Yuzhou Gu
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RESEARCH INTEREST High-dimensional statistics, Information theory, Probability, Optimization

EMPLOYMENT

New York University New York, NY, USA
– Data Science Faculty Fellow & Courant Instructor, Sept. 2024 - Aug. 2026

Institute for Advanced Study Princeton, NJ, USA
– Member, Sept. 2023 - July 2024

EDUCATION

Massachusetts Institute of Technology Cambridge, MA, USA
– Ph.D. in Electrical Engineering and Computer Science, Sept. 2018 - June 2023
Thesis: Channel Comparison Methods and Statistical Problems on Graphs
Advisor: Yury Polyanskiy
– M.Eng. in Electrical Engineering and Computer Science, Sept. 2017 - June 2018
Advisor: Yury Polyanskiy
– B.S. in Electrical Engineering and Computer Science
B.S. in Mathematics, Sept. 2013 - June 2017

AWARDS

– George M. Sprowls PhD Thesis Award, MIT EECS Department, 2024
– Best Student Paper Award at *Conference on Learning Theory (COLT) 2021*
– Jacobs Presidential Fellowship, MIT, 2018-2019
– Gold Medal (3rd place) at *International Olympiad in Informatics (IOI) 2012*

PUBLICATIONS & PREPRINTS

1. Pietro Caputo, Zongchen Chen, **Yuzhou Gu**, Yury Polyanskiy. "Entropy Contraction for Finite Markov Kernels: Continuous-Time versus Discrete-Time," *In preparation.*
2. **Yuzhou Gu**, Xin Li, Yinzhan Xu. "Tight Bounds for Noisy Computation of Threshold, Counting and Connectivity," *Submitted.*
3. **Yuzhou Gu**. "Exact condensation thresholds for NAE-SAT and the hypergraph stochastic block model," *In preparation.*
4. **Yuzhou Gu**, Yury Polyanskiy. "Robust reconstruction on trees revisited," *In preparation.*
5. **Yuzhou Gu**, Aaradhya Pandey. "Community detection in the hypergraph stochastic block model and reconstruction on hypertrees," *Conference on Learning Theory (COLT) 2024.*
6. **Yuzhou Gu**, Yury Polyanskiy. "Non-linear Log-Sobolev Inequalities for the Potts Semigroup and Applications to Reconstruction Problems," *Communications in Mathematical Physics, 404(2):769–831, 2023.*
7. **Yuzhou Gu**, Ziqi Zhou, Onur Günlü, Rafael G. L. D'Oliveira, Parastoo Sadeghi, Muriel Médard, Rafael F. Schaefer. "Generalized Rainbow Differential Privacy," *Journal of Privacy and Confidentiality, 14(2), 2024.*
8. Zongchen Chen, **Yuzhou Gu**. "Fast Sampling of b-Matchings and b-Edge Covers," *ACM-SIAM Symposium on Discrete Algorithms (SODA) 2024.*

9. **Yuzhou Gu**, Yury Polyanskiy. "Weak Recovery Threshold for the Hypergraph Stochastic Block Model," *Conference on Learning Theory (COLT) 2023.*
10. **Yuzhou Gu**, Yury Polyanskiy. "Uniqueness of BP fixed point for the Potts model and applications to community detection," *Conference on Learning Theory (COLT) 2023.*
11. **Yuzhou Gu**, Zhao Song, Lichen Zhang. "Faster Algorithms for Structured Linear and Kernel Support Vector Machines," *Preprint. arXiv: 2307.07735*
12. **Yuzhou Gu**, Zhao Song, Junze Yin, Lichen Zhang. "Low Rank Matrix Completion via Robust Alternating Minimization in Nearly Linear Time," *International Conference on Learning Representations (ICLR) 2024.*
13. **Yuzhou Gu**, Zhao Song. "A Faster Small Treewidth SDP Solver," *Preprint. arXiv:2211.06033*
14. **Yuzhou Gu**, Yinzhan Xu. "Optimal Bounds for Noisy Sorting," *ACM Symposium on Theory of Computing (STOC) 2023.*
15. Emmanuel Abbe, Elisabetta Cornacchia, **Yuzhou Gu**, Yury Polyanskiy. "Stochastic block model entropy and broadcasting on trees with survey," *Conference on Learning Theory (COLT) 2021.* **Best Student Paper Award.**
16. **Yuzhou Gu**, Adam Polak, Virginia Vassilevska Williams, Yinzhan Xu. "Faster monotone min-plus product, range mode, and single source replacement paths," *International Colloquium on Automata, Languages and Programming (ICALP) 2021.*
17. **Yuzhou Gu**, Hajir Roozbehani, Yury Polyanskiy. "Broadcasting on trees near criticality," *IEEE International Symposium on Information Theory (ISIT) 2020.*
18. Zeev Dvir, Sivakanth Gopi, **Yuzhou Gu**, Avi Wigderson. "Spanoids - an abstraction of spanning structures, and a barrier for LCCs," *Innovations in Theoretical Computer Science (ITCS) 2019.*
    Zeev Dvir, Sivakanth Gopi, **Yuzhou Gu**, Avi Wigderson. "Spanoids - an abstraction of spanning structures, and a barrier for LCCs," *SIAM Journal on Computing (SICOMP), 49(3):465–496, 2020.*
19. Lijie Chen, Erik D. Demaine, **Yuzhou Gu**, Virginia Vassilevska Williams, Yinzhan Xu, Yuancheng Yu. "Nearly optimal separation between partially and fully retroactive data structures," *Scandinavian Symposium and Workshops on Algorithm Theory (SWAT) 2018.*
20. **Yuzhou Gu**. "Zero-error communication over adder MAC," *Preprint. arXiv:1809.07364*
21. **Yuzhou Gu**. "Graph magnitude homology via algebraic Morse theory," *Preprint. arXiv:1809.07240*
22. **Yuzhou Gu**. "Generalized equivariant model structure on $\mathbf{Cat}^I$," *Preprint. arXiv:1605.07983*
23. **Yuzhou Gu**. "Some results on reversible gate classes over non-binary alphabets," *Preprint. arXiv:1606.00804*

TALKS

1. Community detection in the hypergraph stochastic block model and reconstruction on hypertrees, *Conference on Learning Theory (COLT) 2024.* Edmonton, CA, Canada, June 2024
2. Weak Recovery Threshold for the Hypergraph Stochastic Block Model, *Rutgers Discrete Mathematics Seminar.* Rutgers University, Piscataway, NJ, Mar. 2024
3. Reconstruction on trees and hypertrees, *Computer Science/Discrete Mathematics Seminar II.* Institute for Advanced Study, Princeton, NJ, Feb. 2024

4. Fast Sampling of b-Matchings and b-Edge Covers, *ACM-SIAM Symposium on Discrete Algorithms (SODA) 2024.* Alexandria, VA, Jan. 2024
5. Uniqueness of Belief Propagation Fixed Point, *Short Talks by Postdoctoral Members.* Institute for Advanced Study, Princeton, NJ, Oct. 2023
6. Weak Recovery Threshold for the Hypergraph Stochastic Block Model, *Probability in High Dimensions Reading Seminar.* Princeton University, Princeton, NJ, Oct. 2023
7. Weak Recovery Threshold for the Hypergraph Stochastic Block Model, *Conference on Learning Theory (COLT) 2023.* Virtual, June 2023
8. Uniqueness of BP fixed point for the Potts model and applications to community detection, *Conference on Learning Theory (COLT) 2023.* Virtual, June 2023
9. Information Theory and Uniqueness of Belief Propagation Fixed Point, *Graduate Student Probability Conference.* University of Wisconsin-Madison, Madison, WI, Sept. 2022
10. Channel degradation and uniqueness of BP fixed point beyond binary alphabet, *Conference on Information Sciences and Systems (CISS).* Virtual, Mar. 2022
11. Stochastic block model entropy and broadcasting on trees with survey, *Conference on Learning Theory (COLT) 2021.* Virtual, Aug. 2021
12. Faster monotone min-plus product, range mode, and single source replacement paths, *International Colloquium on Automata, Languages and Programming (ICALP) 2021.* Virtual, July 2021
13. Broadcasting on trees near criticality, *IEEE International Symposium on Information Theory (ISIT) 2020.* Virtual, July 2021
14. Strong data processing inequalities and reconstruction problems, *LIDS Student Conference 2020.* Massachusetts Institute of Technology, Cambridge, MA, Jan. 2020

SERVICE

- Reviewer for IEEE International Symposium on Information Theory (ISIT) 2021, 2023, 2024, IEEE Information Theory Workshop (ITW) 2022, 2023, ACM-SIAM Symposium on Discrete Algorithms (SODA) 2023, 2024, ACM Symposium on Theory of Computing (STOC) 2024, International Colloquium on Automata, Languages and Programming (ICALP) 2024, IEEE Symposium on Foundations of Computer Science (FOCS) 2024, IEEE Transactions on Information Theory, Algorithmica, Annals of Statistics, Mathematical Reviews
- Program committee member for International Conference on Algorithmic Learning Theory (ALT) 2024

TEACHING

- Instructor, NYU MA-UY 3113 Advanced Linear Algebra and Complex Variables, Fall 2024
- Teaching Assistant, MIT 6.441 Information Theory, Fall 2021