Curriculum Vitae   # Rachel Levanger

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Education

Rutgers, The State University of New Jersey	Mathematics	Ph.D. 2017
University of North Florida	Mathematics & Art History	B.A. 2012

Appointments and Employment

Postdoctoral Researcher, University of Pennsylvania	Summer 2017 - present
Graduate Assistant, Advisor: Prof. K. Mischaikow, Rutgers University	Spring 2017
NSF EAPSI Fellow, Advisor: Prof. T. Ishihara, Nagoya University	Summer 2016
Graduate Assistant, Advisor: Prof. K. Mischaikow, Rutgers University	Fall 2015 – Spring 2016
Graduate Student Coordinator, DIMACS REU	Summer 2014
Statistical Data Analyst Intern, Fidelity National Financial	Summer 2012
Business Systems Analyst, Fidelity National Financial	2005 - 2011
Business Systems Analyst, Wells Fargo Services Company	2001 - 2005

Awards & Fellowships

TA Teaching Excellence Award *Rutgers University, Department of Mathematics*	Fall 2016
University Diversity Fellowship *Rutgers University Graduate School of Arts and Sciences*	2012 - 2014
Janice Pattwell Annual Mathematics Fellowship *Rutgers University, Department of Mathematics*	2012 - 2013
Outstanding Undergraduate Student in Mathematics *University of North Florida Mathematics & Statistics Department*	Apr. 2012
Student Speaker Award *Pi Mu Epsilon National Meeting at MathFest 2011, Lexington, KY.*	Aug. 2011
Undergraduate Scholarships for Analysis & Probability *University of North Florida Mathematics & Statistics Department*	May 2011
UNF College of Arts & Sciences, Willard O. Ash Award *Award recognizing a senior who embodies Dean Ash's philosophy of a* *broad-based education in the liberal arts and sciences.*	Nov. 2010

Publications and Preprints

A Comparison Framework for Interleaved Persistence Modules (with S. Harker, M. Kramar, and K. Mischaikow) *preprint arXiv:1801.06725 (2018)*

Analysis of Kolmogorov Flow and Rayleigh-Bénard Convection using Persistent Homology (with M. Kramar, J. Tithof, B. Suri, M. Xu, M. Paul, M.Schatz, and K. Mischaikow), *Physica D: Nonlinear Phenomena*, 334, 82-98 (2016)

On singular value inequalities for matrix means (with R. Dumitru and B. Visinescu), *Linear Algebra and its Applications*, 439(8), 2405-2410 (2013)

Papers In Preparation

Persistent Homology and Euler Integral Transforms (with R. Ghrist and H. Mai).

On the Stability of Persistence Vineyards (with J. Curry)

A new relationship between enstrophy and higher order statistics of vorticity in high-resolution DNS of incompressible homogeneous isotropic turbulence (with T. Ishihara, P. Dlotko, M. Kramar, and K. Mischaikow)

Connecting Lyapunov Vectors with the Pattern Dynamics of Chaotic Rayleigh-Bénard Convection (with M. Xu, J. Cyranka, M. Schatz, K. Mischaikow, M. R. Paul)

Selected Talks

Studying Fluid Flows with Persistent Homology. *Workshop on Topology: Identifying Order in Complex Systems, IAS.*	Apr. 7, 2018
A Comparison Framework for Interleaved Persistence Modules. *AMS Special Session on Topological Data Analysis, OSU.*	Mar. 17, 2018
A Comparison Framework for Interleaved Persistence Modules. *Applied Algebraic Topology Research Network (online).*	Mar. 11, 2018
Studying Complicated Fluid Flows with Topological Data Analysis. *TRIPODS Workshop: Geometry and Topology of Data, ICERM.*	Dec. 13, 2017
A Comparison Framework for Interleaved Persistence Modules. *Algebra and Geometry Seminar, SUNY Albany.*	Oct. 26, 2017
Tracking Patterns in Rayleigh-Bénard Convection using Topological Methods. *Geometric Analysis of Spatiotemporal Data in Fluid Flows, Georgia Tech.*	Sept. 13, 2017
Applications of Persistent Homology to Simulated Turbulent Fluid Flows on a 3D Domain. *Applied Algebraic Topology 2017, Hokkaido University, Sapporo.*	Aug. 10, 2017
TDA for Spiral Defect Chaos. *Topological Data Analysis: Developing Abstract Foundations, Banff.*	Aug. 4, 2017
Applications of Persistent Homology to Fluid Dynamics. *Summer@ICERM 2017: Topological Data Analysis, ICERM.*	Jul. 20, 2017
An Introduction to Topological Data Analysis for the Digital Humanities. *Group for Experimental Methods in the Humanities, Columbia University.*	Apr. 28, 2017
Studying fluid dynamics with persistent homology. *Applied Topology Seminar, Brown University.*	Feb. 23, 2017
Studying fluid dynamics with persistent homology. *Applied Mathematics Seminar, U.S. Military Academy, West Point, NY.*	Feb. 2, 2017
A Comparison Framework for Interleaved Persistence Modules. *Joint Mathematics Meeting, Atlanta, GA.*	Jan. 4, 2017
Studying fluid dynamics with persistent homology. *Computational Math and Applications Workshop, Rutgers University.*	Dec. 15, 2016
Rigorous error tracking for topological data analysis. *Thomas J. Watson Research Center, IBM Research.*	Dec. 8, 2016
A Comparison Framework for Interleaved Persistence Modules. *Union College Mathematics Conference, Union College.*	Dec. 3, 2016
New applications of persistent homology to image and time series analysis. *Applied Topology Seminar, University of Pennsylvania*	Nov. 15, 2016

Exploring high dimensional data with persistent homology.	Oct. 11, 2016
Guest lecturer, Senior capstone class, New Jersey Institute of Technology	
Tracking Errors in the space of Persistence Diagrams.	Aug. 1-5, 2016
Patterns and Waves 2016, Hokkaido University, Sapporo, Japan	
Using persistent homology and diffusion map embeddings to study turbulent combustion dynamics. *Seminar, Nagoya University, Nagoya, Japan*	July 20, 2016
Recent Developments in Topological Data Analysis.	May 25-27, 2016
High-Dimensional Data Analysis (HDDA VI), Fields Institute, Toronto	
A Comparison Framework for Interleaved Persistence Modules.	Apr. 11, 2016
Applied topology seminar, University of Pennsylvania.	
Auslander-Reiten Quivers of finite-dimensional algebras.	Mar. 23, 2016
Algebra seminar, Rutgers University.	
Generalizations of the induced matching and algebraic stability theorems.	Mar. 10, 2016
MacPherson seminar, Institute for Advanced Study.	
Dynamics of 2D fluid simulations through persistent homology.	Oct. 23, 2015
Applied topology seminar, Columbia Medical University.	
Using Persistent Homology to study dynamics in the space of persistence diagrams, Parts I & II. *Algebraic Topology & High-Dimensional Data Analysis (HDDA V), University of Victoria, Victoria, BC*	Aug. 17-28, 2015
Bent out of Shape: Taking a look at Perturbed Eigenvalues	Feb. 18, 2012
Florida MAA Conference Student Speaker, University of North Florida	
Imagining the Banach-Tarski Paradox	Aug. 4, 2011
Student Speaker, Pi Mu Epsilon National Meeting at MathFest 2011	

Service

Co-organizer for New York Applied Topology seminar, *Columbia University Medical Center*	Fall 2015 – Spring 2016
Co-organizer for AMS Special Session on Topological Data Analysis: Computations, Statistics and Applications, *Rutgers University*	Nov. 2015
Directed Reading Program, *Rutgers University*	Fall 2014 – Spring 2016
Pi Mu Epsilon Florida Eta Chapter, *President*	2011 - 2012
Pi Mu Epsilon Florida Eta Chapter, *Vice President*	2011

Teaching

TA for Calculus III, Rutgers University	Fall 2016
TA for Computational Topology, Rutgers University	Spring 2016
Instructor for Graph Algorithms, RYSP, Rutgers University	Summer 2015
Undergraduate research mentor, DIMACS REU	Summer 2015
TA for Calculus II for Math/Science Majors, Rutgers University	Fall 2014

Programming and Technical Experience

Programming: Python, shell scripting, MATLAB, Mathematica, Maple, R, JavaScript, D3, SQL, and C++. Data modeling experience with relational databases and domain models (UML).

OS and other: Mac OS X, and Linux environments. Microsoft Office Suite (Excel, Word, Access, Visio). Experience running distributed computations in HPC environments.

References

Konstantin Mischaikow, Rutgers University	mischaik@math.rutgers.edu
Michael Schatz, Georgia Tech	ms201@gatech.edu
Miroslav Kramar, Inria Saclay	miroslav.kramar.1@gmail.com
Charles Weibel, Rutgers University	weibel@math.rutgers.edu