

# Darrick Lee

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## ACADEMIC EMPLOYMENT

- 09/2022 - present **Postdoctoral Research Associate**, University of Oxford  
Advisor: Prof. Harald Oberhauser
- 08/2021 - 08/2022 **Postdoctoral Researcher**, École Polytechnique Fédérale de Lausanne (EPFL)  
Advisor: Prof. Kathryn Hess

## EDUCATION

- 2021 **Ph.D.** Applied Mathematics and Computational Sciences, University of Pennsylvania  
Advisor: Prof. Robert Ghrist
- 2018 **M.A.** Applied Mathematics and Computational Sciences, University of Pennsylvania
- 2016 **B.A.Sc.** Engineering Physics (Electrical Option), University of British Columbia  
Minor: Honors Mathematics

## RESEARCH INTERESTS

signature methods for parametrized data, applied algebraic topology

## PUBLICATIONS AND PREPRINTS

8. C. Toth, **D. Lee**, C. Hacker, H. Oberhauser, *Captuing graphs with hypo-elliptic diffusions*, (arXiv:2205.14092)
7. C. Giusti, **D. Lee**, V. Nanda, H. Oberhauser, *A topological approach to mapping space signatures*, (arXiv:2202.00491)
6. C. Giusti, **D. Lee**, *Signatures, Lipschitz-free spaces, and paths of persistence diagrams*, (arXiv:2108.02727)
5. **D. Lee**, R. Ghrist, *Path signatures on Lie groups*, (arXiv:2007.06633)
4. C. Giusti, **D. Lee**, *Iterated integrals and population time series analysis*, Proceedings of the Abel Symposium, 2020. (arXiv:1811.03558)
3. D. Bhaskar, **D. Lee**, H. Knútsdóttir, C. Tan, M. Zhang, P. Dean, C. Roskelley, L. Edelstein-Keshet, *A methodology for morphological feature extraction and unsupervised cell classification*. (biorXiv:623793v1)
2. **D. Lee** and A. Schnyder, *Structure of vortex-bound states in spin-singlet chiral superconductors*, Physical Review B. 93: 064522 (arXiv:1508.05331)
1. R. Froese, **D. Lee**, C. Sadel, W. Spitzer and G. Stolz, *Localization for transversally periodic random potentials on binary trees*, Journal of Spectral Theory. 6: 557-600 (arXiv:1408.3961)

## AWARDS AND HONORS

- 2018 - 2021 NSERC Postgraduate Scholarship - Doctoral (PGS-D3)
- 2018 Good Teaching Award, Department of Mathematics, University of Pennsylvania
- 2016 - 2021 Benjamin Franklin Fellowship, University of Pennsylvania
- 2016 - 2017 Fulbright Canada Student Award
- 2014, 2015 NSERC Undergraduate Research Award

## RESEARCH VISITS

- 06/2022 Research Visitor, *University of Oxford* (under Prof. Harald Oberhauser)
- 03/2022 Research Visitor, *MPI for Mathematics in the Sciences* (under Prof. Bernd Sturmfels)
- 05 - 07/2020 Research Visitor, *University of Oxford* (under Prof. Vedit Nanda)  
(Cancelled due to COVID-19)

## RECENT INVITED SEMINAR AND CONFERENCE TALKS

- 09/2022 *4th IMA Conference on the Mathematical Challenges of Big Data*, Oxford, UK
- 09/2022 *New Interfaces of Stochastic Analysis and Rough Paths*, BIRS Workshop, Banff, Canada
- 07/2022 *Rough Analysis and Data Science Workshop*, Imperial College London
- 07/2022 *SIAM Annual Meeting (Signatures, Kernels and Applications)*, Pittsburgh, USA
- 06/2022 *SPDEs Seminar*, TU Berlin
- 06/2022 *Persistence, Sheaves and Homotopy Online Seminar*
- 05/2022 *Probability, Stochastic Analysis and Statistics in Pisa*, University of Pisa
- 03/2022 *CIMDA-Oxford Seminar*, University of Oxford
- 02/2022 *Applied Topology Seminar*, EPFL
- 12/2021 *Applied Topology Seminar*, University of Oxford
- 12/2021 *Topology Seminar*, Bilkent University
- 11/2021 *Applied Topology in Albany*, University at Albany SUNY
- 08/2021 *Berkeley Seminar*, Topos Institute
- 05/2021 *Geometry/Topology Seminar*, Oregon State University
- 02/2021 *Rough Paths Interest Group*, University of Oxford
- 09/2020 *Geometry and Topology Seminar*, North Carolina State University
- 01/2020 *UF Topological Data Analysis Conference*, University of Florida
- 11/2019 *Applied Topology Seminar*, University at Albany SUNY
- 11/2019 *Data Science and Applied Topology Seminar*, CUNY Graduate Center

## TEACHING EXPERIENCE

## TEACHING ASSISTANT - EPFL

- Fall 2021 MATH 220: Metric and Topological Spaces

## CO-INSTRUCTOR - UNIVERSITY OF PENNSYLVANIA

- 08/2020 Pre-Freshman Program  
An intensive 4-week program for incoming freshman at Penn, many from low-income and/or first generation backgrounds. Alternated between teaching two classes: single variable calculus and multivariable calculus. This course was taught online.

## TEACHING ASSISTANT - UNIVERSITY OF PENNSYLVANIA

- Spring 2018 MATH 241: Calculus IV (Partial Differential Equations)
- Fall 2017 MATH 360: Advanced Calculus (Analysis)

## LAB TEACHING ASSISTANT - UNIVERSITY OF BRITISH COLUMBIA

- Spring 2016 APSC 101: Introduction to Engineering II
- Fall 2015 APSC 100: Introduction to Engineering I

## ACADEMIC ACTIVITIES

## MASTER'S THESIS SUPERVISION

- 05 - 09/2022 **Student:** Hugo Henneuse (Institut Polytechnique de Paris/ENSAE)  
**Project:** Orthogonal Invariants of the Mapping Space Signature
- 02 - 07/2022 **Student:** Karl Arthursson (KTH Royal Institute of Technology in Stockholm)  
**Project:** Gaussian Process Methods for Static and Dynamic Persistent Homology

## UNDERGRADUATE MENTORSHIP

- Fall 2021 Semester Project: Topics in Applied Algebraic Topology (Student: Xiaohan Wang)
- Spring 2021 Directed Reading Program: Mathematics of Data Science (Student: Sam Rosenberg)
- Fall 2020 Directed Reading Program: Causal Inference (Student: Sam Rosenberg)
- Summer 2020 Independent Study: Stochastic Calculus (Student: Sam Rosenberg)
- Spring 2020 Directed Reading Program: Time Series Analysis (Student: Sam Rosenberg)

## SEMINAR ORGANIZATION

- 2020-2021 Organizer: Graduate Student Applied Topology Seminar (UPenn)
- Spring 2019 Co-organizer: Simplicial Homotopy Theory Seminar (UPenn)
- 2017 - 2018 Organizer: Graduate Student Applied Topology Seminar (UPenn)

## OUTREACH AND SERVICE

- 2018-2021 Master TA, University of Pennsylvania  
 Helped train, observe and select teaching assistants for the department of mathematics
- 2018, 2019 Volunteer, University of Pennsylvania Math Festival  
 Coordinated, built and presented topology demonstrations (linkages, picture frame problem, 3D printed examples)
- Summer 2017 Summer Discovery Camp Volunteer, Franklin Institute Science Museum  
 Planned and presented 7 science activities for summer campers entering grades 7-9

## UNDERGRADUATE EMPLOYMENT

- 05 - 08/2016 USRA Student, UBC Math Department (Vancouver, BC)  
**Advisor:** Prof. Leah Edelstein-Keshet  
**Project:** A computational pipeline for morphological cell classification
- 05 - 08/2015 USRA Student, Université du Québec à Montréal Math Department (Montreal, QC)  
**Advisor:** Prof. Steven Boyer and Prof. Dale Rolfsen  
**Project:** Left orderability of knot groups, branched covers, and representations
- 05 - 12/2014 Research Intern, Max Planck Institute for Solid State Physics (Stuttgart, Germany)  
**Advisor:** Prof. Andreas Schnyder  
**Project:** Vortex-bound states in topological superconductors
- 01 - 04/2013 Modeling and Simulations Intern, Robert Bosch GmbH (Stuttgart, Germany)  
**Project:** Simulations for micro-electromechanical system (MEMS) design
- 05 - 08/2012 Research Student, UBC Math Department (Vancouver, BC)  
**Advisor:** Prof. Richard Froese  
**Project:** Anderson localization in 1 dimension