Chen, Zhaoting

zhaoting.chen@roe.ac.uk
github.com/zhaotingchen
0000-0002-4965-8239

I work on neutral hydrogen intensity mapping with MeerKAT and the future SKAO.

Education

Ph.D. in Astrophysics 2020–2023
Jodrell Bank Centre for Astrophysics, University of Manchester Supervisor: Dr. Laura Wolz
Co-Supervisor: Prof. Richard Battye

– Thesis: "Interferometric Neutral Hydrogen Intensity Mapping in the Post-Reionization Universe"

M.Sc. in Astronomy and Astrophysics (Distinction) 2019–2020
Jodrell Bank Centre for Astrophysics, University of Manchester Supervisor: Dr. Laura Wolz
Co-Supervisor: Prof. Richard Battye

– Thesis: "Interferometric Neutral Hydrogen Intensity Mapping"

B.Sc. in Physics 2015–2019
University of Science and Technology of China (USTC) Supervisor: Prof. Yi-Fu Cai

Research Position

Postdoctoral Research Associate 2023-
Institute for Astronomy, University of Edinburgh

Experience

Student Supervisor
Senior Honour project for undergraduate students, University of Edinburgh. 2023-

Project Supervisor 2022
Nuffield summer placement, Nuffield organisation

Publications

Journal articles and preprints under peer-review:

1. MeerKLASS collaboration (incl. **Z. Chen** with significant contributions), "MeerKLASS L-band deep-field intensity maps: entering the HI dominated regime", submitted to *MNRAS*. arXiv: 2407.21626
2. K. Diao, **Z. Chen**, X. Chen and Y. Mao, "Reionization Parameter Inference from 3D Minkowski Functionals of the 21 cm Signals", *ApJ* 974 (2024) 141. arXiv: 2406.20058
3. A. Mazumder, L. Wolz, **Z. Chen** et al. "HI Intensity Mapping with the MIGHTEE Survey: First Results of the HI Power Spectrum", submitted to *MNRAS*.
4. **Z. Chen**, and A. Pourtsidou, "Power spectrum multipoles and clustering wedges during the Epoch of Reionization", submitted to *MNRAS*. arXiv: 2405.05414
5. **Z. Chen**, E. Chapman, L. Wolz and A. Mazumder, "Detecting the HI Power Spectrum in the Post-Reionization Universe with SKA-Low", *Mon.Not.Roy.Astron.Soc.* 524 (2023) 3, 3724. arXiv: 2302.11504
6. S. Paul, M. G. Santos, **Z. Chen** and L. Wolz, "A first detection of neutral hydrogen intensity mapping on Mpc scales at $z \approx 0.32$ and $z \approx 0.44$", *submitted to ApJ letters*. arXiv: 2301.11943

7. **Z. Chen**, L. Wolz and R. Battye, "Towards Optimal Foreground Mitigation Strategies for Interferometric HI Intensity Mapping in the Low-Redshift Universe", *Mon.Not.Roy.Astron.Soc.* 518 (2023) 2, 2971–2990. arXiv: 2205.07776

8. **Z. Chen**, L. Wolz, M. Spinelli and S. G. Murray, "Extracting HI Astrophysics from Interferometric Intensity Mapping", *Mon.Not.Roy.Astron.Soc.* 502 (2021) 4, 5259–5276. arXiv: 2010.07985

9. S. G. Murray, B. Diemer, **Z. Chen** et al., "TheHaloMod: An online calculator for the halo model", *Astron.Comput.* 36 (2021) 100487. arXiv: 2009.14066

10. **Z. Chen**, W. Luo, Y.-F. Cai, and E. Saridakis, "New test on general relativity and $f(T)$ torsional gravity from galaxy-galaxy weak lensing surveys", *Phys. Rev. D* 102 (2020), 104044. arXiv: 1907.12225

11. B. Li, **Z. Chen**, Y.-F. Cai, and Y. Mao, "Testing the scale-dependent hemispherical asymmetry with the 21-cm power spectrum from the epoch of reionization", *Mon.Not.Roy.Astron.Soc.* 487 (2019) 4, 5564-5571. arXiv: 1904.04683

12. **Z. Chen**, Y. Xu, Y. Wang and X. Chen, "Stages of Reionization as revealed by the Minkowski Functionals", *Astrophys.J.* 885 (2019) 23. arXiv: 1812.10333

Conference proceedings and other articles:

1. M. Santos, S. Camera, **Z. Chen**, S. Cunnington and J. Fonseca, "Cosmology with ESO–SKAO Synergies", to appear in *the Messenger*, 193 (2024) 20-23.

2. **Z. Chen**, "Perspective of using multipole power spectrum wedges as summary statistics in future SKA-Low surveys", contribution to 58th Rencontres de Moriond on Cosmology.

Academic Service

- **Referee for Monthly Notices of the Royal Astronomical Society** 2022-

Collaboration Roles

MeerKLASS collaboration

I am a leading member of the MeerKAT interferometric intensity mapping group, working on the data analysis pipeline[1]. I lead the HI stacking project for the single dish survey.

I lead the development of `meer21cm`, a PYTHON package for intensity mapping analysis[2].

SKAO Cosmology Science working group

I am a member of the SKAO cosmology science working group working on SKA-low simulations.

Astrophysical Computing

I am a contributing author of `halomod`[3].

Selected Talks

CASTLE 2024 09/2024
Title: Neutral Hydrogen stacking from MeerKLASS Tagliolo Monferrato, Italy

Tianlai 2024 07/2024
Title: Clustering wedges of power spectrum multipoles during Epoch of Reionization HDU, Hangzhou

Moriond 2024 04/2024
Title: Clustering wedges of power spectrum multipoles during Epoch of Reionization La Thuile, Italy

[3]https://github.com/zhaotingchen/hiimtool
[3]https://github.com/zhaotingchen/meer21cm, currently private and only available to MeerKLASS members
[3]https://github.com/halomod/halomod

MeerKLASS Workshop 2024 02/2024
Title: Foreground leakage from calibration errors in MeerKAT 21cm observations STIAS, Stellenbosch

SKAO Cosmology Science Working Group meeting 2024 01/2024
Title: Foreground leakage from calibration errors in MeerKAT 21cm observations Planetário do Porto

UK National Astronomy Meeting 2023 07/2023
Title: A first detection of neutral hydrogen intensity mapping Cardiff University

National Astronomical Observatories of China 04/2023
Title: A first detection of neutral hydrogen intensity mapping on Mpc scales at $z \approx 0.32$ and $z \approx 0.44$ NAOC

Department of Astronomy, Tsinghua University 04/2023
Title: 21cm Cosmology in the Post-Reionization Universe THU

Shanghai Astronomical Observatory 04/2023
Title: Interferometric Intensity Mapping in the Low-Redshift Universe SHAO

SKAO Cosmology Science Working Group meeting 2023 01/2023
Title: A first detection of neutral hydrogen intensity mapping on Mpc scales at $z \approx 0.32$ and $z \approx 0.44$ JBCA

HITS (HI Intensity Mapping in Trieste) 2022 05/2022
Title: Interferometric Intensity Mapping SISSA Trieste

ETH astronomy (invited) 04/2022
Title: Interferometric Intensity Mapping IPA, ETH Zurich

SAZERAC 21cm 2022 03/2022
Title: Interferometric Intensity Mapping in the Low-Redshift Universe Online

UK National Astronomy Meeting 2021 07/2021
Title: Extracting HI Astrophysics from Interferometric Intensity Mapping University of Bath

2021 SKA Science Conference 03/2021
Title: Extracting HI Astrophysics from Interferometric Intensity Mapping SKA Organisation

SWIFAR Colloquium (invited) 09/2020
Title: Halo Model, Interferometric Intensity Mapping and HI Shot Noise Yunnan University