

# Lichen Zhang

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Cambridge, Massachusetts - 02139, U.S.A.

## EDUCATION

- **Massachusetts Institute of Technology** Sep 2022 - Present  
*Ph.D in Applied Mathematics*  
◦ Advisor: Jonathan Kelner Cambridge, MA
- **Carnegie Mellon University** June 2021 - May 2022  
*M.S. in Computer Science*  
◦ Advisor: Gary Miller Pittsburgh, PA  
◦ Thesis: **Speeding Up Optimizations via Data Structures: Faster Search, Sample and Maintenance**
- **Carnegie Mellon University** Aug 2017 - May 2021  
*B.S. in Computer Science* Pittsburgh, PA

## RESEARCH INTERESTS

Machine learning, large language models, optimization, numerical linear algebra, sketching and streaming, differential privacy.

## EXPERIENCE

- **Amazon Web Services (AWS)** May 2024 - Aug 2024  
*Applied Scientist Intern*  
◦ Mentors: Nina Mishra, Yonatan Naamad, Tal Wagner East Palo Alto, CA
- **Simons Institute for the Theory of Computing** Aug 2023 - Dec 2023  
*Visiting Student*  
◦ Data Structures and Optimization for Fast Algorithms program Berkeley, CA
- **Adobe Research** May 2023 - Aug 2023  
*Research Scientist Intern*  
◦ Mentors: Zhao Song, Ritwik Sinha, Raghavendra Addanki San Jose, CA
- **University of Washington** June 2022 - Aug 2022  
*Research Assistant*  
◦ Advisor: Yin Tat Lee Seattle, WA
- **Carnegie Mellon University** May 2020 - Aug 2020  
*Undergraduate Research Assistant*  
◦ Advisor: Gary Miller Pittsburgh, PA  
◦ Supported by CMU Summer Undergraduate Research Fellowship (SURF)

## TEACHING

- **Intro to Numerical Methods (18.335)** Spring 2025  
*Teaching Assistant*  
◦ Instructor: Shi Chen MIT
- **An Algorithmist's Toolkit (18.408)** Fall 2024  
*Teaching Assistant*  
◦ Instructor: Jonathan Kelner MIT
- **Intro to Numerical Methods (18.335)** Spring 2024  
*Teaching Assistant*  
◦ Instructor: John Urschel MIT
- **The Computational Lens (15-155)** Spring 2022  
*Teaching Assistant*  
◦ Instructors: Pravesh Kothari and Anil Ada CMU
- **Undergraduate Complexity Theory (15-455)** Spring 2021  
*Teaching Assistant*  
◦ Instructor: Pravesh Kothari CMU

## AWARDS AND SCHOLARSHIPS

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- **Finalist of the Two Sigma Graduate Research Fellowship** 2025  
*Two Sigma*
- **Finalist of the Jane Street Graduate Research Fellowship** 2025  
*Jane Street*
- **Finalist of the Jane Street Graduate Research Fellowship** 2024  
*Jane Street*
- **Reitano Fellowship** Sep 2022 - Aug 2023  
*MIT*
- **Summer Undergraduate Research Fellowship** May 2020 - Aug 2020  
*CMU*

## TALKS

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- **Alternating Minimization for Matrix Completion and Beyond**
  - MIT SPAMS Seminar April 2024
- **Training Multi-Layer Over-Parametrized Neural Network in Subquadratic Time**
  - MIT SPAMS Seminar Oct 2024
  - ITCS 2024 Jan 2024
- **Convex Minimization with Integer Minima in  $\tilde{O}(n^4)$  Time**
  - SODA 2024 Jan 2024
- **Sketching as a Tool for Fast Optimization**
  - Google Research (Mountain View) Algorithms Seminar Nov 2023
  - MIT SPAMS Seminar Oct 2022
- **Sketching Meets Differential Privacy: Fast Algorithm for Dynamic Kronecker Projection Maintenance**
  - ICML 2023 July 2023
- **Sketching for First Order Method: Efficient Algorithm for Low-Bandwidth Channel and Vulnerability**
  - ICML 2023 July 2023
- **A Nearly-Optimal Bound for Fast Regression with  $\ell_\infty$  Guarantee**
  - ICML 2023 July 2023
- **Space-Efficient IPM, with applications to LP and Maximum Weight Bipartite Matching**
  - ICALP 2023 June 2023
- **Dynamic Tensor Product Regression**
  - NeurIPS 2022 Dec 2022
- **Fast Sketching of Polynomial Kernels of Polynomial Degree**
  - Workshop on Algorithms for Large Data (Online) Aug 2021
  - ICML 2021 July 2021

## SERVICES

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- **Conference Reviewer**
  - NeurIPS: 2023, 2024, 2025
  - ICML: 2024, 2025
  - ICLR: 2024, 2025
  - AISTATS: 2023, 2024, 2025
  - AAAI: 2025
  - PODS: 2025
  - ICALP: 2025
  - SODA: 2023
- **Journal Reviewer**
  - ACM Transactions on Quantum Computing
  - Transactions on Machine Learning Research (TMLR)

- [1] Yuzhou Gu, Zhao Song and Lichen Zhang. **Faster Algorithms for Structured Linear and Kernel Support Vector Machines**. In *Proceedings of the 13th International Conference on Learning Representations (ICLR)*, 2025.
- [2] Zhao Song, Mingquan Ye, Junze Yin and Lichen Zhang. **Efficient Alternating Minimization with Applications to Weighted Low Rank Approximation**. In *Proceedings of the 13th International Conference on Learning Representations (ICLR)*, 2025.
- [3] Yuzhou Gu, Nikki Lijing Kuang, Yi-An Ma, Zhao Song and Lichen Zhang. **Log-concave Sampling from a Convex Body with a Barrier: a Robust and Unified Dikin Walk**. In *Proceedings of the 38th Conference on Neural Information Processing Systems (NeurIPS)*, 2024.
- [4] Zhao Song, Junze Yin and Lichen Zhang. **Solving Attention Kernel Regression Problem via Pre-conditioner**. In *Proceedings of the 27th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024.
- [5] Zhao Song, Junze Yin, Lichen Zhang and Ruizhe Zhang. **Fast Dynamic Sampling for Determinantal Point Processes**. In *Proceedings of the 27th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2024.
- [6] Yuzhou Gu, Zhao Song, Junze Yin and Lichen Zhang. **Low Rank Matrix Completion via Robust Alternating Minimization in Nearly Linear Time**. In *Proceedings of the 12th International Conference on Learning Representations (ICLR)*, 2024.
- [7] Zhao Song, Lichen Zhang and Ruizhe Zhang. **Training Multi-Layer Over-Parametrized Neural Network in Subquadratic Time**. In *Proceedings of the 15th Innovations in Theoretical Computer Science (ITCS)*, 2024.
- [8] Haotian Jiang, Yin Tat Lee, Zhao Song and Lichen Zhang. **Convex Minimization with Integer Minima in  $\tilde{O}(n^4)$  Time**. In *Proceedings of the 35th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2024.
- [9] Zhao Song, Xin Yang, Yuanyuan Yang and Lichen Zhang. **Sketching Meets Differential Privacy: Fast Algorithm for Dynamic Kronecker Projection Maintenance**. In *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023.
- [10] Zhao Song, Yitan Wang, Zheng Yu and Lichen Zhang. **Sketching for First Order Method: Efficient Algorithm for Low-Bandwidth Channel and Vulnerability**. In *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023.
- [11] Zhao Song, Mingquan Ye, Junze Yin and Lichen Zhang. **A Nearly-Optimal Bound for Fast Regression with  $\ell_\infty$  Guarantee**. In *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023.
- [12] S. Cliff Liu, Zhao Song, Hengjie Zhang, Lichen Zhang and Tianyi Zhou. **Space-Efficient Interior Point Method, with applications to Linear Programming and Maximum Weight Bipartite Matching**. In *Proceedings of the 50th International Colloquium on Automata, Languages and Programming (ICALP)*, 2023.
- [13] Lianke Qin, Zhao Song, Lichen Zhang and Danyang Zhuo. **An Online and Unified Algorithm for Projection Matrix Vector Multiplication with Application to Empirical Risk Minimization**. In *Proceedings of the 26th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2023.
- [14] Aravind Reddy, Zhao Song and Lichen Zhang. **Dynamic Tensor Product Regression**. In *Proceedings of the 36th Conference on Neural Information Processing Systems (NeurIPS)*, 2022.
- [15] Zhao Song, David Woodruff, Zheng Yu and Lichen Zhang. **Fast Sketching of Polynomial Kernels of Polynomial Degree**. In *Proceedings of the 38th International Conference on Machine Learning (ICML)*, 2021.