

# Allen X. Liu

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## Personal Information

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Phone: (585)-643-0696

Date of Birth: June 12, 1999

Citizenship: USA

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## Education

**Massachusetts Institute of Technology**

2020-present

Candidate for Ph.D in Computer Science

**Massachusetts Institute of Technology**

2016-2020

B. Sc. in Mathematics

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## Awards and Honors

Hertz Fellowship (awarded 2021)

NSF Graduate Research Fellowship (awarded 2020)

William Lowell Putnam Mathematical Competition: N1 (2016,17,19), N2 (2018)

International Mathematical Olympiad (IMO): Gold medalist (2014-2016), Perfect Scorer (2016)

USA Mathematical Olympiad (USAMO): National winner (2014-2016), Perfect Scorer (2015,16)

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## Research

### Research Interests

Theoretical Computer Science, Machine Learning

### Selected Publications

#### Semi-Random Sparse Recovery in Nearly-Linear Time

J. Kelner, J. Li, A. Liu, A. Sidford, K. Tian

*Proceedings of the Annual Conference on Learning Theory (COLT 2023)*

#### Learning 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

*Proceedings of the Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2023)*

#### Robust Model Selection and Nearly-Proper Learning for GMMs

J. Li, A. Liu, A. Moitra

*Advances in Neural Information Processing Systems (NeurIPS 2022)*

#### Minimax Rates for Robust Community Detection

A. Liu, A. Moitra

*Proceedings of the Annual 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

*Proceedings of the Annual IEEE Symposium on Foundations of Computer Science (FOCS 2022)*

#### The Pareto Frontier of Instance-Dependent Guarantees in Multi-Player Multi-Armed Bandits with no Communication

A. Liu, M. Sellke

*Proceedings of the Annual Conference on Learning Theory (COLT 2022)*

## **Learning GMMs with Nearly Optimal Robustness Guarantees**

A. Liu, A. Moitra

*Proceedings of the Annual Conference on Learning Theory (COLT 2022)*

## **Clustering Mixtures with Almost Optimal Separation in Polynomial Time**

J. Li, A. Liu

*ACM Symposium on Theory of Computing (STOC 2022)*

## **Settling the Robust Learnability of Mixtures of Gaussians**

A. Liu, A. Moitra

*ACM Symposium on Theory of Computing (STOC 2021)*

## **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

*Proceedings of the 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)*

## **Myersonian Regression**

A. Liu, R. Paes Leme, J. Schneider

*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

*Proceedings of the Annual Conference on Learning Theory (COLT 2020)*

## **Fourier and Circulant Matrices are not Rigid**

Z. Dvir, A. Liu

*Computational Complexity Conference (CCC 2019)*

## **Efficiently Learning Mixtures of Mallows Models**

A. Liu, A. Moitra

*Proceedings of the Annual IEEE Symposium on Foundations of Computer Science (FOCS 2018)*

## **Wavelet decomposition and bandwidth of functions defined on vector spaces over finite fields**

A. Iosevich, A. Liu, A. Mayeli, J. Pakianathan

*Bulletin of the Hellenic Mathematical Society, Volume 62, 2018 (80–93)*

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## **Working Experience**

### **Microsoft Research, WA**

2021,2022

Worked on theoretical research in high-dimensional statistics, mixture models, and optimization

### **Google Research, MA**

2020

Worked on proving theoretical guarantees for distributed load balancing algorithms and correlation clustering

### **Google Research, NY**

2019

Worked on theoretical research in online learning related to bandits, contextual search, and prophet inequalities

### **D. E. Shaw & Co., NY**

2018

Quantitative research intern, worked on generating synthetic orderbook data using recurrent neural networks

### **Jane Street Capital, NY**

2017

Trading intern, analyzed real market data and built models to develop trading strategies for options and commodity futures

### **MIT Computer Science and Artificial Intelligence Laboratory, MA**

2017-2020

Researching and developing algorithms with provable guarantees for learning and modeling ranking data

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## **Volunteer and Teaching**

### **Problem Czar for Harvard MIT Math Tournament**

2016-2018

Wrote problems and assembled tests for the tournament.

### **Teaching Assistant and Grader at USA Math Olympiad Summer Program**

2017-2018

Training program for the USA team for the International Math Olympiad (IMO). Gave lectures to students on a variety of topics and helped coordinate logistics and grading.

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## **References**

Available upon request