ROBIN LYNNE BELTON

Montana State University
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EDUCATION

Montana State University (MSU), Bozeman, Montana
Ph.D. Candidate in Mathematics, Fall 2016-Present
Advisor: Dr. Tomas Gedeon
Thesis: *Directed Graph Descriptors and Distances for Analyzing Multivariate Time Series*
M.S. in Mathematics, May 2019

Kenyon College, Gambier, Ohio
B.A. in Mathematics, May 2016
magna cum laude with Distinction and Honors in Mathematics
Concentration in Scientific Computing

RESEARCH INTERESTS

Applied Algebraic Topology, Topological Data Analysis (TDA), Data Science, Computational Topology, Computational Geometry, Mathematical Biology

FELLOWSHIPS & GRANTS

Graduate Leadership Fellow, MSU, 2020-2021
NSF Graduate Research Fellowship Program (GRFP) Recipient, 2018-2022
STEM Storyteller Communication Fellow, MSU, 2018-2019
Distinguished Academic Scholarship, Kenyon College, 2012-2016

AWARDS & HONORS

Montana State University
William A. Stannard Award for Excellence in Graduate Student Teaching, 2020
Outstanding Graduate Student Award, 2018
Meritorious Award for incoming graduate students, 2016

Bridges Interdisciplinary Art and Mathematics Conference
Artwork featured on the cover of Bridges 2018 Poetry Anthology
Two pieces of artwork featured in exhibit at University of Jväskylä, Finland, 2016

MAA Mathfest Undergraduate Presentation Session
Outstanding Presentation Award, 2015

Kenyon College
Risk-taker award from the Mathematics Department, 2015

PUBLICATIONS

6. **Belton, R.**, Brooks, R., Ebli, S., Fajstrup L., Fasy, B. T., Sanderson, N., & Vidaurre E. *Combinatorial Conditions for Directed Collapsing*. To appear in Research in Computational Topology 2. 2021.

5. **Belton, R.**, Fasy, B. T., Mertz, R., Micka, S., Millman, D., Salinas, D., Schenfisch, A., Schupbach, & Williams, L. *Reconstructing Embedded Graphs from Persistence Diagrams.* Journal of Computational Geometry, Theory and Applications. 2020.

4. **Belton, R.**, Brooks, R., Ebli, S., Fajstrup L., Fasy, B. T., Ray, C., Sanderson, N., & Vidaurre E. *Towards Directed Collapsibility,* Advances in Mathematical Sciences: AWM Research Symposium. 2020.

3. Spaeth, D., Burch, M., **Belton, R.**, Demoret, B., Grosenbacher, N., David, J., Stets, C., Cohen, D., Shakya, R., Hays, J., & Chen, J. *Loss of TXNIP enhances peritoneal metastasis and can be abrogated by dual TORC1/2 inhibition. Oncotarget,* Nov. 2018.

2. **Belton, R.**, Fasy, B. T., Mertz, R., Micka, S., Millman, D., Salinas, D., Schenfisch, A., Schupbach, & Williams, L. *Learning Simplicial Complexes from Persistence Diagrams.* In Proceedings of Canadian Conference on Computational Geometry (CCCG), 2018.

1. Farnell, E., Farnell, S., Chang, J., Hoffman, M., **Belton, R.**, Keaty, K., Lederman, S., & Salafia, C. *A Shape-Context Model for Matching Placental Surface Vascular Networks. 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.

WORKS IN PROGRESS

Belton, R., Cummins, B., Fasy, B. T., Gedeon, T., *Extremal Event Graphs: A (Stable) Directed Graph Descriptor to Analyze Noisy Time Series Data.* Submitted.

Belton, R., Brooks, R., Ebli, S., Edmonds, R., Fajstrup L., Fasy, B. T., Sanderson, N., & Vidaurre E. *Using Directed Topology to Study Multi-parameter Persistence.*

RESEARCH EXPERIENCE

Research Assistant at Montana State University, 2016-Present
Student Analyst for Institutional Research, Kenyon College, 2015-2016
Undergraduate Research Assistant at The Ohio State University Cancer Center, 2015
Kenyon College Summer Science Scholars Program, 2014

TEACHING EXPERIENCE

Courses Taught
Calculus II, Fall 2019 & Spring 2020, MSU
Calculus I, Fall 2017, MSU
College Algebra, Fall 2016 & Spring 2017, MSU

Workshops
Teaching Assistant for Applied Mathematical Modeling with Topological Techniques workshop at ICERM, 2019
Teaching Assistant for "Learning R" workshops at MSU, 2019

Mentor
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

Tutor
College Algebra, Precalculus, Calculus courses, and undergraduate Real Analysis, MSU
Calculus courses, and Art of Mathematics (non-major's course), Kenyon College

Grader
Precalculus, 2019, MSU
Multivariable Calculus, 2014, Kenyon College

PROGRAMS/CONFERENCES

Computational Persistence Workshop, 2021, virtual
BIRS Connecting Network Structure to its Dynamics: Fantasy or Reality?, 2021, virtual
Mini Course: Understanding Nonlinear Dynamics with Finite Data, 2021, virtual
Inner Mountain Leadership Program, MSU, 2020-2021
Picture a Scientist Panel, MSU, 2020
* Invited Graduate Student Panelist
Canadian Conference on Computational Geometry, 2020, virtual
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), D.C., 2019
Nebraska Conference for Undergraduate Women in Mathematics, 2019
* Invited Graduate Student Panelist
SIAM Central States Meeting - Mini Symposium on Applied and Computational Topology, University 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
* Special topic: Visualizing and Learning the Structure of Data
Joint Mathematics Meeting (JMM), Seattle WA, 2016
Ohio State University/Kenyon College Undergraduate Pelotonia Program, 2015
MAA Mathfest, Washington D.C., 2015
Nebraska Conference for Undergraduate Women in Mathematics, 2015
MAA Mathfest, Portland OR, 2014

SELECTED PRESENTATIONS

(*) denotes invited presentation

(*) *Extremal Event Graphs: A Stable Directed Graph Descriptor*, Topology and Data Science Seminar, University of Oklahoma, 2022 (virtual)

(*) *Going Backwards. Reconstructing Simplicial Complexes from Persistence Diagrams*, Kenyon College, 2021 (virtual)

Directed Descriptors of Data, Applied Mathematics Seminar, MSU, 2020

(*) *Going Backwards. Reconstructing Simplicial Complexes from Persistence Diagrams*, Augustana University, 2020 (virtual)

How Algebraic Topology can Verify Concurrent Programs, GTDAML, The Ohio State University, 2019

Even the Processors in Computers have to Share, White Dog Brewery, Bozeman MT, 2019

(*) *Learning Simplicial Complexes from Persistence Diagrams,* SIAM Central States Meeting – Mini Symposium on Applied and Computational Topology, University of Oklahoma, 2018

Analyzing Music Using Persistent Homology, Algebraic Topology in Data and Dynamics (ATDD), MSU, 2018 (poster)

Analyzing Music Using Persistent Homology, Algebraic Topology: Methods, Computation, and Science, IST Austria, 2018 (poster)

(*) *Introduction to TDA*, Undergraduate Mathematics Seminar, MSU, 2018

The Erosion Distance on the Space of Persistence Diagrams, Women in Topology Workshop, MSRI, 2017

(*) *An Overview of TDA,* College of Letters and Sciences Board of Trustees Meeting, 2017

An Overview of TDA, Computer Science Seminar, MSU, 2017

Playing with Numbers, Carroll College, 2017

Distance Metrics on the Space of Persistence Diagrams, MSU, Graduate Students Mathematics Seminar, 2017

Identifying Genes of Interest through Clustering and Outlier Analysis of Genomic Time Series Data, Translational Data Analytics Forum at Ohio State University, 2015 (poster)

A Shape-Context Model to Characterize Altered Geometry In Placental Chorionic Surface Vascular Networks Introduced by Paint Injection, MAA Mathfest, 2015
* Received Outstanding Presentation Award

Numerical Techniques of Integration for Volumes of Revolution, Nebraska Conference for Undergraduate Women in Mathematics, 2015

Numerical Techniques of Integration for Volumes of Revolution, MAA Mathfest, 2014

SERVICE

Montana State University
President of Graduate Women in Science and Engineering (WISE), 2020-2022
- Apply for funding and maintain the budget
- Organize events such as seminars, article discussions, book clubs, and social events

Graduate Program Committee Representative (GPC Rep) for Math Dept., 2018-2020
President of the Computational Topology and Geometry (CompTaG) club, 2017-2019

Professional
Referee for Symposium on Computational Geometry (SoCG)
Referee for European Symposium on Algorithms (ESA)
Referee for European Workshop on Computational Geometry (EuroCG)
Referee for Symposium on Discrete Algorithms (SODA)
Referee for Women in Computational Topology (WinCompTop)
Referee for AWM/Springer volume for the proceedings of the Women in Data Science and Mathematics (WiSDM) workshop
Reviewer for Grace Hopper Celebration (GHC) Poster Session (2018, 2019)

Outreach
Co-organized Math Craft Workshop at Girls for a Change Workshop, 2020
STEM Expo judge at Longfellow Elementary School, 2017-2020
Volunteer for (middle school) Girl Science Saturdays at Kenyon College, 2014-2016

Kenyon College
STEM mentor for first year students, 2015-2016
Upper Classman Counselor, 2013-2016

COMPUTER SKILLS

Python, R, Github, Matlab, Mathematica, Linux, Microsoft, C++

ORGANIZATIONS

Montana State University
Graduate Women in Science and Engineering (WISE)
Topology and Geometry Seminar
Computational Topology and Geometry (CompTaG)

Professional
Women in Topology (WIT)
Women in Computational Topology (WinCompTop)
Pi Mu Epsilon National Mathematics Honor Society
Association for Women in Mathematics
Sigma Xi Scientific Research Society