




SHELBY COX

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SUMMARY

Using tools from algebraic geometry, tropical geometry, and combinatorics, I solve problems in mathematical phylogenetics and algebraic statistics. I frequently use mathematical software to advance my research.

EDUCATION

2018 - 2024 **University of Michigan, Ann Arbor**
Ph.D. Mathematics, *expected May 2024*.

2014 - 2018 **University of Massachusetts, Amherst**
B.S., Mathematics, B.A., Linguistics, May 2018.
summa cum laude, with honors

RESEARCH

* denotes first author, otherwise authors are listed alphabetically.

2023+ **The tropical polytope is the set of all weighted tropical Fermat-Weber points** **preprint**
with Mark Curiel. Available at: [arXiv 2310.07732](https://arxiv.org/abs/2310.07732).

2023 **Classifying Tree Topologies along Tropical Line Segments** **to appear**
Algebraic Statistics, Hawaii 2022. Available at: [arXiv 2302.03611](https://arxiv.org/abs/2302.03611).

2022 **Tree Topologies along a Tropical Line Segment**
with Ruriko Yoshida*. *Vietnam Journal of Mathematics*. 50, 395 - 419 (2022).

2019 **Finding Euler Characteristics of Hilbert Schemes using Colored Young Diagrams**
with Amal Mattoo. *Minnesota Journal of Undergraduate Mathematics* 5(1) (2019).

ONGOING PROJECTS

2023+ **ML Degree of Brownian Motion Tree Models** **in preparation**
with Jane Coons, Aida Maraj, and Ikenna Nomete.

2023+ **Dimensions of 3-Sunlet Models** **in preparation**
with Elizabeth Gross, and Samuel Martin.

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

2017 Leon Emory Lincoln and Robert Bradley Lincoln Scholarship, UMass

2017 Monahan Student Leadership Award, UMass

Fall 2016 M.K. Bennett Geometry Award, UMass

TEACHING

- 2019 - 2021 **Instructor of Record** **University of Michigan, Ann Arbor**
- 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**
- 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.

PRESENTATIONS AND POSTERS

- Oct 2023 **Homaloidal Polynomials and ML Degree One Models** with Pratik Misra and Pardis Semnani
Apprenticeship Week, IMSI, Chicago, IL
- Sept 2023 **Snapshot: ML Degree of Brownian Motion Tree Models** with Ikenna Nometa
Algebraic Statistics and Our Changing World, IMSI, Chicago, IL
- July 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
- June 2022 **Tropical Turning Points**
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** with Amal Mattoo
Joint Mathematics Meeting, MAA Poster Session, Atlanta, GA

SERVICE

- July 2023 **Midwest Research Experience for Graduate Students**
Graduate Student Mentor
- Fall 2021 **Directed Reading Program**
Mentor, Topic: Curvature
- 2019-2023 **Association for Women in Mathematics, UMich Chapter**
Executive Board
- 2016-2018 **Association for Women in Mathematics, UMass Chapter**
President
- 2019 - 2020 **Graduate Student Advisory Committee UMich**
2021 - 2022 Member

