Newsletter

AWM

ASSOCIATION FOR
WOMEN IN MATHEMATICS

**The purpose of the Association
for Women in Mathematics is**

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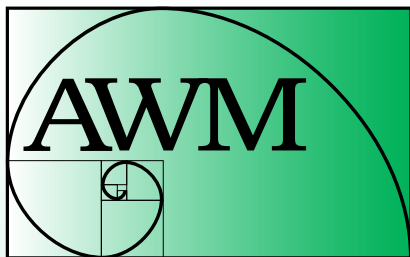
IN THIS ISSUE

PRESIDENT'S REPORT

My last President's Report began with the good news that we had been offered a $5,000 match for contributions to AWM made between December 1 and January 31. I am happy to begin this month's report with even better news: your contributions put us well over the $5,000. Including the match, we raised over $12,000 in two months. To all of you who contributed, please accept my personal thanks as well as the thanks of the Association as a whole for supporting our goals.

February 1 marks the changing of the guard at AWM. We welcome Kristin Lauter (Microsoft Research) as the new President-Elect. Kristin replaces Jill Pipher, the outgoing Past President on the Management Team. The community as a whole owes Jill an enormous thanks for all she has done for AWM over the past four years. Personally, I will miss her sage advice (or more likely, I will pick up the phone and consult her anyway). Kristin has been serving on the AWM Executive Committee (EC) for the past two years so she is well versed in the current issues and has some excellent ideas for the future. I look forward with enthusiasm to working with her.

We also welcome the new AWM Clerk, Janet Beery (University of Redlands) and the new EC Members-at-Large Alissa Crans (Loyola Marymount University), Joan Ferrini-Mundy (National Science Foundation), Bryna Kra (Northwestern University), and Talitha Washington (Howard University). In addition, Marie Vitulli (University of Oregon) has agreed to extend her term for two more years to fill the EC slot vacated by Kristin. Our gratitude goes to those rotating off the EC, Trachette Jackson, Irina Mitrea, Ami Radunskaya, and Rebecca Segal.

As always, AWM had a packed schedule at the Joint Mathematics Meetings in Baltimore. (I was too tired to write this report on the plane ride home, so I am testing out my writing skills at sea level this month.) Wednesday morning was taken up with the AWM Executive Committee meeting. This is the one in-person EC meeting of the year—the other meetings are by teleconference—and I was reminded how much livelier conversations tend to be in person! The EC meeting was followed by the AWM Panel on "Building a research career in mathematics," organized by Bettye Anne Case and Christina Sormani. Panelists included Joan Hutchinson, Delaram Kahrobaei, Tanya Leise, Chikako Mese, Judy Walker, and myself. Coming from a wide variety of institutions, the panelists were able to give multiple perspectives on strategies for building a successful research career and the challenges one may encounter. The panel was well attended and the audience chimed in with many questions.

A highlight of the JMM was the AWM Reception Wednesday evening. The reception attracted a large and lively audience, including such luminaries as the presidents of the AMS and SIAM and past-president of the MAA. With a little help from the bartender, who lent us a glass and a metal bottle opener to clank, we managed to get everyone's attention for the AWM Prize Session. I had the pleasure of announcing the winners of the inaugural AWM-Sadosky Prize in Analysis, Svitlana Mayboroda, and the AWM-Microsoft Prize in Algebra and Number Theory, Sophie Morel. It was gratifying to see some of the donors who made these prizes possible in the audience. I also had the pleasure of presenting the Alice T. Schafer Prize for excellence in mathematics by an undergraduate woman to the winner, Sarah Peluse, the runner-up, Morgan Opie, and two honorable mentions, Shiyu (Jing-Jing) Li and Jessie Zhang. All four have demonstrated truly outstanding talent and I look forward to following their progress. In addition, the AWM Service Awards went to Tai Melcher and Katharine Ott for their outstanding work on the Sonia Kovalevsky Days and USA Science and Engineering Fair. For more details about the awardees, please see the report "AWM at JMM" later in this issue.

Thursday's activities began with the 35th Annual AWM Noether Lecture, given by Georgia Benkart, E. B. Van Vleck Professor of Mathematics (emerita) at the University of Wisconsin–Madison. Benkart is internationally recognized for her work in representation theory and algebraic combinatorics. For the Noether lecture, she presented a marvelous introduction to the rich interplay between combinatorics and representation theory. It is easy to see why she is such a popular speaker! A joint AMS-AWM special session on Geometric Applications of Algebraic Combinatorics was also held in connection with the Noether Lecture.

Later that day, I attended a special session talk by Sarah Greenwald, our Associate Newsletter Editor, entitled "40+ Years of AWM: The history of the AWM and the AWM archives." My favorite moment in her talk was the slide showing a picture from 1966 of a young Mary Gray, one of the founders of AWM. Sitting 20 feet away in the audience was Mary Gray, still very much involved in AWM as legal counsel and as current chair of the Advisory Board!

Thursday afternoon concluded with the Joint AMS-MAA-AWM prize session. The Louise Hay Award went to Sybilla Beckmann (University of Georgia) for her outstanding contributions to improving K–12 mathematics education and the preparation of K–12 teachers. The M. Gweneth Humphreys Award went to William Yslas Vélez (University of Arizona) for his legendary success in encouraging women, especially first generation and minority students, to study mathematics and pursue careers in the mathematical sciences. In addition, the Schafer Prize winner, Sarah Peluse, received her official plaque at the ceremony.

The final AWM event at the JMM was the annual AWM Workshop. These workshops, started in the 1990s, offer an opportunity for graduate students and recent PhDs to present their work, meet others in their field, and interact with more senior mentors. In recent years the workshops were redesigned to focus on a specific research topic and to encourage more interaction between participants. This year's workshop began Friday evening with a poster session and reception. Volunteer judges evaluated the posters and the two top posters were awarded

prizes. The winners were Jacqueline Davis (Vanderbilt University) and Tracy Weyand (Texas A&M). In addition, Aisha Chesler (Claremont Graduate University) was awarded a prize sponsored by the Mathematical Biosciences Institute, for the best poster related to the biosciences. Congratulations to all three! Saturday was devoted to a series of talks by recent PhDs on image analysis, computational geometry, and computer vision. The lunch break provided time for participants to meet with assigned mentors. We are grateful to Maria Basterra, Erin Chambers, Kathryn Leonard, and Luminita Vese for their work in organizing this event and to the National Science Foundation for its financial support.

With the JMM in the rear window, it is time to think about upcoming events. Plans are well under way for the 2014 SIAM Meeting in July and MathFest in August. This year's SIAM workshop will focus on numerical and theoretical approaches for nonlinear partial differential equations. Planning has also begn for the 2015 events and there is one item I would like to bring to your attention now. In 2015, the Annual SIAM Meeting will be replaced by the International Congress on Industrial and Applied Mathematics (ICIAM) in Beijing. As a result, the AWM SIAM workshop, normally held at the annual meeting in July, has been moved to the SIAM Conference on Computational Science and Engineering (CSE) in March 2015. The first announcement of that workshop appears in this issue.

This report represents the end of my first year as President of AWM, a time for reflection. On the one hand, I am very pleased with the direction the organization is moving. We have established a strong Advisory Board, created new research prizes, established an AWM book series, and begun new fund-raising initiatives. On the other hand, leading AWM for the past year has been a humbling experience. Progress on new initiatives is often slow and some good ideas fall by the wayside for lack of time or funding. Perhaps this should come as no surprise as most of us involved in the organization have fulltime jobs in addition to our AWM activities. (Yes, I am still teaching, supervising graduate students, and working on my research … though my co-authors may dispute that!) Nevertheless, the pace of progress can be frustrating at times. I look forward to the energy, the enthusiasm, and the ideas that the new members of the Executive Committee will bring to the table. Together we will keep AWM moving forward!

Ruth Charney

Ruth Charney
Waltham, MA
January 26, 2014

Ruth Charney

AWM at the Baltimore JMM

AWM NOETHER LECTURE

The 2014 Noether Lecture, "Walking on Graphs the Representation Theory Way," was delivered by Georgia Benkart, University of Wisconsin–Madison. She was introduced by Ruth Charney, Brandeis University.

Abstract: How many walks of n steps are there from point A to point B on a graph? Often finding the answer involves clever combinatorics or tedious treading. But if the graph is the representation graph of a group, representation theory can facilitate the counting and provide much insight. The simply laced affine Dynkin diagrams are representation graphs of the finite subgroups of the special unitary group $SU(2)$ by the celebrated McKay correspondence. These subgroups are essentially the symmetry groups of the platonic solids, and the correspondence has been shown to have important connections with diverse subjects including mirror symmetry and the resolution of singularities. Inherent in McKay's correspondence is a rich combinatorics coming from the Dynkin diagrams. Some of the ideas involved in seeing this go back to Schur, who used them to establish a remarkable duality between the representation theories of the general linear and symmetric groups. There is a similar duality between the $SU(2)$ subgroups and certain algebras that enable us to count walks and solve other combinatorial problems. In this case, the duality leads to connections with the Temperley-Lieb algebras of statistical mechanics, with partitions, with Catalan numbers, and much more.

Citation for Georgia Benkart

Georgia Benkart is an international leader in the structure and representation theory of Lie algebras and related algebraic structures. A longtime faculty member at the University of Wisconsin, she received her PhD from Yale in 1974 with Nathan Jacobson. She has given hundreds of invited talks worldwide and published over 100 journal articles, mainly within four broad categories: (1) Modular Lie algebras, (2) Combinatorics of Lie algebra representations, (3) Graded algebras and superalgebras, and (4) Quantum groups and related structures.

Many of her most important papers represent breakthroughs. Her work on the classification of the rank one modular Lie algebras and on the Recognition Theorem provided the building blocks for the subsequent classification of the finite dimensional simple modular Lie algebras. The combinatorial tools developed in other papers provided an effective way to study the stability of root and weight multiplicities of finite dimensional as well as infinite dimensional Kac-Moody Lie algebras. Motivated by the creation and annihilation operators in physics, Benkart and Roby introduced a new family of algebras, "down-up algebras," that still inspire current research. Benkart and co-authors introduced crystal bases for representations of general linear quantum superalgebras, and in a series of papers, she, jointly with others, determined the Lie algebras graded by finite root systems.

Georgia has given excellent service to the mathematical community, particularly as a former President of AWM and as current AMS Secretary. She has been a superb mentor for her 21 PhD students and postdocs. She won the University of Wisconsin

Presentation of Noether Lecture plaque:
Ruth Charney and Georgia Benkart

Distinguished Teaching Award in 1987 and the Mid-Career Faculty Research Award in 1996. A fantastic speaker, Georgia was the Mathematical Association of America Polya Lecturer for 2000–2002.

AWM PRIZES

Louise Hay Award for Contributions to Mathematics Education

In 1990 AWM established the annual Louise Hay Award to recognize outstanding achievements and contributions in any area of mathematics education. While Louise Hay was widely recognized for her contributions to mathematical logic and for her strong leadership of her department, her devotion to students and her lifelong commitment to nurturing the talent of young women and men secured her reputation as a consummate educator. 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.

Citation for Sybilla Beckmann

The 2014 Louise Hay Award is presented to **Sybilla Beckmann**, Josiah Meigs Distinguished Teaching Professor of Mathematics at the University of Georgia, in recognition of her vision, persistence, and leadership in enhancing the teaching and learning of mathematics in this country and beyond. Her work is based on her insight that sustainable improvement in mathematics education can only occur when the mathematical culture in the schools and the universities is "built on respect for the innate mathematical abilities that are the birthright of every student." She has worked to energize every link of this chain, from the daily challenges that teachers face in their classrooms to the highest levels of the national discussions of K–12 education.

Sybilla has made substantial contributions to Galois theory. She began her career as a Gibbs Instructor at Yale University and has been at the University of Georgia since 1988. More bravely, she taught sixth grade for a year and volunteered at another elementary school where she "started a math revolution." Her redesigned mathematics courses for prospective elementary teachers led to her highly regarded and widely adopted textbook, and she created the Mathematicians Educating Future Teachers program. She was a writer of the NCTM's *Curriculum Focal Points for PreKindergarten through Grade Eight* and two supplemental books. She played a significant role in writing the Common

Sybilla Beckmann

Core State Standards in Mathematics and was the lead writer on the elementary grades for *The Mathematical Education of Teachers II.*
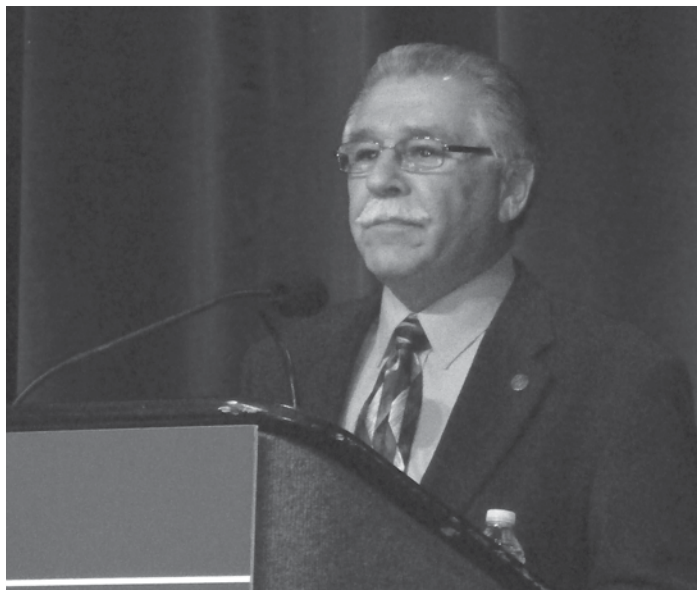
Response from Beckmann

As a longtime member of AWM, I am thrilled and deeply honored to receive this award. I hope I can use it to draw attention to the need for all of us who teach math—at any level—to join together to make the mathematics teaching community a strong, vibrant, and intellectually engaging one. We need to think together about mathematics teaching, and to vet, use, and build on the best ideas about it. We need to own our profession and take pride in it.

Louise Hay said "that sources of inspiration and opportunities to change your life can come unexpectedly and should not be ignored, and that you should not neglect the dictates of your own career, taking some risks if necessary," words with which I wholeheartedly agree. It is still a surprise to me that mathematics education has become my passion. I am so grateful to so many people for helping me pursue this passion. My wonderful family has put up with all the time and intensity I devote to my work. My extraordinary Department of Mathematics at the University of Georgia has given me unfailing support, even as I have chosen a path quite different from the usual one in a math department. My colleagues in mathematics education at the University of Georgia and across the country have welcomed me, worked with me, and taught me so much. But especially, thank you to AWM—a uniquely positive, personal, and encouraging organization—for this special honor.

M. Gweneth Humphreys Award for Mentorship of Undergraduate Women in Mathematics

The 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.

William Yslas Vélez

Citation for William Yslas Vélez

The Association for Women in Mathematics is pleased to present its fourth annual M. Gweneth Humphreys Award to Professor William Yslas Vélez of the Department of Mathematics at the University of Arizona.

Dr. Vélez is legendary for his ability to encourage women to study mathematics and pursue mathematical careers. Particularly impressive is his success in instilling confidence in first generation and minority students who are often struggling to overcome expectations based on culture and gender. At an early stage, Vélez identifies and recruits students he believes would benefit from taking more math courses. Numerous women describe how he met with them their first days on campus and got them thinking about degree and career paths. Others gratefully express how he completely changed their academic horizon when he pulled them aside and urged them to consider graduate studies in mathematics. Many appreciate how he listened carefully to their interests and guided them to attain well-matched research experiences. He challenges his students to step out of their comfort zones so they can achieve greater success. One former student writes: "I catch myself encouraging others to obtain an education and specifically that they should consider a degree in mathematics.… I have experienced firsthand how much impact one person alone can have on a student's academic and professional life, and I hope to be to other students what Dr. Vélez was to me."

The AWM is proud to honor William Yslas Vélez's outstanding achievements in inspiring undergraduate women to discover and pursue their passion for mathematics.

Response from Vélez

I am honored to receive this recognition from the AWM. I am extremely grateful to my colleagues and friends, Deborah Hughes-Hallett and Laurie Varecka, for taking the initiative to nominate me for this recognition and to contact the many women that I had the pleasure of working with over these many years. As I near retirement, the letters that I received from these women are a treasure of wonderful memories.

The small amount of success that I have had in motivating students to pursue mathematical studies has much to do with the culture that I grew up in. The Mexican-American culture and family that nurtured me and that I embraced provided me with an important outlook. From the deserts of Arizona-Sonora, a mother whispered to her children, "Lo único que les puedo dejar es una buena educación." (My inheritance to you is a good education.) My brothers and I took this to heart. Though our career paths were all different, we each shared this inheritance with others. This small breath of hope, whispered so long ago, reverberates still. I am privileged to be the conduit through which my mother has spoken to so many women.

Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman

In 1990, the Executive Committee of the Association for Women in Mathematics established the annual Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman. The prize is named for Alice T. Schafer (1915–2009), one of the founders of AWM and its second president, who contributed greatly to women in mathematics throughout her career. The criteria for selection include, but are not limited to, the quality of the nominees' performance in mathematics courses and special programs, an exhibition of real interest in mathematics, the ability to do independent work, and (if applicable) performance in mathematical competitions.

CALL FOR NOMINATIONS

2015 M. Gweneth Humphreys Award

The Executive Committee of the Association for Women in Mathematics has established a prize in memory of M. Gweneth Humphreys to recognize outstanding mentorship activities. This prize will be awarded annually to a mathematics teacher (female or male) who has encouraged female undergraduate students to pursue mathematical careers and/or the study of mathematics at the graduate level. The recipient will receive a cash prize and honorary plaque and will be featured in an article in the *AWM Newsletter*. The award is open to all regardless of nationality and citizenship. Nominees must be living at the time of their nomination.

The 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.

The nomination documents should include: a nomination cover sheet (available at www.awm-math.org/humphreysaward.html); a letter of nomination explaining why the nominee qualifies for the award; the nominee's vita; a list of female students mentored by the nominee during their undergraduate years, with a brief account of their post-baccalaureate mathematical careers and/or graduate study in the mathematical sciences; and supporting letters from colleagues and/or students. At least one letter from a current or former student of the candidate must be included.

Nomination materials for the Humphreys Award shall be submitted online. See the AWM website at www.awm-math.org for nomination instructions. Nominations must be received by **April 30, 2014** and will be kept active for three years at the request of the nominator. For more information, phone (703) 934-0163, email awm@awm-math.org or visit www.awm-math.org/humphreysaward.html.

AWM is pleased to present the twenty-fourth annual Alice T. Schafer Prize to **Sarah Peluse**, University of Chicago. Additionally, AWM was pleased to honor **Morgan Opie**, University of Massachusetts, Amherst, as runner-up and **Shiyu (Jing-Jing) Li**, University of California, Berkeley and **Jessie Zhang**, Massachusetts Institute of Technology, as honorable mention recipients.

Citation for Sarah Peluse

Sarah Peluse is a senior mathematics major at the University of Chicago. She is hailed by the faculty there as one of the "top 5 undergraduates in 49 years." Peluse transferred to the University of Chicago in 2011 from Lake Forest College and has gone on to take a rigorous curriculum of advanced mathematics courses. In one reading course, she gave a "seminar-quality presentation at the board" each week, skillfully fielding questions on extensions and applications of the material and discussing current research. She is currently working as a research assistant to a faculty member in the area of model theory.

Peluse attended an REU at Williams College; her work there resulted in a talk and poster at the Joint Mathematics Meetings in 2012. She also attended an REU in number theory at Emory University in 2012 and 2013 and was recognized as a "true star." At Emory, she worked on problems concerning lacunary q-series, irreducible representations of $SU(n)$ which have prime power degree, and zeros of Eichler integrals of cusp forms. This work has resulted in one published article and others submitted for publication.

Peluse is described as having impressive creativity and the capability to obtain deep understanding of sophisticated material on her own. Peluse's recommendation letters praise not only her "impressive talent" but also her motivation, saying that she is a "ferocious worker" who "has a drive … only observed in a few top people." She is viewed as a "future superstar."

Response from Peluse

I am greatly honored to be selected as the winner of the 2014 Schafer Prize. First, I'd like to thank Jan Robinson, my middle school math teacher, for sparking my love for math and putting up with me when I'd sneak out of my other classes to talk to her about it. I want to thank every math professor I've taken a course with at Lake Forest College and the University of Chicago for contributing to my education. In particular, I want to thank Ed Packel and Dave Yuen for encouraging me to pursue math at a higher level and
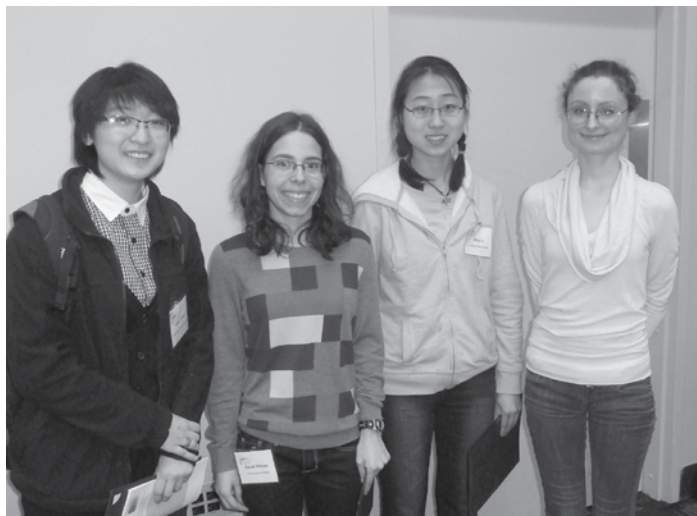
Schafer Prize recipients: Jessie Zhang, Sarah Peluse, Shiyu (Jing-Jing) Li, and Morgan Opie

providing outlets to do and discuss math outside of my courses at Lake Forest. I'm exceedingly grateful to Paul Sally for convincing me to come to the University of Chicago, for his ample advice and encouragement, for always looking out for my best interests, and for his always engaging and challenging classes. I'd also like to thank Maryanthe Malliaris for many good mathematical discussions and for pointing out to me interesting talks and papers. I'm thankful for my experiences at the wonderful REUs I attended at Williams College and Emory University. I would especially like to thank Ken Ono for being a fantastic and tireless advisor who is generous with advice, for creating an amazing environment to do math in at the Emory REU, and for suggesting interesting problems to work on. Finally, I want to thank my family, my friends, and my teammates for their love and support.

Citation for Morgan Opie

Morgan Opie is currently a senior mathematics major at the University of Massachusetts Amherst. Opie was homeschooled from a young age and attended a community college in lieu of high school before transferring to UMass Amherst. Once at UMass, Morgan took and excelled in essentially the entire undergraduate and graduate mathematics curriculum.

She has participated in the Undergraduate Summer School at the UCLA Logic Center and was an REU student in algebraic geometry at UMass last summer. During her REU, Opie worked on a conjecture concerning the moduli space of stable genus zero curves. Not only did she quickly learn the necessary background to work on the research problem, she in fact found a series of counterexamples to the conjecture. The work has been presented at a conference for young mathematicians and

is currently being written up for publication.

Opie's recommenders describe her mathematical abilities as truly impressive and remarkable. She is able to improvise at the board, discover non-standard and exciting solutions to challenging problems, and effectively share her mathematical insights with others. Moreover, they add that Opie is "One of the new emerging leaders in mathematics."

Response from Opie

It is truly an honor to be the 2014 Alice T. Schafer Prize Runner-up. I am grateful to the AWM for advancing women in this field, and in particular for offering the Schafer prize. I would like to take this opportunity to acknowledge a few of the many individuals who have helped me in my mathematical journey thus far. Firstly, I must thank Professor Jenia Tevelev of the University of Massachusetts. As my teacher and REU mentor, his energetic approach to mathematics, consistent support, and high expectations have been instrumental to my mathematical development. I would also like to thank Professors Eduardo Cattani, Tom Braden, and Richard Ellis of the University of Massachusetts. Their exceptional teaching,

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

Application deadline: **August 15, 2014**

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings. Pending funding, an AWM Workshop is scheduled to be held in conjunction with the Joint Mathematics Meetings in San Antonio, TX in January 2015.

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

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

MENTORS: We also seek volunteers to act as mentors for workshop participants. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by September 15, 2014.

ELIGIBILITY: To be eligible for selection and funding, a graduate student must have made substantial progress towards her thesis and a recent PhD must have received her PhD within approximately the last five years, whether or not she currently holds a postdoctoral or other academic position. Women with grants or other sources of support are welcome to apply. All non-US citizens must have a current US address.

All applications should include:

- a title of the proposed poster or talk
- an abstract in the form required for AMS Special Session submissions for the Joint Mathematics Meetings
- a curriculum vitae
- one letter of recommendation from a faculty member or research mathematician who knows the applicant's work—in particular, a graduate student should include a letter of recommendation from her thesis advisor.

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

insightful explanations, and constant encouragement have motivated me in my quest for mathematical knowledge. I am also grateful to Minxie Zhang and Negash Yusuf, my instructors at Cape Cod Community College, who first inspired me to explore mathematics. Lastly, I would like to thank my family for supporting me in all my endeavors.

Citation for Shiyu (Jing-Jing) Li

Shiyu (Jing-Jing) Li is a senior mathematics major at the University of California at Berkeley. She has an impressive history of mathematical prowess, receiving gold medals in the Girls Math Olympiad in 2009 and 2010 and Honorable Mention in the Putnam Competition in 2010 and 2011. At Berkeley, she has taken an extensive selection of advanced undergraduate and graduate courses in mathematics. She has one research paper published and two further papers have been accepted, all in the area of number theory. Li is also involved in outreach; she founded a program of high school and middle school student competitions called the Berkeley Math Tournament (BMT).

Li participated in an REU at Emory University in 2013, in which she studied the Selberg sieve in response to recent advances on the Twin Primes Problem. Her results are described as "highly nontrivial," resulting in "two great papers on central questions in number theory." She is known to be "focused, motivated and smart," with "stellar" performance in her courses and "extensive mathematics-related activities outside the classroom."

Response from Li

I am deeply honored to have been selected as an Honorable Mention for the Alice T. Schafer Prize. I would like to thank the AWM for their efforts in encouraging women to pursue mathematics. I also want to acknowledge all of the people who have shaped and changed me along my journey, making me into who I am today. In particular, I am thankful to my REU advisors, Drs. Gregg Musiker, Steven J. Miller, and Ken Ono for their help and guidance. These professors have been wonderful mentors who have helped me greatly improve my understanding of mathematical research and solidify my desire to continue pursuing this path. In addition, I would like to show gratitude to the Mathematics Department of UC Berkeley, and in particular Drs. Kenneth Ribet, Elena Fuchs, and Lauren Williams for their generous guidance and advice. Lastly, I want to thank my parents and friends for their support, both mathematically and personally.

Citation for Jessie Zhang

Jessie Zhang graduated from high school in Shanghai in the top 1% of her class and is now a junior mathematics major at MIT. In her first two years at MIT she took, and excelled in, ten upper-level mathematics classes. She is currently spending this academic year at Cambridge University, taking part in the Cambridge-MIT exchange program. Zhang has participated in several undergraduate research projects, including one in robotics and one in physics. Following her first year at MIT, she participated in MIT's Summer Program in Undergraduate Research, where she worked on research in homotopy theory, studying the periodic lambda algebra. She then spent six months at MIT's CSAIL Center for Robotics, working on mathematical models and machine learning algorithms to create an adaptive table tennis playing robot arm. In March of 2013, Zhang joined a research group in experimental condensed matter physics at Harvard University, where she conducted data analysis on vortices in a superconductor. Zhang also participated in MIT's Spring High School Studies program, designing and co-teaching a course to advanced high school students.

Zhang's mentors, describing her as "brilliant, creative, hard-working, independent, and productive, as well as generous with her time in helping other members" of her research team, praise her "extraordinary talent as a designer of efficient algorithms" and "amazing potential for research."

Response from Zhang

I am deeply honored to receive honorable mention of the 2014 Alice T. Schafer Prize. I would like to thank AWM for offering this prize and their continued effort in encouraging women to pursue mathematics. There are many people who have supported and encouraged me to help me get this far. First, I would like to thank my middle school math teacher Ms. Xiaoyi Wang, for introducing me to the beautiful world of mathematics. Without her, I may never have been exposed to the joys of math. I would also like to thank the math department at MIT, for never ceasing to provide me with exciting challenges, and the many people in it—my nominator Professor Artin, for coming out to dinner with a bunch of freshman, my academic adviser Professor Vogan, for coming to watch me compete in a table tennis tournament, Professor Behrens and Guozhen Wang, for a fruitful summer project, and Michael Andrews, for digressing to algebraic topology in analysis course office hours. I am also grateful to MIT UROP for its abundance of resources and the chance to explore; through UROP, I had the chance to work on a robot playing the best sport in the world, and to meet Professor Hoffman in physics at Harvard, who has been a strong woman role model in pursuing science to me.

Last but not least, I would like to express my utmost thanks to my beloved family and friends, without whom I would not be where I am today, and to the wonderful field of mathematics, without which I probably would not be here.

AWM-Microsoft Research Prize

The Executive Committee of the Association for Women in Mathematics has established the AWM-Microsoft Research Prize in Algebra and Number Theory. This prize will be awarded every other year, beginning in 2014. 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 U.S. institutions who are within 10 years of receiving their PhD, or have 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 inaugural 2014 AWM-Microsoft Research Prize in Algebra and Number Theory is presented to Professor **Sophie Morel**, in recognition of her exceptional research in number theory.

Morel received her doctorate in 2005 from l'Université Paris-Sud. After appointments at the Institute for Advanced Studies, the Clay Mathematics Institute and Harvard University, she is currently a Professor of Mathematics at Princeton University.

Morel is a powerful arithmetic algebraic geometer who has made fundamental contributions to the Langlands program. Her research has been called "spectacularly original, and technically very demanding." Her research program has been favorably compared to that of several Fields medalists. She accomplished one of the main goals of the

NSF-AWM Travel Grants for Women

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

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

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

Selection Procedure. All awards will be determined on a competitive basis by a selection panel consisting of distinguished mathematicians and mathematics education researchers appointed by the AWM. A maximum of $1500 for domestic travel and of $2000 for foreign travel will be funded. For foreign travel, US air carriers must be used (exceptions only per federal grants regulations; prior AWM approval required).

Eligibility and Applications. These travel funds are provided by the Division of Mathematical Sciences (DMS) of the National Science Foundation. The conference or the applicant's research must be in an area supported by DMS. Applicants must be women holding a doctorate (or equivalent) and with a work address in the USA (or home address, in the case of unemployed applicants). Please see the website (http://www.awm-math.org/travelgrants.html) for further details and do not hesitate to contact Jennifer Lewis at 703-934-0163, ext. 213 for guidance.

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

Langlands program by calculating the zeta functions of unitary and symplectic Shimura varieties in terms of the L-functions of the appropriate automorphic forms. To achieve this, she introduced an innovative *t*-structure on derived categories which had been missed by many experts. Her book *On the cohomology of certain noncompact Shimura varieties* published in the Annals of Mathematics Studies series is described as a tour-de-force. Morel found another remarkable application of her results on weighted cohomology. She gave a new geometric interpretation and conceptual proof of Brenti's celebrated but mysterious combinatorial formula for Kazhdan-Lusztig polynomials, which are of central importance in representation theory. We would like to congratulate Professor Morel for her substantial achievements.

AWM-Sadosky Research Prize

The Executive Committee of the Association for Women in Mathematics has established the AWM-Sadosky Prize in Analysis. This prize will be awarded every other year, beginning in 2014. The purpose of the award is to highlight exceptional research in analysis by a woman early in her career. The field will be broadly interpreted to include all areas of analysis. Candidates should be women, based at U.S. institutions who are within 10 years of receiving their PhD, or have not yet received tenure, at the nomination deadline.

The AWM-Sadosky Research Prize serves to highlight to

AWM WORKSHOP FOR WOMEN GRADUATE STUDENTS
AND RECENT PHDs AT SIAM CSE

For many years, the Association for Women in Mathematics has held a series of workshops for women graduate students and recent PhDs in conjunction with major mathematics meetings.

WHEN: Pending funding, an AWM Workshop is scheduled to be held in conjunction with the SIAM Conference on Computational Science and Engineering (CSE) in March 2015. Check www.awm-math.org for location and exact dates.

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

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

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

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

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

Jill Pipher and Svitlana Mayboroda

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 inaugural 2014 AWM-Sadosky Research Prize in Analysis is awarded to **Svitlana Mayboroda** in recognition of her fundamental contributions to harmonic analysis and partial differential equations. Her research has centered on boundary value problems for second and higher order elliptic equations in non-smooth media, that is, under minimal regularity assumptions on the coefficients and/or the underlying domain's boundary. In particular Mayboroda studies problems aimed at understanding how irregular geometries or internal inhomogeneities of media affect the behavior of the physical system in question, an area where she has made a number of deep and original contributions. Her talent and imagination, praised by world leaders in the field, is also evident in her recent work with Maz'ya on regularity in all dimensions for the polyharmonic Green's function in general domains and of the Wiener test for higher order elliptic equations, which in turn relies on a new notion of capacity in this case. This is the first result of its kind for higher order equations, showing remarkable creativity and deep insight. Svitlana Mayboroda's contributions have opened up fundamental new paths in this uncharted territory and she has been a major driving force behind it.

Mayboroda is an outstanding and talented young analyst whose work is already of lasting impact. She is the recipient of a Sloan Foundation fellowship and an NSF CAREER award. Her professional trajectory is remarkable, and her future potential enormous. She richly deserves the recognition of the 2014 AWM-Sadosky Research Prize. Cora Sadosky would be proud.

Response from Mayboroda

I am greatly honored and immensely delighted to receive the inaugural AWM-Sadosky Prize in Analysis. Most of all, I am truly excited that the beautiful mathematics at the core of the cited results has received such a high recognition. I was so very lucky to have had wonderful teachers, collaborators, and colleagues. It is impossible to properly thank here all the people who have deeply marked my path. I am greatly thankful to Yuriy Gandel and Marius Mitrea for their early guidance, to Vladimir Maz'ya for his incredible mathematical generosity and passion, to Jill Pipher for her continuous support and truly life-changing inspiration, to Steve Hofmann for years of exhilarating collaboration, to Marcel Filoche for a breathtaking introduction into the world of physics, to Carlos Kenig, Guy David, Alexander Volberg, Rodrigo Bañuelos, to my students and postdocs. Above all, I am indebted to my family for their constant belief in me and constant skepticism, both invariably stimulating.

Finally, I would like to express my deep gratitude to the Association for Women in Mathematics and to the many people, men and women, tirelessly fighting for the equal opportunities in our profession. It is a particular honor to receive the award commemorating Cora Sadosky. I am very privileged to have had a chance to meet her and to be one of the many young people with whom she so generously shared her mathematics, her vision of the profession, and her support, to be touched and inspired by her remarkable personality.

AWM Service Awards

The AWM Service Award, established by the AWM Executive Committee in November 2012, recognizes individuals for *helping to promote and support women in mathematics through exceptional voluntary service to the Association for Women in Mathematics.* After an inaugural class of ten awardees in 2013, the award will be given annually to one or two AWM members in recognition of their extensive time and effort devoted to AWM activities during the previous seven years. Presidents (past, present, and elected) and current officers are not eligible for the award.

From a vast list of volunteers, the 2014 awardees were chosen for their extensive work and service to AWM during recent years.

Tai Melcher, University of Virginia, was recognized for her service to AWM as a PI on a successful NSF Sonia Kovalevsky Day grant. Furthermore, her involvement in the organization of the AWM activities at the 2012 USA Science and Engineering Festival (USASEF) has been exemplary. She engaged thousands of children in doing mathematics. The activities she designed were fun and challenging! She brought energy, enthusiasm and creativity in designing the event, and this has been positively noticed by the NSF program officers among many others. Melcher has volunteered, once again, to be on the team representing AWM at the 2014 USAEF.

Katharine Ott, University of Kentucky, was recognized for her service to AWM as a PI on a successful NSF Sonia Kovalevsky Day grant. Furthermore, her involvement in the organization of the AWM activities at the 2012 USA Science and Engineering Festival (USASEF) has been exemplary. She engaged thousands of children in doing mathematics. The activities she designed were fun and challenging! She brought energy, enthusiasm and creativity in designing the event, and this has been positively noticed by the NSF program officers among many others. Ott has volunteered, once again, to be on the team representing AWM at the 2014 USASEF. Additionally, as a writer for the *AWM Newsletter* interview series, she continues to contribute to the AWM.

AWM WORKSHOP

Magnhild Lien, AWM Executive Director

The 2014 Joint Mathematics Meetings were held January 15–18, 2014 in Baltimore, Maryland. The AWM Workshop for Women Graduate Students and Recent PhDs, usually held at these meetings, followed a new format established last year. The first part of the workshop took place Friday evening with a reception and a poster session for graduate students. The workshop continued on Saturday with talks focused on computer vision, image analysis and computational geometry, by recent PhDs and invited speakers, and a luncheon for workshop participants and mentors. The new format allowed for a larger number of workshop participants as well as greater exposure of their work presented either in a poster or a talk. The workshop was organized by **Maria Basterra**, University of New Hampshire, **Erin Chambers**, Saint Louis University,

Tai Melcher and Katharine Ott

Kathryn Leonard, California State University Channel Islands, and **Luminita Vese**, University of California, Los Angeles, a dedicated group of women whose great ideas and abundance of energy made it a big success.

At the workshop reception held in the Pratt Street Lobby of the Baltimore Convention Center, nineteen graduate students presented their posters. There was a steady stream of conference attendees coming by—and not just for the refreshments! The session was scheduled for one hour and fifteen minutes, but many people showed up early and stayed later. Groups congregated by each of the posters, and the graduate students seemed genuinely excited to showcase their work. Prospective employers came to the poster session to meet with potential candidates for positions at their universities. The nineteen poster presenters include: **Kassie Archer**, Dartmouth College, **Lubjana Beshaj**, Oakland University, **Brianna R. Cash**, University of Maryland, College Park, **Ko-Shin Chen**, Indiana University, Bloomington, **Aisha Nájera Chesler**, Claremont Graduate University, **Jacqueline Davis**, Vanderbilt University, **Alyson Deines**, University of Washington, **Taryn C. Flock**, University of California, Berkeley, **Cynthia V. Flores**, University of California, Santa Barbara, **Kathryn A. Haymaker**, University of Nebraska-

Lincoln, **Jodi Herbert**, Kansas State University, **Michaela J. Kubacki**, University of Pittsburg, **Van C. Nguyen**, Texas A&M University, **Sofia Ortega Castillo**, Texas A&M University, **Pei Pei**, University of Nebraska-Lincoln, **Victoria Taroudaki**, AMSC Program, University of Maryland, **Katherine Thompson**, University of Georgia, **Tracy Weyand**, Texas A&M University, and **Fang Zheng**, Johns Hopkins University. For titles and abstracts of the posters see https://docs.google.com/file/d/0B2rXxbFqvn3ZclFYNzl2Y0NjZGs/edit?pli=1.

This year we added poster judging to the workshop. Twenty one volunteer judges evaluated the posters, and the two top posters were awarded prizes. The winners were **Jacqueline Davis** and **Tracy Weyand**. In addition **Aisha Chesler** was awarded a prize sponsored by the Mathematical Biosciences Institute, for the best poster related to the biosciences.

During the two hour luncheon on Saturday the graduate students and recent PhDs met with their mentors. The winners of the poster judging were presented with certificates. The attendees at the luncheon included the workshop participants, the mentors, the workshop organizers, the AWM president, the AWM past president, and the AWM executive director.

The talks at the workshop were given by both senior and junior female researchers in the areas of computer vision, image analysis and computational geometry. Many of the speakers were participants in the Women in Shape Modeling (WiSH) research collaboration conference held at the Institute for Pure and Applied Mathematics (IPAM) in July 2013. Collaboration groups formed at IPAM have


Aisha Nájera Chesler, Noha El-Zehiry, Weihong Guo and Yanxi Liu at the workshop luncheon

continued to work together and will publish some early results in an upcoming Springer Conference Proceedings. WiSH participant **Marylesa Howard** of National Security Technologies provided an explosive beginning to the workshop with her talk about how to denoise x-ray images of underground bomb detonations. **Yanxi Liu** of Penn State followed with an investigation of near-symmetric texture modeling, showing its applications to urban location determination based on the near-symmetric textures on buildings in street scenes. In the afternoon, postdoc **Brittany Fasy** of Tulane University presented results on persistent homology, followed later by her mentor **Carola Wenk**, also of Tulane, who discussed applications of the Frechet distance on graphs to matching GPS trajectories to known street maps. All talks were clear and engaging, resulting in lively question and answer sessions. The twelve workshop speakers include: senior women **Yanxi Liu**, Penn State University, and **Cindy Grimm**, Oregon State University, and WiSH participants **Weihong Guo**, Case Western University, **Noha El-Zehiry**, Siemens Corporation, and **Carola Wenk**, Tulane University. Recent PhDs who spoke are: **Yifei Lou**, University of California, Irvine, **Jing Qin**, University of California, Los Angeles, **Brittany Fasy**, Tulane University, Eunhui Park, University of Maryland, College Park, and **Lori Beth Ziegelmeier**, Macalester College, and WiSh participants **Marylesa Howard**, National Security Technologies, and **Ellen Gasparovic**, Duke University. For titles and abstracts of the talks see https://docs.google.com/file/d/0B2rXxbFqvn3ZclFYNzl2Y0NjZGs/edit?pli=1.

A special thanks to **Maria Basterra**, **Erin Chambers**, **Malena Español**, **Cindy Grimm**, **Weihong Guo**, **Ruth Haas**,
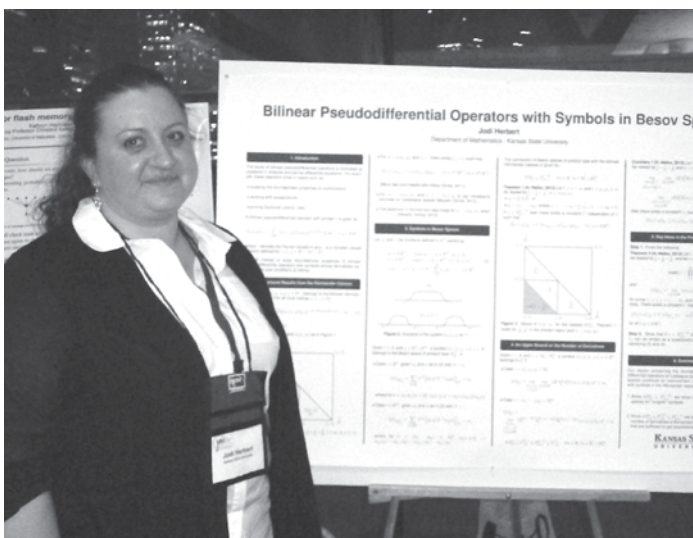
Jodi Herbert at her poster

Aimee Johnson, Amy Ksir, **Rachel A. Ward**, **Carola Wenk** and **Carolyn Yackel** for serving as mentors to the graduate students and recent PhDs. These women shared their varied experiences and provided invaluable guidance. Also many thanks to Sylvia Wiegand, the organizer of the poster judging and the volunteer judges **Ed Aboufadel**, **Sukanya Basu**, **Lynette Boos**, **Randy Cone**, **Courtney Davis**, **John C.D. Diamantopoulos**, **Malena Español**, **Rebecca Garcia**, **Paula Grajdeanu**, **Valentina Harizanov**, **Tony Harkin**, **Barbara Herzog**, **Leslie Hogben**, **Kathryn Leonard**, **David McCune, Mara D. Neusel, Augustine O'Keefe, Beata Ran-drianantoanina**, **David Saltman**, **Emily Sprague** and **Longhua Zhao**. Sylvia's tireless effort to organize this event and the volunteers' eagerness to participate, not only doing the judging but also meeting afterwards to tally the scores, made it all run very smoothly, and we are all set to do this again at the 2015 JMM workshop. Finally, a special thank you to AWM staff member Matthew Hundley, who oversaw the setup of the poster session as well as helping the judges tabulating the scores for the poster judging.
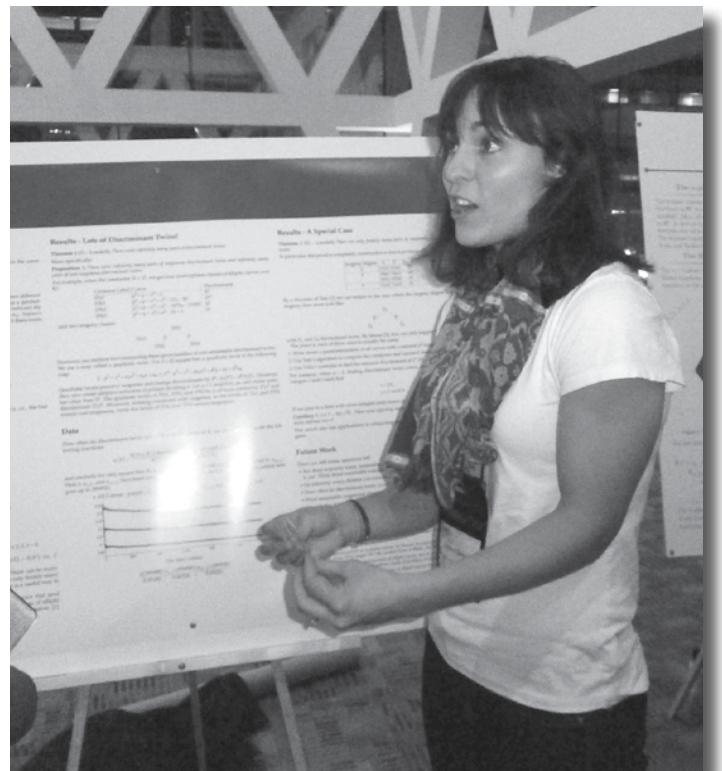
USASEF

AWM will participate in the third USA Science and Engineering Festival Exposition (USASEF), April 26–27, 2014, at the Walter E. Washington Convention Center, Washington, D.C. The expo, touted as the largest science festival in the US, will feature over 750 STEM organizations presenting hands-on science and engineering activities for persons of all ages. Back by popular demand, this year the AWM booth is titled "Secret messages, or how to write your journal so your brother cannot read it." Visitors will learn how to use mathematics to write and break secret messages and codes. The interactive activities will feature codes from throughout history, starting with the eras of Cleopatra and Caesar, to Leonardo da Vinci and Thomas Jefferson, all the way up to the present day. In 2010, at the inaugural USASEF, the AWM booth of the same name attracted over 2,000 visitors. In 2012, the AWM hosted the booth "The Ubiquitous and Beautiful World of Mathematical Patterns," which was equally popular. Building on our previous experiences, this year's booth promises to be the most exciting yet! The AWM is currently seeking enthusiastic volunteers to help staff the booth. If you are in the DC area and are interested in participating, please email Irina Mitrea at imitrea@temple.edu.
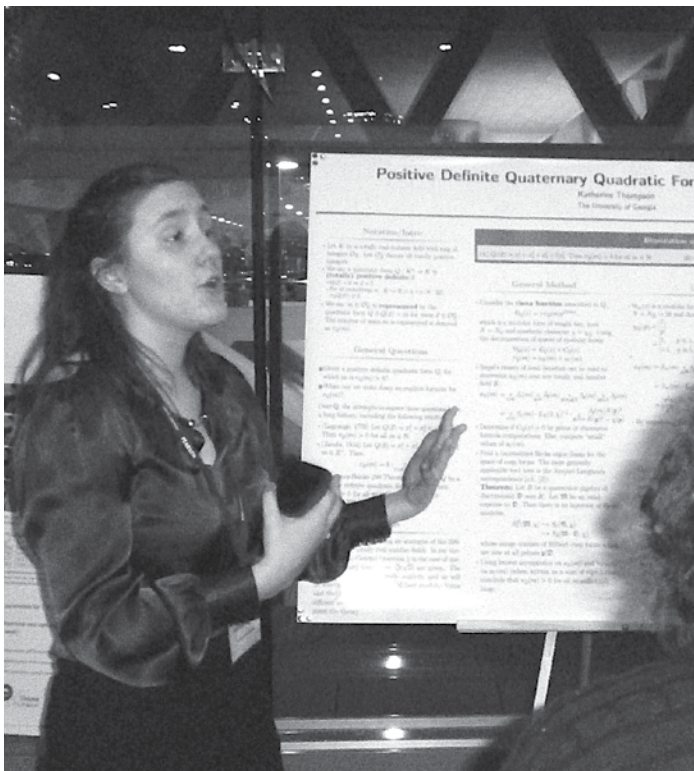
Katherine Thompson explaining her poster

Alyson Deines explaining her poster

2012 USASEF Volunteers

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.

Review of *Mathematics in Popular Culture: Essays on Appearances in Film, Fiction, Games, Television and Other Media*

Sarah J. Greenwald and Jill Thomley, Appalachian State University

The *AWM Newsletter* has already covered this work via Gizem Karaali's book review, which focused on genius stereotypes within three books [1]. This review focuses on media and gender perspectives in one of those books. The authors are a mother, Elizabeth Sklar, and her daughter, associate professor of mathematics Jessica Sklar, an ideal combination of editors for a book on popular culture and mathematics.

From a media perspective, we compared all the article topics to the existing mathematics and popular culture literature, and found that some have been covered elsewhere, while others are new and interesting additions. Overall though, we were disappointed with the balance and breadth of media representations and we wondered how the articles were chosen. For example, we couldn't find any mention of mathematics in children's literature, movies, educational programming, etc., such as *Donald in Mathemagic Land* or *Cyberchase* [2], an area that is important but often overlooked. To be upfront about our own biases here, our thoughts about mathematics and the media are colored by our research and consulting experiences, including those in the long-running show *The Simpsons* (see for example [3] and [4]). So it probably won't be surprising that we were disappointed that some of these are not well represented in this work. For instance, there have been entire books devoted to the mathematical references in *Numb3rs* [5] and *The Simpsons* [6]. In the case of *Numb3rs*, the major inclusion here is a picture on the cover and within an article about "math-savvy" gamblers, which we felt were not representative of the extent of references

to mathematics in that show. We were also struck that the mathematical musical *Fermat's Last Tango* is not mentioned at all in the book, and collectively, we were left with the impression that the editors were often more interested in presenting the stereotypes related to mathematics rather than the mathematics itself.

We were very pleased to see that there are a number of references to stereotypes of women in mathematics in the book. For example, the article "You Never Said Anything about Math" contains some discussion on the topic in its broad overview of mathematics in the television series *Lost,* and "*Flatland* in Popular Culture" discusses gender portrayals in the original book and its adaptions. Two of the articles have titles that would explicitly lead one to expect a more in-depth discussion of gender issues: "Smart Girls: The Uncanny Daughters of *Arcadia* and *Proof*" and "*Mean Girls*: A Metamorphosis of the Female Math Nerd." The first was written by two English professors, who state in the very first sentence that they themselves are "mathematically challenged," a fact that we found disconcerting and rather informal as a narrative introduction. While they are no doubt adept at the literary interpretations of the two plays, in many ways their focus on mathematics as "uncanny" would seem to reinforce many of the traditional stereotypes of mathematicians, and particularly female mathematicians, as inherently extraordinary. In this case, it would have been more interesting to us to see an interdisciplinary perspective on these works—perhaps an English professor and a mathematics professor, similar to the editorial team, rather than a wholly "outsider" view, as the authors themselves state. The second article was a more balanced and informative analysis with respect to gender stereotyping, analyzing not only the journey of the fictional main character in the film but also bringing in the voices of real women who represent a positive and realistic departure from the traditional "math nerd" image.

We found that this book had us reflecting more broadly on gender and mathematics themes in popular culture. The authors did a nice job of including many different examples and themes, and in particular we liked the article on the movie *Mean Girls*, which examines the topic in a depth we have not previously seen. We would recommend this book to anyone who is interested in a fresh perspective on mathematics and popular culture.

References

[1] Karaali, Gizem. Review of the books *Mathematics in Popular Culture: Essays on Appearances in Film, Fiction, Games, Television and Other Media*, *Loving+Hating Mathematics: Challenging the Myths of Mathematical Life,* and *Mathematicians: An Outer View of The Inner World. AWM Newsletter,* 43(6), November–December, 2013, pp. 22–25.

[2] PBS. "Cyberchase. Math is Everywhere | PBS Kids." http://pbskids.org/cyberchase/

CALL FOR NOMINATIONS

2015 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, 2014** 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.

[3] Greenwald, Sarah and Jill Thomley. "Mathematically Talented Women in Film and Television: A Summary of the Last Five Years." *AWM Newsletter*, 39(1), January–February, 2009, pp. 8–11.

[4] Greenwald, Sarah and Andrew Nestler. "Mathematics and Mathematicians on *The Simpsons*." simpsonsmath.com

[5] Devlin, Keith and Gary Lorden. *The Numbers Behind NUMB3RS: Solving Crime with Mathematics.* New York: Plume, 2007.

[6] Singh, Simon. *The Simpsons and Their Mathematical Secrets.* New York: Bloomsbury USA, 2013.

WIMM Watch: P vs. NP … It's Elementary My Dear Watson

Kristine Roinestad, Georgetown College

A female mathematician, two homicides, and the computer science problem P vs. NP take center stage in "Solve for X," the October 14, 2013, episode of the CBS TV series *Elementary*. Dr. Tanya Barrett, played by guest star Lynn Collins, is a suspect in the murders of two mathematicians attempting to solve the P vs. NP problem. She is a gifted mathematician and a well-respected authority in the P vs. NP field. In the past, Barrett had been fixated on solving P vs. NP but supposedly walked away from this work because it had become too all-consuming. A professor at a local college, she presently not only teaches but also writes articles profiling those mathematicians active in the P vs. NP community.

Series regular Dr. Joan Watson, played by Lucy Liu, is a former surgeon who, after making a grievous medical mistake, turned consulting detective and forensic expert as Sherlock Holmes' assistant. Through the zigzags of the investigative process, Watson is painstakingly disciplined and methodical in applying scientific principles to fact-finding research and crime scene management.

The episode's writers simplified the definition of P vs. NP so that the average non-mathematician would be able to understand its underlying concepts. They also explain some of the real-world implications of solving the problem—for example, code-breaking, e-commerce, and digital privacy. In addition, the writers introduce the Clay Mathematics Institute and its naming P vs. NP as one of its Millennium problems. For comedic relief, they unfortunately also portray one of the mathematicians as exceedingly eccentric and exhibiting quirky and peculiar behaviors—thankfully for the reputation of female mathematicians, this character is a man!

BOOK REVIEW

Extraordinary Women in Science & Medicine: Four Centuries of Achievement, Ronald K. Smeltzer, Robert J. Ruben, and Paulette Rose. Grolier Club, ISBN-13 978-1605830476.

Reviewer: Gerald L. Alexanderson, Santa Clara University, galexand@math.scu.edu

This is a handsome and scholarly catalogue for a Grolier Club exhibition of books, manuscripts, letters, portraits, and other related materials on the work of women in mathematics, science and medicine since 1700. First of all, what is the Grolier Club? Modeled on organizations of bibliophiles in Europe, primarily England, it is the oldest such organization in the United States, founded in 1884, and now replicated in almost every major American city. The Grolier maintains a headquarters for offices, library, meeting rooms, and exhibition space in a stately six-story Georgian townhouse on East 60th Street in New York, between Madison and Park Avenues. This exhibition on the work of women in science opened on September 18, 2013 and ran to November 23. The principal curator, Ronald K. Smeltzer, a retired engineer, is active in the Grolier Club and is Secretary of the Fellowship of American Bibliophilic Societies. The other curators are Paulette Rose, a rare book dealer, and Robert J. Ruben, on the faculty of the Albert Einstein College of Medicine. One of the contributors to the catalogue is Marilyn Bailey Ogilvie, curator of the great collection of books on the history of science at the University of Oklahoma. In introductory essays there is speculation on how the number of influential women in engineering, the physical sciences, mathematics, and medicine varies by discipline. In the medical sciences the numbers of women among new students now runs to about 50%, though:

> women in leadership positions are few.… Of the women included here, most are well known within the scientific community but very few have broad recognition. Our intention is to raise awareness and understanding of women's roles in the development of the sciences by chronicling, with primary source documents, their major contributions in science and technology. In presenting the brief biographies

of the women, the curators have tried, in particular, to capture the aspects of their lives that seemed to be significant in the development of their scientific careers and to highlight the factors that contributed to their success and recognition—or lack thereof. For example, the often-proscribed educational opportunities available to the women are noted, and how our subjects overcame limitations imposed by contemporary society and the academy are examined.

Of the thirty-two women featured in the exhibition, most worked in physics. Five others are identified as mathematicians, at least according to the modern use of the word. There is one curious exception, however. The list in mathematics is: Gaetana Maria Agnesi, Sophie Germain, Sophie Kowalevski (Kovalevskaya), Emmy Noether, and Florence Nightingale. The inclusion of Nightingale may be something of a surprise to many. Her work described here is almost exclusively in statistics, largely about casualties in the Crimean War. It is commonly claimed that Nightingale's background in mathematics included tutoring not only by her father but also by James Joseph Sylvester. Mark Bostridge's biography of Nightingale claims in a footnote that there is no documentary evidence of this, though it could have happened. Sylvester's biographer, Karen Parshall, also avoids asserting this. Smeltzer, who writes the entry here on Nightingale, correctly does not include this doubtful claim in the catalogue.

The best known of the five is probably Sophie Kowalevski, even though she published fewer than a dozen papers. She died young, but her short life was, in Lady Bracknell's words, "crowded with incident."[1] Sophie Germain is well-known for her mathematical work but also for the fact that she lived in Paris during a difficult time—it was the height of the French Revolution. A "fictional memoir" of her life, *Sophie's Diary*, by Dora Musielak, was published by the Mathematical Association of America in 2012. Interesting discoveries about Germain's work in number theory have come to light only in recent years and are summarized by Reinhard Laubenbacher and David Pengelley in *Historia Mathematica* in 2010.

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[1] Oscar Wilde, *The Importance of Being Earnest,* Act 3.

This catalogue describes the items on display in the show, following short biographical paragraphs and descriptions of the subjects' contributions. The writing is deft and the content both scholarly and entertaining. Of course, I shall concentrate on work by the mathematicians. Some claims may startle professionals in the field. To describe Emmy Noether's contributions to physics and then add that later in life she turned to abstract algebra where she was "in large part the founder of this mathematical subject," could stimulate some discussion in the common rooms in departments of mathematics across the land. She was in many ways the quintessential algebraist of her time, though this does not give proper recognition to earlier mathematicians like Galois and later contemporaries of Noether, like B. L. van der Waerden, Saunders MacLane, A. Adrian Albert, Nathan Jacobson, and many others. Still, the quality of Noether's work, either in physics or abstract algebra, is beyond question. And we still study Noetherian rings!

The exhibition does not include this information, of course, but it is interesting to note that members of Emmy Noether's family were able to visit this exhibition in New York. They were descendants of her siblings who survived the Second World War. One of her brothers, instead of joining his sister in America, fled into Russia where he was shot by the Soviets. Noether herself had an appointment at Bryn Mawr and regularly lectured at the Institute at Princeton and at the University of Pennsylvania until her premature death in 1935.

The list of women in mathematics appearing in the book could be expanded to include Gabrielle-Émilie Du Châtelet (described here among physicists), a student of Maupertuis and Clairaut. Her name is often mentioned with that of Voltaire. In computer science, Augusta Ada Byron, Countess of Lovelace, daughter of George Gordon, Lord Byron, and collaborator with Charles Babbage, could easily have joined the five defined as being mathematicians. Both appear in this collection but also often on lists of women in *mathematics.*

Anyone interested in the contributions of women in the sciences and medicine should find this volume of interest, but in particular mathematicians will find it worthwhile reading and a good volume to put on the shelf next to Henrion's *Women in Mathematics: The Addition of Difference*, among others. Henrion's book is nicely illustrated and full of fascinating and stimulating accounts.

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

Get Involved in Outreach!

Betsy Yanik, Emporia State University; Suzanne Lenhart and Kelly Sturner, University of Tennessee, National Institute for Mathematical and Biological Synthesis

AWM has been active in the area of supporting outreach programs, principally with its organization and sponsorship of Sonia Kovalevsky Mathematics Days for over twenty years. (See https://sites.google.com/site/awmmath/programs/kovalevsky-days.) Unfortunately AWM has not received funding to support SK Days for the 2013–2014 academic year, but the organization is still working to find future support. However, opportunities to be involved in outreach through colleges and institutes abound. The authors of this column will describe outreach efforts that we have organized and mention additional examples. There are many great ways to engage students in the enjoyment of mathematics. The need for more students with STEM skills is well known, and we hope the column will inspire you to design or join an outreach program in your locality.

At Emporia State University (ESU), we have developed five programs to reach out to underrepresented populations. This year marks the 20th anniversary of two of these programs. The first, Enhancing Your Future with Mathematics and Science, is our own locally developed version of the national outreach effort, Expanding Your Horizons in Science and Mathematics. (See http://www.expandingyourhorizons.org/ for more details). This one-day statewide program offers young women in middle school a wide variety of sessions with career discussions and hands-on workshops, all of which are led by women professionals in mathematical and scientific careers. The second ESU program celebrating its 20th anniversary is our Sonia Kovalevsky Mathematics Day program for women in the junior year of high school. The first two years of this program were made possible by AWM sponsorship. The program has been maintained since then by local sponsorships. The third program, specifically designed to reach out to young women, is a week-long summer program, MASTER IT (Mathematics And Science To Explore caReers— Investigating Together) that has been in existence since the summer of 2000.

In 2007, ESU began an outreach program, entitled Si Se Puede Hacer Ciencias y Mathematicas, for Hispanic children in middle school. This program paralleled the earlier work with young women by having Hispanic professionals lead workshops and career discussions for these students. This has been followed up by our newest program, ESU Summer Scholars, which is a three day camp for Hispanic middle school children filled with activities that highlight a variety of STEM skills and careers.

For two summers, the National Institute of Mathematical and Biological Synthesis (NIMBioS) at the University of Tennessee has co-organized the week-long Adventures in STEM summer camp, which introduces middle school girls to science, math, and engineering through hands-on activities, labs, and team projects. The camp is in cooperation with CURENT (Center for Ultra-wide-area Resilient Electric Energy Transmission Networks) and 4-H. In one activity the girls experienced the creative side of science when they used 3D modeling software to design and print their very own plant cell using NIMBioS' new 3D printer. After watching our 3D printer at work, the girls learned how to use free 3D modeling software called SketchUp to help design different organelles from a plant cell. After drafting potential artistic interpretations of the organelles, final designs were saved and sent off to be printed in 3D. Each organelle took about half an hour to print. The final step involved combining the organelles into one single plant cell. The activity was intended to show the campers how scientists use special tools, like computer software and 3D printers, for visualization and modeling. In another activity, the girls were divided into groups to interview NIMBioS scientists and mathematicians. Then the girls introduced the person whom they had interviewed to the whole group. They really seemed to enjoy asking questions and reporting back and summarizing the answers.

New ideas for outreach activities and new sources for funding such activities are continuing to emerge. For example, the MAA Dolciani Mathematics Enrichment Grants Program (http://www.maa.org/dolciani-mathematics-enrichment-grants) awards grants for enrichment activities for talented middle and high school students. [1] This program helped to fund the Secret Communication Summer Camp on codes and ciphers for sixth- through ninth-graders, organized by Colby-Sawyer College and a charter school, Academy for Science and Design.

In 2011, the Harvey Mudd College (HMC) mathematics department hosted a day-long workshop for high school girls, co-organized with Sacred SISTAHS, a nonprofit collective of

African-American women. At the end of the day an informal session for parents arose through discussions with parents who were waiting for their children. When the workshop was offered at HMC the following two years, a concurrent workshop was offered for parents to learn about preparing their daughters for STEM careers. [2] Consider getting parents involved in your activities!

The Somerville Mathematics Fund is an all-volunteer non-profit organization founded in 2000 with a mission to celebrate and encourage mathematics achievement in Somerville, MA. (To read about their activities, see http://somervillemathematics.blogspot.com.) Each October, they host the Scrapheap Showdown in a gym at Tufts University. High school students create three-member teams in advance and arrive to find out what their challenge will be that year. In the middle of the room is a large scrapheap of interesting junk to use in meeting the challenge problem. Problems have included: building bridges, cantilevers, musical instruments (bonus for automation), windmills, and marble race/Rube Goldberg machines. Not every problem results in the same type of machine, such as when they needed to figure out a way to get different small items from the floor to targets on a table. The students usually spend three to four hours constructing and testing their machines before they compete against each other. The Board of the Somerville Math Fund designs and tests each of the problems in advance to make sure that they are solvable and to develop a scoring rubric.

If you are interested in additional ideas for outreach programs, one opportunity to see a variety of such programs highlighted is the annual poster session on mathematical outreach at the Joint Mathematics Meetings each January. For example, this year in Baltimore the posters described such projects as a year-round schedule of out-of-the-classroom mathematics activities at a community college, a summer program for high school students on digital image analysis, Math Circle programs, a year-long program for a group combining women in their senior year in high school with undergraduate women, a summer camp on the connections between mathematics and music, a Saturday program for minority students focusing on applications of mathematics, a middle school student summer program on using mathematical software, a program for students in grades three through twelve focusing on mathematical literacy, a workshop for high school teachers and students on preparing for the High School

Mathematics Contest in Modeling, a program to mentor faculty members on teaching a course on women and mathematics, and a summer camp on methods of secret communication systems.

References

1. S. Kilic-Bali, K. McKinnie, and N. A. Neudauer, Four Years of Enrichment Grants and Counting…, *MAA Focus*, December 2013/January 2014, pages 14, 17.
2. T. Williams and R. Levy, Hitting the Target: Connecting Parents to STEM, *MAA Focus*, December 2013/January 2014, pages 15–17.

Revisiting the Topic of Contingent Faculty

Column Editor's Note: A concern arose following the publication of Patricia Hale's January–February 2013 Education Column, "Contingent Faculty, What is the Problem?" In response, Patricia Hale and Cathy Kessel have collaborated to write the following clarification.

First, the definition used for contingent faculty was "individuals doing the same work done by ladder faculty, but to whom the institution has made no long-term commitment." In the column, the discussion was focused on teaching even though the data included individuals who had few, or no, teaching responsibilities.

Second, the survey statistics used to identify the extent to which contingent positions occur included some that are very desirable such as "research postdocs" that involve little or no teaching, "teaching postdocs" with an emphasis on teaching and related scholarly work, or positions that are due to an individual's stature in the profession such as those held by visiting emeriti. They may include positions that are not contingent, such as part-time positions held by ladder faculty who have a reduced load for family or medical reasons.

Thus, the statement in the column that 36% of faculty positions in mathematics at doctoral institutions for the academic year 2005–06 were contingent positions does not indicate that these positions had all the characteristics discussed in the column. In particular, it does not say that 36% of the positions were undesirable.

A Conversation with Loredana Lanzani

Interviewer: Katharine Ott, University of Kentucky

Loredana Lanzani is Professor of Mathematics at the University of Arkansas. In 2011–2013 she served as a Program Director for the Analysis Program at the National Science Foundation (NSF). Loredana and I met in person in Lexington, KY last November to discuss her mathematics career and her experiences serving at NSF. Below are excerpts from our conversation.

KO: Good afternoon, Loredana. It's a pleasure to have you here! I want to ask questions about all aspects of your career, so let's get started with your research. Can you describe your field of study?

LL: I work in the general field of analysis and recently I became interested in ways to use real harmonic analysis techniques to study problems in several complex variables, which is a field that has been explored but not to the extent that one could do with the modern technology in harmonic analysis that has been developed over the last 20 years. It has been very interesting.

KO: Are there any practical applications of your work?

LL: Unfortunately I cannot think of any. What I tell my undergraduate students is that with these kinds of problems you can do things that are akin to measuring the temperature of a tree by just touching the bark, and without having to probe a thermometer inside. But really, to be frank, the kind of research that I do doesn't have real life or immediate applications that I can think of.

KO: The problems that you are thinking about today—are they similar to what you studied in graduate school, or has your research evolved since that time?

LL: It has and it hasn't. This particular project that my collaborator and I have just finished, one could think of it as the true completion of my thesis problem. It was the problem that I had first picked for myself to work on as a thesis problem and clearly it was too hard. In my thesis I had to switch to a more approachable problem and set this one aside for many years and develop skills and learn techniques from other fields until I was able to go back to it.

KO: That must be gratifying.

LL: I have to say it is! It's not unusual. I know of at least one other case of someone whose thesis problem was very difficult and they were not able to work on that particular problem at the time, and they came back to it 10, 15 years later and then they solved it with a vengeance. It gives you a sense of closure and satisfaction.

KO: You've written numerous research papers, including many joint papers. What in your mind makes a research collaboration successful?

LL: It's a combination of factors. There should be some intersection in terms of expertise, but also enough distinction in the expertise so that there is no complete overlap.… There also has to be a good match of personalities. For instance, I don't enjoy competition, so when I collaborate with someone we really collaborate—we're not competing against one another, which is not always the case.

KO: Do you have any advice for junior researchers on how to find collaborators?

LL: Yes, I would say, go to lots of conferences and don't be shy in approaching people and just chatting with them. As a graduate student, in fact not just as a graduate student but even as an assistant professor, I always had this sense that I never knew enough about a problem to confidently talk about it with someone else. So I really had a hard time, I had to push myself to go out there and start talking with people. But that is how I started most of my collaborations, just going to a conference, listening to a talk and finding it interesting, and then making an effort to introduce myself to the speaker and just chatting. From there you get a sense of whether you get along with a person, as I was saying before, and typically if the personalities get along then eventually you will find an interesting problem. The one piece of advice is do not be shy. Don't close the door to your office, go to talks and talk to people.

KO: When do you first remember liking math?

LL: I don't have a specific memory of a "Eureka!" moment so to speak, but I have this clear recollection that as a kid mathematics felt like a safe haven, because with math you were assigned problems and you could either solve them or you could not. There was no ambiguity. I grew up in Italy at a time when there was a lot of uncertainty in the country. There were terrorist groups. The Prime Minister was kidnapped when I was in middle school. Math was one of the rocks, a grounding subject, and I guess that sort of stayed with me.

KO: What time in your career did you find challenging?

LL: Certainly the beginning of graduate school was really hard. I come from Italy where the emphasis during college is more on theory than doing practical problems. Then I came to this country where you have weekly homework assignments and you actually have to compute things.… This meant staying up until three in the morning to finish the homework. That was hard. Of course, then you find some buddies and you study together and that helps a lot and you don't feel so lonely.

KO: What has been a rewarding point in your career?

LL: It was not until I was a faculty member at the University of Arkansas (in fact I'd been there for a while). I started to interact with the students through student activities, like the Women in Mathematics group. I felt that I had a concrete sense that I was actually making a difference in these students' lives to some extent. And then, my first PhD student defended her thesis and she completed her work. She had started off as a master's student, and she was involved with the women in math group there [at the University of Arkansas], and all of this somehow congealed and she decided she wanted to go on and pursue a PhD which, as always, was difficult; but once she finished there was a sense of closure for both of us. From that point on things really started to get better. You see results, and that is very gratifying. Getting to the point where you start seeing results may take a long time, so perseverance is a quality that one has to cultivate. These recent years, I have to say, have been the most rewarding years so far.

KO: You recently spent some time at the National Science Foundation. What was your role there?

LL: I was at the NSF for two years as a so-called "rotator." I was one of the four program directors for the Analysis Program in the Division of Mathematical Sciences (DMS), so part of my job was to organize panels for the individual research proposals that were submitted to Analysis. Another part was to branch out to other activities that the DMS is involved with. We look for ideas for new funding initiatives and interdisciplinary activities with programs in other divisions.

Another activity that I found especially rewarding was serving as liaison with the Office of Legislative and Public Affairs (OLPA), which in particular curates media products. I was involved in helping with the promotion of mathematics with the media and the public at large, and in particular with Congress. That is a job that few people want to do, and that is not unusual for mathematics. If there is one criticism that I would have of our discipline it is that mathematicians do not care much for promoting their work with the public at large, and this is a mistake.… The public perception of mathematics tends to be not really positive, to put it mildly, for a number of reasons which would take too long to discuss. But we don't perceive that as a problem as a profession in general.

Promoting our work so that the general public can get some understanding and appreciation of math is important for so many reasons. First, this is how young people become interested in the subject. Second, this is how politicians decide where funding should go. And still, I don't see

enough interest in that. Through my interaction with OLPA we discovered a whole host of media products that other divisions at NSF (e.g., astronomy, biology, physics, chemistry, materials sciences) had been contributing to for a long time, but the mathematical sciences had not. Now this has become a priority to some extent. That [working with the Office of Legislative and Public Affairs] is probably one of the activities that I am most proud of.

KO: You have read many grant proposals in your day. What advice would you give to junior faculty or those applying for their first research grant?

LL: First of all, keep in mind that not to be funded is not a synonym of failure, or of doing research that is not interesting or compelling. At the end of the day, the problem is that there is only a certain amount of money that can be spent and that the policy of the National Science Foundation is to fund only a very small percent of the research, this is regardless of the quality. It's a different model than Canada, for example.… Secondly, there are a lot of random factors that play in allocating funding in a certain year: the amount of the budget, and also in more concrete terms whoever it was that also submitted a proposal in a given year, or how many proposals in your specific sub-field were submitted along with yours, again in a given year. It is very possible that virtually the same proposal could be declined in one year and recommended for funding in the next year. So don't get discouraged and just keep trying, and if something is not clear or you have specific questions, get in touch with your program officer (the program director that manages your proposal).

Another thing that I want to share, from personal experience, is that when I write a proposal and it is funded it's great. Of course it's stupid not to say that, right? … But, as we said, that may not always be the case. On the other hand, one outcome that I know for sure will come out of the process, and which depends only on myself, is that anytime I write a proposal, by the end of the experience (which I always find exacting), typically I have a much better understanding of my own research program, to an extent which I didn't even dream of when I was starting to write the proposal. That is something that has happened to me every time, and that I now rely on, this new clarity that wasn't there until I really went through this rather torturous process of writing a proposal that someone else other than me should be able to understand.

On a more technical note, always remember that you will have three panelists that will read your proposal, but of these three at most one will be an expert in your field. The other two will be an educated readership, but they will not be experts. Try not to write an overly technical proposal. Find a good balance between how much you say about what you

have accomplished already, so that especially if you are a junior PI you establish your credentials, and what you want to do next. For instance, don't write a 15 page proposal where you say nothing or very little about what you have done, and you just give a long list of problems that you want to work on with very little insight as to how you are going to do that. But also don't fall into the opposite pitfall, where you have 14 pages listing your accomplishments and one page where you say, "Oh by the way, I'm going to do this." When you talk about new problems that you're working with, you want to give an idea of what the problem is about, an idea of what are the difficulties, and an idea of the reason why it should be an interesting problem to study. And then, and this is delicate, there is no specific recipe, but you want to give some sense that you have a handle on it. You don't want to give the full description of the steps you are going to take to solve the problem, but you don't want to leave the reader with the impression that you really have no grasp. Certainly, if you are planning on attacking a notoriously difficult problem (the Riemann hypothesis!), you better make sure that you give a few pointers. You need to find a fine balance between motivation, a description of the main difficulties, and a little bit of an idea that's going to convince the reader that you have the means to make perhaps partial progress or to take it all the way through.

Most importantly, acknowledge! Acknowledge the work that has already been done by others, and people that have already been working on this problem. They could be your reviewers. The 15-page limit only applies to the proposal narrative; it does not apply to the cited references. So always make sure to give credit where credit is due. The one reference that you are missing could very well be the one reviewer who is reading your proposal right now. Last but not least, remember to include (both in the summary and the project description) a discussion of the broader impacts of your work (work with students, outreach activities, service to our profession and so forth).

KO: Is there anything else that you want to share with AWM members?

LL: Yes, there is one thing that I want to add. As I was serving at NSF, I got this famous "bird's eye view" that everybody says is the great motivation for going there (instead of just being focused on what you do in your sub-sub-discipline, you sort of get a sense of all the other fields and the people in them). I was shocked to see how few women there are in the hard sciences. I was shocked. I knew things were not (yet) really good but I didn't know to what extent. When I ran panels, you could count the number of proposals submitted by women on less than one hand. It cannot continue this way; it's not healthy. There is a real need there for groups like the AWM.

KO: That seems like a great place to end. Thank you very much for your time and thoughtful answers!

MATHEMATICS + MOTHERHOOD

Before Motherhood

Lillian Pierce, Hausdorff Center for Mathematics and Duke University, with contributions from graduate students and postdocs

It is all too easy to find articles with headlines about the absolute doom babies cause for women in academia. It's all too easy to be convinced by them too. The statistics are definitely alarming, and depending on one's local environment, it may be hard to point to a comforting counter-example down the hall. One of the aims of the discussions in Mathematics + Motherhood is to provide a counterpoint by communicating that it is possible to do both, and that it is possible to do both in many different ways. (Of course, by the way, we should also state the obvious, that it is equally valid to choose to do mathematics without motherhood! Or motherhood without mathematics! Or neither!) Since this series of interviews aims to help young women see realistic possibilities for combining a career in math with motherhood, it occurred to me that we should also check in with young women about what issues most concern them now. So this time we're doing something different: asking young mathematicians who want to be mothers—but are not yet—what they most wonder about.

I suspected that young women would be curious or concerned about issues that are somewhat different from the issues mothers later come to see as dominant in the experience of raising a family and a career at the same time. This certainly was true for me. For example, before my first child, I worried about the effect of pregnancy on my immediate productivity; I did not even look up the cost of childcare. Now, I know that pregnancy was a minor distraction compared to my bouncing children; now I typically budget more for childcare than for rent. My viewpoint is so different, now that I know what parenting is actually like, that I can't even really remember what I *thought* it would be like.

I was lucky to find three women (at the graduate and postdoc stages) who were willing to answer my prying questions about their own views, concerns and hopes for potential motherhood. I am very grateful to these contributors (who will remain anonymous here). Their comments are combined below into one voice (and in some cases edited for clarity), grouped roughly by topic.

Questions we have about a career in mathematics, plus motherhood:

Given how long, intense and unpredictable the process of getting tenure is, when is a good time to have children—keeping in mind that for some women, waiting for tenure might not be an option for medical reasons. A question to those who already have children: now that they know what they know about having children, would they do it differently in terms of the timing? Should one mention the fact that we do (or don't) have children when being interviewed for an academic job?

How does pregnancy affect one's ability to do mathematics? In general, how much mathematics are mothers able to do in the first year, first two years, first five years after having a child?

After having a baby what is a good/typical timeline of getting back to work? How much help should I try to get in terms of nannies, grandparents, housekeeping? As my career advances, there will be more and more administrative duties, teaching, meetings. On the other hand, once I have a family, I'll want to spend significant time outside of work with my family. Any advice on how to organize the day so I can find a nice peaceful chunk of time to think about research?

I'm 28, and I still feel I have a few years until I will have children. Having some statistics would help me figure out when I'd like to have children. What is the percentage of women who leave academic jobs after becoming mothers? (and how does it compare to the percentage of men?) What is the percentage of women who take one year or more off before going back to academia after giving birth? Does this change between the first child and the following ones? On average, how many children do female mathematicians have by a certain age, e.g. 40? (and for men?)

Concerns we have about combining mathematics with motherhood:

I'm worried that there will never be the same amount of time for work as before having children; I'm worried I'll have more duties but less time. I'm worried I won't get enough sleep. I'm worried that once I have kids my schedule will not be as flexible (e.g., you cannot miss a doctor's appointment). In addition, small children get sick frequently, which can affect an already tight schedule. I'm worried that the pressure to do more in less time might affect my ability to think. I'm worried that I may not come back to mathematics after having children.

I'm worried about the two-body problem: before tenure, one usually needs to move every three years; I'm worried about me and my partner both getting jobs in the same city. In fact, how important is it to get married in order to be considered "serious" about a relationship when trying to solve the two-body problem? (and is this perception of "seriousness" solved by having a child?) Additionally, how will I convince my partner to sacrifice (if necessary) both of our careers in equal amounts for the benefit of our child?

I'm worried about the fact that childbearing years overlap with the deciding moments of the tenure-track progression, when I am supposed to work and publish extensively. I'm worried about having to pause my career due to having a child, followed by a slow pace of returning to work. Also, during the pause, other people's research will continue uninterrupted, so I would need to catch up on the missed results (perhaps at that slower pace and with less time at my disposal).

Ideally, I would like to start having kids when I'm around 30, but I'm not sure how it'll affect my ability to do mathematics or my mathematics career as a whole. As of right now, my mathematics is the most important part of my life, and this may mean that I would like to put off having kids until I have tenure. I don't know how to resolve these two desires.

Differences we expect to encounter between mathematics + motherhood and mathematics + fatherhood:

Throughout the pregnancy and perhaps a year later, women have to deal with health issues that men do not have (including the obvious ones, such as morning sickness, losing weight after the birth, etc.). Breastfeeding probably means a more constrained schedule for women in the first year after having a child. I suppose this also means it is more difficult for women to make travel plans (attending conferences, etc.).

I would expect that men could take only a minor pause in their career after having a child, as opposed to the pause women experience. I am not certain it has to be very different beyond the feeding period. After the first year, I would expect things to even out for men and women. I am hoping I'll be able to balance the duties in order to make both situations equal.

But in fact, I can imagine that even ignoring the differences caused simply by health issues and breastfeeding, more time will be put into raising children by the mother than the father. The difficulty will be to fight against the current expectations of our society. For example if both parents have a conference during the same week, only one may go: likely the father would be expected to be the one to travel, but ideally I would try to balance the number of trips each parent does and base a decision on that (as well as the importance of the trip).

I used to think I'd like to develop my career first like my parents did, but as I get older I'm more inclined towards having children at an earlier age, sincerely hoping this won't damage my career too much. In fact, since it seems likely that the damage to my career could come simply from inequality between motherhood and fatherhood, the whole situation pushes me to have children at an earlier age, since even if I waited to have children, there would likely still be consequences coming from this inequality.

Things we look forward to about mathematics + motherhood:

Organizing my schedule around my child's schedule. Spending time thinking about math whilst walking my baby. Generally having children to entertain me outside my office. Getting inspiration from questions my children may ask. Teaching math to my children as early as they seem to enjoy it.

I expect that having children will probably help me to put things into a different perspective and consequently help me worry less about things that would otherwise stress me out. I also hope that a career in math will allow for more flexibility when compared to the typical 9 a.m.–5 p.m. schedule. Finally, after having children, I would expect that I would be more patient with students.

I believe the time in which I continue to pursue mathematics and motherhood will be the most fulfilling part of my life. I look forward to having everything I've wanted.

Where are the answers?

These collected comments poignantly illustrate the cognitive conflict present in young women who are profoundly devoted to mathematics, and also have the desire to become mothers, and have the accompanying expectation of facing a difficult struggle. Where are the answers? I hope the answers will come from everyone who reads this column starting up conversations in their own departments. I bet that young people in every department will deeply appreciate mathematical parents, female and male, who talk openly about our experiences and our strategies for accomplishing our goals, both personally and professionally. Keep in mind that even graduate students and postdocs without partners may already be silently concerned about these issues! We need to hear from fathers too: the more that professional environments support fathers as equal parenting partners, the more that mothers will be freed to be equal career partners. Live discussions about all the issues surrounding mathematics careers and parenting may also make departments aware of simple, concrete ways they can smooth the path forward for new parents within their own halls. Let's start talking!

Announcements

Project NExT

Project NExT (New Experiences in Teaching) is a professional development program for new and recent PhDs in the mathematical sciences (including pure and applied mathematics, statistics, operations research, and mathematics education). It addresses all aspects of an academic career: improving the teaching and learning of mathematics, engaging in research and scholarship, and participating in professional activities. It also provides the participants with a network of peers and mentors as they assume these responsibilities. In 2014, about eighty faculty members from colleges and universities throughout the country will be selected to participate in a workshop preceding the Mathematical Association of America (MAA) summer meeting, in activities during the summer MAA meetings in 2014 and 2015, and the Joint Mathematics Meetings in January 2015, and in an electronic discussion network. Faculty for whom the 2014–2015 academic year will be the first or second year of full-time teaching (post-PhD) at the college or university level are invited to apply to become Project NExT Fellows.

Applications for the 2014–2015 Fellowship year (the twenty-first year of Project NExT) will be due **April 11, 2014**. For more information, see the Project NExT website, http://archives.math.utk.edu/projnext/, or contact Aparna Higgins, Director, at Aparna.Higgins@udayton.edu. Project NExT is a program of the MAA. It receives major funding from the Mary P. Dolciani Halloran Foundation and additional funding from the Educational Advancement Foundation, the American Mathematical Society, the American Statistical Association, the National Council of Teachers of Mathematics, the Association for Symbolic Logic, the W. H. Freeman Publishing Company, John Wiley & Sons, the MAA and some of its Sections, and individual donors.

2014 NSF-CBMS Regional Research Conferences in the Mathematical Sciences

The National Science Foundation has announced support for eight NSF-CBMS Regional Research Conferences to be held during 2014. These eight bring to 353 the total number of such conferences since the NSF-CBMS Regional Research Conference Series began in 1969.

These conferences are intended to stimulate interest and activity in mathematical research. Each five day conference features a distinguished lecturer who delivers ten lectures on a topic of important current research in one sharply focused area of the mathematical sciences. The lecturer subsequently prepares an expository monograph based upon these lectures, which is normally published as a part of a regional conference series. Depending upon the conference topic, the monograph is published by the American Mathematical Society, the Society for Industrial and Applied Mathematics, or jointly by the American Statistical Association and the Institute of Mathematical Statistics.

Support for about 30 participants is provided and the conference organizer invites both established researchers and interested newcomers, including postdoctoral fellows and graduate students, to attend. Information about an individual conference may be obtained by contacting the conference organizer.

A listing of all past conferences and published monographs appears at www.cbmsweb.org/NSF. Information about submitting proposals for future conferences may be found at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504930&org=DMS&from=home. Institutions that are interested in increasing their research activity and profile are especially encouraged to apply. Proposals for conferences to be held in 2015 are due by **April 25, 2014**. Questions should be directed to: CBMS, 1529 18th St. NW, Washington DC 20036 202-293-1170; email: rosier@georgetown.edu.

The eight conferences to be held in 2014 are: Combinatorial Zeta and L-Functions, Wen-Ching Winnie Li, lecturer, May 12–16 at the Sundance Resort, Utah; Inverse Scattering and Transmission Eigenvalues, David Colton, lecturer, May 27–31 at the University of Texas at Arlington; Mathematical Foundations of Transformation Optics, Allan Greenleaf, lecturer, June 10–15 at Howard University; Quantum Spin Systems, Bruno Nachtergaele, lecturer, June 16–20 at the University of Alabama at Birmingham; Fast Direct Solvers for Elliptic PDEs, Gunnar Martinsson, lecturer, June 23–27 at Dartmouth College; Mathematical Phylogeny Conference, Mike Steel, lecturer, June 28–July 2 at Winthrop University; Higher Representation Theory,

Raphael Rouquier, lecturer, July 6–10 at North Carolina State University; and Problems of PDEs Related to Fluids, Peter Constantin, lecturer, July 21–25 at Oklahoma State University. See http://www.cbmsweb.org/NSF/2014_conf.htm for further information.

Extreme-Scale Computing

Computational scientists now have the opportunity to apply for the upcoming Argonne Training Program on Extreme-Scale Computing (ATPESC), to take place from August 3–15, 2014. The program provides intensive hands-on training on the key skills, approaches, and tools to design, implement, and execute computational science and engineering applications on current supercomputers and the HPC systems of the future. As a bridge to that future, this two-week program to be held at the Pheasant Run Resort in suburban Chicago fills the gap that exists in the training computational scientists typically receive through formal education or shorter courses.

Instructions for applying to the program can be found at extremecomputingtraining.anl.gov. The deadline for applying is **March 31, 2014**.

With the challenges posed by the architecture and software environments of today's most powerful supercomputers, and even greater complexity on the horizon from next-generation and exascale systems, there is a critical need for specialized, in-depth training for the computational scientists poised to facilitate breakthrough science and engineering using these unprecedented resources.

Renowned scientists, HPC experts, and leaders will serve as lecturers and will guide the hands-on laboratory sessions. The core curriculum will address: computer architectures and their predicted evolution; programming methodologies effective across a variety of today's supercomputers and that are expected to be applicable to exascale systems; approaches for performance portability among current and future architectures; numerical algorithms and mathematical software; performance measurement and debugging tools; data analysis, visualization, and methodologies and tools for Big Data applications; and approaches to building community codes for HPC systems.

Doctoral students, postdocs, and computational scientists interested in attending ATPESC can review eligibility and application details on the event website. There are no fees to participate. Domestic airfare, meals, and lodging are provided.

2013–2014 Individual Membership Form
JOIN ONLINE at www.awm-math.org!

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Suite 200
Fairfax, VA 22030
(703) 934-0163
http://www.awm-math.org
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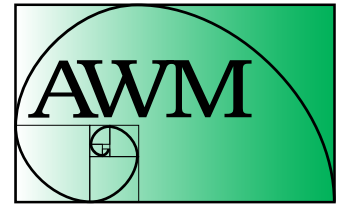
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The AWM *Newsletter* is published six times a year and is a privilege of membership. If you have questions, contact AWM at awm@awm-math.org, (703)934-0163, or visit our website at: http://www.awm-math.org.

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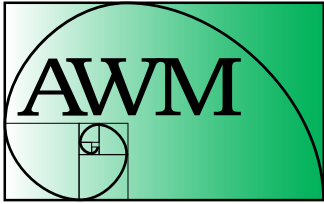
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