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EXPERIENCE & EDUCATION

California Institute of Technology
Sherman Fairchild Postdoctoral Scholar
Host: John Preskill

Pasadena, CA
Sept. 2023—present

University of California, Berkeley
Ph.D., Physics
Thesis: Many-Body Quantum Information Dynamics
Advisor: Norman Y. Yao

Berkeley, CA
Aug. 2016—Aug. 2023

- 1 of 5 Finalists for the APS award for Best Thesis in Quantum Information (2025)
- 1 of 4 Finalists for the APS award for Best Thesis in AMO Physics (2024)
- National Science Foundation Graduate Research Fellowship (2016–2021)
- Theory Fellowship, UC Berkeley Physics Department (2016–2017)

University of California, Berkeley
Bachelors of Science, Engineering Physics

Berkeley, CA
Aug. 2011—May 2015

- Minor in Mathematics

ADDITIONAL EXPERIENCE

Google Quantum AI
Visiting Researcher

Venice, CA
Dec. 2024—present

Google Quantum AI
Research Intern & Student Researcher

Venice, CA
May 2021—Dec. 2022

Boston University
Visiting Researcher, Physics Department

Boston, MA
Aug. 2015—July 2016

PUBLICATIONS & PREPRINTS

*: Co-first authors.

- [1] Daniel Mark, Federica Surace, **Thomas Schuster**, Adam Shaw, Wenjie Gong, Soonwon Choi and Manuel Endres, *Observation of ballistic plasma and memory in high-energy gauge theory dynamics*. [arxiv:2510.11679](https://arxiv.org/abs/2510.11679) (2025).
- [2] **Thomas Schuster***, Dominik Kufel*, Hsin-Yuan Huang, Norman Y. Yao *Hardness of recognizing phases of matter*. [arxiv:2510.08503](https://arxiv.org/abs/2510.08503) (2025).
- [3] Laura Cui, **Thomas Schuster**, Liang Mao, Hsin-Yuan Huang, Fernando Brandão, *Random unitaries from Hamiltonian dynamics*. [arxiv:2510.08434](https://arxiv.org/abs/2510.08434) (2025).
- [4] Liang Mao, Laura Cui, **Thomas Schuster**, Fernando Brandão, Hsin-Yuan Huang, *Random unitaries that conserve energy*. [arxiv:2510.08448](https://arxiv.org/abs/2510.08448) (2025).

- [5] **Thomas Schuster**, Fermi Ma, Fernando Brandão, Hsin-Yuan Huang, *Strong random unitaries and fast scrambling*. [arxiv:2509.26310](#) (2025).
- [6] **Thomas Schuster***, Chao Yin*, Xun Gao, Norman Y. Yao, *A polynomial-time classical algorithm for noisy quantum circuits*. *Physical Review X* (to appear, 2025). (**QIP 2025**)
- [7] Laura Cui*, **Thomas Schuster***, Fernando Brandão, Hsin-Yuan Huang, *Unitary designs in nearly optimal depth*. [arxiv:2507.06216](#) (2025).
- [8] Lorenzo Grevink, Jonas Haferkamp, Markus Heinrich, Jonas Helsen, Marcel Hinsche, **Thomas Schuster**, Zoltán Zimborás, *Will it glue? On short-depth designs beyond the unitary group*. [arxiv:2506.23925](#) (2025).
- [9] **Thomas Schuster**, Jonas Haferkamp, Hsin-Yuan Huang, *Random unitaries in extremely low depth*. *Science* 389 (6755), 92-96 *Science* **389** (6755), 92-96 (2025). (**Long Plenary talk, QIP 2025**)
- [10] Google Quantum AI and Collaborators[†], *Constructive interference at the edge of quantum ergodic dynamics*. [arxiv:2506.10191](#) (2025).
- [11] Bryce Kobrin, **Thomas Schuster**, Norman Y. Yao, *Experiments implementing small commuting models lack gravitational features*. *Nature, Matters Arising*, **643** E17-E19 (2025).
- [12] Bryce Kobrin*, **Thomas Schuster***, Maxwell Block, Bradley Mitchell, Weijie Wu, Emily Davis, Norman Y. Yao, *A universal protocol for quantum-enhanced metrology via information scrambling*. [arxiv:2411.12794](#) (2024).
- [13] Alicja Dutkiewicz, Thomas O’Brien, **Thomas Schuster**, *The advantage of quantum control in many-body Hamiltonian learning*. *Quantum* 8, 1537 (2024). (**QIP 2024**)
- [14] **Thomas Schuster**, Norman Y. Yao, *Operator growth in open quantum systems*. *Physical Review Letters*, **131** 160402 (2023).
- [15] **Thomas Schuster**, Murphy Niu, Jordan Cotler, Thomas O’Brien, Jarrod R. McClean, Masoud Mohseni, *Learning quantum systems via out-of-time-order correlators*. *Physical Review Research* **5** 043284 (2023).
- [16] Jordan Cotler, **Thomas Schuster**, Masoud Mohseni, *Information-theoretic hardness of out-of-time-order correlators*. *Physical Review A* **108** 062608 (2023).
- [17] **Thomas Schuster**, Nathanan Tantivasadakarn, Ashvin Vishwanath, Norman Y. Yao, *A holographic view of topological stabilizer codes*. [arxiv:2312.04617](#) (2023).
- [18] **Thomas Schuster***, Bryce Kobrin*, Ping Gao, Iris Cong, Emil Khabiboulline, Norbert Linke, Chris Monroe, Mikhail D. Lukin, Beni Yoshida, Norman Y. Yao, *Many-body quantum teleportation via operator spreading in the traversable wormhole protocol*. *Physical Review X*, **12** 031013 (2022).
- [19] Machiel S. Blok*, Vinay V. Ramasesh*, **Thomas Schuster**, Kevin O’Brien, John M. Kreikebaum, Dar Dahlen, Alexis Morvan, Beni Yoshida, Norman Y. Yao, Irfan Siddiqi, *Quantum information scrambling on a superconducting qutrit processor*. *Physical Review X*, **11.2** 021010 (2021).
- [20] **Thomas Schuster**, Felix Flicker, Ming Li, Svetlana Kotochigova, Joel E. Moore, Jun Ye, Norman Y. Yao, *Realizing Hopf insulators in dipolar spin systems*. *Physical Review Letters*, **127.1** 015301 (2021).
- [21] **Thomas Schuster**, Felix Flicker, Ming Li, Svetlana Kotochigova, Joel E. Moore, Jun Ye, Norman Y. Yao, *Floquet engineering ultracold polar molecules to simulate topological insulators*. *Physical Review A*, **103.6** 063322 (2021).

- [22] Jiho Noh*, **Thomas Schuster***, Thomas Iadecola, Sheng Huang, Mohan Wang, Kevin P. Chen, Claudio Chamon, Mikael C. Rechstman, *Braiding photonic topological zero modes*. *Nature Physics* **16**, 989-993 (2020).
- [23] **Thomas Schuster**, Snir Gazit, Joel E. Moore, Norman Y. Yao, *Floquet Hopf insulators*. *Physical Review Letters*, **123** 266803 (2019).
- [24] Kevin Landsman, Caroline Figgatt, **Thomas Schuster**, Norbert M. Linke, Beni Yoshida, Norman Y. Yao, Chris Monroe, *Verified quantum information scrambling*. *Nature* **567**, 61-65 (2019).
- [25] Quntao Zhuang, **Thomas Schuster**, Beni Yoshida, Norman Y. Yao, *Scrambling and complexity in phase space*. *Physical Review A*, **99** 062334 (2019).
- [26] Rupert A. Croft, Peter E. Freeman, **Thomas Schuster**, Chad M. Schafer, *Prediction of galaxy ellipticities and reduction of shape noise in cosmic shear measurements*. *Monthly Notices of the Royal Astronomical Society*, **469** 4422-4427 (2017).
- [27] **Thomas Schuster**, Thomas Iadecola, Claudio Chamon, Roman Jackiw, So-Young Pi, *Dissipationless conductance in a topological coaxial cable*. *Physical Review B*, **94** 115110 (2016).
- [28] Thomas Iadecola, **Thomas Schuster**, Claudio Chamon, *Non-abelian braiding of light*. *Physical Review Letters*, **117** 073901 (2016).

INVITED TALKS

- [1] *Probing the classical complexity of quantum experiments*. CS Theory Tea, **California Institute of Technology, Pasadena**, October 2025.
- [2] *Hardness of recognizing phases of matter and distinguishing quantum from classical dynamics*. Northeast Quantum Forum 2025 on AI in Quantum, **University of New Hampshire, Durham**, October 2025.
- [3] *Random unitaries in extremely low depth*. Workshop on Universality in Non-Equilibrium Matter, **Pollica, Italy**, September 2025.
- [4] *Random unitaries in extremely low depth*. Condensed matter seminar, **University of Cambridge, Cambridge, UK**, September 2025.
- [5] *The classical complexity of quantum experiments*. Seeking Quantum Advantage: Workshop and Conference, **University of Oxford, Oxford, UK**, August 2025.
- [6] *Random unitaries in extremely low depth*. Workshop on Quantum Information Dynamics and Non-Equilibrium Physics, **Korea Institute of Advanced Study, Seoul**, June 2025.
- [7] *Random unitaries in extremely low depth*. Invited talk, **Global Physics Summit, Los Angeles**, March 2025.
- [8] *Many-body quantum information dynamics*. APS DQI Thesis Prize Session, **Global Physics Summit, Los Angeles**, March 2025.
- [9] *Random unitaries in extremely low depth*. **Long plenary talk, QIP, Raleigh**, February 2025.
- [10] *A polynomial-time classical algorithm for noisy quantum circuits*. **QIP, Raleigh**, February 2025.
- [11] *Random unitaries in extremely low depth*. Quantum seminar, **Virginia Tech**, February 2025.

- [12] *Random unitaries in extremely low depth.* Eisert group meeting, **Freie Universitat Berlin (virtual)**, December 2024.
- [13] *Random unitaries in extremely low depth.* Quantum Information Seminar, **QuSoft, Amsterdam**, November 2024.
- [14] *Random unitaries in extremely low depth.* Quantum Innovators workshop, **Institute for Quantum Computing, University of Waterloo**, November 2024.
- [15] *The fidelity and complexity of noisy quantum circuits.* Informal seminar, **Perimeter Institute, Waterloo**, November 2024.
- [16] *Random unitaries in extremely low depth.* QI Seminar, **Perimeter Institute, Waterloo**, November 2024.
- [17] *A polynomial-time classical algorithm for noisy quantum circuits.* Seminar, **AWS Center for Quantum Computing, Pasadena**, September 2024.
- [18] *Random unitaries in extremely low depth.* CS Theory Tea, **California Institute of Technology, Pasadena**, July 2024.
- [19] *The fidelity and complexity of noisy quantum dynamics.* Theory seminar, **Max Planck Institute for Quantum Optics, Garching**, July 2024.
- [20] *The fidelity and complexity of noisy quantum dynamics.* Seminar, **Ludwig-Maximilians University, Munich**, July 2024.
- [21] *The fidelity and complexity of noisy quantum dynamics.* Workshop on Non-Equilibrium Many-body Physics Beyond the Floquet Paradigm, **Max Planck Institute for the Physics of Complex Systems, Dresden**, June 2024.
- [22] *Many-body quantum information dynamics.* Deborah Jin Thesis Prize Session, **Division of Atomic, Molecular, and Optical Physics Annual Meeting**, Fort Worth, June, 2024.
- [23] *Noise, complexity, and information dynamics in quantum circuits.* IPAM workshop on Many-body Quantum Systems via Classical and Quantum Computation, **University of California, Los Angeles**, November 2023.
- [24] *Noise, complexity, and information dynamics in quantum circuits.* IQIM Seminar, **California Institute of Technology**, September 2023.
- [25] *The power of time-reversal in quantum learning.* Quantum Machine Learning Seminar, **National University of Singapore (virtual)**, July 2023.
- [26] *Many-body quantum information dynamics.* AMO Seminar, **University of California, Berkeley**, April 2023.
- [27] *Many-body quantum information dynamics.* Quantum Information Group Meeting, **Massachusetts Institute of Technology (virtual)**, January 2023.
- [28] *Many-body teleportation and error propagation via quantum information dynamics.* HQI Quantum Fest, **Harvard University**, December 2022.
- [29] *Many-body quantum teleportation via quantum information dynamics.* Condensed Matter Theory Group Meeting, **California Institute of Technology**, November 2022.
- [30] *Many-body quantum teleportation via quantum information dynamics.* Quantum Information Group Meeting, **Massachusetts Institute of Technology**, September 2022.

- [31] *Many-body quantum teleportation via quantum information dynamics*. Harvard Quantum Information Group Meeting, **Harvard University**, September 2022.
- [32] *Learning quantum systems via out-of-time-order correlators*. Theory Seminar, **Google Quantum AI** (virtual), March 2022.
- [33] *Many-body quantum teleportation via operator spreading in the traversable wormhole protocol*. It from Qubit Seminar, **Stanford University**, March 2022.
- [34] *Operator size and error propagation: the Loschmidt echo in many-body quantum systems*. Geoflow Collaboration Meeting, **University of California, Berkeley**, September 2021.
- [35] *Many-body quantum teleportation via operator spreading in the traversable wormhole protocol*. Quantum/Gravity Seminar, **Brandeis University** (virtual), May 2021.
- [36] *Floquet Hopf insulators*. Condensed Matter Seminar, **Technion, Israel Institute of Technology**, June 2019.

WORKSHOPS & SCHOOLS ATTENDED

- [1] Northeast Quantum Forum on AI in Quantum, University of New Hampshire, 2025.
- [2] Workshop on Universality in Non-Equilibrium Matter, Pollica, Italy, 2025.
- [3] Seeking Quantum Advantage: Workshop and Conference, University of Oxford, Oxford, United Kingdom, August 2025.
- [4] Workshop on Quantum Information Dynamics and Non-Equilibrium Physics. Korea Institute of Advanced Study, Seoul, South Korea, 2025.
- [5] Workshop on Random Quantum Circuits. QuSoft and Centrum Wiskunde & Informatica, Amsterdam, Netherlands, 2024.
- [6] Quantum Innovators workshop. Institute for Quantum Computing, University of Waterloo, Canada, 2024.
- [7] Non-equilibrium Many-body Physics Beyond the Floquet Paradigm. Workshop at the Max Planck Institute for the Physics of Complex Systems, Dresden, Germany, 2024.
- [8] Near-Term Quantum Computers. Workshop at Simons Institute, University of California, Berkeley, 2024.
- [9] Many-body Quantum Systems via Classical and Quantum Computation. Workshop at IPAM, University of California, Los Angeles, 2023.
- [10] Mathematical Aspects of Quantum Learning. Workshop at IPAM, University of California, Los Angeles, 2023.
- [11] Condensed Matter Summer School on Dynamics and Quantum Information in Many-body Systems. University of Minnesota, 2023.
- [12] Online School on Ultra Quantum Matter. Perimeter Institute (virtual), 2020.
- [13] Les Houches Summer School on Quantum Dynamics and Disorder. Les Houches, France, 2019.
- [14] Quantum Connections Summer School. Stockholm, Sweden, 2018.

ADDITIONAL ACTIVITIES

- I am a regular reviewer for the Physical Review Journals (PRX, PRX Quantum, PRL, PRA, PRD), and have also reviewed for the Journal for High-Energy Physics (JHEP), Quantum, and Nature Physics. I am also a frequent sub-reviewer for QIP, QSim, TQC, and STOC.
- I am a member of the program committee for the Quantum Information Processing (QIP) Conference in 2026, and was for the Theory of Quantum Computation (TQC) Conference in 2024 and 2025.