Xingchen Zhou

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Educations

National Astronomical Observatories, CAS 2018 Sep – 2023 Jun
PhD in Astrophysics Beijing, China
Supervisor: Prof. Yan Gong

Dalian University of Technology 2014 Sep – 2018 Jun
Bachelor in Applied Physics Dalian, China

Employments

National Astronomical Observatories, CAS 2024 Apr – present
Reseach assistant in CSST scientific team, NAOC Beijing, China
Collaborator: Prof. Nan Li

Research Interests

- Machine learning and deep learning methodologies
- Photometric and spectroscopic data analysis
- Strong lensing
- Cosmological constraints

Skills

Programming
Skilled in Python, TensorFlow, Keras, PyTorch; Familiar with Numba, CuPy and Jax;
Basic knowledge in C and C++

Language
English (Proficient); Chinese (Native)

Projects

Photometric Redshifts for CSST Optical Survey
- *Goals*: accurate photo-z and uncertainty estimation from photometry and galaxy images
- *Methods*: multi-layer perceptron (MLP), convolutional neural network (CNN), and Bayesian neural network (BNN)
- *Code repo*: https://github.com/xczhou-astro/CSST_photo_z_dl ⇗

Spectroscopic Redshifts for CSST Slitless Spectroscopic Survey
- *Goals*: accurate spec-z and uncertainty estimation from low-SNR slitless spectra
- *Methods*: convolutional neural network (CNN) and Bayesian neural network (BNN)
- *Code repo*: https://github.com/xczhou-astro/CSST_slitless_spectra ⇗

Foreground Removal for Line Intensity Mapping
- *Goals*: recover deviation of power spectra induced by PCA
- *Methods*: Principle Component Analysis (PCA) and U-Net

DESI Photometric Redshift Catalogue
- *Goals*: create a photo-z catalogue for sources in DESI Legacy Surveys from images by BNN
- *Methods*: convolutional neural network (CNN) and Bayesian neural network (BNN)
- *Code repo*: https://github.com/xczhou-astro/DESI_photo-z_by_EDR

MUST Target Selection
- *Goals*: select emission line galaxies (ELG) and Lyman break galaxies (LBG) for MUST
- *Methods*: color selection

GalaxyGenius
Goals: generate mock galaxies from hydro-simulation for various telescopes
Methods: SKIRT radiative transfer project
Code repo: https://github.com/xczhou-astro/galaxyGenius

AI Agent for Source Detection
Goals: learn optimal parameter route to find optimal parameters for SoFiA-2 within a few steps
Methods: reinforcement learning (RL) and SoFiA-2
Code repo: https://github.com/xczhou-astro/AI_agent_for_SoFiA-2

LSST Strong Lensing Data Challenge, *(Team: NAOC-AIchemists-A3)*
Goals: classification and regression for simulated strong lensing by LSST
Methods: ResNet + Domain Adaptation
Code repo: https://github.com/xczhou-astro/LSST-SL-Challenge

JWST Strong Lensing, *ongoing*
*Goals*: discovery strong lensing systems in JWST SPRING field
Methods: active learning (human-in-the-loop)
Code repo: https://github.com/xczhou-astro/SL_discovery_by_HITL/tree/main

JWST MSA-3D Calibration, *ongoing*
Goals: Extend GalaxyGenius for JWST MSA-3D and calibration for observation and spectrum fitting
Methods: Extension of GalaxyGenius for IFU survey and spectrum fitting
Code repo: https://github.com/xczhou-astro/galaxyGenius-MSA.git

Talks

CSST 2022/2023 Scientific Annual Meeting, *Beijing, China, 2023/03/28*
1. Spectroscopic and Photometric Redshift Estimation by Neural Networks for the China Space Station Optical Survey (CSS-OS)
2. Photometric redshift estimates using Bayesian neural networks in the CSST survey

SKIRT Days 2025, *Ghent, Belgium, 2025/10/01*
GalaxyGenius: Mock galaxy image generator for various telescopes from hydrodynamical simulations

Publications

First Author Papers:
- **Xingchen Zhou**, Nan Li, Peng Jia, Yingfeng Liu, Furen Deng, Shuanghao Shu, Ying Li, Liang Cao, Huanyuan Shan and Ayodeji Ibitoye, AI Agent for Source Finding by SoFiA-2 for SKA-SDC2, *RAA in press*, 2025

- **Xingchen Zhou**, Hang Yang, Nan Li, Qi Xiong, Furen Deng, Xian-Min Meng, Renhao Ye, Shiyin Shen, Peng Wei, Qifan Cui, Zizhao He, Ayodeji Ibitoye, Chengliang Wei, Yuedong Fang, GalaxyGenius: A Mock Galaxy Image Generator for Various Telescopes from Hydrodynamical Simulations, *A&A*, 2025

- **Xingchen Zhou**, Nan Li, Hu Zou, Yan Gong, Furen Deng, Xuelei Chen, Qian Yu, Zizhao He and Boyi Ding, Estimating photometric redshifts for galaxies from the DESI Legacy Imaging Surveys with Bayesian neural networks trained by DESI EDR, MNRAS, 2024

- **Xingchen Zhou**, Yan Gong, Xin Zhang, Nan Li, Xian-Min Meng, Xuelei Chen, Run Wen, Yunkun Han, Hu Zou, Xian Zhong Zheng, Xiaohu Yang, Hong Guo and Pengjie Zhang, Accurately estimating redshifts from CSST slitless spectroscopic survey using deep learning, *ApJ*, 2024

- **Xingchen Zhou**, Yan Gong, Furen Deng, Meng Zhang, Bin Yue and Xuelei Chen, Foreground Removal of CO Intensity Mapping using Deep Learning, MNRAS, 2023

- **Xingchen Zhou**, Yan Gong, Xian-Min Meng, Xuelei Chen, Zhu Chen, Wei Du, Liping Fu and Zhijian Luo, Photometric redshift estimates using Bayesian neural networks in the CSST survey, RAA, 2022

- **Xingchen Zhou**, Yan Gong, Xian-Min Meng, Ye Cao, Xuelei Chen, Zhu Chen, Wei Du, Liping Fu and Zhijian Luo, Extracting photometric redshift from galaxy flux and image data using neural networks in the CSST survey, MNRAS, 2022

- **Xingchen Zhou**, Yan Gong, Xian-Min Meng, Xin Zhang, Ye Cao, Xuelei Chen, Valeria Amaro, Zuhui Fan, and Liping Fu, Spectroscopic and Photometric Redshift Estimation by Neural Networks for the China Space Station Optical Survey (CSS-OS), *ApJ*, 2021

Collaborations:
- Yan Gong, Haitao Miao, **Xingchen Zhou**, Qi Xiong, Yingxiao Song, Yuer Jiang, Minglin Wang, Junhui Yan, Beichen Wu, Furen Deng, Xuelei Chen, Zuhui Fan, Yipeng Jing, Xiaohu Yang, Hu Zhan, Future Cosmology: New Physics and Opportunity from the China Space Station Telescope (CSST), SCPMA, 2025

- ..., **Xingchen Zhou**, ..., MUltiplexed Survey Telescope: Perspectives for Large-Scale Structure Cosmology in the Era of Stage-V Spectroscopic Survey, 2024.

- Yingxiao Song, Yan Gong, **Xingchen Zhou**, Haitao Miao, Kwan Chuen Chan, Xuelei Chen, Cosmological Constraints using the Void Size Function Data from BOSS DR16, *ApJ*, 2025.

- Qi Xiong, Yan Gong, **Xingchen Zhou**, Hengjie Lin, Furen Deng, Ziwei Li, Ayodeji Ibitoye, Xuelei Chen, Zuhui Fan, Qi Guo, Ming Li, Yun Liu, Wenxiang Pei, Exploring Cosmological Constraints of the Weak Gravitational Lensing and Galaxy Clustering Joint Analysis in the CSST Photometric Survey, *ApJ*, 2025.

- Zhijian Luo, Yicheng Li, Junhao Lu, Zhu Chen, Liping Fu, Shaohua Zhang, Hubing Xiao, Wei Du, Yan Gong, Chenggang Shu, Wenwen Ma, Xian-Min Meng, **Xingchen Zhou**, Zuhui Fan, Photometric Redshift Estimation for CSST Survey with LSTM Neural Networks, MNRAS, 2024

- Zhijian Luo, Zhirui Tang, Zhu Chen, Liping Fu, Wei Du, Shaohua Zhang, Yan Gong, Chenggang Shu, Junhao Lu, Yicheng Li, Xian-Min Meng, **Xingchen Zhou**, Zuhui Fan, Imputation of Missing Photometric Data and Photometric Redshift Estimation for CSST, MNRAS, 2024

- Junhao Lu, Zhijian Luo, Zhu Chen, Liping Fu, Wei Du, Yan Gong, Yicheng Li, Xian-Min Meng, Zhirui Tang, Shaohua Zhang, Chenggang Shu, **Xingchen Zhou**, Zuhui Fan, Estimating Photometric Redshift from Mock Flux for CSST Survey by using Weighted Random Forest, MNRAS, 2024

- Yuer Jiang, Yan Gong, Meng Zhang, Qi Xiong, **Xingchen Zhou**, Furen Deng, Xuelei Chen, Yin-Zhe Ma, Bin Yue, Cross-Correlation Forecast of CSST Spectroscopic Galaxy and MeerKAT Neutral Hydrogen Intensity Mapping Surveys, *RAA*, 2023