ASSOCIATION FOR WOMEN IN MATHEMATICS

Newsletter

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The purpose of the Association for Women in Mathematics is

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

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PRESIDENT'S REPORT

I begin writing this report looking out at the flowers blooming in my backyard and watching the birds compete with the squirrels for a spot on my birdfeeder. Yes, spring has finally arrived, even here in New England!

I was treated to a sneak preview of spring weather in April when I attended a pair of events at the convention center in downtown Washington, DC. The first event was the **U.S. News STEM Solutions National Leadership Conference**. The conference brought together educators, policymakers and business leaders to discuss strategies for developing a strong workforce in Science, Technology, Engineering and Mathematics (STEM). The need to attract more women into these fields was a recurring theme. Several groups touted new programs or products aimed at attracting women and girls. See for example the Million Women Mentors initiative (http://www.millionwomenmentors.org/) and the National Girls Collaborative Project (http://www.ngcproject.org/). Most of these were aimed at the K–12 level and I took the opportunity to advertise the fact that AWM is unique in its focus on women at the college level and above with an interest in mathematics, a prime talent pool for STEM careers.

It was encouraging to see the sense of urgency for building a strong STEM workforce. This reinforces the view of the AWM Executive Committee and Advisory Board that building stronger ties between AWM and industry is a win-win strategy. With that goal in mind, the Executive Committee recently approved a new **Corporate Sponsorship** program, beginning with the 2014–15 membership year. As Corporate Sponsors, companies will receive a variety of benefits (depending on their sponsorship level) while helping to support AWM's programs. Please help us spread the word about this new opportunity either by informing your friends and colleagues in industry directly, or by sending the AWM office the names of potential industry contacts. More details about Corporate Sponsorship can be found on the AWM website.

The STEM Solutions Conference was followed by the **USA Science and Engineering Festival** (USASEF). The Festival, held every second year in Washington, DC, attracts children, parents, and teachers to experience science through hands-on activities. Thanks to the tireless efforts of Irina Mitrea and numerous volunteers, AWM has staffed a booth at the past three Festivals. This year's Festival featured 750 exhibits and drew over 325,000 participants. The AWM booth attracted a continuous stream of children and parents eager to try their hand at decrypting messages. An article containing pictures and details of this exciting event appears later in this newsletter.

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ASSOCIATION FOR WOMEN IN MATHEMATICS

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

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

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

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PRESIDENT'S REPORT *continued from page 1*

Looking ahead to July and August, the two main events on the horizon are the SIAM Annual Meeting in Chicago, July 7–11, and MathFest in Portland, August 6–9. The SIAM meeting will feature the **AWM SIAM Workshop**. The workshop will include two mini-symposia, a poster session and a two-session panel discussion. The mini-symposia, organized by Chiu-Yen Kao and Ching-Shan Chou, will feature talks by recent PhDs on numerical algorithms for nonlinear partial differential equations. The panels, organized by Misun Min and Xueyan Wang, will address various challenges faced by women in mathematics, science and engineering. In addition, the AWM-SIAM Sonia Kovalevsky Lecture will be featured as a plenary lecture at the meeting. This year the Kovalevsky Lecture will be given by Irene Gamba, Professor of Mathematics and Member of the Institute for Computational Engineering and Sciences at the University of Texas, Austin. Her talk is entitled "The Evolution of Complex Interactions in Non-Linear Kinetic Systems."

MathFest 2014 will take place in Portland, Oregon, August 6–9, and will feature the **AWM-MAA Etta Z. Falconer Lecture**. This lectureship honors women who have made distinguished contributions to the mathematical sciences or mathematics education. It is a great pleasure to announce that this year's Falconer Lecturer is Marie Vitulli, Professor Emerita at the University of Oregon. In addition to a distinguished research career, she has been a strong advocate for women throughout her career and has been actively involved in AWM for many years. Congratulations Marie Vitulli!

It is also a great pleasure to announce the inaugural winner of the **AWM – Joan & Joseph Birman Prize in Topology and Geometry**. The Birman Prize recognizes outstanding research in an area of topology or geometry by a woman in the early stages of her career. It is made possible by a generous contribution from Joan Birman, a leading topologist, and her physicist husband Joseph Birman. This year's winner is J. Elisenda Grigsby, Assistant Professor of Mathematics at Boston College. Her outstanding work in low-dimensional topology has earned her an NSF CAREER award and established her as a leader in the field. The prize will be formally presented at the AWM prize reception at the Joint Meetings in January 2015. Congratulations Eli Grigsby! (See the press releases later in this newsletter for more details about the Falconer Lecture and the Birman prize.)

One of the services AWM provides is to publicize events and opportunities of interest to women in the mathematics community. In addition to announcements posted on our website and Facebook page, AWM has recently instituted a new **E-Communications** series. These news updates contain brief announcements of upcoming deadlines and events of interest. They are sent to our members by email, in alternating months with the regular newsletter, and posted on our website. Speaking of upcoming deadlines, here are two of note: AWM is currently soliciting nominations for the 2015 AWM-MAA Falconer Lecturer (deadline September 1) and the 2015 Alice T. Schafer Prize for undergraduates (deadline September 15).

Staring out into my yard, contemplating how to end this report, I get more and more annoyed at the squirrels frightening the birds away from the birdfeeder. Watching the birds compete (or more accurately, not compete), I am reminded of a recent article in *The Atlantic Monthly* on "The Confidence Gap" by Katty Kay and Claire Shipman. The article discusses the prevalence among females of lack of confidence in their abilities and the insidious effects this has on their performance. The authors observe that "women feel confident only when they are perfect" and assert that "success, it turns out, correlates just as closely with confidence as it

does with competence." While this comes as no surprise to me—I have observed this repeatedly in my own students and younger colleagues—it is nonetheless useful to have concrete evidence. The article quotes a variety of interesting studies that confirm these phenomena. Some of the studies suggest possible means of combating the adverse effects. In one test, for example, women tended not to answer problems they were unsure of and, as a result, performed more poorly than men. But when told that they must answer every question, their performance improved to the level of the men in the study. The message is clear: if we don't have the confidence to try, how can we succeed? If we conflate progress with perfection, how can we confront more difficult challenges? We need to remind ourselves, our students, and our mentees of this frequently. A good place to start is by reading the Kay-Shipman article.

I have often wondered how this issue might affect even those with successful mathematical careers. Does the popular view (or perhaps myth) that most mathematicians do their best work in their early years apply to women? It requires great confidence to attack the more difficult problems in mathematics, confidence that men often exhibit from a young age, but may build more slowly in women. Given the effect of early work on one's career trajectory, could this provide a partial explanation for the slow rise in the number of women at top ranked institutions? Food for thought.

Ruth Charney

Ruth Charney
Waltham, MA
May 25, 2014

Ruth I. Michler Prize

The Association for Women in Mathematics invites applications for the ninth 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.

www.awm-math.org/michlerprize.html

Cornell University

AWM ASSOCIATION FOR WOMEN IN MATHEMATICS

The application deadline is November 1 for the award to be used during the 2015–16 academic year.

Membership Dues
Membership runs from Oct. 1 to Sept. 30
Individual: $65 **Family:** $30
Contributing: $150
New member, affiliate and reciprocal members, retired, part-time: $30
Student, unemployed: $20
Outreach: $10
AWM is a 501(c)(3) organization.

Institutional Membership Levels

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

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

Sponsorship Levels

α **Circle:** $5000+
β **Circle:** $2500–$4999
γ **Circle:** $1000–$2499

See the AWM website for details.

Subscriptions and Back Orders—All members receive a subscription to the newsletter as a privilege of membership. Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for $65/year. Back orders are $10/issue plus S&H ($5 minimum).

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

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

Newsletter Deadlines
Editorial: 24th of January, March, May, July, September, November
Ads: Feb. 1 for March–April, April 1 for May–June, June 1 for July–Aug., Aug. 1 for Sept.–Oct., Oct. 1 for Nov.–Dec., Dec. 1 for Jan.–Feb.

Addresses
Send all queries and all *Newsletter* material except ads and queries/material for columns to Anne Leggett, leggett@member.ams.org. 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 everything else, including ads and address changes, to AWM, fax: 703-359-7562, e-mail: awm@awm-math.org.

ASSOCIATION FOR WOMEN IN MATHEMATICS

AWM ONLINE

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

Website: http://www.awm-math.org

AWM DEADLINES

AWM Workshop at SIAM: July 1, 2014

AWM Workshop at JMM: August 15, 2014

AWM-MAA Falconer Lecture: September 1, 2014

AWM Alice T. Schafer Prize: September 15, 2014

AWM Travel Grants: October 1, 2014 and February 1, 2015

AWM-AMS Noether Lecture: October 15, 2014

AWM-SIAM Sonia Kovalevsky Lecture: November 1, 2014

Ruth I. Michler Memorial Prize: November 1, 2014

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Grigsby Wins AWM – Joan & Joseph Birman Research Prize

J. Elisenda Grigsby

The Association for Women in Mathematics will present the first AWM – Joan & Joseph Birman Research Prize in Topology and Geometry to **J. Elisenda Grigsby**, Assistant Professor of Mathematics at Boston College, at the Joint Mathematics Meetings in San Antonio, TX in January 2015. Established in 2013, the AWM – Joan & Joseph Birman Research Prize recognizes exceptional research in topology/geometry by a woman early in her career. The award is made possible by a generous contribution from Joan and Joseph Birman. The biennial presentation of this prize serves to highlight to the community outstanding contributions by women in the fields of topology and geometry and to advance the careers of the prize recipients.

The inaugural 2015 AWM – Joan & Joseph Birman Research Prize in Topology and Geometry is awarded to J. Elisenda Grigsby in recognition of her pioneering and influential contributions to low-dimensional topology, particularly in the areas of knot theory and categorified invariants. Grigsby received her AB in mathematics from Harvard University and her PhD from the University of California, Berkeley. The title of her thesis was *Knot Floer Homology in Cyclic Branched Covers* and her thesis advisors were Robion Kirby and Peter Ozsváth.

Grigsby's research has centered on the interplay between the combinatorial theory of Khovanov homology and the more geometric Heegaard Floer homology. World leaders in the field have praised her fundamental contributions, noting that her work both connects and unifies structures in geometric, symplectic, and contact topology; homological algebra; and representation theory. To single out just one of her many outstanding results, she and her collaborator Wehrli discovered that Khovanov's categorification of the n-colored Jones polynomial detects the unknot when $n > 1$. This work has generated a great amount of excitement and activity in the field and was described by a leading expert as "one for the history books."

Grigsby is a talented young mathematician who has established herself as a leader in a rapidly developing area that changed the landscape of low-dimensional topology. Before coming to Boston College, Grigsby spent three years at Columbia University as a National Science Foundation Postdoctoral Fellow. In spring 2010, she spent a semester at the Mathematical Science Research Institute as a Viterbi Endowed Postdoctoral Scholar. Her research has been supported by an NSF Division of Mathematical Sciences research grant, and she currently holds an NSF CAREER award.

The 2015 Joint Mathematics Meetings will be held January 10–13 in San Antonio, TX. For further information on the AWM – Joan & Joseph Birman Research Prize, please visit www.awm-math.org.

Vitulli Named 2014 AWM-MAA Falconer Lecturer

The Association for Women in Mathematics and the Mathematical Association of America are pleased to announce that **Marie A. Vitulli** will deliver the Etta Z. Falconer Lecture at MathFest 2014. Dr. Vitulli is Professor Emerita of Mathematics at the University of Oregon.

Vitulli earned her BA in Mathematics from the University of Rochester and her MA and PhD from the University of Pennsylvania. Upon completing the PhD degree Vitulli joined the faculty at the University of Oregon and remained there for her entire academic career.

Vitulli has made original and important contributions to commutative algebra and its interactions with algebraic geometry, has published numerous research articles and book chapters and has lectured on her work throughout the United States, Europe, and South Africa. After her early work in deformation theory Vitulli turned her attention to the study of seminormality and weak normality for commutative rings and algebraic varieties. In a series of papers with her colleague John V. Leahy, she developed fundamental properties of seminormality and made connections to the theory of weakly normal complex analytic spaces. More recently Vitulli discovered an elegant new element-wise criterion for weak subintegrality. Along with her colleague D.K. Harrison, she developed a unified valuation theory for rings with zero divisors that generalized both Krull and Archimedean valuations.

Marie A. Vitulli

Over her long career Vitulli has worked tirelessly for the advancement of women in mathematics. While at the University of Oregon, she was involved in the creation and

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CALL FOR NOMINATIONS

The 2015 Kovalevsky Lecture

AWM and SIAM established the annual Sonia Kovalevsky Lecture to highlight significant contributions of women to applied or computational mathematics. The 2015 lecture will be given at the International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, China, August 10–14, 2015. 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, and Margaret Cheney. Irene Gamba will deliver the 2014 lecture.

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, 2014** 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.

2014 AWM-MAA FALCONER LECTURER

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administration of a scholarship program for undergraduate women in mathematics and the physical sciences. Vitulli was a founding member of a senior women's faculty group that advised the University of Oregon administration on issues of concern to women faculty. She created and maintains the award-winning website Women in Math Web Project. Summaries of studies conducted with Mary E. Flahive of first jobs for new PhDs in mathematics, with an eye towards gender differences, appeared in the *Notices of the American Mathematical Society* in 1997 and 2010.

Vitulli has been an active member of the AWM for decades through membership on a variety of committees that oversee and run the programs of the Association. Currently she chairs the AWM Advocacy and Policy Portfolio and serves on the AWM Executive Committee.

Vitulli's lecture at MathFest is entitled "From Algebraic to Weak Subintegral Extensions in Algebra and Geometry." She will talk about the twin theories of weak normality and seminormality for commutative rings and algebraic varieties and will give a brief history of the twin theories with an emphasis on developments in the area over the past fifteen years.

MathFest 2014 will be held August 6–9 in Portland, OR. The Falconer lectures were established in memory of Etta Z. Falconer (1933–2002). Her many years of service in promoting mathematics at Spelman College and efforts to enhance the movement of minorities and women into scientific careers through many forums in the mathematics and science communities were extraordinary. Falconer lecturers are women who have made distinguished contributions to the mathematical sciences or mathematics education. Previous recipients of this honor include Pat Kenschaft, Karen King, Dawn Lott, Ami Radunskaya, Kate Okikiolu, Rebecca Goldin, Katherine St. John and Trachette Jackson.

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.

Marvel's Thor + High School Girls = Ultimate Mentor Adventure

Sarah Eichhorn, University of California, Irvine

The recent launch of *Thor: The Dark World* brought more than another installment in the successful Marvel superhero movie franchise. It brought an opportunity for high school girls to compete for a chance to participate in the "Ultimate Mentor Adventure" in STEM (see http://dep.disney.go.com/ultimatementoradventure). The competition was jointly sponsored by Disney's Marvel, UL (Underwriters Laboratories), Dolby Laboratories, Girl Scouts USA and the National Academy of Sciences' The Science and Entertainment Exchange. I attended a special screening of the movie that showcased the mentoring adventure, and I interviewed Ann Merchant, Deputy Executive Director of the Office of Communications at the National Academy of Sciences (NAS) and Liz Fogel, Director of Education for Walt Disney Studios (thanks to Alice Silverberg, who arranged the visit).

The contest was a nationwide search "seeking the next Jane Foster." Portrayed by actress Natalie Portman, Jane Foster is the bright young astrophysicist character from the *Thor* movies. According to Ann Merchant of the National Academy of Sciences, "Disney wanted to leverage the character of Jane Foster" into an opportunity for young girls to connect with and get inspired by female leaders in the STEM community.

Unlike most competitions, where only the winners win, the "Ultimate Mentor Challenge" was smartly designed to have all of the participants gain at least a little piece of the prize: mentorship from a woman in STEM. To enter the contest, girls in grades 9–12 had to contact a female STEM mentor, interview them (in-person or virtually) and then compose a video about themselves, their interview with the STEM mentor, and the next steps they might take to explore a STEM career. The competition website provided girls a "Map of Mentors" (http://dep.disney.go.com/ultimatementoradventure/mentorMap.html) with 250 women in a range of STEM careers who were available to meet with the students. Liz Fogel, Director of Education for Walt Disney Studios, said that compiling the list of mentors was surprisingly easy. The

sponsors began by reaching out to some personal contacts. Many of those contacts recommended others, and eventually they were getting unsolicited requests from STEM women excited for the opportunity to serve as mentors, even after the contest closed.

Ultimately, 10 contest winners were selected (see http://www.broadwayworld.com/bwwmovies/article/Winners-of-MARVELS-THOR-THE-DARK-WORLD-Ultimate-Mentor-Adventure-Announced-20131031). These 10 girls from across the US were flown to Southern California for a week of science-related activities, all documented by a film crew who followed them closely. Activities from the week included:

- Behind-the-scenes tour at Disneyland of the "Technology behind the Magic"
- Tour of the Dolby Laboratories with talks on perceptual and neural sciences
- Tour of Underwriters Laboratories with meetings with several mentors and opportunity to conduct some experiments
- Stage tour of *Agents of Shield* TV show set
- Wildlife Learning Center tour
- Two farm trips with discussions on farm technology and food science
- Trip to the Discovery Science Center
- Red carpet premier of *Thor: The Dark World*

The week ended with a special screening of *Thor: The Dark World* at the El Capitan Theater. Victoria Alonso, Executive Producer of the Thor movie, and Jaimie Alexander, the actress who portrayed Sif, introduced the girls on stage before the movie. The special screening also included a run of the documentary film showcasing the girls' week of activities (http://dep.disney.go.com/ultimatementoradventure/videos.php). At the screening, the girls learned that they would each be getting a Kindle Fire and a $1000 check from UL to "keep the mentoring alive." The girls will be participating in virtual WebEx follow-up meetings and have been challenged by the program sponsors to "go on and teach and inspire their peers."

Assessing the Impact on Inspiring STEM Students

The 10 girls who won the "Ultimate Mentor Adventure" got to participate in what I think was an amazing week of science activities, including special access to facilities not normally open to the public. The girls were given the Hollywood star treatment as they were followed by cameras all week, lined the red carpet and got cheered on stage. As I watched the documentary on this program and saw the girls on stage, I found myself asking: How much meaningful impact did this program have on encouraging women to pursue STEM careers, and how much was just a nice PR stunt for the film? Let me discuss what I see as some of the positive and negatives of the "Ultimate Mentor Adventure."

Positive: According to Merchant and Fogel, over 300 girls submitted entries to the competition, meaning that over 300 girls took the time to connect with and interview a woman in a STEM career. I have to think that most of these girls probably took something positive away from the

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CALL FOR NOMINATIONS

The 2016 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 starting 2015 will be 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 and Georgia Benkart.

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, 2014** and will be held active for three years. If you have questions, phone 703-934-0163 or email awm@awm-math.org.

experience, whether it be a particular piece of advice or just deeper knowledge about a potential field of interest.

Positive: It is great to see so many women in STEM careers interested and excited about helping the next generation to become great scientists. Merchant from NAS said that "mentorship is more than just a moment, it is a process" and she is working on translating this program into "something that goes further." I would personally love to see the great list of mentors compiled for this program expanded and built into a program to mentor more girls.

Positive: In general, it was great that promising young STEM students got to be treated like celebrities. It would be nice if our society had more opportunities to recognize and celebrate STEM accomplishments with the glamorous pomp that is normally reserved for actors and athletes.

Negative: With the Marvel and Disney powerhouse behind it, it would have been nice to see this program reach a wider audience than just the few hundred girls who applied. The contest had a relatively short submission window given that girls had to reach out to mentors, which may have contributed to the low numbers.

Mixed: Through the segments of filmed interviews of the 10 winners, I found myself wondering if a priori these girls were already likely to be successful in STEM. Though fun, I wondered if this program was actually impacting the STEM career prospects of these bright young girls. My concerns were alleviated somewhat when I asked Ann Merchant from the NAS about this and she said that they "were mindful to pick girls who could recognize the impact of such a mentor experience" and that they purposefully did not select girls who were clearly already bound for Ivy League schools.

Negative: When creating a program like this to inspire STEM studies, the mathematics portion often tends to be underemphasized. The week of activities for the winners seemed to focus exclusively on science and technology. It can be harder to show flashy experiments and give cool tours in mathematics. The "Map of Mentors" provided by the contest included adequate representation of mathematicians, but I have to wonder how many girls chose the mathematicians when there were Pixar computer scientists, SpaceX engineers and National Wildlife Federation scientists available. To be fair, the list did include mathematicians from Disney Music Group and ABC Entertainment. Those employers sound much more appealing and exciting than your typical mathematics careers.

Mixed: I was not overly impressed with Jane Foster as a science role model. While it is great to see a female astrophysicist character in a major blockbuster, Jane spent much of the movie swooning over Thor, and the science portions of her role did not bear much resemblance to any real world astrophysics. However, Jane does surprise some doctors on Thor's world with a bit of science knowledge and confident sass, so I do not think her character is irredeemably flawed.

Overall, I would say the "Ultimate Mentor Adventure" is a net positive for inspiring more girls to pursue careers in science. Many girls met with STEM women mentors, 10 girls got an extensive science mentoring experience and hundreds of women in science got turned on to the prospect of sharing their knowledge and inspiring the next generation.

In 2013, several Swedish movie theaters started labeling films that pass the "Bechdel test" for gender equity (http://www.washingtonpost.com/blogs/worldviews/wp/2013/11/06/swedens-plan-to-bring-gender-equality-to-the-movies/). For a movie to earn an "A" mark it has to feature two named female characters having a conversation with each other not about men. This is quite a low bar, but a shocking number of major blockbuster movies do not pass this test (for example, all the Star Wars and Lord of the Rings movies and all but one of the Harry Potter movies fail.) Refreshingly, *Thor: The Dark World* actually passes the test on multiple accounts as Jane Foster has conversations, not about men, with her female assistant, with Thor's mother and with a female doctor in Thor's world. Even though passing the Bechdel test may not be the most stringent criterion for gender equity, and the female scientist portrayal in the *Thor* franchise may not be ideal, it is nice to see a major entertainment company making steps in the right direction to include bright, independent women in film and to create a special outreach program aimed at inspiring girls to pursue STEM careers.

Renew your membership or join AWM at

www.awm-math.org

BOOK REVIEW

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

Do Babies Matter? Gender and Family in the Ivory Tower, Mary Ann Mason, Nicholas H. Wolfinger, and Marc Goulden, Rutgers University Press, ISBN-13: 978-0-8135-6080-9.

Reviewer: Elizabeth A. Lamprecht, Adrian College, Adrian, MI, elamprecht@adrian.edu

As an academic and mother of six, ranging in age from 10 to 21 years, I was particularly interested in the research presented in the book *Do Babies Matter? Gender and Family in the Ivory Tower*. I could relate to the struggles of parenthood during the graduate school years and to the challenges of motherhood while still an assistant professor. Indeed, family formation plays an important role in the academic careers of both men and women. It affects the choices they make throughout their professional lives. [p. 1]

The "Do Babies Matter?" Research Project, which began in 2001 at the University of California, Berkeley, provides the first comprehensive investigation of "the effects of family formation on the … careers" of both aspiring and established academics. [p. 1] It addresses the challenges of marriage and parenthood during the graduate school and postdoc years. But more importantly, it cites the need for real tenure reform and suggests strategies for transforming the academy. Such change would address the realities of modern professors' lives and would enable American universities to attract and retain the best and brightest minds. [p. 53]

In Chapter 1, the authors note that "gender parity in graduate education is one of the remarkable accomplishments of the past forty years. In 1966, just 12 percent of all American doctorates were awarded to women. By 2008 that number had soared to over 50 percent." [p. 9] However, the gap between women's PhD receipt and faculty hiring has grown in recent years. In fact, an inquiry funded by the Association for Institutional Research found that women who had children within five years of obtaining their doctorate were far less likely to obtain tenured professorships than men in similar circumstances. Moreover, this pattern was apparent across the disciplines, irrespective of the type of institution. [p. 2] So at what point in their academic careers do mothers drop out? What effect does career have on family formation? Do men and women in the academy realize the same professional *and* familial goals? [p. 3]

As noted in the Appendix, this book is based on two primary data sources. The first is the Survey of Doctorate Recipients (SDR), an "ongoing, biennial longitudinal survey"

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CALL FOR NOMINATIONS

Alice T. Schafer Mathematics Prize

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominee may be at any level in her undergraduate career, but must be an undergraduate as of September 15, 2014. She must either be a US citizen or have a school address in the US. The Prize will be awarded at the Joint Prize Session at the Joint Mathematics Meetings in San Antonio, January 2015.

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 **September 15, 2014**. If you have questions, phone 703-934-0163, email awm@awm-math.org, or visit www.awm-math.org.

begun in 1973. This large "and continually replenished" data set tracks "the experience of PhD recipients in the sciences, including engineering and mathematics, as well as in the social sciences and humanities." It incorporates faculty members at community colleges, liberal arts institutions, and research universities, as well as doctorates employed in the private sector or government. [p. 2] The second principal data source includes a series of "[three] surveys administered at nine schools of the University of California system, [with a fourth survey] limited to UC Berkeley." The surveys, designed to examine work-family issues at the University of California, were delivered via the Internet. They yielded both qualitative and quantitative results. [p. 116] In addition, the authors "collected data on family-friendly policies in separate surveys administered to [various federal agencies, as well as] the sixty-one schools belonging to the Association of American Universities" (AAU). [p. 118]

In Chapter 1, "The Graduate School Years: New Demographics, Old Thinking," the authors observe that work-family concerns *of faculty* have received attention in recent years. However, family issues confronting young scholars have not been adequately addressed. [p. 8] "Today, men and women fill the doctoral student ranks in nearly equal numbers," [p. 8] and this new generation of scholars desires flexibility. Yet "the structure and culture of academia have not kept pace with this … shift in students' priorities." [p. 9] In a 2006–2007 survey of University of California doctoral students, 84 percent of women and 74 percent of men expressed concern over "the family friendliness of their future workplace." [p. 10]

Graduate students and postdoctorates face a host of challenges. Of course, financial constraints are a concern for those considering parenthood. According to a 2008 survey conducted by *The Chronicle of Higher Education*, only 42 percent of PhD students had health insurance through their universities, and "just 13 percent of Association of American University schools … offered graduate students six weeks of paid maternity leave without notable limitations." [p. 14] In addition, there is a need for faculty mentors who "serve as role models on a more personal level." Such individuals can "provide a model of work-family balance." [p. 15] Indeed, concerns over "work-life balance are particularly pronounced … in the bench sciences." [p. 16] These disciplines require long hours spent in campus labs, and "the postdoctoral period of extended training" occurs during women's prime reproductive years. [p. 20]

Marriage and children present different challenges for men and women. SDR data indicate that female academics are, in general, 7 percent less likely to obtain tenure-track employment. In fact, marriage adversely affects a woman's prospects of finding a job. A married woman is 17 percent less likely to obtain a tenure-track position than "her unmarried female peer." In the sciences, family formation has a marked negative effect. Married mothers of young children are 35 percent less likely to obtain tenure-track positions than fathers in similar circumstances. [p. 28] So what accounts for such discrepancies? Maternal discrimination is difficult to prove. Nonetheless, mothers of young children certainly face challenges while on the academic job market. In addition, marriage frequently creates the two-body problem. A 2002 article in *Research in Higher Education* presents evidence "that female academics are more likely than their male counterparts to reside in … areas with clusters of colleges and universities." This suggests that women lower their professional aspirations to accommodate their husbands' careers. [p. 31]

Regardless, an analysis of the data yields some surprising results. The authors' "findings suggest that traditionally conceived gender discrimination" does not explain the lower rate at which women secure tenure-track jobs. In fact, women "fare better than men on the job market when unencumbered by husbands and young children." [p. 43] Older children, those between six and eighteen, have no adverse effect on the likelihood of obtaining tenure-track employment. This is true for both men and women. In reality, mothers of older children are 11 percent more likely to find tenure-track jobs "than are childless women." [p. 29]

The authors observe that academia has traditionally been viewed as a pipeline. However, this model does not portray the reality of today's academic careers. [p. 39] Some experts have called for a "revolving door" model with opportunities for re-entry. In fact, most PhDs do not obtain tenure-track professorships upon graduation. Nevertheless, more than 50 percent of such doctorates obtain tenure-track employment within ten years. [p. 40].

Interestingly, when considering all academic disciplines, women are 21 percent less likely to receive tenure than their male colleagues. This statistic does not depend on marital status or the presence of young children. However, in the sciences, the story is very different. A female scientist with a young child is 27 percent less likely to obtain tenure than her male peer. [p. 48] Federal grants, typically necessary for tenure in many scientific fields, "offer little accommodation for childbirth and motherhood." [p. 49] The result is a "pronounced gender imbalance in

higher education," particularly in the sciences. [p. 59]

In Chapter 5, "Life after Tenure," the authors consider the impact that marriage and children have on men's and women's salaries, as well as the likelihood of promotion to full professor. How do women fare once they receive tenure? [p. 83] Female associate professors in all fields are less likely to get promoted than their male colleagues. However, marriage increases the likelihood of promotion for both men and women. [p. 84] In addition, children no longer adversely affect a woman's chances of promotion. So why are female academics 21 percent less likely to obtain promotion to full professor? A 2011 report based on research conducted at the University of Massachusetts offers a convincing argument: "the unequal allotment of university service." Three-fourths of female associate professors at this institution "have held major service commitments, compared with only half of men." Overall, women associate professors spend more time on teaching and service. [p. 85] Interestingly, academic retirement is the only transition explored in the book that does not appear to be gendered. [p. 95]

I was pleased to find that many institutions have taken steps to achieve a more equitable workplace. The UC Faculty Family Friendly Edge Program (http://ucfamilyedge.berkeley.edu) should serve as a model for any institution desiring to implement real change. The book's final chapter, "Towards a Better Model," "reviews existing family-friendly programs and suggests new directions." [p. 97] It includes a check list of suggested reforms. Among these policies are:

- Six weeks of paid maternity leave
- Maternal and dependent health insurance
- Lactation rooms

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NSF-AWM Travel Grants for Women

Mathematics Travel Grants. Enabling women mathematicians to attend conferences in their fields 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.

Mathematics Education Travel Grants. There are a variety of reasons to encourage interaction between mathematicians and educational researchers. National reports recommend encouraging collaboration between mathematicians and researchers in education and related fields in order to improve the education of teachers and students. Communication between mathematicians and educational researchers is often poor and second-hand accounts of research in education can be misleading. Particularly relevant to the AWM is the fact that high-profile panels of mathematicians and educational researchers rarely include women mathematicians. The Mathematics Education Research Travel Grants provide full or partial support for travel and subsistence for

- mathematicians attending a research conference in mathematics education or related field.
- researchers in mathematics education or related field attending a mathematics conference.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians and mathematics education researchers appointed by the AWM. A maximum of $1500 for domestic travel and of $2000 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. These travel funds are provided by the Division of Mathematical Sciences (DMS) of the National Science Foundation. The conference or the applicant's research must be in an area supported by DMS. Applicants must be women holding a doctorate (or equivalent) and with a work address in the USA (or home address, in the case of unemployed applicants). Please see the website (http://www.awm-math.org/travelgrants.html) for further details and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

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

- "Stop the clock" policies for mothers and fathers
- Dual hires
- Subsidized child care
- Paid parental leave for fathers
- Child care grants for mothers to attend conferences
- Part-time tenure-track appointments, both pre- and post-tenure

Ideally, such policies should be developed for faculty, graduate students, and postdoctoral fellows.

In summary, *Do Babies Matter?* is well-researched and empirically sound, and the strategies outlined for achieving work-family balance are certainly an invaluable resource. An extensive bibliography also offers direction for further study. This book is a must-read for anyone hoping to gain a better understanding of how gender and career interact to affect life in the ivory tower.

EDUCATION COLUMN

Education Column Editor: Jackie Dewar, Loyola Marymount University, jdewar@lmu.edu. *This issue, there are two articles in the column.*

Who's to Blame in the Math Classroom

Natalie Piehl, Naperville North High School

Incredibly irritating—that is how I find the look of confusion I receive when I inform a boy that we are registered for the same advanced math course. Once the course is underway, I do enjoy being asked what grade I have, for how absurd would it be for a fifteen-year-old girl to do better in a math oriented class than a sixteen-year-old guy. I cannot describe my future curricular plans without a male classmate having the audacity to tell me I better not take such a difficult science course if I intend to keep a decent GPA. My name's Natalie Piehl and I am currently a sophomore at Naperville North High School, and it is profoundly disturbing how often I find myself in interactions like these.

What role education plays in discouraging women from pursuing STEM has been and continues to be examined; however, it seems to me that one aspect of schooling has been overlooked. Many studies and organizations focus on the interaction between teachers and their students in an effort to link it to young girls' lack of interest in math and science. A 2010 study by Sian Beilock, a pyschologist at the University of Chicago, discovered that the more anxious elementary school teachers were about math the more likely their female students were to agree that "boys are good at math and girls are good at reading" [1]. Catherine Jay Didion, then executive director for the Association for Women in Science, testified before the congressional Subcommittee on Technology and Research that "a girl who is having trouble with math is often told that her difficulties are normal" [2]. Blaming a female student's poor performance on a math exam or in class on an innate lack of ability lessens her motivation to improve and encourages her to give up on doing well. Boys, on the other hand, tend to be encouraged by their teachers to work harder and study longer to boost their grades because their failures are considered to be a result of a lack of effort. The National Association for Research and Science Teaching observed that teachers tend to "call on boys more often than girls, ask boys more higher-order questions, give boys more extensive feedback, and use longer wait-time with boys than girls" [3]. While instructor bias, intentional or not, is a legitimate cause for concern, in my experience as a student the teachers are not to blame.

Over the last three years I have taken three advanced math courses, two of which were taught by men and the other by a woman. In these courses I observed no difference in teaching style towards boys versus girls by any of the teachers. Neither the boys nor the girls were provided any special encouragement or motivation by the teacher. While it is certainly possible that gender bias from teachers is a genuine issue in other school systems, I have yet to notice it in my own.

Unfortunately, there is certainly a level of sexism within the K–12 education system that is administered by the students themselves. In my math class students are encouraged to work together on reviews and daily problems to reach a unanimous answer. However, contributing to this effort is difficult when my work, as well as that of the other female students, is constantly doubted by the boys. My answers are not taken seriously and are met with skepticism and scrutiny. Before my conclusion is accepted it must first be validated by one of the guys in the class. Only after the same answer is obtained by him will it be generally received. No wonder only about a third of the students enrolled in my class are girls given that they are taught to be self-conscious

about their abilities not by the actual instructors, but by their fellow classmates.

Everyday I can see the detrimental effects brought on by the behavior of boys towards girls attempting to excel in math. The few girls who are in the class are quiet, reserved, and always hesitant to provide an answer. Regardless of whether it is a whole class or a small group discussion, they tend to keep quiet and let the others come to a conclusion. This insecurity is understandable. No one wants to be shot down and underestimated, so many female students allow themselves to be guided by their male classmates. If young women cannot summon up the courage to speak their minds in high school, how can they be expected to do so in a work-force where they are surrounded by men? STEM is male dominated, and one key to fixing this is to help female students overcome the stereotypical bias of their male classmates. We need to focus less on how teachers are treating the sexes differently, and more on how these students are treating each other.

Author's Note: This article originated as part of an activism project for my history class where we were encouraged to contribute to the resolution of an issue of our choice, in my case the lack of women in STEM. This semester-long project required extensive research which eventually led to writing both an essay and a persuasive letter and making a presentation. I am extremely grateful for the opportunity I was given to write for AWM and the guidance I received along the way.

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Online Learning in Grades K through 12

Mary E. Morley, Ocean County College, mmorley@ocean.edu

Online learning is one of the fastest growing trends in education. Most people are aware of this, if only from the ubiquitous advertising for online programs at colleges such as University of Phoenix and University of Southern New Hampshire. But online learning is not just for college students: it is also found in most school districts, even in

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CALL FOR NOMINATIONS

The Etta Z. Falconer Lecture

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

The mathematicians who have given the Falconer lectures in the past are: Karen E. Smith, Suzanne M. Lenhart, Margaret H. Wright, Chuu-Lian Teng, Audry Terras, Pat Shure, Annie Seldon, Katharine P. Layton, Bozenna Pasik-Duncan, Fern Hunt, Trachette Jackson, Katherine St. John, Rebecca Goldin, Kate Okikiolu, Ami Radunskaya, Dawn Lott, Karen King and Pat Kenschaft. Marie Vitulli will deliver the 2014 lecture.

The letter of nomination should include an outline of the nominee's distinguished contributions to the mathematical sciences or mathematics education and address the nominee's capability of delivering an expository lecture. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **September 1, 2014** and will be held active for two years. If you have questions, phone 703-934-0163 or email awm@awm-math.org.

elementary school. The National Center for Educational Statistics finds that more than 55% of public school districts in the United States enroll distance learning students, and the numbers are growing rapidly. The number of public school students enrolled in at least one distance learning class grew from 317,070 students in 2002–2003 to 1,816,390 students in 2009–2010—an increase of 473% in only seven years. The growth of online learning in elementary schools is even more striking—from an estimated 2780 students in 2002–2003 to over 78,000 in 2009–2010. This is equivalent to a yearly growth rate of about 60%. [1]

Not surprisingly, views differ on whether this rapid growth is having a positive effect on our nation's school children. Part of the reason for this is that online learning in school comes in many different forms. Some programs are extensions to the curriculum, for which online access allows school districts or other organizations to offer such programs to more students than would otherwise be possible. An example of this is the Johns Hopkins University Center for Talented Youth distance education program. There are also a variety of online Advanced Placement (AP) courses, so that students can take them even if their schools do not have enough students interested in Advanced Placement in a particular subject. This type of online learning is probably the least controversial. However, online learning has gone far beyond just enrichment or AP; there are totally online virtual schools, even in elementary school. These can be for-profit, public, or even a for-profit company running or supplying the curriculum for a public school.

It is the for-profit virtual schools that seem to attract the harshest critics. A former teacher in one of these schools, Darcy Bedortha, wrote an article about her experiences. It is posted on the Educational Weekly website. [2] The title, "15 Months in Virtual Charter Hell: A Teacher's Tale," does seem to say it all, but some of the details are worth reading. The author complains that the virtual school targeted poor students and then did a very poor job for them. Not only did the students need social interaction—which they were not getting—but some students did little or no work, and the company wanted her to pass them anyway. In at least one case, they passed a student over her objections. The company found this necessary because they were under pressure to improve passing and graduation rates. This company, K12 Incorporated, has attracted other critics; a report released in 2012 by the National Education Policy Center [3] compares the student characteristics, performance, funding, and expenditures of K12 Inc. virtual schools with public and charter schools in the same states. The report's lead author asserts:

> Children who enroll in a K12 Inc. cyberschool, who receive full-time instruction in front of a computer instead of in a classroom with a live teacher and other students, are more likely to fall behind in reading and math. These children are also more likely to move between schools or leave school altogether—and the cyberschool is less likely to meet federal education standards. [4]

Sometimes the for-profit company does not officially run the school; instead a school district contracts with the company to supply curriculum or other services for a virtual school run by the district. Forming partnerships with companies could be a win-win situation, helping public schools expand their offerings while helping the company's bottom line. The aspect of this that critics object to is the secrecy. Public schools are usually required by law to make financial data available to the public, but apparently when a private company is involved these rules may not apply. An article published on the *New York Times* website explains how this happened in Texas:

> When *The Texas Tribune* made an open-records request for employee salary records and marketing expenses at the state's full-time virtual schools, it received responses from all but one of those connected with for-profit entities indicating either that the records were not available or were not subject to public information laws. [5]

But there are other ways to implement online learning, and the failures of a for-profit company should not condemn an entire method of education. And online learning does have its supporters. One organization very much in favor of online learning is the International Association for K–12 Online Learning, as they say in their mission statement: "The mission of the International Association for K–12 Online Learning (iNACOL) is to ensure all students have access to a world-class education and quality blended and online learning opportunities that prepare them for a lifetime of success…." [6]

A world-class education with lots of learning opportunities certainly sounds good; the question is how to get there, and in what ways online learning can help. Part of the problem is that, in spite of the increasingly large numbers of students that are affected by online learning, very few rigorous

studies have been done comparing online and in-person instruction for K–12 students. One of the best summaries of research on this topic is a Department of Education meta-study published in 2010. [7] The study's authors found that good research on K–12 online education was lacking:

> The most unexpected finding was that an extensive initial search of the published literature ... found *no* experimental or controlled quasi-experimental studies that both compared the learning effectiveness of online and face-to-face instruction for K–12 students and provided sufficient data for inclusion in a meta-analysis.

If online learning is to live up to its potential, we need to do more research into what works with younger children. There have been many research studies that examined online learning for graduate students, but what is effective for a 35-year-old professional attending graduate school part-time may not work as well for a second grader.

One of the forces driving the rapid growth in online learning is the perception that it can lower costs. If this means that exceptional programs can be offered to all students everywhere, this is something that everyone can applaud. However, some school districts seem to see it as a way of lowering costs by cutting corners and/or finding loopholes. According to a *New York Times* article [8], this appears to have happened in Florida in 2011. There was a state law that limited class size, but did not apply to online courses. The article's authors say that over 7,000 students in the Miami-Dade school district were enrolled in online classes—in their own brick-and-mortar schools. "These virtual classrooms, called e-learning labs, were put in place last August as a result of Florida's Class Size Reduction Amendment, passed in 2002. The amendment limits the number of students allowed in classrooms, but not in virtual labs." Even if these were great classes, this is not the way to implement online learning.

It is likely that online learning is here to stay, and will keep growing, even in the early grades. I think it does have an important role to play in education. The issue now is what form it will take. Will it be just a way for districts to cut costs, and companies to make money, without concern for students or learning? Or will it be a way to provide world-class education, to students all over the world, allowing students access to resources, teachers, and ideas that would not otherwise be possible?

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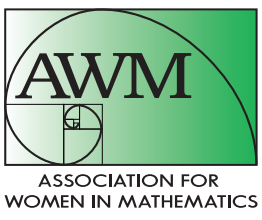

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A Conversation with Sonja Petrović

Interviewer: Katharine Ott, Bates College

Sonja Petrović is an Assistant Professor in the Department of Applied Mathematics at Illinois Institute of Technology (IIT). From 2011–2013 she was an Assistant Professor in the Department of Statistics at Penn State University. Prior to these positions she was a Research Assistant Professor at the University of Illinois Chicago. Sonja and I spoke recently on the phone about her research in algebraic statistics and life as an assistant professor.

KO: Sonja, thank you very much for speaking with me today. Can you briefly describe your field of research?

SP: My field of research is at the intersection of two seemingly unrelated areas: one is commutative algebra and one is statistics. It seems like they are very much disconnected, however it turns out that a few decades ago a connection was made that made it clear that if you are proficient in both fields, you can go very far. [From that point on] the use of computational algebra was promoted in statistics as a new tool where the traditional statistics methods fail. The field uses commutative algebra, algebraic geometry, and some very recent statistical methodology research and data analysis tools.

KO: What drew you to this area of research? Did you start out studying both of these topics, or did you start in one area and then branch out?

SP: I started in algebra. I had not even taken a statistics class since my undergraduate days, because it was a different department [in graduate school] and it didn't seem like a feasible thing to do at that time. I kind of kept up-to-date with the topics a little bit, because I thought this was something that I should know.… Then I went to a conference at the IMA and gave a poster. I should backtrack for a second. I was taking a topics class in commutative algebra where my advisor assigned papers for us to read as part of the course. A friend of mine read a paper on applying computational algebra to statistical models in biology. At first I thought this application was a long shot, but then I thought it was exciting. We started reading a related paper and realized that there were some open problems. We solved one of them. It was new, though it wasn't extremely difficult and we were able to do it in a semester or two. Then I presented this result as a poster at the IMA workshop during a special year on Applications of Algebraic Geometry. There were tons of statisticians around, and I wasn't sure what useful thing I was going to say, but I thought, 'Well, I don't care. I'm a student and this is what I do!'

A statistician who is prominent, Stephen Fienberg from Carnegie Mellon, apparently saw my poster.… He gave the closing talk at the conference. As part of his slides he made sure to incorporate almost every topic he had seen throughout the conference. He said, "Sonja Petrović gave a poster on such and such, which fits within such and such a framework, and it is relevant for (I could not tell what)." He wrapped together the topics of the conference from a statistician's point of view, which was very useful for everybody who was not a statistician at that conference. I made sure that I sat close to him at dinner, together with a friend who I had just met who was his former student, and we chatted about things and I said, "Hey, can you tell me what these things you said my work was relevant for?" He told me, and I had no idea what he said. I tried to ask for an explanation, and he gave me some definitions and I was still lost, so I wrote it down and I went home. I emailed him a few times asking for references. Eventually he said, "All right, just fly over here and spend the day and we'll talk." So I went there and I thought, "I have got to learn statistics!" This is how I started transitioning into using both fields. It was basically because somebody told me that my algebra had use for something.

KO: You mentioned the paper about biological models. Are there a lot of real-world applications of the type of work that you are doing right now?

SP: I don't, at the moment, do much with applications to biology. I would like to, but this is my second tenure track position in a short period of time. It is hard to find collaborations that will be long lasting. A postdoc is very short also. I think in order to do meaningful biological applications you really have to work with biologists, which is hard because by the time you make contacts at the university you leave. But I am interested. I know of lots of people; in fact at the University of Kentucky, Ruriko Yoshida from statistics works in a phylogenetics lab with some computer scientists and other statisticians, and data scientists and biologists.

There are some really cool real world applications. Methods from computational algebra and combinatorics can be used for inferring genetic relationships between species based on their DNA sequences, or for figuring out which genes mutated and what is the best model of evolution of this gene versus that gene. These are questions that are completely down to earth in terms of biology, but they

pose very significant statistical challenges that a lot of us don't know how to deal with yet.

KO: Your publication list includes many different collaborators. How do you initiate a collaboration?

SP: I don't know if you noticed, I have one single-author paper. I can't stop talking to people—it's very exciting to me! Most projects come about because I went somewhere, and I heard something and I asked something, or somebody asked me a question. From there, it turned out that we have common goals but no idea how to solve this problem, and that is how it starts.... The most exciting part of research is talking to other people. A lot of people have really great ideas and the moment you find one common word, you can probably put together a project.

KO: Let's change gears and talk about your background. Where did you go to undergraduate and graduate school?

SP: I did my undergrad at the University of Tennessee, Chattanooga; it's the coolest campus in the UT system. It's a public university but it has the feel of a liberal arts college. I was part of the Honors Program, which gave me a fantastic education, otherwise I do not know if I would have stayed in this country for education. It was really great because it was a program that focused on challenging you in every possible way.

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AWM WORKSHOP FOR WOMEN GRADUATE STUDENTS AND RECENT PHDs AT THE 2015 JOINT MATHEMATICS MEETINGS

Application deadline: August 15, 2014

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. Pending funding an AWM Workshop is scheduled to be held in conjunction with the Joint Mathematics Meetings in San Antonio, TX in January 2015.

FORMAT: The new format, which started in 2013, presents research talks focused on a research theme that changes from year to year. In addition, a poster session for graduate students includes presenters from all fields of mathematics. The AWM Workshop talks in San Antonio in 2015 will focus on homotopy theory. Participants will be selected in advance of the workshop to present their work. Recent PhDs will join senior women in a special session on homotopy theory where they will give 20-minute talks. The graduate students will present posters at the workshop reception and poster session. Pending funding, AWM will offer partial support for travel and hotel accommodations for the selected participants. The workshop will include a reception and a luncheon. Workshop participants will have the opportunity to meet with other women mathematicians at all stages of their careers.

All mathematicians (female and male) are invited to attend the talks and posters. Departments are urged to help graduate students and recent PhDs 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. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by **September 15, 2014**.

ELIGIBILITY: To be eligible for selection and funding, a graduate student must have made substantial progress towards her thesis and a recent PhD must have received her PhD within approximately the last five years, whether or not she currently holds a postdoctoral or other academic position. 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 or talk
- an abstract in the form required for AMS Special Session submissions for the Joint Mathematics Meetings
- a curriculum vitae
- one letter of recommendation from a faculty member or research mathematician who knows the applicant's work—in particular, a graduate student should include a letter of recommendation from her thesis advisor.

Applications (including abstract submission via the Joint Mathematics Meetings website) must be completed electronically by **August 15, 2014**. See http://www.awm-math.org/workshops.html for details.

Whatever your major was, you had to take a gazillion classes outside of your major. For grad school, I went to the University of Kentucky. I did both Masters and PhD there.

KO: Have you always liked math?

SP: Math was always easy. That's not completely true—it was always easy in elementary and high school. In college, it wasn't too easy but it was fun. Though I am from Belgrade, I did not go to the math high school, which everybody assumes I went to, because I didn't know what you could do with it [math]. I wanted to do something more applied. As an undergrad in fact I did not declare as a math major until the end of my third year.

KO: What was your major before math?

SP: I was a computer science and a music performance major, and then I had to juggle credits and ended up graduating with a minor in music performance.

KO: What do you find most rewarding about your career?

SP: I think it changes every semester. In the summer I find it exciting that papers get finished, I meet many new people at conferences, and there is so much research going on. But then the semester starts, and I'm not one who says, "Oh my god I have to teach again." During the semester teaching can get overwhelming, but then for instance, there is this freshman that took my Calculus II class. He keeps running into my office after the semester was over. He runs into my office all excited, "Guess what, guess what? I solved this difficult problem," and he writes it on my board…. It's exciting to see students come around and say "I love this math class!" It's so cool.

I think the most rewarding things are the connections with people, and the way you get to—I don't want to say influence, because that somehow sounds like I am on the top—but the way you get to interact with people, and the way you change them and the way they change you. I think this is the best part, both in research and teaching.

KO: That's a wonderful way to tie those two things together. What about the other side of the coin, what do you find most challenging about being a mathematician?

SP: I think juggling things is the hardest thing for me right now. I have lots of things going on, and you have to set your priorities so that project X or class X doesn't bog you down.

KO: Do you have any strategies that you use to try to help this balancing act?

SP: I thought I had it all worked out as a grad student. Then I thought I had it all worked out as a postdoc. These things change everywhere I go. I found the most efficient thing is to just ask. Everywhere you go there is a mentor usually, and so I talk to my mentor at the beginning of the semester.… I like to hear from the perspective of the local. It sounds very basic, but talking to local people to tell you what are their little strategies for organizing themselves is usually what has worked best for me. People are willing to help if you just ask.

KO: Which transition did you find more difficult, the transition from grad student to postdoc, or from postdoc to faculty member?

SP: I don't know. I thought I was busy as a grad student, and then I thought I was busy as a postdoc. But I think it was about the same. A lot of people experience a shock without their advisor. I had less of that problem because I joined a SAMSI research group that involved video conferencing. There were talks scheduled and they were aired live and you could join and participate by viewing the talk and also by chatting with live audio. I made sure to participate in that, so that whenever I felt like I had nothing to do I had a talk to attend. Not that I ever felt like I had nothing to do! At Kentucky we had to teach as graduate students, so I had taught my own course before and it wasn't a huge deal to teach my own course again.

Going from postdoc to tenure track, what gets piled on you is the service part of the job. If you remain active in the community as a postdoc, if, say, you organize a special session at an AMS meeting, or attend an AWM workshop, you are basically already doing some sort of service. The service transitions to a department level when you start tenure track, but it is not as overwhelming. If you keep looking ahead and thinking "what might I need to do next?" then it won't blow you away.

KO: What achievement are you most proud of so far?

SP: Graduating a PhD student.

KO: Recently?

SP: Yes, it was 1 year and 4 days ago. I say it was my achievement, but it really wasn't my achievement. It was my student's achievement. I am so happy that this was able to happen even though I was a postdoc when this started, and then I moved on and we made a special arrangement so that I could be the "other" advisor (in addition to the local advisor). I am very happy to say that I mentored one person.

KO: Do you have any specific goals for the next few years?

SP: Yes. I don't want to tell you everything because it's going to take a while. But I actually had to think about this because my department's annual activity report asked me what are my goals for next year, so I had to write them down. I want to involve more undergraduates in research

and I'm able to do that at IIT, because we have some fantastic undergraduates and there is already a mechanism for funding students over the summer. I want to get more involved in our PhD program. I am thinking about some kind of a mentoring program, but I don't know what is appropriate yet for this department. In terms of research, I want to finish these eight projects that have been going on for over a year. I am also looking forward to extending the collaborations with social scientists further.

KO: Is there anything else that you would like to share with the AWM community?

SP: I'm reflecting on what we've said, and it seems like so far everything that I've said is along the lines of "Oh, I did this, and I did that." I was really pushed quite a bit along the way by various mentors or non-official mentors. Everything I have and everything that I can do, I think I owe it to those people. Some of them, like my advisors, are people who were obviously helping me along the way. But also just talking to various people who are more senior than me at various stages, that has helped me tremendously.… I work with people who are younger than me academically and I work with people who are much more senior than me academically, and it's nice because you can learn things from all of them. If you let them all push you along, they will. That's just how math works. It's collaborative; you can learn from your students, you can learn from your advisees, you can learn from your advisors, you can learn from your colleagues, you

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AWM WORKSHOP FOR WOMEN GRADUATE STUDENTS AND RECENT PHDs AT THE 2015 SIAM CONFERENCE ON CSE

Application deadline: July 1, 2014

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.

WHEN: Pending funding, an AWM Workshop is scheduled to be held in conjunction with the SIAM Conference on Computational Science and Engineering (CSE), Salt Lake City, UT, March 14–18, 2015.

FORMAT: The workshop will consist of a poster session by graduate students and two minisymposia featuring selected recent PhDs, plus an informational minisymposium directed at starting a career. The graduate student poster session will be open to all areas of research, but the two research minisymposia will focus on Mathematical Modeling and High-performance Computing for Multi-physics and Multi-scale Problems. Pending funding, AWM will offer partial support for travel expenses for between fifteen and twenty participants. Departments are urged to help graduate students and recent PhDs obtain supplementary institutional support to attend the workshop presentations and the associated meetings. All mathematicians (female and male) are invited to attend the program.

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

ELIGIBILITY: To be eligible for selection and funding, a graduate student must have begun work on her thesis problem, and a recent PhD must have received her degree within approximately the last five years, whether or not she currently holds a postdoctoral or other academic or non-academic position. All non-US citizens must have a current US address. All selected and funded participants are invited and strongly encouraged to attend the full AWM two-day program.

All applications should include:

- a cover letter
- a title and a brief abstract (75 words or less) of the proposed poster or talk
- a concise description of research (one-two pages)
- a curriculum vitae
- at least one letter of recommendation from a faculty member or research mathematician who knows the applicant's work is required for graduate students and recommended but not required for recent PhDs. In particular, a graduate student should include a letter of recommendation from her thesis advisor.

Applications must be completed electronically by **July 1, 2014**. See http://www.awm-math.org/workshops.html for details.

can learn from everybody. I think it's really cool to let them carry you along.

I am assuming a lot of readers of the *AWM Newsletter* are grad students, so I'll say this. Do not sit in your room and think that you are going to get your PhD and get a job! It's not going to happen. You can't just sit there by yourself. You have to go out and talk to people. I don't care how scared you are, go to the next conference and make it a point to meet one person and ask them one question about a paper they wrote. You can do amazing research but if nobody ever hears about it, what's the point? I think that getting out and talking to people about whatever you are doing is so important. It can change your life.

KO: That's a good message to end on. Thank you very much Sonja!

Motherhood Then Mathematics: A Unique Perspective

Jeanine Myers, University of Arkansas – Fort Smith

As I read the March–April issue of the *AWM Newsletter,* I came across two particular articles that were of great interest to me, "Mathematics Live! A Conversation with Loredana Lanzani" and "Mathematics and Motherhood: Before Motherhood." You see, I was fortunate enough to be a PhD student of Loredana Lanzani (coadvised by Andrew Raich) and had just completed a PhD in mathematics in May 2013 as a 42-year-old mother of three teenage children. I earned a BS in mathematical sciences from Baylor University in 1992, an MS in mathematical sciences from Clemson University in 1994, birthed and raised three children for the next fourteen years and in 2008, entered the PhD program in mathematics at the University of Arkansas (UA). Although there are advantages and disadvantages in pursuing a mathematics career after motherhood (which is a discussion that is too long for an article in a newsletter), as a new member of AWM who is starting a mathematical career as an assistant professor of mathematics at the University of Arkansas – Fort Smith (UAFS), I would like to mention a number of factors that helped me to succeed in pursuing a mathematics career after motherhood.

First, the enjoyment of mathematics and determination are essential. As if obtaining a PhD in mathematics were not difficult enough, having the resolve to, for example, stay up after the kids go to bed or get up before the kids wake up, in order to work on mathematics, is imperative. The enjoyment of mathematics is great incentive to apply the determination needed to be successful.

Second, the support of family is important. My husband shared household and childcare responsibilities as I pursued my PhD so that I could have more study and research time. My kids were also encouraging to me: they offered a number of times to help me with my "homework" as I struggled to prove some results in my thesis.

Third, a female mentor in the field of mathematics is vital. When I Skyped with Loredana Lanzani (at NSF) to report on progress on my dissertation, she would always ask first about my well-being and my family and would notice if I was frustrated or discouraged. Obviously she gave constructive criticism of my research and suggested ideas for investigation, but she always had encouraging words that inspired me to continue on and persevere toward my academic career goals in mathematics.

Lastly, institutional support is crucial. As my husband is a mathematics professor at an institution in Clarksville, AR, I had a 180 mile round-trip commute to UA when I was in graduate school and currently have a 100 mile round-trip commute to UAFS. Both institutions were supportive in working with me to schedule my teaching duties, office hours, and other responsibilities on Monday, Wednesday, and Friday so that I could have significant blocks of time to work on my research on Tuesday and Thursday. This gave me much needed research time during the day before my children came home from school. Institutions' willingness to work with teaching schedules and to provide blocks of time for research is of critical importance in establishing academic careers in mathematics.

In conclusion, pursuing a career in motherhood and then a career in mathematics is not easy, but with the kinds of support mentioned above it is possible to be successful in both. I enjoy my children immensely; now that they are teenagers who are less dependent on me and will leave home soon, I look forward to starting my career as a mathematician. I have the rest of my life to enjoy mathematics through teaching, research, and presenting talks. As a mother and a mathematician, I have always been inspired by the biography of the notable female mathematician Joan Birman. She received her BA in mathematics in 1948, MA in physics in 1950, PhD in mathematics in 1968 (at the age of 41 with three children) and continued her mathematical career as a prolific researcher, successful teacher, and prominent lecturer in her field of mathematics. Let her biography be an inspiration to all of us.

Women in Numbers 3

Amy Feaver, The King's University College, Edmonton, AB Canada

This past April, Banff International Research Station (BIRS) hosted forty-two female number theorists for its third Women in Numbers (WIN3) workshop. This series of conferences is designed to promote collaborations and enrich the research careers of women in all areas of number theory. The success of these conferences also inspired the formation of the Women in Numbers – Europe workshops, which launched in October 2013.

Participants at Women in Numbers 3

The Women in Numbers conferences are designed to be highly collaborative so that junior faculty members and graduate students can enhance their research programs and learn from more senior mathematicians. Yara Elias, a PhD student at McGill University, commented that one reason WIN3 was a positive experience was because she "had the opportunity to meet accomplished female mathematicians, who are inspiring and passionate." For the conference, participants were organized into small research groups led by prominent mathematicians. Group leaders proposed projects several months ahead of time in order to allow the other members to prepare in advance, and all of the groups plan to continue their collaborations for months or years following WIN3. Ellen Eischen (University of North Carolina at Chapel Hill), who co-led a project titled "A p-adic q-expansion principle for unitary groups" with Ana Caraiani (Princeton), wrote that her group is "already making plans to meet again in a few months. In addition to outlining the paper we plan to submit to the WIN3 proceedings, we made a file of future questions/projects that we might try to address."

The other projects were: Sieves in arithmetic geometry, led by Alina Cojocaru (University of Illinois at Chicago) and Lillian Pierce (Duke); Monodromy of classical hypergeometric functions and complex multiplication, led by Ling Long (Louisiana State University); Shadow lines in the arithmetic of elliptic curves, led by Jennifer Balakrishnan (Oxford) and Mirela Ciperiani (University of Texas at Austin); Curves with many automorphisms in positive characteristic, led by Irene Bouw (University of Ulm); π_1 obstructions to rational points on Fermat curves, led by Vesna Stojanoska (MIT) and Kristen Wickelgren (Georgia Institute of Technology); Computing transcendental Brauer-Manin obstructions on Enriques surfaces, led by Michelle Manes (University of Hawaii) and Bianca Viray (Brown University); Hecke operators for codes, led by Gabrielle Nebe (RWTH Aachen); and Cyclotomic rings in cryptography, led by Kristin Lauter (Microsoft Research) and Katherine Stange (University of Colorado Boulder). One participant wrote that "the project topics at WIN3 were fantastic and it was very inspiring to see everyone working together to make progress on significant problems in number theory."

Sieves in Arithmetic Geometry research group

In addition to having ample time to work in their small research groups, participants had opportunities to engage with the community as a whole. Each group leader and co-leader gave a short presentation of their research topic to all participants. On the last day, other group members gave progress reports to show what was accomplished during the week. Four participants also gave general talks about their research outside of their WIN projects. Anna Haensch

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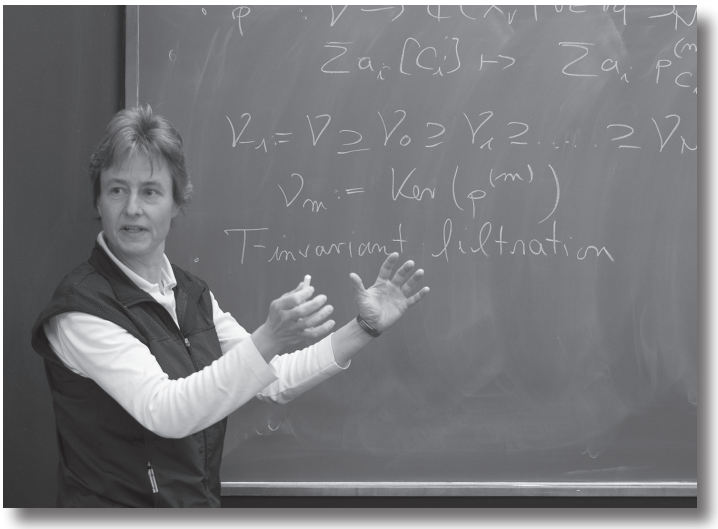
(Max Planck Institute and Duquesne University) spoke about her experience as a science reporter at National Public Radio (NPR), through the AAAS Mass Media Science and Engineering Fellowship. In her talk, Haensch also brought up important questions about how to engage the general public in science and mathematics while still preserving the rigor and details of the subject.



Gabrielle Nebe lecturing

In addition to the great research topics and talks given at WIN3, there were also opportunities for networking. The facilities at BIRS are excellent for conferences of this nature. They provide separate rooms for small working groups but also plenty of opportunities for conference participants to mingle with each other. All attendees ate meals together in the dining halls, allowing them to have conversations with others who were not in their groups. The residence hall also has a lounge, which provides a space for participants to relax and talk in the evenings. After dinner on Tuesday and Wednesday there were informal gatherings to discuss all aspects of careers in number theory. Here people who were organizing conferences or knew about job opportunities were able to announce their events and even find people willing to help with the organization of sessions at their conferences. These informal gatherings allowed participants to make connections with others who have shared interests and find out more about what they are doing. During this time, participants were welcome to ask any questions they had about careers as women in number theory, from finding an advisor to careers in industry, to getting tenure. This led to good discussions and was especially beneficial to graduate students who are planning to be on the job market in the next few years.

The conference was made possible by the organizers: Ling Long (Louisiana State University), Rachel Pries (Colorado State University), and Katherine Stange (University of Colorado Boulder). It was generously supported by funding from the Clay Mathematics Institute, Microsoft Research, the Pacific Institute for the Mathematical Sciences (PIMS), and the Number Theory Foundation.

USASEF: Impressions from the AWM Booth

Janet Fierson, Maria Lorenz, Tai Melcher, Katharine Ott, and Irina Mitrea

At the end of April, the Association for Women in Mathematics was once again present in Hall C of the Walter E. Washington Convention Center in Washington, DC at the Final Expo of the 2014 USA Science and Engineering Festival (USASEF). The organizers of the AWM booth activities share here a potpourri of festival impressions that will hopefully give the reader a sense of the energy and excitement witnessed during this incredible science extravaganza. This is what the festival meant to us.

Janet Fierson (La Salle University): I had a tremendous experience as a first-time organizer for AWM at the USASEF Expo. Although we were competing with beautiful spring weather outside, we had a nonstop flow of visitors through our booth both days of the event. I enjoyed seeing entire families getting involved, sometimes with a little friendly competition between siblings or between children and parents! It was also inspiring to witness the creativity of the participants; they brought the activities to life in a different way each time and took away even more than what had been planned. Some visitors encoded their own secret messages to family members using a reproduction of Jefferson's wheel cipher and watched eagerly as the recipients decoded them. One young participant found the letter that appeared most frequently in an encoded multiplication cipher message, assumed that it corresponded to the letter "E" in the original message, and performed some modular arithmetic to correctly identify the multiplication factor that had been used. It was also rewarding to see a former advisee of mine, now a teacher herself, stop by with several of her students. There was so much genuine curiosity and excitement at the booth. In several cases, children were so engaged that parents had to eventually force them to move on! We may have even facilitated defining moments for some young people who are now on trajectories toward careers in mathematics. This was

many visitors' first time hearing of AWM; I think that our activities and the enthusiasm of our volunteers helped the organization to gain new supporters of all ages. I was proud to represent the association at this fun-filled event. It's too bad we have to wait two years to do it again!

Maria Lorenz (Temple University): My first experience with the USASEF this year was incredible. The sheer number of people in attendance was well beyond what I would have ever imagined. Being part of the AWM booth, with other friendly volunteers, was not only gratifying, but a lot of fun too! The cryptography theme of our activities was exciting and engaging for a wide audience. I was able to watch entire families work together to crack a code, see young girls light up with delight when understanding the ideas behind modular arithmetic, and observe parents proudly looking on as they noticed their children grasping the mathematical ideas that they found mystifying. Not only did everyone enjoy the activities at our booth, but many, many people realized for the first time that the AWM exists. The recognition of a mathematical association for women was greeted with enthusiasm; this kind of exposure is important. Participating in the festival with AWM was a valuable endeavor that I won't soon forget.

Tai Melcher (University of Virginia): Obviously, working with the kids is a lot of fun! They're so excited about learning new things, and they've got this great energy. It's contagious. It's enough to make you forget you've already decoded this message fifty times today, and you're wondering what it will say when they're done deciphering. What's also really fun is getting parents involved. It's gratifying to see families working together, playing around with stacks of styrofoam cups, trying to decode secret messages. And when they're done, mom or dad says, "That's so cool!" and takes a picture of the cups on their smartphone so they can make their own cipher wheel at home together later. The favorite message of the day to decode? "I love pie!"

Katharine Ott (University of Kentucky): This was my second time volunteering as organizer for AWM at the USASEF. My favorite part of the experience was interacting with visitors to our booth. Once again, the AWM team did a fantastic job of organizing activities that were appealing to people of all ages and backgrounds. Hundreds of festival visitors passed through the booth each day. Some were drawn in by the curious looking Jefferson wheel ciphers. Others were stopped by our friendly volunteers and accepted their invitation to decipher a coded message. I witnessed the messages being decoded hundreds of times, but each time it was thrilling to see peoples' satisfaction at having succeeded in deciphering the quotation. Many visitors asked for more ciphers to take home. The outstanding feature of the festival is the opportunity to interact with a very large and very diverse audience, most of whom are extremely excited about mathematics and science. I am glad that the AWM was able to be a part of this great event. Everyone involved in the festival worked hard to provide every visitor to our booth a positive math experience. Judging from the smiles I saw all weekend, I think we kicked ass!

Irina Mitrea (Temple University): I led the activities at the AWM booth at USASEF for three consecutive editions, since its inception in 2010. As I pass on the baton let me say what an exhilarating celebration of science this turned out to be! And while I could tell you about the many unforgettable reactions of young and old, female and male, families and single passers by, students and teachers, all engaged in solving a mathematics problem at the AWM booth, there is something else I found at least equally inspiring and defining of my experience at the festival. This is the group of women and men who all went well beyond the call of duty to best represent AWM at this national event in the last four years. Their energy, love of mathematics, enthusiasm, and professionalism have been exemplary and made all the difference for me. Thank you all!

On behalf of AWM we would like to thank all the volunteers at our USASEF booth this year. These are: Sukanya Basu, Dean James Llewellyn (Hood College), JoAnne Growney, Sunnie Joshi (Temple University), Arthur Kramer (NYC College of Technology), Veronica Krenz, Martin Montgomery (University of Kentucky), Mariel Supina (George Washington University), and Victoria Taroudaki (University of Maryland).

USASEF participant working with volunteer Veronica Krenz.
See more photos on page 24.

USASEF: Impressions from the AWM Booth

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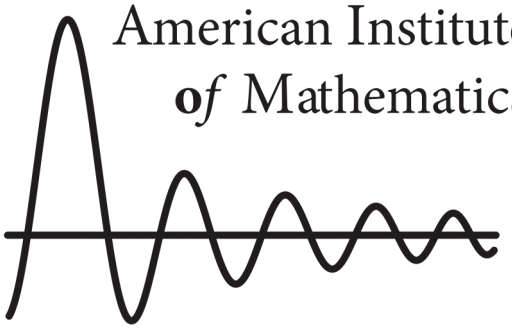

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Workshop Program

AIM invites proposals for its focused workshop program. AIM's workshops are distinguished by their specific mathematical goals. This may involve making progress on a significant unsolved problem or examining the convergence of two distinct areas of mathematics. Workshops are small in size, up to 28 people, to allow for close collaboration among the participants.

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AIM also invites proposals for the SQuaREs program: Structured Quartet Research Ensembles. More long-term in nature, this program brings together groups of four to six researchers for a week of focused work on a specific research problem in consecutive years.

More details are available at:

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AIM seeks to promote diversity in the research mathematics community. We encourage proposals which include significant participation of women, underrepresented minorities, junior scientists, and researchers from primarily undergraduate institutions.

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AWM's membership year is from October 1 to September 30. Please fill in this information and return it along with your DUES to: AWM Membership, 11240 Waples Mill Road, Suite 200, Fairfax, VA 22030.

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

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