

XIAOSHENG ZHAO

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EDUCATION & EXPERIENCE

Institut d'Astrophysique de Paris (IAP), France.

Nov 2022 -

Visitor

Tsinghua University, China

Sep 2018 -

PhD in Astronomy

Wuhan University, China

Sep 2014 - Jun 2018

BS in Physics

RESEARCH INTERESTS

I am interested in applying machine learning techniques to astrophysics. Specifically, my research interests include implicit inference from 3D fields, generative modeling as an alternative to cosmological simulations, geometric deep learning, e.g. machine learning on the sphere, physics-informed machine learning, and automatic knowledge discovery and symbolic regression from the multi-modal information of the universe.

AWARDS

Comprehensive scholarship

2021 - 2022

AMD scholarship

2020 - 2021

National scholarship

2015 - 2016

REFERENCES

Prof. Yi Mao, Tsinghua University

ymao@mail.tsinghua.edu.cn

Prof. Benjamin D. Wandelt, Sorbonne Université & Flatiron Institute

bwandelt@iap.fr

Prof. Yuan-Sen Ting,

Australian National University & The Ohio State University

yuan-sen.ting@anu.edu.au

PUBLICATIONS

Published

[Can Diffusion Model Conditionally Generate Astrophysical Images?](#)

Xiaosheng Zhao; Yuan-Sen Ting; Kangning Diao; Yi Mao

2023, MNRAS, 256, 2

[3D ScatterNet: Inference from 21 cm Light-cones](#)

Xiaosheng Zhao; Shifan Zuo; Yi Mao

2023, ICML 2023 Workshop on Machine Learning for Astrophysics

[Implicit Likelihood Inference of Reionization Parameters from the 21 cm Power Spectrum](#)

Xiaosheng Zhao; Yi Mao; Benjamin D. Wandelt

2022, ApJ, 933, 236

Simulation-Based Inference of Reionization Parameters From 3D Tomographic 21 cm Lightcone Images.

Xiaosheng Zhao; Yi Mao; Cheng Cheng ; Benjamin D. Wandelt

2022, ApJ, 926, 151

Evaluating Summary Statistics with Mutual Information for Cosmological Inference.

Ce Sui; Xiaosheng Zhao; Tao Jing; Yi Mao

2023, ICML 2023 Workshop on Machine Learning for Astrophysics

Submitted

Information-Ordered Bottlenecks for Adaptive Semantic Compression.

Matthew Ho; Xiaosheng Zhao; Benjamin D. Wandelt

2023, submitted to The International Conference on Learning Representations (ICLR) 2024.

In prep

SphinX: Spherical Convolutional Neural Networks in JAX.

Xiaosheng Zhao; Alex Cole; Benjamin D. Wandelt

Simulation-based Inference of Reionization Parameters from 3D Tomographic 21 cm Light-cone Images - II: Application of Solid Harmonic Wavelet Scattering Transform.

Xiaosheng Zhao; Yi Mao; Shifan Zuo; Benjamin D. Wandelt

To be submitted to ApJ as a more detailed complement to the accepted ICML paper “3D ScatterNet: Inference from 21 cm Light-cones”.

SKILLS

Coding languages: {Python, Jax} (middle), {C, Shell, html&CSS} (Junior)

General: Data science and Machine learning application with Pandas, Scikit-learn, Tensorflow and Pytorch.

TALKS & PRESENTATIONS

Understanding the epoch of reionization

Mar 2023

Contributed talk: *Implicit Likelihood Inference of Reionization Parameters from 21 cm Power Spectrum and solid harmonic wavelet scattering coefficients*

Sexten, Italy

SAZERAC 21cm 2022

Mar 2022

Recorded talk: *Implicit Likelihood Inference of Reionization Parameters from the 21 cm Power Spectrum*

Virtual

SAZERAC SIP, learning the high-redshift universe

Feb 2022

Contributed talk: *Simulation Based Inference of Reionization Parameters From 3D Tomographic 21 cm Lightcone Images*

Virtual

SKA CD/EoR Science Telecon

July 2021

Contributed talk: *Simulation Based Inference of Reionization Parameters From 3D Tomographic 21 cm Images*

Virtual

HERA telecon

Jun 2021

Contributed talk: *Simulation Based Inference of Reionization Parameters From*

UC, Berkeley

3D Tomographic 21 cm Images

‘Barefoot Reionization’: Exploring the First Billion Years of the Universe July 2019
Poster sparkler talk: *The 21-cm cosmology with 3D CNN* *U of Melbourne*

MENTORING & TEACHING EXPERIENCE

Teaching Assistant in undergraduate *Physics* course. Feb - Jun 2019

OUTREACH & SERVICE

I organized the [machine learning session](#) at DoA, Tsinghua. Mar 2021 - Mar 2022

I co-organized the joint machine learning session among
DoA (Tsinghua), JBCA (Manchester) and SKAO. Oct 2021 - Mar 2022

EXTRA

Project of *Big Data Ability Enhancement* Sep 2021 - July 2022
Courses: *e.g. big data system, big data analysis, big data application* *Tsinghua University*
(*WeChat big data challenge: multi-modal short-video classification*)

CSST summer school July 2022
Got certification of data processing practice *Peking University*