Xiangyu Zhang **Updated December, 2025**

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## Research interests

Astrostatistics, Statistical Inference, Gravitational-Wave Models, Generative AI

## Education

- Ph.D. in Statistics (2026, expected), University of Minnesota, Minneapolis, MN
  Advisor: Prof. Sara Algeri; Co-advisor: Prof. Charlie Geyer
- B.A. in Mathematics and Statistics (2020), University of Minnesota, Minneapolis, MN

## Research

### — Manuscripts under revision

Xiangyu Zhang, and Sara Algeri. (2025+). Distribution-free data-driven smooth tests without $\chi^2$. Major revision, *Electronic Journal of Statistics*.

### — Peer reviewed articles

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. *To appear in Physical Review D*.

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

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.*

Xuefeng Li, Zijuan Lu, Jianyong Zhang, Xiangyu Zhang, Shu Zhang, Jincheng Zhou, Bingzhe Li, Li Ou (2020). The urgent need to empower rare disease organizations in China: an interview-based study. *Orphanet Journal of Rare Diseases.*

**— Selected works in progress**

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, Portland, Oregon, 2024:
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

## Courses taught

**— University of Minnesota: Graduate Instructor**

Introduction to Statistical Analysis

**— University of Minnesota: 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++, MySQL, MATLAB.

## Outreach and service

2024 Field of Dreams Conference: Representative for the School of Statistics at the University of Minnesota.
Undergraduate Directed Reading Program: Statistics volunteer mentor at the University of Minnesota.