Cole Jeznach | CV

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Education

- **ETH Zurich** — **Zurich, Switzerland**
  PhD in Mathematics, advised by Svitlana Mayboroda and Max Engelstein — *April 2024*
- **University of Minnesota, Twin Cities** — **Minneapolis, MN**
  M.S. in Mathematics — *May 2021*
- **Worcester Polytechnic Institute** — **Worcester, MA**
  Bachelor of Science in Mathematics — *May 2018*
  Graduated with High Distinction.

Research Interests

- Currently, I am a research postdoctoral researcher at the Universitat Autònoma de Barcelona working with Prof. Xavier Tolsa. In general, I am interested in partial differential equations, harmonic analysis, and geometric measurement theory.

Publications and Preprints

Published papers

- with Guy David and Antoine Julia. "Cantor sets with absolutely continuous harmonic measure." J. Ec. Polytech. Math. 10, (2023). `https://arxiv.org/pdf/2303.02055.pdf`
- "Small constant uniform rectifiability." J. Geom. Anal. 34, 125 (2024). `https://arxiv.org/pdf/2307.16858.pdf`
- with Max Engelstein and Svitlana Mayboroda. "Non-local distance functions and geometric regularity of measures." Adv. Math. 445 (2024). `https://arxiv.org/pdf/2208.07342.pdf`

Preprints

- with Matthew Badger. "On the number of nodal domains of homogeneous caloric polynomials." Submitted for publication. `https://arxiv.org/pdf/2401.07268.pdf`
- with Max Engelstein and Yannick Sire. "Singular set estimates for solutions to elliptic equations in higher co-dimension." Submitted for publication. `https://arxiv.org/pdf/2502.03294`
- "Elliptic unique continuation below the Lipschitz threshold." `https://arxiv.org/pdf/2507.23614`

In preparation

- with Max Engelstein, Linhan Li, and Svitlana Mayboroda. "Small constant A_∞ results for Dahlberg-Kenig-Pipher operators outside of low-dimensional, uniformly rectifiable sets." In preparation.

Pre-graduate research.

- with Ganesh et all. "A well-posed surface currents and charges system for electromagnetism in dieletric media." `https://arxiv.org/abs/1810.08064`. 2018.

Talks, Presentations, and Posters

- **Singular set estimates for degenerate elliptic equations** — **Talk**
  UAB Analysis seminar — *November 2024*
- **Low-dimensional Cantor sets with absolutely continuous harmonic measure** — **Talk**
  Geometry of Measures and Free Boundaries 2024, conference in honor of Tatiana Toro, Seattle — *July 2024*
- **Singular set estimates for degenerate elliptic equations** — **Talk**
  Geometric Measure Theory and applications 2024, Cortona Italy — *June 2024*
- **Low-dimensional Cantor sets with absolutely continuous harmonic measure** — **Talk**
  MAA Mathfest, Invited paper session in GMT, Harmonic Analysis, and PDE, Tampa — *August 2023*
- **Low-dimensional Cantor sets with absolutely continuous harmonic measure** — **Talk**
  Harmonic Analysis, PDEs, and GMT in Bilbao 2023, Bilbao Spain — *June 2023*
- **Low-dimensional Cantor sets with absolutely continuous harmonic measure** — **Talk**
  University of Washington Rainwater Seminar, Seattle Washington — *May 2023*
- **Small A_∞ results for elliptic measure outside low-dimensional sets** — **Talk**
  AMS Spring Sectional 2023, special session in "Geometric methods for PDE", Cincinnatti Ohio — *April 2023*
- **Non-local distances and geometric regularity of measures** — **Talk**
  JMM AMS special session in recent developments in Geometric Measure Theory, Boston — *January 2023*
- **Small A_∞ results for elliptic measure outside low-dimensional sets** — **Talk**
  PRIMA 2022, special session in harmonic functions and Laplace eigenfunctions, Vancouver — *December 2022*
- **Non-local distances and geometric regularity of measures** — **Talk**
  University of Connecticut PDE Seminar, Storrs CT — *November 2022*
- **Large-scale regularity theory for elliptic systems in stochastic homogenization** — **Expository talk**
  2022 Oberwolfach Arbeitsgemeinschaft in Quantitative Stochastic Homogenization — *October 2022*
- **Non-local distances and geometric regularity of measures** — **Talk**
  Universitat Autònoma de Barcelona, Analysis Seminar, Barcelona — *October 2022*
- **Fundamental solutions of generalized Schrodinger operators** — **Expository talk**
  HCM Bonn summer school in Nodal domains, Kopp Germany — *October 2022*
- **Non-local distances and geometric regularity of measures** — **Talk**
  University of Minnesota PDE Seminar, Minneapolis MN — *September 2022*
- **Non-local distances and geometric regularity of measures.** — **Poster**
  Simons Collaboration on Wave Localization, NY — *February 2022*
- **Regularized distance kernels** — **Online talk**
  The 17th Prairie Analysis Seminar, Kansas State University — *November 2021*
- **Regularized distance kernels** — **Online talk**
  University of Minnesota Harmonic Analysis, GMT, PDE Seminar — *May 2021*

Awards

- **NSF MSPRF** — **Barcelona, Spain**
  Fellowship — *September 2025*
  The NSF MSPRF is a $190,000 fellowship offered by the NSF to support postdoctoral fellows in mathematics.

- **Silver medal** — **Zurich, Switzerland**
  Award — *August 2025*
  The ETH silver medal is awarded by the Swiss Federal Institute of Technology in Zürich (ETH Zurich) to outstanding Master's and doctoral theses. The amount of medals is capped at 8% of all doctoral theses for each department.
- **Presidential Scholarship** — **Worcester, MA**
  Scholarship — *May 2015*
  Merit based scholarship granted upon admission to Worcester Polytechnic Institute.
- **Mathematics Honor Society** — **Worcester, MA**
  Pi Mu Epsilon — *May 2017*
  Awarded admission in to the Mathematics Honor Society Chapter at Worcester Polytechnic Institute for outstanding work in the Mathematical Sciences.
- **Salisbury Prize** — **Worcester, MA**
  Award — *April 2018*
  Received WPI's Salisbury Prize, awarded to "highly meritorious members of the WPI graduating class who have faithfully, industriously, and with distinguished attainment completed all requirements for the Bachelor degree."

Teaching

- **N/A** — **UAB**
  Exercise instructor, Graduate harmonic analysis — *Spring 2025*
- **N/A** — **ETH Zurich**
  Seminar lead, Seminar in harmonic measure — *Spring 2024*
- **Math 401-4443-73** — **ETH Zurich**
  Exercise instructor, Graduate Elliptic PDEs — *Fall 2023*
- **Graduate TA Instructor** — **University of Minnesota**
  University of Minnesota — *August 2021, 2022*
  Mentored incoming graduate students in TA orientation.
- **MATH 1272** — **University of Minnesota**
  Instructor, Calculus II. — *Spring 2021*
- **MATH 1051** — **University of Minnesota**
  Instructor, Precalculus I. — *Fall 2020*
- **MATH 1271** — **University of Minnesota**
  Instructor, Calculus I. — *Spring 2020*
- **MATH 1271** — **University of Minnesota**
  TA, Calculus I. — *2018-2020*
- **MATH 3283W** — **University of Minnesota**
  TA, Writing intensive introduction to real analysis. — *Fall 2019, 2021*
- **Peer Learning Assistant** — **Worcester Polytechnic Institute**
  Undergraduate TA — *2016-2018*
  Worked 10 hours per week as a tutor and instructor of conference sections in math courses such as Calculus, Linear Algebra, and Principles of Real Analysis. Duties included grading homeworks and quizzes, general tutoring, leading weekly review sessions, and providing office hours to aid students in class material.

Service

- **Organizer of Student Seminar** — **Bonn, Germany**
  HIM, Interactions between GMT, Singular integrals, and PDE Spring Semester — *February 2022*

- **Officer of UMN SIAM Chapter** **Minneapolis, MN**
  University of Minnesota, President for 2022/23 academic year *2019-2023*

Outreach and Mentoring

- **Directed Reading Program Mentor** **Minneapolis, MN**
  University of Minnesota *Fall 2019, Spring 2020, Fall 2021*
  Mentored two undergraduate students in a directed reading program through Kreyszig's Functional Analysis, and two other undergraduates in Fourier Analysis.

Industry Employment

- **Mathworks** **Natick, MA**
  Software Development Intern *May 2019–August 2019*
  Implemented algorithms for Convolution Neural Networks.