# ANNA SCHENFISCH

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## ACADEMIC APPOINTMENTS

**KTH Royal Institute of Technology** *September 2025 – September 2027*

- Postdoctoral researcher

**Eindhoven University of Technology (TU/e)** *September 2023 – August 2025*

- Postdoctoral researcher

## EDUCATION

**Montana State University (MSU)** *2017 – 2023*

- PhD, Mathematics
- Dissertation title – Faithful Sets of Topological Descriptors and The Algebraic $K$-Theory of Multi-Parameter Zig-Zag Grid Persistence Modules

**University of Wyoming** *2013 – 2017*

- Bachelor of Science, Mathematics
- Bachelor of Music, Music Performance, violin
- Honors Program minor

## HONORS AND AWARDS

Outstanding Mathematical Sciences Graduate Student award *spring 2020*

NSF Graduate Research Fellowship Program recipient *spring 2019*

University of Wyoming Trustee's Scholarship recipient *fall 2013 – spring 2017*

## TEACHING

**Discrete Structures** *November 2024 – January 2025*
Main lecturer for section at TU/e with around 300 students (computer science)

**Projects in Topological Data Analysis** *two quarters fall 2023 – winter 2025*
Co-led two iterations of a reading course and project in TDA for small groups of master's students (cross-university collaboration)

**Calculus for Technology II Instructor** *fall 2021 – spring 2022*
Main lecturer and course designer for classes of around 47 students at MSU (mathematics)

**Discrete Mathematics** *summer 2021*
Main lecturer and course designer for an accelerated course of around 10 students, held virtually through MSU (computer science)

**Calculus I Instructor** *fall 2017 – spring 2018*
Main lecturer for classes of around 36 students at MSU (mathematics)

**Grader for University of Wyoming Differential Equations classes** *2015 – 2017*
Provided detailed feedback and scored homework and tests

## MENTORING AND ADVISING

**Master's Student Thesis/Project Co-Advisor** *January 2024 - August 2024*
Co-advised two master's students in a thesis and project

**Computational Topology and Geometry Club** *fall 2017 - fall 2023*
Worked with undergraduate students to prepare seminar presentations and understand material several times during the semester

**Directed Reading Program Mentor** *six semesters spring 2018 – spring 2023*
Mentored undergraduate students reading textbooks in mathematics/computer science

**Research with Undergraduate Students** *2020 – present*
Worked with undergraduate student on research projects in computational geometry (led to *Catching Polygons* paper)

**Letters to a Prescientist pen-pal** *2020*
Scientist role model to middle school students through snail-mail

**Montana State University Math Learning Center** *2017 – 2018*
Provided math tutoring to MSU undergraduate students

**Math and Physics Tutor – Office of Academic Support** *fall 2015*
Tutored student-athletes at the University of Wyoming

## PUBLICATIONS (with hyperlinks)

Journal Publications

9. Ryan Grady and Anna Schenfisch. ***K-Theory of multiparameter persistence modules: Additivity.*** Proceedings of the American Mathematical Society, Series B. Volume 11. March 2024. Pages 63-74. Available at https://doi.org/10.1090/bproc/208

8. Ryan Grady and Anna Schenfisch. ***Zig-Zag Modules: Cosheaves and K-Theory.*** Homology, Homotopy and Applications. Volume 25, Number 2. November 2023. Pages 243-274. Available at https://dx.doi.org/10.4310/HHA.2023.v25.n2.a11

7. Ryan Grady and Anna Schenfisch. ***Regularity via Links and Stein Factorization.*** Beiträge zur Algebra und Geometrie / Contributions to Algebra and Geometry. August 2023. 20 pages. Available at https://link.springer.com/article/10.1007/s13366-023-00713-y

6. Robin Belton, Brittany T. Fasy, Rostik Mertz, Samuel Micka, David L. Millman, Daniel Salinas, Anna Schenfisch, Jordan Schupach, and Lucia Williams. ***Reconstructing Embedded Graphs from Persistence Diagrams.*** Computational Geometry, Theory and Applications. October 2020. 17 pages. Available at https://www.sciencedirect.com/science/article/pii/S0925772120300523

5. Jessica De Silva, Kristin Heysse, Adam Kapilow, Anna Schenfisch, and Michael Young. ***Turán Numbers of Vertex Disjoint Cliques in r-Partite Graphs.*** Journal of Discrete Mathematics, Volume 341, Issue 2. February 2018. Pages 492-496. Available at https://www.sciencedirect.com/science/article/pii/S0012365X17303266

Conference Publications

4. Tim Ophelders, Anna Schenfisch, Willem Sonke, and Bettina Speckmann. ***Computing Geomorphologically Salient Networks via Discrete Morse Theory.*** 15 pages. Symposium on Computational Geometry, 2025.

3. Brittany T. Fasy, David L. Millman, Anna Schenfisch. ***How Small Can Faithful Sets be? Ordering Topological Descriptors.*** 13 pages. Canadian Conference on Computational Geometry, 2024. Conference proceedings available at https://cosc.brocku.ca/∼rnishat/CCCG_2024_proceedings.pdf

2. Brittany T. Fasy, Samuel Micka, David L. Millman, Anna Schenfisch, and Lucia Williams. ***Efficient Graph Reconstruction and Representation Using Augmented Persistence Diagrams.*** Canadian Conference on Computational Geometry, 2022. 9 pages. Conference proceedings available at https://www.torontomu.ca/content/dam/canadian-conference-computational-geometry-2022/papers/CCCG2022_paper_49.pdf

Book Review

1. Anna Schenfisch and Brittany T. Fasy. ***Statistical Analysis of Contingency Tables (Book Review).*** The American Statistician, Volume 73, Issue 2. April 3, 2019. Page 634. Available at https://www.tandfonline.com/doi/full/10.1080/00031305.2019.1571848

## PREPRINTS OR CONFERENCE CONTRIBUTIONS (with hyperlinks)

7. Tim Ophelders and Anna Schenfisch. ***Sweeping Orders for Simplicial Complex Reconstruction.*** 21 pages. Available at https://arxiv.org/pdf/2501.01901

6. Tim Ophelders and Anna Schenfisch. ***An Order for Higher-Dimensional Simplex Sweeps.*** Presented at EuroCG, 2025. 7 pages.

5. Brittany Fasy, David Millman, and Anna Schenfisch. ***Lower Bounding Faithful Sets of Verbose Persistence Diagrams.*** Presented at EuroCG, 2024. 7 pages.
Available at https://eurocg2024.math.uoi.gr/data/uploads/paper_28.pdf

4. George Brooks, Fadekemi Osaye, Anna Schenfisch, Zhiyu Wang, and Jing Yu. ***Outerplanar Graphs with Positive Lin-Lu-Yau Curvature.*** To appear in the Journal of Combinatorics. 8 pages.
Available at https://arxiv.org/pdf/2403.04110.pdf

3. Bradley McCoy, Anna Schenfisch, and Eli Quist. ***Catching Polygons.*** Presented at the Fall Workshop on Computational Geometry, 2021. 6 pages. Available at https://arxiv.org/abs/2201.01286

2. Brittany T. Fasy, Samuel Micka, David L. Millman, Anna Schenfisch, and Lucia Williams. ***A Faithful Discretization of Verbose Directional Transforms.*** Under review. 30 pages. Available at https://arxiv.org/abs/1912.12759

1. Brittany T. Fasy, Samuel Micka, David L. Millman, and Anna Schenfisch. ***Challenges in Reconstructing Shapes from Euler Characteristic Curves.*** Presented at the Fall Workshop on Computational Geometry, 2018. 6 pages. Available at https://arxiv.org/abs/1811.11337

## TALKS AND PRESENTATIONS

### Invited Talks

**Symposium on Computational Geometry (SoCG)** *June 2024*
30 minutes, on concise vs. verbose descriptors, in workshop on directional transforms

**Dutch Categories and Types Seminar** *February 2024*
30 minutes, on $K$-theory of persistence modules research

**SIAM Conference on Applied Algebraic Geometry** *July 2023*
25 minutes, on minimal faithful sets of topological descriptors

**Carroll College Math Colloquium** *April 2023*
50 minutes introducing directional transforms

**Applied Algebraic Topology Research Network (AATRN)** *July 2023*
50 minutes, on ordering topological descriptors (availible at this link)

**CMS Summer Meeting – Relative Homology and Persistence Theory** *June 2022*
50 minutes, on $K$-theory of persistence modules research

**Finite Dimensional Seminar** *March 2022*
50 minutes, on $K$-theory in "seminar on representation theory of finite-dimensional algebras"

**Augustana University Math Colloquium** *April 2021*
50 minutes, on Reeb space stratification

**Applied Algebraic Topology Research Network (AATRN)** *January 2021*
20 minutes, on research related to the persistent homology transform (availible at this link)

**Contributed or Local Talks**

**Computational Persistence Workshop** *September 2024*
20 minutes, on network extraction via discrete Morse theory

**Canadian Conference on Computational Geometry (CCCG)** *August 2024*
20 minutes, on ordering topological descriptors

**European Conference on Computational Geometry (EuroCG)** *March 2024*
15 minutes, on lower-bounding minimal faithful sets

**Canadian Conference on Computational Geometry (CCCG)** *August 2022*
20 minutes, on discretizing the persistent homology transform

**Algebraic Topology Methods, Computation, & Science** *June 2022*
20 minutes, on ordering topological descriptors

**AMS Southeastern Sectional – Workshop on Algebraic Combinatorics and Category Theory in Topological Data Analysis** *March 2022*
20 minutes, on ordering topological descriptors

**University of Florida Topological Data Analysis Conference** *January 2022*
20 minutes, on verbose persistence diagrams and zig-zag modules as cosheaves

**Applied Mathematics Seminar** *October 2021*
50 minutes, at MSU on research related to the persistent homology transform

**Applied Mathematics Seminar** *March 2018*
50 minute joint talk at MSU on research on geometric data analysis and its applications to prostate cancer classification

**Pure Mathematics Seminar** *March 2018*
50 minute talk at MSU on Turán numbers publication

**Computational Geometry Week – Young Researchers Forum** *June 2018*
20 minutes, on research related to prostate cancer classification

**Computer Science Department Seminar** *December 2017*
50 minute joint talk at MSU on topological data analysis and its applications to prostate cancer classification

**Nebraska Conference for Undergraduate Women in Mathematics** *February 2017*
20 minutes, on Turán numbers research

## REFEREE OR REVIEWER

Canadian Conference on Computational Geometry (CCCG)

Discrete & Computational Geometry (DCG)

European Conference on Computational Geometry (EuroCG)

International Symposium on Algorithms and Computation (ISAAC)

Journal of Combinatorics (JOC)

Symposium on Computational Geometry (SoCG)

Symposium on Discrete Algorithms (SODA)

## OTHER MATHEMATICAL CONFERENCES AND REU PARTICIPATION

**Math Research Community** *May/June 2023*
Week-long collaboration on "Ricci Curvatures of Graphs and Applications to Data Science," led to paper on positively-curved graphs.

**Talbot Workshop** *June 2022*
Week-long immersive summer school on $K$-theory and scissors congruence

**Computational Geometry Week** *June 2019*
Attended talks and helped with conference practicalities (set-up, registration, etc.)

**Fall Workshop on Computational Geometry** *October 2018*
Attended talks, and research on Euler Characteristic curves presented by collaborator

**Women in Topology Workshop – MSRI** *November 2017*
Participated in research on directed topology

**Computational Geometry Week** *June 2017*
Gave a talk at a satellite event (YRF)

**HerbFest** *June 2017*
Attended a series of talks in celebration of Herbert Edelsbrunner's 60th birthday

**Summer Undergraduate Applied Mathematics Institute – CMU** *Summer 2016*
Research Intern in Extremal Graph Theory REU, led to Turán numbers publication

## LEADERSHIP SKILLS AND SERVICE LEARNING

**Women in Science and Engineering Board Member** *spring 2024 – fall 2025*
Board member for TU/e group supporting gender minorities in STEM

**Graduate Student Seminar Organizer** *fall 2018 – fall 2023*
Solicited speakers and organized logistics for weekly graduate student seminar

**Montana Science Olympiad** *April 2022 and April 2018*
Led activity on knot theory to group of around 20 elementary students

**Hardin High School Visit** *April 2022*
Led activity on understanding 4-spheres via level-sets to group of around 20 high school students

**University of Wyoming Honors College Mentor** *fall 2015 – spring 2016*
Organized and conducted supportive group sessions for honors freshman

## ADDITIONAL PROFESSIONAL DEVELOPMENT

**Implementing Peer Feedback** *October 2024*
Teacher training from TU/e on implementing peer feedback in assesments to foster a "culture of collaboration...and promote deeper learning"

**Indian Education for All** *September 2022*
Received training through MSU "to learn about the distinct and unique heritage of American Indians in a culturally responsive manner"

**Recognizing & Referring Students with Mental Health Needs** *September 2022*
Received training through MSU for on-campus resources

**Women in Science and Engineering at MSU** *2019 – 2023*
Participated in community-building activities, as well as a book club focused on social justice and diversity in the sciences

**Safe Zone and Related Events** *fall 2013 – spring 2017*
Attended weekly meetings and received certification related to LGBTQ+ topics