

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 Descriptors of Data*

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 Jvaskylä, 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*.

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) MSU, 2021

(*) *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