HAOTIAN JIANG

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CURRENT EMPLOYMENT

University of Chicago, Chicago, IL
Assistant Professor, Department of Computer Science   July, 2024 - Present

PREVIOUS EMPLOYMENT

Microsoft Research, Redmond, WA
Postdoctoral Researcher, Algorithms Group   Dec. 2022 - June. 2024

Google Research, New York, NY
Research Intern (Virtual)   Jun. - Sep. 2022

Microsoft Research, Redmond, WA
Research Intern (Virtual)   Jun. - Sep. 2021
Research Intern   Jul. - Sep. 2019

EDUCATION

University of Washington, Seattle, WA   Sep. 2018 - Dec. 2022
Ph.D. in Computer Science (Advisor: Yin Tat Lee)
Thesis title: "Convex Optimization Over Integer Points"

Tsinghua University, Beijing, China   Sep. 2014 - Jul. 2018
B.Sc. in Mathematics and Physics - GPA: 93/100
Undergrad research advisor: Jian Li

RESEARCH INTERESTS

I am broadly interested in theoretical computer science and applied mathematics, in particular algorithm design for continuous and discrete optimization problems. Most recently, my research focuses on convex optimization and its applications, submodular function minimization, and discrepancy theory.

HONORS & AWARDS

2025 Paper "Quasi-Monte Carlo beyond Hardy-Krause" invited to Journal of the ACM and ACM Transactions on Algorithms Special Issue for SODA 2025
2025 Best Paper Award at SODA 2025
2024 ICML 2024 Spotlight Paper (Top 2% of Submissions)
2023 NeurIPS 2023 Spotlight Paper (Top 3% of Submissions)
2023 Simons-Berkeley Research Fellowship
2023 Paper "Resolving matrix Spencer conjecture up to poly-logarithmic rank" invited to SIAM Journal on Computing Special Issue for STOC 2023
2022 Paper "A new framework for matrix discrepancy: partial coloring bounds via mirror descent" invited to Theory of Computing Special Issue for STOC 2022
2021 Paper "Minimizing convex functions with integral minimizers" invited to ACM Transactions on

Algorithms Special Issue for SODA 2021
2021   Best Student Paper Award at SODA 2021
2018   Paper "Delay asymptotics and bounds for multitask parallel jobs" invited to Queueing Systems Special Issue for Performance 2018
2017   Hangtian CASC Scholarship, First Prize (Best scholarship in Department of Physics)
2016   Gaotong Scholarship (Awarded to outstanding students devoted to CS research)
2016   Samsung Scholarship (Top scholarship in Department of Physics)
2016   Fellowship of "Spark" Talents Program at Tsinghua University (Program for talented undergraduate students dedicated to doing research)
2015   Dongshidongfang Scholarship (Top scholarship in Department of Physics)
2013   2nd Prize in the National Physics Olympiad
2011   1st Prize in the National Mathematics Olympiad

PROFESSIONAL SERVICES

Program Committee Membership: STOC 2025

Conference Reviews: STOC, FOCS, SODA, ITCS, ICALP, ESA, IPCO
Journal Reviews: JACM, SICOMP, SIDMA, TALG, JMLR, CPC

Organizer: Special Session "Recent Progress on Algorithmic Discrepancy Theory and Applications" at MCM 2025.

Thesis Committees (excluding own students). Konstantinos Ameranis, 2026 (expected), UChicago (Advisor: Lorenzo Orecchia); Antares Chen, 2027 (expected), UChicago (Advisor: Lorenzo Orecchia); Max Ovsiankin, 2026 (expected), TTIC (Advisor: Yury Makarychev).

STUDENTS SUPERVISION

Agastya Vibhuti Jha (co-advised with Aaron Potechin)   Sep 2024 - Present

MENTORSHIP

Daogao Liu (PhD student, UW CSE $\to$ Postdoc, Google Research)
Jinghua Sun (Undergrad, UW CSE $\to$ Master student, Yale)

TEACHING

At the University of Chicago:

- **Undergrad Courses:** Theory of Algorithms (Win'25)

- **Graduate Courses:** High Dimensional Probability (Aut'24), Geometric Discrepancy Theory (Aut'24)

PUBLICATIONS

Nikhil Bansal, and Haotian Jiang. "Decoupling via Affine Spectral-Independence: Beck-Fiala and Komlós Bounds Beyond Banaszczyk". https://arxiv.org/pdf/2508.03961.

Jiaheng Chen, Haotian Jiang, and Nathan Kirk. "High-Dimensional Quasi-Monte Carlo via Combinatorial Discrepancy". https://arxiv.org/abs/2508.18426.

Nikhil Bansal, and Haotian Jiang. "An Improved Bound for the Beck-Fiala Conjecture". In *IEEE 66th Annual Symposium on Foundations of Computer Science (FOCS 2025)*. IEEE, 2025.

Andrei Graur, Haotian Jiang, and Aaron Sidford. "Variance Reduction for Faster Decomposable Submodular Function Minimization". To appear.

Afonso S. Bandeira, Sivakanth Gopi, Haotian Jiang, Kevin Lucca, and Thomas Rothvoss. "A Geometric Perspective on the Injective Norm of Sums of Random Tensors". In *Proceedings of the 57th Annual ACM Symposium on Theory of Computing (STOC 2025)*, pp. 822-832. ACM, 2025.

Nikhil Bansal, and Haotian Jiang. "Quasi-Monte Carlo beyond Hardy-Krause". In *Proceedings of the 2025 Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2025)*. **Awarded Best Paper. Invited to Journal of the ACM, and ACM Transactions on Algorithms (TALG) Special Issue.**

Chulin Xie, Zinan Lin, Arturs Backurs, Sivakanth Gopi, Da Yu, Huseyin A Inan, Harsha Nori, Haotian Jiang, Huishuai Zhang, Yin Tat Lee, Bo Li, and Sergey Yekhanin. "Differentially private synthetic data via foundation model APIs 2: text." In *Forty-first International Conference on Machine Learning (ICML 2024)*.

Haotian Jiang, Yin Tat Lee, Zhao Song, and Lichen Zhang. "Convex minimization with integer minima in $\widetilde{O}(n^4)$ time." In *Proceedings of the 2024 Annual ACM-SIAM Symposium on Discrete Algorithms (SODA 2024)*, pp. 3659-3684. SIAM, 2024.

Andrei Graur, Haotian Jiang, and Aaron Sidford. "Sparse submodular function minimization." In *IEEE 64th Annual Symposium on Foundations of Computer Science (FOCS 2023)*, pp. 2071-2080. IEEE, 2023.

Nikhil Bansal, Haotian Jiang, and Raghu Meka. "Resolving matrix Spencer conjecture up to polylogarithmic rank." In *Proceedings of the 55th Annual ACM Symposium on Theory of Computing (STOC 2023)*, pp. 1814-1819. ACM, 2023. **Invited to SIAM Journal on Computing (SICOMP) Special Issue.**.

Haotian Jiang. "Minimizing convex functions with rational minimizers." In *Journal of the ACM (JACM)*, 2022. https://dl.acm.org/doi/10.1145/3566050.

Sally Dong, Haotian Jiang, Yin Tat Lee, Swati Padmanabhan, and Guanghao Ye. "Decomposable nonsmooth convex optimization with nearly-linear gradient oracle complexity." To appear in *Advances in Neural Information Processing Systems (NeurIPS 2022)*.

Deeparnab Chakrabarty, Andrei Graur, Haotian Jiang, and Aaron Sidford. "Improved lower bounds for submodular function minimization." In *IEEE 63rd Annual Symposium on Foundations of Computer Science (FOCS 2022)*, pp. 245-254. IEEE, 2022.

Nikhil Bansal, Haotian Jiang, Raghu Meka, Sahil Singla, and Makrand Sinha. "Smoothed analysis of the Komlós conjecture." In *49th International Colloquium on Automata, Languages, and Programming (ICALP 2022)*. Schloss Dagstuhl-Leibniz-Zentrum für Informatik, 2022.

Daniel Dadush, Haotian Jiang, and Victor Reis. "A new framework for matrix discrepancy: partial coloring bounds via mirror descent." In *Proceedings of the 54th Annual ACM SIGACT Symposium on Theory of Computing (STOC 2022)*, pp. 649-658. ACM, 2022. **Invited to Theory of Computing (ToC) Special Issue.**

Nikhil Bansal, Haotian Jiang, Raghu Meka, Sahil Singla, and Makrand Sinha. "Prefix discrepancy, smoothed analysis, and combinatorial vector balancing." In *13th Innovations in Theoretical Computer Science Conference (ITCS 2022)*, vol. 215, pp. 13:1-13:22. Schloss Dagstuhl-Leibniz-Zentrum für Informatik.

Haotian Jiang, and Victor Reis. "A tighter relation between hereditary discrepancy and determinant lower bound." In *Symposium on Simplicity in Algorithms (SOSA 2022)*, pp. 308-313. SIAM, 2022.

Haotian Jiang. "Minimizing convex functions with integral minimizers." In *Proceedings of the 2021 ACM-SIAM Symposium on Discrete Algorithms (SODA 2021)*, pp. 976-985. SIAM, 2021. **Awarded Best Student Paper. Invited to ACM Transactions on Algorithms (TALG) Special Issue.**

Nikhil Bansal, Haotian Jiang, Raghu Meka, Sahil Singla, and Makrand Sinha. "Online discrepancy minimization for stochastic arrivals." In *Proceedings of the 2021 ACM-SIAM Symposium on Discrete Algorithms (SODA 2021)*, pp. 2842-2861. SIAM, 2021.

Haotian Jiang, Tarun Kathuria, Yin Tat Lee, Swati Padmanabhan, and Zhao Song. "A faster interior point method for semidefinite programming." In *IEEE 61st Annual Symposium on Foundations of Computer Science (FOCS 2020)*, pp. 910-918. IEEE, 2020.

Nikhil Bansal, Haotian Jiang, Sahil Singla, and Makrand Sinha. "Online vector balancing and geometric discrepancy." In *Proceedings of the 52nd Annual ACM SIGACT Symposium on Theory of Computing (STOC 2020)*, pp. 1139-1152. ACM 2020.

Haotian Jiang, Yin Tat Lee, Zhao Song, and Sam Chiu-wai Wong. "An improved cutting plane method for convex optimization, convex-concave games, and its applications." In *Proceedings of the 52nd Annual ACM SIGACT Symposium on Theory of Computing (STOC 2020)*, pp. 944-953. ACM 2020.

Haotian Jiang, Yin Tat Lee, and Santosh S. Vempala. "A generalized central limit conjecture for convex bodies." In *Geometric Aspects of Functional Analysis,* pp. 1-41. Springer, Cham, 2020.

Haotian Jiang, Jian Li, Daogao Liu, and Sahil Singla. "Algorithms and adaptivity gaps for stochastic k-TSP." In *11th Innovations in Theoretical Computer Science Conference (ITCS 2020),* Vol. 151, pp. 45:1-45:25. Schloss Dagstuhl-Leibniz-Zentrum für Informatik.

T-H. Hubert Chan, Haotian Jiang, and Shaofeng H-C. Jiang. "A unified PTAS for prize collecting TSP and steiner tree problem in doubling metrics." *ACM Transactions on Algorithms (TALG 2020),* vol. 16, no. 2, pp. 1-23, 2020.
(Conference version in *26th Annual European Symposium on Algorithms (ESA 2018)*).

Venkatesan Guruswami, and Haotian Jiang. "Near-optimal repair of Reed-Solomon codes with low sub-packetization." In *IEEE International Symposium on Information Theory (ISIT 2019)*, pp. 1077-1081. IEEE, 2019.

Anupam Gupta, Haotian Jiang, Ziv Scully, and Sahil Singla. "The markovian price of information." In *International Conference on Integer Programming and Combinatorial Optimization (IPCO 2019)*, pp. 233-246. Springer, Cham, 2019.

Weina Wang, Mor Harchol-Balter, Haotian Jiang, Alan Scheller-Wolf, and R. Srikant. "Delay asymptotics and bounds for multitask parallel jobs." *Queueing Systems,* vol.91, pp. 207-239, 2019.
(Conference version in *36th International Symposium on Computer Performance, Modeling, Measurements, and Evaluation (Performance 2018)*). **Invited to Queueing Systems (QUESTA) Special Issue.**

SELECTED TECHNICAL REPORTS & PREPRINTS

Haotian Jiang, Janardhan Kulkarni, and Sahil Singla. "Online geometric discrepancy for stochastic arrivals with applications to envy minimization." *arXiv preprint arXiv:1910.01073*, 2019. `https://arxiv.org/pdf/1910.01073.pdf`.

INVITED TALKS

Beck-Fiala and Komlós Bounds Beyond Banaszczyk

UIUC Theory Seminar, Urbana-Champaign, IL	(expected) Sep 2025
Caltech Geoemtry & Topology seminar, Pasadena, CA	(expected) Nov 2025
MSU Applied Math Seminar, East Lansing, MI	(expected) Nov 2025

Algorithmic Discrepancy Theory

MCM 2025, Illinois Institute of Technology, Chicago, IL	Jul 2025

Quasi-Monte Carlo Beyond Hardy-Krause

CNRS, Paris, France	Jun 2025
Tsinghua University, Beijing, China	Apr 2025
Peking University, Beijing, China	Apr 2025
International Seminar on Monte Carlo Methods, Virtual	Feb 2025
IIT Comp Math and Stat Seminar, Chicago, IL	Jan 2025
SODA 2025 Conference, New Orleans, LA	Jan 2025
MSR Redmond Algorithms Group Meeting, Virtual	Nov 2024

Tensor Concentration Inequalities: A Geometric Approach

UMich Theory Seminar, Ann Arbor, MI	Sep 2025
UChicago Theory Seminar, Chicago, IL	Oct 2024
Princeton Theory Lunch, Princeton, NJ	Sep 2024

Sparse Submodular Function Minimization

UChicago Theory Seminar, Chicago, IL	Feb 2024
UW Theory Seminar, Seattle, WA	Jan 2024
Simons Workshop "Optimization and Algorithm Design", Berkeley, CA	Nov 2023

Convex Integer Optimization

UChicago CS Colloquium, Chicago, IL	Mar 2023
Rutgers CS Colloquium, New Brunswick, NJ	Feb 2023
NYU CS Colloquium, New York City, NY	Feb 2023
Georgia Tech CS Colloquium, Atlanta, GA	Feb 2023
Cornell ORIE Colloquium, Ithaca, NY	Feb 2023
UIUC CS Colloquium, Virtual	Jan 2023

Resolving Matrix Spencer Conjecture Up to Poly-logarithmic Rank

CWI Theory Seminar, Amsterdam	Jun 2023
Columbia Theory Seminar, Virtual	Dec 2022
UW Theory Seminar, Seattle, WA	Nov 2022
CMU Theory Seminar, Pittsburgh, PA	Nov 2022
MIT A&C Seminar, Cambridge, MA	Nov 2022
ETH Zurich Theory Seminar, Virtual	Oct 2022
University of Michigan Theory Seminar, Ann Arbor, MI	Oct 2022
Georgia Tech ACO Student Seminar, Atlanta, GA	Sep 2022

Smoothed Analysis of the Komlós Conjecture

ICALP 2022 Conference, Virtual	Jul 2022

Minimizing Convex Functions with Integral/Rational Minimizers

UC Berkeley Theory Seminar, Berkeley, CA	Jul 2022
Stanford University Seminar, Stanford, CA	Jun 2022

University of Michigan Theory Seminar, Ann Arbor, MI	May 2022
HIM Continuous Approaches to Discrete Optimization Workshop, Bonn, Germany	Oct 2021
EPFL Theory Seminar, Virtual	May 2021
Microsoft Research Redmond Theory Seminar, Virtual	Apr 2021
University of Copenhagen Theory Seminar, Virtual	Apr 2021
ETH Zurich Theory Seminar, Virtual	Apr 2021
NUS Theory Seminar, Virtual	Feb 2021
SODA 2021 Conference, Virtual	Jan 2021

An Improved Cutting Plane Method and its Applications

STOC 2020 Conference, Virtual	June 2020
UW Theory Seminar, Seattle, WA	May 2020

Online Vector Balancing and Geometric Discrepancy

Microsoft Research Redmond Theory Seminar, Redmond, WA	Feb 2020
UW Theory Lunch, Seattle, WA	Jan 2020

The Markovian Price of Information

UW Theory Seminar, Seattle, WA	May 2019
IPCO 2019 Conference, Ann Arbor, MI	May 2019

Delay Asymptotics and Bounds for Multi-Task Parallel Jobs

CMU SQUALL Talk, Pittsburgh, PA	Sep 2017
Tsinghua University Network Group Meeting, Beijing, China	Nov 2017

A Unified PTAS for Prize Collecting TSP and Steiner Tree Problem in Doubling Metrics

CMU Theory Lunch, Pittsburgh, PA	Sep 2017
ESA 2018 Conference, Helsinki, Finland	Aug 2018

Miscellaneous

UW Theory Lunch: "Matroid Prophet Secretary Using a Residual"	Jan 2019
UW Theory Lunch: "Matrix Khintchine Inequality and Beyond"	Aug 2022