

Benjamin M^cKenna

Research Interests

Probability, random matrices, mathematical physics.

Employment

- from 2024 **Assistant Professor**, *Georgia Institute of Technology (Georgia Tech), School of Mathematics.*
- 2022–2024 **Postdoctoral Fellow**, *Harvard University, Center of Mathematical Sciences and Applications.*
- Supervisor: Horng-Tzer Yau.
- spring 2022 **Fulbright Fellow**, *Institute of Science and Technology Austria (ISTA).*
- Supervisor: László Erdős.
- fall 2021 **Postdoctoral Fellow**, *Mathematical Sciences Research Institute (now SLMath).*
- Postdoc in the program “Universality and Integrability in Random Matrix Theory and Interacting Particle Systems.”
 - Supervisors: Alice Guionnet and Mariya Shcherbina.

Education

- 2021 **Ph.D. in Mathematics**, *Courant Institute of Mathematical Sciences, New York University.*
- Advisors: Gérard Ben Arous and Paul Bourgade.
 - Thesis title: “Non-invariant random matrices and landscape complexity.”
 - En-route M.Phil. in Mathematics, 2020.
 - En-route M.S. in Mathematics, 2018.
- 2016 **A.B. in Mathematics with Honors**, *The University of Chicago.*
- GPA: 3.98/4.00. Dean’s List 2012–2016. General honors.
 - Study abroad in University of Chicago Paris Mathematics program, Spring Quarter 2015.
 - Minor in Music.

Research

- [8] *Injective norm of real and complex random tensors I: From spin glasses to geometric entanglement.* Joint with Stephane Dartois. Preprint available at [arXiv:2404.03627](https://arxiv.org/abs/2404.03627).
- [7] *Universality for the global spectrum of random inner-product kernel matrices in the polynomial regime.* Joint with Sofiia Dubova, Yue M. Lu, and Horng-Tzer Yau. Preprint available at [arXiv:2310.18280](https://arxiv.org/abs/2310.18280).
- [6] *Large deviations for the largest eigenvalue of generalized sample covariance matrices.* Joint with Jonathan Husson. To appear in **Electronic Journal of Probability**. Preprint available at [arXiv:2302.02847](https://arxiv.org/abs/2302.02847).
- [5] *Extremal statistics of quadratic forms of GOE/GUE eigenvectors.* Joint with László Erdős. **Annals of Applied Probability**, vol. 34, no. 1B, pp. 1623-1662, 2024.
- [4] *Exponential growth of random determinants beyond invariance.* Joint with Gérard Ben Arous and Paul Bourgade. **Probability and Mathematical Physics**, vol. 3, no. 4, pp. 731-789, 2022.
- [3] *Landscape complexity beyond invariance and the elastic manifold.* Joint with Gérard Ben Arous and Paul Bourgade. **Communications on Pure and Applied Mathematics**, vol. 77, no. 2, pp. 1302-1352, 2024.
- [2] *Complexity of bipartite spherical spin glasses.* **Annales de l’Institut Henri Poincaré**, vol. 60, no. 1, pp. 636-657, 2024.
- [1] *Large deviations for extreme eigenvalues of deformed Wigner random matrices.* **Electronic Journal of Probability**, vol. 26, paper no. 34, 2021.

Honors and Awards

- 2023 **AMS–Simons Travel Grant.**
 - Two-year grant (\$3,000 per year) for professional travel.
- 2021 **Fulbright-Austrian Marshall Plan Foundation Award.**
 - Six-month grant (1,050€ per month) to spend spring 2022 at IST Austria, under the supervision of László Erdős.
 - Awarded to five Americans per year.
- 2020 **Predocctoral Summer Fellowship, *New York University.***
 - Travel grant for dissertation research (\$2,000). Travel cancelled due to coronavirus; grant used during Fulbright.
 - Awarded to 15 Ph.D. students across the Graduate School of Arts and Science.
- 2018-2019 **Isaac Barkey and Ernesto Yhap Fellowship, *New York University.***
 - Awarded each year to an outstanding mathematics Ph.D. student.
- 2016-2021 **Henry M. MacCracken Fellowship, *New York University.***
 - Full Ph.D. support for five years.
- 2015 **Phi Beta Kappa, *The University of Chicago.***
 - Elected as a junior.
- 2015 **Student Marshal, *The University of Chicago.***
 - The highest honor awarded to undergraduates by The University of Chicago.
- 2012-2016 **University Scholar, *The University of Chicago.***
 - Four-year partial merit scholarship (\$10,000 per year).

Talks Given

Invited seminar talks

- Lehigh University–University of Minnesota Joint Probability Seminar, online, (November 2024).
- Duke Probability Seminar, Durham, NC, (November 2024).
- Berkeley Probability Seminar, Berkeley, CA, April 2024.
- Stanford Probability Seminar, Stanford, CA, April 2024.
- CRM Probability Seminar, Montreal, Canada, March 2024.
- Georgia Tech Stochastics Seminar, Atlanta, GA, March 2024.
- Séminaire de Probabilités, Institut de Mathématiques de Toulouse, Toulouse, France, June 2023.
- Séminaire Images Optimisation et Probabilités, IMB, Bordeaux, France, June 2023.
- MIT Probability Seminar, Cambridge, MA, May 2023.
- Northwestern University Probability Seminar, Evanston, IL, April 2023.
- University of Chicago Probability and Statistical Physics Seminar, Chicago, IL, April 2023.
- Bielefeld-Melbourne Random Matrix Seminar, online, December 2022.
- Cornell Probability Seminar, Ithaca, NY, November 2022.
- Texas A&M Mathematical Physics and Harmonic Analysis Seminar, online, November 2022.
- CUNY Probability Seminar, New York, NY, October 2022.
- KTH Random Matrix Theory Seminar, online, February 2022.
- Vienna Probability Seminar, online, January 2022.
- Harvard Probabilitas Seminar, online, October 2021.
- University of Basel Seminar in Probability Theory and Statistics, online, September 2021.
- One World Probability Seminar, online, June 2021.
- MIT Probability Seminar, online, March 2021.
- Northwestern University Probability Seminar, Evanston, IL, January 2020.

Invited conference talks

- Random Tensors and Related Topics, Institut Henri Poincaré, Paris, France, October 2024.
- High Dimensional Statistics and Random Matrices, Porquerolles, France, June 2023.
- QMATH 15, session “Disordered systems and random matrices,” Davis, CA, September 2022.
- Youth in High-Dimensions, ICTP, Trieste, Italy, June 2022.

Contributed talks

- Workshop on Spin Glasses, Les Diablerets, Switzerland, September 2022.
- Northeast Probability Seminar, online, November 2020.
- Northeast Probability Seminar, New York, NY, November 2019.
- Saint-Flour Probability Summer School, Saint-Flour, France, July 2019.
- Cornell Probability Summer School, Ithaca, NY, June 2019.

Teaching and Grading

At Georgia Tech

Fall 2024 Instructor of record for Math 3235: Probability Theory (undergraduate).

At Harvard

Fall 2023 Instructor of record for Math 1a: Introduction to Calculus (undergraduate). Student rating 4.4/5.

At NYU

Fall 2019 Recitation leader for MATH-UA 0397: Introduction to Stochastic Processes (undergraduate). Student rating 5/5.

Fall 2018 Recitation leader for MATH-UA 0325: Analysis (undergraduate; two sections). Student ratings 4.7/5, 4.6/5.

Fall 2017 Grader for MATH-GA 2111: Linear Algebra (graduate).

Service

Refereeing

Journal of the European Mathematical Society (JEMS), Communications in Mathematical Physics (CMP), Annals of Probability (AOP), Annals of Applied Probability (AAP), Bernoulli.

Conference organization

2025 Organizer for invited session “Random Graphs & Matrices” at the 22nd INFORMS Applied Probability Society Conference.

Seminar organization

from 2024 Co-organizer for the Georgia Tech Stochastics Seminar.

2022-2024 Co-organizer for the Probability Seminar at Harvard (first at CMSA, then in the math department).

fall 2022, Co-organizer for the Member Seminar at Harvard CMSA.
spring 2024

2018-2021 Co-organizer for the Courant Student Probability Seminar.

2017-2018 Co-organizer for the Courant Graduate Student/Postdoc Seminar.

Departmental service

2020 NYU Votes Ambassador (part of four-person Courant branch of NYU's non-partisan get-out-the-vote effort).

2017-2021 Formal student mentor for three junior Ph.D. students at Courant.

Outreach

2017-2019 **Math Team Volunteer Co-Coach**, *KIPP STAR Harlem Middle School*.

- Taught recreational and competition math to ten students, aged 10-11, during weekly meetings.
- Co-created lesson plans on curricular and non-curricular subjects.
- Worked under the auspices of the nonprofit Bridge to Enter Advanced Mathematics.

2014-2015 **Young Scholars Program Counselor**, *The University of Chicago*.

- Taught breakout group of 6 high-performing students, aged 11-14, during biweekly extracurricular math course.

2013 **Collegiate Scholars Program Counselor**, *The University of Chicago*.

- Coached 14 students, aged 14-16, during two-hour mathematics course three times a week.
- Co-designed and -taught twice-weekly 75-minute problem sessions.

2013 **The SESAME Program Counselor**, *The University of Chicago*.

- Led daily one-hour problem session for 4 adult students in Professor Paul Sally's Mathematical Strategies.
- Corrected and graded regular problem sets.

Other Training

2020 **Science Communication Workshop**, *New York University, Arthur L. Carter Journalism Institute*.

- Two-month-long sequence of courses (basic, then advanced) in communicating science to the general public.

2018-2019 **Teaching Certificate Program**, *New York University, Graduate School of Arts and Science*.

- Year-long interdisciplinary course in the theory and practice of university teaching. Admitted by application.

Conferences and Summer Programs Attended

2024 Random Matrices and Applications (ICERM).

2023 Random Theory 2023 (Estes Park, Colorado).

2023 Workshop ANR STARS (Toulouse, France).

2023 High dimensional statistics and random matrices (Porquerolles, France).

2022 Random media and large deviations, in honor of Ofer Zeitouni's 60th birthday (NYU).

2022 Workshop on Spin Glasses (SwissMAP Research Station, Les Diablerets, Switzerland).

2022 QMATH 15 (UC Davis).

2022 Random Matrices and Random Landscapes, in honor of Yan Fyodorov's 60th birthday (CSF, Switzerland).

2022 Youth in High-Dimensions (ICTP, Trieste).

2022 Random Matrices and Beyond, in celebration of Kurt Johansson's 60th birthday (KTH, Stockholm).

2019 Saint-Flour Probability Summer School.

2019 Cornell Probability Summer School (Cornell University).

2018 Advances in Asymptotic Probability, in honor of Amir Dembo's 60th birthday (Stanford University).

2018 Summer School on Random Matrices (The University of Michigan).

2018 Hausdorff School on Log-correlated Fields (Hausdorff Center for Mathematics, Universität Bonn).

2018 Summer School in Probability and Mathematical Physics (Institute of Science and Technology Austria).

2017 Dyson-Schwinger Equations, Topological Expansions, and Random Matrices (Columbia University).

2017 Graduate Summer School - Random Matrices (Park City Mathematics Institute).

2017 Dynamics, aging, and universality in complex systems, in honor of Gérard Ben Arous's 60th birthday (NYU).

2015 Mathematics REU (The University of Chicago).

2014 Mathematics REU (The University of Chicago).

Relevant Skills

Languages English (native), French (intermediate), Spanish (intermediate), German (beginner).