ANNA SCHENFISCH

a.k.schenfisch@tue.nl
annaschenfisch.github.io/

ACADEMIC APPOINTMENTS

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

- 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 www.intlpress.com/site/pub/pages/journals/items/hha/content/vols/0025/0002/a011/index.php

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.*** Under review. 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 – present*
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