Yuchen Wu

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GitHub: github.com/wuyc0114

Education / Experience

University of Pennsylvania	Philadelphia, PA
Postdoctoral researcher	2023–current
Stanford University	Stanford, CA
Ph.D. in Statistics, Advisor: Andrea Montanari	2018–2023
Ph.D. Minor in Management Science and Engineering	2020–2023
M.S. in Statistics	2021–2022
Tsinghua University	Beijing, China
B.S. in Mathematics, GPA: 3.92/4.00, Rank: 2/96	2014–2018

Research interests

- Sampling in statistics and generative AI
- High-dimensional statistical inference
- Algorithm design under constraints
- Data-driven decision making
- Random matrix theory

Journal publications

[1] Andrea Montanari* and Yuchen Wu* (2024). Fundamental limits of low-rank matrix estimation with diverging aspect ratios. *Annals of Statistics* 52, no. 4: 1460 - 1484.

[2] Andrea Montanari* and Yuchen Wu* (2024). Statistically optimal first order algorithms: a proof via orthogonalization. *Information and Inference: A Journal of the IMA* 13, no. 4: iaae027.

[3] Yuchen Wu* and Kangjie Zhou* (2024). Sharp analysis of power iteration for tensor PCA. *Journal of Machine Learning Research* 25, no. 195: 1−42.

[4] Zihan Wei, Sarfaraz Alam, Miki Verma, Margaret Hilderbran, Yuchen Wu, Brandon Anderson, Daniel E Ho, Jenny Suckale (2024). Integrating water quality data with a Bayesian network model to improve spatial and temporal phosphorus attribution: Application to the Maumee River Basin. *Journal of Environmental Management* volume 360: 121120.

[5] Andrea Montanari* and Yuchen Wu* (2023). Adversarial examples in random neural networks with general activations. *Mathematical Statistics and Learning* 6, no. 1: 143-200.

[6] Song Mei* and Yuchen Wu* (2023). Deep networks as denoising algorithms: sample-efficient learning of diffusion models in high-dimensional graphical models. *arXiv:2309.11420. IEEE Transactions on Information Theory 2025+.*

[7] Andrea Montanari* and Yuchen Wu* (2024). Provably efficient posterior sampling for sparse linear regression via measure decomposition. *arXiv:2406.19550.*
Major revision at Journal of the American Statistical Association.

Conference publications

[1] Yuchen Wu, Minshuo Chen, Zihao Li, Mengdi Wang, and Yuting Wei (2024). Theoretical insights for diffusion guidance: a case study for Gaussian mixture models. *International Conference on Machine Learning (ICML).*

[2] Pratik Patil*, Yuchen Wu*, and Ryan Tibshirani (2024). Failures and successes of cross-validation for early-stopped gradient descent. *International Conference on Artificial Intelligence and Statistics (AISTATS), Oral, top 7.3% of accepted papers.*

[3] Yuchen Wu* and Kangjie Zhou* (2023). Lower bounds for the convergence of tensor power iteration on random overcomplete models. *Conference on Learning Theory (COLT).*

[4] Yuchen Wu, Jakab Tardos, Mohammad Hossein Bateni, André Linhares, Filipe Miguel Goncalves de Almeida, Andrea Montanari, Ashkan Norouzi-Fard (2021). Streaming belief propagation for community detection. *Advances in Neural Information Processing Systems (Neurips).*

[5] Michael Celentano*, Andrea Montanari* and Yuchen Wu* (2020). The estimation error of general first order methods. *Conference on Learning Theory (COLT).*

Preprints

[1] Yuchen Wu, Yuxin Chen and Yuting Wei (2024). Stochastic Runge-Kutta methods: provable acceleration of diffusion models. *arXiv:2410.04760.*

[2] Andrea Montanari* and Yuchen Wu* (2023). Posterior sampling in high dimension via diffusion processes. *arXiv:2304.11449.*

[3] Yuchen Wu, Zhuoran Yang and Xinyi Zhong (2024). Conquering online principal-agent models in the face of strategic behaviors and information asymmetry. *preprint.*
Available on request.

[4] Ran Xie, Iain Johnstone and Yuchen Wu (2024). Estimation of high-dimensional genetic covariance using a parametric model. *preprint.*
Available on request.

* **alphabetical**

Scholarships and Awards

• ICSA China Conference Travel Award	2023
• SIAM Student Travel Award	2022
• National Scholarship, Tsinghua University	2015–2017
• Chinese Mathematical Olympiad, Second prize	2014
• Chinese Girls' Mathematical Olympiad, 3rd place	2013

Talks and presentations

1. INFORMS Applied Probability Society Conference, Georgia Tech	June 2025
2. International India Statistical Association Conference, University of Nebraska-Lincoln	June 2025
3. Optimization and Statistical Learning Workshop, Columbia University	April, 2025

4. Applied Probability Seminar, Columbia University   October, 2024
5. FDS Conference: Recent Advances and Future Directions for Sampling, Yale University   October, 2024
6. INFORMS Annual Meeting   October, 2024
7. Cornell Young Researchers Workshop   October, 2024
8. S. S. Wilks Memorial Seminar in Statistics, Princeton University   October, 2024
9. Joint Statistical Meetings   August, 2024
10. The 41st International Conference on Machine Learning (poster)   July, 2024
11. Youth in High Dimensions workshop at ICTP   May, 2024
12. Professor Weijie Su's group meeting, University of Pennsylvania   May, 2024
13. The 27th International Conference on Artificial Intelligence and Statistics (oral)   May, 2024
14. The 58th Annual Conference on Information Sciences and Systems   March, 2024
15. Measure transport, diffusion processes and sampling (poster), Flatiron Institute   December, 2023
16. Professor Tom Berrett and Professor Yi Yu's group meeting, University of Warwick   November, 2023
17. IMS Young Mathematical Scientists Forum, University of Singapore   November, 2023
18. Wharton lunch seminar   November, 2023
19. Penn/Temple Probability Seminar   October, 2023
20. INFORMS Annual Meeting   October, 2023
21. University of the Chinese Academy of Sciences   October, 2023
22. Mathematical and Scientific Foundations of Deep Learning Annual Meeting (poster)   September, 2023
23. Theory lunch, Stanford University   August, 2023
24. University of Science and Technology of China   July, 2023
25. Zhongnan University of Economics and Law   July, 2023
26. Conference on Learning Theory 2023   July, 2023
27. ICSA 2023 China Conference   July, 2023
28. Shenzhen Conference on Random Matrix Theory and Applications   June, 2023
29. Yuxin Chen's group meeting   May, 2023
30. Ryan Tibshirani's group meeting   April, 2023
31. MoDL meeting   March, 2023
32. Liza Levina and Ji Zhu's group meeting, University of Michigan   January 2023
33. Institute for the Foundations of Data Science, Yale University   December 2022
34. Information Systems Laboratory Colloquium at Stanford University   December 2022
35. Stanford Berkeley Joint Colloquium   November 2022
36. SIAM Conference on Mathematics of Data Science   September 2022
37. TBSI Workshop on Learning Theory, Young Researchers' Forum session   August 2022
38. 2022 ICSA China Conference   July 2022
39. AI TIME PhD, Tsinghua University   February 2022
40. Yuling Jiao's group meeting, Wuhan University   January 2022
41. Conference on Neural Information Processing Systems   December 2021
42. No-retreat day student seminar, Department of Statistics, Stanford University   November 2021
43. 2021 Joint Statistical Meetings, speed presentation   August 2021
44. Conference on Learning Theory   July 2020

Teaching

As an instructor at University of Pennsylvania:

- STAT 1010 Introductory Business Statistics   Summer 2024

As a teaching assistant at Stanford University:

- STATS 200 - Statistical Inference   Autumn 2018-2019, 2020-2021
- STATS 216 - Introduction to Statistical Learning   Winter 2018-2019
- STATS 60 - Introduction to Statistical Methods   Summer 2018-2019, 2019-2020, 2021-2022
- Math 230A / Stat 310A - Theory of Probability   Autumn 2019-2020
- STATS 218 - Introduction to Stochastic Processes II   Spring 2019-2020
- Math 230B / Stat 310B - Theory of Probability   Winter 2020-2021
- Math 230C / Stat 310C - Theory of Probability   Spring 2020-2021
- STATS 214 / CS 229M - Machine Learning Theory   Autumn 2021-2022
- STATS 217 - Introduction to Stochastic Processes I   Winter 2021-2022
- STATS 203 - Introduction to Regression Models and Analysis of Variance   Spring 2021-2022
- STATS 305B - Applied Statistics II   Winter 2022-2023

Visiting experience

- Visiting graduate student at Simons Institute
  Program: Geometric Methods in Optimization and Sampling   Fall 2021

- Visiting graduate student at the Institute for Advanced Study   December 2022

Professional service

Journal reviewer:
Annals of Statistics, Journal of the American Statistical Association, Biometrika, Annals of Applied Probability, Jounral of Machine Learning Research, IEEE Transactions on Information Theory, Journal of Statistical Physics, SIAM Journal on Mathematics of Data Science, Communications on Pure and Applied Mathematics, IEEE Transactions on Big Data, Journal of Medical Internet Research

Conference reviewer:
Conference on Learning Theory (COLT), Conference on Neural Information Processing Systems (Neurips), International Conference on Machine Learning (ICML), International Conference on Learning Representations (ICLR) International Conference on Artificial Intelligence and Statistics (AISTATS), International Conference on Algorithmic Learning Theory (ALT), IEEE Symposium on Foundations of Computer Science (FOCS), IEEE International Symposium on Information Theory (ISIT), International Colloquium on Automata, Languages and Programming (ICALP), Conference on Artificial Intelligence (AAAI)

Session organizer:

- Advances in the Theory of Modern Sampling Algorithms   Joint Statistical Meetings 2024

Skills

- Languages: Mandarin (native), English (advanced)

  - 112 in Toefl IBT test, November 2016
  - 165 (verbal) + 170 (quantity) + 4 in GRE test, October 2016

- Programming: Python, R, Matlab, C++