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# Benjamin M<sup>C</sup>Kenna

#### 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."
    - O Supervisors: Alice Guionnet and Mariya Shcherbina.

#### Education

- 2021 Ph.D. in Mathematics, Courant Institute of Mathematical Sciences, New York University
  - O Advisors: Gérard Ben Arous and Paul Bourgade.
  - Thesis title: "Non-invariant random matrices and landscape complexity."
  - O 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
  - O 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.
- [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.
- [6] Large deviations for the largest eigenvalue of generalized sample covariance matrices. Joint with Jonathan Husson. **Electronic Journal of Probability**, vol. 29, 2024.
- [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, 2021.

#### Honors and Awards

#### 2024, 2025 Georgia Tech CIOS Honor Roll

- Teaching prize for high student evaluations on a single Georgia Tech course.
- Received award for both fall 2024 and spring 2025.
- Typically awarded each semester to about 100 courses across Georgia Tech, of which about 20 are in the College of Sciences, including one or two in the School of Mathematics.

#### 2020 **Predoctoral Summer Fellowship**, New York University

- Travel grant for dissertation research (\$2,000). Travel cancelled due to coronavirus; grant used during Fulbright.
- O 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

O 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

O 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).

# External Funding

#### 2023 AMS-Simons Travel Grant

O 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.

#### Talks Given

#### Invited seminar talks

- Texas A&M Seminar in Random Tensors, College Station, TX, March 2025.
- o Lehigh University-University of Minnesota Joint Probability Seminar, online, November 2024.
- O Duke Probability Seminar, Durham, NC, November 2024.
- O Berkeley Probability Seminar, Berkeley, CA, April 2024.
- Stanford Probability Seminar, Stanford, CA, April 2024.
- o CRM Probability Seminar, Montreal, Canada, March 2024.
- O 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.
- o 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.
- O 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.
- O 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.

#### Invited seminar talks, continued

- MIT Probability Seminar, online, March 2021.
- Northwestern University Probability Seminar, Evanston, IL, January 2020.

#### Invited conference talks

- O Phase Transitions and Dynamics in Random Media, McGill University, Montreal, Canada, June 2025.
- Random Tensors and Related Topics, Institut Henri Poincaré, Paris, France, October 2024.
- O High Dimensional Statistics and Random Matrices, Porquerolles, France, June 2023.
- QMATH 15, session "Disordered systems and random matrices," Davis, CA, September 2022.
- O Youth in High-Dimensions, ICTP, Trieste, Italy, June 2022.

#### Contributed talks

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

# Teaching and Grading

## At Georgia Tech

- Fall 2025 Instructor of record for Math 6241: Probability I (graduate).
- Spring 2025 Instructor of record for Math 3235: Probability Theory (undergraduate). Student rating 4.9/5.
  - Fall 2024 Instructor of record for Math 3235: Probability Theory (undergraduate). Student rating 4.9/5.
    - O Received one "Thank A Teacher" note (through GT's Center for Teaching and Learning).

#### 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), Annales de l'Institut Henri Poincaré B Probabilités et Statistiques (AIHP), 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).
- 2022+2024 Co-organizer for the Member Seminar at Harvard CMSA in fall 2022 and 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 at Georgia Tech

- from 2025 Member of Undergraduate Committee, School of Mathematics.
- from 2025 Member of Communications, Development, and Outreach Committee, School of Mathematics.
- from 2025 Teaching mentor for two postdocs (Tim Wee and Songhao Zhu).
  - 2025 Ph.D. committee member for Manuel Fernandez.

#### Departmental service at NYU

- 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

- O Taught recreational and competition math to ten students, aged 10-11, during weekly meetings.
- O 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

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

## 2013 The SESAME Program Counselor, The University of Chicago

- O 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
  - O 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

- 2025 INFORMS Applied Probability Society Conference (Georgia Tech).
- 2025 Phase Transitions and Dynamics in Random Media (McGill University, Montreal).
- 2024 Random Tensors and Related Topics (Institut Henri Poincaré, Paris).
- 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).