Parker B. **Edwards**

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Research interests: Topological data analysis, applied algebraic geometry, machine learning, and applications.

Employment and Education

Robert and Sara Lumpkins Postdoctoral Research Associate — *University of Notre Dame*
Department of Applied and Computational Mathematics and Statistics — *June 2020 - Present*

Ph.D., Mathematics — *University of Florida*
Adviser: Peter Bubenik — *Aug. 2016 - May 2020*

Master of Science, Mathematics and the Foundations of Computer Science — *University of Oxford*
Advisers: Emilie Dufresne and Heather Harrington — *Oct. 2015 - Oct. 2016*

Bachelor of Science, Mathematics (minor: Computer Science) — *University of Florida*
Aug. 2011 - May 2015

Honors and Scholarships

2018 - 20 **Informatics Institute Fellowship**, U. Florida
2016- 20 **Graduate School Fellowship**, U. Florida, tuition and stipend
2016 **Prize for Excellence**, U. Oxford
2016 **Distinction**, M.Sc. in Math. and Foundations of C.S.
2015 - 16 **Frost Scholarship**, U. Oxford, tuition and stipend
2015 **Phi Beta Kappa**, Florida Chapter Beta
2015 **Magna cum laude**, B.S. in Mathematics
2015 **Pi Mu Epsilon Undergraduate Award**, U. Florida Mathematics Dept.
2013 **Anderson Scholar**, U. Florida College of Liberal Arts and Science

Publications

2021 ***TDAExplore: quantitative image analysis of fluorescence microscopy images through topology-based machine learning*. Patterns (2021).** `https://www.cell.com/patterns/fulltext/S2666-3899(21)00229-4`. With Kristen Skruber, Nikola Milićević, James B Heidings, Tracy-Anne Read, Peter Bubenik, and Eric Vitriol.

2021 ***Graded Persistence Diagrams and Persistence Landscapes.* Discrete Comput Geom (2021).** `https://doi.org/10.1007/s00454-021-00316-1`. With Leo Betthauser and Peter Bubenik.

2021 ***Certified evaluations of Hölder continuous functions at roots of polynomials*. In Maple in Mathematics Education and Research. MC 2020. Communications in Computer and Information Science, vol 1414.** `https://doi.org/10.1007/978-3-030-81698-8_13`. With Jonathan Hauenstein and Clifford Smyth.

2019 ***Sampling Real Algebraic Varieties for Topological Data Analysis*. In 2019 18th IEEE Internatioanl Conference on Machine Learning and Applications (ICMLA) (pp. 1531-1536). IEEE.** `https://doi.org/10.1109/ICMLA.2019.00253`. With Emilie Dufresne, Heather Harrington, and Jonathan Hauenstein.

2020 ***A New Palette for Persistence Landscapes***, Ph.D. dissertation, University of Florida

2016 ***Topological Data Analysis for Real Algebraic Varieties***, M.Sc. dissertation, University of Oxford

Mathematical Software

2021	**`TDAExplore`,** an R library and command line tools for image analysis and exploration using topological features, `https://github.com/P-Edwards/TDAExplore-ML`
2021	**`EvalCertification`,** a Maple library to compute certified evaluations of functions at roots of polynomials, `https://github.com/P-Edwards/EvalCertification`
2018	**`tdasampling`,** a Python package to sample real algebraic varieities for topological data analysis, `https://github.com/P-Edwards/tdasampling`

Presentations

Oct. 2021	**UT Knoxville Math Data Science Seminar (Invited),** Weakly supervised image segmentation with topological data analysis	*U. Tennessee*
July 2021	**Southeast Center for Mathematics and Biology Summer Seminar (Invited),** Using Topological Data Analysis to Extract Spatial Information from Microscopy Datasets	*Georgia Institute of Technology/virt.*
Mar. 2021	**Notre Dame Applied Math Seminar,** Some Vignettes in Applied Topology	*U. Notre Dame*
Jan. 2020	**Workshop and Winter School on Geometric and Topological Data Analysis (Invited),** Graded Pesistence Diagrams and Persistence Landscapes	*CIMAT, Guanajuato, Mexico*
Oct. 2019	**UF Topology and Dynamics Seminar,** Stability for Graded Persistence Diagrams	*U. Florida*
Oct. 2019	**UF Applied Topology Seminar,** Feature Sizes for Real Semialgebraic Sets	*U. Florida*
July 2019	**SIAM Applied Algebraic Geometry 2019,** Sampling Real Algebraic Varieties for Topological Data Analysis	*U. Bern, Switzerland*
May 2019	**Midwest Student Conference on Geometric Data Analysis,** Sampling Real Algebraic Varieties for Topological Data Analysis	*Ohio State U.*
Apr. 2019	**UF SIAM Seminar,** Topological Data Analysis of Actin Networks	*U. Florida*
Mar. 2019	**UF Topology and Dynamics Seminar,** Graded Persistence Diagrams and Persistence Landscapes	*U. Florida*
June 2018	**Applied Topology: Methods, Computation, and Science 8,** Persistence Landscapes are Graded Persistence Diagrams	*IST Austria*
Mar. 2018	**UF Student Data Analysis Seminar,** The Topology of Cyclo-octane's Configuration Space	*U. Florida Informatics Institute*
Aug. 2017	**SIAM Applied Algebraic Geometry 2017,** Topological Data Analysis for Real Algebraic Varieties	*Atlanta, Georgia*
Oct. 2017	**UF Graduate Student Topology Seminar,** Algebraic Stability of Persistence Diagrams	*U. Florida*
Aug. 2017	**UF Student Data Analysis Seminar,** Finding Good Data Samples from Polynomial Systems	*U. Florida Informatics Institute*
Feb. 2017	**UF Graduate Student Topology Seminar,** Finding Matchings Between Persistence Diagrams	*U. Florida*
Feb. 2017	**Joint Florida State University/University of Florida Topology and Dynamics Meeting,** Extracting Topological Information from Systems of Polynomials	*U. Florida*
Feb. 2017	**Joint Math Meetings Mini-Symposium,** Topological Data Analysis for Real Algebraic Varieties	*Atlanta, Georgia*
Mar. 2015	**UF Graduate Student Topology Seminar,** Stability for Persistence Diagrams	*U. Florida*

Teaching and Supervision

Fall 2021 - Present	**Advisor,** Marie Grasse, undergraduate student	*U. Notre Dame*
Fall 2021 - Present	**Advisor,** Hoai Trinh, undergraduate student	*U. Notre Dame*
Fall 2021	**Lecturer,** Special Topics in Applied Mathematics - Applied Topology (ACMS 80770)	*U. Notre Dame*
Spring 2021	**Lecturer,** Applied Linear Algebra (ACMS 20620)	*U. Notre Dame*
Fall 2020	**Lecturer,** Applied Linear Algebra (ACMS 20620)	*U. Notre Dame*
Spring 2019	**Lecturer,** Trigonometry (MAC 1114)	*U. Florida*
Fall and Spring 2018	**Discussion sections,** Calculus I (MAC 2311)	*U. Florida*
Fall 2017	**Discussion sections,** Precalculus Algebra with Trigonometry (MAC 1147)	*U. Florida*

Service and Experience

2021	**Organizer: Special Session on Comp. and Applied Algebraic Geom., AMS Spring Central Sectional 2022**
2021	**Contributor: OPEN-Maps Redistricting and Communities of Interest Faculty Working Group**
2020	**Referee: Journal of Applied and Computational Topology**
2020	**Referee: Foundations of Data Science**
2018	**Member: U. Florida Mathematics Department Graduate Committee**
2018	**President: U. Florida Graduate Mathematics Association**
2017-19	**Organizer: UF Student Data Analysis Seminar**
2016	**Member: U. Oxford, Exeter College IT Committee**
2016-	**Member: American Mathematical Society**
2016-	**Member: Society of Industrial and Applied Mathematics**
2014	**Employment: Software Development Intern, International Business Machines Corporation**