



ASSOCIATION FOR
WOMEN IN MATHEMATICS

Newsletter

VOLUME 47, NO. 3 • MAY–JUNE 2017

The purpose of the Association for Women in Mathematics is

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

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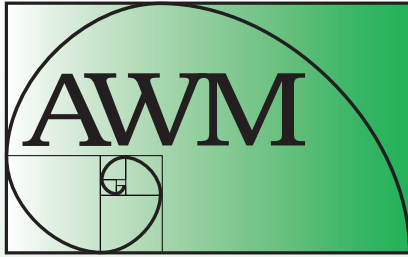
PRESIDENT'S REPORT

Magic numbers. As mathematicians, we often have favorite numbers, shapes, dimensions, or functions. With some exhilaration, I noticed that this issue of the *Newsletter* is the third in volume 47, a cherished number at my institution, Pomona College. Sometimes we think of 47 as our “magic” number, not in the sense of the supernatural, but rather in the informal definition: “fascinating, captivating, alluring.” The number 47 became magical to us by dint of its ubiquitous appearance in and around the college and in the media: for example, you can find me at exit 47 of the San Bernardino freeway. As another illustration, according to UNESCO (ffctn.com/a/womeninscience/), 47% of scientific researchers in Central Asia are women, but only 32% of research scientists in North America and Western Europe are women. At Harvey Mudd College, where 38% of graduates in computer science were women, compared to the national average of 18%, 47% of their women CS majors reported that going to the Grace Hopper Celebration of Women in Computing conference was a key factor in their choice of major (see you at the AWM Symposium!). It's a bit more of a stretch, but note that the hendecasyllabic (eleven syllables) line favored by many Polish and Italian poets is derived from 47 by adding the digits together $4+7 = 11$.

It got me thinking about other magic numbers, numbers that are important to me today. For example, 2°C is generally accepted, though still debated, as the change in global temperature that will bring us to an ecological tipping point. In 2015, 31% of mathematics PhDs in the US were given to women, with less than 5% going to women from traditionally underrepresented groups. The gender ratio of tenure-track faculty at doctoral institutions is approximately 16:84. According to the National Science Foundation, these numbers have not changed much over the past ten years, and they want to support programs that will “move the needle,” that is, make a significant change in these statistics. What's our target? Some people believe that we will have gender equality in politics when each gender makes up at least 40% of the governing body (compare this to the 19:81 gender ratio in our current Congress). At the other extreme, experiments by Mendelberg and Karpowitz indicate that women must make up 60%–80% of a group before they speak as much as men, and are hence able to influence the rhetoric. I suggest that a target of 47% women splits the difference, with a strategic effort to bring the percent of underrepresented minorities receiving PhDs in mathematics to 25%. My goal is that the AWM will continue to lead the effort to create an inclusive community, one that supports every young mathematician in achieving their goals.

In my daily life, I think about my FQ (fun quotient), always trying to bring it up to at least 80%. What are your magic numbers? What targets do you hope

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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*

we can achieve? I welcome hearing from each of you, and working together to make these dreams a reality.

In AWM news, I'd like to extend my deepest gratitude to **Joan Ferrini-Mundy** for her work on the Executive Committee for the past three years. Joan has been a terrific asset to our EC and will continue to support the AWM as she moves into her new role at the NSF. I welcome **Ivelisse Rubio** from the University of Puerto Rico as our new EC member and look forward to working with her over the coming year. I am also delighted to announce that the 2017 Sonia Kovalevsky lecturer is **Liliana Borcea**. Congratulations also go to **Julia Gordon**, the winner of the 2017 Michler prize. See details of these awards on pages 4–5 of this issue. I'd also like to give a special shout-out to our **Policy and Advocacy Committee**, which has been doing a terrific job navigating the current turbulent waters.

Magnhild Lien has been doing a wonderful job as the AWM Executive Director (ED) since January 2012, continuing in the position after her retirement from Cal State University, Northridge. I am sad for us, but happy for Magnhild, that she plans to retire from the ED position at the end of 2017. She will continue her work under the auspices of the AWM ADVANCE grant. We are now advertising our search for her replacement, as you may have read in earlier email from AWM; see page 23 for the ad. Please apply yourselves, or encourage others whom you consider to be appropriate for the position.



Arizona State Student Chapter

As I wind up my first two months as AWM President, I am impressed with the vitality and commitment of our members. In the last few weeks I have visited with three fabulous student chapters across the country, talked with many of you on the phone or over email, and desperately tried to keep up with your energy and your ideas. Keep them coming, and up the Fun Quotient!



Ami Radunskaya
March 25, 2017
Claremont, CA



Ami Radunskaya



Dartmouth Student Chapter



UC Santa Barbara Chapter

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Regular and contributing members living in the US may elect to receive a print version of the *Newsletter*. Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for \$65/year. Back orders are \$10/issue plus shipping/handling (\$5 minimum).

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

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

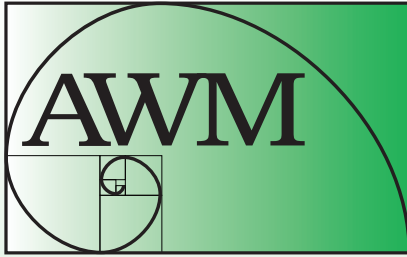
Newsletter Deadlines

Editorial: 24th of January, March, May, July, September, November

Ads: Feb. 1 for March–April, April 1 for May–June, June 1 for July–Aug., Aug. 1 for Sept.–Oct., Oct. 1 for Nov.–Dec., Dec. 1 for Jan.–Feb.

Addresses

Send all queries and all *Newsletter* material except ads and queries/material for columns to Anne Leggett, amcdona@luc.edu. Send all book review queries/material to Marge Bayer, bayer@math.ku.edu. Send all education column queries/material to Jackie Dewar, jdewar@lmu.edu. Send all media column queries/material to Sarah Greenwald, greenwaldsj@appstate.edu and Alice Silverberg, asilverb@math.uci.edu. Send all student chapter corner queries/material to Kavita Ramanan, kavita_ramanan@brown.edu. Send everything else, including ads and address changes, to AWM, fax: 703-359-7562, e-mail: awm@awm-math.org.



ASSOCIATION FOR
WOMEN IN MATHEMATICS

AWM ONLINE

The *AWM Newsletter* is freely available online.

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

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

Media Coordinator

Joanna Wares; jwares@richmond.edu

AWM DEADLINES

AWM Travel Grants: May 1 and
October 1, 2017

RCCW Proposals: July 1, 2017
and January 1, 2018

AWM Workshop at JMM: August 15, 2017

AWM-MAA Falconer Lecture:
September 1, 2017

AWM Alice T. Schafer Prize: October 1, 2017

AWM Dissertation Prize: October 1, 2017

AWM-AMS Noether Lecture:
October 15, 2017

AWM-SIAM Sonia Kovalevsky
Lecture: November 1, 2017

AWM Workshop at SIAM:
November 1, 2017

Ruth I. Michler Memorial Prize:
November 1, 2017

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Liliana Borcea Named Kovalevsky Lecturer

The Association for Women in Mathematics and the Society for Industrial and Applied Mathematics (SIAM) have selected Liliana Borcea to deliver the prestigious Sonia Kovalevsky Lecture at the 2017 SIAM Annual Meeting.

Borcea is the Peter Field Collegiate Professor of Mathematics at the University of Michigan. She is a leading applied mathematician working on imaging and inverse problems related to partial differential equations. Borcea was

selected to deliver the AWM-SIAM Sonia Kovalevsky Lecture for her distinguished scientific contributions to the mathematical and numerical analysis of wave propagation in random media, array imaging in complex environments, and inverse problems in high-contrast electrical impedance tomography, as well as model reduction techniques for parabolic and hyperbolic partial differential equations.

Borcea received her undergraduate degree in Applied Physics from the University of Bucharest, Romania, followed by an MS and a PhD in Scientific Computing and Computational Mathematics from Stanford University.

Borcea started her academic career as an NSF Postdoctoral Fellow at the California Institute of Technology. Before coming to the University of Michigan in 2013, she moved up the ranks from assistant professor to Noah Harding Professor in the Department of Computational and Applied Mathematics at Rice University. Throughout her career she has held visiting positions both in the US, at the Mathematical Sciences Research Institute (MSRI) and Stanford University, and abroad, most recently at École Normale Supérieure, Paris.

Borcea has an impressive list of publications and has regularly conducted tutorials and short courses on imaging and inverse problems at institutions around the world. Currently two postdocs and two graduate students are working under her supervision at the University of Michigan, continuing her record of directing postdocs and graduate students while at Rice University.

In addition to her contributions on scientific research, Borcea is very involved in service to the community of applied and computational mathematics. Currently, she is an elected member of the SIAM Council and serves on the SIAM Coordinating Committee for the Joint Mathematics Meetings. She has served as a member of the IPIA (Inverse Problems International Association) Steering Committee and is now a member of the International Scientific Advisory Board of the National Academy of Finland, for the Center of Excellence in Inverse Problems Research. Borcea has served on the editorial boards of several leading journals on applied and computational mathematics, including, for example, *Multiscale Modeling and Simulation: A SIAM Interdisciplinary Journal*.



Liliana Borcea

The 2017 SIAM Annual Meeting will be held July 10–14 in Pittsburgh, PA. The Kovalevsky Lecture honors Sonia Kovalevsky (1850–1891), the most widely known Russian mathematician of the late 19th century. In 1874, Kovalevsky received her Doctor of Philosophy degree from the University of Göttingen and was appointed lecturer at the University of

Stockholm in 1883. She did her most important work in the theory of differential equations. Past Kovalevsky lecturers are Lisa Fauci, Linda J.S. Allen, Irene M. Gamba, Margaret Cheney, Barbara Keyfitz, Susanne Brenner, Suzanne Lenhart, Andrea Bertozzi, Dianne O’Leary, Lai-Sang Young, Irene Fonseca, Ingrid Daubechies, Joyce McLaughlin and Linda R. Petzold.

Julia Gordon Wins Michler Prize

The Association for Women in Mathematics and Cornell University are pleased to announce that Julia Gordon, University of British Columbia, Canada will receive the 2017–2018 Ruth I. Michler Memorial Prize.

The Michler Prize grants a mid-career woman in academia a residential fellowship in the Cornell University mathematics department without teaching obligations. This pioneering venture was established through a very generous donation from the Michler family and the efforts of many people at AWM and Cornell.

Julia Gordon was selected to receive the Michler Prize because of her wide range of mathematical talents and the connection of her work with the research of Cornell faculty members Nicolas Templier and Birgit Speh. She earned a Diploma (MS equivalent) from St. Petersburg State University, St. Petersburg, Russia in 1998. Gordon received her PhD in mathematics under the direction of Thomas C. Hales from the University of Michigan, Ann Arbor in 2003.

Immediately before coming to the University of British Columbia in 2006, where she is currently an associate professor in the Department of Mathematics, Gordon was a postdoctoral fellow at the University of Toronto. Before that she spent a year at the Institute for Advanced Study, Princeton and a semester as a postdoctoral fellow at the Fields Institute for Research in Mathematical Sciences, Canada.

Gordon’s research is in the areas of representation theory of p -adic groups and of motivic integration. Her research is partially funded by a series of Natural Sciences and Engineering Research Council of Canada (NSERC) Discovery Grants which she has received since 2006.

About her upcoming semester at Cornell, Gordon says: “In 2011, Nicolas Templier and Sug Woo Shin asked about the possibility of making a uniform bound for orbital integrals, which was needed for their work on low-lying zeroes of L-functions. Raf Cluckers, I. Halupczok and I were able to develop this bound, and while at Cornell, I plan to work with Templier on further applications of such bounds. Separately,



Julia Gordon

I have been working with J. Achter and S. Ali Altuğ on a different project of counting the number of abelian varieties in an isogeny class. Some of the calculations done in this project are related to the trace formula and Templier’s area of expertise. I am hoping to learn more about this from him during the term at Cornell. I also hope to talk to Birgit Speh about real Lie groups and mysterious analogies between harmonic analysis on real and on p -adic reductive groups.”

Ruth Michler’s parents Gerhard and Waltraud Michler of Essen, Germany established the memorial prize with the Association for Women in Mathematics because Ruth was deeply committed to its mission of supporting women mathematicians. Cornell University was chosen as the host institution because of its distinctive research atmosphere and because Ithaca was Ruth’s birthplace. At the time of her death, Ruth was in Boston as an NSF visiting scholar at Northeastern University. A recently promoted associate professor of mathematics at the University of North Texas, she was killed on November 1, 2000 at the age of 33 in a tragic accident, cutting short the career of an excellent mathematician.

AWM Essay Contest

Congratulations to all the winners of the 2017 AWM Essay Contest: Biographies of Contemporary Women in Mathematics! Many thanks to Heather Lewis, Nazareth College, contest organizer, for coordinating the judging; Joanna Bieri, University of Redlands, the interviewee coordinator; and the committee that does the matching (of students to subjects) and the judging. We are also grateful to Math for America for their sponsorship of this contest. The essay contest is intended to increase awareness of women's ongoing contributions to the mathematical sciences by inviting students from sixth-graders through college seniors to write biographies of contemporary women mathematicians and statisticians in academic, industrial, and government careers.

The 2017 Grand Prize essay appears after the list of this year's winners. To see the other prize-winning essays, visit <http://www.awm-math.org/biographies/contest/2017.html>.

GRAND PRIZE WINNER

“The Limit Does Not Exist”

Karen Ge, Naperville North High School,
Naperville, Illinois

(The essay was about Elizabeth Moore of Naperville North High School.)

Undergraduate Level Winner

“Persisting Through Barriers of Inequality:

A Biography of Dr. Seema Nanda”

Yixuan He, Dartmouth College, Hanover, New Hampshire
(The essay was about Seema Nanda of Dartmouth College.)

Undergraduate Level Honorable Mentions

“Color by Number”

Lily Jordan, Massachusetts Institute of Technology,
Cambridge, Massachusetts

(The essay was about Joanna Ellis-Monaghan of Saint Michael's College.)

“The Art of Math: An Image Problem”

Anna Schilke, Houghton College, Houghton, New York
(The essay was about Pamela E. Harris of the United States Military Academy.)

High School Level Winner

Same as Grand Prize Winner.

High School Level Honorable Mentions

“Julie Haggerty's Journey to the Clouds”

Macey Broadwater, Fairview High School, Boulder, Colorado
(The essay was about Julie Haggerty of the National Center for Atmospheric Research.)

“Challenges, Growth, & Opportunity”

Kailande Cassamajor, Wheaton High School,
Silver Spring, Maryland

(The essay was about Dr. Bonita V. Saunders of the National Institute of Standards and Technology.)

“The Posters on the Walls of the Math Classroom”

Katie Tam, Thomas Jefferson High School for Science
and Technology, Alexandria, Virginia

(The essay was about Alouf Jirari-Scavotto of Thomas Jefferson High School for Science and Technology.)

Middle School Level Winner

“Breaking Barriers—A Mathematical Journey”

Asmi Kumar, Northwestern Middle School, Milton, Georgia
(The essay was about Suzy Crowe, Career Technology Department Chair at Fulton County Schools.)

Middle School Level Honorable Mention

“No-Recipe Math: Rosa Orellana's Mathematical Journey”

Sophie Usherwood, Frances C Richmond Middle School,
Hanover, New Hampshire

(The essay was about Rosa Orellana of Dartmouth College.)

CORRECTION

The title of the article beginning on page 18 of the March–April issue of this newsletter should have read: AWM-MAA Panel on Mathematics Education. We regret the error.

The Limit Does Not Exist

Karen Ge, Naperville North High School

Walking into Room 203, all of us are filled with anticipation, a bit of fear, and mounting excitement. It is our first day of AP Calculus BC, famous as one of the hardest math courses offered at Naperville North High School. Stories of receiving the first “C” in a math class and insanely long tests fly around the room in surreptitious whispers. When the bell rings, our teacher, Mrs. Moore, dispels our fears with a warm smile, then starts outlining her expectations and goals for the year. Since everyone expects a relaxing introduction to the course, we are startled when she transitions into a presentation about limits halfway through the period. “Remember pre-calc days when you looked at an expression like this?” she begins. Moore proceeds to work out the example and give us three more to try on our own. “Yes, there is homework today. Like I said, we have a lot to cover this year.”

Today, our class sets out discussing an intuitive definition of a “continuous” function. “Well, what kinds of functions are not continuous?” Mrs. Moore inquires. My table group and I brainstorm the graphs of discontinuities. After that, we move to the whiteboards and chalkboards around the room to sketch our ideas. Moore scans the room approvingly before asking each group to describe its drawings. Eventually, we conclude that the limit concept is hidden in our vague ideas of the function “approaching” some value. “Very good! This will be our definition of continuity, then,” Moore announces, “the limit as x approaches c of $f(x)$ is equal to $f(c)$.” She explains that this equation conveys three key pieces of information: the limit exists, $f(c)$ exists, and they are equal. I am struck by the sheer simplicity of this fundamental definition. With each new concept I learn, my respect for Moore only grows. Even so, it was not until I got to know her story that I truly began to admire her character.

Elizabeth Moore grew up with a physicist father and an accountant mother, and she always had a knack for math. Indeed, she was the only young woman taking both Calculus and Physics in her high school. “I really like it when I see math connect in itself,” she explained. This love of intertwining concepts elucidates her passion for teaching calculus, a subject that beautifully combines algebra and geometry. Mrs. Moore recalled that other subjects, unlike math and science, felt more tedious since numbers and their relationships were less obvious in those

courses. Her parents valued education greatly, so to meet their high expectations, she developed a strong work ethic and dogged perseverance early on. She also loved to work and discuss problems with others. However, her parents were not thrilled about a teaching career for their daughter due to more traditional Asian standards. Instead, they expected Moore and her younger brother to become doctors or engineers. As a result, she started college with only a vague idea of what her future might hold.

Moore attended Cornell University, beginning with a double major in applied mathematics and computer science. Soon she found that coding did not suit her, so she began exploring other options, eventually settling on Cornell’s five-year teaching program. As she finished her undergraduate education, however, she could not shake off her parents’ worries about the stability of a teaching job. Changing plans again, she started graduate school studying applied mathematics, working with differential equations and modeling in computational chemistry. As an obedient daughter, she felt limited by others’ expectations.

At last, the pressure of fate abated during Moore’s second year of graduate school. She realized that, as much as physical chemistry innovatively applied the mathematics she loved, she enjoyed being a teaching assistant more than she liked working on research. Her parents finally conceded that their daughter was destined to be a teacher, allowing her to pursue the path that, though less common in their culture, matched her love for helping others. Although Mrs. Moore’s journey through higher education was unusual, it was not wasted. During these years, she observed, “I started discovering that there’s a lot of math in pretty much everything,” which only deepened her joy in teaching mathematics.

Today, Moore is the sole instructor of AP Calculus BC and Multivariable Calculus with Linear Algebra, the highest-level math courses taught at Naperville North. Her dedication to teaching, her variety of resources, and her unlimited energy render the subject manageable for her students despite the lightning-fast pace. Moore is always available to answer questions; she provides review videos and extra practice sheets for every test on top of daily notes and homework. To engage as many students as possible, she incorporates group quizzes, class time for collaboration, and a flexible lesson plan open to in-class questions. She loves getting students excited about math, and she beams when they recognize the beauty of the concepts they are studying. “That moment of lucidity, that’s the best part of my day,” she says. Nevertheless, she holds students accountable for everything they learn, expecting no less than

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hard work and mastery. “I set the bar pretty high,” she states, “but I don’t think it’s an impossible height for the students to reach.”

With Moore teaching the most advanced math courses, budding female mathematicians are more confident in themselves and their futures as they look up to a hard-working and enthusiastic role model. Her passionate teaching and devotion to excellence inspire me in both my school work and my extracurricular study of mathematics. For me and all young women pursuing mathematics, she advises not letting math cut off interests in other fields. One of her favorite aspects of math is how pervasive it is, how it is hidden in so many of the secrets of our world. “Don’t give up if it gets hard—it could be that you aren’t good at one type of

math, but you’re good at another type of math,” she cautions. Moore shows me that she can push the limits of culture by succeeding as a highly regarded mathematics teacher and demonstrates that a woman in mathematics can manifest tremendous mental tenacity. She proves that, where there is passion, the limit does not exist.

About the Student:

Karen Ge is a sophomore at Naperville North High School in Illinois. She is the author of *The Three-Year MathCounts Marathon* and *Dissecting the New CogAT*. She is a USA Junior Math Olympiad qualifier and a MathCounts State Competition 1st place individual. Karen spends her weekends at the Chicago Youth Symphony Orchestra where she is a first violinist and at a local library where she tutors K–12 students for free.

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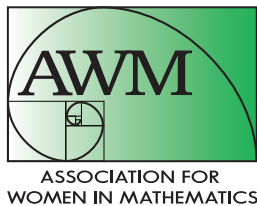
The 2018 Kovalevsky Lecture

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

The mathematicians who have given the prize lecture in the past are: Linda R. Petzold, Joyce R. McLaughlin, Ingrid Daubechies, Irene Fonseca, Lai-Sang Young, Dianne P. O’Leary, Andrea Bertozzi, Suzanne Lenhart, Susanne Brenner, Barbara Keyfitz, Margaret Cheney, Irene M. Gamba, and Linda J.S. Allen. Liliana Borcea will deliver the 2017 lecture at the SIAM Annual Meeting in Pittsburgh, PA in July 2017.

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

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



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BOOK REVIEW/MEDIA COLUMN

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

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.

Margot Lee Shetterly, **Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race.** New York: William Morrow, 2016. ISBN 978-0-06-236359-6. Hardcover, \$27.99.

Hidden Figures. Directed by Theodore Melfi; screenplay by Allison Schroeder and Theodore Melfi, based on the book by Margot Lee Shetterly. Starring Taraji P. Henson, Octavia Spencer, and Janelle Monáe, Kirsten Dunst, Jim Parsons, Mahershala Ali, Aldis Hodge, Glen Powell, Kimberly Quinn, and Kevin Costner. Distributed by 20th Century Fox, 2016.

Margaret A.M. Murray, margaret-a-murray@uiowa.edu

Late in 2010, Margot Lee Shetterly, an African-American writer then based in Mexico, returned to her hometown of Hampton, Virginia for a family visit. Her father, Robert B. Lee, having retired from a 40-year career in science at NASA's Langley Research Center, got to talking about the many friends and neighbors who'd worked at Langley over the years. "A lot of the women around here, black and white, worked as computers" at Langley, Lee recalled ([1]). Here, Shetterly's father was using the term *computer* in its original sense, to refer to a person who performs computations ([2]).

This conversation sparked Margot Lee Shetterly's curiosity about the history of the space program—and specifically, about the history of black women computers at Langley. In just a matter of days, she was "sitting on the couch in Katherine Johnson's living room, listening to a ninety-three-year-old with a memory sharper than mine recall segregated buses, years of teaching and raising a family, and working out a trajectory for John Glenn's spaceflight" (xv). Just six years later, millions of people know the story of Johnson—in the guise of Taraji P. Henson—and her NASA

colleagues, thanks to Theodore Melfi's blockbuster film, *Hidden Figures*. Moviegoers would do well to supplement that knowledge by reading the bestselling book on which the film is based.

For Shetterly, the journey from conversation to research to book to film took place with blazing speed. While research and writing were still underway in 2014, Shetterly obtained, almost at once, grants from the Virginia Foundation for the Humanities (VfH) and the Sloan Foundation, a book contract, and a movie deal ([3]). Just two years later, in what had to have been a breathless race to the finish, the book launched in September, followed by the film in December.

In the book, Shetterly relates the history of NASA's black women computers by focusing on three of the most noteworthy individuals: Dorothy Vaughan (1910–2008), Mary Jackson (1921–2005), and Katherine Johnson (1918–). Vaughan is portrayed—and rightly so—as the pioneer and leader around whom the others revolve. Intellectually precocious, she earned a BA in mathematics from Wilberforce University at 19 and embarked on a career in teaching. In 1943, at the height of World War II, Vaughan left her job at a segregated high school in Farmville, Virginia, and took up a position at what was then Langley Memorial Aeronautical Laboratory, run by the National Advisory Committee for Aeronautics (NACA), the precursor organization to NASA. Hired with the title of Mathematician, Vaughan's salary of \$2000 per year more than doubled her previous salary as a teacher. She was assigned to work in the newly-formed West Area Computing Group, an all-black cadre of female computers under the direction of a white supervisor, first Margery Hannah and then, beginning in 1947, Blanche Sponsler.

That Vaughan could be employed at NACA at all was thanks to a landmark event in the long struggle for black civil rights in America. In 1941, under pressure from A. Philip Randolph, Bayard Rustin, and other civil rights advocates and organizations, President Franklin Roosevelt issued Executive Order 8802, banning discrimination in the defense industry—an important first step toward banning discrimination in federal employment across the board. White women had worked as computers at Langley since 1935, but with the establishment of West Computing, black women began working as computers there, too.

While there was officially no discrimination in employment at Langley, Virginia was still a highly segregated Southern state. This posed some significant problems for Langley's increasing population of black employees. At first, the West computers were expected to sit at a separate table in the cafeteria, but as the war progressed they essentially

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rebelled against that expectation. The bathrooms posed a more serious obstacle, though as time wore on, many of Langley's black employees found ways to circumvent the rules.

In the years after the war, black women became a more visible presence at Langley. When Blanche Sponsler died in 1949, Dorothy Vaughan became the acting head of West Computing; in January 1951, she became the permanent head, thus becoming "the first black manager in all of the NACA's expanding national empire" (p. 92). During that same year, Mary Jackson, a 1942 graduate of Hampton Institute with a BS in mathematics, came to work for Vaughan at West Computing. Katherine Goble (later Johnson), a 1937 graduate of West Virginia State College in mathematics and French, joined Vaughan's team in 1953.

During the 1950s, many changes came to Langley, including a gradual move to disperse the computing staff to separate research teams. So, for example, Mary Jackson left West Computing in 1953 to work for Kazimierz Czarnecki on the Supersonic Pressure Tunnel. Jackson's transfer was entirely serendipitous. While on loan from West Computing to the predominantly white East Side, Jackson was incensed when she was unable to locate a suitable "colored" bathroom. "Still fuming as she walked back to West Computing later that day," Mary Jackson literally bumped into Czarnecki and

let loose a "Mach 2 blowdown of frustration and resentment" (p. 109). Czarnecki's response was to offer her a position in his group. Katherine Goble's time in West Computing was even shorter than Jackson's; after just two weeks she went out on loan to the Flight Research Division and never came back (pp. 121–122). Having come to Langley from West Virginia, Goble "didn't even realize [that Langley's] bathrooms were segregated" and generally refused to obey the bathroom rules (p. 129).

By far the most dramatic transition at Langley began in 1957. With the startling launch of the Soviet Sputnik satellite that fall, Congress moved to absorb the NACA into a new and more ambitious agency, the National Aeronautics and Space Administration (NASA). With the establishment of NASA in 1958, the West Computing unit was abolished entirely, and "Dorothy [Vaughan's] career as a manager came to an end" (p. 173). In her new job in the Analysis and Computation Division, she worked in a racially and sexually integrated group, not of computers, but of computer *programmers*. The advent of electronic computing, "[f]or better or worse ... signaled the beginning of the end of computing as women's work" (p. 205).

Dorothy Vaughan, Mary Jackson, and Katherine Goble Johnson continued to thrive at NASA, working there until 1971, 1986, and 1985, respectively. Vaughan's forte was FORTRAN programming, Jackson excelled as an aero-

CALL FOR NOMINATIONS

The 2019 Noether Lecture

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

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

The letter of nomination should include a one-page outline of the nominee's contribution to mathematics, giving four of her most important papers and other relevant information. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **October 15, 2017** and will be held active for three years. If you have questions, phone 703-934-0163 or email awm@awm-math.org.

nautical engineer, and Johnson famously verified the orbital trajectories for John Glenn's 1962 Friendship 7 mission. Indeed, "Katherine Johnson is the most recognized of all the NASA human computers, black or white," and in 2015 was awarded the Presidential Medal of Freedom (p. 250).

In relating this history, Shetterly interweaves personal stories with social, political, and institutional history. While her emphasis on personal narrative makes for compelling reading, scientific and historical detail is sometimes lost. It's not easy to glean, for example, just how many black women were employed as computers at Langley over the years, nor how the data for Langley compare to other NACA or NASA installations. And, perhaps because Shetterly is not trained in mathematics herself, she doesn't tell us much about what kind of mathematics the human computers actually did.

For the most part, these shortcomings seem understandable: this is, after all, Shetterly's first book, and uncovering this hitherto little-known history is a mammoth undertaking. But I think the challenge for Shetterly was unnecessarily compounded by selling the film rights so soon. It seems almost as if the film's schedule began to drive Shetterly's project, and the book may have suffered as a result. So, for example, the book contains no pictures of the Langley computers—securing photo permissions takes time, and printing photos can lead to production expense and delay—and there's no appendix providing a list of names or bio-

graphical information. Both Shetterly and NASA have built online repositories for photos and data ([4]); Shetterly's own site is clearly a work in progress.

Which brings us, at last, to the film *Hidden Figures*. I can state, unequivocally, that the film is powerful, moving entertainment, centered on the events leading up to the 1962 flight of John Glenn on Friendship 7. For dramatic purposes, many Langley events of the 1940s and 1950s are pushed into the 1961–62 time frame; so, for example, we find West Computing resuscitated and repopulated for the film. Taraji P. Henson's Katherine Goble Johnson stands at the film's dramatic center, while Janelle Monáe plays a rebellious, defiant Mary Jackson, and Octavia Butler plays the grounded, wise, and supremely competent Dorothy Vaughan. Kirsten Dunst and Jim Parsons are enlisted to play entirely fictional characters who place relentless obstacles in the way of Katharine Johnson's manifest competence. In particular, Johnson's struggle to deal with the fact that the colored women's bathroom is nearly a half-mile away from her desk is portrayed in vivid and visceral detail. And when Johnson's fictional boss, played by Kevin Costner, learns of her distress, he walks over to that very same bathroom and destroys the "Colored Women Only" sign in a fit of righteous indignation.

All this makes for great drama and contains much more than a kernel of truth. Certainly segregated bath-

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CALL FOR NOMINATIONS

Alice T. Schafer Mathematics Prize

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominee may be at any level in her undergraduate career, but must be an undergraduate as of October 1, 2017. She must either be a US citizen or have a school address in the US. The Prize will be awarded at the AWM Reception and Awards Presentation at the January 2018 Joint Mathematics Meetings in San Diego, CA.

The letter of nomination should include, but is not limited to, an evaluation of the nominee on the following criteria: quality of performance in advanced mathematics courses and special programs, demonstration of real interest in mathematics, ability for independent work in mathematics, and performance in mathematical competitions at the local or national level, if any.

With the letter of nomination, please include a copy of transcripts and indicate undergraduate level. Any additional supporting materials (e.g., reports from summer work using math, copies of talks, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. All nomination material is to be submitted as ONE PDF file via MathPrograms.Org with a copy of transcripts included at the end of the file. The submission link will be available 45 days prior to the deadline. Nominations must be received by **October 1, 2017**. If you have questions, phone 703-934-0163, email awm@awm-math.org, or visit www.awm-math.org.

rooms posed profound and painful obstacles to men and women of color throughout the Jim Crow South. Certainly black men and women faced mindless racism from the likes of characters like those played by Dunst and Parsons. And the real-life counterparts of the film's heroines struggled against the constraints of a society that denigrated their abilities and achievements. In a time of intensified racial animosity and political division, *Hidden Figures* carries an important message about the power of commitment, intellect, and justice in the face of the stubbornness of bigotry.

But in the film's compressed narrative, some more subtle civic lessons are lost. In the 1940s and 1950s, the Federal employment system provided unprecedented professional opportunity to black men and women in the United States. Long before the Civil Rights Act of 1964, this opportunity was unleashed by Roosevelt in Executive Order 8802 and continued by Presidents Truman and Eisenhower. By conflating the bigotry of the Sixties with the comparatively progressive policies of the Federal employment system, this otherwise masterful film serves to obscure the conditions under which the women of NACA and NASA actually worked. In an age of fake news and widespread civic cynicism, it's important to remember the times when the Executive branch of the Federal government has taken a clear leadership position in the name of social justice.

Notes

1. Shetterly, xi–xii. Subsequent page references are to Shetterly's text.
2. There's an extensive recent literature on the history of the human computing profession, which, until the rise of electronic computing, was generally dominated by women. For an excellent survey of this history, see Jennifer S. Light, "When Computers Were Women," *Technology and Culture*, 40:3 (1999); and David A. Grier, *When Computers Were Human* (Princeton University Press 2005). More recent books include Dava Sobel's *The Glass Universe* (Viking 2016), on women computers at the Harvard Observatory; and Nathalia Holt's *Rise of the Rocket Girls* (Little, Brown 2016), reviewed in the January/February 2017 issue of this *Newsletter*, on women computers at NASA's Jet Propulsion Laboratory.
3. The grants are mentioned on Shetterly's own website for the book, <http://www.hiddenfigures.com/bio/>. For the Sloan grant, see the Sloan Foundation Grants Database at <https://sloan.org/grants-database>; the

VfH grant funds "The Human Computers Project," as detailed at <http://virginiahumanities.org/2015/01/the-human-computers-project/>. For the book deal, see Rachel Deahl, "Book Deals for the Week of March 10, 2014," *Publisher's Weekly*, 10 March 2014, <http://www.publishersweekly.com/pw/by-topic/industry-news/book-deals/article/61357-book-deals-week-of-march-10-2014.html>. For the film script, see Pamela McClintock, "Making of *Hidden Figures*: Recreating the 60s to Tell an Untold Story of Space, Sexism, and Civil Rights," *Hollywood Reporter*, 10 January 2017, <http://www.hollywoodreporter.com/features/making-hidden-figures-how-taraji-p-henson-octavia-spencer-pharrell-williams-revisited-60s-t>.

4. Shetterly's main site for this data is *The Human Computer Project*, <http://thehumancomputerproject.com/>. NASA has a companion site, *From Hidden to Modern Figures*, at <https://www.nasa.gov/modernfigures>. NASA also maintains an historical site, *Human Computers*, with photos and a list of "women who began their careers at Langley as computers ... or worked as a computer at one time." See https://crgis.ndc.nasa.gov/historic/Human_Computers.

Ruth I. Michler Prize

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

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

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

The application deadline is November 1 for the award to be used during the 2018–19 academic year.



www.awm-math.org/michlerprize.html



Cornell University



EDUCATION COLUMN

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

Swan Song

Ginger Warfield, University of Washington, warfield@math.washington.edu

*How far that little candle throws his beams,
So shines a good deed in a naughty world.
Shakespeare, Merchant of Venice*

So also shines a good event in a murky world. I have just had such an event throw a considerable beam through the darkness in which, like many others, I have been wading this winter. And thereby hangs a tale:

A number of years ago I wrote an education column for this *Newsletter* that was in effect an ode to conversation. I had been observing conversations large or small, planned or unplanned, and I was quite enthusiastic about the benefits thereof. My centerpiece for that column was WaToToM, or **Washington Teachers of Teachers of Mathematics**. This was a newly minted organization that had been formed simply for the reason that all over the state folks in Higher Education were teaching future teachers of mathematics and none of us had a clue what the others were doing. When people asked me why I was assembling this bunch my only reply was “We need to talk to each other.” Before our first gathering it became clear that in order for the conversation to remain grounded it needed to include some classroom teachers and someone from the Office of the

Superintendent of Public Instruction (OSPI), so we did that. By the end of the first weekend gathering there was universal agreement that this needed to go on happening. Since then we have met every year. Conversations have run the gamut from calm and earnest discussions of how to construct a program for mathematics specialists in elementary schools to passionate outcries over the need for stronger mathematical background requirements for future teachers, but they have never slowed or lost their fascination. In the process we have enabled several colleges to open up some very strong course sequences, responded to questions posed by sundry state agencies, supplied many members for a hard-working committee that revised the state’s K–12 Standards (almost immediately replaced by the Common Core, but that’s another story!) and developed a very strong relationship with OSPI that has been beneficial in both directions.

The downside in recent years, though, has been a diminution in numbers, starting when the bottom fell out of the economy and continuing as people’s conflicting professional opportunities have increased. This year our numbers were so low that I spent the week before the gathering (or conference, as they came to be called) wondering whether I should have cancelled it.

I didn’t—and what a mistake it would have been. Conversations—good, lively, productive conversations—began at the Friday evening dinner and were still going on as the threat of snow drove us rather hastily out on Sunday morning. The K–12 teachers were fascinated to learn that college students don’t necessarily know how to write a proof, and the higher ed contingent had its collective mind blown

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CALL FOR PROPOSALS

Research Collaboration Conferences for Women

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

Mathematicians interested in organizing the first conference of a new RCCW are invited to submit a proposal to the AWM describing the conference topic, potential co-organizers and project leaders, and potential participants. Proposals should be no more than one page (PDF files only, please), and should be sent to awm.rccw@gmail.com. Deadlines for submission: **January 1** and **July 1** annually.

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

by some of the things that happen to order of operations in the fourth grade; all of us happily grilled our very helpful OSPI representative about what's going on at the school level all over the state. I even learned some very heartening things about developments, especially at my own university, on the subject that currently dominates my passions, which is racial justice and equity.

In all, as I said, a weekend whose glow brightened my life considerably. This was particularly a boon in that this was my swan song as person in charge of WaToToM. After twenty gatherings I am turning the reins over to my excellent Executive Committee—and it is very heartening to turn it over with the conversations still as compelling, passionate and just plain fun as they were nineteen years ago.

And, for a spot of recursiveness, this column is a swan song about a swan song. Retirement has many benefits, but it turns out to be leaving me too disconnected from current events to have anything profound, amusing or even relevant to contribute. So with many thanks to AWM for having permitted me to have my say for a couple of decades, what I am saying this time around is—good-bye!

Education Column Editor's Note—

Ginger Warfield served as editor of the Education Column from 1998 through 2006 during which time (by my count) she herself wrote 45 columns. Since 2007, the

Education Column has had a group of contributors, including Warfield, each assigned to write one column per year. Thus, she has written an additional 11 columns, bringing her total to 56. This past week I looked at each of them in the *Newsletter* archives. Over the years she has informed us about special programs, panels, and reports related to mathematics education, discussed hot button issues such as the Math Wars and testing, and described innovative lessons and assignments. I noticed that the value of conversation was a theme she returned to over and over (see, for example, May–Jun 2000, Jan–Feb 2004, Sep–Oct 2004). How fitting that her closing column revisits this. I am sure that all newsletter readers join me in saying, “Thank you, Ginger!” for sharing your insights and experiences these many years.

AWM Supports Active Learning Statement

The presidents of 15 professional societies in the mathematical sciences, including AWM, have signed a statement of support of active learning in post-secondary mathematics. The statement was published by the Conference Board of the Mathematical Sciences (CBMS) on July 15, 2016. The statement explains that its use of the phrase active learning refers to “classroom practices that engage students in activities, such as reading, writing, discussion, or problem solving, that promote higher-order thinking.” It calls on “institutions of higher education, mathematics departments and the mathematics faculty, public policy-makers, and

CALL FOR NOMINATIONS

The Association for Women in Mathematics Dissertation Prize

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

To be eligible for the award a graduate student must have defended her dissertation within the last two years (October 1, 2015 to September 30, 2017). She must either be a US citizen or have a school address in the US. The Prizes will be presented at the AWM Reception and Awards Presentation at the Joint Mathematics Meetings in San Diego, CA, January 2018.

The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional mathematical research presented in the dissertation; 2) a curriculum vitae of the candidate not to exceed three pages; 3) a copy of the dissertation and 4) two letters supporting the nomination. Nomination materials should be submitted online at MathPrograms.org. The submission link will be available 45 days prior to the nomination deadline. Nominations must be received by **October 1, 2017**. If you have questions, phone 703-934-0163, email awm@awm-math.org, or visit www.awm-math.org.

funding agencies to invest time and resources to ensure that effective active learning is incorporated into post-secondary mathematics classrooms.” It also encourages “professional societies and funding agencies to continue their support of training and resources for the use of active learning.”

The statement is accompanied by a four-page background paper and extensive bibliography. It notes that support for active learning is found in many studies.

A 21-person writing team from CBMS organizations, chaired by Benjamin Braun of the University of Kentucky, developed the statement. The co-chairs of AWM’s Education Committee, Jacqueline Dewar and Pao-sheng Hsu, were members of the writing team. The statement is available at http://www.cbmsweb.org/Statements/Active_Learning_Statement.pdf.

ICIAM Olga Taussky-Todd Lecture 2019

Maria J. Esteban, ICIAM President

The Olga Taussky-Todd Lecture is held every four years at the International Congress on Industrial and Applied Mathematics (ICIAM). This honor is conferred on a woman who has made outstanding contributions in applied mathematics and/or scientific computation. The lecture is named in tribute to the memory of Olga Taussky-Todd, whose scientific legacy is in both theoretical and applied mathematics and whose work exemplifies the qualities to be recognized. The Officers and Board of ICIAM now call for nominations for the Olga Taussky-Todd Lecture, to be given at the ICIAM 2019 congress, to take place in Valencia (Spain) from July 15 to July 19, 2019.

A nomination will consist of: full name and address of person nominated; web home page if any; justification for nomination (in at most two pages, cite nominator’s reason for

considering candidate to be deserving, including explanations of the scientific and practical influence of the candidate’s work and publications); two or three letters of support from experts in the field (not mandatory; each having a maximum length of two pages); CV of the nominee; and name and contact details of the proposer.

Nominations should be made electronically through the website <https://iciamprizes.org/>. The deadline for nominations is **September 30, 2017**. Contact president@iciam.org if you have any question regarding the nomination procedure.

The Olga Taussky-Todd Committee for 2019 is: Liliana Borcea, Chair (University of Michigan); Raymond Chan (The Chinese University of Hong Kong); Ingrid Daubechies (Duke University); Nick Higham (University of Manchester); Sofia C. Olhede (University College London); and Anna Karin Tornberg (KTH, Stockholm).

ICIAM, the International Council for Industrial and Applied Mathematics, is the world organization for applied and industrial mathematics. Its members are mathematical societies based in more than 30 countries. For more information, see the Council’s web page at <http://www.iciam.org/>.

NSF-AWM Travel Grants for Women

Mathematics Travel Grants. The objective of the NSF-AWM Travel Grants is to enable women mathematicians to attend conferences in their fields, which provides them a valuable opportunity to advance their research activities and their visibility in the research community. Having more women attend such meetings also increases the size of the pool from which speakers at subsequent meetings may be drawn and thus addresses the persistent problem of the absence of women speakers at some research conferences. The Mathematics Travel Grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant’s field of specialization.

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians appointed by the AWM. A maximum of \$2300 for domestic travel and of \$3500 for foreign travel will be funded. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

Eligibility and Applications. Please see the website (<http://www.awm-math.org/travelgrants.html>) for details on eligibility and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

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

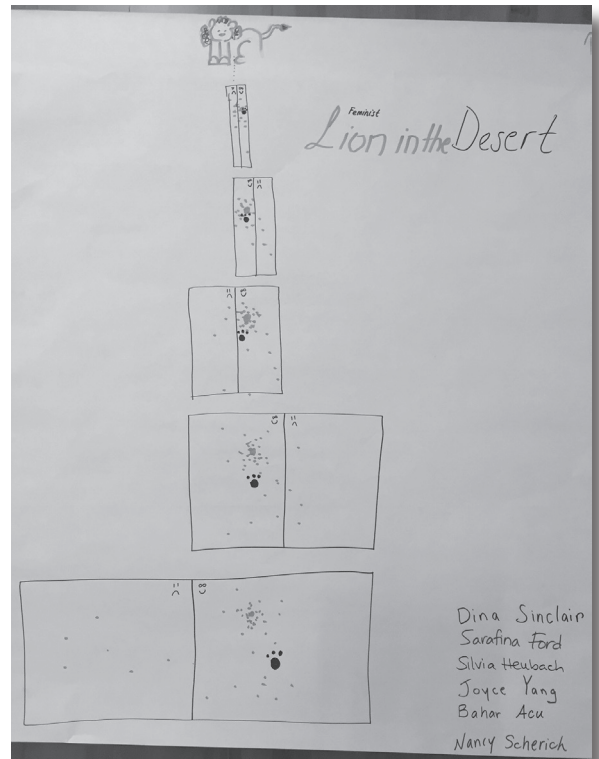
WiMSoCal 2017

Cymra Haskell, University of Southern California

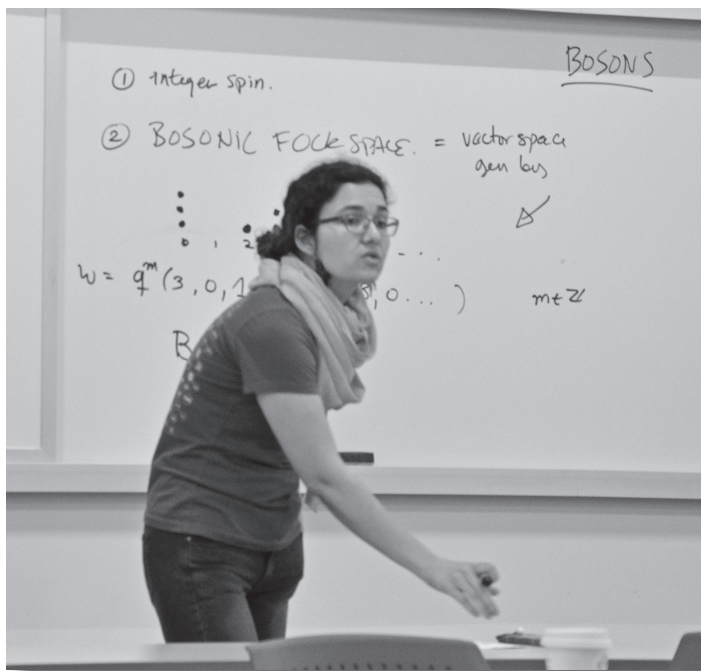
On Saturday, February 11, approximately 90 women mathematicians descended upon the University of Southern California for the 10th annual regional conference for women in mathematics in southern California known, playfully, as the WiMSoCal symposium. It's hard to believe we've been doing these for 10 years! It has become a highlight of the year: a time to catch up with old friends, meet new friends, and watch as the next generation of undergraduates and graduate students move on to become colleagues.

Since lunch was planned as an outdoor event, the light drizzle in the morning caused the organizers some anxiety, but southern California didn't let us down and the sun came through by 8 a.m., providing a glorious day for the event.

Participants ranged from undergraduates to senior faculty. The symposium provided senior women the opportunity to see friends too often neglected, meet new mathematicians recently arrived in southern California, share their research, and shape the up-and-coming generation of mathematicians. Younger mathematicians obtained a broader outlook both on their field and on what it means to be a mathematician, had the opportunity to give a professional talk on their research, and were welcomed



One group's work



Nicolle Sandoval Gonzalez, graduate student at USC, delivers her talk

into a greater community of women mathematicians. Everyone enjoyed the rare opportunity to be among a large group of women with a passion for mathematics and life.

The program was lively with four simultaneous sessions of contributed talks in the morning and afternoon. Research talks covered the gamut of algebra, geometry, topology, analysis, numerical analysis, applied mathematics, and statistics. Graduate students and even some undergraduates tried their hand at giving a research talk and more seasoned mathematicians were able to share their research interests with the southern California community. Speakers did a wonderful job at making their talks accessible to a broad audience while still conveying their results.

After lunch the keynote speaker Professor Sami Assaf delighted the audience with a keynote address on "Thinking Inside the Box."

Breakout groups in the late morning provided a more intimate bonding experience. This year we engaged our mathematical and artistic personalities in creating proofs without words. Posters created by the groups filled the hallway downstairs to be enjoyed by everyone over wine and cheese in the afternoon. One group produced a video of the Bolzano-Weierstrass theorem.



Kimberly Ayers and Cymra Haskell



An amused audience

Good food is always a recipe for a successful event. Due to a last-minute generous contribution from Professor Aaron Lauda's NSF Career Award, we had good food in abundance and feasted at lunchtime on sushi, sashimi, noodles, salad and grilled meat and chicken. Some of us took our piled plates upstairs to discuss issues facing women mathematicians and broader questions about diversity, both in and outside the classroom.

At the end of the day everyone was happy, exhausted and grateful to relax over wine and cheese before heading home. A full program of WiMSoCal 2017 can be found at <http://dornsife.usc.edu/conferences/wimsocal2017/>. For those

of you in Southern California, look for WiMSoCal 2018, hosted by Courtney Davis at Pepperdine University!

Regional conferences are a great way to foster direct interactions between women mathematicians at all stages in their careers. They are easy to organize and are quite inexpensive; we have found that institutions are usually happy to have the opportunity to increase their visibility and foster diversity in their communities and have been generous with funds. Why not organize one yourself in your area? If you are interested in doing this, send an email to Cymra Haskell at chaskell@usc.edu; she'll help you through the process!

CALL FOR NOMINATIONS

The 2018 Etta Z. Falconer Lecture

The Association for Women in Mathematics 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 Terng, Audrey Terras, Pat Shure, Annie Selden, Katharine P. Layton, Bozenna Pasik-Duncan, Fern Hunt, Trachette Jackson, Katherine St. John, Rebecca Goldin, Kate Okikiolu, Ami Radunskaya, Dawn Lott, Karen King, Pat Kenschaft, Marie Vitulli, Erica Walker and Izabella Laba.

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

AWM WORKSHOP AT THE 2018 JOINT MATHEMATICS MEETINGS

Application deadline for graduate students: **August 15, 2017**

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings. New in 2016 and going forward is that the workshop talks are supported by the AWM ADVANCE grant. The AWM Workshops serve as follow-up workshops to Research Collaboration Conferences for Women, featuring both junior and senior women speakers from one of the Research Networks supported by the ADVANCE grant. An AWM Workshop is scheduled to be held in conjunction with the Joint Mathematics Meetings in San Diego, California, January 10–13, 2018.

FORMAT: The workshop will consist of a Special Session focused on Noncommutative Algebra and Representation Theory organized by Anne Shepler and Sarah Witherspoon, and a Poster Session for graduate students. Selected junior and senior women from the Research Collaboration Conferences for Women (RCCW) WINART, which was held at BIRS in April 2016, will be invited to give 20-minute talks in the Special Session on Noncommutative Algebra and Representation Theory. The speakers will be supported by the National Science Foundation AWM ADVANCE grant: Career Advancement for Women Through Research Focused Networks. The Poster Session will be open to all areas of research and graduate students working in areas related to Noncommutative Algebra and Representation Theory are especially encouraged to apply. The graduate students will be selected through an application process to present posters at the Workshop Reception & Poster Session. With funding from NSF, AWM will offer partial support for travel and hotel accommodations for the selected graduate students. The workshop will include a reception, luncheon and a mentoring session where workshop participants will have the opportunity to meet with other women mathematicians at all stages of their careers. In particular, graduate students in Noncommutative Algebra and Representation Theory will have the opportunity to connect with the Women in Noncommutative Algebra and Representation Theory (WINART) Research Network.

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

MENTORS: We also seek volunteers to act as mentors for workshop participants, in particular the graduate students. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by **September 15, 2017**.

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

All applications should include:

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

Applications (including abstract submission via the Joint Mathematics Meetings website) must be completed electronically by **August 15, 2017**. See <https://sites.google.com/site/awmmath/programs/workshops> for details.

Equations of Peace

Zeinab Bandpey, Morgan State University, Baltimore

In March, as a female mathematician, skilled astronomer and noted professor left her university near Cairo, a mob surrounded her. They brutally attacked and killed her, burning her body. The thought of a woman engaging in philosophy and mathematics may have so outraged local religious leaders that there was no penalty for her killer.

This happened 1500 years ago, but even through today, religious issues, ethnic prejudices, and political divisions have historically prevented the progress of women in science and society in general.

Three years ago, when I wrote my first “Equations of Peace” article, I was annoyed that when I needed to find a book for my research in mathematics, *Introduction to Lattices and Order*, by H.A. Priestley, a professor at Oxford University, I was unable to get it easily, if at all, because of sanctions against my home country, Iran: Many websites that sell books online do not ship to Iran. Now after almost two years of being in the United States, I can easily access any book I need for my research projects but I am unable to travel to other countries, including my home country, to present my research to my coworkers.

This is a shame. H.A. Priestley is one of those rare creatures, a prominent female mathematician who would motivate other women to make contributions to math, yet alas students in Iran have a hard time getting her book!

Of course, politics and religion have adversely affected male mathematicians, too: I was told that the Iranian logician Jamshid Derakhshan, who started a doctorate at Oxford University at age 17, had also considered attending the University of California at Berkeley, but there was no US embassy in Iran. And the UC Berkeley mathematician Edward Frenkel, who became a professor of mathematics at Harvard at age 21, describes how he could not get into one university in Russia because of anti-Semitism. But female mathematicians can face additional barriers.

Mathematics has always been my passion and doing it my ambition since I was a child. It has always occupied most of my time and I never had any desire in my life other than to be a mathematics researcher. In chasing my passion, I tried very hard and was fortunate enough to be admitted to one of the top ten universities in Iran; I got my bachelor's and master's degrees in mathematics and I moved to America to work on my PhD. During the years of my studies I have been enjoying achievements like generalizing a result about “perfect terrorist cells” by the renowned combinatorialist



Zeinab Bandpey

Chvátal and three computer scientists from McGill University (including Perouz Taslakian, a woman who became a professor in Iran's neighbor, Armenia) and winning the Award for Excellence sponsored by the Maryland software company vCalc, yet I have been repeatedly confronted with various kinds of stereotypes and ethnic prejudices. They bothered me, very much, but they could never stop me from achieving my goals.

In 2005, the president of Harvard University gave his own thoughts concerning why “Professor Priestleys” are so rare, why at that time there were no women amongst the winners of the Fields Medal: 90% of the winners of international Olympiads in mathematics, physics and chemistry are male and 98% of Nobel laureates in physics. Such statistics may lead one to believe that men are more talented than women in mathematics.

Hypatia, the mathematician from Egypt, and recently Maryam Mirzakhani, the very first female Fields medalist (and fellow Iranian), might lead us to posit otherwise.

Researchers at the University of Wisconsin at Madison examined the level of knowledge and performance of students in different countries and compared math scores of male and female students. [1] In Sweden, Norway, and New Zealand, there is practically no difference between boys and girls in terms of mathematical skills and talents. So the biological thesis is refuted.

Researchers who have studied standardized test results country by country have found that the gender gap in mathematics is much smaller—or non-existent—in societies that benefit from more gender equality. For example,

continued on page 20

Sweden, Norway, and New Zealand are amongst the top seven countries in the world in terms of gender equality.

I urge you to close your eyes and imagine a world in which women of different colors and nationalities, regardless of any restrictions due to religious and ethnic prejudice and the political war of governments, are able to work on mathematical matters. A world where the number of women in mathematics is not less than the number of men. A world in which there is more than one Maryam Mirzakhani. Imagine a world where a human being can travel anywhere with ease, acquire any book, in order to do research. Imagine equations of peace.

This dream excites me not just because I use my mathematics to analyze, and thus hopefully help prevent, terrorism, [2] but also because of a program called Equations of Peace [3] that brings together female mathematicians from cultures and countries that seem far apart because of religious or political divisions. We can indeed use mathematics and science to bridge the divide between the Muslim and non-Muslim worlds.

For my part, I am doing my best to conduct research and continue my education in a public research university and historically black college (HBCU), and also I will do my best to attract more women into the field of mathematics. [4, 5]

The rise of women's rights will result in both boys and girls being more gifted in math in coming generations. This will benefit our world as a whole, and it will help make our world whole.

Notes

1. "New Trends in Gender and Mathematics Performance: A Meta-Analysis" by Sara M. Lindberg, Janet Shibley Hyde, and Jennifer L. Petersen, University of Wisconsin – Madison and Marcia C. Linn, University of California – Berkeley. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3057475/>
2. "Math whiz fights terror with smarts" by Cathryn M. Delude, News Office Correspondent, April 6, 2005, MIT News, gives one example of possible uses of mathematics in fighting terrorism. Jonathan Farley's use of lattice theory to analyze social networks might lead to combating terrorists with abstract theory, more accurately assessing our vulnerability to future attacks than current methods. See <http://news.mit.edu/2005/math-terrorism-0406>.
3. <http://www.equationsofpeace.org/>
4. <http://news.morgan.edu/morgan-students-creation-helps-iranian-workforce-calculate-holiday-bonuses/>
5. <http://news.morgan.edu/morgans-team-of-scholars-takes-third-place-in-hbcu-battle-of-the-brains/>

Awards at JMM

Congratulations to those cited below for their awards from organizations other than AWM presented at the JMM in Atlanta, GA in January! The extracts below are reprinted from "January 2017 Prizes and Awards" (see www.ams.org/profession/prizes-awards/PrizeBooklet-2017.pdf). For full citations, descriptions of the prizes, biographical data and responses, visit the web.

Deborah and Franklin Tepper Haimo Distinguished Teaching Awards (MAA)

Janet Heine Barnett

A 2017 Haimo Award goes to Janet Barnett for her outstanding successes in the undergraduate classroom, important scholarly and curricular work in the history of mathematics, and for her substantial impact on secondary mathematics education in her native southeastern Colorado.... Through her interest in the history of mathematics, Janet has become an international leader in efforts to teach mathematics using

primary historical sources. She has also led efforts in her region to train mathematics teachers and to get secondary students interested in mathematics.

Strong evaluations from students praise her approachability and helpfulness, saying that she is kind and generous as she works to help the students through the difficult material of her courses....

Caren Diefenderfer

For her work as an outstanding teacher and leader both as a professor at Hollins University and in the larger mathematical community, Caren Diefenderfer is recognized with a 2017 Haimo Award. Her contributions to the teaching of mathematics are deep and broad....

At Hollins University, Caren has distinguished herself as a well-loved professor who teaches a broad range of mathematics courses. In addition to her success with the standard curriculum (students write poems about her linear algebra class), she has designed and taught eight special topics courses in mathematics, and supervised forty-nine senior mathematics projects.... Students of many different interests and abilities speak enthusiastically of her influence on their lives....

Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service (MAA)

Martha J. Siegel

The 2017 Gung and Hu Award goes to Martha J. Siegel for her remarkable leadership in guiding the national conversation on undergraduate mathematics curriculum, particularly as it is affected by fields in applied mathematics, and especially from the perspective of the Mathematical Association of America and its mission....

Martha's support of a multitude of MAA initiatives has been far reaching. She was a member of the MAA Executive Committee from 1991 to 2010, serving first in the role of editor of *Mathematics Magazine*, and subsequently as Secretary of the Association for more than fourteen years. In the latter capacity, in particular, she not only shaped the agenda of the Association for many years, but she influenced a generation of MAA leaders (including eight MAA presidents and two executive directors) through her model leadership, stewardship, and commitment to the profession.

Upon leaving her long-time post as Secretary, rather than settle into a much-deserved quieter life, Martha took on the role of chair of the high-profile Committee on the Undergraduate Program in Mathematics as that committee began the process of updating the MAA Curriculum Guide to Undergraduate Majors in the Mathematical Sciences for 2015. This work involves coordination of a large number of stakeholders and requires great leadership to get them working toward a common goal. In many ways, Martha is ideally suited to this role. Her deep understanding of mathematics curriculum and pedagogy, and her ability to connect people of common interests have not only brought the most recent CUPM project to a successful conclusion, but have also had a profound influence on the greater MAA and the mathematics community, in general....

JPBM Communications Award

Siobhan Roberts

The 2017 JPBM Communications Award for Expository and Popular Books is presented to Siobhan Roberts for her engaging biographies of eminent mathematicians and articles about mathematics that are appreciated by the general public and scientific audiences alike. The acclaimed biographies *King of Infinite Space* (about H. S. M. Coxeter) and *Genius at Play* (about John Horton Conway) bring her subjects to life and make the importance of their mathematical accomplishments accessible to all.

The Ruth Lyttle Satter Prize (AMS)

Laura DeMarco

The 2017 Ruth Lyttle Satter Prize in Mathematics is awarded to Laura DeMarco of Northwestern University for her fundamental contributions to complex dynamics, potential theory, and the emerging field of arithmetic dynamics.

In her early work, DeMarco introduced the bifurcation current to study the stable locus in moduli spaces of rational maps, and she constructed a dynamically natural compactification of the moduli spaces with tools from algebraic geometry, potential theory, and geometric topology. Both ideas were groundbreaking, opening new directions of research in complex dynamics. In recent joint work with M. Baker, she formulated a far-reaching conjecture about arithmetically special points in these moduli spaces.... They proved cases of the conjecture with methods involving a remarkable confluence of ideas from complex dynamics and disparate fields such as logic, number theory, and analysis on Berkovich spaces. With K. Pilgrim, she has constructed new invariants of polynomial maps in terms of metric trees and additional planar topological information. This led to two striking results, one on the algorithmic enumeration of cusps for certain curves in the space of cubic polynomials, addressing a problem first formulated and studied by J. Milnor, and the other a generalization of the well-known theorem that the Mandelbrot set is connected. Finally, in her most recent work, she has established direct connections between the theory of bifurcations in complex dynamics and the study of rational points on elliptic curves.

Leroy P. Steele Prize (AMS)

Dusa McDuff and Dietmar Salamon

Dusa McDuff and Dietmar Salamon are awarded the Steele Prize for Mathematical Exposition for their book *J-Holomorphic Curves and Symplectic Topology*, AMS Colloquium Publications, 52, 2004. The field of symplectic topology went through a rapid phase of development following Gromov's 1985 paper that introduced J -holomorphic curves into symplectic topology and intertwined this field with algebraic geometry and string theory. Techniques revolving around J -holomorphic curves have been a basic ingredient in the solution of many classical and crucial questions in symplectic topology as well as in the discovery of new structures. More than thirty years after its publication the influence of Gromov's paper in the rapidly developing field of symplectic topology is as strong as in the beginning and many of the most exciting research topics in the field (like, for example, mirror symmetry) involve in one way or another the notion of a J -holomorphic map....

Announcements

AMS News

Inclusion/exclusion blog

A new AMS blog has debuted at <http://blogs.ams.org/inclusionexclusion/>. The inclusion/exclusion blog will cover issues pertaining to marginalized and underrepresented groups in mathematics. The editor-in-chief, **Adriana Salerno** (Bates College), and editors **Edray Goins** (Purdue University), **Brian P. Katz** (Augustana College), **Luis Leyva** (Vanderbilt University) and **Piper Harron** (University of Hawaii at Manoa) hope that the blog will help develop a more inclusive, supportive, and diverse community of mathematicians.

Read the first posts: “Inclusion/Exclusion Principle,” “Hidden Figures: How and Why We Brought it to the 2017 JMM,” and “Hands Off My Confidence.” Future topics may include: conferences targeted at underrepresented groups, inclusive teaching strategies, summaries of current educational research, features about inspiring and successful mathematicians from underrepresented groups, and advice for students, faculty, and researchers at all levels.

The AMS invites readers to subscribe to the blog to receive notifications of new posts by email and also to join in the conversations by posting comments.

Another new blog

Capital Currents (<http://blogs.ams.org/capitalcurrents/>) is a new AMS blog written by Washington Office Director **Karen Saxe**. Her posts will include information on activities in Congress that affect the mathematics community and the broader science community, and about opportunities for engaging with Congress and other policy-makers. Visitors to the blog can keep up with regular news and with information about the AMS Washington Office’s work.

Saxe has already written two blog posts: one gives an overview of the Washington office, and the other describes how now is the time to contact Congress about NSF funding (and explains how to do that).

Readers can subscribe to the blog via email so that they receive notifications of new posts by email, or subscribe to an RSS feed. Both options are available in the right column of the blog.

New AMS prize

The AMS has a new prize: The Bertrand Russell Prize of the AMS. The prize was established by Thomas Hales, University of Pittsburgh, and honors research or service contributions of mathematicians or related professionals to promoting good in the world and recognizes the various ways that mathematics furthers human values. The \$5000 prize will be awarded every three years.

The nomination process for the 2018 prize is underway; nominations will be accepted through **June 30, 2017**. See <http://www.ams.org/profession/prizes-awards/russell-prize>.

Conferences

US News STEM Solution National Leadership Conference

Over three days, May 24–26, 2017, more than 1000 leaders in the STEM fields will converge on San Diego for this sixth annual National Leadership Conference to address challenges and solutions in the nationwide STEM debate and contribute key insights to propel the movement forward into the near future and beyond. STEM Solutions gathers the brightest minds in business, academia and government to ensure STEM continues its upward surge of momentum.

Through an engaging schedule of keynote speakers, roundtable discussions and breakout sessions, this highly regarded national conference—consistently ranked for the quality and caliber of its speakers and content—is poised to continue to call attention to the STEM pipeline challenge and the shortage of skilled workers in the STEM fields. As an advocate for this important cause, your support is needed to spread the message. Secure your seat at the table and join this important discussion. See www.usnewsstemsolutions.com.

AWM is a Supporting Organization for this conference and has been given a table top in the exhibit area as well as complimentary registration for AWM members; the deadline for free registration has passed.

Women in Statistics & Data Science

The 2017 Women in Statistics and Data Science conference will be held October 19–21, 2017, in La Jolla, CA. It will offer attendees opportunities to grow their influence, their community, and their knowledge.

Women in industry, academia, and government at all

Visit www.awm-math.org for the latest news!

stages of their careers—from graduate students to experienced leaders—will present their work and share their perspectives on the role of women in statistics and data science. See <https://ww2.amstat.org/meetings/wds/2017/index.cfm>.

2017 Mentoring Institute: Call for Proposals

The Mentoring Institute at UNM is pleased to announce its 10th Annual Mentoring Conference. We invite faculty, staff, and students of higher education, researchers, K–12 educators, community leaders, administrators, non-profit partners, government agencies, and other professionals to participate in this five-day event. Together, we will develop dynamic conversations and networking opportunities through hands-on workshops, individual/panel presentations, and plenary sessions. We aim to foster engagement among scholars and professionals in the fields of mentoring, coaching, and leadership.

The conference will be held October 23–27, 2017 at the University of New Mexico, Albuquerque, NM, in the Student Union Building.

This year's conference theme is "A Decade of Cultivating an Inclusive Mentoring Community: Developmental Networks for Innovation, Achievement, and Transformation." We seek to facilitate discourse on the effectiveness of developmental networks and on the importance of mentoring and coaching relationships for community building.

We are particularly keen to receive proposals that are informative and relevant to the field of developmental relationships, supported by theory and research. The term developmental networks includes, but is not limited to mentoring, coaching, networking, and sponsorship relationships. We also need peer reviewers and other volunteers. See <http://mentor.unm.edu/conference/>.

Association for Women in Mathematics: Executive Director

The Association for Women in Mathematics is seeking applicants for the position of Executive Director.

The AWM is dedicated to achieving full participation and equity for women and girls in the mathematical sciences. In support of this mission, AWM seeks to promote awareness and recognition of women's achievements in the mathematical sciences, to administer programs that encourage women and girls to study and have careers in mathematics, and to build community among all mathematical scientists. AWM currently has more than 5000 members (women and men) representing a broad spectrum of the mathematical community—from the United States and around the world. AWM is one of 17 member societies of the Conference Board of the Mathematical Sciences.

This position requires the applicant to hold an advanced degree, preferably a PhD, in the mathematical sciences, broadly construed. The Executive Director will be expected to supervise volunteers, programs, and activities, to work with volunteers in preparing grant proposals and grant reports, to assist with fundraising efforts and membership drives, to represent the AWM at some major mathematics conferences, to prepare press releases and announcements, and to supervise management. The Executive Director will work closely with the AWM President, Executive Committee, and staff.

This is a part-time position for a (renewable) term of two years that may be combined with an existing academic appointment. The term begins on January 1, 2018 (but a paid training period could begin in early fall 2017). The AWM office is in Fairfax, VA, but the geographic location of the Executive Director is flexible. Ultimately, we seek an accomplished individual who is passionate about supporting women in mathematics.

Review of applications will begin on **June 1, 2017** and will continue until the position is filled. Applicants are asked to describe why they feel well suited to this position and how this position could best fit with their existing plans. A letter of application, a curriculum vitae/résumé describing employment history, and contact information for at least three people willing to be called upon to provide a reference should be sent as one single PDF file to ami_radunskaya@pomona.edu.

For more information about AWM, please visit our website at <http://www.awm-math.org/>.

AWM is an Equal Opportunity, Affirmative Action Employer.

AWM WORKSHOP AT THE 2018 SIAM ANNUAL MEETING

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

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

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

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

MENTORS: We also seek volunteers to act as mentors for workshop participants, in particular the graduate students. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by February 1, 2017.

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

All applications should include:

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

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

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Workshops 2017 - 18

Connections for Women: geometry and probability in high dimensions

August 17, 2017 - August 18, 2017

Organized By: Shiri Artstein* (Tel Aviv University), Marianna Csornyei (University of Chicago), Eva Kopecka (University of Innsbruck), Elisabeth Werner (Case Western Reserve University)

Introductory Workshop: phenomena in high dimensions

August 21, 2017 - August 25, 2017

Organized By: Alexander Koldobsky (University of Missouri), Michel Ledoux (University of Toulouse), Monika Ludwig (Technische Universität Wien), Alain Pajor (Université de Paris Est Marne-la-Vallée), Stanislaw Szarek (Case Western Reserve University), Roman Vershynin* (University of Michigan)

Connections for Women: Geometric and Topological Combinatorics

August 31, 2017 - September 1, 2017

Organized By: Federico Ardila (San Francisco State University), Margaret Bayer (University of Kansas), Francisco Santos (University of Cantabria), Cynthia Vinzant* (North Carolina State University)

Introductory Workshop: Geometric and Topological Combinatorics

September 5, 2017 - September 8, 2017

Organized By: Imre Barany (Hungarian Academy of Sciences (MTA)), Anders Björner (Royal Institute of Technology (KTH)), Ben Braun* (University of Kentucky), Isabella Novik (University of Washington), Francis Su (Harvey Mudd College), Rekha Thomas (University of Washington)

Connections for Women: Enumerative Geometry Beyond Numbers

January 18, 2018 - January 19, 2018

Organized By: Barbara Fantechi (Sissa), Chiu-Chu Melissa Liu* (Columbia University)

Introductory Workshop: Enumerative Geometry Beyond Numbers

January 22, 2018 - January 26, 2018

Organized By: Denis Auroux (University of California, Berkeley), Chiu-Chu Melissa Liu* (Columbia University), Andrei Okounkov (Columbia University)

Connections for Women: Group Representation Theory and Applications

February 1, 2018 - February 2, 2018

Organized By: Karin Erdmann (University of Oxford), Julia Pevtsova* (University of Washington)

Introductory Workshop: Group Representation Theory and Applications

February 5, 2018 - February 9, 2018

Organized By: Robert Guralnick (University of Southern California), Gunter Malle (TU Kaiserslautern)

www.msri.org/workshops

The Institute is committed to the principles of Equal Opportunity and Affirmative Action. Students, recent Ph.D.'s, women, and minorities are particularly encouraged to apply. Funding awards are typically made eight weeks before the workshop begins.

Requests received after the funding deadlines are considered only if additional funds become available.

Workshops funded by the National Science Foundation, private foundations, and generous individuals.



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ICERM



The Institute for Computational and Experimental
Research in Mathematics

FALL 2018 SEMESTER PROGRAM

Nonlinear Algebra

September 5 – December 7, 2018

Organizing Committee:

Dan Bates, Colorado State University

Sandra Di Rocco, Royal Institute of Technology

Jonathan Hauenstein, University of Notre Dame

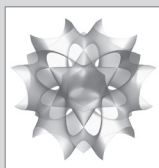
Anton Leykin, Georgia Tech

Frank Sottile, Texas A&M University

Mike Stillman, Cornell University

Cynthia Vinzant, North Carolina State University

Program Description:



The theory, algorithms, and software of linear algebra are familiar tools across mathematics, the applied sciences, and engineering. This ubiquity of linear algebra masks a fairly recent growth of nonlinear algebra in mathematics and

its applications to other disciplines. The proliferation of nonlinear algebra has been fueled by recent theoretical advances, efficient implementations of core algorithms, and an increased awareness of these tools.

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

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

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WOMEN IN MATHEMATICS

2017–2018 Rates: Institutions

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Category 3 \$200

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<http://www.awm-math.org>
awm@awm-math.org

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.

The AWM *Newsletter* is published six times a year. If you have questions, contact AWM at awm@awm-math.org, (703)934-0163, or visit our website at: <http://www.awm-math.org>.

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Graduate Undergraduate

If not employed, leave position and institution blank.

DEGREES EARNED:

Degree(s)

Institution(s)

Year(s)

Doctorate: _____

Master's: _____

Bachelor's: _____

Individual Dues Schedule

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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	<i>Please indicate regular family member: _____</i>		
<input type="checkbox"/>	CONTRIBUTING MEMBERSHIP (includes designation of a free student membership)	\$150	_____
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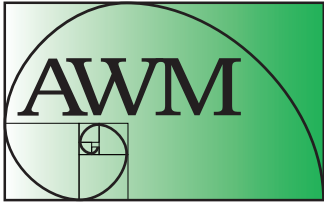
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