Cole Jeznach

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Research interests

geometric measure theory, quantitative unique continuation, boundary value problems

Appointments held

2025–present *NSF Mathematical Sciences Postdoctoral Research Fellow*, Departament de Matemàtiques, Universitat Autònoma de Barcelona

2024–2025 *Postdoctoral researcher*, Departament de Matemàtiques, Universitat Autònoma de Barcelona

Education

2024 PhD in Mathematics, ETH Zürich
– Advisors: Max Engelstein and Svitlana Mayboroda
– Topic: Quantitative rectifiability and harmonic measure for sets of high co-dimension

2021 MS in Mathematics, University of Minnesota, Twin Cities

2018 BS in Mathematics, Worcester Polytechnic Institute

Grants, honors & awards

2025 *Mathematical Sciences Postdoctoral Research Fellowship*, NSF: Boundary Behavior of Elliptic-Harmonic Functions in Rough Domains

2024 *Silver medal*, ETH Zürich

2018 *Salisbury Prize*, Worcester Polytechnic Institute

Publications & talks

Journal articles

2026 **Singular set estimates for solutions to elliptic equations in higher codimension**, with M. Engelstein and Y. Sire.
Proc. Lond. Math. Soc., 132(6).

On the number of nodal domains of homogeneous caloric polynomials, with M. Badger.
Ann. H. Lebesgue, 9.

2024 **Non-local distance functions and geometric regularity**, with M. Engelstein and S. Mayboroda.
Adv. Math., 445.

Small constant uniform rectifiability.
J. Geom. Anal. 34(5).

2023 **Cantor sets with absolutely continuous harmonic measure**, with G. David and Antoine Julia.
J. Èc. polytech. Math., 10.

Preprints

2026 **Optimal rates of decay at infinity for solutions to Schrödinger equations**. With B. Davey.
https://arxiv.org/pdf/2607.07639

Failure of dimension drop for harmonic measure on Ahlfors regular boundaries of dimension close to 1. With Y. Cai and X. Tolsa.
https://arxiv.org/pdf/2610.15759

Failure of dimension drop for harmonic measure on Ahlfors regular flat boundaries. With Y. Cai and X. Tolsa.
https://arxiv.org/pdf/2610.15805

2025 **Unique continuation below the Lipschitz threshold**.
https://arxiv.org/pdf/2507.23614

Talks

2026 **Unique continuation for elliptic operators with variable coefficients**, Université de Bordeaux Analysis seminar, Bordeaux France

2024 **Singular set estimates for degenerate elliptic equations**, UAB Analysis seminar, Bellaterra Spain

Low-dimensional Cantor sets with absolutely continuous harmonic measure, Geometry of measures and free boundaries (in honor of Tatiana Toro), Seattle WA

Singular set estimates for degenerate elliptic equations, Geometric Measure Theory and Applications, Cortona Italy

2023 **Low-dimensional Cantor sets with absolutely continuous harmonic measure**, MAA Mathfest, invited paper session in GMT, Harmonic Analysis, and PDE, Tampa FL

Low-dimensional Cantor sets with absolutely continuous harmonic measure, Harmonic Analysis, PDEs, and GMT in Bilbao, Bilbao Spain

Low-dimensional Cantor sets with absolutely continuous harmonic measure, University of Washington Rainwater seminar, Seattle WA

Small A_∞ results for elliptic measure outside low-dimensional sets, AMS Spring Sectional, special session in Geometric methods for PDE, Cincinnati OH

Non-local distances and geometric regularity of measures, JMM AMS special session in recent developments in Geometric Measure Theory, Boston MA

2022 **Small A_∞ results for elliptic measure outside low-dimensional sets**, PRIMA special session in harmonic functions and Laplace eigenfunctions, Vancouver Canada

Non-local distances and geometric regularity of measures, UConn PDE Seminar, Storrs CT

Large-scale regularity theory for elliptic systems in stochastic homogenization, 2022 Oberwolfach Arbeitsgemeinschaft in quantitative stochastic homogenization, Oberwolfach Germany

Non-local distances and geometric regularity of measures, UAB Analysis seminar, Bellaterra Spain

Fundamental solutions of generalized Schrödinger operators, HCM Bonn summer school in nodal domains (expository), Kopp Germany

Non-local distances and geometric regularity, UMN PDE seminar, Minneapolis MN

2021 **Regularized distance kernels**, UMN Harmonic Analysis, GMT, PDE online seminar

Regularized distance kernels, Kansas State University 17th Prairie Analysis Seminar

Teaching Experience

2025-2026 **Teaching Assistant**, UAB/UB
– Graduate harmonic analysis (Spring 2025, Spring 2026)

2023-2024 **Teaching Assistant**, ETH Zürich
– Graduate elliptic PDEs (Fall 2023)
– Seminar in harmonic measure (Spring 2024)

2020-2021 **Instructor**, University of Minnesota

– Precalculus II (Fall 2020)
– Calculus II (Spring 2021)

2021-2022 **Graduate TA Instructor**, University of Minnesota (Summer 2021, 2022)

2019–2021 **Teaching Assistant**, University of Minnesota
– Calculus I (Spring 2019- Fall 2020)
– Introduction to real analysis (Fall 2019, Fall 2021)

2016-2018 **Peer learning assistant**, WPI
– Calculus I, Linear Algebra, Principles of Real Analysis

Service

2026 **Co-organizer** of Intensive Research Program in free boundary problems, CRM/UAB October-December 2026

2026 **Co-organizer** of JMM AMS Special session on Harmonic Analysis and Elliptic PDE, January 2026, Washington DC

2022 **Student seminar organizer**
– HIM program in interactions between GMT, singular integrals, and PDE (Spring Semester)

2019-2023 **Officer of UMN SIAM Chapter**, UMN
– president during the 2022/23 academic year

2019-2021 **Directed reading program mentor**, UMN
– mentored four undergraduate students in independent reading topics in functional analysis and fourier analysis