# AWM

**ASSOCIATION FOR WOMEN IN MATHEMATICS**

# Newsletter

**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.

## PRESIDENT'S REPORT

**AWM ADVANCEs.** As I fly to the Netherlands to attend WINE2, the fifth Research Collaboration Conference for Women (RCCW) in Number Theory, partially supported by the AWM ADVANCE grant, it is a good time to reflect on all that AWM has accomplished recently. The AWM ADVANCE grant has helped to spawn or support many new research networks for women in various areas of pure and applied math. To quantify the status after one year of the grant: there will be eight special sessions organized by research networks supported by the grant at the AWM Research Symposium in April 2017, and there are eight RCCW conferences scheduled between August 2016 and August 2017, four in new areas, and four from existing networks. We have created an AWM ADVANCE webpage to highlight the networks and the workshops supported by the grant; see https://awmadvance.org. Many of the networks have published or will publish their proceedings volumes in the AWM Springer series: six volumes have appeared so far. Proposals for new networks are welcome, and an AWM ADVANCE committee helping to establish new networks will consider the next round of proposals, due January 1. As I wrote in my report a year ago when we were awarded the grant, each of these networks takes a tremendous amount of work and devotion from

*Women in Numbers—Europe 2 collaboration conference at the Lorentz Center, Leiden*

# AWM
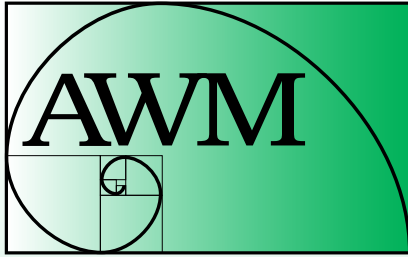
## ASSOCIATION FOR WOMEN IN MATHEMATICS

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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*Women in Shape 2 collaboration conference in Turkey*



*Women in Computational Topology collaboration conference at IMA*

the women who start and run them, and they deserve a huge amount of credit for building these communities and linking them to AWM.

We also have great group shots from two other RCCWs. Above we see participants in WiSh2: Modeling Boundaries of Objects in 2- and 3-Dimensions, Turkey, June 2016, and also those attending WinCompTop, Minneapolis, August 2016. See pages 15–17 for a report by the organizers on the WinCompTop.

I personally benefited tremendously from AWM programs early in my career. As a postdoc, an AWM Travel Grant and an AWM Mentoring Travel Grant to work with Jean-Pierre Serre helped to advance my research career, and the Julia Robinson Celebration and AWM Workshops at JMM helped me to feel included in

the community of mathematicians. So this is my chance to say a big "Thank you!" to all the AWM past presidents and volunteers who made these and all of AWM's programs possible. So many of us owe a big debt to the women who came before us. Let's hope that the current set of initiatives supported by ADVANCE will help to improve the working conditions and careers for the next generations of women in mathematics.

**AWM Service Award Winners!** Speaking of service to AWM, I am delighted to announce this year's AWM Service Award winners: Kathleen (Fowler) Kavanagh, Michelle Manes, Maura Mast, and Marie Vitulli! The winners will be presented with their awards at the AWM Reception at JMM 2017. Congratulations and thank you for your outstanding service to AWM's mission!

**AWM Advisory Board.** We are pleased to welcome new Advisory Board members for three-year terms: **Po-Shen Loh**, **Kristin Swanson**, and **Kathryn Uhrich**. The Advisory Board meets with the AWM Management Team by videoconference twice a year, and their ideas and input provide helpful guidance on many issues. Please find the bios of all the Advisory Board members at the AWM website.

**The AWM Scientific Advisory Committee** is chaired this year by former AWM President **Sylvia Wiegand**—thank you Sylvia! The committee has two new members with three-year terms: former SIAM President **Irene Fonseca** and former IMS President **Ruth Williams**. We are fortunate to have such a distinguished committee! They have already been working hard on SIAM Fellow nominations and many other prizes. Please send ideas and offers to help with nominations to Sylvia.

**JMM 2017 Prizes.** Starting in 2017, AWM will present the AWM Research Prizes at the JMM Joint Prize Session, and this year the Birman Prize will be presented to **Emmy Murphy**. Congratulations again to Humphreys Award winner **Helen Grundman** and Hay Award winner **Cathy Kessel**, who will receive their awards at the Joint Prize Session as usual. Please see the press releases on pages 7–8 of this issue. Also we'd like to remind you that the Noether lecture at JMM 2017 will be given by **Lisa Jeffrey**.

**AWM Student Chapters going strong.** News on the Student Chapter front: we have well over 50 chapters signed up again this year, and a new committee chair, **Kavita Ramanan**. The results should soon be in for the Symposium T-shirt design contest. We will hold the second annual webinar with the AWM President in November. A welcome letter has been sent out to all chapters outlining the activities and deadlines for the year. A copy of the letter appears in the Student Chapter Corner of this issue. To contribute news from your chapter to the Student Chapter Corner for future issues, please send your submissions by the 10th of odd-numbered months.

**NEW Awards!** The AWM Executive Committee has approved a new set of awards for Student Chapters. Chapters will nominate themselves for these awards, with a deadline of April 15 each year. Please see the details at the AWM website.

**AWM-MAA Sectional Liaison Committee.** Our new committee to set up AWM liaisons with MAA Sections will be chaired by **Linda Braddy**. The committee has met, and we already have a liaison for the MD-DC-VA Section: **Minah Oh**, the faculty sponsor for the James Madison University AWM student chapter, who is also in charge of planning the program for MAA Section meetings.

**PRESIDENT'S REPORT** *continued from page 3*

Also, committee member **Betty Mayfield** will be hosting an AWM Lunch table at the joint meeting of the EPaDel and New Jersey Sections of the MAA at Villanova University on November 12.

Betty is an Invited Speaker at this meeting and she will lead the lunchtime discussion on "Creating Community among Women in the Profession." Everyone is invited to join the conversation, and the Villanova AWM Student Chapter will be well-represented there!

**2017 AWM Research Symposium.** On Friday evening, April 7, there will be a welcoming event for the Symposium, hosted by IPAM and focusing on students and AWM Student Chapters. Special guests and activities are being planned, so it should be fun!

In addition to the ADVANCE sessions at the Symposium, there will be special sessions associated with plenary talks, and innovative sessions such as "SMPosium: A celebration of the Summer Mathematics Program for Women," as an SMP reunion to accompany the AWM Presidential Award to **Deanna Haunsperger**, who created the program. Other sessions include an EDGE-y session, Women in Government Labs, Women in SAGE, Math Education, History of Math, Statistics, and areas in pure math. Also, **Ursula Whitcher** is organizing an exciting event: a Wikipedia edit-a-thon to expand Wikipedia's coverage of women in mathematics. For a full list see the webpage for the Symposium.

We are very excited that we already have new and returning sponsors and exhibitors for the Symposium: **Microsoft Research**, **Springer**, **Oxford University Press**, **Basic Books**, **AMS**, **MSRI**, and of course local sponsors **UCLA** and **IPAM**, and also that we have grant support from **NSF** and **NSA**.

**Capitol Hill Visits!** Our next organized trip to visit legislative offices on Capitol Hill will take place on December 1. The recently established Student Chapter at Villanova will come to Washington, D.C. with Faculty Sponsor **Beth Malmskog** for the day to join AWM leaders in small groups to discuss AWM legislative priorities. The AWM Policy and Advocacy Committee set up this semi-annual schedule of visits to coincide with the CBMS meetings held in D.C. every year in May and December. In fact, P&A committee member **Karen Saxe** will soon be in Washington, D.C. full time as the new Director of the Washington Office of the AMS. Congratulations, Karen!

The AWM legislative priorities were set out by the committee and were published in the July–August issue of the newsletter. During our visit in May we discussed our agenda with the offices of Representatives Barbara Lee and Jackie Speier, who are very supportive of women's and minority rights. We are delighted to hear that recently Representative Lee (and several cosponsors) introduced the "Computer Science for All" bill, and Representative Speier introduced "Federal Funding Accountability for Sexual Harassers."

**Webpage updates.** The AWM Membership Director **Amanda Liebert** has taken over the job of updating the AWM webpages, and she is doing a spectacular job so far! Please send comments or requests on the webpage to Amanda's attention at: webmaster@awm-math.org
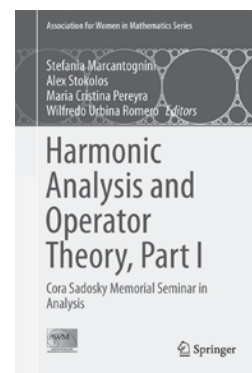


*The Sadosky AWM-Springer volume is now in print!*

**Annual Fundraising Campaign.** The new membership year has started so please don't forget to renew your membership and to become a contributing member if possible. We will again be running a Matching Fund Drive supported by donations from the AWM Advisory Board and past presidents. This year in the annual giving campaign we would like to highlight the opportunity for targeted gifts. These are significant gifts earmarked for specific programs in need of support, such as funding the new student chapter awards or dissertation awards, or supporting specific AWM events at annual meetings. Please continue your generous support of AWM, we are very grateful!

Best wishes,

*Kristin Lauter*

Kristin Lauter
September 24, 2016
Somewhere over the Atlantic

*Kristin Lauter*

# Letter to the Editor

It was a pleasure to see, in the September–October *AWM Newsletter*, Sarah Greenwald's appreciative interview with my friend Mary Gray. Younger members who may know only vaguely that Mary was AWM's principal founder can get a filled-in picture of a complex and creative person. Those of us who have enjoyed working with her over the years—the decades—can enjoy the recap with some details new even to us. Good that you allowed the space to spread all this history before us. And yet, even in nine pages it can't escape giving a feeling of incompleteness to one who has worked with Mary so often and so rewardingly. Her human rights work, through the AMS, the AAUP, Amnesty International, and other agencies, has been tireless, and guided by exceptionally sound judgment. An ally we could always rely on, and always did well to heed!

Chandler Davis
University of Toronto

# 2017 AWM Springer Book on Mathematics Education

A new volume in the AWM Springer Series, *Mathematics Education: A Spectrum of Work in Mathematical Sciences Departments*, will be available at the Joint Mathematics Meetings in January 2017. The AWM receives $1000 in royalties from Springer for each volume in the series. Edited by the co-chairs of the AWM Education Committee, Jacqueline Dewar and Pao-sheng Hsu, and AWM Education Committee member Harriet Pollatsek, the book highlights the breadth of the work in K–16 mathematics education done by members of US departments of mathematical sciences.

Of the 25 chapters in the book, 22 are contributed by mathematicians and mathematics educators describing their work in areas such as teacher education, quantitative literacy, informal education, writing and communication, social justice, outreach and mentoring, tactile learning, art and mathematics, ethnomathematics, scholarship of teaching and learning, and mathematics education research. The contributors also discuss the impact of their work, and how it is perceived and valued.

The opening chapter, written by the editors, defines how the phrase "work in mathematics education" is to be understood for this volume and explains how the 25 chapters are grouped according to intended beneficiaries of the work. It describes the genesis of the book: how the idea arose in June 2015 and how it is an extension of the conversation that took place at the 2016 Joint Mathematics Meetings panel on "Work in Mathematics Education in Departments of Mathematical Sciences," co-sponsored by the AWM Education Committee and the American Mathematical Society Committee on Education. There is also a chapter co-authored by two mathematicians who have become administrators on the challenges of supporting, evaluating, and rewarding work in mathematics education in departments of mathematical sciences. Another chapter, by two researchers in mathematics education, focuses on differences in language use and discourse in communications across professional subcultures within departments of mathematical sciences. The writing is expository, not technical, and should be accessible and informative to a diverse audience.

This book is intended to draw attention to the range of work in mathematics education done in departments of mathematical sciences and to encourage discussion of its value in the mathematical community. To further these conversations, the editors hope that many AWM members will encourage their departmental or institutional libraries to obtain a copy.

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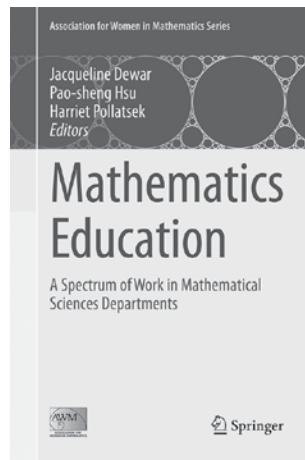
CALL FOR NOMINATIONS

## The Association for Women in Mathematics Student Chapter Awards

In September 2016, the Executive Committee of the Association for Women in Mathematics established the Student Chapter Awards, to be awarded annually at the MAA MathFest each summer. The purpose of these awards is to recognize outstanding achievements in chapter activities among the AWM student chapters.

Awards will be given out in up to four categories: (1) scientific excellence, (2) outreach, (3) professional development, and (4) funding/sustainability. More details about each category can be found on the AWM website www.awm-math.org.

**Eligibility:** Any chapter may nominate itself for awards in at most two of the four categories.

The nomination should include: 1) A cover letter: The cover letter should summarize the chapter's qualifications for the award category to which it is nominating itself. If the chapter is applying in more than one category, it should ensure that all categories are clearly included in one cover letter. 2) An activities report: The activities report, 500–1000 words in length, should give a detailed description of the particular work for which it is seeking an award. If the chapter is applying in more than one category, a separate activities report is required for each. 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 **April 15, 2017**. If you have questions, phone 703-934-0163, email awm@awm-math.org, or visit www.awm-math.org.

# Helen Grundman Honored with Humphreys Award

AWM will present the seventh annual M. Gweneth Humphreys Award to Helen Grundman at the Joint Mathematics Meetings in Atlanta, GA in January 2017. Grundman is Professor Emeritus of Mathematics at Bryn Mawr College and inaugural Director of Education and Diversity at the American Mathematical Society. This award is named for M. Gweneth Humphreys (1911–2006). Professor Humphreys graduated with honors in mathematics from the University of British Columbia in 1932, earning the prestigious Governor General's Gold Medal at graduation. After receiving her master's degree from Smith College in 1933, Humphreys earned her PhD at age 23 from the University of Chicago in 1935. She taught mathematics to women for her entire career, first at Mount St. Scholastica College, then for several years at Sophie Newcomb College, and finally for over thirty years at Randolph-Macon Woman's College. This award, funded by contributions from her former students and colleagues at Randolph-Macon Woman's College, recognizes her commitment to and her profound influence on undergraduate students of mathematics.

At Bryn Mawr, Grundman has an impressive record of mentoring undergraduate students, many of whom have now earned graduate degrees in mathematics, physics, computer science, or other professional programs. Not only has she mentored students from her classes, but her guidance has extended to students of all levels seeking advice on coursework, summer research programs, senior theses, and careers. In recent years, three of her mentees have received NSF Graduate Research Fellowships to continue their studies in mathematics. While at Bryn Mawr, she served as a research advisor for over twenty-five undergraduate theses, master's theses, and PhD dissertations. The undergraduate research has resulted in at least eight published papers coauthored with her students.

She has received high praise for her work with undergraduates in the "Distressing Math Collective," a weekly informal math seminar/club that she created with some students almost twenty years ago. Students gather to give and to listen to math talks in a friendly, gregarious atmosphere, in which interruptions (and jokes) are encouraged. The students learn math, develop their public speaking skills, (get some mentoring,) and find comradery in an environment where it is normal to enjoy math.

Setting Dr. Grundman apart from other professors is her beautifully sincere and long-lasting support of students beyond graduation. One student comments that "her support is the more remarkable because there was no formal relationship between us—she had never taught me in a course or been assigned as my major advisor," while another student states "that kind of unwavering and unconditional support, which is so rare to find in mathematics, allowed me to reach out to her for help during the times I needed it most in graduate school."

The AWM is proud to honor Helen Grundman's outstanding achievements in inspiring, mentoring and supporting undergraduate women at all stages of their mathematical careers.

*The 2017 Joint Mathematics Meetings will be held January 4–7 in Atlanta, GA. For further information on the Humphreys Award, including past winners, please visit* www.awm-math.org.

*Helen Grundman*

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

*Cathy Kessel*

# Cathy Kessel Honored with Hay Award

AWM will present the twenty-seventh annual Louise Hay Award to Cathy Kessel, senior editor at Illustrative Mathematics, at the Joint Mathematics Meetings in Atlanta, GA in January 2017. Established in 1991, the Hay Award recognizes outstanding achievements in any area of mathematics education. Louise Hay was widely recognized for her contributions to mathematical logic, for her strong leadership as Head of the Department of Mathematics, Statistics, and Computer Science at the University of Illinois at Chicago, for her devotion to students, and for her lifelong commitment to nurturing the talent of young women and men. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

Kessel received her PhD in mathematics from the University of Colorado, Boulder, specializing in mathe-matical logic, and has taught mathematics at various US institutions of higher education. During the 1990s, she learned about research in education by auditing courses and working on projects at the School of Education at the University of California at Berkeley. This led to a career that has included editing reports, books, articles, and curriculum and standards documents.

Kessel's clear, crisp scholarship has shaped the reports of investigations ranging from studies of mathematics curricula in East Asia to characterizations of East Asian teachers' shared knowledge of mathematics teaching (with implications for the professional development of U.S. mathematics teachers) to the design and development of mathematics standards in the US. As a mathematician who possesses a unique ability for editing text, Dr. Kessel transforms what mathematicians write into a form read-able by mathematics educators and the general public, with-out sacrificing precision. She also transforms what mathe-matics education researchers write into a form readable by mathematicians unfamiliar with the education literature.

Just as critically, Kessel's contributions span the domains of school mathematics curricula, expectations defining the development of prospective and practicing teachers of mathematics, and mathematics assessment. She fosters productive interactions between often non-communicating communities. Her public writings have been "a source of scholarship, evidence, and intellectual accountability in the debate" surrounding the Common Core State Standards for Mathematics.

Kessel has amassed a rich record of service, including serving a two-year term as the president of the AWM, frequently addressing equity in education in general and women and mathematics in particular, based partly on her own work in the field of gender and mathematics. Through her mentoring, she has influenced the professional lives of aspiring and practicing mathematicians and mathematics educators.

A mathematician and educator fully reflective of the tradition of Louise Hay, Cathy Kessel is richly deserving of the 2017 Louise Hay Award.

*The 2017 Joint Mathematics Meetings will be held January 4–7 in Atlanta, GA. For further information on the Hay Award, including past winners, please visit* www.awm-math.org.

Coordinator: Kathleen (Fowler) Kavanagh,
kkavanagh@clarkson.edu

# Sonia Kovalevsky Days in Chicago

*Laura P. Schaposnik,* schapos@uic.edu
*and James Unwin,* unwin@uic.edu

Indian mathematician Bharati Krishna Tirthaji (1884–1960), on hearing the question "Is this mathematics or magic?" would invariably answer: "It is both. It is magic until you understand it; and it is mathematics thereafter." On November 14th 2015, Professors Laura Schaposnik and James Unwin, with the help of several volunteers, organized the first Sonia Kovalevsky Day for girls on "Maths and Magic" at the University of Illinois at Chicago (UIC), in cooperation with AWM.

For more than twenty years Sonia Kovalevsky Days have been organized by local mathematicians and sponsored by AWM and held at colleges and universities throughout the country. Sonia Kovalevsky Days consist of a program of workshops, talks, and problem-solving competitions for female high school and middle school students and their teachers, both women and men.

The overall goal is to encourage young women to continue their study of mathematics, to assist them with the sometimes difficult transitions between middle school



*Sonia Kovalevsky*

and high school mathematics, and between high school and college mathematics. Moreover, the program assists the teachers and encourages colleges and universities to develop more extensive cooperation with middle schools and high schools in their area. It has been of much importance to create links with female principals of local schools in Chicago who are actively helping promote the UIC Kovalevsky Math Days.

During the First Sonia Kovalevsky Math Day the students and their teachers were separated into two groups, and were taught three different lessons:

**Cards:** The session was dedicated to teaching two (mathematical) card tricks, following Diaconis and Graham's *Magical Mathematics* (foreword by Gardner).

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CALL FOR NOMINATIONS

## 2018 Louise Hay Award

The Executive Committee of the Association for Women in Mathematics has established the Louise Hay Award for Contributions to Mathematics Education, to be awarded annually to a woman at the Joint Prize Session at the Joint Mathematics Meetings in January. The purpose of this award is to recognize outstanding achievements in any area of mathematics education, to be interpreted in the broadest possible sense. The annual presentation of this award is intended to highlight the importance of mathematics education and to evoke the memory of all that Hay exemplified as a teacher, scholar, administrator, and human being.

The nomination documents should include: a one to three page letter of nomination highlighting the exceptional contributions of the candidate to be recognized, a curriculum vitae of the candidate not to exceed three pages, and three letters supporting the nomination. It is strongly recommended that the letters represent a range of constituents affected by the nominee's work. Nomination materials for the Hay Award shall be submitted online. See the AWM website at www.awm-math.org for nomination instructions. Nominations must be received by **April 30, 2017** and will be kept active for three years. For more information, phone (703) 934-0163, email awm@awm-math.org or visit www.awm-math.org.

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**Magic Squares:** The goal of this session was to teach the basic ideas of magic squares, through a set of activities included in each student's package.

**Flexigation:** This session was dedicated to teach the ideas of flexigation with many examples. The main reference was a chapter in Martin Gardner's *Hexaflexagons and other mathematical diversions*.

After an introduction to the AWM for the students and teachers, there was a brief presentation on the life and achievements of Sonia Kovalevsky. The students were then separated into groups for the activities of the day. During the lunch break, professional magician (and mathematician) Tori Noquez performed a magic show.

In the past AWM has provided funding for Sonia Kovalevsky Days with grants from the National Science Foundation and the National Security Agency. In this instance the event was financed through Schaposnik's start-up fund (50%) and the generous support of the Komornicki Fund (50%). The Komornicki Fund was created in memory of Wojciech Komornicki (a 1977 math PhD at UIC), with the purpose of supporting programs developed by the department to recruit students to mathematics.

At the end of the day, the participants were asked to complete a short anonymous questionnaire about their



*Participants working hard on their projects*

experiences of the event, to identify any highlights or weaknesses that might be improved in future events. The participants were universally content with the event, with 100% positive replies on all aspects of the program. Moreover, they gave a strong indication that they would return to future events and encourage others to participate.

In these surveys all the students agreed that more events of this kind should be organized. Moreover, their chaperones asked to be included in email lists that would allow them to hear about events like this one in the future.

Aida Alibek, the UIC Chapter AWM President, remarked: "It is a great promotion for our department and

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CALL FOR NOMINATIONS

# The 2018 AWM-Sadosky Research Prize in Analysis

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

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

The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional contributions of the candidate; 2) a curriculum vitae of the candidate not to exceed three pages; and 3) three letters supporting the nomination (submitted independently). Nomination materials should be submitted online at MathPrograms.org. The submission link will be available 45 days prior to the nomination deadline. Review of candidates will begin in mid-February. For full consideration, nominations should be submitted by **February 15, 2017**. If you have any questions, phone 703-934-0613 or email awm@awm-math.org.

SK Day T-shirts

The website for the 2015 event (with photos) appears at: http://schapos.people.uic.edu/Sonia.html.

Based on the success of this event, and positive feedback, UIC will host its second Sonia Kovalevsky Day in November 2016 and make these days an annual event. The subject of this year's event is "Knots and Graphs," and more information on it can be found at: http://schapos.people.uic.edu/Sonia2016.html.

# Welcome to AWM Student Chapters!

The Association for Women in Mathematics welcomes you to our community! AWM is a 45-year-old professional society devoted to advancing women and girls in the mathematical sciences. Through this letter and the activities listed below, we hope to support your chapter this year in ways that will contribute to your student members' success. The AWM Student Chapter Committee is devoted to running the program for the chapters. Please contact us any time with questions or suggestions.

**November webinar.** Every November we schedule a webinar with the AWM President. This will be an opportunity for the chapter president and faculty sponsor or designated

university. Being active with such events might bring very talented students to our campus," and gave the following description of the event:

> The kids seemed to really enjoy themselves throughout the day and all of them seemed to be really interested in math: they were smart and quick-learners. Not only did they pick up quickly on the basic concepts, they were proposing their own conjectures and tried to prove them or find counterexamples! Which is very admirable in high-schoolers.

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CALL FOR NOMINATIONS

## The 2018 AWM-Microsoft Research Prize in Algebra and Number Theory

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

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

The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional contributions of the candidate; 2) a curriculum vitae of the candidate not to exceed three pages; and 3) three letters supporting the nomination (submitted independently). Nomination materials should be submitted online at MathPrograms.org. The submission link will be available 45 days prior to the nomination deadline. Review of candidates will begin in mid-February. For full consideration, nominations should be submitted by **February 15, 2017**. If you have any questions, phone 703-934-0613 or email awm@awm-math.org.

representatives to meet over video conference link with the President to discuss opportunities and ideas. Keep an eye out for scheduling info and plan to attend!

**AWM Student Chapters Facebook page.** We encourage you all to post to our Facebook page for Student Chapters about your chapter's activities, notices about upcoming events, pictures from your chapter, or anything else you'd like to share with other chapters. Please see your chapter president for access information.

**Student Chapter Corner in the *AWM Newsletter.*** The Student Chapter Corner in the *AWM Newsletter* is a great way to learn what other chapters across the country are doing and spark ideas for your own chapter. AWM has an open invitation for articles highlighting student chapter activities. For example, articles can describe a K–12 outreach event you assisted with, summarize a talk from an invited speaker, or simply describe what makes your chapter successful. Submissions are due the 10th of every odd-numbered month, and can be sent to Kavita Ramanan (kavita_ramanan@brown.edu) and copied to Anne Leggett (amcdona@luc.edu).

**\*New\* Shared Resources Folder.** The AWM Student Chapter Committee would like to let you know about a new opportunity available to student chapters. We have created a set of folders on Google Drive to share resources and foster collaborations between chapters. We are inviting student chapters to share ideas and experiences about getting organized, inviting speakers, running activities, giving awards, fund raising, making connections with industry and participating in outreach. We hope you will help make this a valuable resource by uploading your planning documents to the folders. This can help share the unique qualities of your student chapter with other chapters, to cross-fertilize ideas. Your hand-outs and documents can serve as a guide for other chapters, and you can feel free to browse the files to look for ideas for your chapter. Please see your chapter president for access information.

**AWM Reception in January.** At the Joint Math Meetings in January in Atlanta, AWM will host an evening reception on Wednesday evening after the Gibbs lecture. It is open to all and we present many AWM awards and prizes there. At the end of the reception we invite all AWM Student Chapter members to come forward and meet with the AWM President and Executive Committee. Please encourage your chapter members to join us there if possible!

**\*New\* T-shirt design contest.** Student Chapters were invited to submit designs for the AWM 2017 Research Symposium T-shirt. The deadline has passed.

**\*New\* Student Chapter event at the Symposium.** The AWM 2017 Research Symposium will be held at UCLA on April 8–9, 2017 and will include an AWM Student Chapter event and evening reception on April 7 at the Institute for Pure and Applied Mathematics (IPAM). All chapters are invited. More details will be posted on the website when available.

**\*New\* AWM Student Chapter Awards!** Nominate your chapter for an Award in one of four categories: Scientific Excellence, Community Outreach, Professional Development, Fundraising/Sustainability. The deadline for self-nomination is April 15. Please go to https://sites.google.com/site/awmmath/programs/awm-student-chapter-awards for more details.

# NSF-AWM Mentoring Travel Grants for Women

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

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

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

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

**Free membership for Student Chapter members!** Don't forget to encourage your chapter members to go on the AWM website and take advantage of the opportunity to become an AWM member for free. If they don't sign up, they will not receive email updates and announcements from AWM. Chapter members can sign for free membership by clicking the appropriate link at https://sites.google.com/site/awmmath/programs/student-chapters.

**Regional events ...** are in the planning stages to create opportunities for chapters in the same region to meet or run joint events at MAA meetings or meet via video-conference call. Stay tuned for more details….

With best wishes for a fun and successful year of activities,

Kristin Lauter, AWM President
Kavita Ramanan, AWM Student Chapter Committee Chair
Amanda Leibert, AWM Membership Director

# AWM at MathFest



*Francis Su, MAA President; Magnhild Lien, AWM Executive Director; and Izabella Laba, Falconer Lecturer*
© Mathematical Association of America



*Ohio State Student Chapter members Marissa Renardy and Willa Skeehan at the AWM booth*



*Magnhild Lien and Izabella Laba*
© Mathematical Association of America



*AWM panel, "Prioritizing Your Career and Professional Goals" Moderator Jacqueline Jensen-Vallin (Lamar University) and panelists Annalisa Crannell (Franklin & Marshall College), Jenna Carpenter (Campbell University), and Niles Johnson (The Ohio State University)*

# WinCompTop 2016

*Erin Chambers, Brittany Terese Fasy, and Lori Ziegelmeier*

The 2016 WinCompTop Workshop was the inaugural workshop for women in the field of computational topology to come together as a community to explore a variety of open research problems. The workshop took place August 14–19 at the Institute for Mathematics and Its Applications (IMA) at the University of Minnesota in Minneapolis. It was organized by Erin Chambers (Saint Louis University), Brittany Terese Fasy (Montana State University), and Lori Ziegelmeier (Macalester College). In total, 27 women participated, ranging from undergraduates to full professors; in addition, we were joined by 5 children of the participants, who came to the various social events scattered throughout the week.

One of the central themes of the workshop was to establish collaborations among junior and senior women as well as to develop a network of mathematicians, computer scientists, and statisticians in the field. As such, the workshop had a special format designed to maximize collaboration, allowing participants to develop new results and build connections. The participants were split into four groups; each group, led by a senior researcher, focused on a particular subarea or open question in computational topology. In addition to a wide range of ranks and work experience, participants also had a variety of specializations and research backgrounds, facilitating an open exchange of new ideas from various areas of expertise.



*Courtney Thatcher explains a result in Carola Wenk and Brittany Fasy's working group*

The workshop began with each of the senior researchers presenting an overview of their working group's topic. Giseon Heo (University of Alberta) outlined a project that extends one-dimensional scale-space persistent homology (a fundamental tool in computational topology) to a pseudo-multidimensional persistence tool that can be applied to a variety of applications. Nina Amenta (University of California, Davis) posed the problem of producing an explicit representation of a surface $S$ from an input cloud of points $P$ assumed to lie on or near $S$. Yusu Wang (The Ohio State University) discussed a new method of persistence-based profiles to compare metric graphs and explained that

*Members of Yusu Wang's group laugh while working*

further exploration of what information is captured by persistence-based profiles and understanding their discriminative power would be the focus of their working group. Finally, Carola Wenk (Tulane University) and Brittany Terese Fasy described their exploration of the use of topology in map construction and comparison, particularly understanding directed graphs with multiple lanes and overpasses. After the overview of each project, working groups began to explore their topics; over the course of the week, substantial progress was made in each group.

Interspersed throughout the week were a few other events. On Monday evening, participants shared their individual research at a poster session. On Tuesday, participants Nina Amenta, Erin Chambers, Bei Wang Phillips (University of Utah), and Yusu Wang led a panel discussion on work-life balance and various aspects of academic careers. An open problem session was held on Thursday for participants to share topics of consideration that may be of interest to the community. These problems will be compiled into an open problems in computational topology article in *SIGACT News*. At the end of each working day, all groups



*A few participants and their children joined in a marshmallow roast at the airbnb where several attendees stayed.*



*Bei Wang describing her career path during the panel*

came together to discuss the progress that was made throughout the day, which enabled groups to summarize their results as well as seek advice and possible further avenues to consider from participants not in their group. On Friday, the workshop concluded with a business meeting where, among other topics, logistics of future WinCompTop workshops including frequency, formation of a steering committee, and location were discussed.

Three social outings were held to further establish connections. First, a welcome reception was held at Surly Brewery Co. on Sunday. This provided an initial meeting in an informal setting for participants once they arrived in the Twin Cities. On Thursday evening, participants gathered for a more formal banquet at the Tea House. This allowed for a nice evening out to reflect on the week's progress and to enjoy the company of one another. Finally, participants had a concluding lunch at Kafé 421 on Friday. This provided one last opportunity for participants to come together as a group, establish future collaborations, and connect with one another once more. In addition to formally scheduled outings, informal activities such as a marshmallow roast one evening, group dinners, and many other gatherings took place throughout the week. The new connections established at WinCompTop are already having an effect, as at least two participants have been invited to give a talk at another university this fall.

The IMA generously offered in-kind the use of their facilities, their experienced staff to facilitate conference logistics, and coffee and refreshments for breaks and the poster session. Support for participant travel was made possible by an NSF grant (NSFDMS 1619908) awarded to Macalester College with PI Ziegelmeier and CoPIs Chambers and Fasy. In addition, the social outings and some additional travel support were possible through funding from Microsoft Research.

Throughout the week, each of the projects became more detailed and focused and significant progress was made. Results of the workshop will be compiled in a special Springer Series volume, and each group is continuing to explore its problem for future publication. As a followup

event, a WinCompTop special session will take place at the 2017 AWM Research Symposium at UCLA in April. The session will be organized by Emilie Purvine (Pacific Norwest National Laboratory), Radmila Sazdanovic (North Carolina State University), and Shirley Yap (California State University – East Bay), and travel support for organizers and speakers is provided by the AWM ADVANCE grant. Further follow-up opportunities are also being explored. In two years, we will repeat this experience with the second biennial WinCompTop. We hope to see you there!

If you are interested in being the first to know about upcoming related events and/or find the topic of computational topology interesting, we invite you to join our listserv by sending a blank email to wincomptop+subscribe@googlegroups.com.



*Banquet at the Tea House*

## MEDIA COLUMN

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

# A Conversation About the Film *The Man Who Knew Infinity*

*Madhu Raka, Panjab University and Alice Silverberg, University of California, Irvine*

In this article, Madhu Raka (MR) and Alice Silverberg (AS) discuss some aspects of the film *The Man Who Knew Infinity*. The topic of the film is S. Ramanujan, especially his relationship with G. H. Hardy in Cambridge.

**AS:** I enjoyed the film. I felt that the filmmakers took the mathematics consultants seriously; the mathematics was more authentic than one usually finds in such films.

I think that Jeremy Irons was the perfect Hardy, but he seemed to me to be the Hardy who wrote *A Mathematician's Apology* in 1940, not the younger Hardy of the Ramanujan era.

**MR:** I think the movie is great. I have seen many documentaries on Ramanujan made in India. This film emphasizes more Ramanujan's stay in Cambridge than his struggle in India.

I watched the movie in the cinema hall along with Professor R. P. Bambah (a 91 year old internationally known number theorist who did his PhD at Cambridge under the guidance of Professor Mordell in the 1950s) and two other colleagues from the Math Department. Professor Bambah (he has been my teacher and mentor and encouraged me to apply for a Commonwealth Fellowship at Cambridge in 1979–80) desired to see the movie, so we all watched it together. He told me that he has met Janaki [Ramanujan's wife].

**AS:** Raka, for me one of the benefits of the film was that it gave us an opportunity to connect again after all these years, and reflect on our experiences in Cambridge when we were there in 1979–1980.

Since the University of Cambridge was essentially an all male institution a century ago when the film took place (and sometimes seemed that way to me even when we were there!) there isn't so much in the film relating to "women in mathematics." But some issues that come to mind are:

(1) being an "outsider" at Cambridge (as Ramanujan was as a foreigner, and you and I were as a woman and foreigner);
(2) the (over?)emphasis in the film on the relationship between Ramanujan and Janaki.

**MR:** Of course there is overemphasis on the relationship between Ramanujan and Janaki and also between Janaki and Ramanujan's mother. There has been no indication of this in the films/documentaries made in India.

**AS:** I guess the filmmakers wanted a love interest, and the love triangle of Ramanujan, mathematics, and Hardy (or

quadrilateral, with Littlewood) wasn't enough. It may have been useful for the lay audience to see Ramanujan sharing his love of mathematics with Janaki, and trying to explain to a non-mathematician his passion for it.

The racism towards Ramanujan in the film led me to think back on our time at Cambridge, and to remember what it felt like to be an outsider there, as a woman and an American. I thought that the film conveyed well the feeling of being an outsider in Cambridge. In 1979, when I knew I would be going there, I asked Andrew Wiles for advice (since I was an undergrad at Harvard where he was a postdoc). He told me that none of the other students in the Cambridge Maths department would talk to me, and there were three reasons for that:

1. I was a woman, and they don't talk to women.

2. I was a foreigner, and they don't talk to foreigners.

3. They're shy Englishmen who don't talk to anyone, so they certainly wouldn't talk to me!

It seemed to me that the social circles among the "postgraduate students" at Cambridge were like an onion, with the core being the English students who had been undergraduates at Cambridge. The next layer was English students who hadn't been Cambridge undergraduates, then students from Commonwealth countries, then other foreigners like me on the outer ring. For each layer, the women were further from the center than the men. Did you have that feeling at all? I wonder if you felt closer or further from the center than I did.

**MR:** India had been under English rule for a long time. Most English people at that time treated Indians as inferiors and hated them. Ramanujan had to face the same treatment.

When I visited Cambridge I was very excited though a bit scared also, being a woman and it being my first stay away from my place and that also in a foreign country like the UK. Then there is a lot of difference between Indian English and English English. This was another hurdle. But I remember Professor Cassels (even when he was busy being Department Head) introducing me to others, taking me to the library himself, and inquiring about my progress on the problem I was working on. He introduced me to "adjoint forms," which helped me to complete the paper. Professor Baker talked to me once, when I was about to finish my fellowship. His words I still remember: "would you like to give a talk in the Number Theory Colloquium?" That was all.

I myself being a shy and reserved type of person didn't try much to talk with others. Being a woman and an outsider, I felt very lonely in the beginning. Later I was given a room in a house which was for "outside" ladies and had a common kitchen. Being vegetarian I cooked myself and avoided the kitchen when other ladies cooked non-veg. Now I enjoy recalling those days.

**AS:** I had some email correspondence with Ken Ribet about the film. He thought that an alternative title could be "The man who mistook his wife for a partition," or better yet

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# 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**.

"The man who forsook his wife for a partition." That might make a good title for this review!

**MR:** I do not fully agree with the title "The man who forsook his wife for a partition."

Ramanujan worked a lot on tau functions etc. also but this movie highlights his work on partitions only, maybe because it is easy for a non-mathematician to understand the concept partitions.

The documentaries made in India never mentioned his relationship with his wife. In those days marriages were performed without the consent of the boy or the girl. Whether Ramanujan actually wanted to marry is a question mark. He was so dedicated to his mathematics, he might not have given it any importance and he just obeyed his parents.

As a school boy he devoted all his time in doing mathematics, ignored all other subjects. As a consequence he failed in his high school. He used to guide and teach mathematics to his much senior fellow students.

His reply to Hardy in the film that "It comes to me, God speaks to me and makes me write all this. The formulae can't be wrong." is very touching and inspiring. He was a truly God-gifted person.

**AS:** The filmmaker, Matt Brown, says "this film is really about the cost that comes when people wait out of fear to connect in their relationships." But for me, rather than being about missed opportunities, the story of Hardy and Ramanujan shows that wonderful things can happen when one seizes opportunities, which Hardy brilliantly did by answering Ramanujan's letter and bringing him to England, and which Ramanujan himself did by bravely writing to Hardy in the first place.

## BOOK REVIEW

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

**Breaking In: Women's Accounts of How Choices Shape STEM**, by Ann Wolverton, Lisa Nagaoka, and Mimi Wolverton. Stylus Publishing, 2015.

*Reviewer: Marge Bayer*

This book is part of a series called *Journeys to Leadership*. The goal of the book is to investigate what makes women choose STEM careers, what makes them stay in STEM careers (whether they face major or minor obstacles), and how they choose the directions of their careers. The approach is in-depth interviews with eight women, who have careers in academia, government and industry. The interviewers are not presented in the book, however; the chapters are presented as monologues by the eight women.

The women are from civil engineering, microbiology, molecular biology, paleobotany, physics, chemistry, geology, and computer science. (The computer scientist was previously a PhD student in mathematics, and appears in the mathematics genealogy, so mathematics is not completely unrepresented.) The women range in age from early 40s to 70, so their experiences are in many ways different from those of women in early stages of their careers (we hope), but they are all conscious of the climate for women in STEM today and the challenges they face. The stories of these women, who, after all, stuck with their scientific careers, tell more of "subtle dismissiveness" [Angela Hessler, p. 116] than of blatant discrimination. However, I find some of the experiences they describe to be examples of not-so-subtle discrimination. Most of us have read a number of accounts such as these, but I found a number of new insights in these pages.

Cynthia Barnhart, an associate dean of engineering at MIT, says she never experienced bias or discrimination, but apparently she was using a narrow interpretation of these terms. She describes a poor atmosphere for women at Georgia Tech and was pleasantly surprised by the progress made at MIT after the reports in 1999 and 2002 on the status of women faculty. In a follow-up study in 2011, women who had participated in the earlier studies reported great progress. Barnhart attributes support she feels from male colleagues to their observation of their own daughters facing challenges, trying to manage careers and family. She expresses a common concern about policies intended to ease the workload upon birth or adoption of a child: that some men take advantage of the policy to increase their research efforts rather than to care for their children.

Linda Birnbaum has had the longest career among the interviewees. After completing her PhD in microbiology in 1972, she followed her husband (a mathematician) as he taught at a couple of small colleges. This resulted in a job opportunity that changed the direction of her career: at a medical research institute. The next family move was for her career, as she started a job at the National Institute of Environmental Health Sciences (NIEHS). As many women scientists recognize, a successful career is more likely with a

husband who is supportive and flexible. Birnbaum worked at NIEHS, then at the EPA, and then, since 2007, back at NIEHS as Director. In her early years at NIEHS, she was one of a very small number of women. As director, she has worked hard to increase the participation of women. She reports success at increasing women in top leadership positions, but struggles at lower levels. Like Barnhart, she claims not to have experienced blatant discrimination, even though she says she didn't join her first-choice lab in graduate school because "the lab director didn't like women in his lab." [p. 38].

Susan Blessing is the interviewee most formally involved in the promotion of women in science. She is a particle physicist, associate of Fermilab, professor at Florida State University, and, since 2005, Director of the Women in Math, Science and Engineering Program (WIMSE) at FSU. A first generation college student, she was the only female physics major at her university. The stories she tells of her high school and college physics instructors are definitely not positive. She got an internship at Argonne National Labs, and a visiting faculty member there helped her land in a good graduate program. There, after a rocky start, she found a female doctoral advisor who was a good fit, both in terms of research interests and in terms of advising style. Blessing discusses the male research environment in some detail. She observes that men act differently with no women (or with only one or two women) around. "I never expected so much of my career would be devoted to working to improve the work climate for women and confronting environmental culture issues." [p. 54] The WIMSE program she directs is a "living-learning community" designed to attract and retain women undergraduates in STEM.
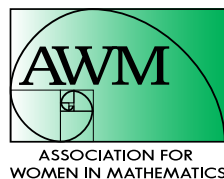
Teresa Golden is a chemistry professor and Director of the Forensic Science Program at the University of North Texas. As an undergraduate a little later than those described above, she had more female peers in the chemistry major. In her research group in graduate school, however, she was not only the only woman, but also the only one from the US. There were few women students in the whole department, and just one woman faculty member. She has benefited from mentoring efforts, particularly from the Committee on the Advancement of Women Chemists, but she feels that these efforts don't address the underlying institutional issues, and she complains that "they're trying to train us how to be more like men." [p. 69] She paints a fairly discouraging picture of progress for women at her university, with few hires, little recognition of the research successes of women in science, and a feeling of isolation. She feels one of the obstacles for women's retention in science is the disparity in confidence, with the resultant disparity in persistence, of women versus men.

Sharon Hays, a molecular biologist in private industry, addresses this same issue. When as a graduate student she hesitated to accept a task from a professor, he said, "Why is it that every time I ask a young woman like you to do something like this I have to convince them that they're good enough to do it?" [p. 95] A colleague of Hays had to respond similarly fifteen years later when Hays expressed her lack of confidence as she faced a confirmation hearing for a government position. Another point from Hays is that scientific study is useful for many careers, even those outside of science. When we encourage students to study science for any reason, we increase the pool of potential scientists.

Angela Hessler is a geologist with Chevron. As an undergraduate she says that she didn't feel "broadly

discriminated against." Professors judged the students by objective criteria such as tests and papers. Yet when she showed her undergraduate advisor the research paper she had done over the summer, he said, "Oh, that's cute." [p. 105] Hessler points out that geology poses special difficulties for the family-work balance, because of the demands of field-work. She followed her geologist husband to Chevron.

Bonnie Jacobs, a paleobotanist, tells plenty of stories of gender discrimination. From being assigned to the kitchen at field camp to being told "Girls shouldn't be geologists," to being propositioned by a professor, Jacobs needed a lot of confidence and perseverance to keep going in her student years. She also spent years doing research without full-time or full-status jobs, as she followed her husband. Then she benefited from the NSF's Career Advancement Program for women whose research careers had been interrupted. Subsequently, her husband's university (Southern Methodist) hired her on the tenure track, and as director of the environmental science program.

Radia Perlman was a PhD student in mathematics at MIT, where she had trouble finding her passion and an advisor, while experiencing a bit of the imposter syndrome. She left to take a job in the computer industry. Eventually, working for DEC, she was able to return to graduate school and complete the PhD in computer science. (She has been extremely successful. She holds over 100 patents and now works for Intel.) Perlman stresses that diversity of strengths and perspectives is more important to an organization than diversity of race and gender. But clearly the latter matters to the individual. She describes not being conscious of being different from her classmates; as she looked around her math classes, everyone looked the same (male). When asked why there are not more women in STEM fields, one of her responses is "we lose women (and men) because of the unpleasantness of dealing with aggressive, overbearing, condescending individuals." [p. 147]

All of these women love what they do. All have needed tenacity and support to maintain their careers. All describe changes that have improved the environment for women scientists and engineers. But there is still much that needs improvement. Let us not forget that the Equal Rights Amendment was originally introduced in Congress in 1923, passed in Congress in 1972, failed to get sufficient state ratifications, and has been reintroduced in Congress every year since 1983. In STEM the struggles for respect and equality are at the level of schools, universities, companies, departments, disciplines, subdisciplines, and individual research groups.

# Good News

Writings about women in mathematics have gone mainstream. In the September 25th *New York Times Book Review*, the Best Seller lists contained five books about women in math and science. Seventh in the adult nonfiction list was *Hidden Figures: The American Dream and the Untold Story of the Black Women Mathematicians Who Helped Win the Space Race* by Margot Lee Shetterly. Four books were on the Children's Best Sellers lists: for Middle Grade readers, *Women in Science: 50 Fearless Pioneers Who Changed the World* by Rachel Inotofsky; and three picture books about women scientists and engineers: *Ada Twist, Scientist* and *Rosie Revere, Engineer* by Andrea Beaty, and *I am Jane Goodall* by Brad Meltzer.

## EDUCATION COLUMN

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

# It's Complicated!

*Jackie Dewar, Professor Emerita, Loyola Marymount University, Los Angeles, CA 90045*

This column is not about the Meryl Streep movie. But the title seemed apt.

Over the years I have taken part in many conversations about teachers and students and the state of K–12 and postsecondary mathematics education and I have read many articles, some scholarly, others in newspapers, including letters to the editor. Conversations have involved friends, family, parents, colleagues (in mathematics and in other disciplines), and people I did not know. Too many of them have been about what is wrong with the students or what is wrong with the teachers. Suggestions of how to fix the problems have abounded: some simplistic, some complex, some evidence-based, others not. This column examines the recent work of some major foundations and professional societies attempting to influence K–16 educational practice. Some of these "players" are now clearly stating, "It's complicated!"

When big money is involved in changing educational practices, we may want to be concerned, because of the undue

influence on policy and practice that big money might bring along (see the addendum to this article). One source of big money for K–12 education ($3 billion since 1999 according to a *Los Angeles Times* article[1]) has been the Bill & Melinda Gates Foundation. At first the Gates Foundation thought smaller schools would be the solution; then it worked to change teacher evaluation and reward systems. Neither of these initiatives produced the desired results. Recently, it provided financial support for the development of the Common Core State Standards and for the political fight to get the standards quickly adopted and implemented. That was problematic as well. Here is how Sue Desmond-Hellmann, CEO, Bill & Melinda Gates Foundation, now sees it:

> Unfortunately, our foundation underestimated the level of resources and support required for our public education systems to be well-equipped to implement the standards. We missed an early opportunity to sufficiently engage educators—particularly teachers—but also parents and communities so that the benefits of the standards could take flight from the beginning[2] [Source: http://www.gatesfoundation.org/2016/ceo-letter].

I was glad to see Desmond-Hellmann acknowledge: "This has been a challenging lesson for [the Gates Foundation] to absorb, but we take it to heart. The mission of improving education in America is both vast and complicated, and the Gates Foundation doesn't have all the answers" [Source: http://www.gatesfoundation.org/2016/ceo-letter].

But what about mathematics education at the collegiate level?

Many in the math community are taking note of the increasing evidence in support of active learning. Various professional societies are supporting and encouraging the adoption of instructional practices that support active learning. See, for example, the MAA's Common Vision document,[3] and most recently the July 15, 2016 statement, "Active Learning in Post-Secondary Mathematics Education,"[4] signed by the presidents of 15 member societies of CMBS, including AWM, AMS, MAA, SIAM, AMATYC, and ten others. The latter statement calls on "institutions of higher education, mathematics departments and the mathematics faculty, public policymakers, and funding agencies to invest time and resources to ensure that effective active learning is incorporated into post-secondary mathematics classrooms" and on "professional societies and funding agencies to continue their support of training and resources for the use of active learning."

Then there is TPSE Math (Transforming Post-Secondary Education in Mathematics) sponsored by the Carnegie Corporation of New York and the Alfred P. Sloan Foundation. According to its website (http://www.tpsemath.org/), TPSE Math "aims to effect constructive change in mathematics education at community colleges, 4-year colleges and research universities." And it will "identify innovative practices where they exist, advocate for innovation where they do not, and work with and through partners to implement and scale effective practices." This attention and these efforts toward improving the teaching and learning of collegiate mathematics are laudable. Mathematics faculty will need significant support (from foundations, from professional societies, from institutional reward structures) for these efforts to be successful.

Going forward, leaders in the mathematics community should take note of these additional words from Desmond-Hellman's Gates Foundation 2016 CEO letter: "We're facing the fact that it is a real struggle to make systemwide change." Those trying to change teaching practice at the collegiate level should pay attention to factors that will promote systemic change. Physics education researchers Henderson and Dancy[5] found that some approaches to encouraging the adoption of new pedagogies are more effective than others. For example, discussions with colleagues

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[1] *LA Times* Editorial. (2016, June 1). Gates Foundation failures show philanthropists shouldn't be setting America's public school agenda. Accessed 7 July 2016. http://www.latimes.com/opinion/editorials/la-ed-gates-education-20160601-snap-story.html

[2] I can't resist pointing out that concerns about implementation of the Common Core without sufficient professional development for teachers, and the resulting parent frustration and misunderstanding have previously appeared in articles in this newsletter. (See C. Kessel, Common Core-related events. *AWM Newsletter*, 43(6) (2013, November–December), 17–21, and J. Hale, Common Core mathematics becomes a pop culture entity. *AWM Newsletter*, 46(1) (2016, January–February), 19–21.)

[3] *Common Vision for Undergraduate Mathematical Sciences Programs in 2025*. Mathematical Association of America, 2015. Accessed July 24, 2016. http://www.maa.org/sites/default/files/pdf/CommonVisionFinal.pdf

[4] Accessed August 18, 2016. http://www.cbmsweb.org/Statements/Active_Learning_Statement.pdf

[5] C. Henderson and M. Dancy, *Increasing the Impact and Diffusion of STEM Education Innovations*, A White Paper commissioned for the Characterizing the Impact and Diffusion of Engineering Education Innovations Forum, New Orleans, LA, Feb. 7–8, 2011. Accessed July 24, 2016. https://www.nae.edu/File.aspx?id=36304

have a significant influence, and instructors are more likely to use materials that they themselves developed or modified. Also, when disseminating curriculum and pedagogy materials (*the what works and how to do it*), it is important to include the underlying research principles (*the why it works*). Without a complete understanding, an instructor may implement a new teaching method in a less effective way.

An instructor's view about teaching "talent" may also be a factor working for or against changing teaching practice. For example, holding the belief that teaching skill is relatively unchangeable (*a great-teachers-are-born-not-made view*) as opposed to something that can be developed may inhibit a faculty member's participation in professional development of teaching,[6,7] much as the belief that mathematical ability is "fixed" rather than something that can be improved through hard work and persistence (a "growth mindset") can hold students back in mathematics.[8]

Many factors complicate attempts to effect systemic change aimed at improving K–16 mathematics education. Let's hope that by becoming more aware of these, we can all contribute more effectively toward the effort.

**Addendum:** On July 20, 2016, as I was putting the finishing touches on this column (much earlier than usual, I admit), an article in *Inside Higher Ed* (https://www.insidehighered.com/news/2016/07/20/author-discusses-new-book-shifts-how-foundations-seek-shape-public-policy) caught my attention. It is an interview with Megan Tompkins-Stange whose new book, *Policy Patrons: Philanthropy, Education Reform, and the Politics of Influence*, explores topics related the role of foundations in public policy and education reform. She finds that some are moving away from investing in research and model programs to focus on advocacy. Her book is based on interviews with 60 staff members at four foundations: the Eli and Edythe Broad Foundation, the Ford Foundation, the Bill & Melinda Gates Foundation, and the W. K. Kellogg Foundation. The article sometimes refers to her sources as "informants" and quotes one staff member as follows:

What a dollar worth of program buys you versus a dollar worth of advocacy if it works ... the potential leverage in terms of public dollars can be enormous ... [the focus on advocacy] interpenetrate[s] a lot because we want to get maximum leverage out of the program investments that we make.

Tompkins-Stange views the Gates Foundation's recent turn toward becoming more of a "learning and listening" organization positively, noting:

Large-scale institutional change efforts cannot be accomplished from the top down alone; they require significant community organizing, changing of norms and beliefs, and building alliances based on mutual trust and respect, not simply the more transactional and power-ridden relationship of a funder.

I haven't (yet) read the book, but I do recommend the *Inside Higher Ed* article for a quick overview.

# International Conference on Mathematics Education

The 13th International Conference of the Mathematics Education for the Future Project held in Catania, Sicily, September 2015, was attended by 130 people from 22 countries. The next conference will be held September 10–15, 2017, at Hotel Annabella, Balatonfüred, Lake Balaton, Hungary. The conference, titled "Mathematics Education for the Next Decade: Heuristics and Challenges of Pólya and Lakatos," continues our search for innovation in mathematics, science, computing and statistics education. The thirteen previous conferences dating back to 1999 were renowned for their friendly and productive atmosphere, and attracted many "movers and shakers" from around the world. We now call for papers and workshop summaries for presentation at the conference and publication in the printed proceedings. The conference has In Cooperation with AWM status. The deadline for submission is **February 18, 2017**.

For more details please see http://directorymathsed.net/montenegro/AAAAHungaryFirstAnnouncementDraft.pdf or email Alan Rogerson at alan@cdnalma.poznan.pl. For more information about the Mathematics Education for the Future Project, see http://math.unipa.it/~grim/21project.htm.

[6] V. Thadani, W. Breland, and J. Dewar, College instructors implicit theories about teaching skills and their relationship to professional development choices. *Journal on Excellence in College Teaching*, 21(2) (2010), 113–131.

[7] V. Thadani, W. Breland, and J. Dewar, Implicit theories about teaching skills predict university faculty members' interest in professional learning. *Learning and Individual Differences*, 40 (2015), 163–169.

[8] C. Dweck, *Mindset: The New Psychology of Success*, Random House, New York, 2006.

# A Conversation with Karoline Pershell

*Interviewer: Kathy Ott, Bates College*

Karoline Pershell earned a PhD from Rice University, writing her dissertation in the area of topology. Since graduating in 2009, she has worked in academia and government and is currently employed by two tech startups. Karoline and I spoke on the phone about her career arc.

**KO:** What is your name and current position?

**KP:** My name is Karoline Pershell and I am Lead Data Scientist at Zenti, Inc., where I am also a member of their Scientific Advisory Group. I am also Director of Research and Strategy with Service Robotics and Technology (SRT).

**KO:** Could you tell us a little about each of your employers and what they do?

**KP:** Zenti, Inc. does data mining of social media data. I work with optimization of the back-end algorithm and I work with our client to help them understand how to understand their client, the client's characteristics, and how we would identify those characteristics through language in social media. I can give you a specific example. We've been working with a professor at Vanderbilt who's now going to be at Florida State University this fall, Dr. Joe Franklin. He's in the psychology department and he focuses on suicidal behavior. The behaviors around suicidal behavior are all well documented medically. We know people exhibit hopelessness and sleeplessness, among other things. It is also well documented how people express themselves and how they talk. So what we have done is to create natural language processing classifiers that can review Twitter data and identify these kinds of languages [associated with suicidal behavior]. Zenti's system will then show the user a red flag, meaning that it has identified a Tweet that is really high on one of our scales (like hopelessness), and then we can review that person's history and determine if they appear to be at risk. Dr. Franklin is currently working on intervention strategies for use once we have identified and validated a person whom we should be concerned about.

The other company is Service Robotics and Technology. I want to mention that both of these companies are startups, and I spend about half of my time on each. At SRT, we are looking to develop a software platform to be able to integrate robots and other technology to augment human driven tasks, focusing first on the custodial industry.

**KO:** What does a typical workday look like for you?

**KP:** Before both of these positions I transitioned from academia first to government, by way of something called the American Association for the Advancement of Science Fellowship. During the fellowship, I worked 8:15–5:00 and had 45 minutes for lunch. I was on a very regulated government schedule, which was strange for me. One of the things we take for granted in academia is the autonomy we have over our time. When I was looking at transitioning out of government, one of the things that was most important to me was having autonomy over my own time. For both of these startups, I work from home. I'll get going at around 8:15 and take whatever sort of breaks I want during the day. It's a lot like academia in that what I'm doing I can do on my own time. If I need to take a break, it's usually in the middle of the day to run errands. I can work on something on the evening or on weekends.

For both companies I am predominantly looking at strategic planning and big picture pieces, so it's nothing that is time sensitive. I don't have to have something graded for a specific class, for instance. On an average day I would say that a lot of my time is spent doing research design planning for groups who have never thought about using any of the technologies that either of the companies have thought of. I do think that being a math professor helped me with that in the following way: If you are an engineering professor, you teach engineering to engineering students. When you're a math professor, you teach everyone. You teach the art students who don't want to be there. What I've gotten good at and what has helped me with these jobs is my ability to transfer technical information to a non-technical audience so that they care about it.

**KO:** You mentioned that you work from home. Do you work alone or with other people?

**KP:** Zenti is a startup in Palo Alto, California. I Skype nearly daily during the workweek with our CEO and another guy who I work very closely with, and oftentimes with the clients as well. Video chatting is something that I never would have thought about. Honestly, I like talking to my mom on the phone only, so that I can be washing dishes or shuffling papers, you know so that I can be multi-tasking. I never would have thought of taking advantage of video chat. [But it allows you to] read the body language of the person so that you can respond to their actions and their facial expressions. That is so important, especially when you don't get the chance to see a person face-to-face very often.

SRT is here, in Washington, D.C., where I am. We have a really interesting model based on software design. We

do these things called software sprints, where we get together for a long weekend, like Friday to Monday. The people who are local will physically come to our office working space each of those days. We will all have taken days off of our other jobs. We'll work hard on a project like this probably once a month, so we get the face-to-face time this way. That group also contains one guy who is in Texas, and one who is in Australia. We have an iPad set up in the corner and they are Skype'd in, as though they are physically there, and they are part of the conversation as well. Technology is great for these sorts of things.

**KO:** Do you see any advantages to working in business over academia?

**KP:** There are a lot of things that I miss about academia. I think that it's really easy in academia to feel like you're making a difference; it's easy to see that you're working for the greater good, that you're making a difference in young peoples' lives, and that you are adding to your field. When you go from that to business, especially to a startup, for me it's been important to keep bringing front and center the big picture. For example, with the depression study that we are doing with Joe Franklin, right there it's easy to feel like you're making a meaningful difference. But that is only one example of, maybe, twenty projects that we're working on right now. I have to keep reminding myself that even the work that we're doing for other clients—which might just be for commercial endeavors—is still helping us develop a technology that is meaningful.

Some of the nice things [about working in business] are: there's no grading, what we're doing is always changing, and there is not the pressure to publish or perish. In a way, working with a startup, it feels almost like grad school again; you're digging into a topic just to learn and figure out something without the pressure with regards to "what can I publish?"

**KO:** Do you have any advice for graduate students or mathematicians looking to enter the non-academic world?

**KP:** When I was in academia, I would tell my students that the most amazing thing about being a student is the summer. Never again are you going to be able to take a job for two or three months and then quit and not look like some sort of irresponsible person. It's important to take advantage of the summer to get experience and exposure to as many different types of people as possible. I know that when I did those summer experiences, they always resonated, they always gave me something different to talk about, and they always opened up my thinking.... I would really encourage students, if they have the opportunity, to look beyond academia and to at least try these things, even if they know that in the end

they want to be a professor.

**KO:** Let's go backwards in time and talk about your government experience. Can you explain in more detail your work through the AAAS?

**KP:** The American Association for the Advancement of Science, or AAAS, is an organization that brings fellows into Washington, D.C. and infiltrates government with science and tech people. They bring in about 100 fellows a year, of whom approximately 30–40 are on Capitol Hill. These can be one or two year fellowships. For the AAAS fellowships you have to have a PhD, but you can be at any point within your career.... For my fellowship, I worked with the Department of State at the Foreign Service Institute. It's a roughly 30-acre campus just outside of Washington, D.C., in Arlington, VA. It was like a college in a lot of ways. I worked in the Director's office, for Ambassador Nancy McEldowney. At the time, she was creating a new office that was going to coordinate common themes across the entire institute, which included curriculum development, the use of educational technology, and evaluation of training curriculum. I was the coordinator for training evaluation.

**KO:** How long were you in that role?

**KP:** Just under two years.

**KO:** Let's keep working backwards through your career. Where were you before the fellowship?

**KP:** I finished my PhD at Rice University in 2009. The place where I had done my undergraduate degree, the University of Tennessee at Martin, was hiring and, after grad school, wouldn't we all like to land at a nice, safe place? I took the opportunity and I went back there to see what else I wanted to do. During my PhD I realized that I wasn't certain if I wanted to be researching in the specific area that I had chosen. The University of Tennessee at Martin, it's a teaching intensive university, and so we were allowed a lot of flexibility to try other things that might not be kind of the hard-core research that I had just finished up at Rice. It was a great atmosphere to get my feet under me and to figure out what is it that I wanted.... I had this degree in theoretical math, and despite all my convincing to my parents that it was very important, I just didn't know what to do with it. I had applied to the AAAS Fellowship as a way to pivot. And that was a really good position for that.... Without that fellowship, I don't think that I could have moved in this other direction.

**KO:** Is there a particular person who piqued or encouraged your interest in math?

**KP:** Yes, absolutely. I was going to study political science, because I thought that in order to save the world I

needed to rule it! I started off at Saint Mary's College, which is the all-women's sister school to the University of Notre Dame. I took a few political science classes and felt that I didn't have the network or connections to go with the politics. At the time I had a math professor who was a nun. She told me I was really good at math and that I should do math. I thought, this is someone who has absolutely no ego, and who is doing math just because it's wonderful, and I decided yes, that's exactly what I want to do!

I probably didn't think it through at the time, but in retrospect what this story really highlights to me is that around the college age it's very important to tap people on the shoulder and say, "You probably don't see it yet, but you actually could come be part of this club." Math is intimidating. We see our professors, particularly older ones, who have been there a long time. We might not feel that that could be us one day. We really need that direct invitation. And sometimes we need to hear it throughout each new stage in

our career. I was fortunate enough to be a part of the EDGE program. This was a powerful program for me, where I was again told and shown how to recognize and deal with the feelings of imposter syndrome.
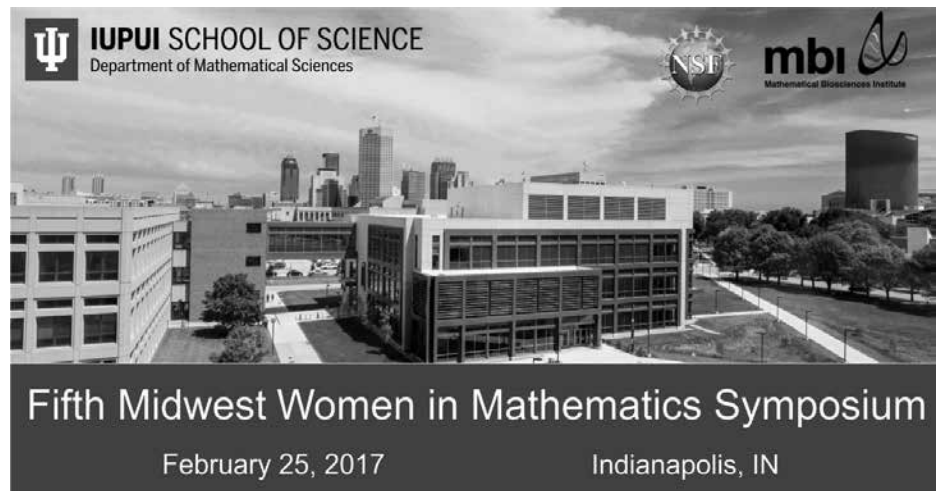
**KO:** Is there anything else that we haven't touched upon that you would like to share with the AWM community?

**KP:** There's something that I was asked about a long time ago, and I always think about that answer and how I would have done it better. [The question was] something to the effect of, "What helped you to be successful?" It dawned on me only later that I was definitely a product of Title IX. I played sports growing up. For me it was sports, for other people it might be music. It can be anything. But I feel that one of the greatest things that prepared me for math was being part of a process where I understood that you didn't have to magically be good, you practiced and you got better. I think that having that mental mindset is so important for grad school, particularly in math.... It really puts the responsibility and the empowerment back onto you, that you can do this.

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## *SAVE THE DATE!*
## 2017 AWM Research Symposium

Save the date! The fourth AWM Research Symposium will take place on the UCLA campus, April 8–9, 2017. The four plenary speakers at the symposium will be AWM Past President Ruth Charney, AWM Sadosky Prize Winner Svitlana Mayboroda, Blackwell-Tapia Prize Winner Mariel Vazquez and the first AWM/SIAM Sonia Kovalevsky Lecturer Linda Petzold. We expect to have 18 special sessions, of which 8 will be organized by the Research Networks supported by the AWM ADVANCE grant. Deanna Haunsperger will be presented with the second AWM Presidential Award, to recognize significant contributions to advancing women in mathematics, at the Saturday evening banquet. Deanna is receiving this award for her work with the Carleton Summer Math Program, and her ongoing mentoring of women mathematicians. Updates on the program can be found at https://sites.google.com/site/awmmath/home/awm-research-symposium-2017.

# ADVERTISEMENTS

**BOISE STATE UNIVERSITY**—Boise State University invites applications for a tenure-track Assistant Professor position in Pure Mathematics to commence in Fall 2017. Candidates must demonstrate strong research potential in analysis, combinatorics/discrete mathematics, or set theory. We strongly encourage applications from women, veterans, members of underrepresented groups, and individuals with disabilities. Applicants must have a PhD in a discipline of Pure Mathematics. Review of applications will begin **December 15th, 2016** and will continue until the position is filled. For additional details and to apply, visit https://www.mathjobs.org/jobs/jobs/9285

**CORNELL UNIVERSITY**—The Department of Mathematics at Cornell University invites applications for at least two H.C. Wang Assistant Professor, non-tenure track, non-renewable, 3-year position beginning July 1, 2017. Successful candidates are expected to pursue independent research at Cornell and teach three courses per year. A Ph.D. in mathematics is required. Diversity and Inclusion are a part of Cornell University's heritage. We're an employer and educator recognized for valuing AA/EEO, Protected Veterans, and Individuals with Disabilities. We actively encourage applications of women, persons of color, and persons with disabilities. Applicants must apply electronically at http://www.mathjobs.org. For information about our positions and application instructions, see: http://www.math.cornell.edu/Positions/positions.html. Applicants will be automatically considered for all eligible positions. **Deadline December 1, 2016**. Early applications will be regarded favorably.

**GEORGIA TECH**—The School of Mathematics at Georgia Tech is accepting applications for faculty positions at all ranks and in all areas of Pure and Applied Mathematics and Statistics. Applications by highly qualified candidates, and especially those from groups underrepresented in the mathematical sciences, are particularly encouraged. See www.math.gatech.edu/resources/employment for more details and application instructions.

**INSTITUTE FOR DEFENSE ANALYSES**—The Institute for Defense Analyses Center for Communications Research—Princeton (IDA/CCR-P) is looking for individuals in mathematics, computer science, electrical engineering, and related fields to join in exciting research that enhances our nation's security along with our sponsor, the National Security Agency. Individuals that thrive here enjoy solving difficult problems with a wide range of tools, from mathematics, statistics, computational science, and engineering. Rather than recruiting specific specialties, we are looking for smart PhDs who are willing to learn whatever it takes to solve our ever evolving research problems. Some problems require very deep and sophisticated mathematics, others the latest computational and other technologies, and many problems require both. Ours is a superior professional working environment emphasizing cooperative effort. We are located in Princeton, NJ and benefit from the exciting intellectual environment of our immediate area, as well as the benefits of being close to both New York and Philadelphia. U.S. citizenship and a Department of Defense TS//SI clearance (with polygraph) are required. IDA/CCR-P will sponsor this clearance for those selected. IDA/CCR-Princeton is an equal opportunity employer committed to providing a working environment that is free from discrimination on the basis of race, color, religion, sex (including pregnancy and gender identity), sexual orientation, national origin, age, disability, status as a protected veteran, marital status, genetic characteristic or any other legally protected condition or characteristic. Interested individuals should contact Dr. David J. Saltman (Director) at saltman@idaccr.org with a C.V. and a list of references.

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## ⊕ PRINCETON UNIVERSITY

### FACULTY POSITIONS IN MATHEMATICS

The Princeton University Mathematics Department expects to offer several junior faculty positions and postdoctoral appointments for the 2017—2018 academic year:

Instructorship: 1-year positions; normally renewed for 1-2 additional years. Ph.D. required.

Veblen Research Instructorships: 3-year positions (offered jointly by the Princeton University Mathematics Department and the School of Mathematics at the Institute for Advanced Study) for outstanding new Ph.D.'s. Typically, the first and third years of these appointments are spent teaching and conducting research at Princeton University and the second year is spent conducting research (without teaching duties) at the Institute for Advanced Study. (Please see the advertisement under THE INSTITUTE FOR ADVANCED STUDY for additional details about the Veblen Research positions.)

Assistant Professorships: 3-year renewable appointments; teaching experience preferred. Ph.D. required.

Postdoctoral Research Associates or Associate Research Scholars: one-year, full-time positions for recent Ph.D. recipients or more senior researchers who wish to carry out research in mathematics with a Princeton faculty member, with possibility of renewal subject to continued funding and satisfactory performance.

Please note: Applicants will automatically be considered for all open junior faculty positions and postdoctoral appointments.

All applications should be submitted via MathJobs at http://www.mathjobs.org. For inquiries, please e-mail: application@math.princeton.edu. DEADLINE FOR APPLICATIONS: December 1, 2016.

These positions are subject to the University's background check policy.

Princeton University is an equal opportunity employer and all qualified applicants will receive consideration for employment without regard to age, race, color, religion, sex, sexual orientation, gender identity or expression, national origin, disability status, protected veteran status, or any other characteristic protected by law.

# ADVERTISEMENTS

**JOHNS HOPKINS UNIVERSITY—NON-TENURE-TRACK J.J. SYLVESTER ASSISTANT PROFESSOR**—Subject to availability of resources and administrative approval, the Department of Mathematics solicits applications for non-tenure-track Assistant Professor positions beginning Fall 2017.The J.J. Sylvester Assistant Professorship is a three-year position offered to recent Ph.D.'s with outstanding research potential. Candidates in all areas of pure mathematics, including analysis, mathematical physics, geometric analysis, complex and algebraic geometry, number theory, and topology are encouraged to apply. The teaching load is three courses per academic year. **To submit your applications go to www.mathjobs.org/jobs/jhu. Applicants are strongly advised to submit their other materials electronically at this site.** If you do not have computer access, you may mail your application to: Appointments Committee, Department of Mathematics, Johns Hopkins University, 404 Krieger Hall, Baltimore, MD 21218. Application should include a vita, at least four letters of recommendation of which one specifically comments on teaching, and a description of current and planned research. Write to cpoole@jhu.edu for questions concerning these positions. Applications received by **November 15, 2016** will be given priority. Johns Hopkins University is committed to active recruitment of a diverse faculty and student body. The University is an Affirmative Action/Equal Opportunity Employer of women, minorities, protected veterans and individuals with disabilities and encourages applications from these and other protected group members. Consistent with the University's goals of achieving excellence in all areas, we will assess the comprehensive qualifications of each applicant.

**MACALESTER COLLEGE**—Macalester College invites applications for a tenure-track position in Statistics to begin Fall 2017. Candidates must have or be completing a Ph.D. in Biostatistics or Statistics and have a strong commitment to teaching and research in an undergraduate liberal arts environment. Strong candidates will have a track record in the mentoring of undergraduate research. Some specific areas of potential interest include machine learning, causal inference, computational statistics, data visualization, and spatial statistics. For details, please see: www.macalester.edu/academics/mscs/statisticstenure-trackjob.html.

**MATHEMATICAL BIOSCIENCES INSTITUTE (MBI)** is accepting applications for Postdoctoral Fellows to start September 2017. MBI Postdoctoral Fellows engage in a two-year integrated program of tutorials, working seminars, workshops, and interactions with their mathematical and bioscience mentors. These activities are geared toward providing the tools to pursue an independent research program with an emphasis on collaborative research in the mathematical biosciences. MBI facilitated activities are tailored to the needs of each postdoctoral fellow. Applications for an MBI Postdoctoral Fellowship should be submitted https://www.mathjobs.org/jobs/mbi. Applications completed before **December 5, 2016** will receive full consideration. For additional information please contact Rebecca Martin ( rebecca@mbi.osu.edu or 614-688-3519 ) or visit http://mbi.osu.edu/participate/postdoctoral-fellow/. MBI receives major funding from the National Sciences Foundation Division of Mathematical Sciences and is supported by The Ohio State University. Mathematical Biosciences Institute adheres to AA/EOE guidelines.

**MATHEMATICAL BIOSCIENCES INSTITUTE (MBI)** is accepting applications for Early Career Awards for the 2017-2018 emphasis programs: Fall 2017 —Control in Biology and Medicine Spring 2018 – Infectious Disease Dynamics. Early Career Awards are aimed at non-tenured scientists who have continuing employment and who hold a doctorate in any of the mathematical, statistical, and computational sciences, or join any of the biological, medical, and related sciences. Applications for an Early Career Award completed before **November 30, 2016** will receive full consideration. The applicant should state the period that he or she would like to be in residence. Applications for an Early Career Award should be submitted online at https://www.mathjobs.org/jobs/mbi. For additional information please contact Rebecca Martin ( rebecca@mbi.osu.edu or 614-688-3519 ) or visit http://mbi.osu.edu/participate/early-career-award/ MBI receives major funding from the National Sciences Foundation Division of Mathematical Sciences and is supported by The Ohio State University. Mathematical Biosciences Institute adheres to AA/EOE guidelines.

**THE WILLIAMS COLLEGE DEPARTMENT OF MATHEMATICS AND STATISTICS**—The Williams College Department of Mathematics and Statistics invites applications for two tenure-track positions in mathematics, beginning fall 2017, at the rank of assistant professor (in an exceptional case, a more advanced appointment may be considered). We are seeking highly qualified candidates who have demonstrated excellence in teaching and research and who are committed to working with an increasingly diverse student body. The teaching load is four 12-week semester courses per year and a pass-fail Winter Study class every other January. Preference will be given to candidates who will have a PhD in mathematics by September 2017. We welcome applications from members of groups traditionally underrepresented in the field. Applicants can apply electronically at http://mathjobs.org. Evaluations of applications will begin on or after **November 15** and will continue until the position is filled. All offers of employment are contingent upon completion of a background check http://dean-faculty.williams.edu/prospective-faculty/background-check-policy. For more information on the Department of Mathematics and Statistics, visit http://math.williams.edu/.

Williams College is a coeducational liberal arts institution located in the Berkshire Hills of western Massachusetts. The college has built its reputation on outstanding teaching and scholarship and on the academic excellence of its approximately 2,000 students. Please visit the Williams College website (http://www.williams.edu). Beyond meeting fully its legal obligations for non-discrimination, Williams College is committed to building a diverse and inclusive community where members from all backgrounds can live, learn, and thrive.

**UNIVERSITY OF CONNECTICUT—DEPARTMENT OF MATHEMATICS—ASSISTANT PROFESSOR IN RESIDENCE**—The Department of Mathematics at the University of Connecticut invites applications for positions at the rank of Assistant Professor in Residence beginning in Fall 2017. The number of positions is subject to budgetary constraints. The University of Connecticut (UConn) is in the midst of a transformational period of growth supported by the $1.7B Next Generation Connecticut (http://nextgenct.uconn.edu/) and the $1B Bioscience Connecticut (http://biosciencect.uchc.edu/) investments and a bold new Academic Plan: Path to Excellence (http://issuu.com/uconnprovost/docs/academic-plan-single-hi-optimized 1). We are pleased to continue these investments by inviting applications for faculty positions in the Department of Mathematics at the rank of Assistant Professor in Residence. The Mathematics Department has active programs in various areas of mathematical research including mathematics education. The education group works on issues across the K-20 spectrum, with particular emphasis on mathematics content, and on applications of mathematics education research to instruction in the department. This group works closely with the Center for Research in Mathematics Education, based in the Neag School of Education. Successful candidates who are interested in mathematics education will have an opportunity to work on writing and implementing grants within these units. These positions are open only to candidates who have received a Ph.D. in mathematics, and are suitable for candidates interested in a career at UConn with an emphasis on teaching excellence. In particular, the committee will be looking within the applications for specific evidence of outstanding teaching and experience with educational technology and interactive technological teaching tools. Applicants with an interest in mathematics education are strongly encouraged to apply. **Minimum qualifications include:** A Ph.D. in mathematics, a record of outstanding teaching, and an interest in mathematics education. Equivalent foreign degrees are acceptable. **Preferred qualifications include:** Experience with educational technologies,
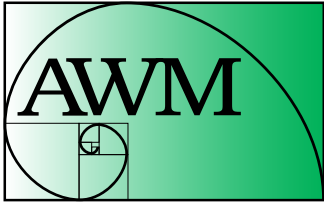
such as online homework systems, message boards, videos, smart boards, or classroom personal response systems ("clickers"); experience teaching large lectures; commitment to effective teaching, the ability to contribute through research, teaching, and/or public engagement to the diversity and excellence of the learning experience. **Appointment Terms:** These are full-time, 9-month, non-tenure track positions which may lead to long-term multi-year contracts. The teaching load for these positions are approximately six courses per year. These positions have an anticipated start date of August 23, 2017. The successful candidate's academic appointment will be at the Storrs campus. Faculty may also be asked to teach at one of UConn's regional campuses as part of their workload. Rank and salary will be commensurate with qualifications and experience.

To Apply: Submit a **cover letter**, **curriculum vitae**, **teaching statement** (including teaching philosophy, teaching experience, commitment to effective learning, concepts for new course development, etc.), a **commitment to diversity statement** (including broadening participation, integrating multicultural experiences in instruction and research and pedagogical techniques to meet the needs of diverse learning styles, etc.); and **three letters of reference**, at least two of which address the applicant's teaching online at http://www.mathjobs.org.jobs.

The review of applications will begin on **November 21, 2016**. Employment of the successful candidate will be contingent upon the successful completion of a pre-employment criminal background check. Questions or requests for further information should be sent to the Hiring Committee at vaphiring@math.uconn.edu. All employees are subject to adherence to the State Code of Ethics which may be found at http://www.ct.gov/ethics/site/default.asp. The University of Connecticut is committed to building and supporting a multicultural and diverse community of students, faculty and staff. The diversity of students, faculty and staff continues to increase, as does the number of honors students, valedictorians and salutatorians who consistently make UConn their top choice. More than 100 research centers and institutes serve the University's teaching, research, diversity, and outreach missions, leading to UConn's ranking as one of the nation's top research universities. UConn's faculty and staff are the critical link to fostering and expanding our vibrant, multicultural and diverse University community. As an Affirmative Action/Equal Employment Opportunity employer, UConn encourages applications from women, veterans, people with disabilities and members of traditionally underrepresented populations.

**UNIVERSITY OF CONNECTICUT—DEPARTMENT OF MATHEMATICS—ASSISTANT, ASSOCIATE, OR FULL PROFESSOR**—The Department of Mathematics at the University of Connecticut, Storrs, invites applications for full-time, 9-month tenure-track faculty positions at the rank of Assistant, Associate, or Full Professor in Mathematics beginning in Fall 2017. We are seeking exceptionally well-qualified individuals with outstanding research programs. The successful candidate will be expected to teach mathematics courses at all levels and to have a vigorous externally funded research program. UConn has grown rapidly in the past decade to become one of the nation's Top 20 public universities, with an ambitious goal, at this transformational time in its history, to join the ranks of the greatest universities in the world. As one of the University's emphasized STEM programs, supported by the $1.7B Next Generation Connecticut (http://nextgenct. uconn.edu/) investment, the math department enjoys an active and dynamic academic environment. The department currently has 43 research faculty members with diverse research interests (including financial mathematics and actuarial science, algebra and number theory, analysis, applied math, geometry and topology, mathematical logic, math education, numerical analysis, partial differential equations, and probability) and a strong record of external funding. Faculty members in the department participate in a range of interdisciplinary projects with Physics, Philosophy, Life Sciences, Statistics, and with the Neag School of Education. The department has moved into a new building in Fall 2016. The successful candidates for these positions will be expected to contribute to research and scholarship through extramural funding (in disciplines where applicable), high quality publications, impact as measured through citations, performances and exhibits (in disciplines where applicable), and national recognition as through honorific awards. In the area of teaching, the candidate will share a deep commitment to effective instruction at the undergraduate and graduate levels, development of innovative courses and mentoring of students in research, outreach and professional development. Successful candidates will also be expected to broaden participation among members of under-represented groups; demonstrate through their research, teaching, and/or public engagement the richness of diversity in the learning experience; integrate multicultural experiences into instructional methods and research tools; and provide leadership in developing pedagogical techniques designed to meet the needs of diverse learning styles and intellectual interests. **Minimum Qualifications:** A Ph.D. or an equivalent foreign degree in mathematics or a closely related area by August 22, 2017, demonstrated evidence of excellent teaching and outstanding research; and a deep commitment to promoting diversity through academic and research programs. Equivalent foreign degrees are acceptable. **Preferred Qualifications:** An outstanding research program in an area that complements the research activity in the department; a record of attracting external funding; a commitment to effective teaching at the graduate and undergraduate levels including integrating technology into instruction, such as online instruction; and the ability to contribute through research, teaching, and/or public engagement to the diversity and excellence of the learning experience. Appointment Terms: These are full-time, 9-month, tenure-track positions with an anticipated start date of August 23, 2017. The successful candidate's academic appointment will be at the Storrs campus. Faculty may also be asked to teach at one of UConn's regional campuses as part of their ordinary workload. Rank and salary will be commensurate with qualifications and experience. **To Apply:** Submit a **cover letter**, **curriculum vitae**, **teaching statement** (including teaching philosophy, teaching experience, commitment to effective learning, concepts for new course development, etc.), research and scholarship statement (innovative concepts that will form the basis of academic career, experience in proposal development, mentorship of graduate students, etc.), **commitment to diversity statement** (including broadening participation, integrating multicultural experiences in instruction and research and pedagogical techniques to meet the needs of diverse learning styles, etc.); and **five letters of reference**, one of which addresses the applicant's teaching online at http://www.mathjobs.org.jobs. Evaluation of applications will begin on **November 21, 2016**. Employment of the successful candidate will be contingent upon the successful completion of a pre-employment criminal background check. Questions or requests for further information should be sent to the Hiring Committee at mathhiring@uconn.edu. All employees are subject to adherence to the State Code of Ethics which may be found at http://www.ct.gov/ethics/site/default.asp. The University of Connecticut is committed to building and supporting a multicultural and diverse community of students, faculty and staff. The diversity of students, faculty and staff continues to increase, as does the number of honors students, valedictorians and salutatorians who consistently make UConn their top choice. More than 100 research centers and institutes serve the University's teaching, research, diversity, and outreach missions, leading to UConn's ranking as one of the nation's top research universities. UConn's faculty and staff are the critical link to fostering and expanding our vibrant, multicultural and diverse University community. As an Affirmative Action/Equal Employment Opportunity employer, UConn encourages applications from women, veterans, people with disabilities and members of traditionally underrepresented populations.

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**ASSOCIATION FOR
WOMEN IN MATHEMATICS**

Printed in the U.S.A.

## ASSOCIATION FOR WOMEN IN MATHEMATICS

Volume 46, Number 6, November–December 2016

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