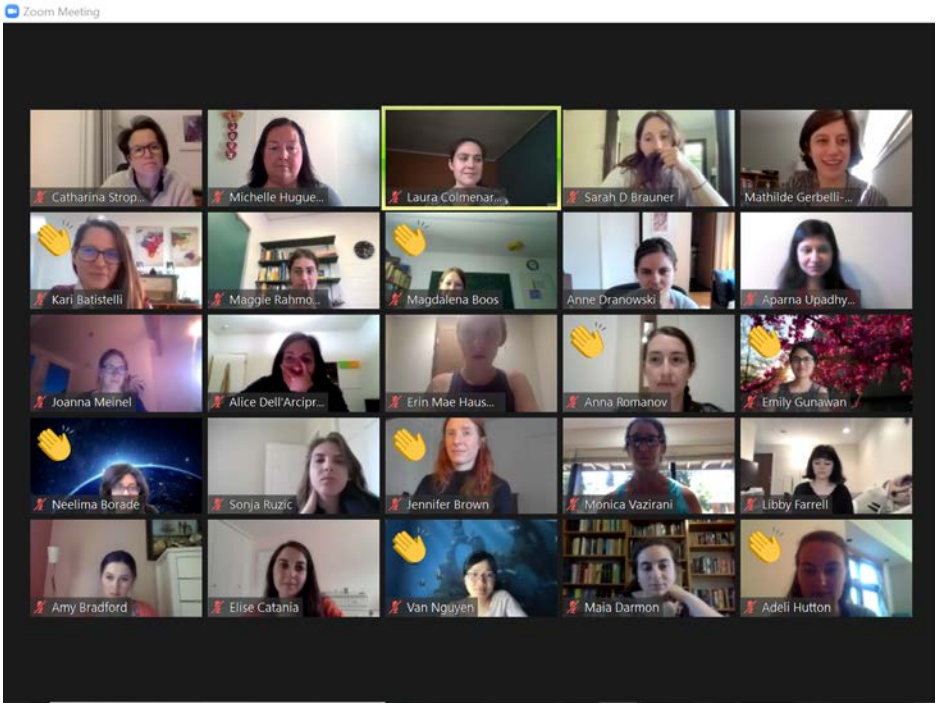
WAM 2021 Yearbook
Representation Theory: Categories and Combinatorics (virtual)



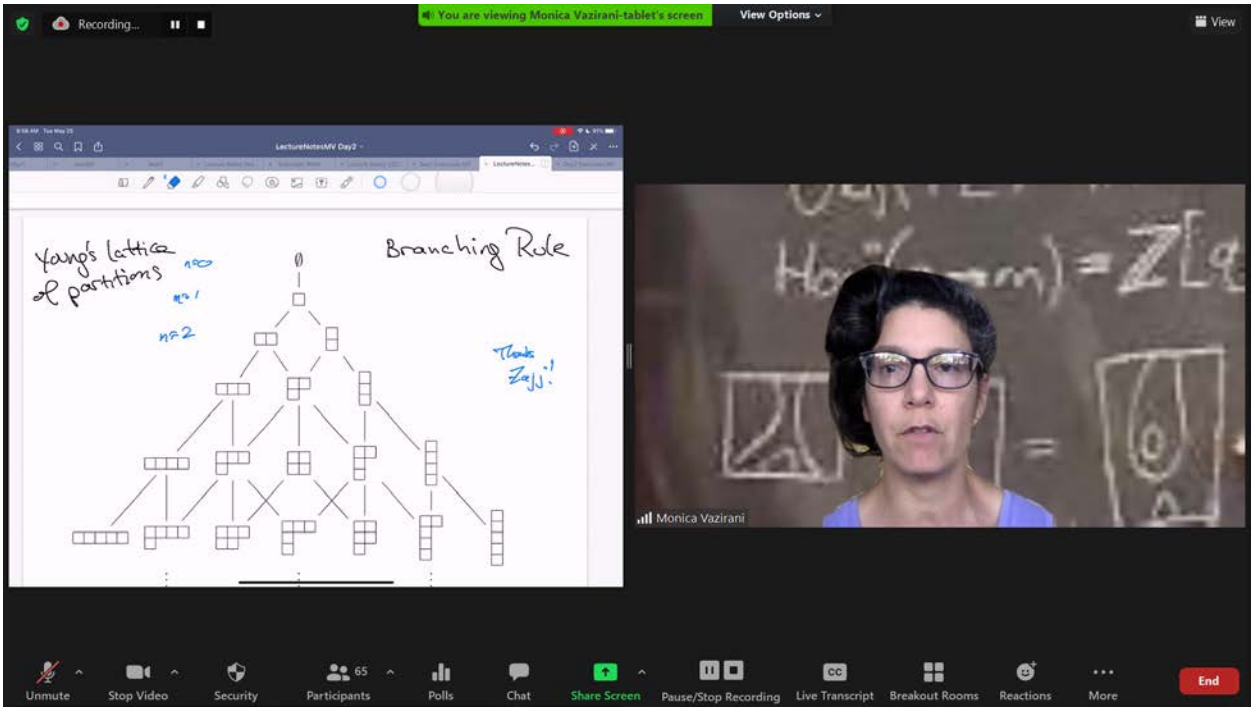
Institute for Advanced Study, Princeton
May 22-28, 2021

This is a compilation of activities and resources contributed by participants during the 2021 Women and Mathematics Program. We hope this can serve as a mathematical and professional reference guide for women mathematicians around the country.

I. Mathematical Talks

A. Terng Lectures:

Monica Vazirani, University of California, Davis, "Representation theory & Combinatorics of the symmetric group and related structures"



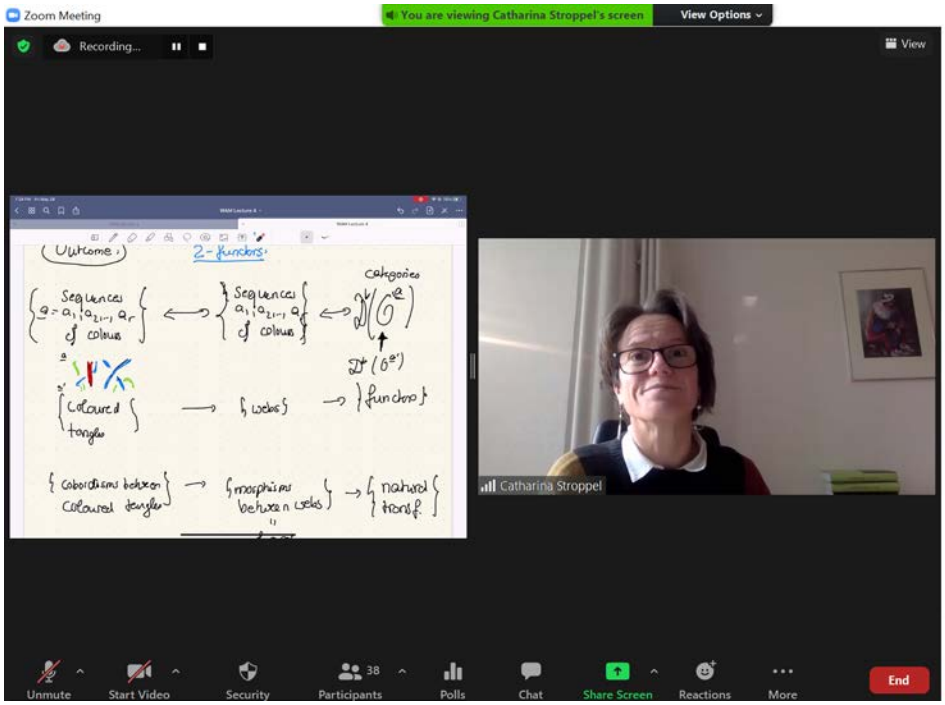
Abstract: With an eye toward coordinating with the advanced course, we will start with the representation theory of the symmetric group and related combinatorics. We will focus on the functors of induction and restriction. We will then consider related algebraic structures such as Hecke algebras. We can use diagrammatics to depict various elements, objects, morphisms, and so on, even in the setting of de-categorification.

Terng Problem sessions were run by Jennifer Brown (University of California, Davis) and Anne Dranowski (IAS).

Lectures were recorded and can be found here: (scroll for dates and lectures) https://www.ias.edu/video?tags=15496

B. Uhlenbeck Lectures:

Catharina Stroppel, University of Bonn, “Representation theory & Categorification”



Abstract: In modern representation theory we often study the category of modules over an algebra, in particular its intrinsic and combinatorial structures. Vice versa one can ask the question: which categories have a given combinatorics? This is the basic insight into the concept of categorification. Categorification is a recent development which often provides finer invariants and is used in different areas of mathematics (such as knot theory). We will explain a crucial ingredient in categorification: diagrammatics of tensor categories. We will focus on a few examples that arise in current research, such as Deligne categories. This course provides a categorical framework for the structures studied in the elementary course.

Uhlenbeck Problem Sessions were run by Joanna Meinel (University of Bonn) and Nicolle Sandoval Gonzalez (UCLA).

Lectures were recorded and can be found here: (scroll for dates and lectures) https://www.ias.edu/video?tags=15496

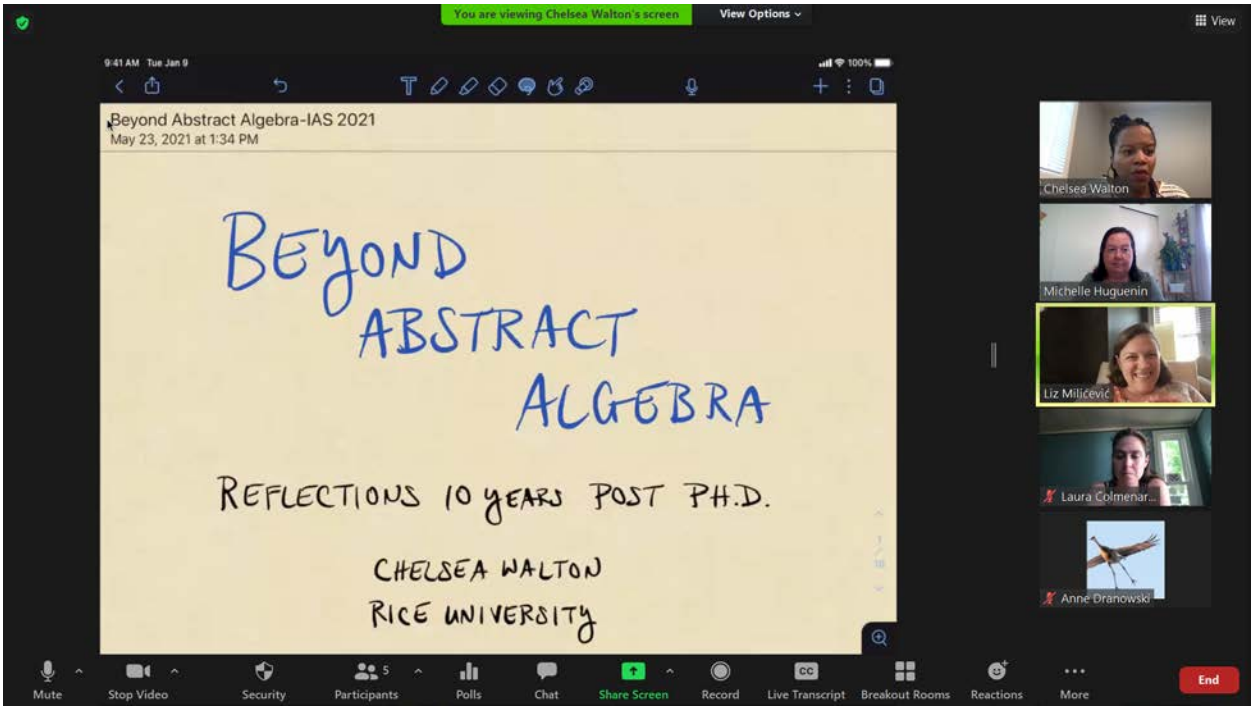
References for both courses

- Etingof's lecture notes :
  - Link : http://www-math.mit.edu/~etingof/reprbook.pdf ;
- Gruson and Serganova: **A Journey Through Representation Theory**:
  - Link: https://link.springer.com/book/10.1007%2F978-3-319-98271-7
- Chapters 1, 2, 3 (particularly 3.1, 3.2, 3.3) of Benson's book **D. J. Benson: Representations and Cohomology I**: Basic Representation Theory of Finite Groups and Associative Algebras;
  - https://www.cambridge.org/core/books/representations-and-cohomology/9EE67E1280D8DB01AAC662530799AA8E)
- J.P. Serre: **Linear Representations of Finite Groups**:
  - Link: https://link.springer.com/book/10.1007%2F978-1-4684-9458-7
- James and Liebeck : **Representations and Characters of Groups**:
  - https://www.cambridge.org/core/books/representations-and-characters-of-groups/9F525E6ACAC7FFADFDBDECE98C115F40)
- Fulton and Harris: **Representation Theory:**
  - Link: https://link.springer.com/book/10.1007%2F978-1-4612-0979-9

C. Colloquium

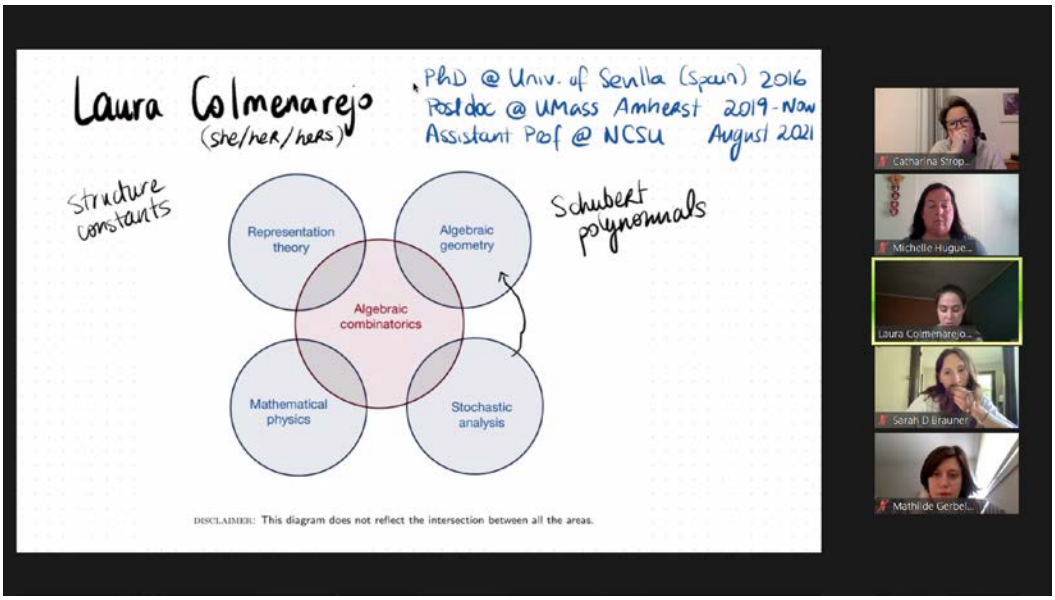
Laura Rider, University of Georgia, " Geometric Categorifications of the Hecke Algebra " Recording of talk can be found here: (scroll for dates and lectures) https://www.ias.edu/video?tags=15496

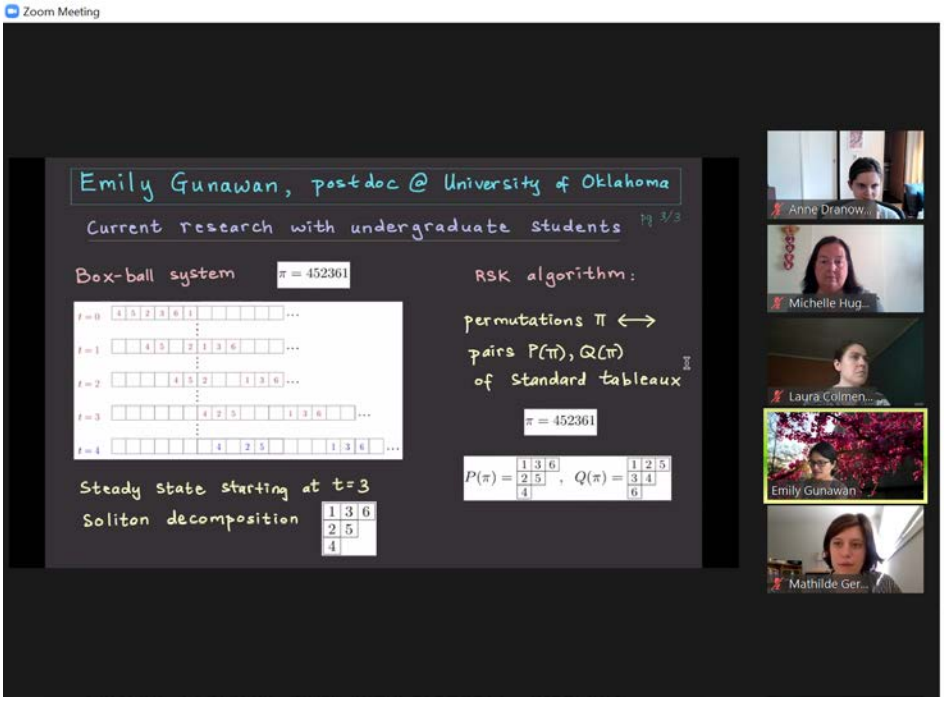
D. **Special Talk** Chelsea Walton, "Beyond Algebra"



E. Postdoc Seminar and Short Postdoc Introductions

F. Organized by Ana Balibanu (Harvard) and Charlotte Chan (MIT)



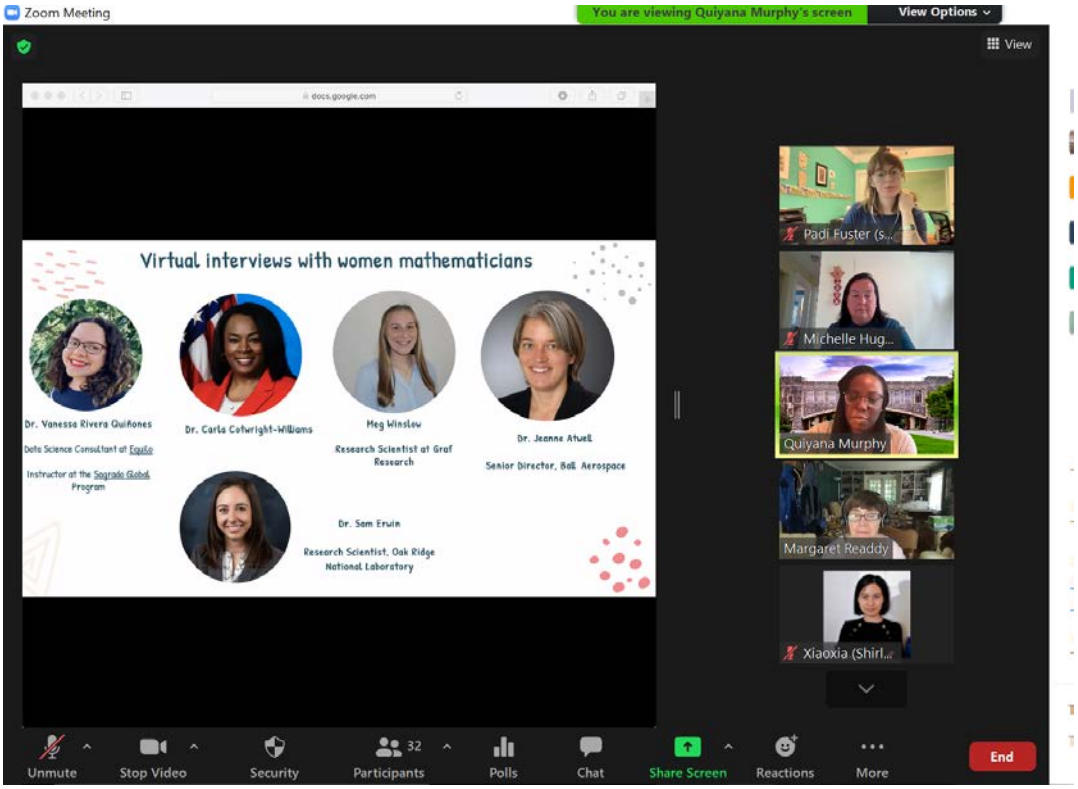


- Esther Banaian, Univ Minnesota, Frieze patterns from orbifolds
- Maiko Serizawa, Univ Ottowa, Foldings of root systems and liftings of Scubert classes
- Jennifer Brown, UC Davis, Color structures and quantum invariants
- Karina Batistelli, Univ Chile, Kazhdan-Lusztig polynomials for $\tilde{B}_2$
- Yusra Naqvi, Univ College London, Positivity of interpolation polynomials

- Sarah Brauner, Univ Minnesota, Eulerian representations for real reflection groups
- Aparna Upadhyay, Univ at Buffalo, The Benson - Symonds invariant for signed permutation modules and trivial source modules
- Alice Dell'Arciprete, Univ of East Anglia, Blocks of Ariki-Koike algebras
- Darlayne Addabbo, Univ Arizona, Higher Level Zhu Algebras
- Flor Oroz Hunziker, Univ Colorado Boulder, Tensor categories for non-rational Virasoro vertex algebras
- Magdalena Boos, Ruhr-Univ Bochum, Classical Lie-theoretic questions via Representation Theory
- Emily Norton, University of Clermont Auvergne, Calibrated representations of cyclotomic Hecke algebras at roots of unity
- Laura Colmenajero Hernando, UMass Amherst, An insertion algorithm for diagram algebras

G. Lunchtime Talks

- Discussion: Maggie Rahmoeller - Get to know you – things I wish I knew getting into grad school
- Discussion: Cynthia Vinzant - Get to know you – things I wish I knew finishing grad school
- Ambassador Program: introductions and summaries from 2021 recipients. Summary videos found here: https://www.ias.edu/math/wam/2021/21-ambassador-video-reports
    - Catherine Berrouet, Florida Atlantic University
    - Rosa Fuster, Tulane University
    - Quiyana Murphy, Virginia Tech
    - Xiaoxia Wu, Univ Chicago/TTIC
- Discussion: Emily Peters – Applying for jobs with a teaching component
- Discussion: Anastasiia Tsvietkova - Computations and programming in mathematics research, and broader career options
- Discussion: Lisa Schneider – Grad School
- Princeton University virtual lunch
- Discussion: Lisa Sauermann – Work-life Balance
- Discussion: Nathalie Wahl – Publishing



III. Outreach

A. "Math E-Carnival" with Princeton Public Library.

Organized by Margaret Readdy with help from Elise Catania, Shanna Dobson, Libby Farrell, Adeli Hutton, Mee Seong Im, Emily Norton, Bhargavi Parthasarathy

B. Introduction to Ambassador Program (see lunch time talks)

Thanks to a generous grant from Lisa Simonyi, the IAS Women and Mathematics Program will fund annually up to three (3) postdoctoral or advanced graduate ambassadors and up to six (6) graduate ambassadors to build support and outreach networks across the country.

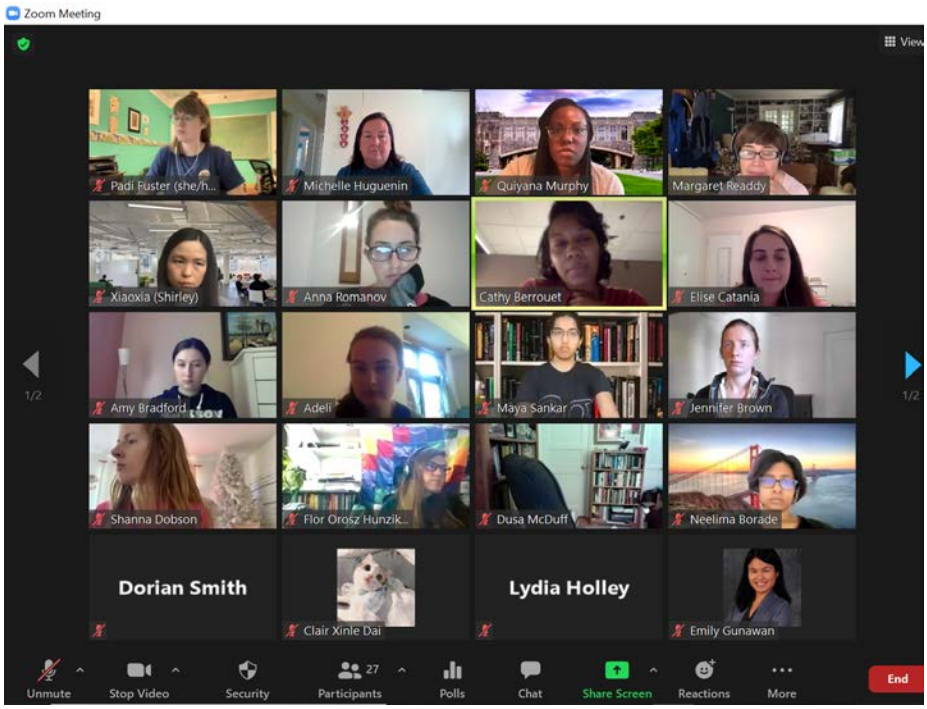
WAM Ambassador selection criteria include previous participation in the Women and Mathematics summer program, mathematical expertise, and enthusiasm. Each lead conference organizer and graduate ambassador should

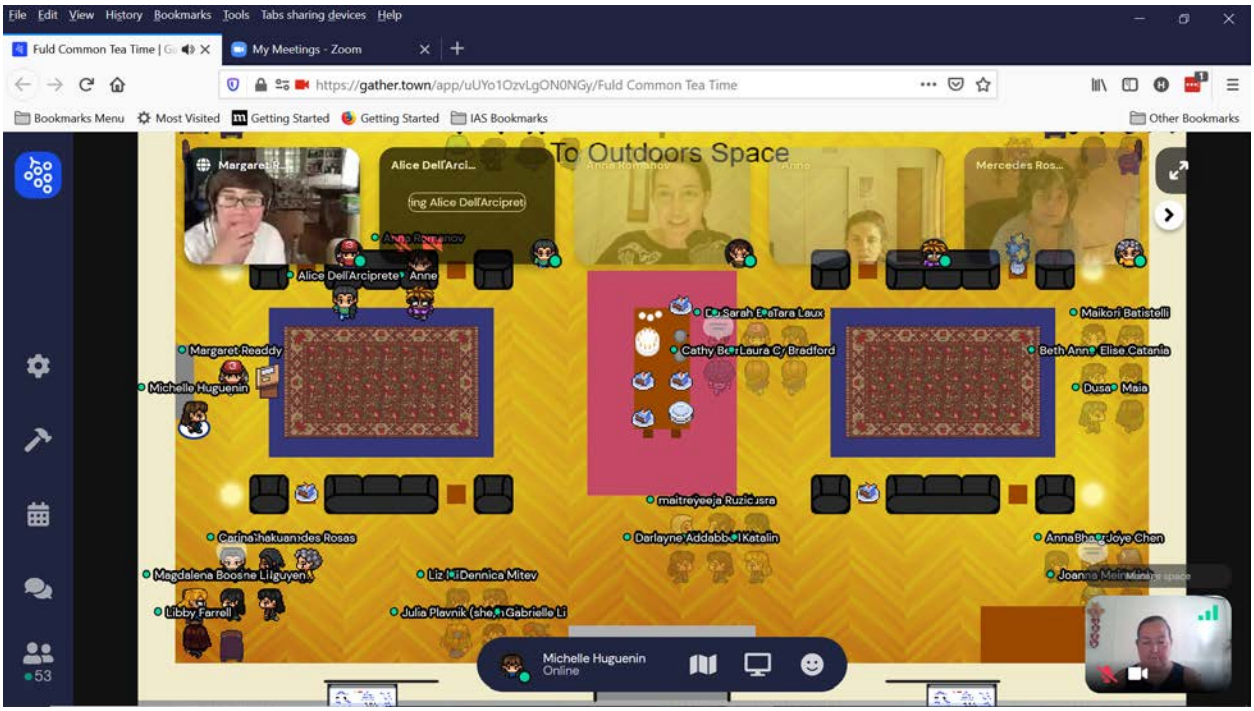
have a faculty sponsor (male or female) at their home institution. They must also have matching funds committed to the project.

WAM Ambassadors must also fulfill these requirements:

1. Submit a summary report within 30 days of the completion of the proposed activity.
2. Acknowledge IAS Women and Mathematics and Lisa Simonyi in activity announcements (print and online) and in any publication that results from the activity.
3. Participate in the WAM annual meeting the following May to share best practices and new outreach ideas, and to help train new WAM Ambassadors.

See https://www.ias.edu/math/wam/2021/21-ambassador-video-reports for details.

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My Meetings - Zoom
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To Outdoors Space
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Mercedes Ros...
Alice Dell'Arcipreti
Anne
Margaret Readdy
Michelle Huguenin
Cathy B
Laura C
Bradford
Maikori Batistelli
Beth Anne
Elise Catania
Dusa
Maia
Carina Nakuan
des Rosas
Magdalena Boosne Liliguyen
Liz
Dennica Mitev
Libby Farrell
Julia Plavnik (she/h
Gabrielle Li
Derlayne Addabbo
Katelin
AnnaBha
Joye Chen
Joanna Mein
Michelle Huguenin
Online
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