Paige Bright

paigeb@mit.edu | https://web.mit.edu/paigeb/www/

Education

Massachusetts Institute of Technology Ph.D. Mathematics (GPA: 5.0/5.0) 2025 – 2030

University of British Columbia M.Sc. Mathematics (GPA: 4.0/4.0) 2024 – 2025

- Co-supervised by Izabella Łaba, Pablo Shmerkin, and Josh Zahl
- Thesis: *Progress in Projection Theory and other dimensional developments*

Massachusetts Institute of Technology B.S. Mathematics (GPA: 5.0/5.0) 2020 – 2024

Fresno City College A.S. Mathematics (GPA: 4.0/4.0) 2016 – 2020

Publications and Preprints

I am interested in geometric measure theory, harmonic analysis, and math education and pedagogy.

[1] A Continuum Beck-type Theorem for Hyperplanes, with Alex Ortiz and Dmitrii Zakharov

[2] Spread Furstenberg Sets, with Manik Dhar

[3] Pinned Dot Product Set Estimates, with Caleb Marshall and Steven Senger

- *Research in the Mathematical Sciences, 13, 9, 2025.*

[4] A Continuum Erdős–Beck theorem, with Caleb Marshall

[5] Radial projections in $\mathbb{R}^n$ revisited, with Yuqiu Fu and Kevin Ren

[6] On a radial projection conjecture in $\mathbb{F}_q^d$, with Ben Lund and Thang Pham. *Submitted.*

[7] Generalized point configurations in $\mathbb{F}_q^d$, with Xinyu Fang, Barrett Heritage, Alex Iosevich, Tingsong Jiang, Hans Parshall, & Maxwell Sun

- *Finite Fields and Their Applications, 99, 102472, 2024.*

[8] Improved bounds for embedding certain configurations in subsets of vector spaces over finite fields, with Xinyu Fang, Barrett Heritage, Alex Iosevich, & Maxwell Sun

- *Bulletin of the Hellenic Mathematical Society, 68:10-30, 2024.*

[9] Exceptional set estimates in finite fields, with Shengwen Gan

- *Annales Fennici Mathematici, 50(2), 467-481, 2025.*

[10] Exceptional set estimates for radial projections in $\mathbb{R}^n$, with Shengwen Gan

- *Annales Fennici Mathematici, 49(2), 631-661, 2024.*

Typed Notes, Expository Writing, and More

- 18.S096: Matrix Calculus (IAP '23) typed notes for Profs. Edelman and Johnson on OCW
- 18.S190/18.S097: Introduction to Metric Spaces (IAP '23 & '22) on OCW
- 18.100A: Real Analysis (Fall '20) typed notes for Prof. Casey Rodriguez on OCW
- A study guide to "Kaufman and Falconer estimates for radial projections", with Ryan Bushling, Caleb Marshall, & Alex Ortiz
- A Proof of a Sobolev Inequality in $\mathbb{R}^2$, with Yuqiu Fu
- Chalk Radio interview with Prof. Haynes Miller: Communication is the Whole Game

Selected Awards and Honors

NSF GRFP Fellowship Offered Award; Accepted 2025
MIT Math Bershadsky Mentor for 2025 Awarded for Mentorship and Outreach 2024
Phi Beta Kappa Member 2024
NSF GRFP Fellowship Offered Award; Declined to attend UBC 2024
MIT Math Peter Baddoo Community Building Award Awarded for Volunteering & Outreach 2024
MIT Math Teaching and Learning Award Awarded for 18.S097 2022

Graduate Experience

Mittag–Leffler Junior Fellow Fall '26

- "Interactions between fractal geometry, harmonic analysis, and dynamical systems" semester
- Awarded a Junior Fellowship to attend

AIM's SQuaREs Program Covering Fractals by Curves present

- Participating in the Structured Quartet Research Ensembles (SQuaREs) Program hosted and supported by the American Institute of Mathematics with R. Bongers, C. Marshall, and K. Taylor

UBC–PIMS Emerging Leaders Lecture Series Coorganizer present

- Coorganizing lecture series with Caleb Marshall, supported by PIMS at UBC
- Hosting early career women and nonbinary researchers in harmonic analysis and fractal geometry

UBC Undergraduate Research Graduate Mentor Summer '25

- Mentored three undergraduates on research in harmonic analysis with Izabella Łaba

Undergraduate Experience

MIT Mathematics Undergraduate Research Spring '21 – Spring '24

- Researched sets of hyperplanes generated by a set of points in $\mathbb{R}^n$ with A. Ortiz and D. Zakharov
- Researched exceptional set estimates for projections in $\mathbb{F}_q^n$ with Shengwen Gan resulting in [8]
- Studied extension theorems for homogeneous Sobolev spaces with Marjorie Drake
- Wrote an expository paper proving a Sobolev inequality in $\mathbb{R}^2$ with Yuqiu Fu, found here
- Explored relations between the side lengths and dihedral angles of a tetrahedron with Prof. Poonen

UPenn Study Guide Writing Workshop Aug. '23

- Collaborated with Ryan Bushling, Caleb Marshall, and Alex Ortiz to write a study guide on a recent paper by Orponen–Shmerkin–Wang, mentored by Josh Zahl

Williams SMALL REU Summer '23

- Studied point configurations in finite fields with Alex Iosevich, resulting in two papers ([7], [8])

MIT Summer Program in Undergraduate Research (SPUR) Summer '22

- Proved two open conjectures on radial projections, as well as two classical exceptional set estimates for orthogonal projections on $\mathbb{R}^n$ using new methods with Shengwen Gan resulting in [7]

Mentorship and Outreach Experience

√mathroots at MIT Residential Director — Summer '24 – present

- Academic Mentor and Residential Counselor (2024), Academic Mentor and Assistant Residential Director (2025), and Residential Director (2026)

MIT PRIMES Circle Coorganizer — Springs '22 – present

- Coorganizing with Mary Stelow for the 2025 - 2026 academic year.
- Previously mentored papers which can be found here, here, and here

Classroom Experience

UBC Teaching Assistantship Math 120, Math 421/510, MLC — Fall '24 – Spring '25

- (Fall) Grader for Math 120: Honors Differential Calculus
- (Spring) Grader for Math 421/510: Functional Analysis, and tutor at UBC's Math Learning Center

MIT 18.S096/18.S190: Introduction to Metric Spaces Lecturer — Jan. '22/'23

- Created and taught a bridge class between real analysis on $\mathbb{R}^n$ and on a general metric space; recipient of MIT Mathematics Department Teaching and Learning Award; course can be found here

MIT Undergraduate Assistant (UA) 18.101, 18.102 — Fall '22 – Fall '23

- 18.101: Analysis and Manifolds (Fall '22/'23); 18.102: Functional Analysis (Spring '23)
- Held weekly office hours, graded problem sets, and typed problem set solutions

Invited Talks and Presentations

05/2026 Erdős Center of the Rényi Institute in Budapest: Workshop on geometric measure theory
05/2026 "New Challenges in the Derivation and Dynamics of Many Body Systems" Conference at MIT
04/2026 AMS Central Sectional "Harmonic Analysis"
02/2026 OURFA^{2}M^2 Conference in the Our Stories Section
01/2026 JMM: AMS Session on "New Directions in Geometric Measure Theory and Effective Methods"
10/2025 AMS Eastern Virtual Sectional "Research in Analysis and PDEs by Early Career Mathematicians"
10/2025 AMS Central Sectional "Harmonic Analysis, Geometric Measure Theory and Fractals"
05/2025 Special Session "Nonlinear Constraints: A Catalyst for Creativity in Analysis and its Applications"
– Coorganized this AWM Research Symposium session with Marjorie Drake and Vinh Nguyen
04/2025 Online Early Career Morning Session 2025 at Washington University in St. Louis
01/2025 JMM: SLMath Session "At the Intersection of Harmonic Analysis and Fractal Geometry"
12/2024 CMS: Scientific Session on "Incidence Problems in Analysis"
11/2024 CMS: Scientific Session on "Harmonic Analysis and Geometric Measure Theory"
10/2024 UBC's Harmonic Analysis and Fractal Geometry Seminar
08/2024 HAPPY's "Hello, World" series (YouTube Video)
01/2024 JMM: AWM Session on "Recent Developments in Harmonic Analysis"
01/2024 JMM: AMS Session on "Harmonic Analysis, Geometric Measure Theory, and Fractals"
11/2023 Graduate Lecture Series in Analysis and PDEs at Brown (GLESPA)
11/2023 Online Undergraduate Research Seminar at UNC with Alex Ortiz
05/2023 MIT International Women in Math Day