EVENTS AT THE 2022 JOINT MATHEMATICS MEETINGS

JANUARY 5–8, 2022

WASHINGTON STATE CONVENTION CENTER

SEATTLE, WA
Tuesday January 4, 2022

AWM Executive Committee Meeting
2:00pm–6:00pm, Jefferson, 4th Floor, Union Street Tower, Sheraton Grand Seattle Hotel

Wednesday, January 5, 2022

AWM Special Session on Women in Geometry, I
8:00am–11:50am, Room 211, Washington State Convention Center
Organizers:
Catherine Searle, Wichita State University
Elizabeth Stanhope, Lewis and Clark University
Guofang Wei, University of California, Santa Barbara

AWM Special Session on Mathematics in the Literary Arts and Pedagogy in Creative Settings
1:00pm–5:50pm, Room 211, Washington State Convention Center
Organizers:
Shanna Dobson, California State University, Los Angeles
Elizabeth Donovan, Murray State University

AWM Panel Discussion: Non-Traditional Careers in Mathematics
2:15pm–3:40pm, Room 609, Washington State Convention Center
Organizer:
Alice Mark, Vanderbilt University
sarah-marie belcastro, MathILy
Panelists:
Kelly MacArthur, University of Utah
Lynne Yengulalp, Wake Forest University
sarah-marie belcastro, MathILy
Alyson Deines, Center for Computational Research

AWM Business Meeting
3:45pm–4:15pm, Room 609, Washington State Convention Center

Joint Prize Session
4:25pm–5:25pm, Ballroom 6BC, Washington State Convention Center

AWM Dissertation Prize: Jinyoung Park, Stanford University; Rita Teixeira da Costa, Princeton University and Trinity College in Cambridge; Heather Wilber, University of Texas at Austin

AWM Microsoft Research Prize in Algebra and Number Theory: Jennifer Balakrishnan, Boston University

AWM Sadosky Research Prize in Analysis: Yaiza Canzani, University of North Carolina at Chapel Hill
Louise Hay Award for Contribution to Mathematics Education: Vilma Mesa, University of Michigan

Gweneth Humphreys Award for Mentorship of Undergraduate Women in Mathematics: Maria Helena Noronha, California State University at Northridge

Alice T. Schafer Mathematics Prize for Excellence in Mathematics by an Undergraduate Woman: Winner: (Carina) Letong Hong, Massachusetts Institute of Technology; Runner-up: Faye Jackson, University of Michigan; Honorable Mentions: Alexandra Hoey, Massachusetts Institute of Technology; Simran Khunger, Carnegie Mellon University; Lily (Qiao) Li, University of California, Berkeley

Grand Opening Reception
6:15pm–5:25pm, Atrium Lobby, 4th Floor, Washington State Convention Center

Thursday, January 6, 2022

AWM Panel Discussion: AWM 101: What You Need to Know about Women in Math
8:00am–9:30am, Tahoma 3, Tahoma Level Three, Washington State Conference Center
Organizer:
Rhonda Olson, Arizona State University
Panelists:
Ami Radunskaya, Pomona College
Hortensia Soto, Colorado State University
Raegan Higgins, Texas Tech University
Juliette Bruce, University of California, Berkeley

AWM Special Session on Women in Geometry, II
8:00am–11:50am, Room 211, Washington State Convention Center
Organizers:
Catherine Searle, Wichita State University
Elizabeth Stanhope, Lewis and Clark University
Guofang Wei, University of California, Santa Barbara

AWM Special Session on Celebrating the Mathematical Contributions of the AWM, I & II
8:00am–11:50am and 1:00pm–4:50pm, Room 611, Washington State Convention Center
Organizers:
Donatella Danielli, Arizona State University
Kathryn Leonard, Occidental College
Michelle Manes, University of Hawaii at Manoa
Ami Radunskaya, Pomona College
AWM Special Session on Women in Mathematical Biology, I & II
8:00 am–11:50am and 1:00pm–4:50pm, Skagit 4, Skagit Lower Level, Washington State Conference Center
Organizers:
Christina Edholm, Scripps College
Maryann Hohn, Pomona College
Amanda Laubmeier, Texas Tech University
Carrie Manore, Los Alamos National Laboratory
Heather Zinn-Brooks, Harvey Mudd College

AWM-AMS Noether Lecture
10:05am–10:55am, Ballroom 6BC, Washington State Convention Center
Marianna Csörnyei, University of Chicago, The Kakeya Needle Problem for Rectifiable Sets

Friday, January 7, 2022

AWM Special Session on Women and Gender Minorities in Symplectic and Contact Geometry and Topology, I & II
8:00 am–11:50am and 1:00pm–5:50pm, Room 211, Washington State Convention Center
Organizers:
Orsola Capovilla-Searle, Duke University
Dahye Cho, Stony Brook University
Angela Wu, University of College, London

AWM Special Session on Women in Mathematical Biology, III
8:00 am–11:50am and 1:00pm–4:50pm, Skagit 4, Skagit Lower Level, Washington State Conference Center
Organizers:
Christina Edholm, Scripps College
Maryann Hohn, Pomona College
Amanda Laubmeier, Texas Tech University
Carrie Manore, Los Alamos National Laboratory
Heather Zinn-Brooks, Harvey Mudd College

AWM Special Session on Women in Topology
1:00pm–5:50pm, Skagit 5, Skagit Lower Level, Washington State Conference Center
Organizers:
Kristine Bauer, University of Calgary bauerk@ucalgary.ca
Anna Marie Bohmann, Vanderbilt University
Angelica Osorno, Reed College
Carmen Rovi, MPIM and University of Heidelberg
Sarah Yeakel, University of California, Riverside

AWM Special Session on Women of Color in Combinatorics, I
1:00pm–5:50pm, Room 204, Washington State Convention Center
AWM Events at the 2022 Joint Mathematics Meetings

Organizers:
- Zhanar Berikkyzy, Fairfield University
- Shanise Walker, University of Wisconsin Eau Claire

**AWM Workshop Poster Presentations by Women Graduate Students and Reception**
4:00pm–5:30pm, Skybridge, 4th Floor, Washington State Convention Center
**Poster Session Organizers:**
- Irina Mitrea, Temple University
- Julie Rana, Lawrence University
- Radmila Sazdanovic, North Carolina State University
- Janet Striuli, Fairfield University
- Isabel Vogt, University of Washington

**AWM Reception and Awards Presentation**
5:00pm–6:30pm, 4th Floor, Washington State Convention Center
**AWM Service Award Winners and AWM Fellows will be honored**

**Saturday, January 8, 2022**

**Special Session on Women in Computational Topology, I & II**
8:00 am–11:50am and 1:00pm–5:50pm, Room 205, Washington State Convention Center
**Organizers:**
- Brittany Fasy, Montana State University
- Lori Ziegelmeier, Macalester College

**AWM Special Session on Women and Gender Minorities in Symplectic and Contact Geometry and Topology, III & IV**
8:00 am–11:50am and 1:00pm–5:50pm, Room 211, Washington State Convention Center
**Organizers:**
- Orsola Capovilla-Searle, Duke University
- Dahye Cho, Stony Brook University
- Angela Wu, University of College, London

**AWM Workshop: Women in Algebraic Geometry (WiAG), I & II**
8:00am–6:00pm, Tahoma 5, Tahoma Level Three, Washington State Conference Center
**Organizers from AWM's JMM Committee and the WiAG Network:**
- Julie Rana, Lawrence University
- Isabel Vogt, University of Washington
AWM Special Session on Women of Color in Combinatorics, II
1:00pm–5:50pm, Room 204, Washington State Convention Center
Organizers:
Zhanar Berikkyzy, Fairfield University
Shanise Walker, University of Wisconsin Eau Claire

The AWM 2022 JMM Organizing Committee
A special thanks to the AWM committee members who have helped organize this year’s program!
Matthew Krauel, California State University, Sacramento
Alice Mark, Rutgers University
Irina Mitrea, Temple University
Radmila Sazdanovic, North Carolina State University, Chair
Julie Rana, Lawrence University
Janet Striuli, Fairfield University
Liz Vivas, Ohio State University
Isabel Vogt, University of Washington

Prize Winners and Citations

AWM Dissertation Prizes
Jinyoung Park, Stanford University
Jinyoung Park’s 2020 dissertation, written at Rutgers University under the supervision of Jeff Kahn, is comprised of five papers, published in: The Annals of Mathematics, Combinatorica (in press), Proceedings of the American Mathematical Society, The Electronic Journal of Combinatorics, and Israel Journal of Mathematics. The work settles major conjectures and runs the gamut from isoperimetric inequalities to random discrete structures. The results are deemed “spectacular” and her innovative techniques “groundbreaking” by expert letters supporting the nomination. In fact, the proof of the Talagrand conjecture (which had generated a great amount of work since being stated in 2010) “easily implies some of the most celebrated—and notoriously difficult—results in the subject” and allowed the solutions of problems “on which earlier (ingenious, difficult) work had made only limited progress”. The result on isoperimetry in the cube stimulated important generalizations by others and also “gives unexpected, simple proofs” of known facts that had been established by renowned researchers. It is also noted that Dr. Park’s outstanding achievements follow a career as a middle and high school teacher in the Republic of Korea. She is now a Szego ˝ Assistant Professor at Stanford University.

Rita Teixeira da Costa, Princeton University and Trinity College in Cambridge
Rita Teixeira da Costa received her PhD in 2021 at the University of Cambridge under the supervision of Mihalis Dafermos. She is now an NSF Postdoctoral Fellow at Princeton and a Junior Research Fellow at Trinity College in Cambridge.

Teixeira da Costa’s research is focused on differential equations arising in general relativity. Her work represents important rigorous mathematical progress on the celebrated
black hole stability problem, a central question in the subject, at the intersection of mathematics, theoretical physics, and astronomy. Her thesis titled “Frequency space analysis in General Relativity” contains four major results, full of original ideas introducing new techniques to the problems.

According to the expert letter writers “Rita’s thesis is an outstanding piece of work that resolves a major problem in the field of general relativity.” Moreover, they praise her presentation and explanation as demonstrating that “besides a complete command of the mathematical techniques involved, Rita has a strong talent to make her work accessible and spends a lot of time thinking about the best way to present an argument.”

Heather Wilber, University of Texas at Austin
Heather Denise Wilber received her PhD in 2021 at Cornell University under the direction of Professor Alex Townsend. She is currently an NSF postdoctoral fellow at the Oden Institute, University of Texas at Austin.

Wilber’s interests include approximation theory, numerical linear algebra, and scientific computing. In her beautifully written dissertation titled “Computing numerically with rational functions,” Wilber presents new numerical methods using rational functions for solving Sylvester and Lyapunov matrix equations whose right-hand sides have decaying singular values. She brings a tremendous breadth of mathematics together to do this, combining rational approximation theory in the complex plane, including associated conformal mapping problems, and numerical linear algebra, focusing on the important and hot topic of low-rank approximation. In addition, the thesis develops a rational approximation framework for adaptive computing in the context of signal processing.

As one letter writer noted, “Chapter 4 makes a very impressive contribution, a new solver for linear systems with Toeplitz structure…. With deep insights from rational approximation and other tools, Wilber has found a completely novel, deterministic construction that offers the potential to outperform randomized algorithms.” Fittingly, this work has resulted in multiple papers in scientific journals. They appear in the SIAM Journal of Scientific Computing, Linear Algebra and its Applications, and Constructive Approximation (to appear).

AWM Microsoft Research Prize in Algebra and Number Theory
Jennifer Balakrishnan, Boston University
The 2022 AWM-Microsoft Research Prize in Algebra and Number Theory is presented to Jennifer Balakrishnan in recognition of outstanding contributions to explicit methods in number theory, particularly her advances in computing rational points on algebraic curves over number fields.

Professor Balakrishnan is internationally recognized as a leader in computational number theory. Her doctoral dissertation presents the first general technique for computing iterated $p$-adic Coleman integrals on hyperelliptic curves. In the course of her collaboration with Minhyong Kim at Oxford, Balakrishnan helped realize the substantial practical
potential of Kim’s non-abelian Chabauty method, and with her collaborators, turned it into a powerful tool for identifying integral and rational points on curves that are entirely beyond reach using the traditional Chabauty approach. In an impressive tour de force, Balakrishnan, Dogra, Müller, Tuitman and Vonk used the quadratic Chabauty method for computing the rational points on the split Cartan modular curve of level 13. Facetiously known as the “cursed curve” among number theorists because 13 is the only prime level that had stubbornly resisted all such prior attempts, this work represents a major breakthrough. It not only completes the proof of the split Cartan cases of Serre’s uniformity conjecture for Galois images of elliptic curves, but also opens an avenue for tackling nonsplit Cartan modular curves at higher level.

Balakrishnan’s research exhibits extraordinary depth as well as breadth. In joint work with Besser, Çiperiani, Dogra, Müller, Stein and others, she has worked extensively on computing p-adic height pairings for hyperelliptic curves. Applications of this research include the formulation, along with numerical evidence, of a p-adic analogue of the celebrated Birch and Swinnerton-Dyer conjecture, some new explicit examples in Iwasawa theory, and more. With Ho, Kaplan, Spicer, Stein and Weigandt, Balakrishnan has assembled the most extensive computational evidence to date on the distribution of ranks and Selmer groups of elliptic curves over the rational numbers, thereby providing the most convincing evidence thus far in support of the widely believed conjecture that the average rank of a rational elliptic curve is $\frac{1}{2}$.

After receiving her doctorate from the Massachusetts Institute of Technology in 2011, Professor Balakrishnan held appointments as an NSF Postdoctoral Fellow at Harvard University as well as a Junior Research Fellow and a Titchmarsh Fellow at the University of Oxford. She is currently the Clare Boothe Luce Associate Professor of Mathematics at Boston University, a Sloan Research Fellow, and a recipient of an NSF CAREER award. Her research is also supported by the Simons Foundation, through the Simons Collaboration in Arithmetic Geometry, Number Theory, and Computation.

Balakrishnan has delivered an impressive array of invited and plenary lectures in locations across four continents. Beyond her outstanding scientific achievements, she has assumed leadership roles in service to her institution and the community, especially in bringing more women into math, devoting untold hours to mentoring and advocating for junior women in the profession, and striving to create supportive environments for them. In addition to her extensive record of student supervision at all levels, she has co-organized numerous research conferences, thematic programs and summer schools, including many Women in Sage gatherings. She serves on the editorial boards for five top quality journals, the AMS Short Course Subcommittee, the Scientific Advisory Board for the Institute for Computational and Experimental Research in Mathematics, the Board of Directors for the Number Theory Foundation, and the Steering Committee for the Women in Numbers Network.

Jennifer Balakrishnan’s work is widely known and recognized across the globe within the number theory community and beyond. AWM congratulates her for her well-deserved AWM-Microsoft Research Prize.
Response from Jennifer Balakrishnan

I am honored to receive the 2022 AWM-Microsoft Prize in Algebra and Number Theory. I would like to thank the AWM and Microsoft for this recognition of my work, which would not have been possible without the support of my mentors and collaborators.

Over the years, I have been very fortunate to have had the encouragement of several mentors: my PhD advisor, Kiran Kedlaya, as well as Dick Gross, William Stein, Barry Mazur, Minhyong Kim, and Henri Darmon. I am deeply indebted to my collaborators, including Amnon Besser, Mirela Çiperiani, Netan Dogra, Steffen Müller, Jan Tuitman, and Jan Vonk, who have been generously working with me for several years and have taught me so much. Boston University has provided a wonderful research environment, and I am very grateful for the support of my colleagues, including Margaret Beck, Tasso Kaper, David Rohrlich, and Glenn Stevens. The Women in Numbers network and the Simons Collaboration in Arithmetic Geometry, Number Theory, and Computation (with special thanks to Noam Elkies, Brendan Hassett, Bjorn Poonen, Andrew Sutherland, and John Voight) have also provided a warm sense of community and the inspiration to follow various research directions I would not have otherwise pursued.

AWM Sadosky Research Prize in Analysis

Yaiza Canzani, University of North Carolina at Chapel Hill

The 2022 AWM Sadosky Research Prize in Analysis is awarded to Yaiza Canzani in recognition of outstanding contributions in spectral geometry and microlocal analysis.

Canzani has established herself as a leading expert in spectral geometry, producing breakthrough results on nodal sets, random waves, Weyl Laws, Lp-norms, and other problems on eigenfunctions and eigenvalues on Riemannian manifolds. Over the past three years, in collaboration with Galkowski, Canzani developed a framework to extract information on the structure of Laplace eigenfunctions from their concentration and propagation behavior in phase space. The outcome of this endeavor is a series of works that are the first to provide quantitative improvements over the standard bounds, under purely dynamical assumptions, for pointwise bounds, Lp-norms, integral averages, and the error term in the pointwise Weyl Law. Canzani’s work is ground-breaking and further development of her framework will continue to greatly advance the field. Canzani, in collaboration with Hanin, carried out a detailed study of scaling limits of the spectral function of the Laplacian, successfully answering Zelditch’s scaling asymptotics conjecture and applying it to prove local universality properties of nodal sets. Her work has opened up the possibility to study random waves on general manifolds; previous techniques had restricted their study to specific classes such as the sphere or the torus. In a beautiful paper with Sarnak, Canzani studied the topology and nesting configurations of the zero sets of monochromatic random waves. Such results seemed quite out of reach even to the leading experts in the area, but Canzani’s technical brilliance and new ideas made it possible to obtain them.

Canzani’s publication record is stellar, with already 24 articles of impressive breadth in top journals. Similarly, impressive is the number of worldwide invited talks she presented at distinguished events. After receiving her Ph.D. from McGill University in 2013, she
Canzani is a remarkable young mathematician whose ground-breaking and original work has greatly impacted the mathematical community and she continues working on a host of exciting and ambitious new projects that she is well equipped to attack. Canzani undoubtedly deserves the recognition that the AWM-Sadosky Prize provides.

Response from Yaiza Canzani
I am honored and delighted to receive the AWM-Sadosky Research Prize in Analysis. It is a particular privilege to receive an award commemorating Cora Sadosky. And I am truly gratified to be awarded a prize by the AWM whose effort to promote equal opportunity plays a key role in the future of our profession.

I am deeply grateful to all of my mentors throughout the years for their support, advice, and guidance. Federico Rodriguez-Hertz, my undergraduate mentor, was instrumental in advancing my career by helping me both find a Ph.D. position and prepare to succeed in it. Dmitry Jakobson and John Toth, my teachers and mentors during my Ph.D., have become good friends and collaborators. Working with them is a joy. In addition, during my postdoc, I had the good fortune to work with Peter Sarnak who continues to provide invaluable guidance and share his talent and passion for mathematics.

Finally, I would like to thank my colleagues and collaborators who support and promote my work. I am especially grateful to Jeff Galkowski and Jason Metcalfe.

AWM Service Awards
The Notable Women in Math Playing Cards Project Management Committee or Even Quads PMC
The committee members are sarah-marie belcastro (Chair), Sherli Koshy-Chenthittayil, Linda McGuire, Monica Morales Hernandez, Denise A. Rangel Tracy, and Oscar Vega.

The Notable Women in Math Playing Cards (https://awm-math.org/publications/playing-cards/), also known as EvenQuads, is a project inspired by the Notable Women in Computing Playing Cards. The EvenQuads PMC is being honored for their role, via this novel and elegant project, in promoting women’s accomplishments in mathematics for the purpose of inspiring and encouraging future generations of mathematicians. With a little guidance from the initial proposers and a criteria committee, the Evenquads PMC took a seed of inspiration and turned it into amazing success in just under two years. The project, which currently enlists around 200 volunteers, began by compiling a list of 1400 mathematicians and seeking nominations from the community. Biographic and professional information was collected on these nominees, and at least 2 volunteers reviewed each nominee using a rubric, the results of which determined inclusion in the first deck of 64. Several new games were created, including the popular EvenQuads, and artists were called upon to illustrate the women whose biographies are featured on the playing cards.
cards. The volunteer list includes game creators, data collectors, reviewers, biographers, artists, a fact checker, and a statistician. A Kickstarter campaign to print the decks was launched in October of 2020 with a goal of $3000. The campaign, in just six weeks, earned 414 backers pledging over $17,000! Some pledges were for deck donations to secondary educators mainly from underserved schools. There was enough post-Kickstarter demand that the first shipment of EvenQuads Limited Edition decks that arrived at the AWM online store sold in a matter of hours.

These decks are the first of their kind, combining multifaceted text about women who have contributed to mathematics in many different ways with beautiful graphic design that evokes multiple professional mathematics organizations. The cards are dual educational resources, spreading mathematical concepts and exercising abstract thinking through the EvenQuads game and variants while also informing players about women mathematicians. Beyond this, the physical decks are supported by a website with full biographies augmented by stories told by the honorees.

Every member of the EvenQuads PMC is passionate, dedicated, and committed to this very complex project. Individual members were responsible for executing certain aspects such as logistics and planning, a Kickstarter campaign, webpage coding, editing text, translation of text into Spanish, and management of collections of volunteers. The members are described as being supportive of each other through the personal and professional challenges that arose with the COVID-19 pandemic, and through challenges to the project itself. The success of the project is attributed to the remarkable and true collaboration—built on consensus, flexibility and respect—that became the EvenQuads Project Management Committee. The entire mathematical sciences community benefits from this project, especially the AWM.

Response from the Committee
We are thrilled to receive an AWM Service award for our work on the ongoing EvenQuads project. Even with only the first phase complete, we are pleased to have created a lasting contribution to the AWM and the larger mathematical community. It has also been a pleasure for us to work together, forging friendships as we reach consensus. We have extensively debriefed our work on the first deck, discussed all feedback received, and made adjustments to streamline and improve the processes for the next three decks. Together, the set of four decks can be used for a 256-card EvenQuads game (and any two of the decks can be used for a 128-card game! Just you wait!). Finally, while we collectively direct the project, a great deal of work has been and will be done by many many additional volunteers. In addition to the aspects listed in the citation, some volunteers have assisted by doing statistics on the reviewing data, drawing multiple portraits of selected women, fact checking biographical information, consulting on marketing, creating photos and videos, liaising with other professional organizations, and dealing with production companies. We are grateful to all the volunteers for responding to our requests for assistance; the EvenQuads decks would not exist without them.
Ellen Kirkman, Wake Forest University

Kirkman is recognized for her eight years of service (2012–2020) as AWM Treasurer and Chair of the Financial Oversight and Investment Committee, for her service on the Membership Portfolio Committee, and for her role as an organizer and a research leader in the WINART (Women in Noncommutative Algebra and Representation Theory) Research Network.

As AWM Treasurer, Ellen made dramatic improvements in the budget process and was integral in developing and implementing an Investment Policy for AWM. She adhered to this Policy by rebalancing accounts annually to match investment goals. Ellen worked closely with the fiscal teams at both the former and current management companies to ensure that the quarterly financial reports provided were accurate and received in a timely manner. In 2017, her efforts were instrumental in reestablishing AWM’s nonprofit status. For eight years (and beyond), Ellen worked tirelessly to provide AWM with conservative stewardship, allowing the Association to continue with a sound financial footing as we move into the next 50 years. Ellen also served on the Membership Portfolio Committee during the same time period. She closely monitored membership data of both individuals and institutions, another vital contribution towards sustaining the AWM.

An active member of the WINART Research Network, Ellen helped organize the special session New Developments in Noncommutative Algebra & Representation Theory at the 2017 Joint Math Meetings and the WINART2 workshop at Leeds in 2019. WINART now connects more than 120 mathematicians. The main purpose of the WINART3 workshop was to bring together women and non-binary people to do research in various subfields of noncommutative algebra and in representation theory. This workshop was organized around eight research groups consisting of four to six participants, each led by two research leaders. A variety of research topics were presented at the workshop; groups were formed several months before the workshop so that participants could prepare and also share ideas for projects.

Ellen has also served the broader mathematical community as a member of The Sylvia Bozeman and Rhonda Hughes EDGE Foundation Board of Directors, the AMS-ASA-MAA-IMS-SIAM Data Committee (2000–2007 and 2009–present), and coauthor of the CBMS 2010 and the CBMS 2015 surveys, Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States.

The AWM is grateful for Ellen’s service in these leadership roles, which are so vital to the long term health of the Association. Congratulations, Ellen!

Response from Ellen Kirkman

I am honored to receive the 2022 AWM Service Award. I appreciate the help and support of the five awesome AWM presidents I served under: Jill Pipher, Ruth Charney, Kristin Lauter, Ami Radunskaya, and Ruth Haas, all of whom were extremely helpful as AWM worked to improve its financial position. I am also grateful to Marie Vitulli, Magnhild Lien, and Karoline Pershell, who served on the Financial Management Committee and contributed their astute expertise and advice. Finally, I want to thank Executive Committee members and other AWM members, who
Louise Hay Award for Contribution to Mathematics Education
Vilma Mesa, University of Michigan

In recognition of her outstanding contributions to mathematics education, the Association of Women in Mathematics (AWM) presents the 2022 Louise Hay Award to Vilma Mesa. Mesa is recognized for her distinguished contributions to mathematics education research at the collegiate level, for her teaching and mentorship, and as an advocate for access to mathematics for women and members of underprivileged populations.

Professor Vilma Mesa exemplifies methodologically rigorous, programmatic, innovative, and impactful research in mathematics education. This work, together with her teaching and recognized mentorship at diverse levels, have served as a model inspiring other already accomplished scholars in the field.

Mesa’s scholarship has two main strands—curriculum, and college level instruction. Her curriculum work started at the Universidad de los Andes, where she joined a group of instructors writing texts for precalculus and statistics. Her University of Georgia dissertation was an international comparison of 8th grade presentations of the concept of function. She used her methods to then study college textbook presentations of trigonometry and calculus concepts. More recently, she has explored instructors’ use of open source and open access electronic mathematics textbooks for Calculus, Abstract Algebra, and Linear Algebra.

Mesa’s work on collegiate instruction has three related foci: calculus instruction; inquiry-based learning (IBL); and community college mathematics instruction. In the MAA National Study of College Calculus, she led the team that focused on calculus instruction in community college. In 2005, Mesa became an evaluator of IBL math courses at the University of Michigan. She brought expertise to this work gained from her involvement with the Michigan Center for Research on Learning and Teaching.

Mesa’s contribution to the study of mathematics instruction in community colleges is, arguably, her most important contribution to mathematics education. Indeed, in 2014, she and her colleagues published a landmark argument for the importance of doing research in community college settings. And she further articulated the equity implications of improving instruction in community college mathematics. Mesa has developed a ground-breaking body of practice-actionable work in this underdeveloped area of research.

Mesa is a distinguished contributor to mathematics education research at the collegiate level. She has had several (inter)national level leadership roles, including: associate editor for several leading journals; officer of the SIGMAA on Research in Undergraduate Mathematics Education; leadership in the national inquiry-based learning movement; and advising projects in Chile, Colombia, and Spain. In all her service activities, as well
as in her teaching and research, Mesa has advocated for access to mathematics for women and members of underprivileged populations. Professor Mesa amply demonstrates the qualities that the Louise Hay Award is meant to celebrate.

Response from Vilma Mesa

It is a great honor to have been awarded the 2022 AWM’s Louise Hay Award for contributions to mathematics education. Dr. Louise Hay was a remarkable scholar and, as I have learned from her personal account, a tour de force. I am humbled and grateful for the nomination, for the committee’s work, and that you thought that my work exemplifies the spirit of the award. I am even more honored to join past Louise Hay Award recipients! The list includes the names of distinguished colleagues whose work have influenced mine, colleagues who have mentored me, and colleagues whom I profoundly admire. Being listed among this group is truly a highlight of my career. Thank you.

Gweneth Humphreys Award for Mentorship of Undergraduate Women in Mathematics

Maria Helena Noronha, California State University at Northridge

In recognition of her outstanding mentoring of undergraduate women in mathematics, and her creation of programs and pathways for those under-represented in mathematics to excel and thrive in the profession, the 2022 Gweneth Humphreys Award for Mentorship of Undergraduate Women in Mathematics is awarded to Maria Helena Noronha

Over an almost thirty-year career at California State University Northridge (CSUN), a primarily undergraduate Hispanic-serving public institution, Noronha has set up structures that foster access to, and success in, the mathematics profession at all stages of the academic pipeline. These initiatives include CSUN’s “Preparing Undergraduates through Mentoring for PhDs” (PUMP), which prepares under-represented minority students to enter doctoral programs in mathematics, and which has now expanded throughout the Cal State network; “Research Experiences in Community Colleges” (RE-C²), providing mathematics research opportunities to community college students and faculty; and “Fellows Engaged in Research in Mathematics to Assist Teachers” (FERMAT), supporting master’s students in mathematics to serve as resources for K–12 teachers.

Noronha has had a lasting influence on the individual careers of countless women in mathematics. Her nomination letter notes that out of 78 women contacted who had been mentored by Noronha, close to a half have obtained a master’s or doctoral degree in a mathematics-related field. All were undergraduates at community colleges or four-year Hispanic-serving colleges when they first met Noronha.

The selection committee received numerous letters in support of Noronha’s nomination—one of them itself jointly written by a dozen former mentees! —from former students and senior and junior colleagues. The picture of Noronha that emerges from these letters is of an educator of prodigious energy, incisiveness, empathy, and belief in her students. Noronha believes that all her students—be they working full time, the first in their families to attend college, dealing with child care concerns, or beset with health challenges— are capable and deserving of the same standards of excellence as those with
more privilege. She encouraged her mentees to engage in high-level research, arranged for international collaborations, and insisted that they have high expectations of themselves and of their own possibilities. In the words of a former student: “She strongly believes you can achieve something even when you can’t imagine it possible, and she helps you to understand how to make it happen.”

Describing her impact as a role model, one former mentee wrote: “Helena was a woman I looked up to. She was a Latina who took pride and ownership of her mathematics abilities.” For her capacity to inspire and set the ground for generations of women to take pride in their mathematics and ownership of their abilities, AWM is pleased to honor Maria Helena Noronha.

Response from Maria Helena Noronha
I am deeply honored to receive the 2022 Humphreys Award from the AWM. I am extremely grateful to my former student and now my colleague and friend Cynthia Flores, who nominated me, to those colleagues and students who wrote in support of my nomination, and to the selection committee. I feel fortunate for having worked with wonderful faculty members of the CSU and UC campuses and nearby community colleges that helped me to implement and make my projects successful. I want to share with all of them this recognition.

I grew up and obtained my degree in Brazil, where the Latinx students are not minorities. I was able to attend excellent schools, a fact that taught me that with appropriate training, academic attention and encouragement, under-represented students in mathematical sciences can excel in their careers. I am glad that my students in the U.S. proved me to be right and, among them, several outstanding women of color. I dedicate this award to all of them and to my late mother, who was my role model as a woman and my inspiration.

Alice T. Schafer Mathematics Prizes for Excellence in Mathematics by an Undergraduate Woman
Winner: (Carina) Letong Hong, Massachusetts Institute of Technology
(Carina) Letong Hong is a junior mathematics and physics major at the Massachusetts Institute of Technology. She has contributed to REUs at the University of Minnesota-Duluth and the University of Virginia in addition to research projects at MIT and the Budapest Semesters in Mathematics, leading to three articles accepted for publication and numerous others submitted or in preparation. She has already taken extensive graduate mathematics courses, receiving the highest possible grades in each, and plans to graduate in Spring 2022 after 3 years at MIT.

Hong already has an impressive track record of completed research in many areas, including stack-sorting algorithms, pattern avoidance in inversion sequences, the Monstrous Moonshine Conjecture, $L$-functions of modular elliptic curves, $K3$ surfaces, and Markov chains on edge colorings of bipartite graphs; Hong’s research addressed open questions posed by top mathematicians in their respective fields. Her mentors describe her as “headed to be a superstar in mathematical research”, “driven and overflowing with enthusiasm”, and “extraordinarily active on both the research side and the broader community-building side.” Hong recently received the Emerging Leader Award and
Community Building Award at MIT, where she is the President of the Undergraduate Mathematics Association and the Advocacy and Outreach Chair of the First Generation and Low Income Students Coalition.

**Runner-up: Faye Jackson, University of Michigan**

Faye Jackson is a math major at the University of Michigan. She excels in course work, in research, and in community engagement both within her department and in the broader Ann Arbor and surrounding areas. Her mentors and professors describe her as enthusiastically engaged in the classroom and an eager, insightful learner. Her instructors consistently describe Faye as a top-achieving student, even as an undergraduate in PhD-level courses, and as “dedicated and passionate ... a clear-thinking, creative, and effective problem solver.” In addition to research at the Lab of Geometry at Michigan, she participated in the SMALL REU where she worked on research questions on four distinct projects (Zeckendorf decompositions, Discrete Erdős Distance Problems, Random Matrix Theory, and More Sums Than Differences sets) and is now a co-author on six papers. (Three already on the arXiv and three more to come!)

In addition to these exceptionally strong academic accomplishments, Faye has been an essential and incredibly reliable presence in the outreach programs of the University of Michigan Mathematics Department. She has participated in Math Mondays in Ypsi, Super Saturdays, the Michigan Math Circle, and the new Math Corps in Ann Arbor. In class, research, and outreach she makes significant contributions that delight all of her mentors, and they also seriously appreciate her ability to make space for other people to contribute. With middle school and high school students this takes the form of working “well with students of all backgrounds, abilities and interests, and help(s) make sure everyone was heard and had something to work on that fit their strengths”. With her peers this becomes sharing her ideas freely to help spark lively discussion.

**Honorable Mention: Alexandra Hoey, Massachusetts Institute of Technology**

Alexandra Hoey is a math major at MIT. She has participated in the MIT Summer Program in Undergraduate Research and spent two summers at the University of Virginia REU. Her summer research has focused on arithmetic statistics—an active area of research that is closely related to many famous conjectures in number theory. In her first summer she worked on a project on class numbers of imaginary quadratic fields. In the second summer she and collaborators proved a strong theorem about the Sato-Tate conjecture. This work has led to two papers—one of which will appear in *Transactions of the American Mathematical Society*. This work is of such strong interest that it served as an introduction to a current mentor who first encountered her through one her arXiv preprints and then learned she was an undergraduate at his own institution.

In addition to her summer research and many challenging math classes, Alexandra has taken four reading courses on advanced topics in number theory and arithmetic geometry. One of these reading courses involved a computational project whose results will be included in the *L*-functions and modular forms database. Alexandra is also a talented mentor herself and has been engaged in outreach through the MIT PRIMES Circle where she worked with two high school women on a semester-long project. Through this work she helped these students gain serious understanding of a demanding topic, write a beautiful exposition of their topic, learn to give a strong talk, and gain confidence.
Honorable Mention: Simran Khunger, Carnegie Mellon University

Simran Khunger is a senior mathematics major at Carnegie Mellon University. She has contributed to REUs at Williams College and Oregon State University and held a research apprenticeship studying Algebraic Topology; these have resulted in one published article, one submitted article, and another in preparation, as well as an impressive number of presentations and posters.

Khunger has excelled in her coursework, completing numerous graduate-level courses in mathematics, the Arizona Winter School, and the Connecticut Summer School in Number Theory. One mentor predicts that she will “greatly contribute wherever she is, and help foster an environment where others are involved as well.” Others describe how, in many research groups, Khunger took charge and made sure that everyone had a problem that they could make progress on and were invested in. She then showed an impressive ability to convert this work into written results.

With her ability to quickly dive into technical material, to convert ideas into usable results, and her infectious enthusiasm, Khunger is expected to excel in all areas of the mathematics profession.

Honorable Mention: Lily (Qiao) Li, University of California, Berkeley

Lily (Qiao) Li is a mathematics and computer science major at UC Berkeley. She has participated in two summer REUs in topology at Georgia Tech. Her research work from the first summer was on totally symmetric sets in groups and led to two papers, already accepted at Geometriae Dedicata and Involve. Based on work done in the second summer REU, she is currently working with one other student on a completely different topic in complex dynamics; their work was described by one of her mentors as “good enough to earn a Ph.D. thesis” at a research university. In addition, Lily was part of the knot theory research group at the SMALL REU at Williams College. There, her research led to an impressive three papers on hyperbolic knot complements, two of which have been submitted for publication. Lily’s research work has thus touched on a great breadth of advanced mathematical topics.

Lily has also taken several graduate courses on topology, algebraic topology and Lie groups, and has taken reading courses on advanced mathematical topics almost every semester. Many of her mentors stressed how, in both research and coursework, she “helped to create a particularly collaborative environment which substantially furthered the research”. Lily has also been very engaged with the mathematical community, by organizing events for incoming students interested in the math major and serving as president of the math undergraduate student association. She also oversees an undergraduate lecture series in her department and has co-founded the Berkeley Integration Bee.
2022 Class of AWM Fellows

M. Carme Calderer, University of Minnesota
For being a role model nationally and internationally due to her outstanding research contributions in the mathematics of materials; for her long record of mentoring, advising, and supervising women in applied mathematics; and for her leadership role in the mathematics community by organizing conferences, workshops, and thematic years.

Debra Carney, Colorado School of Mines
For her extraordinary support of women in the mathematical sciences through personal mentorship and leadership of her local AWM chapter; and for community outreach activities that have had lasting and positive impacts on the lives of women and girls ranging from high school students to faculty members.

Daniela Ferrero, Texas State University, San Marcos
For sustained and impactful mentoring of young women and underrepresented minorities in mathematics; for leadership in creating research opportunities for women in graph theory through the Women in Graph Theory and Applications Research Network; and for promoting the inclusion and visibility of women through organizing conferences and other professional service.

Pamela E. Harris, Williams College
For exceptional leadership in establishing programs and mentoring networks that support, encourage, and advance women and underrepresented minorities in the mathematical sciences; and for contributions through public speaking that create positive systemic change in the culture and climate of the mathematics profession.

Anita Layton, University of Waterloo
For championing equity initiatives in Canada and the US, including grassroots efforts to improve the climate for faculty and institutional efforts to promote diversity and inclusion; for leadership in Research Collaboration Conferences for Women in mathematical biology; and for public communication of issues around gender equity in research science.

Teri Perl
For amazing and tireless efforts over five decades to promote women in mathematics and related fields; particularly, for co-founding what we now know as Expanding Your Horizons, her biographies of women mathematicians, and her influential role in The Learning Company, which have together inspired generations of women and girls.

Jennifer J. Quinn, University of Washington Tacoma
For her outstanding achievements as a teacher, mentor, leader, expositor, and editor; for her pioneering service as AWM executive director; and for continued service as AWM volunteer and supporter.

Beatrice Riviere, Rice University
For her important contributions to numerical analysis, scientific computing and modeling of porous media; for her exemplary mentorship and supervision of women in applied and computational mathematics; and for her distinguished record of service and outreach.
Lauren L. Rose, Bard College
For broad efforts in the professional development of women in mathematics, especially undergraduate women; for her commitment to involving people from diverse communities in mathematics, through Math Circles and outreach in prisons; and for her creative contributions to the AWM including the We Speak Series and the Card Project.

Mary Beth Ruskai, University of Vermont
For championing the cause of women and girls in science through AWM; and for serving as a voice of reason and a call for change through articles and discussions that illuminate the challenges facing women in mathematics and science.

Renate Scheidler, University of Calgary
For her vision and role in founding the Women in Numbers Research Network; for her continuing leadership in that research community; and for impactful work mentoring women at all career stages.

Bianca Viray, University of Washington
For her leadership and support of women and girls in math through her work on Girl’s Angle, the Women In Numbers research network, the Noetherian Ring, the Western Algebraic Geometry Symposium, and for launching new and impactful mentoring programs.

Elizabeth (Betsy) Yanik, Emporia State University
For extraordinary sustained outreach efforts to precollege women and girls, especially underrepresented populations, through conferences and summer programs; for service on AWM’s Executive and Education Committees; and for nearly two decades of organizational leadership, serving as president of Women and Mathematics Education and as director of the Women and Mathematics Network.
2022 AWM Workshop Poster Presenters
Megan Chambers, North Carolina State University
Amanda Colunga, North Carolina State University
Emily Crawford Das, University of Georgia
Aleyah Dawkins, George Mason University
Emily Heavner, Colorado State University
Drew Horton, University of Colorado-Denver
Dionne Ibarra, George Washington University
Minyoung Jeon, Ohio State University
Lara Kassab, Colorado State University
Sefika Kuzgun, University of Kansas
Anastasia Minenkova, University of Connecticut
Tracey Oellerich, George Mason University
Ella Pavlechko, North Carolina State University
Abba Ramadan, University of Kansas
Chathuri Sandamali, Texas Tech University
Sarah Strikwerda, North Carolina State University
Cigole Thomas, George Mason University
Elise Walker, Texas A&M University
Yixian Wu, University of Texas
CONSIDER JOINING AWM TODAY!
See awm-math.org for details.

**History:** Founded in 1971 by a small but passionate group of women mathematicians, the Association for Women in Mathematics (AWM) has grown into a leading society for women in the mathematical sciences. Through its programs and advocacy, the AWM seeks to create a community in which women and girls can thrive in their mathematical endeavors, and to promote equitable opportunity and treatment of women and others of marginalized genders and gender identities across the mathematical sciences.

**Membership:** The AWM has more than 3,000 members from the United States and around the world, representing a broad spectrum of the mathematical community. Individual and institutional memberships are available. There are over a hundred AWM Student Chapters worldwide making waves in the mathematics community. Membership in the AWM and in AWM Student Chapters is open to all regardless of gender identity or expression, race, color, religion, age, national origin, sexual orientation, or disability.

**Awards:** The AWM annually presents the Alice T. Schafer Award for excellence in mathematics by an undergraduate, the Louise Hay Award for contributions to mathematics education, the M. Gweneth Humphreys Award for mentorship of undergraduates in mathematics, the Ruth I. Michler Prize supporting the scholarship of a recently promoted Associate Professor, the Dissertation Prize highlighting outstanding PhD dissertations, and the Student Chapters Awards. Biennially, the AWM presents the Microsoft Research Prize in Algebra and Number Theory, the Sadosky Research Prize in Analysis, the Joan & Joseph Birman Research Prize in Topology and Geometry, and the Mary and Alfie Gray Award for Social Justice. The AWM Service Award recognizes individuals for exceptional voluntary service to the Association. The AWM Fellows program recognizes members who have demonstrated a sustained commitment to the support and advancement of women in the mathematical sciences.

**Professional Support:** Through various grants from the National Science Foundation (NSF), AWM helps establish and maintain research networks for women by fostering research collaborations at conferences, AWM Workshops, and Research Symposia. AWM awards travel grants for attending research conferences and mentoring grants that support junior researchers to develop working and mentoring relationships with senior mathematicians. The AWM also has venues for publications: *La Matematica* is an international peer-reviewed journal featuring high-quality research from all areas of the mathematical sciences, and Springer’s Association for Women in Mathematics Series presents the latest research and proceedings of conferences organized by the AWM, and the *AWM Newsletter* contains informative articles, book reviews, and announcements of upcoming events of interest.

**Lecture Series:** Three lecture series honor women’s achievements. The AWM-AMS Noether Lecturer is chosen for fundamental contributions to the mathematical sciences, the AWM-SIAM Kovalevsky Lecturer for work in applied mathematics, and the AWM-MAA Etta Z. Falconer Lecturer for distinguished contributions to the mathematical sciences or mathematics education.
AWM Welcoming Environment Statement

It is the policy of the Association for Women in Mathematics (AWM) that all participants in AWM activities will enjoy a welcoming environment that is free from all forms of discrimination, harassment, and retaliation. As a professional organization, the AWM is committed to fostering an atmosphere that encourages the free expression and exchange of scientific ideas. In pursuit of that ideal, the AWM is committed to the promotion of equality of opportunity and treatment for all AWM members and participants in AWM-sponsored events, regardless of gender, origin, religion or religious belief, age, marital status, sexual orientation, disabilities, veteran status, or any other reason not related to scientific merit. Harassment, sexual or otherwise, is a form of misconduct that undermines the integrity of AWM activities.

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