SARAH PERCIVAL

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Dept of Mathematics and Statistics
University of New Mexico ◇ Albuquerque, NM

EDUCATION

Purdue University, *West Lafayette, IN*
Ph.D. Dept. of Mathematics August 2021
- Advisor: Saugata Basu
- Thesis: Efficient Computation of Reeb Spaces and First Homology Groups

Rice University, *Houston, TX*
B.A. Mathematics, School of Natural Sciences May 2014
B.A. Statistics, School of Engineering May 2014

RESEARCH EXPERIENCE

University of New Mexico, *Albuquerque, NM*
Dept. Mathematics and Statistics
Assistant Professor August 2024 – Present

Michigan State University, *East Lansing, MI*
Dept. of Computational Mathematics, Science, and Engineering
Fixed-term Assistant Professor August 2023 – August 2024

Michigan State University, *East Lansing, MI*
Dept. of Biochemistry and Molecular Biology
Research Associate (Postdoc) August 2021 – August 2023

Purdue University, *West Lafayette, IN*
Dept. of Mathematics
Graduate Research Assistant Jan 2017 – May 2018

SCHOLARSHIP

Collaborate@ICERM, 2025
Participated in the working group "Finding Geometric and Topological Cores of Higher Graphs"

WinCompTop: Women in Computational Topology 3, 2023
Participated in the Women in Computational Topology workshop at the Bernoulli Institute, EPFL

Rising Stars in Data Science, 2023
Participated in the Rising Stars in Data Science workshop at the Oden Institute, University of Texas

Mathematical Research Community, 2022
Participated in the Models and Methods for Sparse (Hyper)Network Science MRC

GAANN Fellowship, 2020-2021
The US Department of Education awards this fellowship through the Graduate Assistance in Areas of National Need program to graduate students of superior ability who demonstrate financial need.

Ross Fellowship, Purdue University, 2014-2015
This fellowship is awarded to incoming doctoral applicants at Purdue University who demonstrate academic excellence.

Summer Mathematics Program for Women Undergraduates, 2012
Participated in program for undergraduate women in mathematics at Carleton College

PUBLICATIONS

Due to working in an interdisciplinary setting, my work follows two different conventions for authorship. Theoretical mathematics tends to be published alphabetically. Biology tends to be published in descending order of contribution, with graduate students and postdocs listed first, followed by PIs. All journal articles are available on arXiv or bioRxiv.

Preprints

[1] Erin Wolf Chambers, Ishika Ghosh, Elizabeth Munch, Sarah Percival, and Bei Wang. *Towards an Optimal Bound for the Interleaving Distance on Mapper Graphs*. 2025. arXiv: 2504.03865 [cs.CG].

[2] Inés García-Redondo, Claudia Landi, Sarah Percival, Anda Skeja, Bei Wang, and Ling Zhou. *Effective Resistance in Simplicial Complexes as Bilinear Forms: Generalizations and Properties*. 2025. arXiv: 2511.10749 [math.CO].

[3] Inés García-Redondo, Claudia Landi, Sarah Percival, Anda Skeja, Bei Wang, and Ling Zhou. *Finding the Cores of Higher Graphs Using Geometric and Topological Means: A Survey*. 2025. arXiv: 2506.19857 [math.HO].

[4] Enrique G Alvarado, Robin Belton, Kang-Ju Lee, Sourabh Palande, Sarah Percival, Emilie Purvine, and Sarah Tymochko. *Any Graph is a Mapper Graph*. 2024. arXiv: 2408.11180 [math.AT].

[5] Erin Wolf Chambers, Elizabeth Munch, Sarah Percival, and Xinyi Wang. *A Distance for Geometric Graphs via the Labeled Merge Tree Interleaving Distance*. 2024. arXiv: 2407.09442 [cs.DS].

Journal Articles

[6] Enrique Alvarado, Robin Belton, Emily Fischer, Kang-Ju Lee, Sourabh Palande, Sarah Percival, and Emilie Purvine. "G-Mapper: Learning a Cover in the Mapper Construction". In: *SIAM Journal on Mathematics of Data Science* 7.2 (May 2025), pp. 572–596. DOI: 10.1137/24M1641312.

[7] Erin Wolf Chambers, Elizabeth Munch, Sarah Percival, and Bei Wang. "Bounding the interleaving distance for mapper graphs with a loss function". In: *Journal of Applied and Computational Topology* 9.3 (July 2025). ISSN: 2367-1734. DOI: 10.1007/s41468-025-00215-x.

[8] Saugata Basu and Sarah Percival. "Efficient Computation of a Semi-Algebraic Basis of the First Homology Group of a Semi-Algebraic Set". In: *Discrete & Computational Geometry* (Feb. 2024). ISSN: 1432-0444. DOI: 10.1007/s00454-024-00626-0.

[9] John Gray, Yi-Hsuan Chu, Ankita Abnave, Fabio Gomez Cano, Yun Sun Lee, Sarah Percival, Nan Jiang, and Erich Grotewold. "GRASSIUS 2.0: A gene regulatory information knowledgebase for maize and other grasses". In: *Current Plant Biology* 40 (Dec. 2024), p. 100396. ISSN: 2214-6628. DOI: https://doi.org/10.1016/j.cpb.2024.100396.

[10] Sourabh Palande, Jeremy Arsenault, Patricia Basurto-Lozada, Andrew Bleich, Brianna N. I. Brown, Sophia F. Buysse, Noelle A. Connors, Sikta Das Adhikari, Kara C. Dobson, Francisco Xavier Guerra-Castillo, Maria F. Guerrero-Carrillo, Sophia Harlow, Héctor Herrera-Orozco, Asia T. Hightower, Paulo Izquierdo, MacKenzie Jacobs, Nicholas A. Johnson, Wendy Leuenberger, Alessandro Lopez-Hernandez, Alicia Luckie-Duque, Camila Martínez-Avila, Eddy J. Mendoza-Galindo, David Cruz Plancarte, Jenny M. Schuster, Harry Shomer, Sidney C. Sitar, Anne K. Steensma, Joanne Elise Thomson, Damián Villaseñor-Amador, Robin Waterman, Brandon M. Webster, Madison Whyte, Sofía Zorilla-Azcué, Beronda L. Montgomery, Aman Y. Husbands, Arjun Krishnan, Sarah Percival, Elizabeth Munch, Robert VanBuren, Daniel H. Chitwood, and Alejandra Rougon-Cardoso. "Expression-based machine learning models for predicting plant tissue identity". In: *Applications in Plant Sciences* 13.1 (Oct. 2024), e11621. DOI: https://doi.org/10.1002/aps3.11621.

[11] Sarah Percival, Joyce G. Onyenedum, Daniel H. Chitwood, and Aman Y. Husbands. "Topological data analysis reveals core heteroblastic and ontogenetic programs embedded in leaves of grapevine (Vitaceae) and maracuyá (Passifloraceae)". In: *PLOS Computational Biology* 20.2 (Feb. 2024). Ed. by Tobias Bollenbach, e1011845. ISSN: 1553-7358. DOI: 10.1371/journal.pcbi.1011845.

[12] Rose A. Marks, Erik J. Amézquita, Sarah Percival, Alejandra Rougon-Cardoso, Claudia Chibici-Revneanu, Shandry M. Tebele, Jill M. Farrant, Daniel H. Chitwood, and Robert VanBuren. "A critical analysis of plant science literature reveals ongoing inequities". In: *Proceedings of the National Academy of Sciences* 120.10 (Feb. 2023). ISSN: 1091-6490. DOI: 10.1073/pnas.2217564120.

[13] Sourabh Palande, Joshua A. M. Kaste, Miles D. Roberts, Kenia Segura Abá, Carly Claucherty, Jamell Dacon, Rei Doko, Thilani B. Jayakody, Hannah R. Jeffery, Nathan Kelly, Andriana Manousidaki, Hannah M. Parks, Emily M. Roggenkamp, Ally M. Schumacher, Jiaxin Yang, Sarah Percival, Jeremy Pardo, Aman Y. Husbands, Arjun Krishnan, Beronda L Montgomery, Elizabeth Munch, Addie M. Thompson, Alejandra Rougon-Cardoso, Daniel H. Chitwood, and Robert VanBuren. "Topological data analysis reveals a core gene expression backbone that defines form and function across flowering plants". In: *PLOS Biology* 21.12 (Dec. 2023). Ed. by Hajk-Georg Drost, e3002397. ISSN: 1545-7885. DOI: 10.1371/journal.pbio.3002397.

[14] Saugata Basu, Nathanael Cox, and Sarah Percival. "On the Reeb Spaces of Definable Maps". In: *Discrete and Computational Geometry* 68.2 (July 2022), pp. 372–405. DOI: 10.1007/s00454-022-00400-0.

Other Published Work

[15] Henry Hugh Adams, Hana Dal Poz Kouřimská, Teresa Heiss, Sarah Percival, and Lori Ziegelmeier. "How to Tutorial-a-thon". In: *Notices of the American Mathematical Society* 68.09 (Oct. 2021), p. 1. DOI: 10.1090/noti2349.

INVITED SPEAKER

Talk titles with hyperlinks have recordings or supplementary material available.

33. *Effective Resistance and Random Walks on Simplicial Complexes.* Tsingua Sanya International Mathematics Forum, Sanya, China, February 3, 2026

32. *Using Mathematics to Uncover Inequities in Plant Science.* Arizona State University Mathematical Biology Seminar, Tempe, AZ, October 31, 2025

31. *Bounding the Interleaving Distance of Geometric Graphs with a Loss Function.* SIAM-AG, Madison, WI, July 11, 2025

30. *Topological Data Analysis in the Classroom.* SMP@30, Northfield, MN, June 25, 2025

29. *Bounding the Interleaving Distance of Geometric Graphs with a Loss Function.* Joint Meeting of the NZMS, AustMS, and AMS, Auckland, New Zealand, Dec 10, 2024

28. *Bounding the Interleaving Distance of Geometric Graphs with a Loss Function.* Colorado State University Topology Seminar, Fort Collins, CO, Nov 12, 2024

27. *Bounding the Interleaving Distance of Geometric Graphs with a Loss Function.* University of New Mexico Algebra & Geometry Seminar, Albuquerque, NM, Oct 2, 2024.

26. *Bounding the Interleaving Distance of Geometric Graphs with a Loss Function.* AATRN Networks Seminar, Virtual, May 7, 2024.

25. *Using Topological Data Analysis to Study Protein Structure.* Purdue University AWM Symposium, Virtual, April 6, 2024.

24. *A Distance for Geometric Graphs via the Labeled Merge Tree Interleaving Distance.* The Joint Mathematics Meetings, San Francisco, CA, Jan 4, 2024.

23. *Bounding the Interleaving Distance of Geometric Graphs with a Loss Function.* SIAM-Great Lakes, Michigan State University, East Lansing, MI, Oct 14, 2023.

22. *Topological Data Analysis Reveals a Core Heteroblastic Program Embedded in Leaves of Grapevine and Maracuyá.* Math Bio Seminar, Arizona State University, Virtual, Sep 29, 2023.

21. *Bounding the Interleaving Distance of Geometric Graphs with a Loss Function.* Applied Topology in Albany Seminar, Virtual, Sep 22, 2023.

20. *Efficient Computation of a Semi-Algebraic Basis of the First Homology Group of a Semi-Algebraic Set.* SIAM Conference on Applied Algebraic Geometry, TU-Eindhoven, Netherlands, July 12, 2023.

19. *Adaptive Covers for Ball Mapper.* SIAM Optimization, Seattle, WA, June 1, 2023.

18. *Using Mapper to Reveal Morphological Relationships in Passiflora Leaves.* Purdue University AWM Symposium, Virtual, April 1, 2023.

17. *Using Topological Data Analysis to Study Protein Structure.* AMS Spring Southeastern Sectional, Georgia Tech University, Atlanta, GA, March 18, 2023.

16. *Adaptive Covers for Ball Mapper.* Topology, Geometry, and Data Analysis Seminar, Ohio State University, Columbus, OH, Feb 7, 2023.

15. *A Mathematical Look at Voting.* CMSE Brown Bag Seminar, Michigan State University, East Lansing, MI, Jan 27, 2023.

14. *Adaptive Covers for Ball Mapper.* The Joint Mathematics Meetings, Boston, MA, Jan 5, 2023.

13. *Using Mapper to Reveal Morphological Relationships in Passiflora Leaves.* The Joint Mathematics Meetings, Boston, MA, Jan 6, 2023.

12. *An Efficient Algorithm for the Computation of Reeb Spaces from Roadmaps.* The Joint Mathematics Meetings, Boston, MA, Jan 7, 2023.

11. *Using Mapper to Reveal Morphological Relationships in Passiflora Leaves.* SIAM-MDS, San Diego, CA, Sep 30, 2022.

10. *Computation of Reeb Graphs in a Semi-Algebraic Setting.* Applied Algebraic Topology Research Network (AATRN), Online Seminar, July 27, 2022.

9. *An Efficient Algorithm for the Computation of Reeb Spaces from Roadmaps.* AWM Research Symposium, University of Minnesota, Minneapolis, MN, June 18, 2022.

8. *Efficient Computation of a Semi-Algebraic Basis of the First Homology Group of a Semi-Algebraic Set.* AMS Spring Western Virtual Sectional Meeting, May 15, 2022.

7. *Efficient Computation of a Semi-Algebraic Basis of the First Homology Group of a Semi-Algebraic Set.* AWM Special Session on Women in Computational Topology, Joint Mathematics Meetings, Online due to COVID-19, April 9, 2022.

6. *Using Mapper to Reveal Morphological Relationships in Passiflora Leaves.* AMS Spring Central Virtual Sectional Meeting, March 26, 2022.

5. *Computation and Applications of Reeb Graphs.* Colorado State University Data Science Seminar, Virtual, February 24, 2022.

4. *An Efficient Algorithm for the Computation of Reeb Graphs from Roadmaps.* University of Florida Topological Data Analysis Conference, Gainesville, FL, Jan 20, 2022.

3. *An Efficient Algorithm for the Computation of Reeb Graphs from Roadmaps.* Applied Topology in Albany Seminar, Virtual, Oct 29, 2021.

2. *Efficient Computation of Reeb Spaces.* Michigan State University TDA Seminar, Virtual, September 8, 2021.

1. *Reeb Spaces of Definable Maps.* Purdue University Topology Seminar, West Lafayette, IN, Oct 16, 2018.

CONTRIBUTED TALKS

10. *An Efficient Algorithm for the Computation of Reeb Spaces from Roadmaps.* Symposium on Computational Geometry Young Researchers Forum, Virtual, June 7, 2022.
9. *Efficient Computation of a Semi-Algebraic Basis of the First Homology Group of a Semi-Algebraic Set.*Union College Mathematics Conference, Schenectady, NY, June 4, 2022.
8. *Using Mapper to Reveal Morphological Relationships in Passiflora Leaves.* Topological Data Visualization Workshop, University of Iowa, Iowa City, IA, May 19, 2022.
7. *Getting Started with Python for TDA*. AATRN Tutorial-a-thon, Virtual, Feb 22, 2021.
6. *An Algorithm for the Computation of Reeb Graphs from Roadmaps.* Graduate Students Reminisce Online on Topology Seminar, Virtual, Aug 5, 2020.
5. *An Algorithm for the Computation of Reeb Graphs from Roadmaps.* Graduate Student Topology and Geometry Seminar, Indiana University, Bloomington, IN (canceled due to COVID-19).
4. *Reeb Graphs and Their Applications.* MAA Indiana Section, University of Indianapolis, Indianapolis, IN, April 5, 2019.
3. *Reeb Graphs and Their Applications.* Student Colloquium, Purdue University, West Lafayette, IN, Feb 27, 2019.
2. *An Introduction to Topological Data Analysis.* Student Colloquium, Purdue University, West Lafayette, IN, Jan 24, 2018.
1. *An Introduction to Topological Data Analysis.* Graduate Research Day, Purdue University, West Lafayette, IN, Nov 11, 2017.

POSTERS

Poster titles with hyperlinks have supplementary material available.

5. *A Distance for Geometric Graphs via the Labeled Merge Tree Interleaving Distance.* ATMCS, Bozeman, Montana, July 23, 2025.
4. *Adaptive Covers for Ball Mapper.* Kyoto University, Kyoto, Japan, July 31, 2023.
3. *Adaptive Covers for Ball Mapper.* IMSI, University of Chicago, Chicago, IL, March 22, 2023.
2. *Using Mapper to Reveal Morphological Relationships in Passiflora Leaves.* ATMCS, University of Oxford, Oxford, UK, June 20, 2022.
1. *Reeb Spaces of Definable Maps.* TGDA@OSU, The Ohio State University, Columbus, OH, May 21, 2018.

TEACHING EXPERIENCE

Course	Title	Role	Institution	Semesters
MATH 520	Abstract Algebra I	Instructor	UNM	Fall 2025
MATH 532	Algebraic Topology	Instructor	UNM	Fall 2024
CMSE 201	Computational Modeling and Data Analysis I	Instructor	MSU	Spring 2024
CMSE 382	Optimization Methods in Data Science	Instructor	MSU	Fall 2023
HRT 841	Foundations in Computational Plant Science	Assistant Instructor	MSU	Fall 2022
MA 162	Calculus II	Instructor	Purdue	Summer 2019 Summer 2018
MA 162	Calculus II	Teaching Assistant	Purdue	Fall 2015 Spring 2016 Spring 2019
MA 161	Calculus I	Teaching Assistant	Purdue	Fall 2018
MA 158	Precalculus	Instructor	Purdue	Fall 2016
STAT 201	Elementary Statistics	Undergraduate Teaching Assistant	Rice	Fall 2013 Spring 2014

ADVISING

Spencer McCray, Master's Student, UNM — Jan 2026 -
Ross Cocks, Master's Student, UNM — Jan 2026 -
Alex Fritschi, Master's Student, UNM — Dec 2024 -
Aldo Morelli, Undergraduate student, UNM — Dec 2024 -

MENTORSHIP

José Garcia, PhD Student, UNM Math, — Dec 2024 -
Avin Kolahdooz, PhD Student, UNM Math, — Dec 2024 -
Tommy Denny-Martins, Undergraduate student, UNM — Jan 2025 - June 2025
Denis Selyuzhitsky, Undergraduate Student, MSU Math — Aug 2023 - Apr 2024
Ray Hasan, Undergraduate Student, MSU Math — Aug 2023 - Apr 2024
Xinyi (Elena) Wang, PhD Student, MSU CMSE — Feb 2022 - Apr 2024

SERVICE

Departmental and University Service

Climate Committee, University of New Mexico — Nov 2025 -
Qualifying Exams Committee, University of New Mexico — Aug 2025 -
Faculty Search Committee, University of New Mexico — Aug 2025 -
CMSE DEI Committee, Michigan State University — Aug 2022 - Aug 2024
Mathematics Graduate Student Representative, Purdue University — May 2020 - May 2021
AWM Cabinet Member, Purdue University — Aug 2015 - Aug 2021

Professional Service

Organizer, AATRN Tutorial-a-thon — January 2025
Thesis opponent for Erland Raa Vågset, University of Bergen — November 2024
Organizer, Workshop on Directional Transforms, CG Week — June 2024
Organizer, Special Session on Applied Topology: Theory, Algorithms, and Applications, JMM January 2024

Organizer, Minisymposium on Applied Algebraic Topology: Theory and Implementation, SIAM-AG July 2023
Organizer, Workshop on Möbius Inversion and Reeb Spaces, CG Week June 2023
Organizer, Minisymposium on TDA with Mapper, SIAM MDS 22 Sep 2022
Organizer, Graduates Achieving Inclusion Now Conference October 2021
Organizer, AATRN Tutorial-a-thon March 2021

Review and Referee

International Conference on Machine Learning (ICML) 2022
Symposium on Computational Geometry (SoCG) 2023-2026
25th Eurographics Converence on Visualization (EuroVis) 2023
SIAM Journal on Applied Algebra and Geometry (SIAGA) 2023
La Matematica 2023, 2024
Proceedings of the 3rd Women in Computational Topology workshop 2024
European Symposium on Algorithms 2024
International Symposium on Symbolic and Algebraic Computation (ISSAC) 2024
Symposium on Theory of Computing (STOC) 2024
Journal of Computational Geometry (JoCG) 2024, 2025
Journal of Applied and Computational Geometry (JACT) 2025
Journal of Symbolic Compuation (JSCO) 2025
MathSciNet 2025

TECHNICAL STRENGTHS

Software and Coding Python, GIS, R, Javscript, LaTeX, Adobe Creative Suite
Languages English (native), French (conversational)