

## EDUCATION / EXPERIENCE

---

### University of Pennsylvania

Postdoctoral researcher

Philadelphia, PA

2023–current

### Stanford University

Ph.D. in Statistics, Advisor: Andrea Montanari

Stanford, CA

2018–2023

Ph.D. Minor in Management Science and Engineering

2020–2023

M.S. in Statistics

2021–2022

### Tsinghua University

B.S. in Mathematics, GPA: 3.92/4.00, Rank: 2/96

Beijing, China

2014–2018

## RESEARCH INTERESTS

---

- Diffusion model and sampling
- High-dimensional statistics
- Random matrix theory
- Deep learning theory

## JOURNAL PUBLICATIONS

---

- [1] A. Montanari\* and **Y. Wu\***, “Adversarial examples in random neural networks with general activations”, *Mathematical Statistics and Learning*, vol. 6, no. 1, pp. 143–200, 2023.
- [2] Z. Wei, S. Alam, M. Verma, M. Hilderbran, **Y. Wu**, B. Anderson, D. E. Ho, and J. Suckale, “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*, vol. 360, p. 121 120, 2024.
- [3] A. Montanari\* and **Y. Wu\***, “Fundamental limits of low-rank matrix estimation with diverging aspect ratios”, *Annals of Statistics (to appear)*, 2024+.
- [4] **Y. Wu\*** and K. Zhou\*, “Sharp analysis of power iteration for tensor pca”, *Journal of Machine Learning Research*, vol. 25, no. 195, pp. 1–42, 2024.

## CONFERENCE PUBLICATIONS

---

- [1] M. Celentano\*, A. Montanari\*, and **Y. Wu\***, “The estimation error of general first order methods”, in *Conference on Learning Theory*, PMLR, 2020, pp. 1078–1141.
- [2] **Y. Wu**, J. Tardos, M. Bateni, A. Linhares, F. M. Goncalves de Almeida, A. Montanari, and A. Norouzi-Fard, “Streaming belief propagation for community detection”, *Advances in Neural Information Processing Systems*, vol. 34, 2021.
- [3] **Y. Wu\*** and K. Zhou\*, “Lower bounds for the convergence of tensor power iteration on random overcomplete models”, in *The Thirty Sixth Annual Conference on Learning Theory*, PMLR, 2023, pp. 3783–3820.

- [4] P. Patil\*, **Y. Wu\***, and R. Tibshirani, “Failures and successes of cross-validation for early-stopped gradient descent”, in *International Conference on Artificial Intelligence and Statistics*, PMLR, 2024, pp. 2260–2268.
- [5] **Y. Wu**, M. Chen, Z. Li, M. Wang, and Y. Wei, “Theoretical insights for diffusion guidance: A case study for gaussian mixture models”, in *Forty-first International Conference on Machine Learning*.

## PREPRINTS

---

- [1] A. Montanari\* and **Y. Wu\***, “Provably efficient posterior sampling for sparse linear regression via measure decomposition”, *arXiv preprint arXiv:2406.19550*, 2024.
- [2] S. Mei\* and **Y. Wu\***, “Deep networks as denoising algorithms: Sample-efficient learning of diffusion models in high-dimensional graphical models”, *arXiv preprint arXiv:2309.11420*, 2023  
*Major revision at IEEE Transactions on Information Theory.*
- [3] A. Montanari\* and **Y. Wu\***, “Posterior sampling from the spiked models via diffusion processes”, *arXiv preprint arXiv:2304.11449*, 2023.
- [4] A. Montanari\* and **Y. Wu\***, “Statistically optimal first order algorithms: A proof via orthogonalization”, *arXiv preprint arXiv:2201.05101*, 2022  
*Minor revision at Information and Inference: A Journal of the IMA.*

## \* 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. Theoretical insights for diffusion guidance: A case study for Gaussian mixture models (poster)  
*The 41st International Conference on Machine Learning (ICML)* *July, 2024*
2. Posterior Sampling from the Spiked Models via Diffusion Processes  
*Youth in High Dimensions workshop at ICTP* *May, 2024*
3. Recent Theoretical Advances in Diffusion Models  
*Professor Weijie Su’s group meeting, University of Pennsylvania* *May, 2024*
4. Failures and Successes of Cross-Validation for Early-Stopped Gradient Descent (Oral)  
*The 27th International Conference on Artificial Intelligence and Statistics (AISTATS)* *May, 2024*
5. Failures and Successes of Cross-Validation for Early-Stopped Gradient Descent  
*The 58th Annual Conference on Information Sciences and Systems (CISS)* *March, 2024*
6. Posterior Sampling from the Spiked Models via Diffusion Processes (poster)  
*Measure Transport, Diffusion Processes and Sampling Workshop, Flatiron Institute* *December, 2023*
7. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*Professor Tom Berrett and Professor Yi Yu’s group meeting, University of Warwick* *November, 2023*

8. Posterior Sampling from the Spiked Models via Diffusion Processes  
*IMS Young Mathematical Scientists Forum, University of Singapore* *November, 2023*
9. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*Wharton lunch seminar* *November, 2023*
10. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*Penn/Temple Probability Seminar* *October, 2023*
11. Posterior Sampling from the Spiked Models via Diffusion Processes  
*INFORMS Annual Meeting* *October, 2023*
12. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*University of the Chinese Academy of Sciences* *October, 2023*
13. Posterior Sampling from the Spiked Models via Diffusion Processes (poster)  
*Mathematical and Scientific Foundations of Deep Learning Annual Meeting* *September, 2023*
14. Posterior Sampling from the Spiked Models via Diffusion Processes  
*Theory lunch, Stanford University* *August, 2023*
15. Posterior Sampling from the Spiked Models via Diffusion Processes  
*University of Science and Technology of China* *July, 2023*
16. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*Zhongnan University of Economics and Law* *July, 2023*
17. Lower Bounds for the Convergence of Tensor Power Iteration on Random Overcomplete Models  
*Conference on Learning Theory 2023* *July, 2023*
18. Posterior Sampling from the Spiked Models via Diffusion Processes  
*ICSA 2023 China Conference* *July, 2023*
19. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*Shenzhen Conference on Random Matrix Theory and Applications* *June, 2023*
20. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*Yuxin Chen's group meeting* *May, 2023*
21. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*Ryan Tibshirani's group meeting* *April, 2023*
22. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*MoDL meeting* *March, 2023*
23. Fundamental Limits of Low-Rank Matrix Estimation with Diverging Aspect Ratios  
*Liza Levina and Ji Zhu's group meeting, University of Michigan* *January 2023*
24. Fundamental Limits of Low-Rank Matrix Estimation: Information-Theoretic and Computational Perspectives  
*Institute for the Foundations of Data Science, Yale University* *December 2022*
25. Fundamental Limits of Low-Rank Matrix Estimation with Diverging Aspect Ratios  
*Information Systems Laboratory Colloquium at Stanford University* *December 2022*
26. Fundamental Limits of Low-Rank Matrix Estimation with Diverging Aspect Ratios  
*Stanford Berkeley Joint Colloquium* *November 2022*

27. Adversarial Examples in Random Neural Networks with General Activations <i>SIAM Conference on Mathematics of Data Science</i>	September 2022
28. Adversarial Examples in Random Neural Networks with General Activations <i>TBSI Workshop on Learning Theory, Young Researchers' Forum session</i>	August 2022
29. Adversarial Examples in Random Neural Networks with General Activations <i>2022 ICSA China Conference</i>	July 2022
30. Streaming Belief Propagation for Community Detection <i>AI TIME PhD, Tsinghua University</i>	February 2022
31. Streaming Belief Propagation for Community Detection <i>Yuling Jiao's group meeting, Wuhan University</i>	January 2022
32. Streaming Belief Propagation for Community Detection <i>Conference on Neural Information Processing Systems</i>	December 2021
33. Asymmetric Estimation of Low-Rank Matrix: Statistical and Computational Limits <i>No-retreat day student seminar, Department of Statistics, Stanford University</i>	November 2021
34. Asymmetric Estimation of Low-Rank Matrix: Statistical and Computational Limits <i>2021 Joint Statistical Meetings, speed presentation</i>	August 2021
35. The Estimation Error of General First Order Methods <i>Conference on Learning Theory</i>	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, Journal 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

### 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)

### 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++