Ewin Tang

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WORK

Princeton University *2026 – Present*
Assistant Professor, Computer Science and Princeton Quantum Initiative

University of California, Berkeley *2023 – 2026*
Miller Postdoctoral Fellow, hosted by Umesh Vazirani

RESEARCH INTERESTS

quantum computing; learning theory; many-body quantum systems; numerical linear algebra

EDUCATION

University of Washington *2018 – 2023*
PhD in Computer Science
Thesis: Quantum machine learning without any quantum
Advisor: James Lee

University of Texas at Austin *2014 – 2018*
Bachelor of Science in Computer Science
Bachelor of Science in Pure Mathematics
Thesis: A quantum-inspired classical algorithm for recommendation systems
Advisor: Scott Aaronson

RECOGNITION

Maryam Mirzakhani New Frontiers Prize *2025*

QIP 2025 plenary talk *2025*
For "High-temperature Gibbs states are unentangled and efficiently preparable" [BLMT24b]

QIP 2024 plenary talk *2024*
For "Learning quantum Hamiltonians at any temperature in polynomial time" [BLMT26b]

Miller Postdoctoral Fellowship *2023*

QIP 2020 plenary talk and best student paper *2020*
For "Quantum-inspired algorithms for recommendation systems, principal component analysis, and supervised clustering" [Tan19; Tan21]

NSF Graduate Research Fellowship *2019*

Forbes 30 Under 30 *2019*

Dean's Honored Graduate *2018*

SERVICE

Co-organizer, "A Quantum Sprint" *2027*
Simons Institute

Co-organizer, "The Random Purification Channel" *June 2026*
STOC 2026

Co-organizer, "Mathematical Challenges of Quantum Algorithms for Open Quantum Systems"
Simons Institute *October 2024*

QIP program committee *2027*
FOCS program committee *2024*
QIP program committee *2022*
QIP program committee *2020*

TEACHING

Lecturer, "Quantum and quantum-inspired linear algebra"
PCMI Graduate Summer School *July 2023*

PUBLICATIONS

Angelos Pelecanos, Jack Spilecki, Ewin Tang, and John Wright. "The Keyl–Werner algorithm is not optimal for spectrum estimation". In: *FOCS 2026*. To appear.

Angelos Pelecanos, Jack Spilecki, Ewin Tang, and John Wright. "Mixed state tomography reduces to pure state tomography". In: *FOCS 2026*. To appear.

Ewin Tang, John Wright, and Mark Zhandry. "Quantum oracles, weak and strong". In: *FOCS 2026*. To appear; presented at QIP 2026.

- Ewin Tang and John Wright. *Amplitude amplification and estimation require inverses*. 2025.
- Ewin Tang and John Wright. *Are controlled unitaries helpful?* 2025.
- Ewin Tang, John Wright, and Mark Zhandry. *Conjugate queries can help*. 2025.

Ainesh Bakshi, Allen Liu, Ankur Moitra, and Ewin Tang. "A Dobrushin condition for quantum Markov chains: Rapid mixing and conditional mutual information at high temperature". In: *STOC 2026*. Presented at QIP 2026.

Angelos Pelecanos, Xinyu Tan, Ewin Tang, and John Wright. "Beating full state tomography for unentangled spectrum estimation". In: *SODA 2026*.

Ainesh Bakshi, John Bostanci, William Kretschmer, Zeph Landau, Jerry Li, Allen Liu, Ryan O'Donnell, and Ewin Tang. "Learning the closest product state". In: *STOC 2025*. Presented jointly in a **short plenary talk** at QIP 2025.

Ainesh Bakshi, Allen Liu, Ankur Moitra, and Ewin Tang. "Structure learning of Hamiltonians from real-time evolution". In: *FOCS 2024*. Presented at QIP 2025.

Ainesh Bakshi, Allen Liu, Ankur Moitra, and Ewin Tang. "High-temperature Gibbs states are unentangled and efficiently preparable". In: *FOCS 2024*. Presented in **plenary talk** at QIP 2025.

Ainesh Bakshi, Allen Liu, Ankur Moitra, and Ewin Tang. "Learning quantum Hamiltonians at any temperature in polynomial time". In: *SIAM Journal on Computing* (2026). STOC 2024. Presented in **plenary talk** at QIP 2024, awarded **best student paper**.

Ewin Tang and Kevin Tian. "A CS guide to the quantum singular value transformation". In: *SOSA 2024*.

Ainesh Bakshi and Ewin Tang. "An improved classical singular value transformation for quantum machine learning". In: *SODA 2024*.

Jeongwan Haah, Robin Kothari, Ryan O'Donnell, and Ewin Tang. "Query-optimal estimation of unitary channels in diamond distance". In: *FOCS 2023*. Presented at QIP 2024.

Ewin Tang. "Dequantizing algorithms to understand quantum advantage in machine learning". In: *Nature Reviews Physics* (2022). [Review article].

Jeongwan Haah, Robin Kothari, and Ewin Tang. "Learning quantum Hamiltonians from high-temperature Gibbs states and real-time evolutions". In: *Nature Physics* (2024). Presented at QIP 2022 and FOCS 2022.

András Gilyén, Zhao Song, and Ewin Tang. "An improved quantum-inspired algorithm for linear regression". In: *Quantum* (2022).

Nai-Hui Chia, András Gilyén, Tongyang Li, Han-Hsuan Lin, Ewin Tang, and Chunhao Wang. "Sampling-based sublinear low-rank matrix arithmetic framework for dequantizing quantum machine learning". In: *Journal of the ACM* (2022). Appeared in STOC 2020, presented at QIP 2020.

András Gilyén, Seth Lloyd, and Ewin Tang. "Quantum-inspired low-rank stochastic regression with logarithmic dependence on the dimension". In: *ISAAC 2020*.

Ewin Tang. "Quantum principal component analysis only achieves an exponential speedup because of its state preparation assumptions". In: *Physical Review Letters* (2021). Presented at QIP 2020 (joint with 1807.04271).

Ewin Tang. "A quantum-inspired classical algorithm for recommendation systems". In: *STOC 2019*. Presented in **plenary talk** at QIP 2020 (joint with 1811.00414), awarded **best student paper**.

Sunita Chepuri, Neeraja Kulkarni, Joseph Suk, and Ewin Tang. "Factorizations of k-nonnegative matrices". In: *Journal of Combinatorics* (2022).

PREPRINTS

Sabee Grewal, Angelos Pelecanos, Jack Spilecki, Ewin Tang, and John Wright. *Pretty good shadow tomography*. 2026.

William Kretschmer and Ewin Tang. *Unitary complexity in polynomial space*. 2026.

Laura Lewis, Ewin Tang, and John Wright. *Learning the structure of open quantum systems*. 2026.

Arjan Cornelissen, João F. Doriguello, Alessandro Luongo, and Ewin Tang. *Do you know what q-means?* 2023.

INVITED TALKS

"Around the random purification channel" [PSTW26b]
- Princeton Quantum Technology Conference *October 2026*
- Princeton theory lunch *September 2026*

"How did we miss the random purification channel?" [PSTW26b]
Simons Institute Quantum Summer Cluster *July 2026*

"A Dobrushin condition for quantum Markov chains" [BLMT26a] *January 2026*
IPAM, New Frontiers in Quantum Algorithms for Open Quantum Systems

"Quantum oracles, weak and strong" [TWZ26]
Stanford quantum group meeting *October 2025*

"When do you need an inverse or controlled unitary oracle?" [TWZ26]
Simons Institute Quantum Summer Cluster *July 2025*

"What are quantum computers good for?"
- Princeton special seminar *March 2025*
- Harvard Computer Science Lecture Series *February 2025*
- Caltech Frontiers in Information, Systems, and Computing *February 2025*

"Structure learning of Hamiltonians from real-time evolution" [BLMT24a]
Workshop on correlations of quantum many-body systems *December 2024*

"A perspective on Gibbs sampling"
Simons Institute Quantum Industry Day *November 2024*

"How to learn a Hamiltonian"
FOCS Recent Advances in Quantum Learning workshop *October 2024*

"High-temperature Gibbs states are unentangled and efficiently preparable" [BLMT24b]
Stanford Thermalization and Quantum Information workshop *October 2024*

"Learning the closest product state" [Bak+25].
UC Berkeley quantum pod talk *October 2024*

"Learning quantum Hamiltonians at any temperature in polynomial time" [BLMT26b].
- Simons Institute one-day Hamiltonian learning workshop *February 2024*
- UC Berkeley quantum seminar *December 2023*
- MIT Theory Reading Group *November 2023*
- Harvard Special Quantum Information seminar *November 2023*

"An improved classical singular value transformation for quantum machine learning" [BT24].

- Berkeley theory lunch *October 2023*
- Google Quantum CS Theory seminar *May 2023*

"Two results on estimation of unitary channels"
MIT QI seminar *January 2023*

"Query-optimal estimation of unitary channels in diamond distance" [HKOT23].

- Cornell Junior Theorists' Workshop *May 2023*
- MIT Algorithms and Complexity Seminar *April 2023*
- Chicago Junior Theorists Workshop *January 2023*
- Sandia Labs QPL seminar *December 2022*
- CMU theory group seminar *December 2022*
- Southwest Quantum Information and Technology Workshop *October 2022*
- Quantum Innovators in Computer Science and Mathematics *October 2022*
- Perimeter Institute QI seminar *October 2022*

"Optimal learning of quantum Hamiltonians from high-temperature Gibbs states" [HKT24].

- MIT A+C seminar *March 2022*
- Simons Institute Quantum Wave in Computing Reunion *July 2021*

Talks surveying quantum-inspired classical linear algebra algorithms:

- ColdQuanta seminar *March 2023*
- Perimeter Institute colloquium *October 2021*
- University of Illinois IQIST seminar series *April 2021*
- Simons Institute Quantum Colloquium *March 2021*
- Simons Quantum Algorithms workshop *February 2020*
- Simons Quantum Wave in Computing boot camp *January 2020*
- Santa Fe Institute workshop *July 2019*
- TQC **(plenary talk)** *June 2019*
- TCS+ *May 2019*
- CIFAR Quantum Information Systems Meeting *May 2019*
- Microsoft Research QuArC seminar *November 2018*

"A quantum-inspired classical algorithm for recommendation systems" [Tan19]

- Microsoft Research AI seminar *December 2018*
- UW Theory Seminar *October 2018*
- Quantum Cluster, Simons Institute (informal) *June 2018*