

Theo McKenzie

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CURRENT APPOINTMENT

Stanford University, Department of Mathematics, Science Fellow 7/2023-2026

PREVIOUS APPOINTMENT

Harvard University, Department of Mathematics, NSF MPS Ascend Postdoctoral Fellow 7/2022-6/2023

EDUCATION

Ph.D. in Mathematics, University of California, Berkeley 8/2017-5/2022

Thesis: *Eigenvector Structure in the Adjacency Matrix of Discrete Graphs*

Advisors: Prof. Nikhil Srivastava of UC Berkeley and
Prof. Luca Trevisan of Bocconi University

A.B. in Mathematics, Harvard University (Cum Laude) 8/2011-5/2015

Secondary Field: The Classics

Thesis: *Real Stable Polynomials: Description and Application*

Advisor: Prof. Péter Csikvári of MIT

RESEARCH INTERESTS

The intersection of mathematical physics and combinatorics, specifically the structure of eigenvectors of graphs. Random graphs, random matrices, probability theory, theoretical computer science.

LIST OF PUBLICATIONS AND PREPRINTS

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8. [Explicit two-sided unique-neighbor expanders](#). With Jun-Ting Hsieh, Sidhanth Mohanty, and Pedro Paredes. Preprint, arXiv:2302.01212. *Submitted*
 7. [Quantum ergodicity for periodic graphs](#). With Mostafa Sabri. Preprint, arXiv:2208.12685. *Submitted*
 6. [Many nodal domains in random regular graphs](#). With Shirshendu Ganguly, Sidhanth Mohanty, and Nikhil Srivastava. Preprint, arXiv:2109.11532. *Submitted*
 5. [The necessity of conditions for graph quantum ergodicity and Cartesian products with an infinite graph](#). Preprint, arXiv:2106.09772. *Comptes Rendus Mathématique*, 360(G4), 399-408.
 4. [Support of closed walks and second eigenvalue multiplicity of graphs](#). With Peter M. R. Rasmussen and Nikhil Srivastava. In *Proceedings of the 53rd Annual ACM SIGACT Symposium on Theory of Computing (STOC 2021)* (pp. 396-407)
 3. [High-girth near-Ramanujan graphs with lossy vertex expansion](#). With Sidhanth Mohanty. In *Proceedings of the 48th International Colloquium on Automata, Languages, and Programming (ICALP 2021)* (pp. 96:1-96:15)
 2. [A new algorithm for the robust semi-random independent set problem](#). With Hermish Mehta and Luca Trevisan. In *Proceedings of the Fourteenth Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2020)* (pp. 738-746)
 1. [Real stable polynomials: description and application](#). Advisor: Péter Csikvári. Undergraduate Thesis

SELECTED FELLOWSHIPS AND SCHOLARSHIPS

T. McKenzie 2

NSF Math and Physical Sciences ASCEND Fellowship <i>300k support offered (100k support per year for three years. 100k accepted).</i>	2022
NSF Graduate Research Fellow <i>~\$138k equivalent (12k tuition and fees + 34k per year stipend for three years)</i>	2019
Ford Foundation Predoctoral Fellow <i>~\$72k equivalent (24k per year stipend for three years)</i>	2019
Math and Physical Sciences Mentorship Award <i>\$1,800 Award</i>	2018
Berkeley Chancellor's Fellowship Recipient <i>~\$126k equivalent (tuition and fees + 30k per year stipend for two years)</i>	2017

TEACHING EXPERIENCE

Lecturer at Boston University Prison Education Program, MCI-Framingham Prison	8/2022-Present
Lead Instructor of Pre-Calculus and Intermediate Algebra for Mount Tamalpais College (formerly the Prison University Project) at San Quentin State Prison.	2018-2022
Graduate Student Instructor at UC Berkeley Mathematics for <i>Methods of Mathematics: Calculus, Statistics, and Combinatorics</i>	2019
Course Assistant at Harvard University for 6 semesters. Assisted classes in calculus, linear algebra, and group theory	2012-2015

PROFESSIONAL EXPERIENCE

Research Intern at Microsoft Research, Machine Learning Foundations Group <i>Redmond, WA</i>	5/2022-8/2022
Trading Analyst at Goldman Sachs & Co. <i>New York, NY</i>	7/2015-5/2017

MENTORSHIP AND LEADERSHIP

Math Includes Mentor (Mentors 5 undergraduates from underrepresented backgrounds interested in math. Meets monthly.)	8/2022-Present
STEM First Year Initiative Ambassador (mentored three first year minority STEM Ph.D. students)	2019-2022
Organized Berkeley Discrete Analysis Student Seminar	2021
Getting into Graduate School Mentor (met monthly with two mentees to help them prepare applications for graduate school)	2019-2020
Directed Reading Program Mentor (advised two research projects for Berkeley undergraduates, one on spectral graph theory, one on convex optimization)	2017- 2018
Be A Scientist Mentor (helped plan and organize science experiments for City of Berkeley middle school public school students)	2017-2018

SELECTED INVITED TALKS

Institute for Advanced Study Computer Science and Discrete Mathematics Seminar	May 2023
University of Virginia Operator Theory Seminar	March 2023
MIT Combinatorics Seminar	February 2023
Online Asymptotic Geometric Analysis Semiar	April 2022
Texas A&M Mathematical Physics Seminar	April 2022
Spectral Geometry in the Clouds Young Researcher Showcase	March 2022
JMM Special Session on Applied Combinatorial Methods	January 2022
Math Analysis Egypt Seminar	November 2021
Berkeley Edge Conference <i>Keynote Speaker</i>	November 2021
Georgia Tech Stochastics Seminar	October 2021
Carnegie Mellon Theory Seminar	October 2021
University of Washington CS Theory Seminar	October 2021
University of Washington Probability Seminar	October 2021
CanaDAM Minisymposium on Spectral Graph Theory	May 2021
Delaware Discrete Mathematics and Algebra Seminar	February 2021
Stanford Probability Seminar	February 2021
JMM Special Session on ADJOINT Research Showcase	January 2021
IPAM Quantitative Linear Algebra Program	December 2019
Pacific Math Alliance Conference	October 2019

SELECTED CONTRIBUTED TALKS

MSRI Workshop on Universality and Integrability in Random Matrix Theory	September 2021
International Colloquium on Automata, Languages, and Programming	July 2021
Symposium on Theory of Computing	June 2021
Conference of Ford Fellows	October 2020, October 2019
Symposium on Discrete Algorithms	January 2020

SELECTED PROGRAMS ATTENDED

AIM online workshop on spectral graph and hypergraph theory	2021
Simons Program on Probability, Geometry, and Computation in High Dimensions	2020
Simons Foundation Conference on High Dimensional Expanders	2019
MSRI African Diaspora Joint Mathematics (ADJOINT) Workshop on Monodromy of Compositions of Belyi Maps	2019
Simons Summer Cluster on Error-Correcting Codes and High-Dimensional Expansion	2019
Simons Program on Geometry of Polynomials	2019
Heidelberg Laureate Forum Young Researcher	2018
UCLA IPAM Semester on Quantitative Linear Algebra	2018