Zhenjie Liu

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Education

✧ **Ph.D.**

2021.09 - 2026.06	School of Physics and Astronomy, Shanghai Jiao Tong University *Ph.D. student.* Advisor: Jun Zhang
2024.10 - 2025.09	Division of Physics and Astrophysical Science, Nagoya University *Exchange Ph.D. student.* Advisor: Hironao Miyatake

✧ **Bachelor**

2017.09 - 2021.06	School of Physics and Astronomy, Sun Yat-sen University *Undergraduate student.* Advisor: Zhiqi Huang

Research Interests

- Weak gravitational lensing as a probe of cosmology and large-scale structure
- Dark energy, modified gravity, and other extensions beyond ΛCDM
- Shear measurement techniques, data processing, and statistical analysis

Main Research Experiences

A. Ph.D. Phase (2021-Present)

My PhD research focuses on using weak lensing as a probe of cosmology and large-scale structure. I enjoy developing new statistical tools—such as quasi-2D inference methods and novel shear estimators—that make lensing a sharper probe of cosmology. At the same time, I have been fascinated by how galaxies trace their halos: from the first detection of cluster-halo ellipticities and luminosity-dependent assembly bias, to uncovering galaxy morphology–halo correlations. I have experience in both observational data analysis and simulation-based modeling. More recently, I have extended these interests to high-redshift structure, collaborating with Hironao Miyatake in Nagoya University, and constructing realistic mock catalogs of Lyman-α emitters for upcoming HSC Medium-band surveys.

B. Undergraduate Phase (2019-2021)

As an undergraduate student, I independently led a project on neutrino mass constraints in the context of dark energy models, resulting in a first-author publication. By combining Planck-2018 CMB, BAO, and Pantheon SNe Ia data, I derived competitive upper limits on the total neutrino mass across ΛCDM, quintessence, and PEDE frameworks, and demonstrated the strong degeneracy between neutrino mass and the dark-energy model. In addition, I was deeply involved in a project on the impact of neutrinos on large-scale structure, which resulted in a co-authored publication as second author.

Conferences

✧ 3rd HSC-Medium-band Survey Science Community Workshop, 6-8 August 2025, Nagoya, Japan. **Talk**: *Lyman-α Emitters for HSC-Medium Bands and Cosmological Forecast.*

- ✧ 2025 Summer DESI Collaboration meeting, 7-11 July 2025, Berkeley, USA. **Poster**: *Lyman-α Emitters for HSC-Medium Bands and Cosmological Forecast.*
- ✧ Nagoya-Madrid 3rd Workshop, 9 June 2025, Nagoya, Japan. **Talk**: *Stellar Mass–Dependent Assembly Bias of Central Galaxies in Massive Clusters.*
- ✧ 27th International Conference on Particle Physics and Cosmology, 21-25 October 2024, Kyoto, Japan. **Talk**: *Ellipticities of galaxy cluster halos from halo–shear–shear correlations.*
- ✧ The 32nd Texas Symposium on Relativistic Astrophysics, 11-15 December 2023, Shanghai, China. **Talk**: *Quasi-2d weak lensing cosmological constraints using the pdf-sym method*.
- ✧ 26th International Conference on Particle Physics and Cosmology, 11-15 September 2023, Madrid, Spain. **Talk**: *Quasi-2d weak lensing cosmological constraints using the pdf-sym method*.

Fellowship and Awards

- ✓ National Scholarship from Shanghai Jiao Tong University (2025)
- ✓ Yangyang Astronomy Scholarship from Shanghai Jiao Tong University (2025)
- ✓ Avantsemi Scholarship from Shanghai Jiao Tong University (2024)
- ✓ Fellowship from China Scholarship Council for visiting Nagoya University (2024)
- ✓ Outstanding Undergraduate Thesis Award of Sun Yat-sen University (2021)

Teaching assistant

Observational Cosmology (Graduate)	Spring 2024	SJTU
Mechanics (Undergraduate)	Fall 2023	SJTU
Observational Cosmology (Graduate)	Spring 2023	SJTU
Physics Experiments (Undergraduate)	Spring 2022	SJTU
Theoretical Physics (Undergraduate)	Fall 2021	SJTU

Skills

- ✓ **Programming**: I primarily use **Fortran** to perform heavy numerical computations, while employing **Python** for tasks requiring flexibility, such as theoretical model construction, processing of simulation data, parameter inference, and visualization.
- ✓ **Data Analysis & Modeling:** 3 × 2 pt Analysis, parameter inference using MCMC techniques, fisher forecasting, modifying dark energy models within CAMB, computing power spectra in simulations ....

References

- ➢ **Jun Zhang** (advisor), Shanghai Jiao Tong University, betajzhang@sjtu.edu.cn
- ➢ **Hironao Miyatake** (co-advisor), Nagoya University, hironao.miyatake@nagoya-u.jp
- ➢ **Wenting Wang** (collaborator), Shanghai Jiao Tong University, wenting.wang@sjtu.edu.cn