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 interactions between machine learning techniques and astrophysics. Specifically, my research interests include, but not limited to, 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 from 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*