Bowen Yang

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Research Interests

Algebraic methods in mathematical physics, particularly commutative algebra in exactly solvable quantum lattice models. Stable homotopy-theoretic approaches to quantum cellular automata and topological phases of matter. Mathematical aspects of quantum error-correcting codes.

Employment

Postdoctoral Fellow, Center of Mathematical Sciences and Applications, Harvard University 2024–present

Teaching Fellow, Department of Mathematics, Harvard University 2026–present

Publications

Published and Accepted

1. Clifford quantum cellular automata from topological quantum field theories and invertible subalgebras (with Meng Sun, Zongyuan Wang, Nathanan Tantivasadakarn, Yu-An Chen), to appear in **PRX Quantum** (2026) arXiv:2509.07099.
2. Categorifying Clifford QCA, to appear in **Communications in Mathematical Physics** (2026), arXiv:2504.14811.
3. Homological invariants of Pauli stabilizer codes (with Blazej Ruba), **Communications in Mathematical Physics** (2024). arXiv:2204.06023
4. Spatial decay of Kubo's canonical correlation functions, **Letters in Mathematical Physics** (2021). arXiv:1912.10831
5. A classification of invertible phases of bosonic quantum lattice systems in one dimension (with Anton Kapustin, Nikita Sopenko), **Journal of Mathematical Physics** (2021). arXiv:2012.15491
6. Toy Teichmüller spaces of real dimension 2: the pentagon and the punctured triangle (with Yudong Chen et al.), **Geometriae Dedicata** (2018). arXiv:1704.04331
7. "Strange" combinatorial quantum modular forms (with Amanda Folsom et al.), **Journal of Number Theory** (2017).

Preprints

1. *Quantum Cellular Automata: The Group, the Space, and the Spectrum* (with Mattie Ji), arXiv:2602.16572 (2026).
2. *Transition between 2D Symmetry Protected Topological Phases on a Klein Bottle* (with Vibhu Ravindran, Xie Chen), arXiv:2510.00587 (2025).
3. Witt Groups and Bulk-Boundary Correspondence for Stabilizer States (with Blazej Ruba), arXiv:2509.10418 (2025).
4. A mathematical theory of topological invariants of quantum spin systems (with Adam Artymowicz, Anton Kapustin), arXiv:2410.19287 (2024).
5. Operator algebra and algorithmic construction of boundaries and defects in (2+1)D topological Pauli stabilizer codes (with Zijian Liang, Joseph T. Iosue, Yu-An Chen), arXiv:2410.11942 (2024).

Invited Talks since Fall 2024

- 2026, **Stanford University**, *Quantum Cellular Automata Workshop*
- 2026, **Massachusetts Institute of Technology**, *Infinite-Dimensional Algebra Seminar*
- 2026, **La Jolla Meeting**, *Simons Collaboration on Global Categorical Symmetries*
- 2025, **University of Colorado Boulder**, *Topology Seminar*
- 2025, **Harvard University**, *Freedman Seminar*
- 2025, **New York University**, *Simons Collaboration on Global Categorical Symmetries*
- 2025, **SLMath**, *Workshop on Infinite-Dimensional Division Algebras*
- 2025, **Massachusetts Institute of Technology**, *Algebraic Topology Seminar*
- 2025, **University of Pennsylvania**, *Mathematical Physics Seminar*
- 2025, **University of California, Davis**, *Lattice Seminar* (online)
- 2024, **Amherst College**, *Colloquium*
- 2024, **Institute for Advanced Study**, *CMP/QFT Group Meeting*

Education

Ph.D. in Mathematics, California Institute of Technology 2018–2023
Advisor: Anton Kapustin

B.A. in Mathematics, *summa cum laude*, Amherst College 2014–2018

Visiting Master's Student, New College, University of Oxford 2016–2017

Teaching Experience

Instructor, Harvard University — Spring 2026
Math 21B — Linear Algebra and Ordinary Differential Equations

Instructor, California Institute of Technology — Fall 2021
Math 8 — Calculus for Problem Solving

Course Assistant, California Institute of Technology — 2018–2022

Math 2/102 — Differential Equations	Fall 2018
Math 3/103 — Introduction to Probability and Statistics	Winter 2019
Math 5/105a — Introduction to Abstract Algebra	Fall 2019
Math 5/105b — Introduction to Abstract Algebra	Winter 2020
Math 5/105c — Introduction to Abstract Algebra	Spring 2019
Math 110c — Harmonic Analysis	Spring 2020
Math 121a — Combinatorial Analysis	Winter 2021
Math 121b — Combinatorial Analysis	Spring 2021
Math 1c — Calculus	Spring 2022
Math 120a — Commutative Algebra	Fall 2022

Teaching Assistant, Amherst College — 2016–2018

Math 350 — Groups, Rings, and Fields	Spring 2018
Math 355 — Introduction to Analysis	Fall 2017
Math 405 — Lie Algebras	Fall 2017
Math 450 — Functions of a Real Variable	Spring 2016

Counselor, Ross Mathematics Program — Summers 2017, 2019

Awards and Fellowships

Scott Russell Johnson Graduate Dissertation Prize	2023
Rufus B. Kellogg University Fellowship ($30,000 per annum)	2018–2021
Amherst International Student Scholarship	2014–2018

Professional Service

Referee for *Communications in Mathematical Physics*; *Quantum Computing Theory in Practice (QCTiP)*.