ELIZA O'REILLY

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ACADEMIC POSITIONS

Johns Hopkins University
Assistant Professor in Applied Mathematics and Statistics *July 2023 - Present*

California Institute of Technology
NSF Postdoctoral Fellow and Postdoctoral Scholar Fellowship Trainee *September 2020 - June 2023*
CMI Postdoctoral Scholar *September 2019 - September 2020*

EDUCATION

University of Texas at Austin *September 2013 - August 2019*
PhD in Mathematics, Advisor: François Baccelli
Thesis: Repulsion of Determinantal Point Processes and Stationary Poisson Tessellations in High Dimensions

University of Pittsburgh *January 2010 - May 2013*
B.S. in Mathematics, Minor in Computer Science

HONORS AND AWARDS

NSF Mathematical Sciences Postdoctoral Research Fellowship *2020 - 2022*
Departmental Dissertation Excellence Award, *UT Austin Department of Mathematics* *2020*
NSF Graduate Research Fellowship *2013 - 2018*
Graduate School Professional Development Award, *UT Austin* *2017*

CURRENT GRANTS

NSF DMS-2402234 Data-adaptive Random Tessellations for Complex Data Analysis. Award period: 10/01/2024- 09/31/2027. Total award amount: $320,236.

PUBLICATIONS

[1] Eliza O'Reilly and Venkat Chandrasekaran. Operatopes, operanoids, and noncommutative zonoids. *Preprint*, 2026. `https://arxiv.org/abs/2602.08103`.

[2] Oscar Leong, Eliza O'Reilly, and Yong Sheng Soh. Optimal regularization under uncertainty: Distributional robustness and convexity constraints. *Preprint*, 2025. `https://arxiv.org/abs/2510.03464`.

[3] Samuel D Curtis, Sambit Panda, Adam Li, Haoyin Xu, Yuxin Bai, Itsuki Ogihara, Eliza O'Reilly, Yuxuan Wang, Lisa Dobbyn, Maria Popoli, et al. Minimizing and quantifying uncertainty in ai-informed decisions: Applications in medicine. *Proceedings of the National Academy of Sciences*, 122(34):e2424203122, 2025.

[0] Authorship is alphabetical except in [2], [3], [5], [6], [11] and [18] where authors are ordered by contribution.

[4] Samuel D Curtis, Tingshan Liu, Yuxin Bai, Yuxuan Wang, Sambit Panda, Adam Li, Haoyin Xu, Eliza O'Reilly, Lisa Dobbyn, Maria Popoli, et al. Fragmentation signatures in cancer patients resemble those of patients with vascular or autoimmune diseases. *Proceedings of the National Academy of Sciences*, 122(34):e2426890122, 2025.

[5] Ekin Gunes Ozaktas, Sreyas Chintapalli, Eliza O'Reilly, and Susanna M Thon. Aperiodicity and disorder as systematic spectral tuning mechanisms for plasmonic nanostructures. *Optics Express*, 33(11):23227–23243, 2025.

[6] Oscar Leong, Eliza O'Reilly, Yong Sheng Soh, and Venkat Chandrasekaran. Optimal regularization for a data source. *Foundations of Computational Mathematics*, 2025.

[7] Calvin Osborne and Eliza O'Reilly. The uniformly rotated Mondrian kernel. In *The 28th International Conference on Artificial Intelligence and Statistics*, 2025. https://openreview.net/forum?id=nLClQpOUIh.

[8] Oscar Leong, Eliza O'Reilly, and Yong Sheng Soh. The star geometry of critic-based regularizer learning. In *The Thirty-eighth Annual Conference on Neural Information Processing Systems*, 2024.

[9] Ricardo Baptista, Eliza O'Reilly, and Yangxinyu Xie. TrIM: Transformed iterative Mondrian forests for gradient-based dimension reduction and high-dimensional regression. *Preprint*, 2024. https://arxiv.org/abs/2407.09964.

[10] Eliza O'Reilly. Statistical advantages of oblique randomized decision trees and forests. *Preprint*, 2024. http://www.arxiv.org/abs/2407.02458.

[11] Eliza O'Reilly and Ngoc Mai Tran. Minimax rates for high dimensional random tessellation forests. *Journal of Machine Learning Research*, 25:1–32, 2024.

[12] Eliza O'Reilly and Venkat Chandrasekaran. Spectrahedral regression. *SIAM Journal on Optimization*, 33(2), 2023.

[13] Eliza O'Reilly and Ngoc Mai Tran. Stochastic geometry to generalize the Mondrian process. *SIAM Journal on Mathematics of Data Science*, 4(2):531–552, 2022.

[14] Gilles Bonnet and Eliza O'Reilly. Facets of spherical random polytopes. *Mathematische Nachrichten*, 295(10):1901–1933, 2022.

[15] Jesper Møller and Eliza O'Reilly. Couplings for determinantal point processes and their reduced Palm distributions with a view to quantifying repulsiveness. *Journal of Applied Probability*, 58(2), 2021.

[16] Eliza O'Reilly. Thin-shell concentration for zero cells of stationary Poisson mosaics. *Advances in Applied Mathematics*, 117, 2020.

[17] François Baccelli and Eliza O'Reilly. A stochastic geometry model for unconstrained one-bit data compression. *Electronic Journal of Probability*, 24(138), 2019.

[18] François Baccelli and Eliza O'Reilly. Reach of repulsion for determinantal point processes in high dimensions. *Journal of Applied Probability*, 55(3), September 2018.

[19] Eliza O'Reilly, François Baccelli, Gustavo De Veciana, and Haris Vikalo. End-to-end optimization of high-throughput dna sequencing. *Journal of Computational Biology*, 23(10), 2016.

INVITED TALKS AND WORKSHOPS

Stochastic Networks Conference, Chicago IL	*June 2026*
SIAM Conference on Optimization, Edinburgh, UK	*June 2026*
Statistics and Data Science Seminar, University of Massachusetts Amherst	*April 2026*
SCAN Seminar, Cornell University	*November 2025*
Joint Statistical Meetings, Nashville TN	*August 2025*
AWM Research Symposium, Madison WI	*May 2025*
Joint Mathematics Meetings, Seattle WA	*January 2025*
INFORMS Optimization Society (IOS) Conference, Houston, TX	*March 2024*
Asymptotics of (Random) Convex Sets Workshop, HIM	*February 2024*
Tulane Algebra and Combinatorics Seminar	*November 2023*
Probability and Analysis Webinar	*October 2023*
CIS & MINDS Seminar, Johns Hopkins University	*October 2023*
Kaiserslautern Applied and Industrial Mathematics Days	*September 2023*
ICSA 2023 Applied Statistics Symposium, Ann Arbor, Michigan	*June 2023*
Random Algebraic Geometry Workshop, Banff International Research Station	*April 2023*
UW-Madison Applied Algebra Seminar	*May 2023*
Joint Mathematics Meetings, Boston MA	*January 2023*
Online Asymptotic Geometric Analysis Seminar	*December 2022*
TAG-DS Online Seminar	*October 2022*
SFU Statistics Seminar	*April 2022*
UBC Statistics Seminar	*March 2022*
Online Seminar on Spatial and spatio-temporal Point processes and beyond	*March 2022*
Young Data Science Researcher Seminar Zurich (Virtual)	*March 2022*
UW-Madison Probability Seminar	*April 2022*
JMM AMS Special Session on Geometry in the Mathematics of Data Science	*April 2022*
9th conference of Stochastic Geometry Days 2021, Dunkerque	*November 2021*
BIRS-CMO Workshop on Geometry & Learning from Data	*October 2021*
Stochastic Systems Seminar, UC San Diego	*October 2021*
VII Mexican Workshop on Geometric and Topological Data Analysis	*September 2021*
High Dimensional Spatial Random Systems Workshop, Hausdorff Research Institute for Mathematics	*February 2021*
Inria, Paris, France	*January 2021*
Probability Seminar, Brown University	*May 2020*
New Perspectives and Computational Challenges in High Dimensions Workshop, Oberwolfach Research Institute for Mathematics	*February 2020*
Center for the Mathematics of Information Seminar, Caltech	*October 2019*
Inria, Paris, France	*May 2019*
Workshop on Point Processes in Space, Time, and Beyond, Skagen, Denmark	*May 2019*
Austin-TAMU Probability and Related Fields, Texas A&M	*November 2018*

TEACHING

Instructor, Johns Hopkins University	
Introduction to Stochastic Processes	*Spring 2024, 2025, 2026*
Point Processes and Stochastic Geometry	*Fall 2025*
Instructor, Caltech	
ACM 270 "Point Processes and Stochastic Geometry"	*Spring 2021*

SERVICE

Reviewer: NSF DMS Panel (2025), SIMAX, JRSS Series B, Bernoulli, Journal of Applied Probability, SIMODS, IEEE Transactions on Information Theory, SIAGA, STCO, SIREV

Co-organizer, DeepMATH conference, Ann Arbor, Michigan *November 2025*

Co-organizer, DeepMATH conference, Philadelphia, Pennsylvania *November 2024*

Organizer, "Data-Driven Regularization: Theory and Applications" Minisymposium *October 2024*
SIAM Conference on Mathematics of Data Science, Atlanta, Georgia

Organizer, "Algebraic and Geometric Methods in Optimization" Minisymposium *May 2023*
SIAM Conference on Optimization, Seattle, Washington

Organizer, "The Role of Data Geometry in High-dimensional Learning" Minisymposium *September 2022*
SIAM Conference on Mathematics of Data Science, San Diego, California

Organizer, "Geometry of Machine Learning" Minisymposium *November 2021*
4th Annual Meeting of the SIAM Texas-Louisiana Section, South Padre Island, Texas

Co-organizer, CMX Student and Postdoc Seminar Organizer, Caltech *September 2020 -*

MENTORING

PhD Students (JHU):
- Mary Versa Clemens-Sewall *Fall 2024 -*
- Drew Henrichsen *Fall 2025 -*
- Yufei Zhan *Spring 2026 -*

Master's Students (JHU):
- Sarwesh Rauniyar *Fall 2024 - Spring 2025*

Undergraduate Students (JHU):
- Jiaxing Brisbois *Spring 2026*
- Nina Li *Spring 2026*
- Kevin Huang *Summer 2025*

PhD Committees (JHU):
- Yuxin Bai, Jayanta Dey, Sambit Panda, Eleanor Belkin

Caltech Summer Undergraduate Research Fellows (SURF):
- Calvin Osbourne, Evelyn Huerta (co-supervised with Ricardo Baptista) *June 2023 - Oct 2023*
  Projects: Applications and generalizations of the Mondrian Process for Machine Learning
- Hannan Saddiq, co-supervised with Bamdad Hosseini *June 2021 - Oct 2021*
  Project: Random Geometric Priors for Bayesian Inverse Problems

Freshman Summer Research Institute (FSRI):
- *Project: Random Forest Prediction: Theory and Applications* *August 2022*

OUTREACH

Member of the Institute of Mathematical Statistics (IMS) Diversity and Equity Committee *2024 - 2027*

SNF Agora Democracy Day Speaker *August 2024 and 2025*
Gave a presentation to incoming freshman at Johns Hopkins University about using data analysis to understand voter turnout trends in US elections

Caltech Postdoc Association Diversity Committee *2020 - 2022*
Developed and ran an "Inclusive Mentoring Workshop" for Caltech Postdocs

Caltech Y's Student Activism Speaker Series Organizer *2020 - 2022*
Invited speakers to give seminars about public policy and technical advocacy