Halley Fritze

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EDUCATION

Ph.D, Mathematics, University of Oregon. 2025
Advisor: Dev Sinha
M.S, Mathematics, University of Oregon. 2021
B.S.Mathematics, North Dakota State University. 2017
Magna cum laude

PAPERS AND PROJECTS

2Mapper: Inferring topological structure through higher order mapper. Halley Fritze, Dev Sinha (in progress 2024).
GitHub Repository

Identifying orbits in atmospheric dynamical systems through temporally enriched mapper graphs. Halley Fritze, Dev Sinha, Joshua Dorrington (In progress 2024).

Neutrophil State-space Modeling: Combining morphology and dynamics. Halley Fritze, Bhagirath Mehta, Alexandra Stavrianidi, Arianna Cao, Ishani Mukherji, Dev Sinha, Ronald Davis, Sharada Kalanidhi (In progress 2024).

A forest is more than a bunch of trees: haplotypes in inferred ARGs. Halley Fritze, Peter Ralph, Nathaniel Pope, Ava Bamforth, Jerome Kelleher (2024).
Preprint

Embedded Graph Reconstruction Under Hausdorff Noise. Halley Fritze, Sushovan Majhi, Marissa Masden, Atish Mitra, Michael Stickney (2024)
Extended Abstract

ICML Topological Deep Learning Challenge 2024: Beyond the Graph Domain. PR #48. Halley Fritze, Marissa Masden (2024).
White Paper
Honorable Mention and Highlighted Submission.

The Erdös Institute Data Science Bootcamp: Foursquare Location Matching. Halley Fritze, Jay Hathaway, Max Vargas (2022).
GitHub Repository

RESEARCH EXPERIENCE

Stanford University, Remote Employment. 2023–Present
Statistician and Data Scientist at Stanford Genome Technology Center

University of Oregon, Eugene, OR. 2019–Present
Mathematics Department: Graduate Research 2021–Present
Institute of Evolution and Ecology: Kern-Ralph Co-Lab 2022–Present
Institute of Neuroscience: Mazzucato Lab 2022

Sam Houston State University, Huntsville, TX. Summer 2016
NSF Research Experience for Undergraduates Program

North Dakota State University, Fargo, ND. 2015–2017
Ronald E. McNair Scholar

TEACHING EXPERIENCE

Mathematics Department, University of Oregon. 2019–Present
Instructor of Record for the following courses:

- Introduction to Probability and Statistics (Math 243)
- Calculus I (Math 251)
- Calculus II (Math 252)

Teaching Assistant and Grader for the following courses:

- College Algebra (Math 111)
- Introduction to Probability and Statistics (Math 243)
  Lead TA: Fall 2023
- Calculus I (Math 251)
- Stochastic Processes (Math 467/567)
- Applied Mathematics II (Math 607)

Graduate Teaching Assistant, North Dakota State University. 2017–2019
Teaching Assistant and Grader for the following courses:

- College Algebra (Math 103)
- Trigonometry (Math 105)
- College Pre-calculus (Math 107)
- Calculus I (Math 165)
- Calculus II (Math 166)

PRESENTATIONS

Enhanced topological inference through higher dimensional mapper graphs.
AWM Workshop Poster Presentations, Joint Mathematics Meetings, Seattle, WA. January 2025

Identifying orbits in atmospheric dynamical systems through temporally enriched mapper graphs.
Invited Speaker, Joint Mathematics Meetings, Seattle, WA. January 2025

Stability of higher-order covers for mapper.
Invited Speaker, Topology and Geometry Seminar, Oregon State University. November 2024

Embedded graph reconstruction under Hausdorff noise.
Fall Workshop in Computational Geometry, Tufts University. November 2024

Algebraic-topological tools for understanding higher-order structure in neural data.
Neuroscience Journal Club, University of Oregon. November 2024

Towers of Covers and Mapper.
Student Topology and Geometry Seminar, University of Oregon. May 2024

Inference in Hidden Markov Models.
Neuroscience Journal Club, University of Oregon. January 2024

Controllability of Nonlinear Systems.
Neuroscience Journal Club, University of Oregon. November 2023

Persistence Homology, an Overview.
Student Topology and Geometry Seminar, University of Oregon. April 2023

Topological Morphology Descriptors and Neuron Classification.
Neuroscience Journal Club, University of Oregon. March 2023

Topological Data Analysis and Tracking C. Elegans.
Student Topology and Geometry Seminar, University of Oregon. January 2023

Lefschetz Fibrations and Dehn Twists.
Topology Geometry Seminar, North Dakota State University April 2019

From Symplectic Geometry to Chaos.
Graduate Colloquium, North Dakota State University September 2018

Analysis of a Mathematical Model of the Carolina Wolfberry Plant.
Applied Mathematics Seminar, North Dakota State University August 2018

CONFERENCES AND WORKSHOPS ATTENDED

31st Annual Fall Workshop on Computational Geometry. Tufts University, November 2024.
Accepted Abstract: Embedded graph reconstruction under Hausdorff noise.

Climate Science at the Interface Between Topological Data Analysis and Dynamical Systems Theory. Java Center, NY, June, 2024.
AMS Mathematics Research Communities Summer Conference.

Topology and Geometry in Neuroscience. ICERM, October, 2023.
Workshop in ICERM Semester Program Math+Neuroscience: Strengthening the Interplay Between Theory and Mathematics.

Simons Laufer Mathematical Sciences Institute Summer Graduate School: Machine Learning. University of California San Diego, June, 2023.
Topological data analysis and deep learning.

Simons Laufer Mathematical Sciences Institute Summer Graduate School: From Symplectic Geometry to Chaos. University of California Berkeley, July, 2018.
Symplectic geometry and dynamics related to the n-body problem.

HONORS AND AWARDS

Marie Vitulli Scholar, University of Oregon. 2019–2020
Ronald E. McNair Scholar, North Dakota State University. 2015–2017

LEADERSHIP, SERVICE AND OUTREACH

Mathematics Directed Reading Program Mentor. University of Oregon
Modelling predator-prey systems with Lotka-Volterra equations. 2023–2024

Mathematics Department Climate Committee. University of Oregon
Graduate Student Member 2021–Present

Graduate Topology and Geometry Seminar. University of Oregon.
Organizer 2022–2024

Association for Women in Mathematics. University of Oregon, Graduate Student Chapter.
Vice President 2022–2023
Chair of the Social and Professional Enrichment Committee 2020–2023
Member of the Speaker Series Committee 2023–2024

American Mathematical Society. University of Oregon, Graduate Student Chapter.
Founding Member 2020
Member at Large 2020–2021
Department Liason 2023–2024

uCodeGirl. Non-profit Organization.
Mentor 2018–2019

PROFESSIONAL AFFILIATIONS

The Erdös Institute. Member since 2022.
American Mathematical Society. Member since 2021.
Association for Women in Mathematics. Member since 2020.

TECHNICAL SKILLS

Programming Languages:

- Strong Proficiency: Python, LaTeX
- Some Proficiency: R, Java, C, HTML

Software: ImageJ/Fiji