, could not—three schools of architecture wrote "… we are saving all our spaces for the men who have been in the armed services." Mundy comments: "She could not say she had sunk a convoy.... Elizabeth ended up running the computer system at the University of Cincinnati. She taught herself how to do it." [pp. 344–345]

A friend, a serious reader, said she enjoyed *Code Girls*. I asked for her reactions as contrast to my perhaps overly STEM view. "… [This is] yet another confirmation of how transformative World War II was for this country. So many people found themselves in jobs and locations they never expected, exposed to people and experiences they could not have imagined. Here they are drawn into an important mission that must have appealed to those with a taste for the mysterious as well as the patriotic."

Mundy's stage-setting Introduction concludes with mention of after-war statements of high officials and members of Congress. Her last comment is epic. She first quotes from a congressman "… [code breakers] did as much to bring that war to a successful and early conclusion as any other group of men." Then Mundy: "That more than half … were women was nowhere mentioned." [p. 31]

End Notes

1. Some sister books: Dunlop, *The Bletchley Girls*, Hachette UK, 2015; Howes/Herzenberg, *Their Day in the Sun*, Temple University Press, 1999; Kiernan, *The Girls of Atomic City*, Touchstone/Simon & Schuster 2013; Shetterly, *Hidden Figures*, HarperCollins, 2016; Smith, *The Debs of Bletchley Park*, Aurum Press, 2015. Also biographies of Elizebeth Smith Friedman: Smith, *A Life in Code*, McFarland, 2017; Fagone, *The Woman Who Smashed Codes*, Dey Street Books, 2017. And some sister films: *Hidden Figures* (Twentieth Century Fox Entertainment, 2017) and *Top Secret Rosies: The Female "Computers" of WWII* (Public Broadcasting Service, 2010).
2. Murray, *Women Becoming Mathematicians*, 2000, MIT Press, online supplement. https://womenbecomingmathematicians.net/ page/2/?s accessed 5/10/18.
3. *Canby, Louise Pearsall. Oral History*, University of N. TX, OH 1163, accessed 7/1/18. https://oralhistory.unt.edu/oh-1163. Also Mundy pp. 20, 278-279, 346–347.
4. Johnson, *The Neglected Giant: Agnes Meyer Driscoll*, Center for Cryptologic History Special Series Volume 10, accessed 5/10/18. https://www.nsa.gov/about/cryptologic-heritage/historical-figures-publications/publications/assets/files/the-neglected-giant/the_neglected_giant_agnes_meyer_driscoll.pdf
5. Case/Leggett, *Complexities*, 2005, Princeton University Press, p. 29.
6. Johnson, *op. cit.*
7. Case/Leggett, *op. cit*, pp. 151–152.
8. Green/LaDuke, *Pioneering Women in American Mathematics*, 2009, AMS, p. 1.
9. Blum, A Brief History of the Association for Women in Mathematics: The Presidents' Perspectives, *Notices of the AMS*, Vol. 38, No. 7, 1991, pp. 738–774 (data compiled by B. Scott).

EDUCATION COLUMN

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

The Joy of Mathematics

Pat Kenschaft, Professor Emerita of Mathematics, Montclair State University

Why is mathematics required as part of our educational system? Is it partly because of the enormous joy it can give to human beings? I think the latter question is worthy of more exploration.

We often hear that math helps in careers, and that is true. However, the original reasons for education of rich males two centuries ago were to enrich their lives and make them better citizens. Math is still needed by them (as well as by everyone, regardless of gender or socioeconomic status) in many ways—understanding issues and managing the budget being two. Managing one's family budget seems very important to me, both in comparing prices of prospective purchases and in comparing the value of possible investments.

However, today I want to explore a reason that gets much too little public attention—the fun that mathematics can be. Little children without the pressure of tests are fascinated as elders explain math ideas to them. I remember fondly early conversations about math with both my parents. These days, having been retired for twelve years, I greatly enjoy doing math puzzles, KenKen and Sudoku. I do them every evening before going to sleep, and often find myself reflecting on how much fun I am having! Of course, when I mess up on one, I am subjected to an inner voice saying "Bad Pat!" but later on there is the satisfaction of figuring out successfully how to do it.

I suspect almost everyone reading the *AWM Newsletter* enjoys math, at least occasionally. What can we do to spread the joy of math?

Having little children use manipulatives tempts them to think of math as a fun game. It is amusing to watch them play with base-ten blocks and pattern blocks. What fun they are having!

If only math weren't associated with being judged! I remember enjoying many positive aspects of doing math, especially helping my classmates. My first-grade teacher put me in the back of the room with my two slowest classmates, which started my teaching career while the

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. Byrna Kra will deliver the 2019 lecture.

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.

three of us enjoyed each other. I thought I helped them; I still hope I did.

I have written before (in my 2014 column) that I believe we should abolish testing as much as possible.[1] Surely, nobody should make money from it prior to college admission tests, and recently some colleges have found they can abstain from admission tests and still make good decisions. I strongly believe that math education would be improved if we abolished all standardized testing before eleventh grade, and another result would be that students would enjoy math more.

Math stories and jokes are fun. I liked to tell classes about mathematicians and the origins of what they are learning. Biographies are entertaining, and those of mathematicians are no exception.

Recently I discovered in my file drawers a file of math jokes. My husband was asked by a student, "What do you get when you divide the circumference of a pumpkin by its radius?" The answer, of course, is "pumpkin pi(e)."

Most children around me now know the punch line to, "Why is six afraid of seven?" "Because seven ate nine." Less common is, "Why did seven eat nine?" "Because it wanted a square meal."

Perhaps less known is why one should be wary about people who like graph paper. "Because they are always plotting things."

Certain teaching practices can also add to the pleasure of learning math. "Is there another way?" is a question worth asking after each answer is provided. I remember that once my students provided four different ways to solve one math problem. Fun! Also, I think emphasizing the omnipresence of mistakes helps people relax and enjoy math. During my last decade of teaching, I gave students an extra point on their final grade when they found me making a math mistake. I never erred intentionally, but, being human, I did occasionally. Each class would look absolutely amazed when I complimented the first student who corrected me and said, "You will be rewarded with an extra point on your final grade!"

People still often ask why I became a mathematician. Increasingly, I credit my parents. In my 2015 column I wrote about early family experiences related to mathematics.[2] These included conversations with my father about π when I was a preschooler and an early introduction to algebra by my mother one day while I was eating lunch in second grade. She posed one of those number magic problems where you take any number, perform a series of operations, and always get the same result regardless of what number you picked. Later on, when I was in fifth grade, I asked her what "algebra" was and we looked it up in the encyclopedia. This probably contributed to my finding the beginning of algebra, which was required for college prep students in ninth grade, rather boring. My teacher, Belle Kearney, identified my problem and offered me her college algebra text. "Read it in the back of the room," she suggested. "If you

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CALL FOR NOMINATIONS

AWM-Sadosky Research Prize in Analysis

The Executive Committee of the Association for Women in Mathematics has established the AWM-Sadosky Research Prize in Analysis. First presented in 2014, the prize will be awarded every other year. The purpose of the award is to highlight exceptional research in analysis by a woman early in her career. Candidates should be women based at US institutions who are within 10 years of receiving their PhD, or having not yet received tenure, at the nomination deadline.

The AWM-Sadosky Research Prize serves to highlight to the community outstanding contributions by women in the field and to advance the careers of the prize recipients. The award is named for Cora Sadosky, a former president of AWM, and made possible by generous contributions from Cora's husband Daniel J. Goldstein, daughter Cora Sol Goldstein, friends Judy and Paul S. Green and Concepción Ballester.

The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional contributions of the candidate; 2) a curriculum vitae of the candidate not to exceed three pages; and 3) three letters supporting the nomination (submitted independently). Nomination materials should be submitted online at MathPrograms.Org. The submission link will be available 45 days prior to the nomination deadline. Review of candidates will begin in mid-February. For full consideration, nominations should be submitted by **February 15, 2018**. If you have any questions, phone 401-455-4042 or email awm@awm-math.org.

have questions, ask me." What fun! I was soon hooked on mathematics.

Perhaps I should give some credit to Louis Zwirek, my trigonometry teacher, for my future career. Early in that year he was stumped on a problem in the book and I was able to bail him out. He accepted my offer to go to the front of the room to make the explanation when I didn't seem to reach the class from my seat. The class smirked amusedly as I wrote the solution on the board. However, as the year progressed, the class accepted the routine of his nodding toward me when he was stumped. I would then go to the front and explain the solution. It was fun to be a teacher, and I enjoyed sharing the mathematics.

I was delighted a few years later when Lou Zwirek was made principal of the high school. I thought he had the right personality. At our fiftieth high school reunion I saw his photo on the wall—much older than I remembered him, but recognizable.

Mathematics has brought me lots of pleasure. I wish it were more widely promoted as a pleasure-giving activity.

End Notes

1. Kenschaft, P. (2014). Why I oppose standardized testing. *AWM Newsletter* 44(5), 14–16.
2. Kenschaft, P. (2015). Family Mathematics Education Memories. *AWM Newsletter* 45(5), 11–14.

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.

Representations in *Young Sheldon*

Lauren N. Murray, NC State University, and
Sarah J. Greenwald, Appalachian State University

Young Sheldon is a television show airing on CBS that is a spinoff of the hugely popular *The Big Bang Theory*. Sheldon is a character who is extremely smart. In *The Big Bang Theory* he is known for being rather antisocial and making funny comments that show how disconnected he is from social norms. The spinoff show is about Sheldon's childhood. In Season 1, Episode 10 of *Young Sheldon*, "An Eagle Feather, a String Bean, and an Eskimo," which originally aired on January 4, 2018, there are two women connected to mathematics, Sheldon's mathematics teacher and the head of a school for gifted children.

The first woman seen doing mathematics in this episode is Sheldon's high school teacher, Ms. Ingram. Sheldon, who is much younger than the typical high school student, often corrects her in class, and to her dismay, he is right. Ingram's intelligence and capability are challenged in two scenes. In one of these, she says: "the square of sine plus cosine equals one" and responds to Sheldon's correction with exasperation. When discussing Sheldon with the other teachers, she admits, "of course he's right, he's always right." Out of frustration, Ingram is even shown drinking alcohol during the school day. Why should we care about this representation? Social identity is important in that it can determine the direction that leads someone to their future career path. There are many cues that may affect social identity and one of them is having role models. In cases where there is a lack of real-life role models, children may be especially influenced by the media. We wondered whether the negative depiction of a black female teacher might send the wrong message to children who are in need of positive mathematical role models and positive depictions of black people and women.

The other woman connected to mathematics in the show is the head of a school for the gifted. When we first meet Dr. Flora Douglas towards the beginning of the episode, Sheldon is clearly pleased with how educated she is in mathematics and that her husband is an astrophysicist from NASA. Douglas's PhD is in noncommutative algebraic topology. Aside from some books on a bookshelf, and the introductory scene, mathematics is not a focus, but what we did find very interesting were the changes in how she looked. It is not often that we see older, successful women mathematicians on television. In the first scene Douglas is classily dressed in business professional wear with her hair in a bun, and she has a very nice office. When Sheldon is welcomed into their home later in the episode, she has her hair down and is in a bohemian-style dress. Then, when Sheldon's parents tell the rest of the family about dropping Sheldon off at their home, there is a flashback from the point of view of Sheldon's mother with a new (re)visualization of that same

scene. Douglas is now seen laughing maniacally with hair that is all over the place. To complete the scene, smoke pours out of a basement lab as Douglas's husband, now shown as a mad scientist, comes up the stairs. There is an interesting connection to make in the casting. In another show, *American Horror Story*, the same actress, Frances Conroy, plays a prestigious witch in the season "Coven," making her a perfect candidate for that stereotype here, and we are not the only viewers to have noticed a connection to a witch. User mirs1 at a fansite equated her business professional look to professor Minerva McGonagall from *Harry Potter*, yet another witch (https://forum.the-big-bang-theory.com/topic/7226-110-an-eagle-feather-a-string-bean-and-an-eskimo-january-4/). We liked seeing the positive depiction of Douglas on the screen in the earlier scenes, but we were disappointed when that turned into the cackling witch fantasy.

Teagan Wall was a story editor on this episode and Wall's website specifies that she is "an Emmy-nominated writer, speaker, and science communicator" (http://www.teaganwall.com/). She has a PhD in computation and neural systems and numerous other degrees, including a BS in mathematics. Overall, we were frustrated to see a science communicator associated with a show that depicts negative stereotypes for the only two women connected to mathematics on *Young Sheldon* to date.

Women in Mathematics of Materials Workshop

Hala AH Shehadeh, Petronela Radu, and Malena Español

Materials Science is an interdisciplinary field that focuses on the discovery and design of new materials. Mathematics plays a fundamental role when developing models that describe the processing, structure, and properties of materials. This is a domain that encompasses many fields including Continuum Mechanics, Partial Differential Equations, Computational Solid Mechanics, etc. These areas have evolved synergistically over the centuries, one field informing the other and together creating a solid foundation for resolving important issues in elasticity of materials, plasticity and diffusion. In recent decades scientific computation has joined in to provide insights where theoretical aspects could not. These fields go to the core of applied mathematics and are used to formulate a majority of problems in engineering and physics.

During the SIAM Conference on Mathematical Aspects of Materials Science in Philadelphia in May 2016, Hala AH Shehadeh (James Madison University), Malena

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CALL FOR NOMINATIONS

The 2020 AWM-Microsoft Research Prize in Algebra and Number Theory

The Executive Committee of the Association for Women in Mathematics has established the AWM-Microsoft Research Prize in Algebra and Number Theory. First presented in 2014, the prize will be awarded every other year. The purpose of the award is to highlight exceptional research in some area of algebra by a woman early in her career. The field will be broadly interpreted to include number theory, cryptography, combinatorics and other applications, as well as more traditional areas of algebra. Candidates should be women based at US institutions who are within 10 years of receiving their PhD, or having not yet received tenure, at the nomination deadline.

The AWM-Microsoft Research Prize serves to highlight to the community outstanding contributions by women in the field and to advance the careers of the prize recipients. The award is made possible by a generous contribution from Microsoft Research.

The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional contributions of the candidate, 2) a curriculum vitae of the candidate not to exceed three pages, and 3) three letters supporting the nomination (submitted independently). Nomination materials should be submitted online at MathPrograms.Org. The submission link will be available 45 days prior to the nomination deadline. Review of candidates will begin in mid-February. For full consideration, nominations should be submitted by **February 15, 201**9. If you have any questions, phone 401-455-4042 or email awm@awm-math.org.

Español (The University of Akron), and Maria Emelianenko (George Mason University) organized a Women in Mathematics of Materials (WIMM) networking luncheon in cooperation with the Association for Women in Mathematics and the support of the SIAM Activity Group on Mathematical Aspects of Materials Science (SIAG/MS). Approximately forty female researchers at different levels in their careers attended the event. There was an overwhelming sentiment at the luncheon to develop a strong and active community for women in this area and a support structure to help women advance their research. Women in other applied fields have benefited from the existence of such communities, but there had not been cohesive efforts before in Mathematics of Materials. The compelling need for such an effort is the severe underrepresentation of women at major research conferences and workshops in the materials science area. For example, out of the total number of speakers at conferences such as the SIAM Conference on Mathematical Aspects of Materials Science, fewer than 15% are women. This is mainly due to the low representation of women in the field, and it is amplified by the challenges that women, in particular, face in maintaining active research programs while caring for their families, securing funding and traveling to disseminate their results.

WIMM Workshoppers

With that in mind, Hala AH Shehadeh, Malena Español, and Petronela Radu (University of Nebraska – Lincoln), encouraged by AWM president Ami Radunskaya (Pomona College), organized a workshop to support and expand research efforts by female mathematicians in the field of materials science. With the wide range of topics encompassed by mathematics applied to materials science, we brought together researchers representing that range of analytical and computational approaches to important materials in science problems. With financial support provided by the Michigan Center for Applied and Interdisciplinary Mathematics (MCAIM) at the University of Michigan – Ann Arbor, and the support of its director John Schotland, and with partial support from the AWM NSF ADVANCE grant and James Madison University, the MCAIM-WIMM Workshop was held at the University of Michigan – Ann Arbor, on May 14–18, 2018.

The workshop consisted primarily of several groups working on problems in materials science. Each group was composed of junior female researchers led by a senior female investigator. This structure benefited all participants: the senior researchers had the opportunity to showcase and propose research projects around critical problems in the field of materials science, while junior women (tenure track faculty, postdocs and advanced graduate students) worked on new areas and recent advances in the field. This collaborative workshop inherently facilitated the formation of new collaborative research groups that will continue to advance the field long after the workshop. There were five research project groups:

- "Liquid Crystals with Applications to Biology" led by Maria-Carme Calderer (University of Minnesota) and Robin Selinger (Kent State University), and junior group members Malena Español, Lidia Mrad, Eleni Panagiotou, Ling Xu, and Longhua Zhao.
- "Fluid Driven Fracture in Poroelastic Media" led by Yekaterina Epshteyn (University of Utah) and Pania Newell (University of Utah), and junior group members Lei Cao, Amanda Howard, and Hala AH Shehadeh.
- "Machine Learning for Predicting Mechanical Response of Polycrystals" led by Marisol Koslowski (Purdue

Workshop organizers: Malena Español, Petronela Radu, and Hala AH Shehadeh

Group hike

University), and junior group members Siwei Duo, Cindy Wang, Somayyeh Sheikholeslami, and Katerine Saleme.

- "Materials Science and Differential Geometry" led by Marta Lewicka (University of Pittsburgh), and junior group members Silvia Jimenez Bolanos, Xiaochuan Tian, and Anna Zemlyanova.
- "Local and Nonlocal Models in Materials Science" led by Petronela Radu (University of Nebraska – Lincoln), and junior group members Marta D'Elia, Cynthia Flores, Helen Li, and Yue Yu.

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Workshop poster presentation

WORKSHOP *from page 17*

There were also four one-hour plenary talks given by experts in the area of materials science:

- "Mathematical Analysis of Novel Advanced Materials" by Irene Fonseca (Department of Mathematics, Carnegie Mellon University)
- "Complex Crystal Structures in Hard and Soft Condensed Matter" by Julia Dshemuchadse (Chemical Engineering Department, University of Michigan – Ann Arbor)
- "Elastic Networks and Topological Mechanics" by Xiaoming Mao (Physics Department, University of Michigan – Ann Arbor)
- "Diffuse Interface Methods in Materials Science & Engineering" by Katsuyo Thornton (Materials Science and Engineering Department, University of Michigan – Ann Arbor)

The workshop included poster presentations, networking coffee breaks and lunches, a banquet, a group hike and four panel discussions addressing personal and professional issues that are of concern to women in mathematics such as: dealing with negative reviews, editorial work, mentoring, and grant writing. The workshop concluded with oral presentations given by each group on the progress of the projects and future work.

As follow up events, there will be special sessions for the WIMM Research Network to showcase the results of this workshop at the AWM Research Symposia to be held at Rice University, Houston, TX, April 6–7, 2019 and the AWM Workshop at the SIAM Annual Meeting to be held in Toronto, Ontario, Canada, July 6–10, 2020.

Katsuyo Thornton at her plenary talk

The second networking luncheon for the WIMM research network was held on Wednesday July 11, 2018, during the SIAM Conference on Mathematical Aspects of Materials Science in Portland, OR.

More information about the WIMM Research Network can be found on the website http://educ.jmu.edu/alhajjhy/WIMM/indexWIMM.html.

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. 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/.

AWM at the 2018 SIAM Annual Meeting

Karoline Pershell (AWM Executive Director), Ami Radunskaya (AWM President), and Suzanne Sindi (AWM SIAM Committee Chair)

The 2018 SIAM Annual Meeting was held July 9–13, 2018 in Portland, Oregon. Once again, AWM hosted, sponsored and endorsed a series of events that spanned the week and brought together AWMers across academia, government and industry.

The AWM Workshop. The AWM Workshop features a session of invited speakers supported by the AWM ADVANCE grant, Career Advancement for Women Through Research-Focused Networks, which purposefully builds from previously held Research Collaboration Conference Workshops. This year's AWM Workshop kicked off on Monday with research talks in Shape Analysis and Modeling and a mentoring lunch to bring together workshop participants, AWM-invited graduate student poster presenters, and graduate student mentors in the same research field. On Tuesday afternoon the workshop participants attended a career panel entitled "Perspectives from Women in Research," and in the evening the graduate students presented their work in the SIAM conference poster session. AWM aims to provide opportunities for meaningful interaction between the workshop participants as well as for greater exposure of their work in posters and talks; we want to aid women in getting anchored into research groups. To find out how to get involved with AWM research groups or to volunteer to be a graduate student mentor, see the end of this article.

Special thanks go to the AWM SIAM Committee, **Laura Ellwein** (Virginia Commonwealth University), **Malena Español** (The University of Akron), **Cindy Grimm** (Oregon State University), **Giseon Heo** (University of Alberta), **Deanna Needell** (University of California Los Angeles), **Megan Owen** (Lehman College), **Beatrice Riviere** (Rice University), **Hala AH Shehadeh** (James Madison University), **Suzanne Sindi** (University of California Merced), and **Joyati Debnath** (Winona State University) who served as poster judging coordinator. The AWM presence at SIAM is critical in increasing our visibility in the community, and we are grateful to the entire committee for planning and facilitating the array of AWM activities.

The following women from the Research Collaboration Conference for Women (RCCW), Women in Shape-2: Modeling Boundaries of Objects in 2- and 3-Dimensions, were invited to give 20-minutes talks in the two research mini-symposia.

- Ellen Gasparovic, Union College
  Medial Fragments for Segmentation of Articulating Objects in Images
- Kathryn E. Leonard, Occidental College
  Skeletal Models and Shape Representation
- Xiaoting Zhang, Boston University
  Computational Design and Fabrication
- Nina Amenta, University of California, Davis
  Deformation and Rigidity

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Two organizers with six speakers: Cindy Grimm, Megan Owen, Xiaoting Zhang, Lori Ziegelmeier, Ellen Gasparovic, Carlotta Domeninconi, Nina Amenta, Kathryn Leonard, and Anastasia Dubrovina

- Ilke Demir, Facebook
  Representations of the World
- Carlotta Domeniconi, George Mason University
  Finding Communities and Roles in Networks
- Lori Ziegelmeier, Macalester College
  Stratifying High-Dimensional Data Based on Proximity to the Convex Hull Boundary
- Anastasia Dubrovina, Stanford University
  Consistent Shape Matching via Coupled Optimization

Sonia Kovalevsky Lecture. Éva Tardos, Cornell University, delivered the AWM-SIAM Sonia Kovalevsky Lecture. She started her talk in front of a large audience on Monday afternoon by honoring her inspirations: Sonia Kovalevsky, through her biography, and Tardos' "local inspiration," Vera T. Sós of Eötvös University. The lecture itself, "Learning and Efficiency of Outcomes in Games," gave an excellent overview of the effect of learning behaviors on the welfare of the group. It was interesting to see how adding dynamics to the behavior affected the outcomes. Judging by the reaction of the crowd, they thought it was interesting as well! At the SIAM Awards Luncheon on Tuesday, Tardos was presented with a plaque by AWM President Ami Radunskaya and SIAM President Nicholas J. Higham.

Career Panel. The workshop continued on Tuesday, July 10 with the career panel "Perspectives and Advice from Women in Research." It featured female panelists from diverse backgrounds: **Nina Amenta**, University of California, Davis, **Chiu-Yen Kao**, Claremont McKenna College, **Laina Mercer**, Institute for Disease Modeling, and **Lalitha Venkataramanan**, Schlumberger-Doll Research. The panel was moderated by **Megan Owen**, Lehman College, CUNY. Panelists shared their own experiences with the gender gap in STEM fields and their opinions on how one can increase the number of female scientists in academia, national labs and industry. The audience was eager to ask the panel many questions, in particular on the role of female researchers in leadership positions, how and when to negotiate, and what one would even ask for. Of particular interest was how the panelists came to the jobs they are in, since the "typical" career path now appears to be the "mythical" career path. Career panels offer a group version of the "informational interview," allowing those on the job market to learn what different work environments could look like, and how to prioritize the components that matter to each of us.

Éva Tardos delivers the AWM-SIAM Sonia Kovalevsky lecture to a large, appreciative audience at SIAM2018 in Portland, OR.

Poster prize winner, Stephanie Dodson, explaining her poster

The workshop concluded on Tuesday evening with ten graduate students presenting posters during a well-attended concurrent poster and dessert reception. The AWM Graduate Student Poster Session is a judged event, where each of the students have the opportunity to present to three judges and receive constructive feedback. In coordination with the NSF Mathematical Sciences Institutes, AWM is able to offer an invitation to participate in a week-long workshop at one of the institutes as a prize for the best poster, a prize that is intended to aid in anchoring a graduate student in her field by introducing her to future colleagues and (hopefully) collaborators. The ten poster presenters were: Weaam Alhejaili (Claremont Graduate University), Summer Atkins

(University of Florida), Elena Balashova (Princeton University), Stephanie Dodson (Brown University), Aditi Ghai (Stony Brook University), Emily Hendryx (Rice University), Jiahua Jang (University of Massachusetts Dartmouth), Ratna Khatri (George Mason University), Sue Kulason (Johns Hopkins University), and Bingying Lu (University of Michigan). This year's winner was Stephanie Dodson!

Many thanks to Joyati Debnath for organizing the poster judging, and to the volunteer judges Ilke Demir, Suzanne Sindi, Ami Radunskaya, Victor Moll, Daniel Szyld, Kathryn Leonard, Heather Brooks, Candice Price, Megan Owen, Laina Mercer, Korana Burke, Shelley Rohde, and Roummel Marcia.

Fostering the Environment that We Want. AWM is committed to helping foster welcoming, inclusive environments which encourage the free expression and exchange of scientific ideas. In pursuit of this ideal, AWM seeks to expose and educate our community where there are still problems and to find ways to work towards solutions that we can implement as individuals and institutions. The AWM and SIAM, along with EDGE (Enhancing Diversity in Graduate Education) and BDIS (Broadening Diversity in Science), co-sponsored two programs at SIAM2018, a workshop, Difficult Dialogues: How To Be A Better Ally, and a panel, Hidden Figures: The Women Behind the Space Program.

The workshop was created and led by Rebecca Renard, an experienced facilitator who has been working at the intersection of education, social justice, equity, and the arts for more than 20 years. The interactive, 2-hour workshop was overflowing with mathematicians young and old who were eager to explore strategies to support each other. The first step in being an ally, we learned, is to recognize our place in the existing socio-economic-political structure. Certainly two hours was not enough even to scratch the surface of this difficult topic, and participants will be encouraged to engage in follow-up activities in the coming months.

The panel was the third on this subject that the AWM has co-sponsored, the first one taking place just as the movie *Hidden Figures* was released in January 2017. The panel was moderated by Shelby Wilson (Morehouse College), who opened the conversation by introducing Christine Darden. Dr. Darden, one of the characters in the book *Hidden Figures: The American Dream and the Untold Story of the Black Women Who Helped Win the Space Race*, received her PhD in engineering and had a long, successful career at NASA. She worked on designing supersonic aircraft, wrote over 50 articles on aeronautics design, and became the first African-American person of any gender to be promoted into the Senior Executive Service at Langley. Darden shared her "P^4- formula" with the audience: in order to succeed, we must be able to perceive, to plan, to prepare and to persist. She told us how she implemented this plan to take initiative, persist in her dreams, and insist on getting the education she wanted and the promotions she deserved while at NASA. While she certainly faced challenges, she feels happy with her life and satisfied with her career. After Darden's inspirational talk, the mike was handed over to the rest of the panel,

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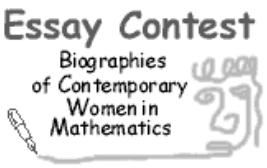
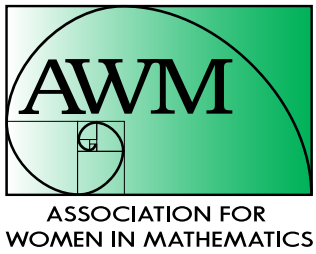


To increase awareness of women's ongoing contributions to the mathematical sciences, the Association for Women in Mathematics holds an essay contest for biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers. AWM is pleased to announce that the 2018 contest is sponsored by Math for America, www.mathforamerica.org.

The essays will be based primarily on an interview with a woman currently working in a mathematical career. The AWM Essay Contest is open to students in the following categories: grades 6–8, grades 9–12, and undergraduate. At least one winning entry will be chosen from each category. Winners will receive a prize, and their essays will be published online at the AWM website. Additionally, a grand prize winner will have his or her entry published in the A*WM Newsletter*. For more information, contact Dr. Heather Lewis (the contest organizer) at hlewis5@naz.edu or see the contest web page: www.awm-math.org/biographies/contest.html. The deadline for electronic receipt of entries is **January 31, 2019.** (To volunteer as an interview subject, contact Dr. Joanna Bieri (interviewee coordinator) at joanna_bieri@redlands.edu.)



who were able to give their perspectives on past and current challenges. The three panelists, Suzanne Weekes (WPI), Candice Price (University of San Diego) and Erica Graham (Bryn Mawr College) each had her own version of the P^4-formula, reminding us of the work that is still to be done in our mathematics community to make it equitable and welcoming to all.

The AWM Booth. The AWM Booth was strategically located in the main reception area and served as a place for conversations during coffee breaks. We used easels to share information (like AWM's upcoming formal deadlines) and to promote informal opportunities, like AWM's Happy Hour gathering, organized by Suzanne Sindi. During coffee breaks, we were able to greet old friends and meet new ones. Sometimes, the table was just a convenient place to stash a coffee cup. We encourage you to use the AWM booth/table at meetings as a place to gather, share, and belong.

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

Karamatou Yacoubou Djima, Marissa Renardy and Ami Radunskaya

Christine Darden speaking on panel with Shelby Wilson, panel moderator

Rebecca Renard leading workshop on how to be a better ally

Announcements

The CML Is No More

Likely we have all seen many changes in privacy statements over the past several months, which have been required by the GDPR: the General Data Protection Regulation promulgated by the European Union. The Mathematical Association of America had already opted out of the Combined Membership List, citing privacy concerns. The Combined Membership List transitioned into the AMS Member Directory at the beginning of May 2018. If you are an AMS member, the Directory is available to you as a membership benefit, but it is no longer freely available on the web.

15th International Conference of the Mathematics Education for the Future Project

"Theory and Practice: An Interface or A Great Divide?" will be held August 4–9, 2019 at Maynooth University, Kildare, Ireland under the auspices of The Mathematics Education for the Future Project, which was founded in 1986 as an international non-profit to support and encourage innovation in mathematics, statistics, science and computer education. Its Hungary Conference in September 2017 was attended by 125 people from 22 countries.The conferences are renowned for their friendly and productive atmosphere. See http://directorymathsed.net/public/Ireland/IrelandConferencePreliminaryAnnouncement.pdf for further info.

The Project also provides the International Directory of Mathematics Educators at http://www.DirectoryMathsEd.net. Write to Alan Rogerson at alan@cdnalma.poznan.pl to add your entry or to correct an existing one.

NASA Names Building for Katherine Johnson

In September 2017, NASA opened the Katherine G. Johnson Computational Research Facility, named for one of the women commemorated in the book and movie Hidden Figures. See https://www.smithsonianmag.com/smart-news/nasa-dedicates-new-facility-katherine-johnson-pioneering-mathematician-hidden-figures-180965012/ for further information.

Celebratio Mathematica Volumes on Women Mathematicians

Mathematical Sciences Publishers (msp.org) is pleased to announce publication of the first of ten volumes to be devoted to women mathematicians in our open-access archive of collected works, *Celebratio Mathematica*. The volume is about Dusa McDuff and is freely accessible here: http://celebratio.org/McDuff_D/cover/391/. It includes a comprehensive 2011 interview with Donald Albers on how McDuff became a mathematician and the difficulties she encountered as a woman mathematician, a memoir about her life in mathematics, a complete bibliography and list of her PhD students, and photographs. It also includes a Celebratio exclusive: a perspective by Leonid Polterovich and Felix Schlenk (http://celebratio.org/McDuff_D/article/485/) on McDuff's contributions to symplectic embedding problems.

As part of the goal of sustaining a scientific publishing platform for and by scientists, MSP hopes the volume (and others like it that we will announce soon) will be especially useful to educators who will be able to access the material freely to help inspire young women who may be considering a career in the mathematical sciences.

The volume is made possible by generous funding from the Mathematical Sciences Research Institute (msri.org) in Berkeley. For more information about the series, contact the Managing Editor, Sheila Newbery (Sheila@msp.org).

The 2019–2020 Joan and Joseph Birman Fellowship for Women Scholars

The Joan and Joseph Birman Fellowship for Women Scholars is a mid-career research fellowship specially designed to fit the unique needs of women. The fellowships are open only to women. This program, established in 2017, is made possible by a generous gift from Joan and Joseph Birman.

The fellowship seeks to address the paucity of women at the highest levels of research in mathematics by giving exceptionally talented women extra research support during their mid-career years. One award will be made for the 2019–2020 academic year in the amount of $50,000. Applications will be accepted at MathPrograms.org starting September 1, 2018 with deadline **December 1, 2018**. See https://www.ams.org/programs/ams-fellowships/ Birman-fellow for further information.

ASSOCIATION FOR
WOMEN IN MATHEMATICS

AWM Will Be *50* in 2021!

Can you believe that the AWM is closing in on its Golden Anniversary?! From its small but powerful beginning in 1971, to the expansive network of (mostly) women in the mathematical sciences that it is today, AWM has a lot to celebrate in 2021! As we start the countdown, help us develop and plan the festivities. Watch this space for ways that you can be involved in celebrating the great work we have already accomplished, and join us in looking forward to the amazing future of this timeless (and yet timely!) organization.

Ruth I. Michler Prize

The Association for Women in Mathematics invites applications for the twelfth annual 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 November 1 for the award to be used during the 2018–19 academic year.

www.awm-math.org/michlerprize.html

Cornell University

AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

NSF-AWM Mentoring Travel Grants for Women

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

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

Eligibility and Applications. Please see the website (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.

ADVERTISEMENTS

BROWN UNIVERSITY—THE DEPARTMENT OF MATHEMATICS—J.D. TAMARKIN ASSISTANT PROFESSORSHIP J. D. Tamarkin Assistant Professorship: One or more three-year non-tenured non-renewable appointments, beginning July 1, 2019. The teaching load is one course one semester, and two courses the other semester and consists of courses of more than routine interest. Candidates are required to have received a Ph.D. degree or equivalent by the start of their appointment, and they may have up to three years of prior academic and/or postdoctoral research experience. Applicants should have strong research potential and a commitment to teaching. Field of research should be consonant with the current research interests of the department. For full consideration, applicants must submit a curriculum vitae, an AMS Standard Cover Sheet, at least three letters of recommendation primarily focused on research, and one letter addressing teaching (possibly as part of a research letter), by **November 19, 2018**. (Later applications will be reviewed to the extent possible.) In addition, applicants are required to identify a Brown faculty member with similar research interests. Please submit all application materials on line at http://www.mathjobs.org. Email inquiries should be addressed to juniorsearch@math.brown.edu. Brown University is committed to fostering a diverse and inclusive academic global community; as an EEO/AA employer, Brown considers applicants for employment without regard to, and does not discriminate on the basis of, gender, race, protected veteran status, disability, or any other legally protected status.

BROWN UNIVERSITY—THE DEPARTMENT OF MATHEMATICS—ASSOCIATE PROFESSOR ASSISTANT PROFESSOR The Mathematics Department at Brown University invites applications for one regular position, to begin July 1, 2019 at the level of Associate Professor with tenure or tenure-track Assistant Professor; exceptionally qualified senior candidates may be considered for appointment as full Professor. Preference will be given to applicants who will interact mathematically with current members of the Department. For more information see: https://www.brown.edu/academics/math/faculty-0. Qualified individuals are requested to submit a letter of application, and a curriculum vitae online to: http://www.mathjobs.org. Tenure-level applicants should include the names of precisely 5 references that would be contacted at the appropriate time by the search committee. Candidates should have an outstanding record of scholarship establishing them as international leaders in their fields; a demonstrated willingness to contribute to vitality of the department by mentoring students and interacting with colleagues; and evidence of effective and responsible classroom teaching. Tenure-track level applicants should request no more than 5 reference letters to be uploaded by referees directly to the same site. At least one letter should address the candidate's teaching credentials. Candidates should have an excellent track record of research and teaching, and show clear potential to contribute in the future as tenured faculty members. Applications received by **October 15, 2018** will receive full consideration, but the search will remain open until the position is closed or filled. For further information or inquiries, write to: srsearch@math.brown.edu. Brown University is committed to fostering a diverse and inclusive academic global community; as an EEO/AA employer, Brown considers applicants for employment without regard to, and does not discriminate on the basis of gender, race, protected veteran status, disability, or any other legally protected status.

BROWN UNIVERSITY—THE DEPARTMENT OF MATHEMATICS—LECTURER: One full time position, to begin July 1, 2019. The teaching load is four courses per year (two per semester). Candidates must have received a Ph.D. degree in Mathematics by the start of the appointment. A minimum of three years full time teaching experience at the university level is required. Applicants should have a strong commitment to teaching. Courses to be taught will include calculus at all levels and/or linear algebra. The position will also involve coordinating multi-section high-enrollment courses. Other responsibilities will include the oversight and training of graduate student TAs. For full consideration, applicants must submit a curriculum vitae, teaching statement, AMS Standard Cover Sheet, and at least three teaching references by November 19, 2018. (Later applications will be reviewed to the extent possible.) Please submit all application materials on line at http://www.mathjobs.org. Email inquiries should be addressed to info@math.brown.edu. Brown University is committed to fostering a diverse and inclusive academic global community; as an EEO/AA employer, Brown considers applicants for employment without regard to, and does not discriminate on the basis of, gender, race, protected veteran status, disability, or any other legally protected status.

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CORNELL UNIVERSITY—THE DEPARTMENT OF MATHEMATICS—ASSISTANT PROFESSOR The Department of Mathematics at Cornell University invites applications for one tenure-track Assistant Professor position, starting July 1, 2019. While we particularly invite dynamical systems, partial differential equations, probability, and topology, candidates from all areas will be considered. Diversity and Inclusion are a part of Cornell University's heritage. We are an employer and educator recognized for valuing AA/EEO, Protected Veterans, and Individuals with Disabilities. We actively encourage applications of women, persons of color, and persons with disabilities. Applicants must apply electronically at http://www.mathjobs.org. Deadline: **November 1, 2018**. Early applications will be regarded favorably.

CORNELL UNIVERSITY—THE DEPARTMENT OF MATHEMATICS—H.C. WANG ASSISTANT PROFESSOR(S) The Mathematics Department at Cornell University invites applications for H.C. Wang Assistant Professor(s), non-tenure track, non-renewable, 3-year position beginning July 1, 2019. Successful candidates are expected to pursue independent research at Cornell and teach three courses per year. A Ph.D. in mathematics is required. The Department actively encourages applications from women and minority candidates. Applicants must apply electronically at http://www.mathjobs.org. Deadline: **December 1, 2018**.

CORNELL UNIVERSITY—THE DYNAMICS, PROBABILITY, AND PDE GROUP—RTG NSF POSTDOCTORAL POSITIONS The Dynamics, Probability and PDE group at Cornell invites applications for postdoc positions (Visiting Assistant Professors) beginning July 1,2019. These positions cover Mathematics and Applied Mathematics. They are funded by Cornell University and a Research Training Grant from the National Science Foundation. The usual term is three years, with a two course teaching load each year. The salary is $60,000 plus $13,000 supplemental summer support per year. The successful candidates will integrate research groups in Dynamics, Probability and PDEs and participate in the RTG activities. Applicants must be US citizens, nationals or permanent residents, who complete their PhD requirements on or after January 1, 2017 and before July 1, 2019. The Department actively encourages applications from women and minority candidates. Applicants are required to apply electronically at http://www.mathjobs.org. Deadline **December 1, 2018**.

THE UNIVERSITY OF OREGON—THE DEPARTMENT OF MATHEMATICS—ASSISTANT PROFESSOR The University of Oregon's Mathematics Department invites applications for a tenure-track Assistant Professor position to begin in fall 2019. Competitive applicants will have a record of research excellence, as well as a demonstrated potential for outstanding teaching. The position is open to all research areas of mathematics, with a particular focus on scholars who will enhance the department's existing strengths in Analysis, Number Theory, Combinatorics, and Probability/Statistics. The UO Mathematics Department is committed to recruiting and retaining a culturally diverse and pluralistic faculty. We encourage applications from all qualified candidates, and strongly encourage women faculty, faculty of color, and faculty with disabilities to apply. We are especially interested in candidates who can support our work in mentoring, research, teaching, and outreach with women, first-generation students, communities of color, and other underrepresented groups. All applicants are encouraged to include in their cover letter information about how they will contribute to this work. Candidates are asked to apply online at https://www.mathjobs.org/jobs/jobs/12092 by submitting a standard AMS cover page, CV, research statement, teaching statement, at least three (3) letters of recommendation concerning research, and one (1) letter of recommendation concerning teaching. Review of applications will begin **November 1, 2018**, and to guarantee consideration applications must be submitted before this date.

THE UNIVERSITY OF OREGON—THE DEPARTMENT OF MATHEMATICS—PAUL OLUM POSTDOCTORAL SCHOLAR The University of Oregon's Mathematics Department invites applications for up to four (4) Paul Olum Postdoctoral Scholar, non-tenure-track assistant professor positions to begin in fall 2019. Competitive applicants will have an outstanding record of research potential in an area of interest to the department, and evidence of teaching ability. The position is open to all research areas of mathematics, with a particular focus on scholars who will enhance the department's existing strengths in Analysis, Number Theory, Combinatorics, and Probability/Statistics. The UO Mathematics Department is committed to recruiting and retaining a culturally diverse and pluralistic faculty. We encourage applications from all qualified candidates, and strongly encourage women faculty, faculty of color, and faculty with disabilities to apply. We are especially interested in candidates who can support our work in mentoring, research, teaching, and outreach with women, first-generation students, communities of color, and other underrepresented groups. All applicants are encouraged to include in their cover letter information about how they will contribute to this work. Candidates are asked to apply online at https://www.mathjobs.org/jobs/jobs/12093 by submitting a standard AMS cover page, CV, research statement, teaching statement, at least three (3) letters of recommendation concerning research, and one (1) letter of recommendation concerning teaching. Review of applications will begin **November 1, 2018**, and to guarantee consideration applications must be submitted before this date.

UNIVERSITY OF CALIFORNIA, IRVINE—DEPARTMENT OF MATHEMATICS—MULTIPLE POSITIONS The Department of Mathematics at the University of California, Irvine invites applications from outstanding candidates for multiple positions, including Lecturer with Potential Security of Employment (LPSOE), Visiting Assistant Professors (VAP), and possibly tenure-track Assistant Professors. Applicants must hold a Ph.D. The LPSOE series requires, in addition to excellent teaching and service, that the candidate makes outstanding and externally recognized contributions to the development of his or her specific discipline and/or of pedagogy. VAP candidates must show strong promise in research and teaching. Tenure-track Assistant Professor position candidates should have demonstrated excellence in research and teaching. Applications are welcome at any time. The review process starts **November 1, 2018** and will continue until positions are filled. Please visit www.mathjobs.org for details on positions and the application process. The University of California, Irvine is an Equal Opportunity/Affirmative Action Employer advancing inclusive excellence. All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability, age, protected veteran status, or other protected categories covered by the UC nondiscrimination policy.

UNIVERSITY OF NEBRASKA-LINCOLN—DEPARTMENT OF MATHEMATICS—TENURE TRACK POSITIONS IN OPERATOR ALGEBRAS OR MODERN ANALYSIS Applications are invited for one tenure-track position in operator algebras or modern analysis, starting August 2019. The successful candidate will have a Ph.D. in mathematics and outstanding potential for research and teaching in mathematics. Preference will be given to applicants in an area of operator algebras or modern analysis which complements or builds upon existing departmental strengths. Applicants should send a letter of application, a CV, separate statements addressing research and teaching, and at least three letters of reference, at least one of which should address teaching, to mathjobs.org or to: Search Committee, Department of Mathematics, University of Nebraska-Lincoln, Lincoln, NE 68588-0130. Use of the AMS application cover sheet is encouraged. To be considered for the position, applicants must also complete the Faculty/Administrative application at http://employment.unl.edu, requisition F_180093. Review of applications will begin **November 16, 2018** and continue until the position is filled. For more information see the department's web site at www.math.unl.edu. As an EO/AA employer, qualified applicants are considered for employment without regard to race, color, ethnicity, national origin, sex, pregnancy, sexual orientation, gender identity, religion, disability, age, genetic information, veteran status, marital status, and/or political affiliation. See http://www.unl.edu/equity/notice-nondiscrimination

WILLIAMS COLLEGE—THE DEPARTMENT OF MATHEMATICS AND STATISTICS—ASSISTANT PROFESSOR The Williams College Department of Mathematics and Statistics invites applications for a new tenure-track position in Statistics, beginning fall 2019, at the rank of assistant professor. A more senior appointment is also possible for a qualified candidate at a later stage in their career. The candidate should have a Ph.D. in Statistics or a closely related field by the time of appointment. We are

seeking candidates who show evidence and/or promise of excellence in teaching and a strong research program that can engage undergraduate students. The candidate will become the seventh tenure-track statistician in the department, joining a vibrant and innovative group of statisticians with an established statistics major. For more information on the Department of Mathematics and Statistics, visit http://math.williams.edu/. Candidates may apply via https://apply.interfolio.com/50978 by uploading a cover letter addressed to Professor Richard De Veaux, a curriculum vitae, a teaching statement, a description of research plans, and three letters of recommendation on teaching and research. The Department is committed to building a diverse and inclusive community. In your application materials, we also ask you to address how your teaching, scholarship, mentorship and/or community service might support Williams's commitment to diversity and inclusion. Expectations: The teaching load is two courses per 12-week semester and a winter term course every other January. The candidate will be expected to teach introductory statistics, core courses for the statistics major, and elective courses in their areas of interest. The successful candidate will establish an independent research program that results in scholarly publications. Williams College provides broad support for start-up funds, funding for student research assistants, faculty professional development funds, and a shared computer cluster for parallel computation. Review of applications will begin on or after **October 1st** and will continue until the position is filled. All offers of employment are contingent upon completion of a background check. Further information is available at https://faculty.williams.edu/prospective-faculty/background-check-policy/. Williams College is a coeducational liberal arts institution located in the Berkshire Hills of western Massachusetts. The college has built its reputation on outstanding teaching and scholarship and on the academic excellence of its approximately 2,000 students. Please visit the Williams College website (http://www.williams.edu). Beyond meeting fully its legal obligations for non-discrimination, Williams College is committed to building a diverse and inclusive community where members from all backgrounds can live, learn, and thrive.

WILLIAMS COLLEGE—DEPARTMENT OF MATHEMATICS AND STATISTICS—VISITING POSITIONS The Williams College invites applications for two two-year visiting positions in mathematics, to begin fall 2019. Candidates should have earned a Ph.D. in mathematics, applied mathematics, or a related field by summer, 2019. We will consider candidates with any area of mathematical expertise. Visiting Assistant Professors are asked to teach four courses per year on our 12-week semester schedule, advise several undergraduate student colloquia (our capstone experience for seniors), and make small contributions to service activities in the department. This set of professional duties provides a window into the experience of being a mathematician in a liberal arts setting. Our department offers a vibrant undergraduate program with majors in mathematics (including an applied mathematics emphasis) and in statistics. For more information, see https://math.williams.edu. The multidisciplinary environment is a rich and collegial setting for student education and faculty research. Williams College provides: the opportunity to apply for student research assistant support; a standard, annual allocation of funds to support travel and research; and a shared computer cluster for parallel computation. Visiting Assistant Professors are also eligible to participate in the college's comprehensive First Three professional development program (https://faculty-networks.williams.edu/networking-opportunities). Approximately one hour from the Albany, NY airport, Williams College is located in Williamstown, a thriving destination proximate to: three major art museums; theater, music, and dance festivals; community supported agriculture farms; a highly-rated public school system; and many other resources. The Williams undergraduate student body has 40% U.S. minority enrollment and nearly 10% international enrollment. Reflecting the institution's values, our department is diverse and inclusive, with 50% of our faculty being women, people of color, and/or members of the LGBTQ+ community. We encourage applications from members of underrepresented groups with respect to gender, race and ethnicity, religion, sexual orientation, disability status, socioeconomic background, and other axes of diversity. Applications should be submitted via http://www.mathjobs.org. Your application should include the following components. 1) Please provide a cover letter. This letter might describe your interest in Williams and in the liberal arts, and provide a brief summary of your professional experience and future goals. We ask you to address how your teaching, scholarship, mentorship and/or community service might support Williams's commitment to diversity and inclusion. 2) Please provide a current curriculum vitae. 3) Please provide a teaching statement. Ideally, this statement should be 2 – 3 pages long, and it might address your teaching philosophy, teaching experience, and any other reflections or relevant information you would like to share. 4) Please provide a brief research statement. Ideally, it should help our faculty, who come from a wide range of mathematical disciplines, understand the nature of your work and think about how to support you during your post-Ph.D. years. 5) Please have at least three recommenders submit letters of recommendation. If possible, at least one of these letters should comment on your experience as a teaching assistant or on any other instructional capacities in which you have served. We also ask applicants to fill out this brief EEOC demographic survey: https://goo.gl/forms/xqT52JBGKXSonPUn1. While completing this form is voluntary, we hope you will fill it out. Responses will be accessible only by administrators and EEO officers. If you have questions about this position, contact search committee chair Chad Topaz (cmt6@williams.edu). Review of applications will begin on or after **November 1** and will continue until the positions are filled. All offers of employment are contingent upon completion of a background check. Further information is available at https://faculty.williams.edu/prospective-faculty/background-check-policy. Williams College is a coeducational liberal arts institution located in the Berkshire Hills of western Massachusetts. The college has built its reputation on outstanding teaching and scholarship and on the academic excellence of its approximately 2,000 students. Please visit the Williams College website (http://www.williams.edu). Beyond meeting fully its legal obligations for non-discrimination, Williams College is committed to building a diverse and inclusive community where members from all backgrounds can live, learn, and thrive.

YORK UNIVERSITY—DEPARTMENT OF MATHEMATICS—ASSISTANT PROFESSOR Applications are invited for a tenure-track faculty appointment in Modelling Infectious Disease Data and Decision Making at the Assistant Professor level in the Department of Mathematics and Statistics at York University to commence July 1, 2019, or thereafter. The faculty position is initially funded in part by the recently awarded NSERC/Sanofi Industrial Research Chair (IRC) in Vaccine Mathematics, Modelling and Manufacturing program. The successful candidate is expected to engage with and benefit from this IRC program. The IRC program team of collaborators led by Professor Jianhong Wu in the Department is composed of faculty members from the Statistics Section and the Applied Mathematics Section. Existing expertise of the IRC program team includes but is not limited to: stochastic optimization; statistical computing; infectious disease modeling; numerical analysis of differential equations; Markov chains and Monte Carlo methods; Bayesian inference. The successful candidate is expected to be a member of this IRC team. The collective expertise of the IRC team is expected to be mobilized to develop complex models capturing sources of heterogeneity and uncertainty in infection dynamics and to explore high performance computing for the purpose of testing hypotheses, identifying promising vaccine candidates, simulating trials prior to implementation, informing vaccination production priority and immunization program design. Further information about the Department and the University can be found at http://mathstats.info.yorku.ca/ The successful candidate must have a PhD degree in mathematical sciences or a related area, and must have a proven record of independent research excellence, and evidence of potential for superior teaching and mentoring of trainees at all levels. The new hire is expected to develop an excellent and innovative research program to analyze, model, and simulate public health data, and to have the potential for leading interdisciplinary research to inform decisions on public health policy and industrial production. The successful candidate must be suitable for prompt appointment to the Faculty of Graduate Studies. Pedagogical innovation in high priority areas such as experiential education and technology enhanced learning is an asset. Applications must be received by **October 15, 2018**. Only applications received through the AMS MathJobs website, www.mathjobs.org, will be considered. Applicants will be asked to provide three signed letters of reference, a statement on teaching, a statement on research and a covering letter. Applicants wishing to self-identify can do so by downloading, completing and submitting the form found at: http://acadjobs.info.yorku.ca/. Once this form has been signed it can be uploaded to MathJobs. *All York University positions are subject to budgetary approval. York University is an Affirmative Action (AA) employer and strongly values diversity, including gender and sexual diversity, within its community. The AA program, which applies to Aboriginal people, visible minorities, people with disabilities, and women, can be found at http://yorku.ca/acadjobs or by calling the AA office at 416-736-5713. All qualified candidates are encouraged to apply; however, Canadian citizens and Permanent Residents will be given priority.*

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