

ELIZABETH GROSS

PROFESSOR
DEPARTMENT OF MATHEMATICS
UNIVERSITY OF HAWAII AT MĀNOA

Appointments

- 2025 – **Graduate Chair**, *University of Hawai'i at Mānoa*.
- 2025 – **Professor**, *University of Hawai'i at Mānoa*.
- 2021 – 2025 **Associate Professor**, *University of Hawai'i at Mānoa*.
- 2018 – 2021 **Assistant Professor**, *University of Hawai'i at Mānoa*.
- 2014 – 2018 **Assistant Professor**, *San José State University*.
- 2013 – 2014 **NSF Postdoctoral Fellow**, *North Carolina State University*.

Education

- 2013 **PhD, Mathematics**, *University of Illinois at Chicago*.
- 2010 **MA, Mathematics**, *San Francisco State University*.
- 2003 **BS, Mathematics**, *California State University, Chico*.

Career Themes

Algebraic Statistics with Applications to Evolutionary Biology and Ecology, Building Collaborative Research Spaces and Networks, Scientific Organizing, Innovations in Graduate Education.

Visiting Positions

- Fall 2024 **Semester Participant/Organizer**, *Brown University, The Institute for Computational and Experimental Research in Mathematics*, Program on Theory, Methods, and Applications of Quantitative Phylogenomics.
- Fall 2023 **Visiting Research Assoc./Organizer**, *University of Chicago, Institute for Mathematical and Statistical Innovation*, Program on Algebraic Statistics and Our Changing World.
- Fall 2018 **Semester Participant**, *Brown University, The Institute for Computational and Experimental Research in Mathematics*, Program on Nonlinear Algebra.
- Fall 2014 **Visiting Scientist**, *UC Berkeley, Simons Institute of Computing*, Program on Algorithms and Complexity in Algebraic Geometry.

Grants

- 2025–2028 **NSF, Emerging Mathematics in Biology**, \$409,940, Title: Algebraic methods for microbiome keystone analysis, Co-PIs: Nicole Hynson, Mengting Yuan, DMS-2527518.
- 2024–2027 **NSF, Innovations in Graduate Education**, \$436,302, Title: Overcoming Geographic Isolation with Research Communities, Co-PI: Daniel Erman, DGE-2429967.
- 2020 **NSF Conference Grant**, \$34,200, Title: Algebraic Statistics 2020, awarded with Vishesh Karwa and Sonja Petrović, DMS-2004271.
- 2020–2025 **NSF: Faculty Early Career Development Program (CAREER)**, \$464,828, Title: Identifiability and inference for phylogenetic networks using applied algebraic geometry, DMS - 1945584.

2016–2019 **NSF 14-579, Computational Mathematics**, \$133,547, Title: Computational algebraic geometry and combinatorial algorithms for neuroscience and biological networks, DMS-1620109.

Peer-Reviewed Publications

Preprints

- [44] **Singular Learning Theory for Factor Analysis**, with Dimitra Kosta, Daniel Windisch, Mathias Drton, Anton Leykin, and Seth Sullivant, arXiv:2511.15419.
- [43] **Identifiability of Phylogenetic Level-2 Networks under the Jukes-Cantor Model**, with Aviva Englander, Martin Frohn, Niels Holtgreffe, Leo van Iersel, Mark Jones, and Seth Sullivant, bioRxiv (2025): 2025-04.
- [42] **Methodological considerations for semialgebraic hypothesis testing with incomplete U-statistics**, with David Barnhill, Marina Garrote-López, Max Hill, Bryson Kagy, John Rhodes, and Joy Zhang, arXiv:2507.13531.
- [41] **One-connection rule for structural equation models**, with Bibhas Adhikari, Marc Härkönen, and Elias Tsigaridas, arXiv:2210.00239.
- [40] **Goodness of fit for log-linear ERGMs**, with Sonja Petrović and Despina Stasi, arXiv:2104.03167.
- [39] **When do two networks have the same steady-state ideal?**, with Maize Curiel and Carlos Munoz, arXiv:2012.02251.

Research Articles

- [38] **Broken bracelets and Kostant's partition function**, with Maize Curiel and Pamela Harris, *Journal of Combinatorics*, to appear (2026+), arXiv:2202.01416.
- [37] **The Pfaffian structure of CFN phylogenetic networks**, with Joseph Cummings, Benjamin Hollering, Samuel Martin, and Ikenna Nometa, *Journal of Mathematical Biology* **92** no. 1 (2026) 21.
- [36] **Statistical learning with phylogenetic network invariants**, with Travis Barton, Colby Long, and Joseph Rusinko, *Bulletin of the Society of Systematic Biologists*, **4** no. 1 (2026).
- [35] **Routing Functions for Parameter Space Decomposition to Describe Stability Landscapes of Ecological Models**, with Joseph Cummings, Kyle Dahlin, and Jonathan Hauenstein, *Bulletin of Mathematical Biology* **87** no. 12 (2025) 177.
- [34] **Group-based phylogenetic models on 3-sunlet networks**, with Shelby Cox and Samuel Martin, *Bulletin of Mathematical Biology*, **87** no. 9 (2025) 132.
- [33] **Maximum likelihood degree of the β -stochastic blockmodel**, with Cashous Bortner, Jennifer Garbett, Elizabeth Gross, Naomi Krawzik, Christopher McClain, and Derek Young, *Algebraic Statistics* **16** no. 1 (2025) 77–94..
- [32] **Absolute concentration robustness: Algebra and geometry**, with Luis David García Puente, Heather Harrington, Matthew Johnston, Nicolette Meshkat, Mercedes Pérez Millán, and Anne Shiu, *Journal of Symbolic Computation*, 128 (2025): 102398.
- [31] **Mixed volumes of networks with binomial steady-states**, with Jane Ivy Coons and Maize Curiel, *Journal of Symbolic Computation*, 128 (2025): 102395.
- [30] **New directions in algebraic statistics: Three challenges from 2023**, with Yulia Alexandr, Miles Bakenhus, Maize Curiel, Sameer K. Deshpande, Elizabeth Gross, Yuqi Gu, Max Hill, Joseph Johnson, Bryson Kagy, Vishesh Karwa, Jiayi Li, Hanbaek Lyu, Sonja Petrović, Jose Israel Rodriguez, *Algebraic Statistics* **15** no. 2 (2024) 357–382.
- [29] **Dimensions of level-1 group-based phylogenetic networks**, with Robert Krone and Samuel Martin, *Bulletin of Mathematical Biology* **86**, no. 8 (2024) 90.

- [28] **Identifiability of linear compartmental tree models**, with Cashous Bortner, Nicolette Meshkat, Anne Shiu, and Seth Sullivant, *Advances in Applied Mathematics* (2023) 102268.
- [27] **Distinguishing level-1 phylogenetic networks on the basis of data generated by Markov processes**, with Leo van Iersel, Remie Janssen, Mark Jones, Colby Long, and Yukihiro Murakami, arXiv:2007.08782. *Journal of Mathematical Biology*, **83**, no. 3 (2021) 1–24
- [26] **Identifiability of linear compartment models: the singular locus**, with Nicolette Meshkat and Anne Shiu, *Advances in Applied Mathematics* (2021) 102490.
- [25] **Binomial ideals of domino tilings**, with Nicole Yamzon, *Discrete Mathematics*, **344**, no. 11 (2021) 112530.
- [24] **Steady state degree and mixed volume of chemical reaction networks**, with Cvetelina Hill, *Advances in Applied Mathematics*, 131 (2021) 102254.
- [23] **Phylogenetic trees**, with Hector Baños, Nathaniel Bushek, Ruth Davidson, Pamela Harris, Robert Krone, Colby Long, Allen Stewart, and Robert Walker, *Journal of Software for Algebra and Geometry*, **11**, no. 1 (2021) 1–7.
- [22] **Joining and decomposing reaction networks**, with Heather Harrington, Nicolette Meshkat, and Anne Shiu, *Journal of Mathematical Biology* (2020) <https://doi.org/10.1007/s00285-020-01477-y>.
- [21] **Identifying the number of components in Gaussian mixture models using numerical algebraic geometry**, with Adel Alaeddini and Sara Shirinkam, *Journal of Algebra and Its Applications* (2020) <https://doi.org/10.1142/S0219498820502047>.
- [20] **Linear compartmental models: input-output equations and operations that preserve identifiability**, with Heather Harrington, Nicolette Meshkat, and Anne Shiu, *SIAM Journal on Applied Mathematics*, **79**, no. 4, (2019) 1423–1447.
- [19] **Algebraic signatures of convex and non-convex codes**, with Carina Curto, Jack Jeffries, Katherine Morrison, Zvi Rosen, Anne Shiu, and Nora Youngs, *Journal of Pure and Applied Algebra*, **223**, no. 9 (2019) 3919–3940..
- [18] **Dimensions of group-based mixtures**, with Hector Baños, Nathaniel Bushek, Ruth Davidson, Pamela Harris, Robert Krone, Colby Long, Allen Stewart, and Robert Walker, *Bulletin of Mathematical Biology*, **81**, no. 2 (2019) 316–336..
- [17] **The multiple roots phenomenon in maximum likelihood estimation for factor analysis**, with Sonja Petrovic, Donald Richards, and Despina Stasi, *Advanced Studies in Pure Mathematics, The 50th Anniversary of Gröbner Bases, Mathematical Society of Japan*, to appear, arXiv:1702.04477.
- [16] **Neural ideals and stimulus space visualization**, with Nida Obatake and Nora Youngs, *Advances in Applied Mathematics*, **95** (2018) 65–95.
- [15] **The maximum likelihood threshold of a graph**, with Seth Sullivant, *Bernoulli*, **24** no. 1 (2018) 386–407.
- [14] **Distinguishing phylogenetic networks**, with Colby Long, *SIAM Journal on Applied Algebra and Geometry*, **2** no. 1 (2018) 72–93.
- [13] **What makes a neural code convex?**, with Carina Curto, Jack Jeffries, Katherine Morrison, Mohamed Omar, Zvi Rosen, Anne Shiu, and Nora Youngs, *SIAM Journal on Applied Algebra and Geometry*, **1** (2017) 222–238.
- [12] **Goodness-of-fit for log-linear network models: Dynamic Markov bases using hypergraphs**, with Sonja Petrović and Despina Stasi, *Annals of the Institute of Statistical Mathematics* **69** no. 3 (2017) 673–704.
- [11] **Numerical algebraic geometry for model selection and its applications to the life sciences**, with Brent Davis, Kenneth L. Ho, Daniel J. Bates, and Heather A. Harrington, *Journal of the Royal Society Interface*, **13** no. 123 (2016) 20160256 .

- [10] **Algebraic systems biology: A case study for the Wnt Pathway**, with Heather Harrington, Zvi Rosen, and Bernd Sturmfels, *Bulletin of Mathematical Biology* **78** (2016) 21–51.
- [9] **Maximum likelihood geometry in the presence of data zeros**, with Jose Israel Rodriguez, *ISSAC 2014 Conference Proceedings*.
- [8] **Combinatorial degree bound for toric ideals of hypergraphs**, with Sonja Petrović, *Intl. Journal of Algebra and Computation* **23**, (2013), 1503-1520.
- [7] **Interfacing with PHCPack**, with Sonja Petrović and Jan Verschelde, *Journal of Software for Algebra and Geometry*, **5** (2013) 20-25.
- [6] **Maximum likelihood degree of variance component models**, with Mathias Drton and Sonja Petrović, *Electronic Journal of Statistics*, **6**, (2012), 993-1016.
- [5] **A proof of the set-theoretic version of the salmon conjecture**, with Shmuel Friedland, *Journal of Algebra* **356**, (2012), no.1, 374-379.

Book Chapters

- [4] **Phylogenetic Networks**, with Colby Long and Joseph Rusinko, in *Foundations for Undergraduate Research in Mathematics*, eds. P. Harris, E. Insko, and A. Wootten.
- [3] **Social Networks of Mobile Money in Kenya**, with Sibel Kusimba and Gabriel Kunyu, in *Money at the margins: Global perspectives on technology, financial inclusion, and design (Vol. 6)*, eds. B. Maurer, S. Musaraj, and I. V. Small. (2018) Berghahn Books..

Review Articles

- [2] **What are higher-order networks?**, with Christian Bick, Heather Harrington, and Michael Schaub, *SIAM Review*, **65** (2023) no. 3, 686–731.
- [1] **Algebraic statistics, tables, and networks: The Fienberg advantage**, with Vishesh Karwa and Sonja Petrović, to appear, *Springer Series in the Data Sciences, Statistics in the Public Interest: In Memory of Stephen E. Fienberg*, arXiv:1910.01692.

Software Packages

Bertini.m2, with Daniel J. Bates, Anton Leykin, and Jose Israel Rodriguez, A Macaulay2 interface for Bertini.

PHCPack.m2, with Sonja Petrović and Jan Verschelde, A Macaulay2 interface for PHCPack. Available with Macaulay2 v.1.4.

PhylogeneticTrees.m2, with Hector Baños, Nathaniel Bushek, Ruth Davidson, Pamela Harris, Robert Krone, Colby Long, Allen Stewart, and Robert Walker, A Macaulay2 package for phylogenetic algebra.

Organizing activities

Semester Programs

- Fall 2024 **Theory, Methods, and Applications of Quantitative Phylogenomics**, *The Institute for Computational and Experimental Research in Mathematics, Brown University, Providence, RI*, Organizer with Elizabeth Allman, Cécile Ané, Leo van Iersel, Laura Kubatko, Simone Linz, Siavash Mirarab, John Rhodes, and Sebastien Roch.
- Fall 2023 **Algebraic Statistics and Our Changing World: New Methods for New Challenges**, *Institute for Mathematical and Statistical Innovation, University of Chicago, Chicago, IL*, Organizer with Mathias Drton, Lek-Heng Lim, Sonja Petrović, Elina Robeva, Jose Rodriguez, Bernd Sturmfels, and Piotr Zwiernik.

Research Communities

- Fall 2025 **Graduate Research Community in Hawai'i**, *UH Mānoa*, Semester long program that brought together 3 visiting PhD students and 4 UH students to work together on research problems in evolutionary biology.
- Jun 2016 **AMS Mathematical Research Community Workshop on Algebraic Statistics**, *Snowbird, Utah*, Organizer with Mathias Drton, Serkan Hoşten, David Kahle, and Sonja Petrović.

Workshops

- Dec 2025 **Short Course & Workshop on Scientific Machine Learning and Applications**, *UH Mānoa*, Local organizer, organized with Long Chen, Wenrui Hao, Guang Lin, and Yahong Yan.
- June 2025 **Polarized varieties and their applications**, *UH Mānoa*, Local organizer, organized with Ivan Cheltsov and Julius Ross.
- July 2024 **Algebraic Methods in Phylogenetics**, *UH Mānoa*, This workshop focused on three research projects lead by three research leads with 12 junior participants.
- May 2022 **Workshop on Algebra of Phylogenetic Networks**, *UH Mānoa*, This workshop brought together junior researchers to work on problems related to phylogenetic networks.
- Mar 2016 **Global Attractor Conjecture Workshop**, *SJSU*, Organizer with Matthew Johnston, Nicolette Meshkat, and Bernd Sturmfels.

Conferences

- May 2026 **Chemical Reaction Networks in Hawai'i 2026**, *hosted by UH Mānoa*, Organized with Daniele Cappelletti, Jinsu Kim, Chuang Xu, and Polly Yu.
- Oct 2025 **Math-Bio Symposium at the Hawai'i Institute of Marine Biology**, *hosted by UH Mānoa*, Organized with Lisa McManus.
- May 2022 **Algebraic Statistics 2022**, *hosted by UH Mānoa*, Organized with Vishesh Karwa and Sonja Petrović.
- June 2020 **Algebraic Statistics 2020, a virtual conference**, *hosted by UH Mānoa*, Organized with Vishesh Karwa and Sonja Petrović.
- March 2019 **UH Mānoa Phylogenetics and Math Day**, *UH Mānoa*, Organized with Sean Harrington and Robert Thomson.
- Spring 15–Spring 18 **Bay Area Discrete Math Day**, *Biannual conference in the San Francisco bay area*, Member of Organizing Committee.
- April 17 **Bay Area Discrete Math Day**, *SJSU*, Local organizer.

Teaching Seminars

- Summer 2026 **‘Āina-based Mathematics Summer Teaching Seminar**, *A summer teaching seminar on place and culture-based teaching in the mathematics classroom*, *UH Mānoa*, Organized with Kyle Dahlin and Stacy Potes.
- Summer 2024 **Place-based Math Education Seminar**, *A summer teaching seminar on place and culture-based teaching in the mathematics classroom*, *UH Mānoa*, Organized with Kyle Dahlin and Stacy Potes.

Minisymposia and Special Sessions

- July 2025 **Minisymposium on Algebraic Methods for Evolutionary Biology and Ecology**, *SIAM Conference on Applied Algebraic Geometry*, Madison, Wisconsin, Organized with Hector Baños and Colby Long.
- Jan 2025 **Minisymposium on Algebraic Statistics and Our Changing World**, *Joint Mathematics Meetings*, Seattle, Washington, Organized with Yulia Alexandr, Jose Rodriguez, and Teresa Yu.
- July 2019 **Minisymposium on Algebraic Statistics**, *SIAM Conference on Applied Algebraic Geometry*, Bern, Switzerland, Organized with Jose Rodriguez.
- July 2018 **Minisymposium on Algebraic Statistics**, *SIAM Annual Meeting*, Portland, OR, Organized with Jose Rodriguez.
- Aug 2017 **Minisymposium on Software and Computation in Algebraic Statistics**, *SIAM Conference on Applied Algebraic Geometry*, Atlanta, GA, Organized with David Kahle.
- July 2016 **Minisymposium on Algebraic Statistics**, *SIAM Annual Meeting*, Boston, MA, Organized with Jose Rodriguez.
- Aug 2015 **Minisymposium on Software and Applications in Numerical Algebraic Geometry**, *SIAM Conference on Applied Algebraic Geometry*, Dajeon, South Korea, Organized with Danielle Brake.
- Oct 2014 **Special Session on Algebraic Statistics**, *AMS Fall Western Sectional Meeting*, San Francisco State University, Organized with Kaie Kubjas.

PhD students

- current **Udani Ranasinghe**, Research Topic: *Ideals of phylogenetic networks*.
- 2021–2025 **Ikenna Nometa**, Dissertation: *Algebraic statistics: Problems in phylogenetics and Wasserstein distance optimization*.
- 2019–2024 **Maize Curiel**, Dissertation: *Algebraic and combinatorial applications in systems and evolutionary biology*.

Master's students

- 2023 – current **Derek Mizumoto**, Research Topic: *Pseudo-monomial ideals for microbiome data*.
- 2023–2025 **Dylan Alvarenga**, Research Topic: *Algebraic properties of the coalescent model*.
- 2020 – 2021 **Morgan Gauvin**, Thesis: *Maximum likelihood thresholds for graphical models*.
- 2019 – 2021 **Ikenna Nometa**, Thesis: *Algebraic tools for the analysis of trait evolution*.
- 2019 – 2021 **JoeAnna McDonald**, Thesis: *Algebra of neural ideals*.
- 2017 – 2019 **Travis Barton**, Thesis: *Invariants-based reconstruction for phylogenetic networks*.
- 2017 – 2019 **Mark Curiel**, Thesis: *Operations that preserve steady-state ideals*.
- 2017 – 2018 **Nicole Yamzon**, Co-advised with Federico Ardila, Thesis: *Toric ideals of domino tilings*.
- 2015 – 2017 **Carson Sprock**, Thesis: *Non-convexity measures for detecting gerrymandering*.
- 2014 – 2016 **Matthew Litrus**, Thesis: *Sampling zero-one tables using sequential importance sampling and graph theory*.
- 2014 – 2016 **Nida Kazi Obatake**, Thesis: *Drawing place field diagrams of neural codes using toric ideals*.

Undergraduate projects

- 2023 - 2024 **Jasmine Carpena**, Project title: *Fixed maximum likelihood threshold random graph sampling*.
- Spring 2018 **Carlos Munoz**, Project title: *When are steady-state ideals monomial*.

2016-2017 **Rodolfo Garcia and Ha Nguyen**, Project title: *Geometry of exponential random graph models*.

Statistical consulting projects advised

Summer 2021 **Student: Ethan Lamb, Partner Institution: Ma Ka Hana Ka 'Ike**, Project title: *East Maui Community Food Assessment* .

Teaching

- 2025– **Associate Professor**, *University of Hawai'i at Mānoa*,
Courses Taught:
Spring 2026, Math 216, Applied Calculus II
Spring 2025, Math 100, Survey of Mathematics .
- 2021–2025 **Associate Professor**, *University of Hawai'i at Mānoa*,
Courses Taught:
Spring 2025, Math 100, Survey of Mathematics
Spring 2024, Math 215, Applied Calculus I
Spring 2024, Math 649J, Computational Algebra
Spring 2023, Math 414, Optimization: Theory & Methods
Spring 2023, Math 372, Elementary Probability and Statistics
Fall 2022, Math 100, Survey of Mathematics
Spring 2022, Math 372, Elementary Probability and Statistics
Fall 2021, Math 611, Modern Algebra.
- 2018–current **Assistant Professor**, *University of Hawai'i at Mānoa*,
Courses Taught:
Spring 2021, Math 472, Statistical Inference
Spring 2021, Math 242, Calculus II
Fall 2020, Math 649K, Algebraic Statistics
Spring 2020, Math 472, Statistical Inference
Fall 2019, Math 372, Elementary Probability and Statistics
Spring 2019, Math 242, Calculus II
Spring 2019, Math 321, Introduction to Advanced Mathematics.
- 2014–2018 **Assistant Professor**, *San José State University*,
Courses Taught:
Fall 2014, Math 285-01, Networks
Spring 2015, Math 31, Calculus II
Fall 2015, Math 142, Combinatorics
Spring 2016, Math 129A, Linear Algebra
Fall 2016, Math 142, Combinatorics
Spring 2016, Math 128B, Modern Algebra II
Fall 2017, Math 108, Introduction to Abstract Mathematics and Proofs
Fall 2017, Math 129A, Linear Algebra
Spring 2018, Math 108, Introduction to Abstract Mathematics and Proofs .
- 2009–2011 **Graduate Teaching Assistant**, *University of Illinois at Chicago*.
Discussion leader for Intermediate Algebra and Calculus I; Grader and Tutor for Applied Linear Algebra.
- 2008–2009 **Graduate Teaching Assistant**, *San Francisco State University*.
Instructor for Beginning Algebra and Intermediate Algebra; Discussion leader for Calculus I, II; Grader for Calculus III.

Professional Development, Teaching

- 2024 **Creating Intentional Equity in the Classroom Fellow**, *UH Mānoa Center for Teaching Excellence and Office of the Vice President for Academic Strategy*.
Helped to develop programming for equity focused, data-informed instructional practices and to improve faculty engagement in equity-driven teaching and learning.
- 2017 **Active Learning Certificate**, *SJSU eCampus and Center for Faculty Development*.

Teaching Awards

- 2018 **MAA Golden Section Alder Award**.
Teaching award for junior faculty.
- 2010 **MSCS Graduate Student Teaching Award**, University of Illinois at Chicago.
Departmental award for excellent teaching by a teaching assistant

Talks and Presentations (since Fall 2018)

Plenary Talks

- July 2025 **Computational algebraic geometry for evolutionary biology**, *SIAM Conference on Applied Algebraic Geometry*, University of Wisconsin–Madison, Madison, WI.
- Jun 2024 **Computational algebraic geometry for evolutionary biology**, *International Symposium on Symbolic and Algebraic Computation*, North Carolina State University, Raleigh, NC.

Invited Talks

- April 2026 **Network Reconstruction in Evolutionary Biology**, *AI Seminar Series*, University of Tennessee, Knoxville, Knoxville, TN.
- March 2026 **Identifiability of phylogenetic networks**, *Analysis & Applications Seminar*, Florida Atlantic University, Boca Raton, FL.
- Feb 2026 **What Do Ecosystems Look Like? Geometry in Evolution and Ecology**, *UNM-PNM Statewide High School Mathematics Contest*, University of New Mexico, Albuquerque, NM.
- Feb 2026 **Identifiability of phylogenetic networks**, *Seminar*, University of New Mexico, Albuquerque, NM.
- March 2025 **Identifiability of Level-2 Phylogenetic Networks**, *Algebraic Statistics 2025*, TU Munich, Munich, Germany.
- March 2025 **Dynamic Markov Bases**, *Algebraic Statistics Seminar*, MPI—Dresden, Dresden, Germany.
- Jan 2025 **Identifiability of linear compartmental tree models**, *ILAS Special Session on Matrix Analysis and Applications*, Joint Mathematics Meeting, Seattle, Washington.
- Jun 2024 **Mixed volumes of chemical reaction networks**, *Workshop on Computational and Applied Enumerative Geometry*, Fields Institute, Toronto, Canada.
- Jan 2024 **The singular locus of directed graphical models**, *Joint Mathematical Meetings, AMS Special Session on Algebraic Approaches to Mathematical Biology*, San Francisco, CA.
- Dec 2023 **The Algebra and Geometry of Evolutionary Biology**, *Colloquium*, University of Wisconsin–Milwaukee, Milwaukee, WI.
- Dec 2023 **Algebraic Geometry of Evolutionary Biology**, *Colloquium*, Loyola University, Chicago, IL.
- Nov 2023 **Mixed volumes of networks with binomial steady-states**, *Mathematics of Reaction Networks Seminar*, Virtual.
- Sept 2023 **What has happened in ecological and biological networks**, *Invitation to Algebraic Statistics and Applications*, IMSI, University of Chicago, Chicago, IL.
- Sept 2023 **Distinguishing level-1 phylogenetic network-based Markov models**, *Workshop on Foundations of Phylogenetic Networks*, Institute for Mathematical Sciences, National University of Singapore, Singapore.

- May 2023 **Dimensions of phylogenetic networks**, *Workshop on Computations and Data in Algebraic Statistics*, Casa Matemática Oaxaca, Oaxaca, Mexico.
- Mar 2023 **The geometry of evolutionary biology and ecology**, *College of Natural Sciences Pilina Ao Speaker Series*, University of Hawai'i at Mānoa, Honolulu, Hawai'i.
- Dec 2022 **The singular locus for linear compartment models and structural equation models**, *Workshop on Algebraic Structures in Statistical Methodology*, Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany .
- Dec 2022 **Phylogenetic network inference with invariants**, *Seminar on Statistics and Data Science*, Technische Universität München, Munich, Germany.
- Nov 2022 **Model Selection for Gaussian mixtures with numerical algebraic geometry**, *Optimization, Algebra, and Geometry Seminar*, Carnegie Mellon University, Pittsburgh, PA, Virtual.
- Apr 2022 **Computational algebraic geometry for evolutionary biology**, *Topics in Algebra, Topology, Etc., Research Seminar*, Boise State, Boise, ID, Virtual.
- Mar 2022 **Maximum likelihood thresholds for Gaussian graphical models**, *53rd Southeastern Combinatorics conference, Special Session on Matroids and Rigidity Theory*, Florida Atlantic University, Boca Raton, FL.
- Dec 2021 **Learning phylogenetic networks using invariants**, *Information, Network & Topological Data Analysis Workshop*, POSTECH, Pohang, South Korea, Virtual.
- Oct 2021 **Learning phylogenetic networks using invariants**, *Geometry & Learning from Data Workshop*, BIRS, Banff, Virtual.
- Aug 2021 **Machine learning with phylogenetic network invariants**, *SIAM Conference on Applied Algebraic Geometry, Minisymposium on Algebraic Geometry and Machine Learning*, Virtual.
- Mar 2021 **Mixed volumes of steady-state systems**, *Applied Combinatorics, Algebra, Topology & Statistics*, KTH, Stockholm, Sweden, Virtual.
- Mar 2021 **Mixed volumes of chemical reaction networks**, *Graduate Colloquium*, University of Minnesota Duluth, Virtual.
- Feb 2021 **When do two networks have the same steady-state ideal?**, *Nonlinear Algebra Seminar Online*, MPI MIS, Leipzig, Germany, Virtual.
- Jan 2021 **Mixed volumes of steady-state systems**, *Joint Mathematical Meetings, AMS Special Session on Numerical Methods for Solving Polynomial Systems*, Virtual.
- Oct 2020 **The maximum likelihood threshold of a graph**, *Virtual seminar on algebraic matroids, rigidity theory, distance geometry, and geometric constraint systems*, Virtual.
- Sept 2020 **Phylogenetic network varieties**, *Zoom Algebraic Geometry Marathon*, Virtual.
- Sept 2020 **Polynomial systems of graphical models**, *ICERM Workshop on Monodromy and Galois groups in enumerative geometry and applications*, Virtual.
- Sept 2019 **Mixed volumes of steady-state systems**, *AMS Fall Central Sectional Meeting, Special Session on Applications of Algebra and Geometry*, University of Wisconsin, Madison, Madison, WI.
- July 2019 **Mixed volumes of steady-state systems**, *2019 Annual Meeting of the Society for Mathematical Biology, Minisymposium on Algebraic Tools for the Analysis of Biochemical Reaction Networks*, Université de Montréal, Montreal, Canada.
- July 2019 **Algebra and statistical learning for inferring phylogenetic networks**, *2017 SIAM Conference on Applied Algebraic Geometry, Minisymposium on Graphical Models*, University of Bern, Bern, Switzerland.
- April 2019 **Distinguishing and inferring phylogenetic networks**, *AWM Research Symposium, Special Session on New Developments in Algebraic Biology*, Rice University, Houston, TX.
- March 2019 **Dimensions of group-based phylogenetic mixtures**, *AMS Spring Central and Western Joint Sectional Meeting, Special Session on Combinatorial and Experimental Methods in Mathematical Phylogeny*, UH Mānoa, Honolulu, HI.

- Feb 2019 **Algebraic Systems Biology**, 2019 MAA Golden Section Meeting, American Institute of Mathematics, San Jose, CA.
- November 2018 **Distinguishing and inferring phylogenetic networks**, *Applied Algebra Day*, MIT, Cambridge, Massachusetts.
- September 2018 **Algebraic Biology with Macaulay2**, *Workshop on Core Computational Methods in Nonlinear Algebra*, ICERM, Providence, Rhode Island.

Additional Service to Profession

Editorial Activities

- 2023–2026 **Associate Editor**, *SIAM Journal of Applied Algebra and Geometry*.
- 2022–2023 **Guest Editor**, *Algebraic Statistics*, Special Issue: Hawai'i 2022.
- 2021– current **Associate Editor**, *La Mathematica*.

Committees

- 2018–2024 **MAA Golden Section Teaching Award Committee**, *Chair of committee from 2021–2024*.
- 2022–2023 **2023 SIAG/AG Early Career Prize Selection Committee**.
- 2021 **Judging Panel for the Graduate Women in Science Hawai'i (GWISH) Research and Travel Grant**.

Review activities

Referee, *Journal of Symbolic Computation*; *International Journal of Approximate Reasoning*; *Bernoulli*; *Statistics and Probability Letters*; *Foundations of Computational Mathematics*; *Bulletin of Mathematical Biology*; *SIAM Journal on Discrete Mathematics*; *Journal of Algebra*; *Journal of Algebraic Statistics*; *Discrete and Computational Geometry*; *Journal of Pure and Applied Algebra*; *SIAM Journal on Applied Algebra and Geometry*; *AMS Notices*; *AIMS Numerical Algebra, Control and Optimization*; *Advances in Applied Mathematics*.

Panelist and ad hoc reviewer, *National Science Foundation*.

Proposal reviewer, *Banff International Research Station*.

Articles

Inferring Phylogenetic Networks Using Algebraic Geometry, with John Rhodes, *XRDS: Crossroads, The ACM Magazine for Students*, Volume 30, Issue 2 (2024).

2019 AWM Research Symposium, with Mary Flagg, *Association for Women in Mathematics Newsletter*, July/August 2019.

PB&J (An article about motherhood in mathematics), *Journal of Humanistic Mathematics*, Volume 8 Issue 2 (2018).

Discussing the Proof of the Global Attractor Conjecture, with Matthew Johnston and Nicolette Meshkat, *SIAM News*, July/August 2016.

Service to the University

- 2025–current **College of Natural Science Research Council**.
- 2022–2025 **General Education Foundations Board**.
- 2022–current **ITS Cyberinfrastructure Faculty Advisory Committee**.
- 2024 **Tenure and Promotion Review Committee Member**.
- 2023 **Outside Committee Member for College of Education Hiring Committee**.