Allen X. Liu

Personal Information
Email: aliu42@berkeley.edu
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Academic Appointments
New York University, Courant Institute
Assistant Professor of Computer Science, (tentative 2026 start)
UC Berkeley
Miller Postdoctoral Fellow (2025-present)

Education
Massachusetts Institute of Technology
   Ph.D in Computer Science, 2025
   Advisor: Ankur Moitra
Massachusetts Institute of Technology
   S.M. in Computer Science, 2022
   Advisor: Ankur Moitra
Massachusetts Institute of Technology
   B. Sc. in Mathematics, 2020

Awards and Honors
Quantum Information Processing (QIP) Best Student Paper (2024)
Citadel GQS PhD Fellowship (awarded 2024)
Hertz Fellowship (awarded 2021)
NSF Graduate Research Fellowship (awarded 2020)
International Mathematical Olympiad (IMO): Gold medalist (2014-2016), Perfect score (2016)

Working Experience
Research Intern, Microsoft Research, WA, Summer 2021, 2022 **(**hosted by Jerry Li)
Research Intern, Google Research, NY, Summer 2019 **(**hosted by Jon Schneider and Renato Paes Leme), Summer 2020 **(**hosted by Morteza Zadimoghaddam)
Quantitative Research Intern, D. E. Shaw & Co., NY, Summer 2018
Trading Intern, Jane Street Capital, NY, Summer 2017

Selected Publications
Research Areas: Theoretical Computer Science, Machine Learning, Quantum Information
*In my field, author order is generally alphabetical denoting equal contribution

Sequences of Logits Reveal the Low Rank Structure of Language Models
N. Golowich, A. Liu, A. Shetty
In Submission

Model Stealing for Any Low Rank Language Model
A. Liu, A. Moitra
ACM Symposium on Theory of Computing (STOC 2025)

High-Temperature Gibbs States are Unentangled and Efficiently Preparable
A. Bakshi, A. Liu, A. Moitra, E. Tang
IEEE Symposium on Foundations of Computer Science (FOCS 2024)

Structure Learning of Hamiltonians from Real-Time Evolution
A. Bakshi, A. Liu, A. Moitra, E. Tang
IEEE Symposium on Foundations of Computer Science (FOCS 2024)

Learning Quantum Hamiltonians at Any Temperature in Polynomial Time
A. Bakshi, A. Liu, A. Moitra, E. Tang
Quantum Information Processing (QIP 2024), **Invited Plenary, Best Student Paper**
ACM Symposium on Theory of Computing (STOC 2024)
Invited to SIAM Journal on Computing Special Issue

An Optimal Tradeoff between Entanglement and Copy Complexity for Quantum State Tomography
S. Chen, J. Li, A. Liu
ACM Symposium on Theory of Computing (STOC 2024)

Constant Approximation for Individual Preference Stable Clustering
A. Aamand, J. Chen, A. Liu, S. Silwal, P. Sukprasert, A. Vakilian, F. Zhang
Advances in Neural Information Processing Systems (NeurIPS 2023), **Spotlight**

When Does Adaptivity Help for Quantum State Learning?
S. Chen, B. Huang, J. Li, A. Liu, M. Sellke
Quantum Information Processing (QIP 2023)
IEEE Symposium on Foundations of Computer Science (FOCS 2023)

The Full Landscape of Robust Mean Testing: Sharp Separations between Oblivious and Adaptive Contamination
C. Canonne, S. Hopkins, J. Li, A. Liu, S. Narayanan
IEEE Symposium on Foundations of Computer Science (FOCS 2023)
Invited to SIAM Journal on Computing Special Issue

Matrix Completion in Almost-Verification Time
J. Kelner, J. Li, A. Liu, A. Sidford, K. Tian
IEEE Symposium on Foundations of Computer Science (FOCS 2023)

Semi-Random Sparse Recovery in Nearly-Linear Time
J. Kelner, J. Li, A. Liu, A. Sidford, K. Tian
Conference on Learning Theory (COLT 2023)

Tensor Decompositions Meet Control Theory: Learning General Mixtures of Linear Dynamical Systems
A. Bakshi, A. Liu, A. Moitra, M. Yau

International Conference on Machine Learning (ICML 2023)

A New Approach to Learning Linear Dynamical Systems
A. Bakshi, A. Liu, A. Moitra, M. Yau
ACM Symposium on Theory of Computing (STOC 2023)

Robust Voting Rules from Algorithmic Robust Statistics
A. Liu, A. Moitra
ACM-SIAM Symposium on Discrete Algorithms (SODA 2023)

Minimax Rates for Robust Community Detection
A. Liu, A. Moitra
IEEE Symposium on Foundations of Computer Science (FOCS 2022)

Tight Bounds for Quantum State Certification with Incoherent Measurements
S. Chen, B. Huang, J. Li, A. Liu
Quantum Information Processing (QIP 2023)
IEEE Symposium on Foundations of Computer Science (FOCS 2022)

Robust Model Selection and Nearly-Proper Learning for GMMs
J. Li, A. Liu, A. Moitra
Advances in Neural Information Processing Systems (NeurIPS 2022)

Clustering Mixtures with Almost Optimal Separation in Polynomial Time
J. Li, A. Liu
ACM Symposium on Theory of Computing (STOC 2022)
SIAM Journal on Computing Special Issue 2024

Learning GMMs with Nearly Optimal Robustness Guarantees
A. Liu, A. Moitra
Conference on Learning Theory (COLT 2022)

Settling the Robust Learnability of Mixtures of Gaussians
A. Liu, A. Moitra
ACM Symposium on Theory of Computing (STOC 2021)
Journal of the ACM 2023, 70(3), pp. 1-53

Variable Decomposition for Prophet Inequalities and Optimal Ordering
A. Liu, R. Paes Leme, M. Pal, J. Schneider, B. Sivan
ACM Conference on Economics and Computation (EC 2021)

Optimal Contextual Pricing and Extensions
A. Liu, R. Paes Leme, J. Schneider
Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2021)

Tensor Completion Made Practical
A. Liu, A. Moitra
Advances in Neural Information Processing Systems (NeurIPS 2020)

Better Algorithms for Estimating Non-Parametric Models in Crowd-Sourcing and Rank Aggregation
A. Liu, A. Moitra
Conference on Learning Theory (COLT 2020)

Fourier and Circulant Matrices are not Rigid
Z. Dvir, A. Liu
Computational Complexity Conference (CCC 2019)
Theory of Computing Special Issue 2020, 16(1), pp. 1-48

Efficiently Learning Mixtures of Mallows Models
A. Liu, A. Moitra
IEEE Symposium on Foundations of Computer Science (FOCS 2018)

Teaching
Teaching Assistant for 6.S896 (Algorithmic Statistics) at MIT**,** Fall 2023
Teaching Assistant at USA Math Olympiad Summer Program**,** Summer 2017, 2018

Service
Reviewer for SODA 2025, NeuIPS 2024, FOCS 2024, STOC 2024, ICALP 2024, FOCS 2023, STOC 2023, SODA 2023, FSTTCS 2023, FOCS 2022, SODA 2022, NeurIPS 2021, FOCS 2021,

Chief Problem Writer for Harvard MIT Mathematics Tournament (HMMT) 2017,2018