

Kangning Diao

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Education

Tsinghua University <i>Ph.D. Student, Department of Astronomy</i>	Sept 2020 – Oct 2025 (est.)
◦ Advised by: Prof. Yi Mao	
◦ Research interest:	
Astronomy: Cosmology, 21 cm line, Reionization, Galactic Synchrotron, Weak lensing;	
Statistics: Differentiable simulations, Model comparison and validation, Fast sampling methods.	
University of California, Berkeley <i>Visiting Student, Berkeley Center for Cosmological Physics</i>	Jan 2024 – June 2025
◦ Hosted by: Prof. Uros Seljak	
Tsinghua University <i>BS in Physics</i>	Sept 2016 – June 2020

Awards

First class comprehensive scholarship funded by Xiaomi, Tsinghua University	2023-2024
Second class comprehensive scholarship funded by Xiaomi, Tsinghua University	2022-2023
Outstanding teaching assistant , Department of Physics, Tsinghua University	2022-2023

Publications

First Author

- Kangning Diao**, Biwei Dai, Uros Seljak. *Detecting Out-of-Distribution with Continuous-Time Flow Models on Weak Lensing Maps*. Submitted to JCAP. [arXiv: 2505.00632](#)
- Kangning Diao**, Zack Li, Richard D.P. Grumitt, Yi Mao. *synax: A Differentiable and GPU-accelerated Synchrotron Simulation Package*. 2025, ApJS, 278, 25. [arXiv: 2410.01136](#) Repo:
- Kangning Diao**, Richard D.P. Grumitt, Yi Mao. *Modeling Foreground Spatial Variations for 21 cm Gaussian Process Component Separation*. Accepted by ApJ. [arXiv: 2407.11296](#) Repo:
- Kangning Diao**, Zhaoting Chen, Xuelei Chen, Yi Mao. *Reionization Parameter Inference from 3D Minkowski Functionals of the 21 cm Signals*. 2024, ApJ, 974, 141. [arXiv: 2406.20058](#)
- Kangning Diao**, Yi Mao. *Multi-fidelity Emulator for Cosmological Large Scale 21 cm Lightcone Images: a Few-shot Transfer Learning Approach with GAN*. ICML 2023 Machine Learning for Astrophysics workshop. [arXiv: 2307.04976](#) Full version submitted to ApJ [arXiv: 2502.04246](#) Repo:

Others

- Xiaosheng Zhao, Yuan-Sen Ting, **Kangning Diao**, Yi Mao. *Can Diffusion Model Conditionally Generate Astrophysical Images?* 2023, MNRAS, 526, 1699 [arXiv: 2307.09568](#)
- Contribution: provided the GAN baseline, prepared dataset, and wrote paper.
- Anna Bonaldi et al. (incl. **Kangning Diao**) *Square Kilometre Array Science Data Challenge 3a: foreground removal for an EoR experiment* Submitted to MNRAS [arXiv: 2503.11740](#)
- Contribution: core member of the Shuimu-Tainlai team.

Talks

Seminars

KIPAC Tea Talk , Stanford University	<i>Jan. 2025</i>
Cosmology Lunch , Princeton University	<i>Dec. 2024</i>
AstroAI Seminar , Harvard University	<i>Oct. 2024</i>
Lunar Science Meeting , UC Berkeley	<i>Sept. 2024</i>
Galaxy & Cosmology seminar , Tsinghua University	<i>June. 2023</i>

Contributed

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

Posters

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

Others

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

References

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

Teaching Experience

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

Service & Outreach

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