Robin Belton

Email: rbelton@smith.edu
Website: robinbelton.github.io/

Academic Appointments

Smith College — Northampton, MA
Postdoctoral Researcher and Lecturer — *July 2022 - Present*

Education

Montana State University (MSU) — Bozeman, MT
Ph.D. - Mathematics — *May 2022*
Dissertation: *Directed Graph Descriptors and Distances for Analyzing Multivariate Time Series Data*
Advisor: *Dr. Tomas Gedeon*

Montana State University — Bozeman, MT
M.S. - Mathematics — *May 2019*

Kenyon College — Gambier, OH
B.A. - Mathematics — *May 2016*
magna cum laude
Honors and Distinction in Mathematics
Concentration in Scientific Computing

Honors, Awards, and Fellowships

MSU Student Organization of the Year: Graduate Women in Science and Engineering (WISE) - 2022. Award to one of the 270+ student organizations at MSU that makes significant contributions to the MSU and Bozeman community. I was on the leadership team for WISE from 2020-2022.

Graduate Leadership Fellowship Program - 2020. Year long leadership program that consists of leadership and DEI trainings organized by the graduate school at MSU.

William A. Stannard Award for Excellence in Graduate Student Teaching - 2020. $500 award to a graduate teaching assistant in the Department of Mathematical Sciences at MSU.

STEM Communication Fellowship - 2018. Year long program at MSU for graduate students that focuses on science communication.

Outstanding Graduate Student - 2018. Award from the Department of Mathematical Sciences at MSU.

National Science Foundation Graduate Research Fellowship Program (NSF GRFP) Recipient - 2018. National award that provides a $34000 stipend per year for three years to a select number of graduate students.

Meritorious Award - 2016. $5000 award to a select number of incoming graduate students at MSU.

Two Pieces of Artwork featured at Bridges Interdisciplinary Art and Mathematics Conference - 2016.

Outstanding Presentation Award - 2015. Award to a select number of undergraduate presenters at Math Fest.

Risk Taker Award - 2015. Award to a math major at Kenyon College.

Research Interests

Topological Data Analysis, Computational Topology & Geometry, Directed Topology, Network Science, Math Bio.

Publications

1. *Combinatorial Conditions for Directed Collapsing.* **Belton, R.**, Brooks, R., Ebli, S., Fajstrup L., Fasy, B. T., Sanderson, N., & Vidaurre E. Research in Computational Topology 2. Association for Women in Mathematics Series, Volume 30, Springer, Cham. 2022.
2. *Reconstructing Embedded Graphs from Persistence Diagrams.* **Belton, R.**, Fasy, B. T., Mertz, R., Micka, S., Millman, D., Salinas, D., Schenfisch, A., Schupbach, & Williams, L. Computational Geometry Theory and Applications, Volume 90, 2020.
3. *Towards Directed Collapsibility.* **Belton, R.**, Brooks, R., Ebli, S., Fajstrup L., Fasy, B. T., Ray, C., Sanderson, N., & Vidaurre E. Advances in Mathematical Sciences. Association for Women in Mathematics Series, vol 21. Springer, Cham. 2020.
4. *Learning Persistence Diagrams from Simplicial Complexes.* **Belton, R.**, Fasy, B. T., Mertz, R., Micka, S., Millman, D., Salinas, D., Schenfisch, A., Schupbach, & Williams, L. In Proceedings of Canadian Conference on Computational Geometry (CCCG), 2018.
5. *Loss of TXNIP Enhances Peritoneal Metastasis and Can be Abrogated by Dual TORC1/2 Inhibition.* Spaeth, D., Burch, M., **Belton, R.**, Demoret, B., Grosenbacher, N., David, J., Stets, C., Cohen, D., Shakya, R., Hays, J., & Chen, J. L. Oncotarget, 2018.
6. *A Shape-Context Model for Matching Placental Surface Vascular Networks. Image Analysis & Stereology.* Farnell, E., Farnell, S., Chang, J., Hoffman, M., **Belton, R.**, Keaty, K., Lederman, S., & Salafia, C. Image Analysis & Stereology, 37(1), 55-62. 2018.

Book Reviews

The Structure and Stability of Persistence Modules, by Chazal, F., Silva, V., Glisse, M., & Oudot, S. Review by **Belton, R.**, and Fasy, B.T., ACM SIGACT News, Vol. 48 Issue 2, June 2017.

Preprints

Extremal Event Graphs: A (Stable) Tool for Analyzing Noisy Time Series. **Belton, R.**, Cummins, B., Fasy, B.T., Gedeon, T. 2022.

Code

Computing and Comparing Extremal Event DAGs. **Belton, R.**, Cummins, B., Narem, R., 2021.

Selected Presentations

* Denotes invited talk.

Extremal Event Graphs: A (Stable) Tool for Analyzing Noisy Time Series

* Topological Data Visualization Workshop, University of Iowa, 2022.
* Topology and Data Science Seminar, University of Oklahoma, 2022.

Going Backwards: Reconstructing Simplicial Complexes from Persistence Diagrams

* Math Colloquium, Kenyon College, 2021.
* Math Colloquium, Augustana University, 2020.
* SIAM Central States Meeting – Mini Symposium on Applied and Comp. Topology, Univ. of Oklahoma, 2018.

How Algebraic Topology can Verify Concurrent Programs

Geometry and Topology Meet Data Analysis and Machine Learning Conference, the Ohio State University, 2019.
White Dog Brewery, 2019.

Analyzing Music Using Persistent Homology

Algebraic Topology in Data and Dynamics (ATDD), MSU, 2018 (poster).
Algebraic Topology: Methods, Computation, and Science, IST Austria, 2018 (poster).

An Introduction to Topological Data Analysis

* Undergraduate Mathematics Seminar, MSU, 2018.
Computer Science Seminar, MSU, 2017.

Conferences and Workshops

AMS Mathematical Research Community on Models and Methods for Sparse (Hyper)Network Science, 2022.

Topological Data Visualization Workshop, University of Iowa and Virtual, 2022.

Computational Persistence Workshop, Virtual, 2021.

BIRS Connecting Network Structure to its Dynamics: Fantasy or Reality?, Virtual, 2021.

Mini Course: Understanding Nonlinear Dynamics with Finite Data, Virtual, 2021.

Canadian Conference on Computational Geometry, Virtual, 2020.

Applied Mathematical Modeling with Topological Techniques, ICERM, 2019.

Geometry and Topology meet Data Analysis and Machine Learning (GTDAML), The Ohio State University, 2019.

Geometric Data Analysis, University of Chicago, 2019.

American Association for the Advancement of Science (AAAS), Washington D.C., 2019.

SIAM Central States Meeting - Mini Symposium on Applied and Comp. Topology, Univ. of Oklahoma, 2018.

Algebraic Topology in Data and Dynamics (ATDD), Montana State University, 2018.

Algebraic Topology: Methods, Computation, and Science (ATMCS), IST Austria, 2018.

Women in Topology (WIT) Workshop, MSRI, 2017.

Spring School and Conference in Applied and Computational Algebraic Topology, Hausdorff Research Institute for Mathematics (HIM), 2017.

Park City Mathematics Institute (PCMI) Undergraduate Summer School, 2016.

Joint Mathematics Meeting (JMM), Seattle WA, 2016.

MAA Mathfest, Washington D.C., 2015.

Nebraska Conference for Undergraduate Women in Mathematics, 2015.

Reviewer

AWM/Springer volume for the proceedings of the Women in Data Science and Mathematics (WiSDM) workshop

European Symposium on Algorithms (ESA)

European Workshop on Computational Geometry (EuroCG)

Grace Hopper Celebration (GHC) Poster Session

Symposium on Computational Geometry (SoCG)

Symposium on Discrete Algorithms (SODA)

Women in Computational Topology (WinCompTop)

Undergraduate Research Experience

Student Analyst for Institutional Research at Kenyon College, 2015-2016.

Undergraduate Research Assistant at The Ohio State University Cancer Center, 2015.

Kenyon College Summer Science Scholars Program, 2014.

Teaching

Responsibilities included lecturing, conducting office hours, and grading.

Smith College

M 111: Calculus I, Fall 2022.

Montana State University

M 172: Calculus II, Spring 2020.

M 172: Calculus II, Fall 2019.

M 171: Calculus I, Fall 2017.

M 121: College Algebra, Spring 2017.

M 121: College Algebra, Fall 2016.

Teaching Related Experience

Teaching Assistant for Applied Mathematical Modeling with Topological Techniques workshop at ICERM, 2019.

Teaching Assistant for "Learning R" workshops at MSU, 2019.

Mentoring Experience

Met twice a week with an REU student on TDA applied to music, 2017.

Assisted math and CS undergraduates prepare presentations for the Computational Topology and Geometry Seminar.

Tutoring and Grading Positions

Tutor at Math Learning Center at MSU for 6 semesters.

Grader for M 151: Precalculus, MSU, Summer 2019.

Lead Tutor for Calculus II (2 semesters) and Art of Mathematics (1 semester), Kenyon College.

Tutor at Math and Science Skills Center, Kenyon College.

Grader for Multivariable Calculus, Spring 2014, Kenyon College.

Leadership Experience

President of Graduate Women in Science and Engineering (WISE) MSU
WISE aims to support graduate students of all genders especially those that are underrepresented in STEM. In my leadership role, I applied and was awarded $\sim$ \$5000 per year for WISE, maintained the budget and website, and organized events such as seminars, article discussions, book clubs, and social events. Large events I organized included a conference on COVID-19 research and mentoring workshop for undergraduates interested in graduate school. *2020 - 2022*

Graduate Program Committee Representative MSU
Organized social events for the math department and acted as a liaison between graduate students and faculty. *2018-2020*

President of Computational Topology and Geometry MSU
Managed budget and helped organize weekly seminar for graduate and undergraduate students. *2017-2019*

Invited Panels

Picture a Scientist Panel, MSU, 2020.

Nebraska Conference for Undergraduate Women in Mathematics, 2019.

Outreach

Co-organized Math Craft Workshop at Girls for a Change Workshop at MSU, 2020.

STEM Expo judge at Longfellow Elementary School, 2017-2020.

Volunteer for (middle school) Girl Science Saturdays at Kenyon College, 2014-2016.

STEM mentor for first year students at Kenyon College, 2015-2016.

Upper Classman Counselor at Kenyon College, 2013-2016.

Organizations

American Mathematical Society (AMS)

Applied Algebraic Topology Research Network (AATRN)

Association for Women in Mathematics (AWM)

National Association of Mathematics (NAM)

Pi Mu Epsilon National Mathematics Honor Society

Sigma Xi Scientific Research Society

Women in Computational Topology (WinCompTop)

Women in Topology (WIT)