Stepan Malkov

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Education

University of California, Los Angeles
Ph.D., Mathematics, 2027 (expected).
M.A., Mathematics, 2024.

University of North Carolina at Chapel Hill
Honors B.S., Mathematics, 2022, with Highest Distinction.

Thesis Advisor: Jeremy Marzuola
Honors Thesis: "*Decay Estimates for Spectral Gap Eigenstates of the Haldane-Lieb Hamiltonian*"

Dissertation

Dissertation advisor: Michael Hitrik

Dissertation title: *"Resolvent Estimates and Spectral Asymptotics for Semiclassical Non-Self-Adjoint Operators*"

Research areas: Semiclassical analysis, spectral theory, microlocal analysis, partial differential equations.

Publications and Preprints

Preprints and Submitted Work:

- S. Malkov. "Non-Elliptic Quadratic $\mathcal{PT}$-Symmetric Operators and Similarity to Self-Adjoint Operators." Submitted, 2026. `arXiv:2608.28821`.
- S. Malkov. "Harmonic Approximation and Resolvent Estimates for Semiclassical Non-Self-Adjoint Operators." Submitted, 2026. `arXiv:2601.17643`.

Published Articles:

- A. J. Abraham, **S. Malkov**, F. A. Ljubetic, M. Durey, & P. J. Sáenz. "Anderson localization of walking droplets." *Physical Review X*, **14**(3), 031047, 2024. `doi:10.1103/PhysRevX.14.031047`.

Talks and Presentations

Research Talks:

- *Resolvent Estimates and Spectral Asymptotics for Semiclassical Non-Self-Adjoint Operators*
  UCLA Analysis & PDE Seminar, May 12, 2026.
- *Harmonic Approximation for Non-Self-Adjoint Operators*
  Bernoulli Center for Fundamental Studies, Lausanne, July 10, 2025.
- *Anderson Localization of Walking Droplets in a Random Topography*
  North Carolina School of Science and Mathematics, November 17, 2021.

SIAM Annual Meeting, July 19–23, 2021.

Expository Talks:

- *Infinite Chocolate and the Banach-Tarski Paradox*
  Graduate Student Organization (GSO) Seminar, UCLA, February 27, 2025.
- *Renormalization and DiPerna-Lions Theory for the Boltzmann Equation*
  Participating Analysis Seminar, UCLA, May 2, 2024.
- *The Concentration-Compactness Principle of P. L. Lions*
  Participating Analysis Seminar, UCLA, November 9, 2023.

Conferences and Workshops

Selected Conferences and Workshops:

- *International Congress of Mathematicians (ICM)*
  Philadelphia, USA, July 23–30, 2026.
- *May Midwestern Microlocal Meeting (MMMM)*
  Chicago, USA, May 9–10, 2026.
- *High Energy Spectral Theory: Geometry and Dynamics*
  Isaac Newton Institute, Cambridge, UK, January 12–16, 2026.
- *New Trends and Applications Around Generalised Fokker-Planck Operators*
  Bernoulli Center for Fundamental Studies, Lausanne, CH, July 5–12, 2025.
- *SIAM Annual Meeting*
  July 19–23, 2021.

Awards and Fellowships

Liggett Departmental Teaching Assistant Award
Department of Mathematics, UCLA 2025–2026
Awarded for outstanding performance among departmental Teaching Assistants.

William Lowell Putnam Mathematical Competition, Top 500
University of North Carolina at Chapel Hill 2022

Seely College Fellow
University of North Carolina at Chapel Hill 2020–2022
Selective undergraduate academic merit scholarship.

Phi Beta Kappa Membership
University of North Carolina at Chapel Hill 2022

Teaching Record

Instructor of Record:

- MATH 131BH – Honors Analysis
- MATH 33B – Differential Equations

Teaching Assistant/Associate/Fellow:

- MATH 1 – Precalculus
- MATH 31B – Integration and Infinite Series

- MATH 33A – Linear Algebra and Applications
- MATH 33B – Differential Equations
- MATH 61 – Discrete Structures
- MATH 131A/B – Analysis
- MATH 131AH/BH – Honors Analysis
- MATH 131C – Topics in Analysis
- MATH 132 – Complex Analysis for Applications
- MATH 134 – Linear and Nonlinear Systems of ODEs
- MATH 136 – Partial Differential Equations
- MATH 151A – Applied Numerical Methods
- MATH 164 – Optimization
- MATH 170S – Introduction to Probability and Statistics: Statistics
- MATH 246A – Graduate Complex Analysis

Other:

- Basic Exam Bootcamp

Mentoring and Service

Seminar Co-organizer
University of California, Los Angeles Fall 2026–present
Co-organize the UCLA–Caltech Joint Analysis Seminar and the UCLA Analysis & PDE Seminar, including speaker coordination, scheduling, and seminar logistics.

Directed Reading Program (DRP) Mentor
University of California, Los Angeles 2023–present
Supervise undergraduate reading projects in analysis, measure theory, spectral theory, and related topics.

- Zihao Sun
  Holomorphic Dynamics, Fatou and Julia Sets Spring 2026
- Zachary Maeder-Wolland
  Functional Analysis and Banach Space Theory Fall 2025
- Michael Papagni
  Measure Theory Spring 2025
- Francis Park
  C-algebras and the Continuous Functional Calculus* Fall 2024
- Andranik Kyababchyan
  Measure Theory Spring 2024
- Nafiz Faiaz
  Spectral Theory & Applications to Schrödinger Operators Spring 2024
- Elvie Lin
  Measure Theory Fall 2023
- Yun Zhang
  An Introduction to the Fourier Transform Spring 2023

Research Mentor
Scholar Launch 2023–2025
Mentored talented high school students on independent mathematics research projects, including topics in symmetry, knot theory, Fourier analysis, and mathematical modeling.

Academic and Professional Appointments

University of California, Los Angeles
Department of Mathematics

Teaching Fellow	2025–present
Teaching Associate	2024–2025
Teaching Assistant	2022–2024

Mathematics AI Consultant
Outlier, Alignerr, Scale AI, Handshake AI 2023–present

- Designed and evaluated Ph.D.-level mathematics prompts for AI model training and assessment.

Languages

Russian (native), English (fluent), German (advanced), Chinese (intermediate)