Zi-Liang Zhang

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Research Interests

Fast radio bursts; High-energy transient; Multi-messenger astronomy

Education

University of Nevada, Las Vegas — Las Vegas, U.S.A.
Graduate Student in Astronomy — 2024/08 –
Advisor: Prof. Bing Zhang

Central China Normal University — Wuhan, China
M.Sc. in Astronomy — 2021/09 – 2024/06
Advisor: Prof. Yun-Wei Yu *GPA: 90.5/100*

Central China Normal University — Wuhan, China
B.Sc. in Physics — 2017/09 – 2021/06
Thesis: Dispersion Measure and Rotation Measure of Core-Collapse Supernova Remnant (Grade: Excellent)
Advisor: Prof. Yun-Wei Yu

Publications

Cosmological Parameter Estimate from Persistent Radio Sources of Fast Radio Bursts
Zi-Liang Zhang and Bing Zhang.
The Astrophysical Journal Letters, 984:L40.

Diverse origins for non-repeating fast radio bursts: Rotational radio transient sources and cosmological compact binary merger remnants
Zi-Liang Zhang, Yun-Wei Yu, Xiao-Feng Cao.
Astronomy & Astrophysics, 675, A66.

The evolution of Persistent Radio Sources of Fast Radio Bursts
Zi-Liang Zhang and Bing Zhang.
in preparation

Honors and Scholarships

National Scholarship, Ministry of Education of China	2023
Outstanding Graduate Student	2023
Second Class Scholarship for Academic Achievement*3	2021, 2022, 2023
Proactive Member of Student Club Activities	2020
ShuRen Scholarship	2020
Theoretical Physics Talent Training Base Class Scholarship*3	2018, 2019, 2020

Research Experience

Persistent Radio Sources of Fast Radio Bursts

2024/09 –

• Using the Yang relation (luminosity-RM relation) to constrain cosmological Parameters.
• Modeling the evolution of Persistent Radio Sources.

Diverse Origins for Non-repeating Fast Radio Bursts (FRBs)

2022/09 – 2024/06

• Discovered a potential low-energy population of non-repeating FRBs, enriching the current understanding of FRB diversity and origins.
• Considered the direction-dependent sensitivity of the CHIME telescope to unveil the true galactic latitude distribution of low-energy FRBs.
• Discussed the possible explanations behind the observed galactic plane concentration of these low-energy FRBs.
• Engaged in ongoing efforts to gather more comprehensive evidence to substantiate the existence and characteristics of the identified low-energy FRB population.

Dispersion Measure and Rotation Measure of Core-Collapse Supernova Remnant 2021/01 – 2021/06

• Researching the evolution of dispersion measure and rotation measure of Fast Radio bursts for two environments: core-collapse supernova and compact binary merger.
• Calculating the shock wave radius of different ejecta, and dispersion measure and rotation measure from shocked and unshocked region.

Research on Issues Related to White Dwarf and Neutron Star/Black Hole Merger Events 2018/09 – 2020/08

• Studying numerical solutions of Lane–Emden equation and calculating Mass-Radius relation of stars and white dwarfs by MATLAB.
• Programming runge-kutta method of ODE system to solve TOV equation of neutron star and calculating Mass-Radius relation.

Teaching Experience

Undergraduate supervision

Chang-Lan Ling-hu: Statistical study of repeating FRBs. 2022/12 – 2023/05
Tian-En Chen: Statistical study of non-repeating FRBs. 2021/12 – 2022/05
Co-supervisor with Prof. Yun-Wei Yu

Teaching

An Introduction to Astronomy (mixed undergraduate and graduate Course), TA and observation organizer Fall 2021, 2022, 2023
General Physics, TA Spring 2023
Physics 196L, Instructor 2024/08-

Advanced Courses

Physics: Grad-level Electrodynamics, Grad-level General Relativity, Plasma Physics, Dimensional Analysis, Quantum mechanics, Statistical Mechanics, Analytical Mechanics
Astrophysics: Astrophysics, Radiation Process, High-energy Astrophysics, Neutron Star and Pulsar, Cosmology, Fluid Dynamics
Math: Differential Geometry, Bayes Analysis, Advanced Algebra

Skills

Programming
Proficient in: MATLAB, Python, Mathematica and LaTex;
Languages
Chinese (native speaker and speak several dialects), English (IELTS: band6.5)

Public Outreach

Speaker & Organizer, *Not So Simple Star Party*. 2023/10
• Curated an interactive astronomical observation session focused on normal stars and deep sky objects.
• Utilized telescopes and astrography cameras to facilitate public observations, enhancing their celestial experience.
• Communicated complex astrophysical concepts in an accessible manner, fostering a deeper appreciation and understanding of the observed stars and star clusters.

Core member & star party organizer, Amateur Astronomers Association of CCNU. 2017–2023
Observation manager of several astronomy courses. 2021–2023
Examiner, Hubei Province astronomy knowledge competition. 2022/07

Conference Talks

"Diverse origins for non-repeating fast radio bursts: Rotational radio transient sources and cosmological compact binary merger remnants", Fast/Future Pulsar Symposium 12, Nanyang, Henan 2023/07
"The origin diversity of non-repeating fast radio bursts: Rotational radio transient sources and cosmological compact binary merger remnants?", 14th Zhang Heng Academic Symposium of the Chinese Astronomical Society, Wuhan, Hubei 2023/04
"Revisiting the event rate and energy function of fast radio bursts: Are they originate from compact binary mergers?", Fast/Future Pulsar Symposium 11, Xiangtan, Hunan 2022/08

Conferences and Summer Schools

POLAR-2 Scientific Mission and HERD Design Plan Symposium, Nanning, Guangxi 2021/04
Gravitational Wave Astrophysics Conference 2021, Hefei, Anhui 2021/06
Hubei Astronomical Society 2021 Annual Meeting, Wuhan, Hubei 2021/07
Chinese Astronomical Society 2021 Academic Annual Meeting, Online 2021/10
FAST 2022 Summer School, 4 days, Pingtang, Guizhou 2022/07

Fast/Future Pulsar Symposium 11, Xiangtan, Hunan 2022/08
2022 Pulsar Summer School, 10 days, Xiamen, Fujian 2022/08
1st CSST Scientific Annual Meeting, Beijing 2023/03
14th Zhang, Heng Academic Symposium of the Chinese Astronomical Society, Wuhan, Hubei 2023/04
Fast Radio Bursts and Their Astrophysics Symposium, Hefei, Anhui 2023/05
The First LHAASO Symposium, Chengdu, Sichuan 2023/05
Fast/Future Pulsar Symposium 12, Nanyang, Henan 2023/07
1st FAST Science Forum, Pingtang, Guizhou 2023/09
International Workshop on Intelligent Computing In Astronomy, Hangzhou, Zhejiang 2023/11
32nd Texas Symposium on Relativistic Astrophysics, Shanghai 2023/12
1st Shen, Kuo Symposium of Chinese Astronomical Society, Wuhan, Hubei 2024/01
2nd Fast Radio Bursts and Their Astrophysics Symposium, Wuhan, Hubei 2024/06
NCfA Symposium 2025, Las Vegas, NV 2025/03