Zachary Stier

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Education

- **University of California, Berkeley**, PhD Candidate, Mathematics 8/2020–Present
  Advised by Prof. Nikhil Srivastava
- **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

Employment & Research

- **UC Berkeley**, Graduate Student Instructor, Math 1B (Calculus) Fall 2020, Spring 2021
- **REU at University of Minnesota–Twin Cities** Summer 2019
  Algebraic combinatorics research advised by Profs. Vic Reiner and Ben Brubaker
- **Princeton CS Department**, Grader, COS 326 (Functional Programming) Fall 2018
- **DIMACS REU at Rutgers University** Summer 2018
  Number theory research advised by Prof. Alex Kontorovich
- **Princeton Physics Department**, Intern Summer 2017
  Prepared FPGA modules for PHY 312 (Experimental Physics)
- **Princeton Plasma Physics Laboratory**, Intern 9/2015–6/2016
  Created sea salinity visualizations from Geophysical Fluid Dynamics Laboratory data

Volunteer & Organizational Experience

- **UC Berkeley Student Discrete Analysis Seminar**, Co-Organizer 2022 and 2023
- **Student seminar on quantum theory**, Co-Organizer Fall 2022
- **UC Berkeley Mathematics Directed Reading Program**, Mentor Fall 2022, Spring 2023
- **Mount Tamalpais College**, Mathematics Tutor and Study Group Leader 3/2022–10/2023
  Tutor for math courses at college operating in San Quentin State Prison
- **Princeton Math Club**, President 2019
  Co-Academic Chair 2018
- **Princeton University Math Competition**, Head Problem Czar 2017
  Problem Czar 2016–2019
- **YMath**, ymathtutoring.com, Founder & Executive Director 2013–Present
  501(c)(3) provides free tutoring to socioeconomically disadvantaged students

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

Papers & Preprints

- **A no-go result for pure state synthesis in DQC1.** 2023. arXiv:2404.04198.
- **A Ricci flow on graphs from effective resistance.** 2024. arXiv:2403.01151. Submitted.
  With A. Dawkins, V. Gupta, M. Kempton, W. Linz, J. Quail, and H. Richman.
- **Node resistance curvature in Cartesian graph products.** 2024. arXiv:2403.01037. Submitted.
  With A. Dawkins, V. Gupta, M. Kempton, W. Linz, J. Quail, and H. Richman.
- **A Quantum Algorithm for Functions of Multiple Commuting Hermitian Matrices.** 2023. arXiv:2302.11139. Submitted.
  With Y. Borns-Weil and T. Saffat.
- **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.
- **Metaplectic Analogues of Gelfand–Graev Models.** 2019. REU report.
  With Q. Dao, N. Kenshur, F. Lin, C. Meng, and C. Yost-Wolff.
- **A Proposed KDM-Secure Scheme to Evaluate *k*-DNF Formulas.** 2019. Junior paper.
- **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.

Skills: Mathematica, Python, LaTeX, Haskell, OCaml, GAP

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

Conferences, Workshops, & Talks

- **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