Weixuan Pan

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EDUCATION

Guangzhou University, BS in Astronomy — Sept. 2022 – Jul. 2026

- GPA: 3.48/4.0
- Research Interests: Baryon Physics, Galaxy-Halo Connection, Large-Scale Structure
- Thesis: Evolution and Disk Stability of Milky Way-like Galaxies with Different Dark-Matter Halo Properties (manuscript in preparation)

RESEARCH EXPERIENCES

Effects of Dark-Matter Halo Properties on the Stability of Disk Galaxies — Jul. 2025 – Present

Undergrad Researcher | Advisor: Dr. Shi Shao, National Astronomical Observatories

- Generated galaxy initial conditions for MW-mass halo using GALIC, varying halo concentration, spin, and shape.
- Conducted 10 Gyr collisionless N-body simulations with GADGET-4.
- Wrote scripts to compute stability diagnostics, such as Toomre Q and bar strength.

Dust Attenuation Fitting and Analysis — May 2025 – Present

Undergrad Researcher | Advisor: Dr. Yewei Mao, Guangzhou University

- Developed a Python pipeline for SED fitting of M81 using 17-band photometric data and χ^2 minimization across 3 attenuation curves, with Milky Way model performing better, suggesting M81's very weak UV bump features.
- Performed Bayesian SED fitting of M81 using BAGPIPES program, evaluating Salim dust model with and without bump parameters, finding Bayesian evidence supports the no-bump model with $\Delta \ln Z = -1.539 \pm 0.273$.
- Characterized global weak photometric constraints on M81's UV bump strength, with different statistical approaches producing uncertain conclusions about dust attenuation properties.

Analysis on Numerical Simulation of Large-Scale Structure — Sept. 2024 – Jun. 2025

Undergrad Researcher | Advisor: Dr. Qiao Wang, National Astronomical Observatories

- Investigated the effects of $\Omega_b h^2$, $\Omega_c h^2$ and A_s on the matter power spectrum using CAMB, revealing medium-scale BAO features, strong CDM scale dependence, and overall amplitude modulation across cosmic scales.
- Employed FoF algorithm to identify 2 million dark matter halo structures from N-body simulation snapshot ($50\,h^{-1}$ Mpc box size).
- Utilized Colossus and Halotools libraries to study halo statistics, revealing systematic biases in Press-Schechter mass functions and quantifying spatial clustering to provide observational constraints for structure formation.
- Completed a report about the project: *Analysis on Numerical Simulation of Large-Scale Structure*

Identification and Observation of Blue Straggler Stars in COIN-Gaia 11 Nov. 2024 – Mar. 2025
Team Member | Advisor: Dr. Feng Wang, Guangzhou University

- Applied Density-Based Spatial Clustering of Applications with Noise (DBSCAN) clustering algorithm to Gaia DR3 data, identifying potential member stars of open cluster COIN-Gaia 11 after field star removal.
- Determined main sequence turn-off (MSTO) position using empirical color distribution analysis on color-magnitude diagram, classifying cluster members into main sequence and MSTO populations.
- Selected stars bluer and brighter than the MSTO in the CMD, detecting blue straggler star candidates.
- Formulated observational proposal and secured 3-night telescope allocation at 85cm telescope in Xinglong Observatory for photometric monitoring, acquiring light curves for 5 BSS candidates.

Spectroscopy of one H II region in the external galaxy NGC 0925 May 2024 – Nov. 2024
Undergrad Researcher | Advisor: Dr. Yewei Mao, Guangzhou University

- Processed 2D FITS spectral data to extract calibrated 1D spectra using PyRAF system.
- Extracted fluxes of 10 emission lines (Hβ, [OIII] λ4959, etc.) from the corrected spectra using CCM extinction law and Gaussian profile fitting.
- Calculated dust attenuation (0.630 mag), star formation rate (0.019 $M_\odot$ yr^{-1}), and oxygen abundance (8.293 dex) of the H II region.

ACADEMIC PROJECTS

Galaxy Classification using Machine Learning Apr. 2025 – May 2025
Advisor: Dr. Feng Wang, Guangzhou University

- Learnd how to connect to remote computing resources.
- Built an RNN classifier in PyTorch to categorize galaxy spectra, processing 6,000 samples across 3 spectral categories, achieving an accuracy improvement from 72% to 83%.
- Designed a CNN model in PyTorch to classify galaxy images into 7 morphological categories, assessing 5 input modes (RGB, grayscale, and individual R/G/B channels) and determining the blue channel performed best.

Radio Astronomy Data Processing Dec. 2024
Advisor: Jin Wang, Laboratory Instructor, Guangzhou University

- Executed baseline correction and Gaussian fitting with GILDAS on 4 CS isotopologue transitions ($C^{32}S, C^{33}S, C^{34}S,^{13}CS$ 2-1 lines) at 3 galactic positions, demonstrating strong signals for all lines at G010.32.30 and weaker $C^{33}S$ detection at G000.31.30 and G017.63.30 positions.
- Converted 3D cube data of Orion A region to 2D intensity maps using GILDAS, revealing centrally-peaked molecular gas distribution with radial intensity gradient.

CONFERENCES AND PRESENTATIONS

Effects of Dark-Matter Halo Properties on the Stability of Disk Galaxies Dec. 2025 (Upcoming)
Guangzhou University Undergraduates Research Symposium Guangzhou, Guangdong Province

Dust Attenuation Fitting and Analysis Jul. 2025
Guangzhou University Undergraduates Research Symposium Guangzhou, Guangdong Province

EXTRA-CURRICULAR ACTIVITIES

Shenzhen International Dark Sky Community Field Program May 2024
Research Trainee

- Measured night sky light of dark sky community employing monitoring instrument.
- Delivered lectures on basic principles of astronomical observations, helping residents and tourists appreciate the significance of dark sky community.

Astronomy Dilettantes Association of Guangzhou University 2022 – 2024
Director of Science and Technology Department

- Organized outreach events such as stargazing nights, public lectures, and guided tours, showcasing facilities and telescopes on campus.
- Served as judge for the 18th Guangdong Province Astronomy Olympiad semi-finals, evaluating contestants on telescope assembly and observational performance.

HONORS AND AWARDS

Guangzhou University Comprehensive Scholarship (¥1000)	2025
Outstanding Staff of the Astronomy Dilettantes Association	2024
Guangzhou University Comprehensive Scholarship (¥1000)	2023

SKILLS & LANGUAGES

Programming: Python, C/C++, PyTorch, HTML

Professional Codes: GADGET-4, GALIC, Pynbody, Colossus, Halotools, CIGALE, Bagpipes, Pyraf, GILDAS

Languages: English (Fluent, IELTS: 6.5), Mandarin (Native), Cantonese (Native)