

SUMMARY

Using tools from tropical geometry, algebraic geometry, and combinatorics, I solve problems in biology, statistics, physics, and machine learning. I use a variety of mathematical software to advance my research.

EDUCATION AND EXPERIENCE

- 2024 - 2026 **Max Planck Institute, Leipzig**
Postdoctoral Researcher.
- 2018 - 2024 **University of Michigan, Ann Arbor**
Ph.D. Mathematics, May 2024.
- 2014 - 2018 **University of Massachusetts, Amherst**
B.S., Mathematics and B.A., Linguistics, May 2018.
summa cum laude, with honors

PUBLICATIONS

* denotes first author, otherwise authors are listed alphabetically by last name.

- 2026 **ML degrees of Brownian motion tree models: star trees and root invariance**
with Jane Coons, Aida Maraj, and Ikenna Nometa, *Journal of Symbolic Computation*, 132 (2026)
- 2025+ **Tropical Fermat-Weber points over spaces of M-ultrametrics**
with John Sabol, Roan Talbut, and Ruriko Yoshida, accepted to the *Vietnam Journal of Mathematics*
- 2025 **Tropicalizing binary geometries**
with Igor Makhlin, *Le Matematiche*, 80(1) (2025).
- 2025 **Group-based phylogenetic models on 3-sunlet networks**
with Elizabeth Gross and Samuel Martin, *Bulletin of Mathematical Biology*, 87(132) (2025)
- 2024 **Homaloidal polynomials and Gaussian models of ML degree one**
with Pratik Misra and Pardis Semnani. *Algebraic Statistics* 15(2), 167-198 (2024).
- 2023 **Valuations.m2** (code package)
with Colin Alstad, Oliver Clarke, Michael Burr, Michael Byrd, Courtney George, Ethan Partida.
- 2023 **Classifying tree topologies along tropical line segments**
Algebraic Statistics 14(1), 71–90 (2023).
- 2022 **Tree topologies along a tropical line segment**
with Ruriko Yoshida*. *Vietnam Journal of Mathematics*. 50, 395-419 (2022).
- 2022 **On the Reproducibility of “G-Mixup: Graph Data Augmentation for Graph Classification”**
with Dylan Cordaro, Yiman Ren, and Teresa Yu, *ML Reproducibility Challenge 2022*.
- 2019 **Finding Euler characteristics of Hilbert schemes using colored Young diagrams**
with Amal Mattoo. *Minnesota Journal of Undergraduate Mathematics*. 5(1) (2019).

PREPRINTS AND ONGOING PROJECTS

- submitted **Maxout polytopes**
with Andrei Balakin, Georg Loho, and Bernd Sturmfels. Available at: arXiv:2509.21286.
- preprint **The tropical polytope is the set of all weighted tropical Fermat-Weber points**
with Mark Curiel. Available at: arXiv:2310.07732.

GRANTS AND AWARDS

2023	Rackham Research Grant, UMich	\$3000
2023	Rackham Travel Grant, UMich	\$1150
2023	SIAM Student Travel Award	\$800
2020	UMich International Center Grant	\$400
2018 - 2023	NSF Graduate Research Fellowship	\$138,000
2017	Honorable Mention, Barry Goldwater Scholarship	
2017 - 2018	William Field Alumni Scholarship, UMass	\$750
2017	Leon Emory Lincoln and Robert Bradley Lincoln Scholarship, UMass	
2017	Monahan Student Leadership Award, UMass	
Fall 2016	M.K. Bennett Geometry Award, UMass	
2014-2018	Chancellor's Award, UMass	\$48,000

TEACHING

Winter 2024	Graduate Student Mentor	University of Michigan, Ann Arbor
	<ul style="list-style-type: none">• Conducted observations of first-year instructors.• Contributed to development and review of university-wide calculus exams.• Served as a substitute instructor for introductory calculus courses as needed.	
2019 - 2021	Instructor of Record	University of Michigan, Ann Arbor
	<ul style="list-style-type: none">• Math 116: Calculus II (2 semesters), and Math 115: Calculus I (1 semester).• Classes of 15 - 20 students, meeting for 80 minutes, three times per week.• Designed worksheets, lesson plans, and quizzes.	
2015 - 2018	Undergraduate Teaching Assistant	University of Massachusetts, Amherst
	<ul style="list-style-type: none">• Led recitations for Math 300: Fundamental Concepts of Math (4 semesters),• Office hours and in-class assistant for Math 127: Calculus for Life and Social Sciences, and Math 104: Algebra, Analytic Geometry and Trigonometry (1 semester each).	

REFERENCES

Ph.D. Advisor	David Speyer Professor, University of Michigan, Ann Arbor	speyer@umich.edu
Postdoc Advisor	Bernd Sturmfels Director, Max Planck Institute for Mathematics in the Sciences, Leipzig	bernd@mis.mpg.de
Postdoc Advisor	Michael Joswig Einstein Professor of Discrete Mathematics/Geometry, TU Berlin	joswig@math.tu-berlin.de
	Serkan Hoşten Professor, San Francisco State University	serkan@sfsu.edu
	Ruriko Yoshida Professor, Naval Postgraduate School	ryoshida@nps.edu
Teaching	Paul Kessenich Lecturer IV, University of Michigan, Ann Arbor	paulkess@umich.edu

SELECTED TALKS AND POSTERS

* denotes invited plenary talk.

- Jul 2025 **Tropical phylogenetics***
New Directions in Algebraic Statistics, IMSI, Chicago, IL
- Jul 2025 **Weighted tropical Fermat-Weber points**
SIAM AG 2025, Madison, WI
- Mar 2025 **Maxout polytopes (poster)**
Algebraic Statistics 2025, Munich, Germany
- Jan 2025 **Tropical tree spaces**
Tropical geometry in Frankfurt, Frankfurt, Germany
- Jul 2024 **ML degrees of Brownian motion tree models: star trees and root invariance**
Effective Methods in Algebraic Geometry (MEGA) 2024, Leipzig, Germany
- Oct 2023 **Homaloidal polynomials and ML degree one models**
with Pratik Misra and Pardis Semnani
Apprenticeship week: Varieties from statistics, IMSI, Chicago, IL
- Sept 2023 **Snapshot: ML degree of Brownian motion tree models**
with Ikenna Nometa
Algebraic Statistics and Our Changing World Long Program, IMSI, Chicago, IL
- Jul 2023 **Classifying tree topologies along tropical line segments**
SIAM AG 2023, Eindhoven, The Netherlands
- Nov 2022 **Tropical phylogenetics**
Matroids Day, University of Wisconsin, Madison, WI
- Jun 2022 **Tropical turning points (poster)**
Poster Session at CCAAGS-22, University of Washington, Seattle, WA
- May 2022 **Tree topologies along the tropical line segment**
Algebraic Statistics 2022, University of Hawaii, Manoa, HI
- July 2021 **Minicourse in tropical geometry**
Math Summer Mini-Courses, University of Michigan, Ann Arbor, MI
- Jan 2017 **Euler characteristics of Hilbert schemes via colored Young diagrams**
with Amal Mattoo
Joint Mathematics Meeting, AMS Special Session, Atlanta, GA
- Jan 2017 **Euler characteristics of Hilbert schemes via colored Young diagrams (poster)**
with Amal Mattoo
Joint Mathematics Meeting, MAA Poster Session, Atlanta, GA

PROGRAMMING

Most experienced with: Python, Julia, Macaulay2, and Oscar.

Some experience with: Polymake, R, Sage, and qhull.

SERVICE

- July 2023 **Midwest Research Experience for Graduate Students (MREG)**
- MREG is a 2-week research program for early graduate students,
 - Mentor for a group led by Juliette Bruce, studying matroid complexes,
 - Co-organizer for MREG in 2022.
- Fall 2021 **Directed Reading Program**
- Mentor for a semester-long reading course on curvature with an undergraduate student,
 - Assisted the student in creating a presentation on Steiner symmetrization.
- 2016-2023 **Association for Women in Mathematics (AWM), Local Chapters**
- Founded and served as president of UMass AWM chapter (2016 – 2018),
 - Served on the executive board of UMich AWM chapter (2019 – 2023),
 - Organized professional development and community events to broaden participation by women in math, including: panel on graduate school for undergraduates, website-making workshop, and lunches with visiting faculty.
- 2019 - 2020 **Graduate Student Advisory Committee UMich (GSAC)**
2021 - 2022
- Member of GSAC, which advises the department on graduate student issues,
 - Co-organized programs for graduate students, including: MREG, and workshops on academic job opportunities in math.