Zachary Stier

zstier@berkeley.edu
+1 (973) 780-7074
math.berkeley.edu/~zstier
Citizenship: United States

Education

- **University of California, Berkeley**, PhD, Mathematics 8/2020–5/2026
  Thesis "Algorithms and Spectral Gaps for Quantum Problems,"
  advised by Prof. Nikhil Srivastava
  Departmental and overall GPA: 4.0 (out of 4.0)
- **Princeton University**, AB with Honors, Mathematics 9/2016–6/2020
  Certificate in Applications of Computing
  Thesis "Optimal topological generators of U(1) and short paths in $X^{p,q}$ and SU(2),"
  advised by Prof. Peter Sarnak
  Departmental GPA: 3.94; overall GPA: 3.86 (out of 4.0)

Professional Experience

- **Hudson River Trading**, Algorithm Developer Intern Summer 2026
  Built machine learning models in Python to predict short-term equity price movements
  Worked with a team to turn these models into live-deployed high-frequency strategies in C++
  Built data-collection binaries and ran research across thousands of threads

Skills: Python (NumPy, pandas, scikit-learn), C++, Linux, Mathematica, LaTeX

Submitted & Accepted Papers

- "Finite Free Entropy Inequalities." 2026. arXiv:2602.15822.
  With J. Garza-Vargas and N. Srivastava.
- "On quantum to classical comparison for Davies generators." 2025. arXiv:2510.07267 and in *Quantum Information Processing* 2026.
  With J. Basso, S. Ganguly, A. Sinclair, N. Srivastava, and T.-D. Vuong.
- "A Ricci flow on graphs from effective resistance." 2025. In *Journal of Combinatorics* 16:4, doi.org/10.4310/JOC.250923002737.
  With A. Dawkins, V. Gupta, M. Kempton, W. Linz, J. Quail, and H. Richman.
- "Node resistance curvature in Cartesian graph products." 2025. In *Journal of Combinatorics* 16:4, doi.org/10.4310/JOC.250923003413.
  With A. Dawkins, V. Gupta, M. Kempton, W. Linz, J. Quail, and H. Richman.
- "On the Ground State Energies of Discrete and Semiclassical Schrödinger Operators." 2024. In *Pure and Applied Analysis* 6:4, doi.org/10.2140/paa.2024.6-4.
  With I. Detherage and N. Srivastava.
- "Fast Navigation with Icosahedral Golden Gates." 2023. In *Quantum Information and Computation* 23:11&12, doi.org/10.26421/QIC23.11-12-1.
  With T. Blackman.
- "Dihedral Sieving on Cluster Complexes." 2021. In *Enumerative Combinatorics and Applications* 2:2, ecajournal.haifa.ac.il/Volume2022/ECA2022_S2A9.pdf.
  With J. Wellman and Z. Xu.
- "Short paths in PU(2)." 2021. In *Quantum Information & Computation* 21:9&10, doi.org/10.26421/QIC21.9-10-3.

- "Optimal topological generators of U(1)." 2020. In *Journal of Number Theory* 214, doi.org/10.1016/j.jnt.2020.02.003.
- "A Taxonomy of Crystallographic Sphere Packings." 2019. In *Journal of Number Theory* 207, doi.org/10.1016/j.jnt.2019.07.007.
  With D. Chait-Roth and A. Cui.

Teaching Experience

- **UC Berkeley**, Graduate Student Instructor, Math 1B (Calculus II) Fall 2020, Spring 2021
  Math 53 (Calculus III) Fall 2024, Fall 2025
  Math 54 (Lin. Alg. & Diff. Eq.) Spring 2026
  As Head Instructor for Math 54, organized team of 6 instructors for course of 450 students
- **UC Berkeley Mathematics Directed Reading Program**, Mentor Fall 2022, Spring 2023
  Supervised undergraduates in reading mathematics texts in their areas of interest
- **Mount Tamalpais College**, Mathematics Tutor and Study Group Leader 3/2022–12/2024
  Tutor for math courses at college operating in San Quentin State Prison
- **YMath**, ymathtutoring.com, Founder & Executive Director 2013–Present
  501(c)(3) provides free tutoring to socioeconomically disadvantaged students

Seminar Organization

- **UC Berkeley Student Discrete Analysis Seminar**, Co-Organizer 2022–2026
- **Student seminar on quantum theory**, Co-Organizer Fall 2022

Honors & Awards

- UC Berkeley **Outstanding Graduate Student Instructor Award** 2021
- **Middleton Miller '29 Prize** from the Princeton Mathematics Department, for best independent work 6/2020
- **National Science Foundation Graduate Research Fellowship** 2020–2025
- **National Defense Science and Engineering Graduate Fellowship** (declined) 2020–2023
- **Putnam Competition top 500 scorer** 2017, 2019
- **Diller Teen *Tikkun Olam* Award**, for YMath 2016

Refereeing & Subreviewing: *Journal of Number Theory*, ITCS, STOC, *Discrete Mathematics*

Scientific References

Prof. Nikhil Srivastava
Department of Mathematics
University of California, Berkeley
nikhil@math.berkeley.edu

Prof. Shirshendu Ganguly
Department of Statistics
University of California, Berkeley
sganguly@berkeley.edu

Prof. Mark Kempton
Department of Mathematics
Brigham Young University
mkempton@mathematics.byu.edu

Prof. Lin Lin
Department of Mathematics
University of California, Berkeley
linlin@math.berkeley.edu

Conferences, Workshops, & Talks

- **Probabilistic Operator Algebras Seminar** (invited talk; virtual) 4/2026
- **Random Matrix Theory** (summer school) 9/2025
  Kyoto University, Kyoto, Japan
- **Free Entropy Theory and Random Matrices** 2/2025
  Institute for Pure & Applied Mathematics, Los Angeles, CA
- **Heidelberg Laureate Forum** (Young Researcher) 9/2024
  HLF Foundation, Heidelberg, Germany
- **Non-commutative Function Theory and Free Probability** 4–5/2024
  Mathematisches Forschungsinstitut Oberwolfach, Oberwolfach, Germany
  Supported by Oberwolfach Leibniz Graduate Students grant
- **Mathematical Aspects of Quantum Mechanics** (winter school) 1/2024
  Institut de Mathématiques de Toulouse, Toulouse, France
- **Centre for Quantum Information and Foundations Seminar** (invited talk) 1/2024
  University of Cambridge, Cambridge, England
- **Colloquium** (invited talk) 12/2023
  Medgar Evers College, Brooklyn, NY
- **Quantum Computation** (summer school) 7–8/2023
  Park City Mathematics Institute, Park City, UT
- **Mathematical Research Community on Ricci Curvatures of Graphs** 5–6/2023
  American Mathematical Society, Java Center, NY
- **American Mathematics Society Special Session on Quaternions** (invited talk) 1/2023
  Joint Mathematics Meetings, Boston, MA
- **Spectral independence and entropy decay** (summer school) 8/2022
  UC Santa Barbara, Santa Barbara, CA
- **Number Theory Informed by Computation** (summer school) 7–8/2022
  Park City Mathematics Institute, Park City, UT
- **American Mathematics Society Special Session on Quaternions** (invited talk) 4/2022
  Joint Mathematics Meetings, Seattle, WA (virtual)
- **New Trends in Quaternions and Octonions** (talk) 11/2021
  Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal (virtual)
- **Arithmetic reflection groups and crystallographic packings** 12/2020
  American Institute of Mathematics, San Jose, CA (virtual)
- **Heidelberg Laureate Forum** (Young Researcher) 9/2019
  HLF Foundation, Heidelberg, Germany
- **Young Mathematicians Conference** (poster presentation) 8/2018
  The Ohio State University, Columbus, OH