

Alexander Wagner

CONTACT INFORMATION	Department of Mathematics Duke University 120 Science Drive, Durham, NC 27708	alexander.wagner@duke.edu aywagner.github.io
RESEARCH INTERESTS	Topological Machine Learning, Computational Geometry, Statistical Learning Theory, Dimensionality Reduction, Risk Management	
EDUCATION / EMPLOYMENT	Duke University Phillip Griffiths Assistant Research Professor, Department of Mathematics, 2020 - 2023 University of Florida Ph.D. in Mathematics, May 2020 Advisor: Dr. Peter Bubenik Vanderbilt University M.S. in Mathematics, May 2015 B.A. in Mathematics, Summa Cum Laude, May 2013	
VISITING POSITIONS	Hausdorff Institute for Mathematics, Germany, September 2017	
HONORS AND AWARDS	2019 2018 2012 2010–2013 2009–2013	UF CAM Summer Graduate Research Fellowship UF Informatics Institute Graduate Student Fellowship MAA Outstanding Presentation Award Vanderbilt University College of Arts and Science College Scholar National Merit Scholar
PAPERS	<ul style="list-style-type: none">❑ Alexander Wagner*, Elchanan Solomon*, and Paul Bendich. Improving Metric Dimensionality Reduction with Distributed Topology. arxiv:2106.07613❑ Elchanan Solomon, Alexander Wagner, and Paul Bendich. From Geometry to Topology: Inverse Theorems for Distributed Persistence. <i>Symposium on Computational Geometry</i>, 2022. arxiv:2101.12288❑ Alexander Wagner. Nonembeddability of Persistence Diagrams with $p > 2$ Wasserstein Metric. <i>Proceedings of the American Mathematical Society</i>, March 2021. arXiv:1910.13935❑ Elchanan Solomon*, Alexander Wagner*, and Paul Bendich. A Fast and Robust Method for Global Topological Functional Optimization. <i>24th International Conference on Artificial Intelligence and Statistics (AISTATS)</i>, 2021. arxiv:abs/2009.08496❑ Peter Bubenik and Alexander Wagner. Embeddings of Persistence Diagrams into Hilbert Spaces. <i>Journal of Applied and Computational Topology</i>, September 2020. arXiv:1905.05604	

- Paul Bendich, Peter Bubenik, and Alexander Wagner. Stabilizing the unstable output of persistent homology computations. *Journal of Applied and Computational Topology*, November 2019. arXiv:1512.01700
- Alexander Wagner and Stan Uryasev. Portfolio Optimization with Expectile and Omega Functions. *Proceedings of the 2019 Winter Simulation Conference*, National Harbor, Maryland, December 8-11, 2019. arxiv:1910.14005

INVITED TALKS

Distributed Persistent Homology: Inverse Theorems and Dimensionality Reduction, Algebraic Topology: Methods, Computation and Science (ATMCS10), University of Oxford, June 2022

A Topological Heatmap for the Shape of Biological Images, AMS Fall Southeastern Virtual Sectional Meeting, November 2021

Learning with Approximate or Distributed Topology, Topological Data Analysis Workshop, Institute for Mathematical and Statistical Innovation, April 2021

Nonembeddability of Persistence Diagrams into Hilbert Spaces, Applied Algebraic Topology Research Network, August 2020

Portfolio Optimization with Expectile and Omega Functions, Winter Simulation Conference 2019, National Harbor, Maryland, December 8-11, 2019

Embeddings of Persistence Diagrams into Hilbert Spaces, AMS Sectional Meeting, University of Florida, November 2019

Embeddings of Persistence Diagrams into Hilbert Spaces, Midwest Graduate Student Conference: Geometry and Topology meet Data Analysis and Machine Learning, The Ohio State University, June 2019

The Generic Nature of Morse Functions, AMS Spring Southeastern Sectional Meeting, Auburn University, March 2019

The Generic Nature of Morse Functions, Topology, Geometry, and Data Analysis seminar, The Ohio State University, March 2019

A Persistent Homology Measure for Morse Functions, Joint Mathematics Meetings, Baltimore, MD, January 2019

Stabilizing the location of persistent homology, Algebraic Topology: Methods, Computation and Science (ATMCS8), Institute of Science and Technology Austria, June 2018

MENTORING

2021-2023	Jesse Zhang (Duke University)
2019	David Freeman (University of Florida)
2019	Gianfranco Cortes-Arroyo (University of Florida)
2018-2019	Jose Bouza (University of Florida)

OUTREACH / SERVICE

2021	Faculty Curriculum on Anti-Racism
2019	Facilitator at Julia Robinson Mathematics Festival

PROGRAMMING LANGUAGES

□ Python, TensorFlow, PyTorch

- R
- MATLAB
- C/C++

TEACHING
EXPERIENCE

Fall	2022	Instructor, Introduction to High-Dimensional Data Analysis
Fall	2022	Instructor, Linear Algebra
Spring	2022	Instructor, Matrices and Vector Spaces
Fall	2021	Instructor, Topological Data Analysis
Spring	2021	Instructor, Topology
Fall	2020	Instructor, Multivariable Calculus
Fall	2017	Instructor, Online Precalculus and Algebra
Summer C	2017	Instructor, Online Precalculus and Algebra
Fall	2016	Discussion Leader, Calculus 1
Spring	2016	Discussion Leader, Mathematics for Liberal Arts
Spring	2016	Grader, Survey of Calculus 2
Fall	2015	Discussion Leader, Mathematics for Liberal Arts
Spring	2015	Teaching Assistant, Differential Equations with Linear Algebra
Fall	2014	Teaching Assistant, Calculus 1
Spring	2014	Teaching Assistant, Number Theory
Fall	2013	Teaching Assistant, Abstract Algebra