

Xingchen Zhou

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Educations

National Astronomical Observatories, CAS

PhD in Astrophysics

Supervisor: Prof. Yan Gong

2018 Sep – 2023 Jun

Beijing, China

Dalian University of Technology

Bachelor in Applied Physics

2014 Sep – 2018 Jun

Dalian, China

Employments

National Astronomical Observatories, CAS

Research assistant in CSST scientific team, NAOC

2024 Apr – present

Beijing, China

Research Interests

- Machine learning and deep learning
- Photo-z and spec-z estimations
- Galaxy morphology
- Cosmological constraints
- Line intensity mapping

Skills

Programming

Skilled in Python, TensorFlow, Keras, PyTorch

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 or 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

- Code repo: https://github.com/xczhou-astro/CO_foreground_removal 

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, Ongoing

Goals: find optimal parameters for source detection

Methods: deep Q learning (DQN) and SoFiA-2

Publications



First Author Papers:

- **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:

- 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, Cosmological forecast for the weak gravitational lensing and galaxy clustering joint analysis in the CSST photometric survey, *submitted to ApJ*.
- 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, *accepted by MNRAS*.
- 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, *submitted to MNRAS*

- 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, *submitted to MNRAS*
- 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