

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

VP, Director of Data Science, Fidelity National Financial	Summer 2018 - Present
Postdoctoral Researcher, University of Pennsylvania	Summer 2017 –2018
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 <i>Rutgers University, Department of Mathematics</i>	Fall 2016
University Diversity Fellowship <i>Rutgers University Graduate School of Arts and Sciences</i>	2012 - 2014
Janice Pattwell Annual Mathematics Fellowship <i>Rutgers University, Department of Mathematics</i>	2012 - 2013
Outstanding Undergraduate Student in Mathematics <i>University of North Florida Mathematics & Statistics Department</i>	Apr. 2012
Student Speaker Award <i>Pi Mu Epsilon National Meeting at MathFest 2011, Lexington, KY.</i>	Aug. 2011
Undergraduate Scholarships for Analysis & Probability <i>University of North Florida Mathematics & Statistics Department</i>	May 2011
UNF College of Arts & Sciences, Willard O. Ash Award <i>Award recognizing a senior who embodies Dean Ash's philosophy of a broad-based education in the liberal arts and sciences.</i>	Nov. 2010

Publications and Preprints

Connecting Lyapunov Vectors with the Pattern Dynamics of Chaotic Rayleigh-Bénard Convection (with M. Xu, J. Cyranka, M. Schatz, K. Mischaikow, M. R. Paul) *preprint arXiv:1810.09384 (2018)*

Persistent Homology and Euler Integral Transforms (with R. Ghrist and H. Mai), *JACT*, Volume 2, Issue 1–2, 55–60 (2018)

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

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)

Selected Talks

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

New applications of persistent homology to image and time series analysis. <i>Applied Topology Seminar, University of Pennsylvania</i>	Nov. 15, 2016
Exploring high dimensional data with persistent homology. <i>Guest lecturer, Senior capstone class, New Jersey Institute of Technology</i>	Oct. 11, 2016
Tracking Errors in the space of Persistence Diagrams. <i>Patterns and Waves 2016, Hokkaido University, Sapporo, Japan</i>	Aug. 1-5, 2016
Using persistent homology and diffusion map embeddings to study turbulent combustion dynamics. <i>Seminar, Nagoya University, Nagoya, Japan</i>	July 20, 2016
Recent Developments in Topological Data Analysis. <i>High-Dimensional Data Analysis (HDDA VI), Fields Institute, Toronto</i>	May 25-27, 2016
A Comparison Framework for Interleaved Persistence Modules. <i>Applied topology seminar, University of Pennsylvania.</i>	Apr. 11, 2016
Auslander-Reiten Quivers of finite-dimensional algebras. <i>Algebra seminar, Rutgers University.</i>	Mar. 23, 2016
Generalizations of the induced matching and algebraic stability theorems. <i>MacPherson seminar, Institute for Advanced Study.</i>	Mar. 10, 2016
Dynamics of 2D fluid simulations through persistent homology. <i>Applied topology seminar, Columbia Medical University.</i>	Oct. 23, 2015
Using Persistent Homology to study dynamics in the space of persistence diagrams, Parts I & II. <i>Algebraic Topology & High-Dimensional Data Analysis (HDDA V), University of Victoria, Victoria, BC</i>	Aug. 17-28, 2015
Bent out of Shape: Taking a look at Perturbed Eigenvalues <i>Florida MAA Conference Student Speaker, University of North Florida</i>	Feb. 18, 2012
Imagining the Banach-Tarski Paradox <i>Student Speaker, Pi Mu Epsilon National Meeting at MathFest 2011</i>	Aug. 4, 2011

Service

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

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Michael Schatz, Georgia Tech

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Miroslav Kramar, Inria Saclay

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Charles Weibel, Rutgers University

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