

ASSOCIATION FOR
WOMEN IN MATHEMATICS

Newsletter

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The purpose of the Association for Women in Mathematics is

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

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PRESIDENT'S REPORT

Dear AWM Friends,

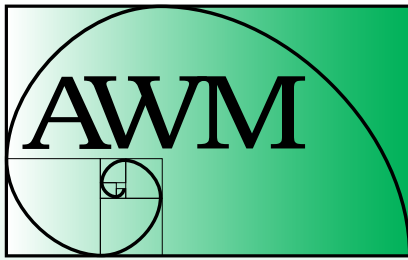
Greetings friends. I'm happy to announce that three of the ten new members in the mathematical sciences elected as 2019 members of the National Academy of Sciences (NAS) are Jennifer T. Chayes, Microsoft Research; Bryna Kra, Northwestern University; and Karen E. Smith, University of Michigan. To name just one AWM connection for each: Kra was the 2019 Noether Lecturer, Smith was the 2016 Noether Lecturer, and Chayes is a past member of the AWM Board of Advisors. Also, Pamela Harris, Williams College, currently a Member-at-Large on our Executive Committee, was recently named the early-career 2019 Faculty Mentor by the Council on Undergraduate Research (CUR) Mathematics and Computer Sciences Division. Congrats to all!

It has been a busy few months for me. I represented AWM at TPSE and CBMS and also attended our biennial AWM research symposium, traveled for research conferences in my field and finished another semester. My report this month focusses on interesting items from the first two of these.

The project Transforming Post-Secondary Education in mathematics, TPSE, was started several years ago with the aim of (you guessed it) transforming mathematics education. To me, the key idea with TPSE is how we can adapt our mathematics education system to truly serve all students. To date TPSE has been most involved with early college education, working to move from long "remediation" pathways for students to a co-requisite, just-in-time model to better motivate students. For women and girls in math I think we'll see particular benefit from TPSE ideas about upper division pathways and graduate education. In both cases a key idea is to include more kinds of applicable mathematics in the curriculum. Like many of you reading this, I love a good abstract algebra course, but many other students will seriously consider mathematics as a career if they believe it will be socially relevant. As well, at most places, the model of what it takes to be a good mathematician still emphasizes things like Putnam scores and does not recognize (early enough) "soft" skills like communication and collaboration. The folks at TPSE are eager to have AWM help shape these conversations. What structural changes in our programs will help encourage more women (and especially women *not* like us) to stay in mathematics?

While you might think the Conference Board of the Mathematical Sciences just deals with conferences, it is actually a forum for a variety of professional concerns. This particular meeting featured a thought provoking presentation by Billy

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

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

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

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PRESIDENT'S REPORT *continued from page 1*

Williams, VP for Ethics at the American Geophysical Union (AGU), on the NAS Sexual Harassment report and how the AGU is responding to it. (We have our Past President Ami and ED Karoline to thank for making an initial presentation about the NAS report at the previous CBMS meeting.) Among the many features of the AGU policy is the recognition that sexual harassment is about power and a put down, rather than only about a come on. Sexual misconduct is the tip of the iceberg. The chilly climate for women comes from the microaggressions that are still pervasive. The AGU ethics policy defines harassment as scientific misconduct, thereby prohibiting harassers from various grants and honors. They provide annual ethics summary reports to all members. They are also pursuing ways to reward and recognize departments for exhibiting best practices. You may know about the Athena SWAN awards in the UK, in which departments and institutions apply to be recognized as working to promote gender equality and to identify and address challenges particular to the department and discipline. The American Association for the Advancement of Science (AAAS) SEA Change initiative aims to create the same kind of program in the US, starting first at the institutional level. The AGU is working with AAAS to create a process for their discipline. It would be great for mathematics to do the same. Even before such awards are ready to roll, why not encourage your department to take the steps necessary to earn a SEA Change award: do an evidence-based self-assessment of climate; identify barriers to inclusion; develop and institute an action plan!

If your department is already in great shape tell the rest of us about it, so we can learn from your success. I think we all believe there are plenty of talented women in mathematics to go around, once we make the path to get there and the place they work truly welcoming. As Chelsea Walton challenged us in her address at the research symposium, it's not enough to say "come on in, the door's open," we have to learn and create the environments that help all sorts of people thrive.



Ruth Haas

Ruth Haas
May 23, 2019
Mānoa, HI



ASSOCIATION FOR
WOMEN IN MATHEMATICS

AWM Election Info!

In December we will hold the next election of officers of the Executive Committee, as we do every odd-numbered year. Please check out the full slate on page 18.

PRESIDENTS' REFLECTIONS

Column Editors: Janet Beery, University of Redlands; Francesca Bernardi, Florida State University; Kayla M. Bicol, University of Houston; Cathy Kessel, consultant

This is the fourth in a series of “Presidents’ Reflections,” articles by past presidents of the AWM that are intended to help us take stock of where we are and where we should be going, and to consider what we want the organization to be at its 50th anniversary. As always, the *AWM Newsletter* welcomes your suggestions and comments in letters to the editor.

Judith Roitman was the fourth president of AWM (1978–1981). For more about Roitman, see her entries at Wikipedia and the Agnes Scott College Biographies of Women Mathematicians, and Claudia Henrion’s book *Women in Mathematics: The Addition of Difference*.

Reflections of an AWM president

Judith Roitman

I became president of AWM in 1978, in my fourth year as an assistant professor. Looking back, this seems ridiculous—such a newbie to the field! given such a responsibility! (See the picture below to see how young I was.) But I’d already been in charge of the newsletter (taken over around that time, to my relief, by the estimable Anne Leggett). And AWM was a small operation back then—no grants, no conferences, no national programs such as Kovalevsky Days. Somehow it worked.

I am quoted in Lenore Blum’s 1991 *Notices* article, “A Brief History of the Association for Women in Mathematics: The Presidents’ Perspectives,” as saying,

I can summarize my time in AWM office by saying that I was one of the last—perhaps the last—President of an amateur AWM.... I suspect that had we known how closely we were following in the footsteps of earlier feminists, and how little change their tremendous efforts made, we probably never would have bothered.... It was an easy kind of agitation—you just had to look around you and report what you saw ...



Judith Roitman, circa 1978

This kind of agitation included consciousness-raising (remember that? probably not) wedded to political action. We organized (if you could call it organization) in small local groups to provide support for each other and to call out the patriarchy. If we saw something, we said something—for example, as AWM president I spent untold hours writing letters (yes, we wrote letters back then) trying to improve the way

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Membership Dues

Membership runs from Oct. 1 to Sept. 30

Individual: \$70 Family: \$35

Contributing: \$160

New member, affiliate and reciprocal members, retired, part-time: \$30

Student, unemployed: \$20

Outreach: \$10

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Institutional Membership Levels

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Category 2: \$325

Category 3: \$200

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

Executive Sponsorship Levels

\$5000+

\$2500–\$4999

\$1000–\$2499

Print Subscriptions and Back Orders—

Regular and contributing members living in the US may elect to receive a print version of the *Newsletter*. Libraries, women’s studies centers, non-mathematics departments, etc., may purchase a subscription for \$75/year. Back orders are \$10/issue plus shipping/handling (\$5 minimum).

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

Newsletter Ads—AWM will accept ads for the *Newsletter* for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership, and other appropriate subjects. The Managing Director, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines. *All institutions and programs advertising in the Newsletter must be Affirmative Action/Equal Opportunity designated.* Institutional members receive discounts on ads; see the AWM website for details. For non-members, the rate is \$130 for a basic four-line ad. Additional lines are \$16 each. See the AWM website for *Newsletter* display ad rates.

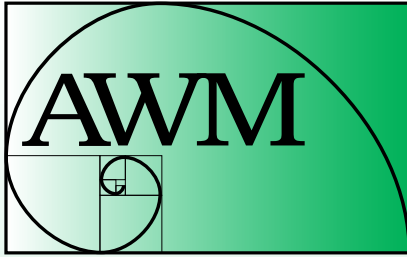
Newsletter Deadlines

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

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

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AWM ONLINE

The *AWM Newsletter* is freely available online.

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

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

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AWM DEADLINES

RCCW Proposals: July 1, 2019
and January 1, 2020

AWM Workshop at JMM:
August 15, 2019

AWM-MAA Falconer Lecture:
September 1, 2019

AWM Alice T. Schafer Prize:
October 1, 2019

AWM Dissertation Prize:
October 1, 2019

AWM Travel Grants: October 1, 2019
and February 1, 2020

Moving Towards Action Workshop:
October 1, 2019

AWM-AMS Noether Lecture:
October 15, 2019

AWM-SIAM Sonia Kovalevsky Lecture:
November 1, 2019

AWM Workshop at SIAM:
November 1, 2019

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PRESIDENTS' REFLECTIONS *continued from page 3*

girls were treated in the Math Olympiad training camps. We were part of an informal coalition of organizations (such as the National Association of Mathematicians, which worked for African-American mathematicians) and experienced individual agitators (such as the exemplary Lee Lorch and Chandler Davis and our very own co-founder Mary Gray). What we did not generally do was set up institutions or programs, with the exception of the Noether Lectures (the founding committee was chaired by Karen Uhlenbeck), which began in 1980. The vibrant AWM ecosystem of conferences and awards and research support that now exists took a long time to develop and is wonderful to see. We have a space to flourish that didn't exist before. We have a space to do mathematics freely without the subtly destructive, almost invisible social constraints that exist in the broader community.

Outside of that ecosystem, how much of a difference have we made? Is my 1991 despair at how little things have changed still valid?

Whenever I get the *Notices of the AMS* I look at the folks who've won research awards (other than those restricted to women) and the major AMS officers. Until the last few months, they were almost always men. Why look at awards and officers? Because they are an indicator of how a community is perceived. The *Notices* can put out a special issue on mathematicians who have green skin and purple hair, but until you see officers and award winners with green skin and purple hair appear with some regularity you know that their community is still not fully accepted.

So it is with great delight that I note that Jill Pipher is the president of the AMS, that Karen Uhlenbeck is the 2019 Abel Prize winner, that Ana Humphrey's mathematical modeling project won the top award in the Regeneration Science Talent Search, and that among the nine 2019 AMS research awards, Ilse Fischer was one of the winners of the David P. Robbins Prize and Marsha Berger won the Norbert Wiener Prize. Women are far more normalized in the mathematical research community than they were 40 years ago when I was AWM president. The fact of gender is far less prominent in how mathematicians are perceived. AWM did not do this single-handedly, of course. I would give special credit to the people—I don't know exactly who—involved in the *Notices* who over the years have given special attention to communities outside the mathematical mainstream—women and so-called minorities, graduate students (imagine!), non-academics.... This effort has done much to change the perception of “what a mathematician looks like” and I deeply appreciate it.

The attentive reader will note that I have focused almost exclusively in this piece on the research community; AWM's programs for adults focus largely on this community. The mathematics community is of course much larger—education, industry, government. In some sense I am biased because the research community has been my home. But perhaps it is not just bias that makes me think that, in our hierarchical society, it is the research community that sets the tone for full acceptance. We seem to be moving towards full acceptance, and the AWM has been crucial to this movement.

Things are not perfect but they are much, much better. AWM has been and continues to be an important factor in the lives of women mathematicians.

Mihaela Ignatova Awarded 2020 AWM-Sadosky Research Prize

AWM will present the fourth AWM-Sadosky Research Prize in Analysis to **Mihaela Ignatova**, Assistant Professor of Mathematics, Temple University at the Joint Mathematics Meetings in Denver, CO in January 2020. Established in 2012, the AWM-Sadosky Research Prize recognizes exceptional research in analysis by a woman early in her career. This prize is in recognition of Ignatova's contributions to the analysis of partial differential equations, in particular in fluid mechanics.

Ignatova received her PhD in 2011 from the University of Southern California and has held appointments at the University of California, Riverside; Stanford University; and Princeton University before assuming her current position at Temple University. She works on challenging analytical questions motivated by fundamental questions in geophysics, fluid dynamics, biology and material science. The breadth of her work is impressive, spanning from unique continuation properties of elliptic and parabolic equations, to fluid-structure interaction problems and to nonlocal models of electroconvection. For example, her work with Kukavica and Ryzhik extends considerably the validity of Harnack inequality to second-order operators with rough drifts.

Her remarkable technical abilities are evident in several of her works, in particular in her study, joint with Peter Constantin, of the critical Surface-Quasi-Geostrophic equation in bounded domains. Ignatova developed a new approach to deal with boundaries, which provides also an alternative approach for the case without boundaries. Ignatova's work on fluid-structure interaction problems, joint work with Kukavica, Lasiecka, and Tuffaha, establishes well-posedness of a system coupling the fluid equations with a wave equation for an elastic structure with a moving free interface, and it is highly nontrivial. This work highlights again Ignatova's outstanding analytical skills, her unusual creativity, and her focus on physically important problems, for which the underlying mathematical analysis is technically extremely challenging.

Her publication record has already amassed seventeen highly regarded papers, which appeared in first rate analysis journals, including *Archive for Rational Mechanics and Analysis*, *Communications in Partial Differential Equations*, *Journal of Differential Equations*, and the *SIAM Journal of Mathematical Analysis*.



Mihaela Ignatova

Ignatova is among the most talented young analysts in fluid mechanics and partial differential equations and is poised to become a leader in the field. She deserves the recognition that the AWM-Sadosky Prize provides.

Established in 2012, the AWM-Sadosky Research Prize recognizes exceptional research in analysis by a woman early in her career. The award is named for Cora Sadosky, a former president of AWM, and is 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 biennial presentation of this prize serves to highlight to the community outstanding contributions by women in the field of analysis, to advance the careers of the prize recipients, and to evoke the memory of all that Cora Sadosky exemplified as a mathematician, mentor and friend. Previous recipients of this honor include Svitlana Mayboroda, Daniela De Silva, and Lillian Pierce.

**You can renew your
membership at
awm-math.org.**

Melody Chan Awarded 2020 AWM-Microsoft Research Prize

AWM will present the fourth AWM-Microsoft Research Prize in Algebra and Number Theory to **Melody Chan**, Assistant Professor of Mathematics, Brown University at the Joint Mathematics Meetings in Denver, CO in January 2020. Established in 2012, the AWM-Microsoft Research Prize recognizes exceptional research in algebra and number theory by a woman early in her career. This prize is in recognition of Chan's advances at the interface between algebraic geometry and combinatorics.

Chan received her doctorate in 2012 from University of California, Berkeley and held an NSF Postdoctoral Fellowship at Harvard University. She is currently an Assistant Professor at Brown University and a Sloan Research Fellow and has recently won an NSF CAREER Award.

Chan is known for an exceptional combination of strength in both combinatorics and algebraic geometry, as well as her ability to fearlessly digest difficult techniques from other fields of mathematics. Chan has proved numerous conjectures across tropical geometry, graph theory, and algebraic geometry.

In Chan's recent work with Galatius and Payne, they showed that the cohomology of the moduli space of genus g curves grows exponentially in a particular degree, an astounding result which contradicts conjectures of Kontsevich and Church-Farb-Putman that said this cohomology should vanish. This breakthrough comes from a deep study of moduli spaces of tropical curves.

Chan's foundational work on the moduli of metric graphs and tropical curves, both solo and with several coauthors, is central to the field, already having important applications, and is expected to continue to lead to further work far beyond the original papers. Chan's work with López Martín, Pflueger, and Teixidor i Bigas proves beautiful new results on the expected number of turns in a random Young tableau and then applies them to give explicit topological information on Brill-Noether varieties that seemed beyond reach before their work.



Melody Chan (Photo by Joe Rabinoff)

Beyond her outstanding scientific achievements, Chan has assumed leadership roles to promote the participation of women in research, co-organizing Women@AGNES (Algebraic Geometry Northeastern Series) at Brown and Yale; serving as Faculty Advisor for the Horizons Seminar at Brown, featuring talks and workshops on topics including diversity, community, and career development for young mathematicians; and organizing the peer Mentoring Network for women in math at Brown.

Researchers call Chan a “leader” and a “major force” and are impressed by both her insights and her technical prowess. AWM congratulates Melody Chan for her well-deserved AWM-Microsoft Research Prize.

Established in 2012, the biennial presentation of this prize serves to highlight to the community outstanding contributions by women in the field of algebra and number theory, and to advance the careers of the prize recipients. This award is made possible by a generous contribution from Microsoft Research. Previous recipients of this honor include Sophie Morel, Lauren Williams, and Melanie Matchett Wood.

See awm-math.org for the latest news!

Tara Holm Named 2019 AWM-MAA Falconer Lecturer

In recognition of her distinguished contributions to mathematics and mathematics education as well as her skill in delivering an expository lecture, the Association for Women in Mathematics and the Mathematical Association of America are pleased to announce that the 2019 Etta Z. Falconer Lecturer will be Professor **Tara Holm** of Cornell University.

Holm earned a BA in mathematics from Dartmouth College and a PhD in mathematics from MIT. After an NSF Postdoc at University of California, Berkeley and a year at the University of Connecticut, Holm has spent her career at Cornell. She has been Simons Fellow and a von Neuman Fellow at the Institute for Advanced Study, as well as the Oliver Smithies Fellow at Balliol College, Oxford.

Tara is a well-respected expert in symplectic geometry, the mathematical framework for classical and quantum mechanics. This field has blossomed since the 1980s. Broadly speaking, there are two tools in every symplectic geometer's toolbox: the momentum map and holomorphic curves. Tara uses these tools to build bridges between symplectic geometry and other fields of mathematics and mathematical physics. She works to identify and quantify the essential features of a symplectic structure and of the symmetries that preserve such a structure. Tara has 19 coauthors and 27 peer-reviewed



Tara Holm (Photo by Melissa Totman)

publications. She has done much to share her expertise with the mathematics community at large.

Tara is a mentor to many mathematicians: she has advised five PhD students and two postdocs. She has given

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NSF-AWM Travel Grants for Women

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

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

Eligibility and Applications. Please see the website (<https://awm-math.org/awards>) for details on eligibility and do not hesitate to contact Steven Ferrucci at 401-455-4042 for guidance.

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

lectures and served as a consultant to young faculty members through MAA's Project NExT. Tara has also generously contributed her time and energy to the AWM: At Cornell University, she advises an AWM chapter that recently won a University-wide award presented by the President of Cornell; also she served on the AWM committee awarding the Alice T. Schafer Prize for excellence in mathematics by an undergraduate woman and has served continuously on the AWM Michler Prize Committee as the Cornell Representative.

Tara currently leads the Cornell Math Active Learning Initiative. Students comment that "Professor Holm is one of the most passionate lecturers I have had," that "she always manages to make the course content sound interesting," and that "she is extremely clear in her explanations." In recognition of her skill in communicating mathematical ideas, she won the 2016 Senior Faculty Teaching Award; most recently she won Cornell's 2019 Morgan Chia-Wen Sze and Bobbi Josephine Hernandez Distinguished Teaching Prize, where she is charged to "bring back the world to Cornell."

Holm's leadership in mathematics and mathematics

education is prominent on the national stage, as she has chaired the AMS Committee on Education, is a member of the Board of Governors for Transforming Post-Secondary Education in Mathematics, served on the Advisory Board for the MAA Instructional Practices Guide, and is now President of Pro Mathematica Arte, the corporation that oversees the Budapest Semesters in Mathematics and the Budapest Semesters in Mathematics Education.

MathFest 2019 will be held July 31–August 3 in Cincinnati, OH. The Falconer lectures were established in memory of Etta Zuber Falconer (1933–2002). Her many years of service in promoting mathematics at Spelman College and efforts to enhance the movement of minorities and women into scientific careers through many forums in the mathematics and science communities were extraordinary. Falconer lecturers are women who have made distinguished contributions to the mathematical sciences or mathematics education. Recent recipients of this honor include Rebecca Goldin, Pamela Gorkin, Pat Kenschaft, Karen King, Izabella Laba, Dawn Lott, Kate Okikiolu, Ami Radunskaya, Marie Vitulli, Erica Walker, and Talithia Williams.

CALL FOR NOMINATIONS

The 2019 Etta Zuber Falconer Lecture

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

The mathematicians who have given the Falconer lectures in the past are: Karen E. Smith, Suzanne M. Lenhart, Margaret H. Wright, Chuu-Lian Terng, Audrey Terras, Pat Shure, Annie Selden, Katharine P. Layton, Bozenna Pasik-Duncan, Fern Hunt, Trachette Jackson, Katherine St. John, Rebecca Goldin, Kate Okikiolu, Ami Radunskaya, Dawn Lott, Karen King, Pat Kenschaft, Marie Vitulli, Erica Walker, Izabella Laba, Talithia Williams, and Pamela Gorkin. Tara Holm will deliver this year's lecture.

The letter of nomination should include an outline of the nominee's distinguished contributions to the mathematical sciences or mathematics education and address the nominee's capability of delivering an expository lecture. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **September 1, 2019** and will be held active for two years. If you have questions, phone 401-455-4042 or email awm@awm-math.org or visit <https://awm-math.org/awards/falconer-lectures/> to learn more.

2019 AWM Research Symposium

Mary Flagg, University of St. Thomas, Houston, and Elizabeth Gross, University of Hawai'i at Mānoa

Introduction. The Association for Women in Mathematics held its 2019 AWM Research Symposium April 6–7 at Rice University in Houston, Texas. This was the fifth symposium the AWM has organized since it launched its series of biennial research symposia in 2011. With 30 invited and special sessions, a poster session, and over 200 speakers, the symposium showcased research from across the mathematical sciences in academia, government and industry, as well as across the career spectrum, including undergraduates, graduate students, postdocs, and professionals. The event featured three plenary talks from distinguished women at the top of their fields and a career panel with women mathematicians in government and industry. The event was organized by **Ruth Haas** (University of Hawai'i at Mānoa), **Shelly Harvey** (Rice University), **Raegan Higgins** (Texas Tech University), **Magnhild Lien** (CSU Northridge), **Omayra Ortega** (Sonoma State University), **Karoline Pershell** (AWM Executive Director), **Ami Radunskaya** (Pomona College), and **Béatrice Rivière** (Rice University).

Welcoming and Gathering. The AWM research symposia are designed to help support and nurture networks of female researchers in many areas of mathematics, providing networking opportunities for junior and senior women to enhance their career prospects and recognition. In addition, as mentioned in the welcoming statement by the organizers, the weekend was “about just being mathematicians and

celebrating.” The tone of gathering and celebrating was set by the informal opening reception on Friday night and was carried throughout the event. The informal opening reception was held outside Valhalla at Rice University. Participants gathered on the warm spring Friday evening under stately oak trees, chatting with old friends and making new friends. Sitting at picnic tables under the trees, participants celebrated the commonality of their experiences as mathematicians and shared their challenges. These opportunities for networking were an important part of the event for many participants. **Xuemei Chen** (New Mexico State) explained, “I got to reconnect with many of my collaborators and friends. I was constantly talking about research with people, and was introduced to many other wonderful people. I also ran into many old friends from outside my field as there isn't a better venue for that.”

On Saturday morning, over 300 participants gathered in Duncan Hall of Rice University for breakfast and welcoming remarks by current AWM President Ruth Haas and AWM Past-President Ami Radunskaya. Duncan Hall is designed to encourage interaction across academic disciplines in the sciences, and its whimsical feel was the perfect backdrop to the event. The atrium, which housed the exhibition space, is bright and colorful, with the stairway in the middle of the atrium angled to draw you upward into possibilities. Exhibitors included organizations with a history of supporting women in mathematics such as the Enhancing Diversity in Graduate Education (EDGE) program as well as organizations with opportunities to further research such as the Institute for Advanced Study (IAS) and the National Security Agency (NSA). In addition, the Caucus for Women in Statistics, the Society for Industrial and Applied Mathematics, TODOS: Mathematics for ALL, and Women in Math Education had materials on hand so that the AWM community could learn more about the important work they do.

Plenary Talks. Three esteemed mathematicians gave plenary lectures. The meeting opened with “Quantum Symmetry” by Sloan Research Fellow and Brad and Karen Smith Professorial Scholar, **Chelsea Walton** (University of Illinois). To motivate the study of symmetries of quantum objects, Walton began her talk by introducing symmetries and explaining how we naturally understand symmetries as group actions on commutative algebras. Walton then introduced quantum groups, taking the audience into the world of noncommutative objects and Hopf algebras and exploring cases where genuine Hopf algebra actions exist. In addition to her talk on quantum symmetry, Walton gave a talk that asked us to think more deeply about what it means

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At the informal opening reception

to be inclusive and how we must “cross the street” to help others into our world.

The scientific program on Saturday closed with the second plenary talk, “Higher Order Elliptic Problems,” given by SIAM, AMS, and AAAS Fellow **Susanne Brenner** (Louisiana State University). Brenner introduced several higher order elliptic problems arising from diverse application areas and discussed the theoretical and numerical challenges posed by such problems. The symposium ended on Sunday with a plenary talk on “How to Keep Your Secrets in a Post-Quantum World” by **Kristin Lauter**, Principal Researcher and Research Manager for the Cryptography group at Microsoft Research. Lauter reminded the audience that modern cryptography is based on hard math problems, and quantum computers may provide linear time algorithms for today’s hard problems. She shared her investigation of finding paths on supersingular isogeny graphs as a problem with no known subexponential algorithm either classically or on a quantum computer. She explained the NIST Post-Quantum Cryptography (PQC) Competition and challenged women in mathematics to take up the challenge of post-quantum cryptography.

Invited and Special Sessions. As evidenced by the broad array of research sessions organized for the meeting, it is clear that now, as the 50th anniversary of the AWM approaches, AWM members are contributing in every corner of mathematics. Formal Research-Focused Networks supported by the AWM ADVANCE grant initiative were invited to organize special sessions. In addition to the 14 invited sessions, the event hosted 16 contributed sessions, some of which represent ADVANCE networks that have just started up. The 30 research sessions not only created the opportunity for women from all points in their career to share their work, but they also provided space for the work of the conference to take place, as participants learned about the current trends and breakthroughs in their fields and met with current collaborators. The listing that follows shows the breadth of research mathematics presented. Interested readers can visit <https://awm-math.org/wp-content/uploads/2019/04/Overview-and-Detailed-Schedule-with-Abstracts-19.pdf> to learn more about the speakers and their topics. A Wikipedia Edit-a-Thon was also held.

The full scientific program, including the plenary lectures and research sessions in all fields, was inspirational. **Nida Obatake** (Texas A & M), a graduate student who spoke



Chelsea Watson delivering her lecture

in the session on New Developments in Algebraic Biology, said “It was so cool to spend the weekend hearing talks from amazing mathematicians—all of whom were women! Meeting new female role models was an empowering experience and really highlighted the successes of the women in math network.”

ADVANCE Network Invited Sessions

- ACxx: Algebraic Combinatorics (Elizabeth Niese, Elizabeth Drellich)
- WIC: Control (Lorena Bociu, Irena Lasiecka)
- WICA: Commutative Algebra (Sandra Spiroff, Adela Vraciu)
- WIG: Geometry (Liz Stanhope, Chikako Mese)
- WIMB: Mathematical Biology (Angela Peace, Wenjing Zhang)
- WIMM: Mathematics of Materials (Malena Español, Hala AH Shehadeh)
- WIN: Numbers (Michelle Manes, Ila Varma)
- WINART: Noncommutative Algebra and Representation Theory (Van C. Nguyen, Julia Plavnik, Sarah Witherspoon)
- WINASC: Numerical Analysis and Scientific Computing (Bo Dong, Adrianna Gillman)
- WinCompTop: Computational Topology (Erin Chambers, Brittany Terese Fasy, Elizabeth Munch)
- WISDM: Science of Data and Mathematics (Linda Ness, Carlotta Domeniconi)
- WISh: Shape Modeling (Kathryn Leonard, Terry Knight)
- WIT: Topology (Sarah Yeakel, Martina Rovelli)
- WDS: Data Science (Jing Qin, Yifei Lou)

Contributed Special Sessions

- Analysis and Numerical Methods for Kinetic Transport and Related Models (Liu Liu)
- Applied and Computational Harmonic Analysis (Julia Dobrosotskaya, Xuemei Chen)
- Braid Groups and Quantum Computing (Colleen Delaney, Jennifer Vasquez, Helen Wong)
- Combinatorial Algebra (Christine Berkesch, Laura Felicia Matusevich)
- Combinatorial Commutative Algebra (Sara Faridi, Susan Morey)
- Current Challenges in Mathematical Biology (Renee Dale)
- Education Partnerships: University Mathematics Faculty and K–12 Mathematics Teachers (Evan Rushton)
- Graph Theory (Carolyn Reinhart, Kate Lorenzo)
- Math on the EDGE (Sarah Chehade)
- Multiphysics and Multiscale Problems (Yue Yu, Xingjie Li)
- New Advances in Symplectic and Contact Topology (Jo Nelson, Morgan Weiler)
- New Developments in Algebraic Biology (Anne Shiu, Brandilyn Stigler)
- Origami, Belyi Maps, and Dessins D’Enfants (Rachel Davis, Edray Goins)
- Recent Developments in the Analysis of Obstacle Problems Associated to Nonlocal Operators (Donatella Danielli, Camelia Pop)
- On Advances and New Techniques of Fluid Dynamics and Dispersive Equations (Betül Orcan-Ekmekci)
- Topology of 3- and 4-Manifolds (Allison N. Miller, Arunima Ray)

Poster Session. In addition to the research sessions, there was a poster session where over 25 graduate students and recent PhD recipients shared their work. The posters were exhibited around the first floor of Duncan Hall during most of the symposium, and poster presenters discussed their projects with conference attendees on Saturday afternoon. The topics varied from neuroscience with **Ariel Bowman’s** (University of Texas at Arlington) poster on “Mathematical modeling of a network of neurons regarding G1D transport deficiency epilepsy seizures,” to knot theory with **Sarah Yosef’s** (Claremont Graduate University) “An enumeration process of n -quandles” to algebraic geometry with **Juliette Bruce’s**
continued on page 12

CALL FOR NOMINATIONS

The 2021 Noether Lecture

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

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

The letter of nomination should include a one-page outline of the nominee’s contribution to mathematics, giving four of her most important papers and other relevant information. Nominations are to be submitted as ONE PDF file via MathPrograms.Org. The submission link will be available 45 days prior to the deadline. Nominations must be submitted by **October 15, 2019** and will be held active for three years. If you have questions, phone 401-455-4042 or email awm@awm-math.org.

2019 AWM RESEARCH SYMPOSIUM

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poster on “Asymptotic syzygies for products of projective space.” **Catherine Berrouet**, a master’s student at Florida Atlantic University who presented a poster on “A mathematical model of anti-cancer drug’s IC50 values in monolayer and spheroid cultures,” said “I am most grateful for having the opportunity to speak with other PhD students, candidates, and experienced mathematicians.” Berrouet continued by saying that the interactions gave her greater insight into several of her current areas of interest and expanded her knowledge of current work.

Banquet and Awards. After the last plenary talk on Saturday evening, participants networked at the wine reception at the Brochstein Pavilion. This relaxing interlude between the scientific program and the celebratory evening banquet allowed participants to share their favorite talks, imagine new projects, and meet mathematicians outside their fields. These conversations continued as participants gathered in the Student Center Grand Hall for the symposium banquet.

At the banquet, Provost **Marie Lynn Miranda** (Rice University) welcomed the audience with enthusiasm and shared her efforts to diversify the Rice faculty. **Mary Flagg** had a flashback to sitting in that same room years ago as a senior engineering student at Rice who did not have any women faculty role models: “At the time I did not think I needed one, but now I wonder if having a female role model would have changed my trajectory as an engineering graduate



Mariam Manuel giving keynote address

student.” Miranda’s message encouraged the audience to be the role models for the next generation.

PhD candidate and Science Master Teacher **Mariam Manuel** (University of Houston) of teachHOUSTON gave the keynote address of the banquet. Manuel talked about cultivating creative confidence in girls and women. Manuel’s research involves exploring the intersection of engineering design and culturally responsive pedagogy as it relates to science and mathematics instruction, and she is the recipient of the 2018 Million Women Mentors Stand Up for STEM Award, recognizing her efforts in mentoring young girls and women to pursue STEM related career pathways. Manuel’s presentation was the main event of the evening; however, she was also able to use the perspective of the stage to highlight another notable event: the audience. “Looking out at an audience of nearly 250 female mathematicians was a spectacular and unforgettable view,” Manuel tweeted the next morning.

The organizers of the 2019 AWM Research Symposium chose to recognize and highlight local programs that make a difference in encouraging girls and women to love mathematics as a part of the banquet program. The women honored were:

- **Anne Papakonstantinou** (Rice University Mathematics School Project (RUMSP) Director)
- **Paula Myrick Short** (University of Houston Provost, Director of the Center for ADVANCing UH Faculty Success)
- **Kelsey Friedemann** (Houston Museum of Natural Science, GEMS (Girls Exploring Math and Science) program)
- **Tricia Berry** (UT Austin, Director, Director, Texas Girls Collaborative Project)
- **Joanna Papakonstantinou**, PhD (Episcopal High School, Math Educator, involved in many local projects for girls in math)

Research Networks Lunch Meeting. In addition to celebrating women in mathematics, the AWM Research Symposium offers a way for established research networks to come together and meet. With the success of these networks on display at the symposium, Magnhild Lien and Kristin Lauter, PIs on the AWM ADVANCE Grant, Career Advancement for Women through Research-Focused Networks, hosted an informal lunch conversation for research communities interested in starting their own networks. The ADVANCE grant focuses on establishing research networks for women by fostering research collaborations at conferences and AWM Workshops. These networks are initiated

by Research Collaboration Conferences for Women (RCCWs), which are week-long conferences held at mathematics institutes where junior and senior women come together to work on predefined research projects. The lunch conversation invited participants to join a research community or start a new one in their research area. To learn more about the ADVANCE Grant, see <https://awmadvance.org/>.

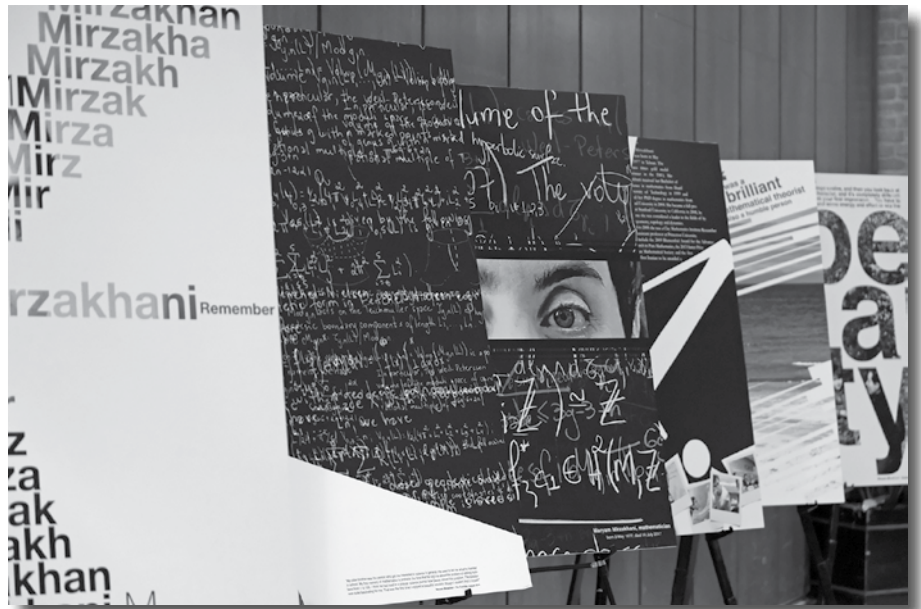
Professional Development.

The program of the 2019 AWM Research Symposium also included several professional development activities, such as the Mathematicians in Government and Industry Panel and the Lunch Meeting on NSF DMS Funding Opportunities. The Mathematicians in Government and Industry Panel featured **Sarah Charlton**, an Applied Research Mathematician at the National Security Agency who leads the multimedia forensics research team as part of the VISTA (Video, Image, Speech, and Text Analytics) Research group, **Veronica Lino**, a Full-Stack Immersive Instructor at DigitalCrafts who teaches a 16-week web development boot camp that transforms beginning level students into full-stack web developers with cutting edge skill sets, **Jennifer Pearl**, Director of the Science and Technology Policy Fellowships program of the American Association for the Advancement of Science, and **Wenting Xiao**, a team lead and engineering associate at ExxonMobil Upstream Research Company. The panel offered participants the opportunity to learn about a wide variety of career paths.

For those on the academic track, **Yuliya Gorb** (University of Houston), NSF Program Director of the Computational Mathematics program gave a lunchtime presentation highlighting major funding opportunities through the Division of Mathematical Sciences. Gorb paid special attention to the NSF's 10 Big Ideas, especially to those that are relevant to the mathematics community.

Remember Maryam Mirzakhani Exhibition.

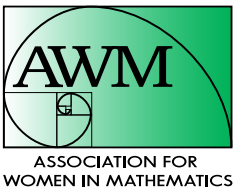
A special addition to the symposium was the Remember Maryam Mirzakhani Exhibition which was hosted by Rice



Maryam Mirzakhani Exhibition

University and on display in Duncan Hall. The exhibition was created by the International Mathematical Union's Committee for Women in Mathematics (CWM) with Curator **Thais Jordao** and Designer **Rafael Meireles Barroso** and consists of 18 posters. The exhibit was shown for the first time at the World Meeting for Women in Mathematics in Rio on July 31, 2018 as well as during the International Congress of Mathematicians (ICM2018) which immediately followed. Many were moved by the exhibit. **Isabella Tobin** (University of Hawai'i at Mānoa), a graduate student and special session speaker, said "The exhibit was striking, in a wonderful way, and it was inspirational to see such an extraordinary and accomplished woman be featured."

Forward from Here. The 2019 Research Symposium ended on a thunderous note! Nature provided the thunder and rain, but the enthusiasm of the over 300 mathematicians energized a community of women and others interested in the work of making mathematics available to all. Many are looking forward to celebrating the AWM's 50th anniversary at the 2021 AWM Research Symposium.



AWM Will Be *50* in 2021!

Can you believe that the AWM is closing in on its Golden Anniversary?! From its small but powerful beginning in 1971, to the expansive network in the mathematical sciences that it is today, AWM has a lot to celebrate in 2021! As we start the countdown, help us develop and plan the festivities. We are now accepting nominations to the 50th Anniversary Organizing Committee. If you are interested, reach out to Karoline Pershell at karoline@awm-math.org. Join us in looking forward to the amazing future of this timeless (and yet timely!) organization.

2019 AWM Research Symposium





STUDENT CHAPTER CORNER

Coordinator: Kavita Ramanan, kavita.ramanan@brown.edu

New Chapter: University of Tennessee



Our officers celebrate our new BIG ORANGE AWM chapter!
Kelly Buch, Suzanne Lenhart, Cara Sulyok, and Jack Ryan

BOOK REVIEW

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

Broad Band: The Untold Story of the Women Who Made the Internet, by Claire L. Evans, Portfolio/Penguin 2018, ISBN 978-0-735-21175-9.

Reviewed by Marge Bayer

Books about women's participation in computing and technology during and shortly after World War II have been popular recently. *Broad Band* takes a much longer view, from Ada Lovelace in the 19th century to the end of the 20th century. I learned a lot, not just about women's contributions, but about the evolution of the internet.

Before the age of electronic computers, the word "computer" referred to people employed by government and business to do hand calculations. They played a crucial role in World War II. These computers were, by and large, women; someone from the National Defense Research Committee coined the term "kilogirl" for a thousand hours of computing labor. [p. 24]

Grace Hopper had a PhD in mathematics from Yale and was a faculty member at Vassar when the US joined World War II. She left academia to join the navy, where she embarked on a long and illustrious career with electronic computers. Hopper is most famous as the mother of the COBOL programming language, released in 1960. While mathematicians have no use for COBOL, it is still used in business, particularly for ATMs. Evans says, "by the turn of the millennium, 80 percent of all code *on the planet* was written in COBOL." [p. 71] In the 1980s I heard Grace Hopper speak and received one of her "nanoseconds," pieces of wire of the length light travels in a nanosecond.

On COBOL and other projects, Grace Hopper collaborated with a number of women. In the 1950s and 1960s many programmers were women, but they faced wage discrimination and family-unfriendly corporate policies. This column has previously mentioned the 1968 NATO conference to address the shortage of programmers. All conference invitees were men, and they decided to market the profession as "software engineering," a move that hastened the departure of women from the field.

The most interesting part of Evans's book is on the evolution of the internet. The story starts in the 1970s with a communal group called Project One (men and women) with a mainframe computer in the Bay Area. They took over a community-organizing phone tree and installed a

Teletype terminal in a record store, with a sign “Community Memory.” A female hacker, Jude Milhon, seeded the system with questions to get users interested. Users posted opinions, resources and ads. Another project on this computer was the Social Services Referral Directory, a database that filled a gap for the social service agencies in the Bay Area. The designers had a vision of agencies accessing the directory through terminals and modems, but the primary distribution was on paper. With the advent of the Web, the directory became an online resource maintained by the San Francisco Public Library.

The precursor of the internet was the packet-switching network ARPANET. While funded by the Defense Department, it was used by university and industry researchers, mostly men. But while men were the engineers who built the network, they relied on women for organizational roles, and these roles had a major impact on the direction of development. Jake (Elizabeth) Feinler was one of these; she was responsible for creating and maintaining the registry of host computers, the directory of users and the database of shared resources. She had a lasting influence on the organization and protocols of the internet. For example, Jake was responsible for introducing the idea of domain identifiers, such as .edu, .org and .com.

Before the World Wide Web (in the late 1990s), individuals accessed the internet through bulletin board servers (BBS); Evans says that 150,000 individual bulletin board services existed in the 1980s and 1990s. The users were largely male, but some female-friendly BBSs played a major

role in promoting women’s use of computers and the internet. An early example was Echo (East Coast Hang-Out), built (in Unix) by Stacy Horn, a graduate student in NYU’s Interactive Telecommunications Program. Echo had public “conferences,” where users could post messages and engage in chats on specific topics. (One was a *Ms. Magazine* conference.) It also had private spaces including Women in Telecommunications, whose potential members were screened by Stacy Horn by phone. There was already a problem with men impersonating women on the internet, though not always for nefarious reasons. In 1993 Echo also faced the issue (later to be a big issue for women’s colleges and other women’s spaces) of inclusion of transgender women. Echo still exists as a BBS, with its old-fashioned access method, typing ssh on a terminal command line.

While Echo was a women-produced BBS, overall it was not specifically women-oriented in content. At around the same time, on the west coast, Nancy Rhine and Ellen Pack started Women’s WIRE (Women’s Information Resource Exchange). While the news media presented the new BBS as an attempt to protect online women from male harassment, this was not the motivation of the innovators, nor did they exclude men from the BBS. Women’s WIRE served a dual purpose with two divisions: Information Resource and Exchange. The latter division was a place to build community, particularly among the 90% of users who were female.

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CALL FOR NOMINATIONS

The Association for Women in Mathematics Dissertation Prize

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

To be eligible for the award a graduate student must have defended her dissertation within the last two years (October 1, 2017 to September 30, 2019). She must either be a US citizen or have a school address in the US. The Prizes will be presented at the AWM Reception and Awards Presentation at the Joint Mathematics Meetings in Baltimore, MD, January 2020.

The nomination should include: 1) a one to three page letter of nomination highlighting the exceptional mathematical research presented in the dissertation, 2) a curriculum vitae of the candidate not to exceed three pages, 3) a copy of the dissertation and 4) two letters supporting the nomination. Nomination materials should be submitted online at MathPrograms.org. The submission link will be available 45 days prior to the nomination deadline. Nominations must be received by **October 1, 2019**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit awm-math.org/awards/awm-dissertation-prize/ for more information.

To me the word “hypertext” signifies text embedded in a file to enable a link on a web page. However, hypertext predates the Web, and a main individual responsible for it was a mathematician named Wendy Hall. (In 2009 she was appointed Dame Commander of the Order of the British Empire for her contributions to computer science.) In England, Wendy put together a team to create Microcosm, an information system that linked documents and media files by content associations. A different hypertext system, NoteCards, was developed by Cathy Marshall in the US; she envisioned it as a tool for intelligence analysis.

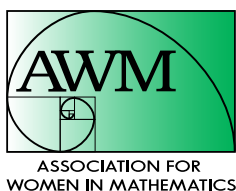
“Computer science has always marginalized people that are interested in users,” according to Cathy Marshall. [p. 165] The development of hypertext was largely collaborative, with involvement by humanists and social scientists. Perhaps for this reason, it attracted more female participation. This was reflected in the first academic conference on hypertext in 1987. At Hypertext '91 Tim Berners-Lee and Robert Cailliau introduced the system they called the World Wide Web, but it garnered little attention. It was quite different at Hypertext '93. Wendy envisioned a use of hypertext on the Web that went beyond clicking on a link on a web page. I guess this was a preview of search engines. She also was aware of the downside of the ease of communication on the Web: “it is easier to put rubbish on the Net than anything of real and lasting value.” [p. 173]

With the explosion of the Web in the 1990s came content produced by or directed at women. Another graduate of the NYU Interactive Telecommunications Program (which still exists), Jaime Levy produced an electronic magazine called *Cyber Rag*, later renamed *Electronic Hollywood*, still later

giving rise to a multimedia agency of the same name. In between Jaime teamed up with Marisa Bowe to create one of the first magazines on the Web: *Word*. In 1998 *Word* got one to two million hits per week; in 1998 (in the dot.com bubble) it was sold for two billion dollars.

The BBS Women’s WIRE morphed into a website, women.com. The changes that accompanied the move to the Web say a lot about the evolution of the Web itself. Evans: “the evolution from one to the other reveals how quickly early efforts to claim online space for women turned into building businesses that sold products to women, and then to the commodification of the women’s Web as a whole.” [pp. 215–216]

The history Evans tells goes only through the 1990s. Of course, much has happened since then, and we can hope for a good exposition of women’s participation in the development of the 21st century internet, seemingly dominated by social media. I was, compared to my colleagues, a relatively early adopter of email, of TeX/LaTeX, and of web use, but I never participated in bulletin boards and I hardly use social media. I found it very interesting to learn about the early days of the internet. On the other hand I had a few difficulties in reading the book. One is purely operational: there are 24 pages of endnotes, but no marks in the text to lead you to them. I sometimes found the chronology unclear; more frequent mention of dates would have made it easier to figure out the sequencing of events. Also, in some cases I was not sure whether the author was telling the whole story of some internet development, or only carving out the specific contributions of women. It would have been nice to place their work in a broader context. In any case, I recommend the book—read it for many more interesting details I did not include in this review.



AWM Slate Announced!

We are pleased to announce the slate for this fall’s AWM election. **Kathryn Leonard** (Occidental College) has been nominated to serve as President-Elect. **Mary Shepherd** (Northwest Missouri State) has been nominated to serve as Treasurer. **Linda Chen** (Swarthmore College), **Carla Cotwright Williams** (DOD), **Donatella Danielli-Garofalo** (Purdue University), **Elena Fuchs** (UC Davis), **Gretchen Matthews** (Virginia Tech), **Andrea Nahmod** (UMass Amherst), **Michelle Snider** (IDA), and **Suzanne Weekes** (WPI) have accepted nominations for Member-at-Large; four will be elected.

Nominations by petition signed by 15 members are due to our president by **September 1, 2019**. Thanks to the Nominating Committee (Kristin Lauter, chair, Georgia Benkart, Ricardo Cortez, Aparna Higgins, Karen Saxe, and Erica Walker) for their efforts in producing this fine slate of candidates.

AWM Workshop at the 2020 SIAM Annual Meeting

Application deadline for graduate students: **November 1, 2019**

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. Since 2016, these workshop talks are supported by the AWM ADVANCE grant. The AWM Workshops serve as follow-up workshops to Research Collaboration Conferences for Women, featuring both junior and senior women speakers from one of the Research Networks supported by the ADVANCE grant. An AWM Workshop is scheduled to be held in conjunction with the 2020 SIAM Annual Meeting in Toronto, Ontario, Canada, July 6–10, 2020.

FORMAT: The workshop will consist of two research minisymposia focused on the **Mathematics of Materials** organized by Hala AH Shehadeh and Malena Español, a Poster Session and an informational minisymposium directed at starting a career. Selected junior and senior women from the Research Collaboration Conference for Women (RCCW) WIMM will be invited to give 20-minute talks in the two research minisymposia. The speakers will be supported by the National Science Foundation AWM ADVANCE grant: *Career Advancement for Women Through Research Focused Networks*. The Poster Session will be open to all areas of research; graduate students working in areas related to mathematics of materials are especially encouraged to apply. The graduate students will be selected through an application process to present posters at the Workshop Poster Session run in conjunction with the SIAM Poster Session. AWM will offer partial support for travel and hotel accommodations for the selected graduate students. The workshop will include a luncheon and mentoring session where workshop participants will have the opportunity to meet with other women mathematicians at all stages of their careers, and a career panel which will be open to the public. In particular graduate students working in areas related to the mathematics of materials will have the opportunity to connect with the Women in Mathematics of Materials (WIMM) Research Network.

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

MENTORS: We also seek volunteers to act as mentors for workshop participants, in particular the graduate students. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by **February 1, 2020**.

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

All applications should include:

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

Applications must be completed electronically by **November 1, 2019**. See <https://awm-math.org/workshops.html>.

EDUCATION COLUMN

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

Working Across Disciplines to Ensure Undergraduate Statistical Literacy for All

Anna Bargagliotti, Loyola Marymount University, Anna.Bargagliotti@lmu.edu

Introduction

“Over the last two years alone 90 percent of the data in the world was generated.” (Marr, 2018). With data growing at such an exponential rate, the demand for people educated to work with data is increasing tremendously. Jobs related to statistics are expected to grow by about 27% between 2012 and 2022 according to the Bureau of Labor Statistics (Bureau of Labor Statistics, 2013). The burgeoning role of data and statistics in society and the work force compels universities to prepare statistically literate graduates.

Although it is clear that more needs to be done to prepare undergraduate students to work with data, the type of preparation and how such preparation might be implemented is not clear. Guidelines exist related to undergraduate preparation; however, these documents largely focus on introductory courses (e.g., ASA/MAA, 2014; GAISE, 2016) or on general broad principles (AEA, 2019; ASocA, 2017; ASA 2014a; ASA, 2014b; CUPM, 2014; Hettich, 2013). Something currently missing from the literature is a set of learning outcomes that describe the data-related content and processes students should meet during their undergraduate education.

In this article, I outline 13 cross-disciplinary learning outcomes developed through the Undergraduate Data Pathways (UDaP) project for achieving data literacy of undergraduate students. The learning outcomes were developed as part of an effort to be more cohesive in the teaching and learning of data analysis related topics across disciplines at Loyola Marymount University (LMU).

Statistics and Data Science Education Across Undergraduate Disciplines

Typically, universities offer a variety of statistics courses across campus. Even though the content of these courses may overlap, their prerequisite structures rarely allow a student to

move from a statistics course offered in one department to a more advanced course offered by another department. Departments, often rightfully, argue that the types of statistical techniques needed by their students are discipline-specific and thus necessitate the offering of a course within the department.

While techniques vary from discipline to discipline, certain basic themes of working with data should be present in all courses. Regardless of discipline, statistics should be guided and taught through the statistical investigative process of: (1) formulating a question, (2) collecting appropriate data to answer that question, (3) choosing the appropriate analytic technique to answer that question, and (4) interpreting the results to answer the question (Franklin et al., 2007).

Developing Undergraduate Data Learning Outcomes

The National Science Foundation (NSF)-funded project (NSF Grant No. 1712296), Undergraduate Data Pathways, for which I am the PI, focuses on understanding differences and similarities of statistics and data analysis course offerings across different disciplines. Using LMU as a case study, the initial phase of the project aimed to engage departments across campus to garner input on what constitutes a data literate undergraduate. While LMU does not have a department dedicated to statistics or data science, the Departments of Mathematics, Biology, Engineering, Economics, Political Science, Psychology, and Sociology and the Schools of Business and Education all offer courses related to statistics and data analysis. Representatives from mathematics, economics, biology, psychology, sociology, business, political science, and education formed a faculty working group. A goal of the working group was to explicitly define learning outcomes for what would constitute a data literate undergraduate student.

The working group established 13 learning outcomes (LOs) related to data analysis as being important for students to meet at the university level. The process to develop the LOs proceeded as follows:

1. Internally, a survey was administered to the working group members asking which statistical concepts different disciplines view as important.
2. Policy documents from professional organizations were reviewed and outlined to check for similarities and differences across disciplines.
3. Course descriptions and syllabi of all courses related to statistics/data analysis at LMU were reviewed to cross check what content and processes were important across disciplines.

4. Statisticians on the UDaP grant external advisory board were consulted.
5. Externally, a survey was administered to a wide range of stakeholders such as faculty, administrators, professionals, and consultants to gauge broader community agreement on the LOs.

The table below provides the set of learning outcomes put forth by the UDaP project.

The LOs span both content and process. LOs 2, 3, 4, 5, 11, 12, and 13 all focus on content. The content begins with descriptive statistics, moves through inferential statistics, and includes visualizations, prediction, and other more advanced topics. It is important to note that the content goes beyond that typically found in an introductory statistics course. Introductory statistics courses may cover LOs 2, 3, 4, and 5 but not delve into more complex topics or heavy use of software, thus missing LOs 11, 12, and 13. This implies that more than one course may be needed for a student to meet all of the LOs.

The process LOs are 1, 6, 7, 8, 9, and 10. More specifically, LO 1 and 10 describe the GAISE statistical process

(Franklin et al., 2007) for the univariate and the multivariate case. LOs 6 and 7 focus on communication while LOs 8 and 9 focus on interpretation and limitations. These are particularly important when reading the news and being a consumer of statistics on a daily basis.

As a whole, the LOs represent a combination of traditional content outcomes that have historically been taught in statistics courses along with a modernization of statistics content that emphasizes communication, media, projects, and overall statistical thinking. An important aspect of these LOs is that they are meant to bridge all disciplines and not narrowly focus on only certain subsets of the undergraduate population. Instead, these learning outcomes are designed for students to achieve data literacy across all disciplines. An initial goal of the UDaP project was to characterize data literacy at the undergraduate level through the construction of this set of LOs. While the LOs were developed through a working group at LMU, LMU is not unique in its course offerings across disciplines. These LOs were also developed with extensive external input. As a result, the LOs are intended to

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Learning Outcomes	
1	Students formulate and/or address questions about univariate data, collect/consider univariate data, analyze univariate data, and interpret results
2	Students understand, calculate, and interpret descriptive measures for quantitative and/or categorical variables to describe characteristics of the data
3	Students create and interpret basic data visualizations for quantitative and categorical variables
4	Students understand, carry out, and interpret basic inferential statistical procedures for one or two samples
5	Students understand, carry out, and interpret results from estimating statistical models for bivariate data (e.g., linear regression, interpolation, extrapolation, predictive inference)
6	Student carry out and communicate results from extensive data-driven project(s) related to a real-life problem (Extensive means that a single project takes more than two weeks to complete or a series of projects take more than two weeks to complete and are worth at least 25% of the final grade.)
7	Students communicate their analyses and the interpretations of their results in a manner that is appropriate to their discipline in the context of the data (e.g., communication could be emphasized with presentations,
	oral explanations of results, oral/written answers for in-class work, written explanation of results)
8	Students understand the implications of study design, can select appropriate statistical methods for data analysis, and can explain limitations of their analyses and interpretations
9	Students become critical consumers of statistically-based results reported in popular media, recognizing whether reported results reasonably follow from the study and analysis conducted
10	Students formulate and/or address questions about multivariate data, collect/consider multivariate data, analyze multivariate data, and interpret results
11	Students use current statistical software or statistical packages that are appropriate to the discipline and context beyond basic Excel or a calculator
12	Students write a program (using a programming language) to analyze data or extract information from the data
13	Students study at least one type of advanced data-analytic methods such as (not limited to): generalized linear models, Bayesian analysis, advanced probability theory and stochastic processes, non-linear models, machine learning, advanced study-design, big data analysis, econometrics, or statistical computing

make a broader contribution to the field of statistics education at the undergraduate level across disciplines as well as across institutions.

Conclusion

As society pushes toward being more data-driven, it is important to understand and characterize what higher education should be doing in response. The UDaP project is ongoing and expanding. This initial contribution of the project of identifying a set of learning outcomes for undergraduate data literacy has been an important exercise that can inform the undergraduate statistics education community. Future work for UDaP includes reviewing enrollment data and all of the courses offered at LMU to examine whether students are achieving data literacy.

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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, appalachianawm@appstate.edu and Alice Silverberg, University of California, Irvine, asilverb@math.uci.edu.

WIMM Watch: Body of Proof

Sarah J. Greenwald and Jill E. Thomley, Appalachian State University

HUMIRA, the brand name of adalimumab, is an immunosuppressive drug that doctors prescribe to treat a variety of inflammatory conditions. The pharmaceutical company AbbVie has been heavily promoting the drug to treat plaque psoriasis [2]. One of its commercials focuses on a sort-of-mathematical lead character who is played by actress, writer and comedian Sarah Peele. It is still airing as of the date we are writing this article, having already

been shown almost 5000 times [1].

We found the use of numbers throughout the commercial interesting. They are in almost every scene in an over-the-top, cheerful visual presentation. For instance, Peele bakes a pie with π carved into it, while wearing an apron that says “I ♥ π .” The ad actually begins with the line “I’m mildly obsessed with numbers so I started with the stats...” It is clear that the numbers are supposed to contextualize her intelligence, so that we will believe what she says about HUMIRA.

The lead character has a great life and is seen smiling throughout the ad, at her workplace and beyond. She serves the π pie at a dinner with a group of diverse, happy friends, including what appears to be her significant other. In another vignette she paddleboards with friends while wearing a T-shirt that has numbers encased in a heart. From the way she interacts with others at work, she seems to be the boss or a leader at a tech company as she is seen checking in at various departments and stopping to collect progress reports, while proudly showing off her numerical mug. The female mathematical characters we see in fictional media are often students or earlier in their careers with a male authority figure in charge, so this is a refreshing portrayal. Although Peele doesn’t present with corrective glasses in real life, in the commercial her character does, a common trope used in media in order to signify intelligence. However, they aren’t

the primary defining part of her personality in the ad, as her glasses come off in a number of leisure scenes (paddleboarding and coaching a girls’ sports team) and while she is testing a virtual reality headset at work.

Of course, not everything is as rosy as it seems. AbbVie is required to tell us about the potential side effects of the drug, some of which are severe. By showing us very positive visuals over the narration of these nasty side effects, the producers are effectively downplaying them. At the ending of the ad, the tagline “This is my body of proof” is used doubly to refer to the human body itself (the character’s plaque psoriasis) as well as to try to convince viewers of the drug’s effectiveness. While we understand that the main point of the commercial overall is to sell the idea that HUMIRA can help people lead a happier life, a byproduct of all the visuals is that someone so openly interested in numbers can enjoy a well-rounded life with great relationships both in and out of the workplace. It’s a wonderful life?

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CALL FOR NOMINATIONS

Alice T. Schafer Mathematics Prize

The Executive Committee of the Association for Women in Mathematics calls for nominations for the Alice T. Schafer Mathematics Prize to be awarded to an undergraduate woman for excellence in mathematics. All members of the mathematical community are invited to submit nominations for the Prize. The nominee may be at any level in her undergraduate career, but must be an undergraduate as of October 1, 2019. She must either be a US citizen or have a school address in the US. The Prize will be awarded at the AWM Reception and Awards Presentation at the January 2020 Joint Mathematics Meetings in Denver, CO.

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

With the letter of nomination, please include a copy of transcripts and indicate undergraduate level. Any additional supporting materials (e.g., reports from summer work using math, copies of talks, recommendation letters from professors, colleagues, etc.) should be enclosed with the nomination. All nomination material is to be submitted as ONE PDF file via MathPrograms.Org with a copy of transcripts included at the end of the file. The submission link will be available 45 days prior to the deadline. Nominations must be received by **October 1, 2019**. If you have questions, phone 401-455-4042, email awm@awm-math.org, or visit awm-math.org.

Connecting Undergraduates with AWM at the 2019 NMF

Alice Petillo, Marymount University

Each spring in Washington DC thousands of people of all ages descend on the Walter E. Washington Convention Center for a major STEM festival event. Since 2016 undergraduate students from MU have volunteered with the Association for Women in Mathematics. Some are mathematics majors; others are taking a mathematics class to fulfill a liberal arts core requirement. Members of the mathematics department also participate, coming to help out or bring along their families. They have worked alongside other AWM volunteers like Tai Melcher and Katie Kochalski who have faithfully organized the AWM booth year after year.

As a mathematics professor, why do I take the time and energy during a crazy time of the semester to bring students to the National Math Festival on a spring weekend? I love math and I love sharing that with my students! Where else can you find the positive social contagion of thousands of people excited about seeing mathematics intersect with so many areas of interest in so many ways? Students see and



Festival goes playing Chomp (a game of math and chocolate)

experience mathematics outside of the classroom, some of them for the very first time.

Sample comments from this year's volunteers in response to post-reflection prompts indicate that their view of mathematics has expanded in scope and relevance.

I was never told such events existed. It is not only a way to encourage people to see the always hidden aspect of mathematics; it also brings people together.

It challenged my ignorance on how much math is applied to anything and everything. I knew math was very important but never did I see how many examples [there are] of how math is applied.

The Association for Women in Mathematics has recognized the importance of math and STEM fairs. They are a way to celebrate mathematics, as well as to feature women mathematicians and scientists as role models for women doing math. AWM models that "math is for everyone" by supporting the visibility of women mathematicians to young women and men in public spaces.

Post-reflection responses indicated that these undergraduate volunteers experienced and noticed that math is for everyone.

[I thought] that there wouldn't be a lot of women presenters or mathematicians and I was wrong.

At Marymount, we value student service as part of the undergraduate experience. For our mathematics majors, their participation helps them consider ways they can take their mathematics background and scale it for children to enjoy. For the non-majors, it becomes the kind of transformative experience that puts a creative, fun-filled lens on



MU student volunteer Angela Alvarez-Bennett volunteering at the AWM booth

mathematics and encourages their own engagement with the subject matter.

Our preservice elementary and special education teachers commented on the benefits to them as future educators. One said:

Volunteering in the NMF, I was able to engage with children of different ages. Some children needed more details on the how-to of the game whereas others would quickly grasp the concept. Additionally, walking around, I was able to see different activities. NMF deepened my understanding of my major, special education, because of the experience it provided.

In addition to connecting students with mathematics in new ways and providing a meaningful service opportunity, the National Math Festival also links undergraduates with the mathematical community in an embodied way in a socially rich context. They are not just reading about mathematicians; they are actually meeting and interacting with them. Women mathematicians and scientists are featured speakers for about half of the public sessions, providing a visible and embodied presence that counters the old narrative that math is primarily for men. STEM festivals provide a unique and powerful way to connect our students with mathematics, service and the mathematical community. I commend informal learning events like these as a way to inspire you as well as your students.

For those of us at Marymount University, we realized we had a special connection with AWM as Alice Schafer, one of the founding members of AWM and its second president, had taught at Marymount University for several years in the



Tai Melcher (UVA) at the AWM booth

late 1980s through 1996. This fall we are planning to start a university chapter of AWM and renew our relationship with an organization that is committed to the cause of full participation of women in mathematics.

Alice Petillo teaches mathematics at Marymount University in Arlington VA. She has a special interest in using informal learning opportunities to help undergraduate students have positive experiences with mathematics in and out of the classroom.

If you are interested in becoming involved in the next major STEM Festival event, USA Science and Engineering Festival (April 2020), please contact Katie Kochalski (kochalski@geneseo.edu) for more information.

CALL FOR PROPOSALS

Research Collaboration Conferences for Women

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

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

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

WPO2019

Cecilia Bitz, bitz@uw.edu; *Emily Frye*, fefrye@mitre.org; and *Gretchen Matthews*, gmatthews@vt.edu

The Workshop for Women in Mathematics and Public Policy met January 22–25 at UCLA’s Luskin Center. Organized by the RAND Corporation and the Institute for Pure and Applied Mathematics at UCLA, with support from the Luskin Center and the NSF-AWM ADVANCE Grant, the workshop brought together 40 mathematicians, climate scientists, cybersecurity professionals, and policy experts to explore multidisciplinary approaches to two of the world’s most pressing challenges: climate change and cybersecurity. Program co-organizer Mary Lee said, “We are very excited about bringing women together to work on meaningful research questions at the intersection of science, math, and policy.” Co-organizer Aisha Najera Chesler added, “We hope this workshop provides a foundation for strong and lasting collaborative networks.”

Three cybersecurity projects were pursued by three teams during the weeklong workshop: Differential Privacy for Graph Algorithms, focusing on what it means for a mechanism operating on data, collected from various individuals, to preserve the privacy of an individual; Modeling Risk Triage in a Cyber-Compromised World, seeking to determine which mathematical models and policy choices can be used to jointly understand and manage security situational awareness and inform decisions about least-cost placement of security burdens within a complex system of systems; and Targeted Mobile Digital Forensics and Privacy, studying



One of the cybersecurity groups

forensic analysis in light of the rapid growth of mobile device usage, apps, and Internet of Things devices. Dana Dachman-Soled, Assistant Professor of Electrical & Computer Engineering at University of Maryland and group leader, shared “one of the main benefits of the workshop is that it has created an environment for interdisciplinary researchers who would not have normally worked together to collaborate.” Each group, supported by cyber experts from RAND, worked to address technical challenges and their interplay with public policy. Sarah Anderson, Assistant Professor at University of St. Thomas, said, “I am excited to learn more about how mathematics can better inform policy decisions.”

Women in climate participated in one of three projects: Estimating the spatial extent of groundwater contamination in vulnerable communities in Los Angeles County; Decadal prediction of the climate and the ocean: Advancing understanding and techniques; and Downscaling climate



WPO2019 participants



One of the climate groups

projections with advanced statistical methods for policy. Participants on the teams rolled up their sleeves and worked together to split up the tasks and simultaneously shared tips on theory, methods and coding. The side conversations at meals and coffee breaks also fostered ideas about professional growth. “I was pleasantly surprised at how empowering it was to be engaged in science with all women,” said

Katie Brennan, a third year graduate student in Atmospheric Sciences at the University of Washington. “The workshop has been a safe space for freeform brainstorming,” agreed Oriana Chegwiddden, a fourth year graduate student in Civil and Environmental Engineering at the University of Washington. “It has been an expansive experience within my field and beyond,” added Brennan.

WinSCV 2019

Purvi Gupta, Rutgers University and Loredana Lanzani, Syracuse University

The first WinSCV (Women in Several Complex Variables) RCCW was titled “Problems on holomorphic functions spaces and complex dynamics” and was hosted by the American Institute of Mathematics (AIM) in San Jose, April 8–12, 2019.

During the conference, various new collaborations were initiated on certain topics in complex analysis. These topics included the study of Bergman and Hardy spaces of holomorphic functions; Fatou-Bieberbach domains; and holomorphic dynamics.

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Right: Dynamics group members Tanya Firsova, Liz Vivas and Sara Lappan





WinSCV 2019 participants

WINSCV 2019 *continued from page 27*

The organizers were Tanya Firsova (Kansas State University); Anne-Katrin Gallagher (Seattle); Purvi Gupta (Rutgers University); Loredana Lanzani (Syracuse University) and Liz Vivas (Ohio State University). A majority of the participants were junior mathematicians (postdocs and tenure-track assistant professors) and graduate students.

This RCCW was slightly different from the norm, in that about 25% of the participants were required to be male, as per AIM's requirement that a quarter of the participants be selected from underrepresented groups. (Since our initial list of suggested participants consisted entirely of women, AIM adapted its requirement to allow for a 3:1 ratio of women to men.) In the end, due to last minute cancellations, etc., it turned out that all the women from our initial list of suggested participants were issued an invitation, in addition to which, there were a few male invitees (also selected by the five organizers). Having a gender-diverse participant pool turned out to have a positive effect on 1. the female leadership at the workshop, and 2. the induction and education of junior male mathematicians as advocates for inclusion and diversity. In addition to this, the AIM

format provided an excellent support structure for the goals of this workshop.

Overall, it was a very positive and energizing experience for all involved; participants' feedback included the following comments (extracted from anonymous feedback forms).

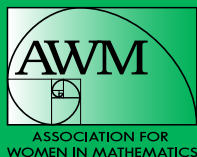
"This was an incredible, career-changing event for me."

"Hearing about the progress of other groups was helpful because it gave me a broader sense of what math collaborations look like."

"The relaxed, friendly nature of the workshop made it easier to ask questions during talks and discuss math with others."

"Social activities helped improve the cohesion of the whole group."

"The positive, relaxed atmosphere during the problem sessions seemed really conducive to working through exploratory problems, and to connecting with new collaborators."



**See awm-math.org
for the latest news!**

AWM Workshop at the 2020 Joint Mathematics Meetings

Application deadline for graduate students: **August 15, 2019**

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. Beginning in 2016, the workshop talks are supported by the AWM ADVANCE grant. The AWM Workshops serve as follow-up workshops to Research Collaboration Conferences for Women, featuring both junior and senior women speakers from one of the Research Networks supported by the ADVANCE grant. An AWM Workshop is scheduled to be held in conjunction with the Joint Mathematics Meetings in Denver, CO, January 2020.

FORMAT: The workshop will consist of a Special Session focused on Several Complex Variables organized by Liz Vivas and Loredana Lanzani, and a Poster Session for graduate students. Selected junior and senior women from the Research Collaboration Conferences for Women (RCCW) WinSCV, which was held at AIM in April 2019, will be invited to give 20-minute talks in the Special Session on Women in Several Complex Variables. The speakers will be supported by the National Science Foundation AWM ADVANCE grant: Career Advancement for Women Through Research Focused Networks. The Poster Session will be open to all areas of research; graduate students working in areas related to Several Complex Variables are especially encouraged to apply. The graduate students will be selected through an application process to present posters at the Workshop Reception & Poster Session. With funding from NSF, AWM will offer partial support for travel and hotel accommodations for the selected graduate students. The workshop will include a reception, luncheon and a mentoring session where workshop participants will have the opportunity to meet with other women mathematicians at all stages of their careers. In particular, graduate students in complex analysis will have the opportunity to connect with the Women in Several Complex Variables (WinSCV) Research Network.

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

MENTORS: We also seek volunteers to act as mentors for graduate students as part of the workshop. If you are interested in volunteering, please contact the AWM office at awm@awm-math.org by **September 15, 2019**.

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

All applications should include:

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

Applications (including abstract submission via the Joint Mathematics Meetings website) must be completed electronically by **August 15, 2019**. See <https://awm-math.org/meetings/awm-jmm/> for details.

24th SK Day Held at VSU

Denise Reid and Sandy Trowell

Valdosta State University hosted its 24th annual Sonya Kovalevsky High School Math Day (SK Day) for female students on Thursday, April 25, 2019. The day is named in honor of Sonya Kovalevsky, who was the first woman to earn her PhD in Mathematics. It is a hands-on STEM event with workshops, speakers, and a contest. There were 107 students and teachers from 16 high schools at this year's SK Day. The co-directors for the day were Denise Reid and Sandy Trowell. Sponsors for the event included the VSU Department of Mathematics, VSU office of Admissions, Publix Supermarket, VSU Office of Sponsored Programs and Research, Hester & Morris Orthodontics, VSU Bookstore, and VSU Graduate School. This year's SK Day was held on National Bring Your Daughter to Work Day. Reid was excited that both of her daughters were at this year's event with Rena presenting and Callie participating.

The participants were welcomed by Theresa Grove, Associate Dean of the College of Science and Mathematics, as well as Shaun Ault, Head of the Department of Mathematics. There were five workshops during the day. Rena Reid, who attended SK Day in previous years, led a workshop entitled "Line Robotics." Rena is currently a dual enrolled student majoring in Computer Science. She is a senior at Lanier County High School and a sophomore at VSU. Dereth Drake, VSU physics professor, took the students to the physics lab for a workshop entitled "Coloring with



Denise Reid between her daughters Rena and Callie



At the Line Robotics workshop

Electricity." Joanne Wardell, senior CS student at VSU, taught the participants about 3D printing. Patti Robertson, VSU Mathematics Lecturer, led a problem-solving workshop entitled "Problem Solving: Intentional, Serendipitous, Crucial; Some Food for Thought." Martha Leake, astronomy professor, took the students to the VSU Planetarium for a show entitled "Our Night Sky."

The career speaker for the day was Leah Jones, a Project Manager for Altman + Barrett Architects. She is currently based in Atlanta and has been involved in numerous projects, including the new Valdosta High School. Ryan Hogan from the VSU Office of Admissions spoke with everyone about educational opportunities at VSU. There was also a 25-question mathematics contest during the day. The participants had a chance for door prizes at both the beginning and the end of the day. While there, the teachers and students had a light breakfast and were treated to an on-campus lunch at Palms Dining Center.

Reid notes, "When Kathy Simons and I started the SK Days all those years ago, we had no idea what an impact they would have on our area students and teachers. We love that it has become a tradition at Valdosta State and with our local schools."



A roomful of SKDay participants at Valdosta State

Moving Towards Action Workshop

Maeve McCarthy

AWM is pleased to announce that a “Moving Towards Action” workshop to address sexual harassment in the mathematical sciences will take place in conjunction with the 2020 Joint Mathematics Meeting (JMM) in Denver, Colorado on Tuesday, January 14, 2020. Co-organized by Maeve McCarthy, Elizabeth Donovan, Vrushali Bokil, Ami Radunskaya and Karoline Pershell, this workshop is funded by the National Science Foundation and is supported in part by the American Mathematical Society.

When members of the community are ostracized, harassed, or made to feel unwelcome, then the success of mathematics as a whole is put into jeopardy. The workshop will (1) establish the impacts of sexual harassment, how climate and policies can affect the prevalence of sexual harassment, and the recommendations for improving climate and institutional structures, based on the NASEM’s *Sexual Harassment of Women* report; (2) provide guidance to define a desired workplace climate from an interpersonal perspective, and actions towards achieving awareness and adoption; (3) supply tools, techniques and training to respond to behaviors that undermine a welcoming environment; (4) present guidance in identifying gaps in university policies that drive unwanted behaviors and provide a recommended structure for responding when such issues are discovered; and (5) initiate guided development of indivi-

dual action plans for implementing change at participant’s home institutions.

Speakers will include experts in organizational development and sexual harassment, professionals knowledgeable about best practices in policy implementation in academia, and an expert in defining and creating inclusive work environments. Bystander intervention training by University of New Hampshire’s Power Play will be included. Participants will be invited to present posters describing current practices for reporting, investigating and preventing sexual harassment at their home institutions, to promote interactive discussions on lessons learned and to allow participants to bring examples from other institutions back to their home institutions. Participants will develop action plans for their own institutions during the day-long event.

Funding is available for thirty participants and will cover one night of hotel and meals. Priority will be given to faculty at departments in need of change and to faculty in a position to lead change at their home institutions. An application form will be available mid-summer at <https://awm-math.org/meetings/awm-jmm/>, and applications will be accepted until **October 1, 2019**.

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Announcements

GROW 2019 at UIUC

Graduate Research Opportunities for Women (GROW) 2019 will be held October 4–7 at the University of Illinois at Urbana-Champaign. This conference, one in a continuing series, is aimed at female-identified undergraduate students who may be interested in pursuing a graduate degree in mathematics. The conference is open to undergraduates from all around the US. The cost of attendance for all accepted undergraduate students will be covered.

The conference features: lectures, panel discussions about graduate research in mathematics, networking opportunities, and advice on preparing applications for graduate school. Questions to the conference organizers may be sent to grow2019@math.uiuc.edu.

For full consideration for funding, please apply by **July 15, 2019**; see <https://forms.illinois.edu/sec/2359826> for an application form.

AWIS Unveils the ARC Network, a STEM Equity Brain Trust

AWIS, Washington, DC

The Association for Women in Science (AWIS), a leading advocate for women in STEM, introduces the ADVANCE Resource and Coordination (ARC) Network as a priority initiative to create meaningful systemic change in academia. The STEM equity program ARC Network will host an Equity in STEM Community Convening on October 6, 2019 in Cleveland, OH, and provide an opportunity for scholars to participate in the Virtual Visiting Scholars (VVS) Program, a one-year research project. Both offer in-depth exploration of resources, strategies and promising practices for achieving equity.

Funded by a multi-year investment from the National Science Foundation (NSF), the ARC Network draws on the efforts of ADVANCE, the NSF's program addressing systemic inequities in academic STEM, and produces new perspectives, methods and interventions with an intersectional, intentional and inclusive lens. Gender equity advocates are invited to join the ARC Network Community at www.Equity-InSTEM.org/join.

Learn more about the ARC Network by reading the project fact sheet at www.equityinstem.org/factsheet.

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TOPICAL WORKSHOP

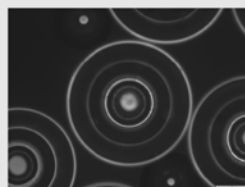
Numerical Methods and New Perspectives for Extended Liquid Crystalline Systems

December 9 – 13, 2019

Organizing Committee:

Jan Lagerwall, University of Luxembourg
Apala Majumdar, University of Bath
Shawn Walker, Louisiana State University

Program Description:



Liquid crystals (LCs) are classic examples of partially ordered materials that combine the fluidity of liquids with the long-range order of solids, and have great potential to enable new materials and technological

devices. A variety of LC phases exist, e.g. nematics, smectics, cholesterics, with a rich range of behavior when subjected to external fields, curved boundaries, mechanical strain, etc. Recently, new systems came into focus, such as bent-core LC phases, twist-bend-modulated nematics, chromonics and polymer-stabilized blue phases, with more to be discovered.

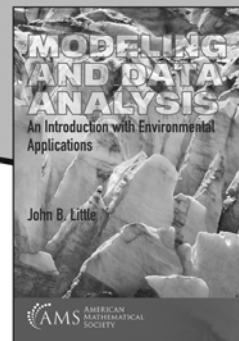
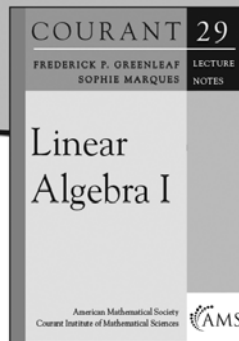
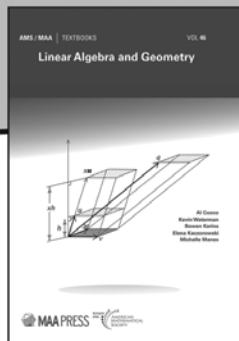
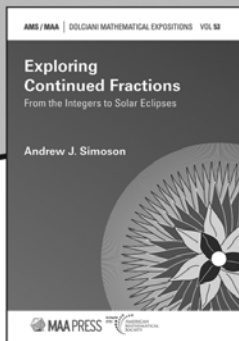
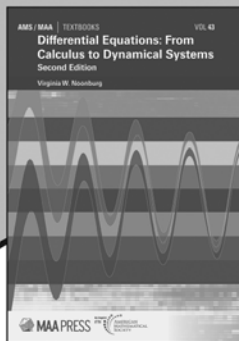
Best known for applications in displays, LCs have recently been proposed for new applications in biology, nanoscience and beyond, such as biosensors, actuators, drug delivery, and bacterial control (related to active matter). Indeed, it is believed that the LC nature of DNA once enabled the mother of all applications, namely life itself. New numerical methods and scientific computation is needed to guide new theory and models for these systems that capture the interplay of symmetry, geometry, temperature and confinement in spatio-temporal pattern formation for LCs and extended LC-like systems.

This workshop provides an interdisciplinary platform for computational and experimental research in extended LC-like systems, and how these approaches can yield new theoretical insight for novel LC systems.

Full details can be found at:

https://icerm.brown.edu/topical_workshops/tw19-7-elcs/
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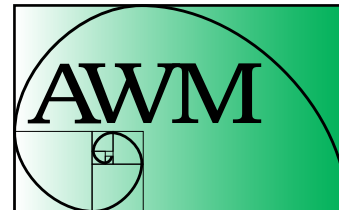


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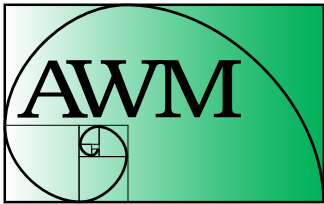


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