Yiru Chen

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Education

Tsinghua University, Beijing, China Bachelor of Science, Physics Sept 2018 – June 2022
Tsinghua University, Beijing, China Research Assistant, Astronomy Sept 2022 – June 2023

- **Research interest:** Galaxy Formation, Galaxy Evolution, Cosmological Simulation

Leiden University, Leiden, the Netherlands Master of Science, Astronomy Sept 2023 – June 2025

- **Research interest:** Cosmology, Gravitational Lensing, Inflation, Early Universe

Research Experience

Investigation of Multifield Inflation Attractors
Adviser: Ana Achúcarro Oct 2024 – July 2025

- **Description:** Cosmic inflation is the favoured explanation for the (quantum) origin of the primordial density perturbations that seeded all large scale structures. We will investigate inflation scenarios beyond the simplest one, in particular a new class of multifield attractor solutions, their observational signatures, their unusual mathematical properties, and how to find them in particle physics models.

Analytic Marginalisation over Tomographic Redshift Distribution for Next-Generation Weak Lensing Cosmology
Adviser: Koen Kuijken Oct 2023 – July 2024

- **Description:** Recent advancements in weak gravitational lensing surveys have unveiled potential inconsistencies with the findings based on Planck CMB observations. Accurately mitigating the effects of galaxy tomographic redshift distributions on cosmic inference may help address these discrepancies. We developed a new mathematical framework to explicitly relate the angular power spectra to tomographic galaxy redshift distributions, thereby facilitating more precise, nuanced marginalisation. Our method can improve the accuracy of the inferred cosmological parameters and increase the computational efficiency. Our method sets a robust foundation for the cosmological analysis for the next-generation wide-field imaging surveys, including Euclid and Rubin.
- **Report** This is the link to the report. The paper is in preparation.

Synthesizing absorption-line spectra for simulated galaxies in Illustris TNG
Adviser: Dandan Xu Oct 2022 – July 2023

- **Description:** Recently, computer simulations have played an important role in the study of galaxy formation and evolution. Existing theories of galaxy formation and evolution can be tested using the Illustris TNG simulation. In order to better link observations (spectral information) and simulations (age, metallicity, galactic dynamics, etc.), we used the stellar population synthesis method to generate the spectra of galaxies in Illustris TNG. With synthetic spectra, we can testify the validity of Initial Mass Function measuring method based on certain absorption lines, or explore whether spectral data can be used to distinguish dynamical substructures in galaxies.
- **Report** This is the link to the report (in Chinese).

Volunteering

- Leiden Old Observatory Open Day 14th Oct 2023
- Exoplanets 5 conference in Leiden 21st June 2024

Extracurricular Activities

- Participated in Tsinghua University 2020 summer school in theoretical physics and atomic and molecular physics
- Participated in Summer School of theoretical physics and particle physics of Peking University in 2020

Skills

Programming: Experience with C, Python, Mathematica, HTML, CSS, JavaScript

Courses: General Relativity, Deep Learning, Cosmology, Effective Field Theory, Large Scale Structure