Hongru Zhao **Updated December, 2025**

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Academic Appointments

IRSA Faragher Distinguished Postdoctoral Fellow, School of Statistics, University of Minnesota 2025–2026

Education

Ph.D. in Statistics (2025), University of Minnesota,
Adviser: Adam J. Rothman
M.S. in Mathematical Sciences (2020), University of Minnesota,
B.S. in Statistics (2018), Jilin University, China

Research interests

High-Dimensional Statistics; Observational Astrophysics and Cosmology; Quantum Tomography; Generative AI and Diffusion Models; Reinforcement Learning from Human Feedback; Deep Learning Theory; Machine Learning; Sequential Analysis; Random Matrix Theory; Non-Convex Optimization.

Research

— Manuscripts submitted for publication

Hongru Zhao, Jinwen Fu, Tuan Pham. (2025) Convergence and Stability Analysis of Self-Consuming Generative Models with Heterogeneous Human Curation. *Preprint.*

Hongru Zhao. (2025) Allocation-Constrained Adaptive Design and Sequential Estimation: Theory and Application to Bradley–Terry–Davidson Models. Submitted, *Journal of Statistical Planning and Inference*.

Hongru Zhao, Aaron J. Molstad, and Adam J. Rothman. (2025) Subspace Decompositions for Association Structure Learning in Multivariate Categorical Response Regression. *Preprint*.

— Peer reviewed articles

Hongru Zhao, and Xiaotong Shen. (2025) Distributed Algorithms for High-Dimensional Statistical Inference and Structure Learning with Heterogeneous Data. *Statistica Sinica*. (forthcoming)

Xiangyu Zhang, Erik Floden, Hongru Zhao, Sara Algeri, Galin Jones, Vuk Mandic, and Jesse Miller. (2025) On Validating Angular Power Spectral Models for the Stochastic Gravitational-Wave Background Without Distributional Assumptions. *Physical Review D* (forthcoming).

Sara Algeri, Xiangyu Zhang, Erik Floden, Hongru Zhao, Galin L. Jones, Vuk Mandic, and Jesse Miller. (2025) Testing models for angular power spectra: A distribution-free approach, *Physical Review D* (forthcoming).

Xiaoou Li and Hongru Zhao. (2025) Globally-Optimal Greedy Active Sequential Estimation. *IEEE Transactions on Information Theory*, 71(5), 3871–3924.

Hongru Zhao, and Jinchao Xu. (2024) Convergence Analysis and Trajectory Comparison of Gradient Descent for Overparameterized Deep Linear Networks. *Transactions on Machine Learning Research*, ISSN: 2835-8856.

Kangsheng Liu, Zhuangyi Liu, and Hongru Zhao. (2024) Exponential stability of the linear KdV-BBM equation. *Discrete and Continuous Dynamical Systems-B*, 29(3), 1206-1216.

Yongcheng Qi, and Hongru Zhao. (2021) Limiting empirical spectral distribution for products of rectangular matrices. *Journal of Mathematical Analysis and Applications*, 502(2),125237.

Grants & Proposals

NSF DMS—CDS&E: On the detection of new astrophysical signals in spectral data:a new suite of highly scalable data-driven solutions.
Co-Principal Investigator *proposal number: 2603537* 2025

Mentoring & Supervision

— Undergraduate Research

Huiqian Feng — Undergraduate Research Mentee (high-dimensional statistics), School of Statistics, UMN Fall 2025–present

Xiaxuan Zhang — Undergraduate Research Assistant (RA; quantum tomography), School of Statistics, UMN Fall 2025–present

Invited presentations

— 2025

Contributed Paper Presentation, Joint Statistical Meetings (JSM), Nashville, TN:
Subspace Decompositions for Association Structure Learning in Multivariate Categorical Response Regression.

— 2024

Poster Presentation, IRSA Conference, School of Statistics, University of Minnesota:
Structure Learning in Multivariate Categorical Response Regression.

— 2023

Colloquium Seminar, Computer, Electrical, and Mathematical Science and Engineering Division, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia:
Exploring the Optimization Landscape and Training Dynamics of Deep Linear Networks.

Professional service

— Departmental Service

Seminar Coordinator, UMN School of Statistics Seminar Series, Fall 2025

— External Outreach and Sponsorship

Sponsor representative, WiADS Conference — Represented the IRSA; staffed the sponsor desk, and promoted IRSA consulting and statistical workshops.

— Journal Referee

IEEE Transactions on Information Theory, 2025

Electronic Journal of Statistics, 2025

Annals of Applied Probability, 2022

— Conference Reviewer

Transactions on Machine Learning Research, 2024-2025

Courses taught

— UMN-TC: Graduate Instructor

Spring 2026: STAT 4052 Statistical Machine Learning II
Fall 2025: STAT 4102 Theory of Statistics II
Spring 2025: STAT 3301 Regression and Statistical Computing
Fall 2024: STAT 4101 Theory of Statistics I
Spring 2024: STAT 3301 Regression and Statistical Computing
Fall 2023: STAT 3011 Introduction to Statistical Analysis

— UMN-TC: Graduate Teaching Assistant

Fall 2022: STAT 5101 Theory of Statistics I
Spring 2022: STAT 5102 Theory of Statistics II
Fall 2021: STAT 3021 Introduction to Probability and Statistics

Programming Skills

R, MATLAB, Mathematica, Python.