AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

Newsletter

VOLUME 47, NO. 5 • SEPTEMBER–OCTOBER 2017

The purpose of the Association for Women in Mathematics is

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

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PRESIDENT'S REPORT

It is with deep sadness that I write this report. In the past few weeks, we have lost two women mathematicians whom I admire greatly. Marina Ratner, an eminent ergodic theorist and a member of the National Academy passed away July 7, and Maryam Mirzakhani, the first female Fields Medalist, left us far too soon on July 14. As I reflect on their accomplishments and their lives, I think about what support structures we need in order to succeed.

We avail ourselves of many support structures in our lives, both professional and personal. In this context, I am thinking of support in our personal lives, how our families and friends shape us, how we evolve together. As we pursue our mathematical dreams, whatever they may be, there are those who lift us up, allowing us to overcome the many obstacles that could put us down. In my own life, I have a father who encouraged me to think outside the box, an uncle who told me to improvise, because then there could be no "wrong notes." I had a mother who gave me a book called *Great Women in Medicine*. In "Understanding current causes of women's underrepresentation in science," Ceci and Williams (PNAS, 2010) suggest that one of the main factors in the small number of women in STEM is "fertility issues and work-home balance." Contrary to this view, I have always felt that family and children are often a strength, rather than a deterrent. My son is my biggest supporter, my collaborator and my cheerleader, and I hit my research stride only after marrying my (non-academic) husband of the past 22 years. We need to attach ourselves to people who take pleasure and pride in our accomplishments. My husband is known to give standing ovations at math colloquia: how often does that happen? As my friend Candice says, "Surround yourself with people who think you are awesome, and tell you so." These people become our family, and we should treasure them.

In her 2013 paper in the *Journal of Differential Geometry*, Maryam Mirzakhani acknowledges her husband, Jan Vondrak. Her young daughter sat next to her at the Fields Medal ceremony in Seoul at ICM 2014. In 2014, Marina Ratner wrote an article in the *Wall Street Journal* on the Common Core Curriculum, prompted by her grandson's experience in middle school. I imagine the joy and pride that these families take in the accomplishments of these two women.

See pp. 26–28 for memorials to Maryam. A memorial article on Marina will appear next issue.

Ed. note: See also "With Snowflakes and Unicorns, Marina Ratner and Maryam Mirzakhani Explored a Universe in Motion" by Amie Wilkinson, Science section, *The New York Times*. It appeared August 7 while we were in press.

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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.

Circulation: 3500. © 2017, AWM

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PRESIDENT'S REPORT *continued from page 1*

At the 2014 ICM opening ceremonies in Seoul: Martin Hairer (University of Warwick), Manjul Bhargava (Princeton University), South Korean President Park Geun-Hye, Maryam Mirzakhani (Stanford University), IMU President Ingrid Daubechies (Duke University), and Artur Avila (IMPA and CNRS, France) [Seoul ICM, IMU]

AWM news. The AWM had a scintillating presence at the annual SIAM conference. Our table was strategically placed near the entrance to the plenary talks, so we got plenty of foot traffic.

Liliana Borcea gave a thought-provoking AWM/SIAM Kovalevsky lecture, **Susanne Brenner**, **Beatrice Riviere** and **Fengyan Li** organized the AWM Workshop talks, and Malena Español and Joyati Debnath planned the poster judging, with help from our fantastic team of judges. The AWM career panel featuring **Lenore Cowen**, **Anshu Dubey**, **Fariba Fahroo** and **Alison Marsden** was informative and fostered a lively discussion. On Tuesday evening, the AWM co-sponsored a panel inspired by the book *Hidden Figures*, featuring Dr. Christine Darden and three "modern figures." This inspirational and moving event drew a large crowd and helped build awareness of the challenges that women of color still face in our mathematics community. See pages 6–8 for more about AWM activities and SIAM.

Another highlight of the SIAM conference for me was meeting **Carola-Bibiane Schönlieb**, who gave a very cool plenary lecture on deep learning and image reconstruction. Carola is my counterpart, a "co-convener" of the European Women in Mathematics (EWM) association. The EWM has been in existence since 1986 and has plans to grow its programs and strengthen ties to the AWM. Keep an eye out for travel grants to support participation in the 18th EWM meeting in Austria in September, 2018. Visit the EWM website at http://www.europeanwomeninmaths.org to learn more about our sister organization.

Earlier this summer I visited Berlin to attend a meeting of the IMU's Committee for Women in Mathematics (CWM). This organization's mission is to promote international contacts between organizations for women in mathematics. See their website at http://www.mathunion.org/cwm for more information about the CWM. I find it heart-warming to get a glimpse of the global network that supports women in mathematics. Two CWM activities are particularly exciting. Funded by a grant from the International Council for Science (ICSU), the CWM has teamed up with other organizations on a project to study the gender gap in mathematics and science. This three-year project will develop metrics to measure the gender gap and propose strategies to reduce it. **Jean Taylor** (14th AWM President) is participating in the gender gap project as a representative of ICIAM; to learn more about the project see their new website https://icsugendergapinscience.org. I look forward to seeing how the AWM can participate in this valuable world-wide effort.

Much of the meeting in Berlin focused on planning for **(WM)²: World Meeting for Women in Mathematics**, a one-day meeting on July 31, 2018, immediately preceding the International Congress of Mathematicians taking place in Rio. Put this on your calendars! It will be an exciting first: keep an eye out for further details, including funding possibilities.

I am delighted to announce that **Jill Pipher** (20th AWM President) will be the 2018 Noether Lecturer at the Joint Meetings 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). We want to hear from you!

Thanks to all of the volunteers who help us with our programs, our policy decisions and the running of the organization. I want to give a special shout-out to **Anne Leggett**, who is celebrating her 40th anniversary as AWM Newsletter Editor this issue. Anne: you are awesome!

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Rosalie Bélanger-Rioux (Harvard), Francesca Bernardi (UNC Chapel Hill), Carla Cotwright-Williams (Social Security Administration)

Membership Dues
Membership runs from Oct. 1 to Sept. 30
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Student, unemployed: $20
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Send all queries and all *Newsletter* material except ads and queries/material for columns to Anne Leggett, amcdona@luc.edu. Send all book review queries/material to Marge Bayer, bayer@math.ku.edu. Send all education column queries/material to Jackie Dewar, jdewar@lmu.edu. Send all media column queries/material to Sarah Greenwald, greenwaldsj@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, fax: 703-359-7562, e-mail: awm@awm-math.org.

Finally, I'd like to welcome two new AWM Advisory Board members: **Alejandro Adem** (CEO and Director of MITACS) and **Lenore Blum** (CMU and third AWM President). We look forward to working with both of you.

As we move towards the end of summer, I wish you all just the right combination of productivity, relaxation and fun. I send gratitude to my friends, my family, and to you, my mathematical family, for all your love and support.

Ami Radunskaya

Ami Radunskaya
July 27, 2017
MathFest, Chicago, IL

Jill Pipher Named 2018 Noether Lecturer

The Association for Women in Mathematics and the American Mathematical Society are pleased to announce that Jill Pipher will deliver the Noether Lecture at the 2018 Joint Mathematics Meetings. Dr. Pipher is the Elisha Benjamin Andrews Professor of Mathematics and Vice President for Research at Brown University. She has been selected as the 2018 Noether Lecturer for her profound impact on mathematics, both through her work in the fields of harmonic analysis and partial differential equations, and through her service to the profession.

Pipher received both her BS and PhD degrees in mathematics from the University of California, Los Angeles, her PhD directed by John Garnett. Before joining the Brown University faculty in 1989, Pipher was an L. E. Dickson Instructor and assistant professor at the University of Chicago

Pipher is best known for her fundamental contributions to solutions and regularity of partial differential equations in minimally smooth domains. For example, her classic 1995 paper with Verchota, "Dilation invariant estimates and the boundary Gårding inequality for higher order elliptic operators" (*Annals of Mathematics*), settled a long-standing conjecture on the solvability of the Dirichlet problem with L^2 boundary data on bounded Lipschitz domains. More recently, with Hofmann, Kenig, and Mayboroda, Pipher introduced innovative new tools to establish solvability of the Dirichlet problem with L^p data for non-symmetric elliptic operators.

Pipher has also done groundbreaking work in cryptography. With her collaborators Hoffstein and Silverman, Pipher described the first secure and practical public key cryptosystem based on hard lattice problems (NTRU). NTRU appears to be secure against attack by quantum computers, unlike earlier systems, including RSA. This work has been influential, spawning an intense new research area

ASSOCIATION FOR WOMEN IN MATHEMATICS

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

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AWM DEADLINES

AWM-MAA Falconer Lecture:
September 1, 2017
AWM Alice T. Schafer Prize: October 1, 2017
AWM Dissertation Prize: October 1, 2017
AWM Travel Grants: October 1, 2017
and February 1, 2018
AWM-AMS Noether Lecture:
October 15, 2017
AWM-SIAM Sonia Kovalevsky Lecture:
November 1, 2017
AWM Workshop at SIAM: November 1, 2017
Ruth I. Michler Memorial Prize:
November 1, 2017
RCCW Proposals: January 1 and July 1, 2018
AWM Essay Contest: January 31, 2018
AWM Mentoring Travel Grants:
February 1, 2018
AWM-Birman Research Prize,
February 15, 2018

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of lattice-based cryptosystems. Pipher holds four patents in encryption.

In addition to being in the inaugural class of AMS Fellows, Pipher was granted an Alfred P. Sloan Foundation Fellowship earlier in her career. She was an invited speaker at the International Congress of Mathematicians (ICM), Seoul 2014. Pipher has given numerous talks, often invited lectures, in the US and abroad. Without mentioning them all, in 2014 alone, in addition to the ICM, she was a plenary speaker, Joint Meeting of Australia and New Zealand Mathematical Societies, Melbourne; invited speaker, Harmonic Analysis and PDE, A conference in honor of C.E. Kenig, University of Chicago; invited speaker, Conference in Harmonic Analysis and PDE, Sydney, Australia; the Hayden-Howard Lecture, Mathematics, University of Kentucky; and an MAA Invited Address, Joint Mathematics Meetings, Baltimore, MD.

Pipher was the founding director of the Institute for Computational and Experimental Mathematics (ICERM) at Brown and was instrumental in securing the foundational NSF award. In 2015 before she left the director position, NSF awarded ICERM a $17.5 million renewal grant. For two years, 2011–2013, while in the midst of serving as the ICERM director, she also served as president of the AWM.

Jill Pipher

The 2018 Joint Mathematics Meetings will be held January 10–13 in San Diego. 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 and Lisa Jeffrey.

CALL FOR NOMINATIONS

The 2018 Kovalevsky Lecture

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

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

The lectureship may be awarded to anyone in the scientific or engineering community whose work highlights the achievements of women in applied or computational mathematics. The nomination must be accompanied by a written justification and a citation of about 100 words that may be read when introducing the speaker. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be received by **November 1, 2017** 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.

AWM at the 2017 SIAM Annual Meeting

Magnhild Lien, AWM Executive Director with Susanne Brenner, Ami Radunskaya and Beatrice Riviere

The 2017 SIAM Annual Meeting was held July 10–14, 2017 in Pittsburgh, PA. The AWM Workshop followed the new format instituted last year. The first part of the Workshop took place on Monday, July 10 with research talks on **Recent Advances in Numerical Analysis and Scientific Computing** given by invited speakers supported by the AWM ADVANCE grant, Career Advancement for Women Through Research-Focused Networks. Also on Monday, there was a mentoring session and luncheon for all the workshop participants. 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. The new format allowed for more interaction between the workshop participants as well as greater exposure of their work presented either in a poster or a talk. Special thanks go to the workshop organizers **Susanne Brenner**, Louisiana State University (workshop talks), **Laura Ellwein**, Virginia Commonwealth University (career panel and poster session), **Fengyan Li**, Rensselaer Polytechnic Institute (workshop talks), **Megan Owen**, Lehman College, CUNY (career panel and poster session), **Beatrice Riviere**, Rice University (workshop talks and career panel) and the poster judging coordinators **Joyati Debnath**, Winona State University and **Malena Español**, the University of Akron. Their dedication and enthusiasm while planning the workshop were instrumental in its success.

Ami Radunskaya, Liliana Borcea, and Nicholas J. Higham

Workshop speakers: Annalisa Quaini, Sara Pollock, Yekaterina Epshteyn, Kening Wang, Yulia Hristova, Yan Jiang, Zheng Chen, Susanne Brenner

The AWM workshop talks focused on Recent Advances in Numerical Analysis and Scientific Computing. This was a follow-up to the Workshop for Women in Applied Mathematics: Numerical Partial Differential Equations and Scientific Computing that was held at the IMA in August 2014. There were two sessions consisting of eight talks. The morning session was chaired by **Kening Wang**. The speakers and the titles of their talks were:

Susanne Brenner, Louisiana State University
A New Convergence Analysis of Finite Element Methods for Elliptic Distributed Optimal Control Problems with Pointwise State Constraints

Zheng Chen, Oak Ridge National Laboratory
Super-convergence of the Asymptotic Approximation of Linear Kinetic Equation with Spectral Methods

Yekaterina Epshteyn, University of Utah
Numerical Methods for the Chemotaxis Models

Yulia Hristova, University of Michigan, Dearborn
The Effect of the Sensitivity Parameter in Weighted Essentially Non-oscillatory Methods

The afternoon session was chaired by Susanne Brenner. The speakers and the titles of their talks were:

Sara Pollock, Wright State University
Pseudo-time Adaptive Regularization for Nonmonotone Problems

Annalisa Quaini, University of Houston
On the Sensitivity to the Filtering Radius in Leray Models of Incompressible Flow

Kening Wang, University of North Florida
A BDDC Preconditioner for C0C0 Interior Penalty Methods

Yan Jiang, Michigan State University
A Moving Mesh WENO Method Based on Exponential Polynomials for One-dimensional Conservation Laws

Abstracts of the talks can be found at awmadvance.org.

At the lunch, all of the workshop participants, including graduate students, workshop speakers and organizers and women mathematicians, joined together for a networking and mentoring session. Participants were seated by groups according to their research interests. The food was excellent and the conversation at the tables between mentees and mentors was lively. Discussion topics ranged from possibilities for first jobs (research postdoc, internship, or teaching position?) to strategies for having both a family and a career. We were joined by special guests **Talitha Washington** (AWM EC member) and **Ron Buckmire** (Program Director, NSF S-STEM program).

Liliana Borcea, University of Michigan, delivered the AWM-SIAM Sonia Kovalevsky Lecture. She gave an inspiring talk on "Mitigating Uncertainty in Inverse Wave Scattering" to a large audience on Monday afternoon. At the SIAM Awards Luncheon on Tuesday, Borcea was presented with a plaque by AWM President Ami Radunskaya and SIAM President Nicholas J. Higham.

Jessica Taylor explaining her poster

The workshop continued on Tuesday, July 11 with the career panel "Perspectives from Women in Research." It featured female panelists from diverse backgrounds: **Lenore J. Cowen**, Tufts University; **Anshu Dubey**, Argonne National Laboratory; **Fariba Fahroo**, Defense Advanced Research Projects Agency; and **Alison Marsden**, Stanford University. The panel was moderated by **Beatrice Riviere**, Rice University. 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 and on the balance between career and family. While young female mathematicians face many obstacles in their careers, the panel's point of view is optimistic as the societal culture is ever changing in favor of reducing the gender gap in STEM fields. It is crucial to keep offering these career panels regularly, so that junior and senior female scientists continue to exchange advice and ideas on this important topic.

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Career Panel: Beatrice Riviere (Rice), Lenore Cowen (Tufts), Farina Fahroo (DARPA), Anshu Dubey (Argonne Lab), and Alison Marsden (Stanford)

AWM AT THE 2017 SIAM ANNUAL MEETING

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That evening AWM was one of the sponsors of the *Hidden Figures* Event; see the report following this article.

The workshop concluded on Tuesday evening with ten graduate students presenting posters during a well-attended concurrent poster and dessert reception for the AWM Workshop and the SIAM Annual Meeting. There was a steady stream of conference attendees coming by—and not just for the desserts! The graduate students seemed genuinely excited to showcase their work. The ten poster presenters were: **Francesca Bernardi**, University of North Carolina; **Yi Jiang**, Iowa State University; **Adeline Kornelus**, University of New Mexico; **Karina Koval**, Courant Institute of Mathematical Sciences; **Junyuan Lin**, Tufts University; **Jennifer A. Loe**, Baylor University; **Zhaoyi Meng**, University of California, Los Angeles; **Marissa Renardy**, Ohio State University; **Jessica Taylor**, University of California Merced, and **Ganesha Weerasinghe**, Auburn University. To see the titles and abstracts of the posters see http://meetings.siam.org/sess/dsp_programsess.cfm?SESSIONCODE=63267.

Poster judging, a feature started three years ago, is now a regular part of the workshop. In coordination with the NSF Mathematical Sciences Institutes we are able to offer an invitation to participate in a week-long workshop at one of the institutes as a prize for the best poster. The poster judging was skillfully handled by **Malena Español** and eleven volunteer judges. **Joyati Debnath**, who was not able to attend the meeting, was responsible for the preparation of the poster competition, including finding the judges. The winner was **Ganesha Weerasinghe** from Auburn University. **Francesca Bernardi** from University of North Carolina and **Yi Jiang** from Iowa State University received honorable mentions.

Marissa Renardy explaining her poster

At the AWM Table: Ami Radunskaya, Michelle Snider, and Jessica Taylor

Many thanks to **Joyati Debnath** and **Malena Español**, the organizers of the poster judging and the volunteer judges **Ed Dunne**, **Cynthia Flores**, **Laurie Heyer**, **Carrie Anna Manore**, **Suzanne M. O'Regan**, **Norma Ortiz-Robinson**, **Alicia Prieto Langarica**, **Catherine Roberts**, **Louis Rossi**, **Shawn Ryan,** and **J. Patrick Wilber**. Joyati and Malena's tireless efforts in organizing this event and the volunteers' eagerness to participate made it all run very smoothly.

The 2017 AWM Workshop was made possible by funding from the National Science Foundation (NSF) through the ADVANCE grant Career Advancement for Women Through Research-Focused Networks (NSF-HRD 1500481) and the grant Graduate Student Participation in National Workshops to Encourage Women's Engagement in Mathematics Research (NSF-DMS 1636610).

Renew your membership at www.awm-math.org

Hidden Figures Event

report from the audience

Moderator Carla Cotwright-Williams with the panelists: Shelby Wilson, Christine Darden, Erica Graham, and Talitha Williams

On Tuesday July 11, during the 2017 SIAM Annual Meeting in Pittsburgh, PA, we attended the *Hidden Figures* panel where four African American women, Drs. Christine Darden, Erica Graham, Talitha Washington, and Shelby Wilson shared their mathematical work as well as personal insights on how to support and encourage diversity. The event was co-sponsored by AWM, Building Diversity in Science/ Infinite Possibilities Conference, Enhancing Diversity in Graduate Education (EDGE), IBM, National Association of Mathematicians (NAM), and SIAM.

The following are our reactions to the panel, as five different women in STEM at different stages of their careers.

Karamatou Yacoubou Djima, Assistant Professor of Mathematics

Out of the many events held at SIAM this year, I was really anticipating the panel on *Hidden Figures*. I had heard great things about a similar panel held during the Joint Meetings so I could not wait for the privilege to listen to Christine Darden, one of the bright characters of the book *Hidden Figures* by Margot Lee Shetterly. In addition, two good friends of mine, Shelby Wilson and Erica Graham, were among the panelists. These young women and I participated in the amazing EDGE Program, and they have been incredible mentors, confidantes and cheerleaders to others and me throughout the years; they more than deserved increased attention from the mathematical community. Talitha Washington, whom I knew mainly through word of mouth about her accomplishments, was also a panelist. Needless to say, I fully expected the panel to be a great experience. However, it was more than that: sincere, intimate, at times funny, but mostly inspirational.

Christine Darden discussed her work on supersonic flight and sonic booms at NASA and with each sentence conveyed the kind of passion and dedication that many of us hope to carry throughout our career. A few details told without pretension drew smiles and laughter from the room. For example, as an undergraduate, because of her intense preparation, she always finished her work long before the due date. The lesson was clear: hard work and discipline. Erica Graham followed Darden, starting the flow of the younger generation with a description of her path toward mathematical biology. Her story demonstrated how mathematical skills and an academic career can blossom quietly and steadily through the right mentoring and environments where one's value is not questioned based on arbitrary biases. Talitha Washington related a career path punctuated with challenges that she managed to turn in her favor. An illustration of this is her upbringing in rural Indiana and the socio-economic shock she felt, and surmounted, as an undergrad at Spelman College. She then pursued her graduate studies in a department from which she was the first African American to receive a PhD degree. This trait of character, that of facing challenges head-on and persevering even despite certain slights (for example, Darden was denied rightful promotion several times in her career), was a constant theme throughout the panel. Another common theme was that of "paying it forward." All four women are committed to increasing diversity in the mathematical sciences, and they shared ideas on how to achieve this, mainly through effective mentoring, with the audience.

The last person to speak at the panel was Shelby Wilson, and her presentation was the most personal and emotional. Sitting near me, my friend Alicia could not help shedding some tears. After a summary of her career, Shelby gave a lengthier, vulnerable, account of her relationship with her grandmother, the illustrious mathematician Etta Falconer. For those in the room who, like me, know Shelby, this was a rare and precious moment. Shelby and I went to the same graduate program and have been friends for many years, yet I have only heard her mention her grandmother a handful

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of times. What caught my attention in the testimony was the advice given by her grandmother when she stated her desire to be a math major. The response was something along the line of: "Just take your first proof class, and we'll see." I was taken aback. I suppose I was expecting something grander, more obviously inspirational and quotable. However, I came to rethink this first impression. Perhaps Falconer's careful and wise advice is what we faculty should give our students who express an early interest in mathematics. Still, very little is more inspirational to a (perhaps future) mathematician than the simple urge to dig a little further, learn a little more before making up your mind, whether to confirm a desire, dive deeper into a homework problem or advance a research project.

In summary, the panel was excellent. The display of passion, grit, and dedication of the four panelists was exemplary for someone like me, a new faculty member, as well as many others. I am glad that Darden and others have come into the light and hopeful that we will all make sure that in this generation and in the future, such bright minds will be "hidden no more."

Sarah Elisabeth A. Odidika, first year undergraduate premedical student

When I think of a "hidden figure," I think of a woman or man who has changed or is changing history through their contribution to the advancement of STEM, and has left a lasting impact without being acknowledged. Yesterday, on the panel, I listened to the legendary Christine Darden talk about her career at NASA. She worked her way up through the ranks by hard work, dedication, and love for math. While listening to her, I could see myself through her, at NASA, running tests, talking to my collaborators, and making history without knowing it. Darden made history, without anyone truly recognizing the significance of her accomplishments until only a few years ago. What stuck with me the most was her perseverance to achieve her goal of becoming a scientist and mathematician as well as not letting adversities of the age bring her down. It just shows you that if you want something hard enough and are willing to put in the work and overcome hurdles that will come your way, nothing anybody says will or can stop you. All the women and men that have changed history are unhidden figures, I just hope I can become one too.

Hannah Haynie, first year undergraduate premedical student

My unexpected journey with mathematical research began when I attended my first AWM meeting at Youngstown State University. Upon telling the standing president my major, biology, it was suggested that I send an email to Dr. Alicia Prieto Langarica who does research in biomathematics. The rest is history! I started studying myogenesis (muscle formation) through infancy and how muscle development may be modeled by using MATLAB. I asked Prieto if we could visit her in Pittsburgh at the SIAM conference. Luckily,

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 Jennifer Lewis at 703-934-0163, ext. 3 for guidance.

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

she agreed. Upon arriving, my group members and I were overwhelmed with all the exciting research going on! The event that stood out the most to me was the *Hidden Figures* panel. Every speaker was encouraging and very passionate about her students and mathematical achievements. As a mathematical pioneer in a male dominated field, Darden was asked of situations that she had to overcome due to both her gender and race. She graciously responded by saying that she loved what she did, and while she experienced adversity, she persevered with honesty, integrity, and hard work. I enjoyed my experience at the SIAM conference, but most of all, I feel very honored for the opportunity to have listened to four very inspiring female trailblazers in the field of mathematics.

Alanis Chew, first year undergraduate mathematics major

I attended the *Hidden Figures* event because I had heard wonderful things about the panelists and I was interested in listening to their experiences, how they overcame obstacles and how they inspire others. I realized that these wonderful women share the same goal: to encourage and help students grow, not only academically but also as individuals. No matter how challenging it may be, they are always there for a student in need. The panelists also talked about the people in their lives and the importance of having mentors, those individuals who guide and support the students through their journey. This made me appreciate all the amazing people who have helped me become who I am and pushed me to challenge myself to do better. When someone has faith in you, you have a little more faith in yourself. I want to share the love of mathematics with others and help people understand that they too can excel in mathematics, regardless of their background, skin color, or gender.

Alicia Prieto Langarica, Associate Professor of Mathematics

I sat with my friend Kara to listen to a panel of women whom I admire and who have, many times before, served as my mentors and *sheros*. At the beginning of the year at the Joint Meetings, I attended a similar panel, which was moving and motivational, so I expected a similar experience. But this time, in addition to moving and motivational, the panelists were much more personal. Christine Darden talked about a particular project that was of special significance to her, reducing sonic boom during supersonic flight, and how excited she is about the possibility of seeing her project completed in the near future. The modern figures discussed their trajectories and the people that helped them get where they are now. Particularly moving to me was Shelby Wilson's testimony of what it meant to grow up as the granddaughter of Dr. Etta Falconer. Rather than hide under the shadow of her grandmother, Shelby has become a black female mathematician who shines on her own while continuing to shed light on her ancestor's legacy.

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, 2015 to September 30, 2017). 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 San Diego, CA, January 2018.

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, 2017**. If you have questions, phone 703-934-0163, email awm@awm-math.org, or visit www.awm-math.org.

MEDIA COLUMN

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

Timeless: "Space Race" (Season 1, Episode 8)

Tanya Moore, cofounder of the Infinite Possibilities Conference

Timeless, an NBC TV series recently renewed for a second season, is a show centered around Garcia Flynn (Goran Višnjić), a criminal who steals a time machine in order to disrupt significant events in American history. An unlikely trio is brought together by the government to stop Flynn. The heroes—a historian Lucy Preston (Abigail Spencer), a computer scientist Rufus Carlin (Malcolm Barrett), and a soldier Wyatt Logan (Matt Lanter)—follow Flynn in a lifeboat time machine through different time periods trying to capture him and interfere with his plans to change history.

"Space Race," the eighth episode of *Timeless* (original airing on November 28, 2016), takes place on July 20, 1969, in the control room of NASA in the middle of a "Go-No Go" decision for the first manned lunar landing. The episode was directed by Charles Beeson, director of sci-fi and crime-solving TV shows such as *Revolution*, *The Mentalist*, *Supernatural*, and *Fringe*. The protagonists have followed Flynn to NASA as they feared that his actions will result in the astronauts being stranded in space to die. Carlin is immediately in awe walking the halls of NASA—star-struck is probably a more apt description. Posing as a janitor, he watches over the control room with his partner Logan, who is disguised as an FBI agent, when they discuss the historical magnitude of this moment in time.

Wyatt: This moon landing means something to you.

Rufus: It means everything. It's like all of my heroes in one room, every Christmas and July 4th combined.[1]

[1] "Space Race." *Timeless*. NBC. 28 Nov. 2016. Television.

The team quickly realizes that NASA's computer system has been infected with a computer virus and despite Carlin's savvy computer know-how, he's at a loss with how to work with these "antiquated machines." Rufus searches his mind for options, and he lights up with a solution, "The smartest person in the building works in the basement." He's referring to legendary mathematician and former NASA computer Katherine Johnson.

The national awareness of Katherine Johnson's mathematical contribution to aeronautical research has grown exponentially with the release of *Hidden Figures*, the *New York Times* bestseller written by Margot Lee Shetterly and Academy Award nominated film directed by Theodore Melfi and starring Taraji Henson, Octavia Spencer and Janelle Monáe. *Hidden Figures* tells the story of three Black female mathematicians who worked as "computers" during the period of the Space Race at the National Advisory Committee for Aeronautics (NACA), which eventually became NASA. Johnson's mathematical calculations on orbital trajectories are remarkable both for the mathematical complexity involved and because her work took place during a period in our country's history when segregation prevailed and African Americans had limited access to higher education and to jobs as scientists, researchers or mathematicians. The significance of her contributions was recognized in 2015 by President Obama when he awarded Johnson the Presidential Medal of Freedom.

In the episode, Carlin calls on Johnson to help him understand how to work the "antiquated" machines. He shows her the mathematics he wants to program, and she looks on with amazement, not realizing that he is bringing future mathematical discoveries into their conversation. After some convincing, she assists him with the computer programming and teaches him how to feed the computer tape into the machine in order to run the program. If their intervention works, they might be able to save the lives of the astronauts hovering just above the moon's surface.

It is notable that on a major network, a prime-time TV show recognized Johnson, a Black woman mathematician, as a national hero and as the "smartest person in the building." Rarely are Black women portrayed as heroic, intellectual or mathematical in TV shows or movies. It also demonstrates the impact *Hidden Figures* has had elevating our collective awareness of the historical and important role women, and black women in particular, have had in mathematics and aeronautics research. That excellence in mathematics and science is offered up as a noble and relevant path for women, is important to all the young girls who grow up with a spark of interest in science, technology, engineering

or mathematics so that they can know that they can have a meaningful future as mathematicians or scientists.

Stories of heroes and their journeys are powerful. Their struggles, lessons and victories can serve as a road map for what is possible in our own lives. Although in "Space Race" Johnson is more of an accessory to the main protagonists, and she is called on more for her ability to operate the computer hardware as opposed to her mathematical skills, she is portrayed as consequential to the astronauts in space and the men in mission control. Her story, her journey is valued as an important one. In *Hidden Figures*, Shetterly also makes clear the value of sharing Katherine Johnson's story.

> What I wanted was for them to have the grand, sweeping narrative that they deserved, the kind of American history that belongs to the Wright Brothers and the astronauts, to Alexander Hamilton and Martin Luther King Jr. Not told as a separate history, but as a part of the story we all know. Not at the margins, but at the very center, the protagonists of the drama. And not just because they are black, or because they are women, but because they are part of the American epic.[2]

Shetterly points us away from our tendency to shroud our heroes in exceptionalism. She reminds us that in pursuing the work we love with courage and persistence that we too have the opportunity to lead impactful lives. "Space Race" cannot do complete justice to Katherine Johnson's hero's journey, but they do provide another step in cementing her legacy as part of the American epic.

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[2] Shetterly, M. L. (2016). *Hidden figures: the untold true story of four African-American women who helped launch our nation into space*. New York, NY: Harper, An Imprint of HarperCollins, xviii.

Deeper in Debt: Women and Student Loans

AAUW, press release, May 2017

A new American Association of University Women (AAUW) report, *Deeper in Debt: Women and Student Loans*, estimates that women hold almost two-thirds ($833 billion) of the country's $1.3-trillion student debt while men hold $477 billion. The research shows that those with the scarcest resources bear the brunt of student debt in the United States.

"It's encouraging that women are enrolling in college more than ever before," said Kevin Miller, PhD, the senior researcher for AAUW, "but at the same time they are taking on larger amounts of debt to pay for their dreams. Because of factors like the gender pay gap, debt that could be manageable ends up becoming unmanageable, particularly for women."

More than half of graduating U.S. college students have financed some or all of their education with student loans. Women now earn 57 percent of bachelor's degrees from U.S. colleges and universities, and AAUW estimates that women take on average two years longer to pay off their student debt than men do. Black women take on more student debt than do members of any other group and ultimately struggle the most to pay it off.

"Women face a catch-22: go to college and take on student loan debt but get a higher paying job or, alternatively, forgo college and avoid the debt, but be locked out of higher-wage careers. We need to do better," said Miller.

Women with college degrees working full time make 26 percent less than their male peers, which leaves women with less income on average to devote to debt repayment. And thanks to student debt, women are more likely than men to experience financial difficulties: Thirty-four percent of all women, 42 percent of Hispanic women, and 57 percent of black women who were repaying student loans said they had been unable to meet essential expenses within the past year.

"This isn't just a student problem, it's a gender inequity problem and it impacts us all," said Anne Hedgepeth, senior government relations manager at AAUW. "As a nation, we rely on women to add to and strengthen our economy. That can't happen under mountains of student debt."

AAUW advocates safeguarding and expanding Pell Grants for low-income students as well as providing nontraditional students with the resources they need, such as on-campus child care, to successfully complete college degrees. Solutions to the student debt problem should also include supporting income-driven repayment approaches that reflect borrowers' realities. And our support for students should address the additional costs students face beyond tuition: books, supplies, and housing, to name a few. Congress can take leaps toward closing the gender pay gap and bolstering women's economic security by passing legislation like the Paycheck Fairness Act and the Pay Equity for All Act.

"The status quo is untenable for women with student debt," said Hedgepeth. "It's time for policy makers, institutions of higher education, and us as a nation to commit to fixing this problem for women and for all student borrowers."

STUDENT CHAPTER CORNER

Coordinator: Kavita Ramanan, kavita_ramanan@brown.edu

AWM Student Chapter Awards

This year the AWM sponsored its first annual Student Chapter Awards. Awards were given in each of four categories: scientific excellence, professional development, fundraising/sustainability, and community outreach. We received 19 unusually noteworthy proposals, so making the final selections was a difficult task. The four chapters receiving awards, along with summaries of the citations, are given below.

We thank all who participated in this year's competition for the attention to their proposals and congratulate them on the strength of the activities they described. They clearly demonstrate the excellent work being done by our student chapters and represent an inspiration to other existing chapters. We hope they will also provide examples of what might be done by organizing on campuses where AWM student chapters do not yet exist. See the section of this Corner that follows to learn about one of the winning chapters.

Brown University, Winner of the Scientific Excellence Category

The AWM student chapter of Brown University is receiving this award in recognition of their regional conference, Women's Intellectual Network Research Symposium. This impressive undertaking was partially funded by the NSF and benefited over a hundred mathematicians in their area. The program included plenary lectures on a wide variety of topics, a student meeting of local AWM chapters, three tutorials, a panel on mentoring, 22 contributed talks and a poster session. In the follow-up survey, feedback from the conference's participants was enthusiastic. The student meeting was particularly successful in initiating a wider communication among chapters, supporting young chapters and encouraging the establishment of new ones. Their work embodies the spirit of the Student Chapter Awards and, we hope, will serve as a model to other chapters around the country.

University of North Carolina at Chapel Hill, Winner of Community Outreach Category

The AWM student chapter of the University of North Carolina is receiving this award in recognition of their superlative community outreach events. The centerpiece of the chapter's outreach program is their free, two-week summer camp, Girls Talk Math, at UNC for rising high school students. The program is implemented by chapter members and partially funded by the MAA. Student groups work on math problems and study the life of a female mathematician from a particular area of mathematics. Each group records a podcast and writes a blog post describing its project. Female mathematicians also give talks and lead campers on various mathematical explorations. Additionally, each year UNC holds a Science Expo for children of the surrounding community, an event where chapter members organize and run a table devoted to math-related games. We congratulate the chapter members on their exceptional programs and their impressive commitment to their mathematical community.

University of Texas at Arlington, Winner of the Fundraising/Sustainability Category

The AWM student chapter of the University of Texas at Arlington is receiving this award in recognition of their creative and educational means of fundraising. The chapter members run two-hour review sessions for five large introductory math and statistics classes. The cost of admission is $5, and attendees also get copies of previous exams. From this tutoring program the chapter earns over $1500 each semester, which it uses to fund its other activities. Rewards for attendees are clear, and review leaders also gain confidence as presenters of mathematics and solidify their own mathematical background. The work of the chapter enhances the mathematical culture of the entire department and makes it highly worthy of this award.

Youngstown State University, Winner of the Professional Development Category

The AWM student chapter of Youngstown State University is receiving this award in recognition of four excellent professional development activities. First, they have established a Big/Little Mentoring project, which increased first-year student interest in mathematical research. In response, the chapter, along with a faculty AWM advisor, instituted two research groups of first-year students working on projects in mathematical biology. These students are presenting their work at MathFest this summer as rising sophomores. Third, the chapter sponsors an annual Women's History Month mathematics colloquium. Finally, their chapter held an event called "Pursuing an Inclusive Environment in STEM," with a keynote speaker and a panel. The program created by the Youngstown student chapter has successfully encouraged an impressive number of young students to become engaged in mathematics and has helped to retain their interest and engagement with our field. We congratulate them on their exemplary work.

Girls Talk Math: Engaging Girls through Math Media

Francesca Bernardi and Katrina Morgan

In 2016 the AWM Student Chapter at the University of North Carolina at Chapel Hill was awarded funding from the Mathematical Association of America, a Tensor Women and Mathematics Grant to develop a summer camp at UNC. Francesca Bernardi and Katrina Morgan, currently President and Treasurer of the chapter, applied for such funding and used it to design the Girls Talk Math program. Girls Talk Math is a free summer camp for high school students identifying as girls in the Triangle area of North Carolina who are interested in mathematics. The goal of the program is to encourage young girls to continue to pursue mathematics in college and their careers. The grant was renewed in 2017 and the second run of camp was held this past June.

During the two weeks of camp, campers are split into groups of four or five campers, and each group is given several projects. They work together on an advanced mathematics problem set, often containing undergraduate or even graduate level topics. Problem sets have focused for example on elliptic curve cryptography, scientific computing, fluid dynamics, special relativity, and knot theory. Each group is also assigned a female mathematician in history whose work focused on similar topics. Some mathematicians campers have researched are Katherine Johnson, Ada Lovelace, Maryam Mirzakhani, and Emmy Noether. As a group, campers then create their own media, writing a blog post about the mathematics they learned, and creating and recording a podcast about the mathematician they researched. You can visit www.girlstalkmath.web.unc.edu to view and listen to the products from both years of the camp.

A camper in the Scientific Computing group shares her findings with her groupmates.

Members of the Knot Theory group visualize different knots using yarn.

In addition to daily group work, a multitude of activities are incorporated into the program. During the 2016 camp, Dr. Lilly Nguyen from the Women's and Gender Studies Department at UNC gave a lecture on the history of women in computing. This year, Dr. Sarah Greenwald from Appalachian State University gave a talk titled "Popular Culture and Mathematics: Gender, Race, and More." The program also emphasizes a growth mindset approach to learning, including a workshop led by a representative from the UNC Learning Center. Female mathematicians, students from local universities, and mathematics professionals from industry spoke on their experiences and research to connect participants to modern mathematics.

The camp is designed, organized, and run by Bernardi and Morgan. Members of the chapter, including both graduate and undergraduate students, develop the curriculum, prepare the camp, and serve as group leaders and counselors for the campers. Students from both runs of camp have said they found the experience interesting and gratifying. The girls are particularly excited about meeting other campers interested in mathematics as well as the counselors and instructors. Being a high-school girl with a fascination for math and the sciences can be challenging and isolating;

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campers thrived in the community of peers and mentors created by the camp.

In 2017 Bernardi and Morgan were invited to attend the Joint Mathematics Meeting in Atlanta, GA to participate in the Mathematical Association of America Outreach Poster Session. The presentation was an invaluable experience to learn about outreach programs from around the US and brainstorm with other like-minded individuals. They are planning to attend JMM 2018 in San Diego, CA. The goal is to continue with camp once the two founders earn their PhDs (Bernardi in 2018 and Morgan in 2019). The Mathematics Department has shown support for the program and several faculty and graduate students have demonstrated interest in the possibility.

We are excited to be the inaugural recipients of the AWM Student Chapter Award for Community Outreach. Thank you to AWM for the honor!

The Elliptic Curve Cryptography group working hard on their problem set

During a talk by Dr. Sarah Greenwald from Appalachian State University, campers discussed the portrayal of math, women, race, and more in pop culture.

Campers attended a professional panel during which they were able to ask questions to women currently working in math related fields.

A group photo from the last day of camp in June 2017, including campers, volunteers, and the directors.

AWM WORKSHOP AT THE 2018 SIAM ANNUAL MEETING

Application deadline for graduate students: **November 1, 2017**

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings. New in 2016 and going forward is that the workshop talks are supported by the AWM ADVANCE grant. The AWM Workshops serve as follow-up workshops to Research Collaboration Conferences for Women, featuring both junior and senior women speakers from one of the Research Networks supported by the ADVANCE grant. An AWM Workshop is scheduled to be held in conjunction with the 2018 SIAM Annual Meeting in Portland, Oregon, July 9–13, 2018.

FORMAT: The workshop will consist of two research minisymposia focused on Shape Analysis and Modeling organized by Cindy Grimm and Megan Owen, a Poster Session and an informational minisymposium directed at starting a career. Selected junior and senior women from the Research Collaboration Conference for Women (RCCW) WiSh 2 will be invited to give 20-minutes talks in the two research minisymposia. The speakers will be supported by the National Science Foundation AWM ADVANCE grant: Career Advancement for Women Through Research Focused Networks. The Poster Session will be open to all areas of research; graduate students working in areas related to shape analysis and modeling are especially encouraged to apply. The graduate students will be selected through an application process to present posters at the Workshop Poster Session run in conjunction with the SIAM Poster Session. Pending funding, AWM will offer partial support for travel and hotel accommodations for the selected graduate students. The workshop will include a luncheon and mentoring session where workshop participants will have the opportunity to meet with other women mathematicians at all stages of their careers. In particular, graduate students working in areas related to shape analysis and modeling will have the opportunity to connect with the Women in Shape (WiSh) Research Network.

All mathematicians (female and male) are invited to attend the talks, career panel and poster presentations. Departments are urged to help graduate students and junior faculty who are not selected for the workshop to obtain institutional support to attend the presentations.

MENTORS: We also seek volunteers to act as mentors for workshop participants, in particular the graduate students. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by February 1, 2018.

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

All applications should include:

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

Applications must be completed electronically by **November 1, 2017**. See http://www.awm-math.org/workshops.html.

BOOK REVIEW

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

Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy by Cathy O'Neil. Crown Publishing Group, 2016. ISBN-13: 978-0553418811

Reviewer: Marge Bayer

The subtitle of this book gives you a good idea of what it is about. The author did a PhD in number theory at Harvard, taught at Barnard for a while, and worked for a hedge fund and then as a data scientist for various start-ups. Now she is director of The Lede Program at Columbia, a graduate certificate program that focuses on computer science and data science in the context of journalism, social science and the humanities. She is also the author of the blog at mathbabe.org.

The author gives us a wide range of examples of the misuse of data and prediction models in the areas of teacher evaluation, crime prediction, sentencing of those convicted of crimes, credit scores, mortgage approvals, insurance ratings, employment screening, employee scheduling, worker evaluation, social network algorithms, and political targeting. In higher education, she talks about college rankings, for-profit college marketing, and college admissions.

My heart sank a bit when Chapter 1 started with the example of data use in baseball. (I say my heart sank, because Bill James, of sabermetrics fame, is my neighbor, and I didn't want to become disillusioned about his work.) But actually she was presenting baseball statistics as an example of statistical modeling that avoids the negative features of *Weapons of Math Destruction* (WMD). WMDs are characterized by widespread use, enormous impact, inappropriate and often secret metrics, creation of a feedback loop for the victims, and lack of adaptation in the algorithms themselves.

You may remember hearing about Michelle Rhee, Chancellor of the DC Public Schools from 2007 to 2010. In this position she had a lot of power, as the DC Board of Education had only an advisory role. She wanted to reform the school district by closing schools and weeding out low-performing teachers and principals. In evaluating schools, principals and teachers, she put a lot of weight on students' standardized test scores. O'Neil tells the story of one of the fired elementary teachers who had received excellent reviews from the principal and from parents. However, her students' test scores had not improved enough over their previous year's scores, and overall she was deemed to be a poor performer. Later there was evidence that some of her

CALL FOR NOMINATIONS

The 2019 AWM–Joan & Joseph Birman Research Prize in Topology and Geometry

The Executive Committee of the Association for Women in Mathematics has established the AWM – Joan & Joseph Birman Research Prize in Topology and Geometry. First presented in 2015, the prize will be awarded every other year. The purpose of the award is to highlight exceptional research in topology/geometry by a woman early in her career. The field will be broadly interpreted to include topology, geometry, geometric group theory and related areas. Candidates should be women, based at US institutions who are within 10 years of receiving their PhD, or have not yet received tenure, at nomination deadline.

The AWM – Joan & Joseph Birman Research Prize in Topology and Geometry 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 Joan Birman who works in low dimensional topology and her husband Joseph Birman who is a theoretical physicist.

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 703-934-0613 or email awm@awm-math.org.

students' previous year's scores had been inflated by alleged cheating by teachers, throwing into question the conclusion that her students had not progressed over the year.

In this example, we see the features of WMDs. The system for evaluating teachers was in widespread use, had a great impact, and was opaque—the teachers and principals did not know what factors were used in the evaluation. One known factor was improvement in test scores, which turned out to be clearly unreliable, even if you think that the standardized tests are measuring the outcomes we should value in education. The victims here were teachers and students. The feedback loop refers to the fact that the fired teachers would have difficulty in finding new jobs, although the teacher highlighted here was able to get a job in an affluent suburb, having a strong recommendation from her principal. So the real victims of this error were the students in the disadvantaged school district, which lost a good teacher. In addition, there was no attempt to assess whether this teacher evaluation system was accomplishing the stated aims. When teachers who were highly rated by their principals were identified as low-performing by the evaluation system, the metrics should have been re-examined.

One thing common to many of the examples of WMDs in the book is the use of proxies in evaluating an individual for risk, whether as a potential criminal, an insurance customer, or a job applicant. Someone lives in a neighborhood with a high incidence of nuisance crimes, minor traffic collisions, and high job turnover. These conditions serve as proxies for the individual's legal history, driving record, and employment history. Credit scores are also used as proxies for evaluating job candidates and insurance policies. A *Consumer Reports* study found that "in Florida, adults with clean driving records and poor credit scores paid an average of $1552 more than the same drivers with excellent credit and a *drunk driving conviction*." [p. 165]

US News & World Report ranks colleges by a number of proxies for educational quality: admission rates, matriculation rates, test scores of incoming students, retention and graduation rates, student-teacher ratios, and alumni contributions. Add to that "reputation," as measured by the opinions of other college administrators. No one would dispute that these measures give important information about a college, but they miss much of what contributes to educational quality. The rankings create a vicious cycle; if a college were ranked poorly, fewer students would apply, so the admission rates would go up and alumni contributions might decrease. In addition, the rankings invite colleges to try to game the system. Making it easier or cheaper to apply would reduce the admission rates; denying admission to students who would

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CALL FOR NOMINATIONS

The 2019 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 and Lisa Jeffrey.

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, 2017** and will be held active for three years. If you have questions, phone 703-934-0163 or email awm@awm-math.org.

likely go to a more prestigious institution would improve matriculation rates; and running a major capital campaign (perhaps aimed at funding a sports facility) would factor into the ratings. Baylor University reportedly paid for admitted students to retake the SAT in the hopes of improving their scores. Some colleges even ran advertising campaigns directed at other schools, in an attempt to improve their reputation scores.

The internet is, of course, a great source of data about individuals' status and habits. This enables businesses and political organizations to target their ads. While elite universities focus their advertising on students with high test scores, for-profit universities target the vulnerable, as identified by search histories. One career-training institute was investigated by Congress, which found a manual directing recruiters to target "Welfare Mom w/Kids. Pregnant Ladies. Recent Divorce. Low Self-Esteem. Low Income Jobs. Experienced a Recent Death. Physically/Mentally Abused. Recent Incarceration. Drug Rehabilitation. Dead-End Jobs – No Future." [p. 72] These populations are least likely to be skeptical of the institution's promises and are likely to bring in federal student loan money.

Crime prediction software is used to assign police to places and times where certain types of crime are more likely. Of course, the types of crime do not include "white collar" crime. Street crime can be divided into two types, which we will refer to as violent crime and nuisance crime. The theory of broken-window policing is that stepping up policing in neighborhoods with high nuisance crime rates will reduce violent and other serious crime. The idea is to create a good relationship between the neighborhoods and the police. As the author describes, however, if the focus is on arrests for nuisance crime, it "creates a pernicious feedback loop." [p. 87] More people are arrested for low-level crimes. The neighborhoods of those arrests (generally those suffering from high poverty rates) get a higher crime rate. More police are assigned to those locations. More people serve time in prison for minor offenses. It is very difficult for them to get jobs when they are released. They may be responsible for more nuisance crime.

Discrimination in hiring has a long history. Before automation, personnel departments often made hiring decisions based on all sorts of factors not relevant to the job. Face-to-face interviews could be used to decide that a candidate was not suitable, without any justification. Software tools seemed to promise increased fairness in hiring. These start with résumé scanners that score the resumes for the job opening; 72% of résumés are never read by humans. [p. 114]

Those who get to the interview often are given automated tests, now used on 60% to 70% of prospective workers in the US. [p. 108] The tests often include psychological components that purport to measure characteristics such as temperament, conscientiousness and ability to get along with others. The book includes examples of questions ranging from those with an obvious desired answer ("Do you get mad easily?") to those where any choice of answer seems risky ("Which adjective best describes you at work, unique or orderly?"). The consequences can be bad for both prospective employee and employer. The unsuccessful job-seekers do not learn what kept them from getting the job, and may have the same experience interviewing at several companies using the same software. The employer suffers because there is no feedback mechanism for the model. There is no review of whether the test actually identifies good employees or whether it excludes good employees.

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 Jennifer Lewis at 703-934-0163, ext. 3 for guidance.

Deadline. There is one award period per year. Applications are due **February 1**.

One of the most disturbing examples in the book is recidivism models used by many courts in deciding criminal sentences. The people convicted are asked questions about their background, neighborhood, their own and their family members' previous contact with law enforcement, as well as things more specifically related to the crime. Clearly, some of these questions have the effect of assigning higher risk to those who come from poorer neighborhoods. And here again is the vicious cycle: increasing the length of the sentence, making it more difficult to find employment after release, and putting friends and neighbors at higher risk for long sentences.

I was a bit surprised that the book says little about gender. Some of the models described may avoid incorporating gender information and thus represent an improvement over traditional screening. However, as we have seen in several contexts, there is no doubt proxy data for gender in some of the models. It would have been good to address that issue.

Many of these mathematical models can be used to do good. Categorizing prospective students or employees by situations in their past or in their neighborhood could result in greater fairness, special assistance and higher retention. Recidivism models can be used to identify good candidates for intervention programs in prisons. Computer screening does not discriminate on the basis of personal appearance. But the book certainly leads us to believe that the accumulated effect of these models is to compound disadvantage.

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

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, 2017. 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 2018 Joint Mathematics Meetings in San Diego, CA.

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, 2017**. If you have questions, phone 703-934-0163, email awm@awm-math.org, or visit www.awm-math.org.

EDUCATION COLUMN

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

Choice Without Charter Schools

Pat Kenschaft, Professor Emerita of Mathematics, Montclair State University, Montclair, NJ

I live in a town that gives parents a choice of the school philosophy they prefer without having any charter schools. Before each child begins kindergarten, parents must specify their order of preference for the six elementary schools in the town. The district's software tries to give every family one of their top three choices and often succeeds.

Before writing this article I asked a variety of young parents if they found this cumbersome and all said they liked the system. One said, "Who doesn't like choice?" She then went on to say that her first two children went to the same school, but she decided her third child would be happier in a smaller, less lively, school, so she sent her elsewhere. Another with two not yet school age said she liked having choice, but was finding it a bit "overwhelming." "It's the reason we moved here," she added, "having moved to Montclair during her first pregnancy.

Most whom I talked to went on "the tour," where each principal highlights the bright spots of that school. All consulted the district website about the process and the online virtual tours before making their decision.

All Montclair elementary schools provide basic education, but options vary. Each of the six elementary schools has its own theme:

- The elementary school nearest to Montclair State University, Bradford Academy, refers to itself as the "University Magnet" and encourages students and faculty to work with the children. It has a "Character Education" theme and emphasizes "Cooperation, Acceptance, Respect Responsibility, Empathy and Self-Control." It has an indoor peace garden.
- Edgemont School calls itself the "Montessori Magnet."
- Northeast School's theme is "Global Studies"; students reflect on cultural diversity, the global economy, politics, and real life issues. All students take Spanish each year. Each grade level studies a designated continent, and students are allowed and encouraged to study other foreign languages. I have heard that delegates to the UN sometimes choose to live in Montclair so their children can go to this school.
- The Charles H. Bullock School offers an "Environmental Science" theme.
- Watchung School features "Science and Problem Solving." Annual events include a school-wide week-long science fair with a science bee, an interactive Science Summit, and a three-day environmental education camping trip. The curriculum offers hands-on activities including weekly lessons in a science lab and greenhouse, which includes a hydroponics system.
- The "Gifted and Talented Magnet" is the self-identification of Nishuane School in K–2 and Hillside in 3–5. The Hillside website says, "Hillside Elementary School's gifted and talented magnet program presumes ALL children have special gifts and talents and that it is our responsibility to identify and nurture those talents."

Each elementary school "feeds" specifically one of the three middle schools. Nishuane feeds Hillside, and Hillside and Edgemont feed Glenfield Middle School. Graduates of Bradford, Northeast, and Watchung go to the Buzz Aldrin Middle School (formerly Mt Hebron). Graduates of the Charles Bullock School go to Renaissance at Rand Middle School. All then go to the high school, where there are a variety of program choices and small learning communities within the same building. Each school is racially and ethnically integrated, as the state mandates.

As I researched for this article, I discovered that the choice system has evolved over several decades and is assumed to be still evolving. From the mid-19th to the mid-20th century Montclair had school segregation resulting from residential segregation. Blacks lived mostly in the southern part of town with "Upper Montclair" in the north being almost entirely white. The black servants who did not live in their employers' homes were relegated to a small segment of a town that was roughly one mile wide and six miles from south to north.

The first public protest against racial segregation was apparently in May 1961, when a parent realized that his daughter, who had earned As in elementary and middle schools, was getting Ds in high school.[1] Increasingly, he suspected that the preparation in the southern schools was not comparable to that in the northern part of town. He and a group of friends collaborated with the NAACP and found that there was an egregious difference in classroom supplies

[1] Jane Caroline Manners, "Selling Integration: A History of the Magnet School System in Montclair, New Jersey," Cambridge, MA: B.A. Honors Thesis, Harvard College, 1997. http://id.lib.harvard.edu/aleph/007572907/catalog

and teacher preparation. "Where white schools had new science laboratories, extensive libraries, and fully equipped gymnasiums and cafeterias, Glenfield [which served black students] had exposed and leaky pipes, faulty toilets, and a run-down gymnasium that converted to a cafeteria during lunch hours."[2] It took considerably more public action, but in the fall of 1962, for the first time, some black students in Montclair would be bussed to another part of town.

The following June white parents in northern Montclair filed a suit claiming their children did not have the options available to the southern students; they did not mention race in their suit, apparently to avoid charges of racism. In May 1964, the judge in the New Jersey Supreme Court ruled in favor of the Montclair Board of Education, saying it had the right to consider race in its school assignments as long as the motive was to achieve racial integration. There then arose much debate about the appropriateness of bussing young children.

On April 24, 1966, 24 Montclair black parents, aided by the NAACP, filed a petition with the New Jersey State Commissioner of Education charging the Montclair Board of Education with "the maintenance of segregated schools." On August 19, 1968, the Commissioner ruled in their favor. After several years of bitter debating and demonstrations, some mildly violent, in February 1972 the Board adopted a plan that for first time involved bussing small white children, along with small black children. That May, Montclair elected to its township Commission (the then-name of the township ruling body) a mayor and others who strongly opposed "bussing little children" and promised to restore neighborhood schools. However, the Commission's authority over the schools was indirect; they could only appoint Board members. Discussions, protests, and organizing continued; mothers met repeatedly to try to figure out what system could integrate Montclair public schools; they included black and white mothers and one administrator. In July 1975, the New Jersey Education Commissioner ordered Montclair to devise a desegregation plan in which each school would reflect the district's 40% black/60% white racial balance. The local school board told its new superintendent to devise such a plan.

Currently, the Montclair Public Schools website says that the magnet school system started in 1977.[3] However, when I was preparing to move to town in 1975, my daughter and I met with some school administrators to make a choice about her program when she entered fifth grade that fall. Her brother, in third grade, walked to the "neighborhood" school and I found this distressing because he had to cross two numbered highways himself with no safety patrols or crossing guards. He survived the year without mishap, but the next year I was greatly relieved to have him bussed to the "Gifted and Talented" magnet in the southern part of town, feeling good about my contribution to racial integration. In Manners' paper I read that only the "Gifted and Talented" programs offered any program in art, music, or the performing arts.[4] I was glad, as are many parents, to have my children's education include these subjects.

To draw black families to send their children to the northern part of town, a "Back to Basics" program was instituted in one of the schools with the highest percentage of white students. The following year the program was polished with a variety of magnets. Suddenly, more parents wanted their children to ride busses than had ever been forced to!

Although it hasn't been a perfect solution,[5] the Montclair controlled choice program with a variety of magnet schools made—and still makes—a big difference in the flavor of Montclair. The hostility we heard about forced bussing when we came gave way to joy at being able to choose the type of education children would receive. The community pulled together and was MUCH happier for several decades. Our high school graduates who go on to college remark that they seem much more comfortable with diverse friends, points of view, and cultures than many of their (especially white) peers.

Then last year two newcomers to town thought that a French-immersion charter school would be a good idea and made their application to the New Jersey Department of Education. Many Montclair citizens were outraged at the proposal. Most residents couldn't understand why the proposers hadn't operated within the town's very flexible system if they wanted an immersion school, or why French was so much more desirable than Spanish, Arabic, or Mandarin for total immersion; all four languages are offered within our elementary schools. The local Board of Education and the Council (the new name for township "Commission") unanimously opposed it. We learned that the total power to decide whether Montclair would have a charter school was in the state Department of Education. Residents were outraged to discover that under New Jersey law local citizens have no control over such a decision. Activists from the NAACP, Montclair Cares About Schools, Blue Wave, Montclair 250 (an organization

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[2] Ibid., p. 12.

[3] "A Historical Perspective of Montclair's Magnet School System" 2017. http://www.montclair.k12.nj.us/district/magnet-system/historical-perspective

[4] Manners, op. cit., p. 49

[5] http://www.nytimes.com/1994/08/11/nyregion/specter-segregation-returns-montclair-schools-are-troubled-racial-imbalance.html?pagewanted=all

of educators who live in Montclair), and the Montclair Education Association organized together in opposition to the charter. The activists discovered that many charter developers and investors who were initiating and supporting charters in Newark lived in Montclair.

The estimate was that the school would cost two to five million dollars a year, so the cost to students not enrolled would be significant. We were urged to write letters to the Commissioner of Education, and about 4,000 of us did.[6] High school students had a large demonstration against the proposal. They held up many signs saying, "We [heart] our public schools." In August the *Wall Street Journal* reported that the issue had become so heated that the proposers feared retaliation against their families.[7] On September 14, 2016, there was a public rally that included about a hundred demonstrators. Among them were our state senator, an assemblyman, our representative to the county government, our mayor, and our superintendent of schools.[8]

Finally, in late September the New Jersey Commissioner of Education turned down the application, and Montclair breathed a sigh of relief.

I'm not sure how typical New Jersey's charter school law is of the country, but it seems amazing to me that nationwide there has been such tolerance for allowing charter schools to divert so much public money to a few children of some highly motivated parents. A choice system involving all children and parents seems much, much more desirable to me. I didn't realize until researching for this article that the concept of "magnet" schools, giving parents a choice of which magnet they want, is far from unique to Montclair. I strongly recommend it be adopted widely, perhaps everywhere. Why not? It makes more sense than favoring financially those most assertive—whose children probably have other advantages too.

Giving *all* parents a choice, including those who are public school advocates or are too busy or preoccupied to get involved with charter schools seems good for our country's children, and, therefore, the future of our country.

Postscript: A few days before this article was due, I became aware of the book *Keeping the Struggle Alive: Studying Desegregation in Our Town*, written collectively by the Renaissance Middle School Class of 2000, who gathered scores of oral histories with desegregation activists, school principal Dr. Bernadette Anand, educator Michelle Fine, civil rights attorney Arthur Kinoy, and educator David Surrey; it was published by Teachers College Press in 2002. I haven't yet read the book, but I have great respect for its authors and am sure it is an important elaboration of the themes of this article.

Editor's Note: In the next issue of the *Newsletter*, the Education Column will be revisiting the topics of charter schools, resegregation within schools due to tracking, achievement gaps, and the influence of outside money on K–12 education.

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[6] Casey Abramson, "Rally Against Proposed Charter School Held at Montclair High School," *TAP into Montclair*, September 15, 2016. https://www.tapinto.net/towns/montclair/articles/rally-against-proposed-charter-school-held-at-mon-5

[7] https://www.wsj.com/articles/proposed-french-charter-school-faces-resistance-in-montclair-1471483484, August 17, 2016.

[8] Abramson, op. cit.

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/.

Women Advancing Mathematical Biology (WAMB)

Rebecca Segal, Virginia Commonwealth University

If you read AWM President Ami Radunskaya's column in the July–August *Newsletter*, you heard her enthusiastic reference to the Women Advancing Mathematical Biology workshop at the Mathematical Biosciences Institute (MBI) in Columbus, OH. For one week in April 2017, a diverse group of mathematicians worked to solve a range of biological problems using mathematical and computation tools. This workshop was one in a series aimed at building new research collaborations, expanding career networks and energizing mathematical biology research.

Working in collaborative teams of six or seven, each along with a senior research mentor and a co-leader, researchers developed new mathematical models to address questions in a range of application areas. Topics include autism spectrum disorder, ectoparasites and allo-grooming, argasid ticks dynamics, super-fast nematocyst firing, combination therapy dynamics, and infectious disease modeling led by Jen-Mei Chang (California State University Long Beach), Nina Fefferman (University of Tennessee, Knoxville), Holly Gaff (Old Dominion University), Laura Miller (University of North Carolina, Chapel Hill), Helen Moore (Bristol-Myers Squibb), and Linda Allen (Texas Tech University), respectively. The workshop hosted a total of fifty participants.

I was lucky enough to be included in the group led by Laura Miller. We used immersed boundary method simulations to explore the surprising fluid dynamics required to allow a Cnidarian (e.g. hydrae, jellyfish, etc.) or dino-flagellate to attack and/or capture its prey. Assumed to live and move in a low Reynolds number environment based on their typical size, they actually must fire their nematocyst (stinging cell) at incredible speeds.

In the post workshop survey, 100% of responders felt that the workshop was worth their time. The workshop provided a positive, supportive, productive work environment with researchers at all career stages. It helped to build new collaborations and expand their professional network.

100% of the participants gained knowledge in a variety of areas: 78% learned new mathematics, 90% learned new biology, and 70% learned new computational skills. 90% of participants expect to continue with the research group beyond the first publication. The workshop allowed participants to get real research done, to learn new tools that can be applied to other projects, and to get re-engaged and excited about research in general.

The workshop was organized by Ami Radunskaya (Pomona College), Rebecca Segal (Virginia Commonwealth University), and Blerta Shtylla (Pomona College). They are working to offer additional workshops in the future. This workshop was made possible with funding support from the Society of Mathematical Biology, the AWM-ADVANCE grant, Microsoft Research, and the Mathematical Biosciences Institute.

Participants in the Women Advancing Mathematical Biology workshop

IN MEMORIAM

Maryam Mirzakhani (1977–2017)

Ami Radunskaya

As a community supporting women in mathematics, we were thrilled and proud to see Maryam Mirzakhani win the Fields Medal in Seoul. AWM past-President Kristin Lauter recalls:

> I was sitting next to AWM President Ruth Charney, watching the female president of South Korea award the Fields medal to a woman for the first time in history. Many of us were cheering loudly from the audience and there was a sense of a real breakthrough and potential for change, and certainly an outpouring of emotion. The same outpouring of emotion has been palpable these last few days at the terribly sad news of her death.

When Maryam won the Sattler prize in 2013, she wrote in the April, 2013 AMS *Notices*:

> I have enjoyed a pleasant and supportive environment during my time at Harvard, Princeton, and Stanford. Still, in my opinion, the situation of women in math is far from ideal. The social barriers for girls who are interested in mathematical sciences might not be lower now than they were when I grew up. And balancing career and family remains a big challenge. It makes most women face difficult decisions which usually compromise their work. However, there has been a lot of progress over the years, and I am sure this trend will continue.

The AWM will strive to honor Maryam by continuing to support this positive trend.

Andrew Myers and Bjorn Carey; reprinted by permission; http://news.stanford.edu/2017/07/15/maryam-mirzakhani-stanford-mathematician-and-fields-medal-winner-dies/

Stanford mathematics professor Maryam Mirzakhani, the first and to-date only female winner of the Fields Medal since its inception in 1936, died Friday, July 14. She had been battling breast cancer since 2013; the disease spread to her liver and bones in 2016. Mirzakhani was 40 years old. She died at Stanford Hospital.

Maryam Mirzakhani

The quadrennial Fields Medal, which Mirzakhani won in 2014, is the most prestigious award in mathematics, often equated in stature with the Nobel Prize. Mirzakhani specialized in theoretical mathematics that read like a foreign language to those outside of mathematics: moduli spaces, Teichmüller theory, hyperbolic geometry, ergodic theory and symplectic geometry.

Mastering these approaches allowed Mirzakhani to pursue her fascination for describing the geometric and dynamic complexities of curved surfaces—spheres, doughnut shapes and even amoebas—in as great detail as possible. Her work was highly theoretical in nature, but it could have impacts concerning the theoretical physics of how the universe came to exist and, because it could inform quantum field theory, secondary applications to engineering and material science. Within mathematics, it has implications for the study of prime numbers and cryptography.

Mirzakhani joined the faculty of Stanford University in 2009, where she served as a professor of mathematics until her death.

"Maryam is gone far too soon, but her impact will live on for the thousands of women she inspired to pursue math and science," said Stanford President Marc Tessier-Lavigne. "Maryam was a brilliant mathematical theorist, and also a humble person who accepted honors only with the hope that it might encourage others to follow her path. Her contributions as both a scholar and a role model are signi-

ficant and enduring, and she will be dearly missed here at Stanford and around the world."

Despite the breadth of applications of her work, Mirzakhani said she enjoyed pure mathematics because of the elegance and longevity of the questions she studied.

A self-professed "slow" mathematician, Mirzakhani's colleagues describe her as ambitious, resolute and fearless in the face of problems others would not, or could not, tackle. She denied herself the easy path, choosing instead to tackle thornier issues. Her preferred method of working on a problem was to doodle on large sheets of white paper, scribbling formulas on the periphery of her drawings. Her young daughter described her mother at work as "painting."

"You have to spend some energy and effort to see the beauty of math," she told one reporter.

In another interview, she said of her process: "I don't have any particular recipe [for developing new proofs].… It is like being lost in a jungle and trying to use all the knowledge that you can gather to come up with some new tricks, and with some luck you might find a way out."

Mirzakhani was born in Tehran, Iran, and—by her own estimation—was fortunate to come of age after the Iran-Iraq war when the political, social and economic environment had stabilized enough that she could focus on her studies. She dreamed of becoming a writer, but mathematics eventually swept her away.

She attended an all-girls high school in Tehran, led by a principal unbowed by the fact that no girl had ever competed for Iran's International Mathematical Olympiad team. Mirzakhani first gained international recognition during the 1994 and 1995 competitions. In 1994, she earned a gold medal. In 1995, she notched a perfect score and another gold medal.

After graduating college at Sharif University in Tehran, she headed to graduate school at Harvard University, where she was guided by Curtis McMullen, a fellow Fields Medal winner. At Harvard, Mirzakhani was distinguished by her determination and relentless questioning, despite the language barrier. She peppered her professors with questions in English. She jotted her notes in Farsi.

McMullen described Mirzakhani as filled with "fearless ambition." Her 2004 dissertation was a masterpiece. In it, she solved two longstanding problems. Either solution would have been newsworthy in its own right, according to Benson Farb, a mathematician at the University of Chicago, but then Mirzakhani connected the two into a thesis described as "truly spectacular." It yielded papers in each of the top three mathematics journals.

"The majority of mathematicians will never produce something as good," Farb said at the time. "And that's what she did in her thesis."

Iranian President Hassan Rouhani said the "unprecedented brilliance of this creative scientist and modest human being, who made Iran's name resonate in the world's scientific forums, was a turning point in showing the great will of Iranian women and young people on the path towards reaching the peaks of glory … in various international arenas," according to Iranian state media.

"What's so special about Maryam, the thing that really separates her, is the originality in how she puts together these disparate pieces," said Steven Kerckhoff at the time of

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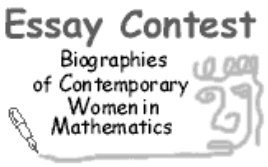
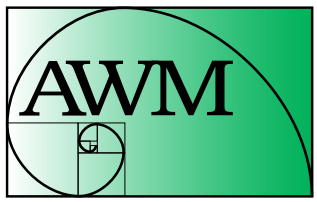


To increase awareness of women's ongoing contributions to the mathematical sciences, the Association for Women in Mathematics holds an essay contest for biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers. AWM is pleased to announce that 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 *AWM 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, 2018**. (To volunteer as an interview subject, contact Dr. Christine Sample at samplec@emmanuel.edu.)



her Fields Medal award. Kerckhoff is a professor at Stanford who works in the same area of mathematics. "That was the case starting with her thesis work, which generated several papers in all the top journals. The novelty of her approach made it a real tour de force."

After earning her doctorate at Harvard, Mirzakhani accepted a position as assistant professor at Princeton University and as a research fellow at the Clay Mathematics Institute before joining the Stanford faculty.

"Maryam was a wonderful colleague," said Ralph L. Cohen, the Barbara Kimball Browning Professor of Mathematics at Stanford. "She not only was a brilliant and fearless researcher, but she was also a great teacher and terrific PhD adviser. Maryam embodied what being a mathematician or scientist is all about: the attempt to solve a problem that hadn't been solved before, or to understand something that hadn't been understood before. This is driven by a deep intellectual curiosity, and there is great joy and satisfaction with every bit of success. Maryam had one of the great intellects of our time, and she was a wonderful person. She will be tremendously missed."

In recent years, she collaborated with Alex Eskin at the University of Chicago to answer a mathematical challenge that physicists have struggled with for a century: the trajectory of a billiard ball around a polygonal table. That investigation into this seemingly simple action led to a 200-page paper which, when it was published in 2013, was hailed as "the beginning of a new era" in mathematics and "a titanic work."

"You're torturing yourself along the way," she would offer, "but life isn't supposed to be easy."

Mirzakhani is survived by her husband, Jan Vondrák, and a daughter, Anahita, as well as her parents, sister and two brothers.

The university will organize a memorial service and an academic symposium in her honor in the fall, when students and faculty have returned to campus.

Links of interest: https://nyti.ms/2vrhLMN; http://www.newyorker.com/tech/elements/maryam-mirzakhanis-pioneering-mathematical-legacy; http://www. npr.org/2017/07/16/537509478/remembering-maryam-mirzakhani (Ami Radunskaya was interviewed by NPR); and https://youtu.be/mdlEPk3m4es (tribute by Rep. Jerry McNerney, D-CA, on the House floor)

Nancy Kreinberg

Nancy Kreinberg (1937–2017)

Wendy Williams

Nancy Kreinberg died on May 28 at her home in the Berkeley Hills after a long illness. She was 79.

Nancy was born to Burt Levy and Betty Bows Levy (later Himelblau) on September 20, 1937 and was raised in the Chicago area. She graduated from the University of Wisconsin in 1959, where she majored in English. When her marriage to Lew Kreinberg ended in divorce, she moved with her two young sons to Berkeley, arriving in 1969 just as the Civil Rights Movement was ending, the Vietnam War was escalating, and the women's liberation movement was on the rise. She would live and work in Berkeley for the rest of her life.

Motivated by her deep belief that the voice of the underserved and the underdog needed to be heard, Nancy's work and personal life reflected her dedication to the equality of women and girls, and, more broadly, to equality and equity for all. To all her undertakings, Nancy brought her gift as a collaborative change-maker, who could catalyze and

motivate her colleagues and friends and give voice to their collective visions and accomplishments in her many books and articles.

When she first arrived in Berkeley, Nancy worked as a freelance editor and writer, coauthored a book on the integration of children with disabilities into the regular classroom for Far West Laboratory for Educational Research and Development of San Francisco, and, in 1971, was instrumental in launching Editcetera, a Berkeley organization of freelance writers, editors and other publishing specialists. To this day, Editcetera handles referrals for its member freelancers and conducts workshops for aspiring writers and editors. In her spare time, she helped organize and facilitate "consciousness raising"—the gathering of women in small, ongoing groups to share, question, and address their experiences as the subordinate "second sex" that took hold throughout the country in the late '60s and early '70s.

In the fall of 1973, Nancy landed the job she would hold until her retirement—director of special educational programs at the five-year old Lawrence Hall of Science. LHS, a "public science center" perched high on the hill above the University of California's Berkeley campus, features hands-on exhibits and multiple programs for teaching and learning science and mathematics. Nancy's first major project was the establishment of a Math for Girls class at the Hall. Building on that initial project, she created and led the EQUALS program, under the umbrella of which the LHS sponsored math workshops for girls and women as well as teaching technique classes for math and science teachers. Later she added Family Math, which developed strategies for family members to use in helping their children learn and love math. Over the years, the reach of Equals and Family Math, initially concerned with gender equity, was expanded to address race and class biases that hinder children's math learning as well. As Nancy explained in a 1998 pamphlet coauthored with Patricia Campbell, "Questioning our own assumptions, and the solutions based on those assumptions, have moved us away from the idea of educational equity as a separate concept to the idea that high quality education must include all." In the words of her long-time colleagues Dr. Elizabeth Stage and Dr. Rita Levinson, "Nancy catalyzed the now-widespread public recognition that mathematics and science education are essential for all students' opportunities and the now-conventional wisdom that teaching students in a cooperative, problem-solving environment (the design premise of Math for Girls and every subsequent program) prepares them for lives as parents, citizens, employees and leaders."

Nancy's creativity reached beyond the programs she nurtured at the Lawrence Hall of Science. The summer after launching Math for Girls, she and Dr. Levinson sent out an invitation: "Please join us at the Lawrence Hall of Science for a gathering of people interested in increasing the participation of girls and women in math/science/technical fields." By 1975, that initial effort had morphed into the Math/Science Network, and Nancy served, with Dr. Lenore Blum, as co-director of the Network. By the early 1980s, the Network became an independent nonprofit organization, supported by educators, scientists, parents, government agencies and educational foundations. Headquartered at the Math/Science Resource Center at Mills College and sustained by a major grant from the Carnegie Corporation of New York, the program attained a national and international reach. Nancy helped plan the Network's 30th anniversary celebration, held in November of 2004, at the Lawrence Hall of Science. By then, the Math/Science Network's primary program, Expanding Your Horizons in Science and Mathematics (EYH), had produced hands-on workshops for well over half a million girls and young women at 100 sites around the country. In 2010, it received the National Science Board's Public Service Award.

Nancy retired in October of 1995. In retirement, she tended her backyard garden, wandered her Berkeley Hills neighborhood, and took up birding. Art from around the world adorned the walls of every room in her home, reminding her of her travels, especially her many trips to Paris. (She had savored planning those trips almost as much as the trips themselves; a friend once called her a frustrated travel agent.) Tooling around the East Bay in her ancient Toyota Camry, she partook of the Bay Area's wealth of art and theater offerings. She loved foreign films (especially French ones) and served as a volunteer usher at the Berkeley Repertory Theatre for over a decade. She enthusiastically indulged her talent for bargain hunting, bringing home treasures from clothes to ceramics, and continued to put her collaborative skills to work for various voluntary groups.

Nancy died peacefully, surrounded by her family—sons Jed Kreinberg of Berkeley and Luke Kreinberg of El Cerrito, and her partner of 17 years, Meyer Roth, who she first met in high school. The family plans to hold a celebration of Nancy's life before year's end. Memorial donations in her honor may be made to Doctors Without Borders at www.doctorswithoutborders.org.

Announcements

ECMTB 2018

The 11th European Conference on Mathematical and Theoretical Biology (ECMTB 2018) will be held in Lisbon, Portugal, July 23–27, 2018. It will be a main event of the Year of Mathematical Biology (http://euro-math-soc.eu/year-mathematical-biology-2018) set up by the European Society for Mathematical and Theoretical Biology (ESMTB) and the European Mathematical Society (EMS).

For that reason, ECMTB 2018 will, for the first time, be a joint ESMTB-EMS conference and will be co-organized by SPM (Portuguese Mathematical Society). The conference chairs are Maira Aguiar, Carlos Braumann, and Nico Stollenwerk.

We invite all researchers and students interested in mathematical and theoretical biology and its applications to join us at this exciting conference! Registration is now open at the ECMTB webpage http://www.ecmtb2018.org. Important deadlines: minisymposium applications, November 15, 2017; abstract submission for contributed talks and posters, February 20, 1018; early bird registration fees, April 15, 2018. Follow us at https://www.facebook.com/ecmtb2018/.

UNM Mentoring Conference

The Mentoring Institute at UNM is pleased to announce its 10th Annual Mentoring Conference, A Decade of Cultivating an Inclusive Mentoring Community: Developmental Networks for Innovation, Achievement, and Transformation. This five-day event will take place October 23–27, 2017 at the Student Union Building on UNM's main campus in Albuquerque, New Mexico.

The Conference features a total of twelve keynote, plenary, and round-table sessions, three pre-conference workshops (master sessions), a poster session, and over three hundred individual/panel presentations. We aim to host a broad constituency, including divisions of higher education, academic researchers, educators, community leaders, administrators, non-profit partners, government agencies, and other professionals

The 2016 conference attracted more than 600 mentoring researchers and practitioners, 86% of whom were faculty, staff or students from higher education. The remaining 14% were professionals and practitioners from health care, government, non-profit, and business organizations.

More information can be found at mentor.unm.edu/conference.

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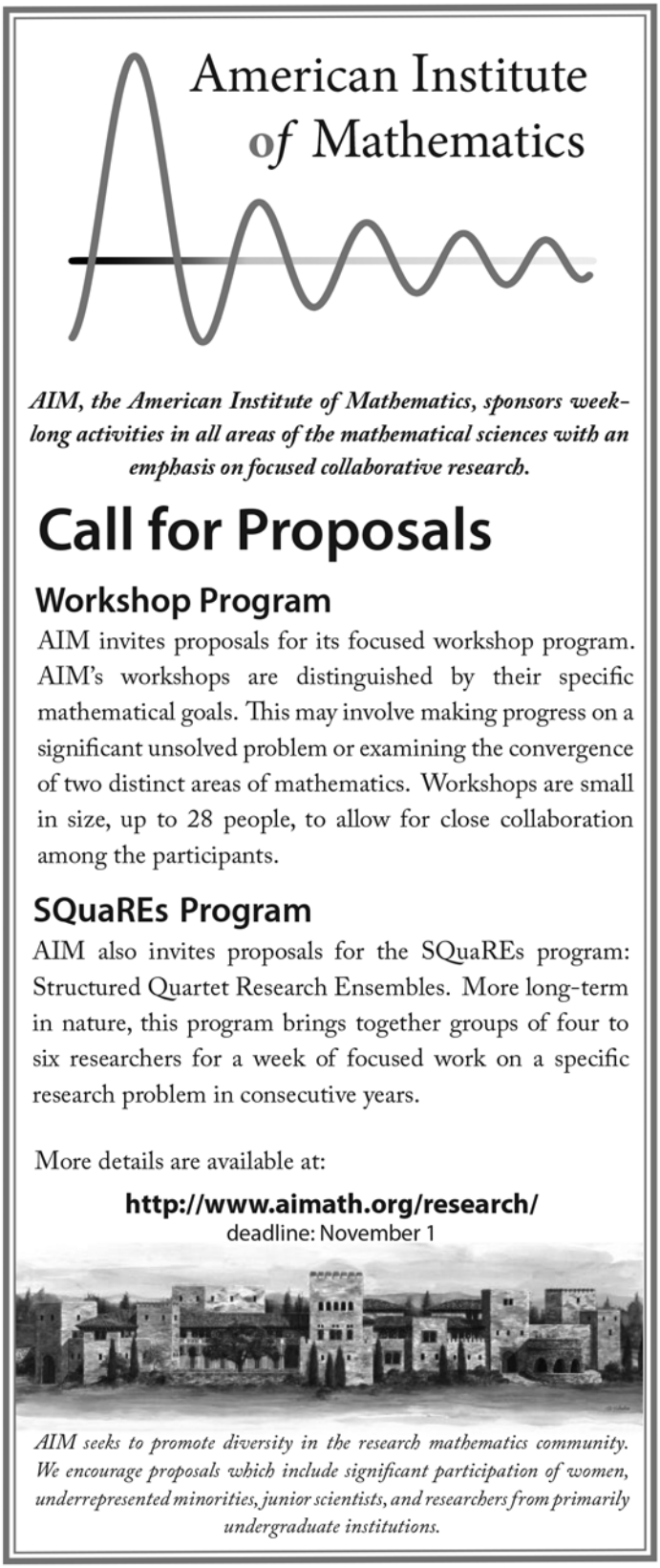


The Institute for Computational and Experimental Research in Mathematics

FALL 2018 SEMESTER PROGRAM

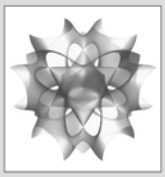
Nonlinear Algebra

September 5 – December 7, 2018

Organizing Committee:

Dan Bates, Colorado State University
Sandra Di Rocco, Royal Institute of Technology
Jonathan Hauenstein, University of Notre Dame
Anton Leykin, Georgia Tech
Frank Sottile, Texas A&M University
Mike Stillman, Cornell University
Cynthia Vinzant, North Carolina State University

Program Description:



The theory, algorithms, and software of linear algebra are familiar tools across mathematics, the applied sciences, and engineering. This ubiquity of linear algebra masks a fairly recent growth of nonlinear algebra in mathematics and its applications to other disciplines. The proliferation of nonlinear algebra has been fueled by recent theoretical advances, efficient implementations of core algorithms, and an increased awareness of these tools.

The benefits of this nonlinear theory and its tools are manifold. Pushing computational boundaries has led to the development of new mathematical theories, such as homotopy methods for numerical algebraic geometry, tropical geometry and toric deformations, and sums of squares methods for polynomial optimization. This uncovered many concrete nonlinear mathematical objects and questions, many of which are ripe for computer experimentation. In turn, resulting mathematical breakthroughs often lead to more powerful and efficient algorithms for computation.

Full program details can be found at: ***icerm.brown.edu***

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2018-2019 MEMBERSHIP

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The School of Mathematics at the Institute for Advanced Study welcomes applications from postdoctoral, mid-career, and senior mathematicians and theoretical computer scientists, and strongly encourages applications from women and minorities.

Stipends, on-campus housing, and other resources are available for periods of 4-11 months for individual researchers in all mathematical subject areas. The School supports approximately 40 post-docs per year. In 2018-2019, there will be a special-year program called "Variational Methods in Geometry," led by Fernando Codá Marquez of Princeton University, however, Membership will not be limited to mathematicians in this field. For more information, please visit: math.ias.edu/administration/membership

Programs:

EMERGING TOPICS
math.ias.edu/emergingtopics

WOMEN & MATHEMATICS
math.ias.edu/wam/2018

SUMMER COLLABORATORS
math.ias.edu/summercollaborators

Application Deadline:
December 1, 2017
mathjobs.org

MSRI
Call for Applications
2018-19 Programs

The Mathematical Sciences Research Institute in Berkeley, California invites applications for membership in its 2018-19 research programs:

FALL 2018

- Hamiltonian Systems, from Topology to Applications through Analysis

SPRING 2019

- Derived Algebraic Geometry
- Birational Geometry and Moduli Spaces

msri.org/programs

Apply online beginning August 1, 2017

Research Professorships (Deadline: 10/1/17)
Postdoctoral Fellowships (Deadline: 12/1/17)
Research Memberships (Deadline: 12/1/17)

MSRI
Mathematical Sciences Research Institute

The Institute is committed to the principles of Equal Opportunity and Affirmative Action. Students, recent Ph.D.'s, women, and minorities are particularly encouraged to apply.

MSRI has been supported from its origins by the National Science Foundation, now joined by the National Security Agency, over 100 Academic Sponsor Institutions, by a range of private foundations, and by generous and farsighted individuals.

University of Nebraska Lincoln

20th Annual
JANUARY 26-28, 2018

Nebraska Conference for Undergraduate Women in Mathematics

A national showcase for the research of undergraduate women in the mathematical sciences

PLENARY SPEAKERS

Dr. Jill Pipher
Brown University

Dr. Irena Swanson
Reed College

APPLICATION INFORMATION

go.unl.edu/ncuwm

Application guidelines and information about selection and registration for the conference is posted on the website.

For undergraduate participants, most local expenses are covered and some travel support is available.

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AMHERST COLLEGE—Assistant, Associate, or Full Professor—The Department of Mathematics and Statistics invites applications for a full-time tenure-track or tenured appointment in mathematics beginning July 2018. Within the last decade, Amherst College has transformed its student body in terms of socioeconomic status, ethnicity, and nationality. We seek applicants who can teach and encourage students of diverse backgrounds, including first-generation college students, international students, and students with varying mathematical preparation. Responsibilities include teaching two courses per semester and supervising undergraduate theses. Applicants must hold a Ph.D. in mathematics or a related field, have a strong commitment to research, and be passionate about teaching undergraduates at all levels. A senior appointment would be with tenure, contingent upon a tenure review. Applicants should submit a cover letter, curriculum vitae, research statement, teaching statement, and at least three letters of recommendation (including at least one that specifically addresses teaching), to MathJobs.Org. Applications will be accepted until the position is filled, and applications received by December 1, 2017, will be guaranteed consideration. Questions can be addressed to mathstats@amherst.edu. Amherst College is co-educational liberal arts college with 1,800 students and 200 faculty. Resources for faculty include a Teaching and Learning Collaborative, a Center for Community Engagement, and a Faculty Research Award Program.

BROWN UNIVERSITY—MATHEMATICS DEPARTMENT—J. D. Tamarkin Assistant Professorships: One or more three-year non-tenured non-renewable appointments, beginning July 1, 2018. 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, and three letters of recommendation by November 20, 2017. (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.

BRYN MAWR COLLEGE—Department of Mathematics—Assistant Professor—The Department of Mathematics at Bryn Mawr College invites applications for a full-time, tenure-track, beginning Assistant Professor position with a specialization in Algebra (broadly construed to include algebra, pure and applied, and allied fields such as algebraic geometry, representation theory, algebraic number theory, and algebraic combinatorics) to begin August 1, 2018. Candidates must have completed all Ph.D. requirements by the start date. Postdoctoral research experience is desirable. Candidates must show demonstrated promise in research and a serious commitment to undergraduate and graduate teaching. The faculty member filling this position will teach courses at all levels in our mathematics curriculum (from introductory and elective courses to core and graduate sequences in algebra), supervise senior theses, and lead the algebra component of our graduate program. We are looking for candidates excited to contribute to the department's nationally recognized success in supporting women and students from underrepresented groups in mathematics. To apply for this position, candidates must submit a cover letter, curriculum vitae, research statement, and statement of teaching philosophy by December 1, 2017 to the Mathematics Department Search Committee at https://www.mathjobs.org/jobs/jobs/10440. In addition, candidates must arrange for three letters of recommendation to be submitted via www.MathJobs.org to the Mathematics Department Search Committee. Applications received by December 1, 2017 will receive full consideration. Located in metropolitan Philadelphia, Bryn Mawr College is a distinguished liberal arts college for women and has strong consortial relationships with Haverford College, Swarthmore College, and the University of Pennsylvania. Bryn Mawr has a student body of 1,300 undergraduates, as well as 350 graduate students in coeducational graduate programs in social work, humanities and science. We are a diverse and international community of faculty, students and staff who share an intense commitment to intellectual inquiry and a desire to make meaningful contributions to the world. The College supports faculty excellence in both research and teaching and is committed to social justice and inclusion in the classroom and in the community at large. Bryn Mawr College is an equal-opportunity employer; candidates from underrepresented groups and women are especially encouraged to apply.

CORNELL UNIVERSITY—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, 2018. 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, 2017.

CORNELL UNIVERSITY—The Mathematics Department of Cornell University invites applications for a potential non-tenure track renewable 3-year Lecturer position beginning July 1, 2018. Responsibilities include teaching four courses per year, serving on committees and contributing to overall the educational mission of the Department. 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, 2017.

NIST—NRC Postdoctoral Research Positions—The Applied and Computational Mathematics Division (ACMD) of the National Institute of Standards and Technology (NIST) invites applications for two-year NRC postdoctoral research positions at NIST Laboratories in Gaithersburg, Maryland and Boulder, Colorado. NIST is a Federal government research laboratory specializing in measurement science. ACMD consists of some 47 full-time professional staff, along with part-time faculty appointees and guest researchers. Staff members engage in collaborative research with scientists throughout NIST, providing expertise in applied mathematics, mathematical modeling, and computational science and engineering. Research areas of interest include combinatorial and discrete algorithms, computational materials science, computational fluid dynamics, computational electromagnetics, computational biology, orthogonal polynomials and special functions, applied optimization and simulation, combinatorial software testing, data mining, immersive visualization, parallel and distributed algorithms, quantum information science, and statistics for quantum systems. Candidates and their research proposals are evaluated in a competitive process managed by the National Research Council (NRC) Associateship Programs. The current stipend is $69,533 per year; there is also a $3000 travel allowance. For further details, see http://www.nist.gov/itl/math/mcsd-postdoctoral-opportunities.cfm. Application deadlines are August 1, 2017 and February 1, 2018. Appointments commence within one year of selection. For questions, contact Timothy Burns, burns@nist.gov. NIST is an equal opportunity employer. The NRC Associateship Program at NIST is restricted to US citizens.

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UNIVERSITY OF CALIFORNIA, SANTA BARBARA—DEPARTMENT OF MATHEMATICS—FACULTY POSITIONS—VISITING POSITIONS: One or more special one-year visiting assistant professorships may be available, with possibility of renewal for additional years, up to three years in total. These positions carry a teaching load of 4.5 one-quarter courses per year. Excellence in research, potential for interaction with faculty at UC Santa Barbara and evidence of good teaching are required. Candidates must possess a Ph.D. by September 2018. Appointments to be effective July 1, 2018. To apply for this position(s), applicants must possess a Ph.D. in Mathematics or a closely related field. Applicants must submit a curriculum vitae, statement of research, statement of teaching philosophy, and the American Mathematical Society cover sheet (available online at http://www.ams.org), and arrange for four letters of reference to be sent (at least one of which is directed towards teaching). Materials should be submitted electronically via: https://www.mathjobs.org/jobs/jobs/10308 Applications received on or before December 1, 2017 will be given full consideration. For questions or additional information, please email, recruitment@math.ucsb.edu. The department is especially interested in candidates who can contribute to the diversity & excellence of the academic community through teaching and service. The University of California is an Equal Opportunity/Affirmative Action Employer and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, disability status, protected veteran status, or any other characteristic protected by law.

UNIVERSITY OF CALIFORNIA, IRVINE—Department of Mathematics Irvine, CA 92697-3875 The Department of Mathematics at the University of California, Irvine invites applications from outstanding candidates for multiple positions, including: tenure-track Assistant Professors, Lecturer with Potential Security of Employment (LPSOE) and Visiting Assistant Professors (VAP). Applicants must hold a Ph.D. Tenure-track Assistant Professor position candidates should have demonstrated excellence in research and teaching. 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. Applications are welcome at any time. The review process starts November 1, 2017 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, Milton Mohr Professor of Mathematics—The Department of Mathematics at the University of Nebraska-Lincoln invites applications for the Milton Mohr Professor of Mathematics, at the Associate Professor or Full Professor level, to begin in August 2018. The ideal candidate will have a strong, internationally recognized research program in mathematics, a demonstrated ability to attract external funding, and a strong record of mentoring Ph.D. students and postdocs. To be considered for the position, applicants must complete the Faculty/Administrative application at http://employment.unl.edu, requisition # F_160191. In addition, applicants must also submit a cover letter, a curriculum vitae, and the names and contact information of three references. Materials may be submitted through mathjobs.org or via email to hiring@math.unl.edu. Review of applications will begin October 1, 2017 and continue until the position is filled. For more information about this position, please go to: http://www.math.unl.edu/department/jobs/. The University of Nebraska-Lincoln is committed to a pluralistic campus community through affirmative action, equal opportunity, work-life balance, and dual careers. See http://www.unl.edu/equity/notice-nondiscrimination.

WASHINGTON UNIVERSITY in St. Louis, MO, Mathematics Department has two openings for tenure track Assistant Professors, one in mathematics, and one in statistics, to begin August 2018. Responsibilities include teaching three one-semester courses per year, maintaining a strong research program, publishing the results of the research, and normal student advising and departmental and university service. Statisticians in all areas will be considered. Mathematicians in pure mathematics, especially Algebra, Algebraic Geometry, or Analysis, will be considered. A Ph.D. in statistics or mathematics is required. Applicants should provide their CV, publication list, research and teaching statements, and arrange for at least four letters of recommendation to be submitted. At least one of the letters should report on the applicant's teaching abilities. Applicants are encouraged to submit this material using the AMS mathjobs website (www.mathjobs.org/jobs); however it may be sent directly to the Chair, Department of Mathematics. The department is committed to excellence in teaching and is particularly interested in candidates who have evidence of pedagogical skill. The department will begin reviewing applications on November 1, 2017, and continue until the search is concluded. Washington University is an Equal Opportunity Employer. All qualified applicants will receive consideration for employment without regard to race, color, religion, age, sex, sexual orientation, gender identity or expression, national origin, genetic information, disability, or protected veteran status. For more information about the position or the department, visit wumath.wustl.edu.

WILLIAMS COLLEGE—The Department of Mathematics and Statistics invites applications for a tenure-track position in Statistics, beginning fall 2018, at the rank of assistant professor (a more senior appointment is possible under special circumstances). 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 students from diverse backgrounds and a strong research program that can engage undergraduate students. The candidate will become the sixth 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/. At Williams, we are committed to building a diverse and inclusive community where members from all backgrounds can live, learn, and thrive. In your application materials, we ask you to address how your teaching, scholarship, mentorship and/or community service might support our commitment to diversity and inclusion. Candidates may apply via http://apply.interfolio.com/43065 by uploading a cover letter addressed to Professor Klingenberg, a curriculum vitae, a teaching statement, a description of your research plans, and three letters of recommendation on teaching and research. 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 electives in their area of expertise. 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 November 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 with easy access to the culturally rich cities of Albany, Boston, and New York City. The College is committed to building and supporting a diverse population of approximately 2,000 students, and to fostering an inclusive faculty, staff and curriculum. Williams has built its reputation on outstanding teaching and scholarship and on the academic excellence of its students. Please visit the Williams College website, http://www.williams.edu/.

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ASSOCIATION FOR WOMEN IN MATHEMATICS

Volume 47, Number 5, September–October 2017

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