Kangning **Diao**

PhD Student

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Education

Tsinghua University *Beijing*

PhD in Astronomy *Aug. 2020 - present*

- Advisor: Prof. Yi Mao
- Research Interest: *Astronomy*: Reionization, 21 cm line, large scale structure
- *Stats/ML*: Fast simulations for inference, Validation of ML models.

UC Berkeley *Berkeley*

Visiting Scholar *Jan. 2024 - June 2025*

- Advisor: Prof. Uros Seljak

Tsinghua University *Beijing*

BS in Physcis *Aug. 2016 - June 2020*

Awards

2022-2023 **Second Class Outstanding Scholarship (Top 20%)**, Tsinghua University

2022-2023 **Outstanding Teaching Assistant**, Dept. of Physics, Tsinghua University

Publications

First Author

Diao, Kangning, Zack Li, Richard D.P. Grumitt, Yi Mao. Synax: A Differentiable and GPU-accelerated Synchrotron Simulation Package. In preparation to JCAP.

Diao, Kangning, Richard D.P. Grumitt, Yi Mao. Modeling Foreground Spatial Variations for 21 cm Gaussian Process Component Separation. Submitted to ApJ. arXiv: 2407.11296

Diao, Kangning, Zhaoting Chen, Yi Mao, Xuelei Chen. Reionization Parameter Inference from 3D Minkowski Functionals of the 21 cm Signals. Accepted for ApJ. arXiv: 2406.20058

Diao, Kangning, Yi Mao. Multi-fidelity Emulator for Cosmological Large Scale 21 cm Lightcone Images: a Few-shot Transfer Learning Approach with GAN. ICML 2023 ML4Astro workshop. ApJ version in preparation.

Others

Xiaosheng Zhao, Yuan-Sen Ting, **Diao, Kangning**, Yi Mao. Can Diffusion Model Conditionally Generate Astrophysical Images? MNRAS, 256, 2.

Talks

Seminar

Sept 2024. *Simulating and Separating the Galactic Synchrotron Foreground*. Lunar Radio Science Meeting, Radio Astronomy Lab, Berkeley, U.S.

Contributed

June 2023. *Multi-fidelity Emulator for Cosmological Large Scale 21 cm Lightcone Image*. Galaxy & Cosmology meeting, Tsinghua University, China

May 2023. *Multi-fidelity Emulator for Cosmological Large Scale 21 cm Lightcone Image*. HI as a Cosmological Probe, Nazareth, Israel.

Oct 2022. *Reionization Parameter Inference from 3D Minkowski Functionals of the 21 cm Signals*. Global 21cm Workshop, Berkeley, U.S.

March 2022. *Reionization Parameter Inference from 3D Minkowski Functionals of the 21 cm Signals*. Recorded talk, SAZERAC 21cm 2022, Virtual.

Poster

Sept 2023. *Modeling Foreground Spatial Variations in 21 cm Gaussian Process Component Separation*. Computing senses Cosmos, Hangzhou, China

August 2023. *Multi-fidelity Emulator for Cosmological Large Scale 21 cm Lightcone Image*. ICML 2023 ML4Astro workshop, Hawaii, U.S.

Others

Dec 2023. *Introduction to Gradient Based Sampling methods*. ML Session, Tsinghua University, China

Dec 2022. *A Quickstart for Parallel Computing with JAX* . ML Session, Tsinghua University, China

Reference

Prof. Yi Mao. Tsinghua University, Beijing, China. *ymao@tsinghua.edu.cn*

Prof. Uros Seljak. UC Berkeley, Berkeley, U.S. *useljak@berkeley.edu*

Prof. Xuelei Chen. National Astronomical Observatory of China, Beijing, China. *xuelei@cosmology.bao.ac.cn*

Dr. Zack Li. UC Berkeley, Berkeley, U.S. *zackli@berkeley.edu*

Teaching Experience

Fall 2022	**Analytical Mechanics**, Teaching Assistant
Spring 2022	**General Relativity**, Teaching Assistant
Fall 2021	**Applications of General Relativity**, Teaching Assistant
Spring 2021	**General Relativity**, Teaching Assistant
Fall 2020	**General Physics I: Mechanics and Special Relativity**, Teaching Assistant

Service & Outreach

2022-2023	**Data Science Club in DoA, Tsinghua**, Co-organizer
2020-2021	**Student Taekwondo Association in Tsinghua**, Coach & Organizer