

# Paige Bright

paigeb@mit.edu | <https://web.mit.edu/paigeb/www/> | US Citizen

## Education

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<b>Massachusetts Institute of Technology</b>	Ph.D. Mathematics (GPA: N/A)	2025 – 2030
<b>University of British Columbia</b>	M.Sc. Mathematics (GPA: N/A)	2024 – 2025
<b>Massachusetts Institute of Technology</b>	B.S. Mathematics (GPA: 5.0/5.0)	2020 – 2024
<b>Fresno City College</b>	A.S. Mathematics (GPA: 4.0/4.0)	2016 – 2020

## Publications and Preprints

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

- [1] [A continuum Erdős–Beck theorem](#), with Caleb Marshall
- [2] [Radial projections in  \$\mathbb{R}^n\$  revisited](#), with Yuqiu Fu and Kevin Ren
- [3] [On a radial projection conjecture in  \$\mathbb{F}\_q^d\$](#) , with Ben Lund and Thang Pham
- [4] [Improved bounds for embedding certain configurations in subsets of vector spaces over finite fields](#), with Xinyu Fang, Barrett Heritage, Alex Iosevich, & Maxwell Sun
- [5] [Generalized point configurations in  \$\mathbb{F}\_q^d\$](#) , with Xinyu Fang, Barrett Heritage, Alex Iosevich, Tingsong Jiang, Hans Parshall, & Maxwell Sun
- [6] [Exceptional set estimates in finite fields](#), with Shengwen Gan
- [7] [Exceptional set estimates for orthogonal and radial projections in  \$\mathbb{R}^n\$](#) , with Shengwen Gan

## Typed Notes, Expository Writing, and More

- [A study guide to "Kaufman and Falconer estimates for radial projections"](#), with Ryan Bushling, Caleb Marshall, & Alex Ortiz
- [\(Draft\) 18.S096: Matrix Calculus \(IAP '23\) typed notes](#) for Profs. Edelman and Johnson
- [18.S097/18.S190: Introduction to Metric Spaces \(IAP '22/'23\)](#) on OCW
- [18.100A: Real Analysis \(Fall '20\)](#) typed notes for Prof. Casey Rodriguez on OCW
- [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](#)

## Talks and Presentations

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01/2025 **SLMath Special Session "At the Intersection of Harmonic Analysis and Fractal Geometry"**

– ["Pinned Dot Product Sets"](#), joint work with C. Marshall and S. Senger at the JMM

12/2024 **Special Session on "Incidence Problems in Analysis"**

– ["Dual Furstenberg Sets"](#), joint work with Y. Fu and K. Ren at the CMS

11/2024 **Special Session on "Harmonic Analysis and Geometric Measure Theory"**

– ["A Continuum Erdős–Beck Theorem"](#), joint work with C. Marshall at the CMS

10/2024 **UBC's Harmonic Analysis and Fractal Geometry Seminar**

– ["Continuum Beck–Type Problems"](#), joint work with C. Marshall & A. Ortiz and D. Zakharov

- 08/2024 **HAPPY's "Hello, World" series**
- "A Continuum Erdős–Beck Theorem," *joint work with C. Marshall*
- 01/2024 **AWM Special Session on "Recent Developments in Harmonic Analysis"**
- "Recent Developments in Radial Projections" at the JMM
- 01/2024 **AMS Special Session on "Harmonic Analysis, Geometric Measure Theory, and Fractals"**
- "Exceptional Set Estimates for Orthogonal Projections" at the JMM
- 11/2023 **Graduate Lecture Series in Analysis and PDEs at Brown (GLESPA)**
- "From Discrete Geometry to Geometric Measure Theory" and "Exceptional Set Estimates"
- 11/2023 **Online Undergraduate Research Seminar at UNC** with Alex Ortiz
- "Incidences and Projections: Discrete and Continuous"
- 05/2023 **MIT International Women in Math Day**
- "Exceptional Set Estimates for Orthogonal and Radial Projections"
- 11/2022 **MIT Undergraduate Mathematics Association**
- "Topics in Orthogonal Projections in Euclidean Space"

## Research Experience

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### MIT Mathematics Undergraduate Research (UROP) Spring '21 – Spring '24

- Researched sets of hyperplanes generated by a set of points in  $\mathbb{R}^n$  with A. Ortiz and D. Zakharov
- Studied exceptional set estimates for projections in  $\mathbb{F}_q^n$  with Shengwen Gan resulting in [6]
- 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

### Williams SMALL REU Summer '23

- Studied point configurations in finite fields with Alex Iosevich, resulting in two papers: ([4], [5])

### Summer Program in Undergraduate Research 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 resulting in [7]

## Mentoring and Teaching

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### 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](#)

### UBC TA/Grader Math 120 Fall '24

- Math 120: Honors Differential Calculus (Fall '24)
- Graded homework and provided feedback on proof writing skills

### 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

### MIT OpenCourseWare Spring '21 – Spring '24

- Provided feedback and developing materials for courses being uploaded to OpenCourseWare

## Activities and Programs

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**√mathroots at MIT** Academic Mentor and Residential Counselor Summer '24

- Mentored for this two-week high school math program held at MIT

**Fourier Analysis Reading Group** with Larry Guth Fall '23 – Spring '24

- Participated in a reading group under Larry Guth studying recent results on the Furstenberg set problem and related work in geometric measure theory

**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

**PRIMES Circle** Mentor Springs '22 – '24

- Met weekly with high school students reading math textbooks. Mentored papers which can be found [here](#), [here](#), and [here](#)

**Council for Math Majors (CoMM)** Co-chair and Project Lead Fall '21 – Spring '24

- Co-organized numerous projects based on gathered student feedback on the math department

## Selected Awards and Honors

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**NSF GRFP Fellowship** Offered Award; Declined 2024

**MIT Math Peter Baddoo Community Building Award** Awarded for Volunteering & Outreach 2024

**MIT Math Teaching and Learning Award** Awarded for 18.S097 2022