

# XIAOSHENG ZHAO

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## EDUCATION & EXPERIENCE

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**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

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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, and automatic knowledge discovery and symbolic regression from the multi-modal information of the universe.

## AWARDS

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AMD scholarship

2020 - 2021

National scholarship

2015 - 2016

## REFERENCES

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Prof. Yi Mao, Tsinghua University

[ymao@mail.tsinghua.edu.cn](mailto:ymao@mail.tsinghua.edu.cn)

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

[bwandelt@iap.fr](mailto:bwandelt@iap.fr)

Prof. Yuan-Sen Ting,

Australian National University & The Ohio State University

[yuan-sen.ting@anu.edu.au](mailto:yuan-sen.ting@anu.edu.au)

## PUBLICATIONS

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[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

## SKILLS

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**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

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### Astro Coffee

informal talk: *Can Diffusion Model Conditionally Generate Astrophysical Images?*

Sept 2023

IAS

### Understanding the epoch of reionization

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

Mar 2023

Sexten, Italy

### SAZERAC 21cm 2022

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

Mar 2022

Virtual

### SAZERAC SIP, learning the high-redshift universe

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

Feb 2022

Virtual

### SKA CD/EoR Science Telecon

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

July 2021

Virtual

### HERA telecon

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

Jun 2021

UC, Berkeley

### ‘Barefoot Reionization’: Exploring the First Billion Years of the Universe

Poster sparkler talk: *The 21-cm cosmology with 3D CNN*

July 2019

U of Melbourne

## MENTORING & TEACHING EXPERIENCE

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Teaching Assistant in undergraduate *Physics* course.

Feb - Jun 2019

## SERVICE

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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

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

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