

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, quantum computing.

EXPERIENCE

- **Google Research** June 2025 - Aug 2025
Student Researcher
◦ Mentors: Fotis Iliopoulos, Gaurav Menghani, Erik Vee Mountain View, CA
- **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

- **Simons Dissertation Fellowship in Mathematics** 2025 - 2027
Simons Foundation
- **Mathworks Fellowship** 2025 - 2026
Mathworks
- **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** 2022 - 2023
MIT
- **Summer Undergraduate Research Fellowship** 2020
CMU

TALKS

- **Faster Algorithm for Structured Linear and Kernel Support Vector Machines**
 - MIT Theory Lunch Seminar April 2025
- **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 ℓ_∞ 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

- **Conference Reviewer**
 - NeurIPS: 2023, 2024, 2025
 - ICML: 2024, 2025
 - ICLR: 2024, 2025, 2026
 - AISTATS: 2023, 2024, 2025, 2026
 - AAAI: 2025, 2026
 - PODS: 2025
 - ICALP: 2025
 - SODA: 2023, 2026
- **Journal Reviewer**
 - ACM Transactions on Quantum Computing
 - Transactions on Machine Learning Research (TMLR)
 - Transactions on Pattern Analysis and Machine Intelligence

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- [1] Zhao Song, Jianfei Xue and Lichen Zhang. **Differential Privacy for Euclidean Jordan Algebra with Applications to Private Symmetric Cone Programming**. In *Proceedings of the 39th Conference on Neural Information Processing Systems (NeurIPS)*, 2025.
 - [2] Shiyuan Feng, Ying Feng, George Z. Li, Zhao Song, David P. Woodruff and Lichen Zhang. **On Differential Privacy for Adaptively Solving Search Problems via Sketching**. In *Proceedings of the 42nd International Conference on Machine Learning (ICML)*, 2025. **Selected for Oral Presentation (top 1% of submissions)**.
 - [3] 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.
 - [4] 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.
 - [5] 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.
 - [6] 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.
 - [7] 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.
 - [8] 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.
 - [9] 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.
 - [10] 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.
 - [11] 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.
 - [12] 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.
 - [13] Zhao Song, Mingquan Ye, Junze Yin and Lichen Zhang. **A Nearly-Optimal Bound for Fast Regression with ℓ_∞ Guarantee**. In *Proceedings of the 40th International Conference on Machine Learning (ICML)*, 2023.
 - [14] 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.
 - [15] 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.
 - [16] Aravind Reddy, Zhao Song and Lichen Zhang. **Dynamic Tensor Product Regression**. In *Proceedings of the 36th Conference on Neural Information Processing Systems (NeurIPS)*, 2022.
 - [17] Zhao Song, David P. 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.