Zhong Zheng

University of Pennsylvania
Department of Statistics and Data Science

Email: zh1zheng@wharton.upenn.edu

Education

Ph.D. in Statistics, The Pennsylvania State University, 2020–2025.

Advisor: Dr. Lingzhou Xue

B.Sc. in Statistics, Peking University, 2015–2019.

Advisor: Dr. Weinan E

Professional Experiences

(Expected) Tenure-Track Assistant Professor, 2026–future.

Department of Applied and Computational Mathematics and Statistics, University of Notre Dame.

(Ongoing) Postdoctoral Researcher in Statistics, University of Pennsylvania, 2025–2026.

Advisor: Dr. Dylan Small

Machine Learning Engineer, 2019–2020.

Beijing Institute of Big Data Research

Research Interests

Reinforcement Learning: designing provably efficient RL algorithms with applications to life sciences and public health.

Nonconvex Problems in Machine Learning: developing new statistical and computational methods and theory with applications to single-cell data analysis and image study.

Causal Inference: designing testing methods with applications to survey data and public health.

Interdisciplinary Research: Designing online learning algorithms for inventory control problems and conducting statistical analysis in environmental science research.

Preprints

1. **Zheng, Z.**, Ma, S., and Xue, L. (2025) A New Inexact Manifold Proximal Linear Algorithm with Adaptive Stopping Criteria. *INFORMS Journal on Optimization, under review.*
   Available at http://arxiv.org/abs/2508.19234.

2. Zhang, H., **Zheng, Z.** (co-first author), and Xue, L. (2025) Regret-Optimal Q-Learning with Low Cost for Single-Agent and Federated Reinforcement Learning. *Neurips 2025, under review.*
Available at `https://arxiv.org/abs/2506.04626`.

3. **Zheng, Z.**, Chen, Q., Fang, E. X., and Shi, C. (2024+) Online Learning for Inventory Control Problems under Random Yield. *Operations Research, major revision.*
Available at `https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5012366`.

4. **Zheng, Z.** and Xue, L. (2024+) Smoothed Robust Phase Retrieval, *The Annals of Statistics, under review.*
Available at `https://arxiv.org/abs/2409.01570`.

5. **Zheng, Z.**, Aybat, N. S., Ma, S., and Xue, L. (2024+) Adaptive Algorithms for Robust Phase Retrieval. *SIAM Journal on Optimization, under review.*
Available at `https://arxiv.org/abs/2409.19162`.

6. Yang, Y., **Zheng, Z.** (co-first author), and E, W. (2020). Interpretable Neural Networks for Panel Data Analysis in Economics. Available at `https://arxiv.org/abs/2010.05311`.

Publications

1. Zhang, H., **Zheng, Z.** (co-first author), and Xue, L. (2025) Gap-Dependent Bounds for Federated Q-Learning, *The Forty-Second International Conference on Machine Learning (ICML).*
Available at `https://arxiv.org/abs/2502.02859`.

2. **Zheng, Z.**, Zhang, H. (co-first author), and Xue, L. (2025) Gap-Dependent Bounds for Q-Learning using Reference-Advantage Decomposition *The Thirteenth International Conference on Learning Representations (ICLR),* ***Spotlight***.
Available at `https://openreview.net/forum?id=6tyPSkshtF`.

3. **Zheng, Z.**, Zhang, H. (co-first author), and Xue, L. (2025) Federated Q-Learning with Reference-Advantage Decomposition: Almost Optimal Regret and Logarithmic Communication Cost *The Thirteenth International Conference on Learning Representations (ICLR).*
Available at `https://openreview.net/forum?id=FoUpv84hMw`.

4. **Zheng, Z.**, Gao, F., Xue, L. and Yang, J. (2024) Federated Q-Learning: Linear Regret Speedup with Low Communication Cost. *The Twelfth International Conference on Learning Representations (ICLR).*
Available at `https://openreview.net/forum?id=fe6ANBxcKM`.

5. **Zheng, Z.**, Ma, S., and Xue, L. (2024) A New Inexact Proximal Linear Algorithm with Adaptive Stopping Criteria for Robust Phase Retrieval. *IEEE Transactions on Signal Processing.* 72: 1081-1093.
Available at `https://doi.org/10.1109/TSP.2024.3365933`

6. Shaheena, S. W., Wen, T., **Zheng, Z.**, Xue, L., Baka, J., and Brantley, S. L. (2024) Wastewaters Co-Produced with Shale Gas Drive Slight Regional Salinization of Groundwater. *Environmental Science & Technology.* 58: 17862-17873
Available at `https://doi.org/10.1021/acs.est.4c03371`

Honors and Awards

Best poster presentation award for the 2025 C. R. and Bhargavi Rao Prize Conference, University Park, PA, May 2025.

J. Keith Ord Scholarship in Statistics, Penn State University, December 2024

Travel Award for “Purdue Operations Conference" at Purdue University, August 2024.

Travel Award for “Statistical Foundations of Data Science and their Applications" Conference at Princeton University, May 2023.

Travel Award for “Modern Computation Statistics" Workshop at the University of Florida, Jan. 2023.

Outstanding Graduates in the School of Mathematical Science, Peking University, 2019.

First Prize of National Physics Competition for College Students, 2016.

Gold Medal of the 30th Chinese Mathematical Olympiad, 2014.

Software and Data Library

amanpg: R package for Alternating Manifold Proximal Gradient Method for Sparse PCA
Available at https://cran.r-project.org/web/packages/amanpg/

Shale Network: Groundwater Analyses from Pennsylvania as of 09/2024
Available at https://doi.org/10.26208/DT5Y-5B37

Talks

Invited Talk on “Federated On-Policy Reinforcement Learning", Colloquium, Department of Applied and Computational Mathematics and Statistics, University of Notre Dame, IN. March 2025.

Invited Talk on “Optimal Online Learning of Linear Inflation Rules under the Random Yield", Purdue Operations Conference, West Lafayette, IN. Aug. 2024.

Invited Talk on “Smoothed Robust Phase Retrieval", Topic-Contributed Session on “Advanced Statistical Methods in Nonparametric Statistics and Causal Inference for Complex Data Structures,” Joint Statistical Meetings, Portland, OR. Aug. 2024.

Poster Presentations

Poster Presentation on “Gap-Dependent Bounds for Federated Q-learning”, The Forty-Second International Conference on Machine Learning (ICML), Vancouver, July 2025.

Poster Presentation on “Federated Q-Learning with Reference-Advantage Decomposition: Almost Optimal Regret and Logarithmic Communication Cost”, The 2025 C. R. and Bhargavi Rao Prize Conference, University Park, PA, May 2025.

Poster Presentation on “Gap-Dependent Bounds for Q-Learning using Reference-Advantage Decomposition”, The 2025 C. R. and Bhargavi Rao Prize Conference, University Park, PA, May 2025.

Poster Presentation on “Federated Q-Learning with Reference-Advantage Decomposition: Almost Optimal Regret and Logarithmic Communication Cost”, The Thirteenth International Conference on Learning Representations (ICLR), Singapore, April 2025.

Spotlight Poster Presentation on “Gap-Dependent Bounds for Q-Learning using Reference-Advantage Decomposition”, The Thirteenth International Conference on Learning Representations (ICLR), Singapore, April 2025.

Poster Presentation on “Federated Q-Learning with Reference-Advantage Decomposition: Almost Optimal Regret and Logarithmic Communication Cost”, Penn State’s AI Week Research Forum, April 2025.

Poster Presentation on “Gap-Dependent Bounds for Q-Learning using Reference-Advantage Decomposition”, Penn State’s AI Week Research Forum, April 2025.

Poster Presentation on “Federated Q-Learning: Linear Regret Speedup and Low Communication Cost”, The Twelfth International Conference on Learning Representations (ICLR), Vienna, Austria, May 2024.

Poster Presentation on “Federated Q-Learning: Linear Regret Speedup and Low Communication Cost", Penn State’s AI Week Research Forum, April 2024.

Poster Presentation on “Smoothed Robust Phase Retrieval", The 2023 C. R. and Bhargavi Rao Prize Conference, University Park, PA, May 2023.

Poster Presentation on “Smoothed Robust Phase Retrieval", “Statistical Foundations of Data Science and their Applications" Conference at Princeton University, May 2023.

Poster Presentation on “Smoothed Robust Phase Retrieval", “Modern Computation Statistics" Workshop at the University of Florida, Jan. 2023.

Teaching

The Pennsylvania State University

Lab Instructor and Teaching Assistant. STAT 200: Elementary Statistics. Spring 2022.

Lab Instructor and Teaching Assistant. STAT 200: Elementary Statistics. Fall 2021.

Service

Ad-Hoc Reviewers

Since 2021, I have reviewed papers for the following:

Operations Research.

Annals of Statistics.

Journal of the American Statistical Association.

International Conference on Learning Representations (ICLR)

Transactions on Machine Learning Research (TMLR)

Journal of Global Optimization