Xiangyu Zhang **Updated April, 2025**

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Research interests

Astrostatistics, statistical inference, statistical computing, gravitational-wave models, generative AI, and diffusion models, statistical machine learning

Education

- Ph.D. in Statistics (August 2025, expected), University of Minnesota, Minneapolis, MN
  Advisor: Prof. Sara Algeri. Co-advisors: Prof. Charlie Geyer and Prof. Galin Jones.
- B.A. in Mathematics and Statistics (2020), University of Minnesota, Minneapolis, MN

Research

— Manuscripts submitted for publication

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. Submitted, *Physical Review D*.

Sara Algeri, Xiangyu Zhang, Erik Floden, Hongru Zhao, Galin Jones, Vuk Mandic, and Jesse Miller. (2025+) A Distribution-Free Approach to Testing Models for Angular Power Spectra. Submitted, *Physical Review Letters*.

— Peer reviewed articles

Xiangyu Zhang, Sara Algeri, Vinay Kashyap, and Margarita Karovska (2023). A novel approach to detect line emission under high background in high-resolution X-ray spectra. *Monthly Notices of the Royal Astronomical Society.*

Sara Algeri, and Xiangyu Zhang (2022). Exhaustive Goodness-of-Fit Via Smoothed Inference and Graphics. *Journal of Computational and Graphical Statistics*.

Xuefeng Li, Xiangyu Zhang, Shu Zhang, Zijuan Lu, Jianyong Zhang, Jincheng Zhou, Bingzhe Li, and Li Ou (2021). Rare disease awareness and perspectives of physicians in China: a questionnaire-based study. *Orphanet Journal of Rare Diseases.*

Xuefeng Li, Meiling Liu, Jinduan Lin, Bingzhe Li, Xiangyu Zhang, Shu Zhang, Zijuan Lu, Jianyong Zhang, Jincheng Zhou, and Li Ou (2021). A questionnaire-based study to comprehensively assess the status quo of rare disease patients and care-givers in China. *Orphanet Journal of Rare Diseases.*

— Selected works in progress

Xiangyu Zhang, Sara Algeri, and Charlie Geyer. (2025+). Distribution-free data-driven smooth tests without χ^2. Soon to be submitted to *Electronic Journal of Statistics*

Hongru Zhao, Xiangyu Zhang, Sara Algeri, Galin Jones, and Vuk Mandic. (2025+). EM Algorithm for Complex-Valued Linear Mixed Models: With Application in Testing Angular Power Spectral Models. Soon to be submitted to *The Annals of Applied Statistics*

Hongru Zhao, Xiangyu Zhang, and Xiaotong Shen. (2025+). Conditional Independence Testing with Diffusion Models: A Generative Approach.

— Publicly available software packages and repositories

LPsmooth: an R package for goodness-of-fit which naturally integrates modeling, estimation, inference, and graphics utilizing smooth tests and comparison density plot.

DisfreeTestAPS: a Python repository including the code, tutorials, and examples for implementing the distribution-free goodness-of-fit tests.

LPBkg: a python package for implementing a unified statistical strategy for modeling, estimation, inference, and signal characterization under background mismodeling.

Invited presentations

Topic-Contributed Paper Presenter, Joint Statistical Meetings 2024, Portland, Oregon:
A distribution-free approach to test astrophysical models for angular power spectra.

CHASC Astrostatistics Collaboration, Harvard University, Cambridge, Massachusetts. 2024:
On smooth tests of goodness-of-fit for astrophysical searches under high background.

Awards

Data Science Initiative-MnDRIVE Graduate Assistantship Award (2023–2024), University of Minnesota

Summer Research Fellowship (2021), School of Statistics, University of Minnesota

First Year Scholarship (2020), School of Statistics, University of Minnesota

Buehler Memorial Scholarship (2020), School of Statistics, University of Minnesota

Global Excellence Scholarship (2016-2020), University of Minnesota

Courses taught

— University of Minnesota: Graduate Instructor

Introduction to Statistical Analysis

— University of Minnesota: Graduate Teaching Assistant

Theory of Statistics
Statistical Machine Learning

Regression and Statistical Computing
Applied Statistical Methods
Introduction to Probability and Statistics
Introduction to the Ideas of Statistics

Programming Skills

R, Python, C, C++, MATLAB.

Outreach and service

2024 Field of Dreams Conference: representative for the School of Statistics at the University of Minnesota.
Undergrad Directed Reading Program: statistics volunteer mentor at the University of Minnesota.