Yuchen Wu

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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

- Diffusion model and sampling
- High-dimensional statistical inference
- Constraint-aware algorithm design
- Data-driven decision making

Preprints

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

[2] Yuchen Wu, Zhuoran Yang and Xinyi Zhong (2024). Conquering online principal-agent model in the face of strategic behavior and information asymmetry. *preprint*.

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

[4] 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.*

[5] 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. Major revision at IEEE Transactions on Information Theory.*

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

Journal publications

[1] Andrea Montanari* and Yuchen Wu* (2024+). Fundamental limits of low-rank matrix estimation with diverging aspect ratios. *Annals of Statistics*.

[2] Andrea Montanari* and Yuchen Wu* (2024). Statistically optimal first order algorithms: a proof via orthogonalization. *Information and Inference: A Journal of the IMA*.

[3] Yuchen Wu* and Kangjie Zhou* (2024). Sharp analysis of power iteration for tensor PCA. *Journal of Machine Learning Research*.

[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*.

[5] Andrea Montanari* and Yuchen Wu* (2023). Adversarial examples in random neural networks with general activations. *Mathematical Statistics and Learning*.

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, MohammadHossein 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)*.

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