

# Kangning Diao

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## Education

### Tsinghua University

*Ph.D. Student, Department of Astronomy*

*Sept 2020 – June 2025  
(est.)*

- **Advised by:** Prof. Yi Mao
- **Research interest:**

Astronomy: Reionization, 21 cm line, Galactic structure, Low frequency radio observation, Large scale structure;

Stats/ML: Differentiable simulations, Application and validation of ML models, Fast sampling methods.

### University of California, Berkeley

*Visiting Student, Berkeley Center for Cosmological Physics*

*Jan 2024 – June 2025*

- **Advised by:** Prof. Uros Seljak

### Tsinghua University

*BS in Physics*

*Sept 2016 – June 2020*

## Awards

**First class comprehensive scholarship**, Tsinghua University

*2023-2024*

**Second class comprehensive scholarship**, Tsinghua University

*2022-2023*

**Outstanding Teaching Assistant**, Dept. of Physics, Tsinghua University

*2022-2023*

## Publications

### First Author

**Diao, Kangning**, Zack Li, Richard D.P. Grumitt, Yi Mao. **synax**: A Differentiable and GPU-accelerated Synchrotron Simulation Package. *Submitted to ApJS*. [arXiv: 2410.01136](#) [🔗](#)

**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, Xuelei Chen, Yi Mao. 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*. [arXiv: 2307.04976](#) [🔗](#) (ApJ version in prep.)

### Others

Xiaosheng Zhao, Yuan-Sen Ting, **Diao, Kangning**, Yi Mao. Can Diffusion Model Conditionally Generate Astrophysical Images? *MNRAS*, 256, 2. [arXiv: 2307.09568](#) [🔗](#)

## Talks

### Seminars

**Lunar Science Meeting**, UC Berkeley

*Sept. 2024*

**Galaxy & Cosmology seminar**, Tsinghua University

*June. 2023*

## Contributed

<b>HI as a Cosmological Probe Conference</b> , Nazareth, Israel	<i>May 2023</i>
<b>Global 21cm Workshop</b> , Berkeley, U.S.	<i>Oct 2022</i>
<b>SAZERAC 21cm 2022</b> , Virtual	<i>May 2022</i>

## Posters

<b>Computing senses Cosmos</b> , Hangzhou, China	<i>Oct 2023</i>
<b>ICML 2023 ML4Astro workshop</b> , Hawaii, U.S.	<i>Aug 2023</i>

## Others

<b>ML Session</b> , <i>Introduction to Gradient Based Sampling methods</i> , Tsinghua University, China	<i>Dec 2023</i>
<b>ML Session</b> , <i>A Quickstart for Parallel Computing with JAX</i> , Tsinghua University, China	<i>Dec 2022</i>

## References

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<b>Prof. Yi Mao</b> , Tsinghua University, Beijing, China.	<i>ymao@tsinghua.edu.cn</i>
<b>Prof. Uros Seljak</b> , UC Berkeley, Berkeley, U.S.	<i>useljak@berkeley.edu</i>
<b>Prof. Xuelei Chen</b> , NAOC, Beijing, China.	<i>xuelei@cosmology.bao.ac.cn</i>
<b>Dr. Zack Li</b> , UC Berkeley, Berkeley, U.S.	<i>zackli@berkeley.edu</i>

## Teaching Experience

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<b>Analytical Mechanics</b> , Teaching Assistant	<i>Fall 2022</i>
<b>General Relativity</b> , Teaching Assistant	<i>Spring 2022</i>
<b>Applications of General Relativity</b> , Teaching Assistant	<i>Fall 2021</i>
<b>General Relativity</b> , Teaching Assistant	<i>Spring 2021</i>
<b>General Physics I: Mechanics and Special Relativity</b> , Teaching Assistant	<i>Fall 2020</i>

## Service & Outreach

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<b>Organizer</b> of Machine Learning Session, DoA, Tsinghua	<i>2022-2023</i>
<b>Coach &amp; Organizer</b> of Tsinghua Student Taekwondo Association	<i>2020-2021</i>
<b>Captain</b> of Tsinghua Taekwondo Team	<i>2017-2018</i>