Jie Wu

PhD student in Physics

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About me

I am a Ph.D. student in Physics at Chongqing University, specializing in gravitational-wave research. My academic interests lie in physics and astronomy, with a particular focus on understanding the fundamental mechanisms governing the universe. Gravitational waves provide a powerful and unique probe for exploring these questions. I aim to contribute to the advancement of gravitational-wave science through rigorous theoretical and data-analysis research.

Research

Gravitational wave	Signal simulation, Post-Newtonian waveform.
Detection	Space- and ground-based detectors, Time-delay interferometry, Detector noise.
Binary system	Stellar binary black hole, Massive black hole binary, Galactic binary.
Data processing	Parameter estimation, Fisher matrix, Bayesian analysis.
Gravitation	Modified theory of gravity, Cosmology, Dark matter.
Astronomy	Electromagnetic observation, Multi-messenger observation.

Currently, my primary research focus is on the simulation of gravitational wave signals in space, assessment of detector performance, and the processing and analysis of gravitational wave data.

Education

Chongqing University *Chongqing, China*

PH.D. IN PHYSICS *Sep 2022 - Jun 2028 (expected)*

- Advisor: Prof. Jin Li
- Research: Gravitational wave data simulation and detector performance evaluation

China West Normal University *Nanchong, China*

B.S. IN PHYSICS *Sep 2018 - Jun 2022*

- Advisors: Assoc. Prof. Di Wu and Assoc. Prof. Guo-Ping Li
- Research: Ground-based gravitational wave detection and data processing
- Thesis (in Chinese): An Analysis of the LIGO Gravitational Waves Data Based on Newtonian Approximate Model

Experience

Beijing Normal University *Beijing, China*

VISITOR *Feb 2024 - Apr 2024*

- Advisor: Prof. Zhoujian Cao
- Research: Gravitational wave waveform simulation and moving source effect

University of Chinese Academy of Sciences *Beijing, China*

PARTICIPANT *Sep 2020 - Sep 2021*

- Advisor: Assoc. Prof. Yong Tang
- Research: Analysis of gravitational wave data
- Program: College Student Innovation and Practice Program

Skills

Languages	Chinese (native), English.
Programming	Python, Mathematica, MATLAB
Data Analysis	Experienced in handling and analyzing datasets (statistical analysis, data visualization, and signal processing).
Teaching	High School Physics Teacher Qualification Certificate.

Funding

National Natural Science Foundation of China

Young Students' Basic Research Program (PhD) *Principal Investigator*

Signal Processing and Theoretical Modeling of Space-Based Gravitational Waves with Moving-Source Effects *Jan 2026 - Dec 2027*

- Grant No. 125B2102
- CNY 300,000

Honors & Awards

Awards

2025.12 **Young Scientific Talent Development Program (PhD Track)**, China Association for Science and Technology
2025.12 **Advanced Individual in Scientific and Academic Innovation**, Chongqing U.
2023.12 **Second Prize (Ranked 2nd-3rd)**, The 7th Sichuan Chongqing Astronomy Competition
2022.06 **Excellent Graduation Thesis**, China West Normal U.
2022.05 **Outstanding Graduate**, China West Normal U.
2018.11 **Third Prize (Ranked 7th-8th)**, The 5th Sichuan Chongqing Astronomy Competition

Scholarships

2025.12 **National Scholarship**, Ministry of Education of China
2024.09 **Theoretical Physics Graduate Scholarship (Twice)**, Chongqing U.
2022-2023 **Graduate Academic Scholarship (Twice)**, Chongqing U.
2020-2022 **Fist-class Scholarship (Three times)**, China West Normal U.
2020.12 **Haotian Astronomy Scholarship**, Nanjing VasTech Astronomical Instrument & Equipment Co. Ltd.
2018-2021 **Second-class Scholarship (Four times)**, China West Normal U.

Publications

Publications are listed in reversed chronological order (*: corresponding author).

[1] Mengfei Sun, **Jie Wu**, Jin Li*, Nan Yang, Xianghe Ma, Borui Wang, Minghui Zhang and Yuanhong Zhong*, "Detection of Lensed Gravitational Waves from dark matter halos with deep learning," (Nov. 2025). arXiv: 2511.09107.

[2] Mengfei Sun, **Jie Wu**, Jin Li*, Brendan Mccane, Nan Yang, Xianghe Ma, Borui Wang and Minghui Zhang, "Conditional Autoencoder for Generating Binary Neutron Star Waveforms with Tidal and Precession Effects," *Phys. Rev. D*, **112**, 8, 084016, (Oct. 2025). arXiv: 2503.19512.

[3] Xianghe Ma, Borui Wang, Nan Yang, Jin Li*, Brendan McCane, Mengfei Sun, **Jie Wu**, Minghui Zhang and Yan Meng*, "Identification of Stochastic Gravitational Wave Backgrounds from Cosmic String Using Machine Learning," *Phys. Rev. D*, **112**, 6, 064081, (Sep. 2025). arXiv: 2502.11804.

[4] **Jie Wu**, Yao Xiao, Mengfei Sun and Jin Li*, "Probing globular clusters using modulated gravitational waves from binary black holes," (Aug. 2025). arXiv: 2508.04021.

[5] **Jie Wu**, Mengfei Sun, Xianghe Ma, Xiaolin Liu, Jin Li* and Zhoujian Cao*, "Effect of kick velocity on gravitational wave detection of binary black holes with space- and ground-based detectors," *Phys. Rev. D*, **112**, 2, 024040, (Jul. 2025). arXiv: 2502.13710.

[6] Yalin Hu, **Jie Wu**, Haiyan Luo, Guanqi Su, Xiangxi Meng, Liyu Liu and Guo Chen*, "Parallel manipulation of multiple ink droplets via near-infrared light on lubricant infused surface," *Appl. Phys. Lett.*, **126**, 2, 021602, (Jan. 2025).

[7] **Jie Wu**, Mengfei Sun and Jin Li*, "Constraints and detection capabilities of GW polarizations with space-based detectors in different TDI combinations," (Nov. 2024). arXiv: 2411.03631.

[8] **Jie Wu** and Jin Li*, "Prospects of constraining on the polarizations of gravitational waves from binary black holes using space- and ground-based detectors," *Phys. Rev. D*, **110**, 8, 084057, (Oct. 2024). arXiv: 2407.13590.

[9] **Jie Wu**, Jin Li*, Xiaolin Liu and Zhoujian Cao, "Comparison and application of different post-Newtonian models for inspiralling stellar-mass binary black holes with space-based GW detectors," *Phys. Rev. D*, **109**, 10, 104014, (May 2024). arXiv: 2401.03113.

[10] **Jie Wu** and Jin Li*, "Subtraction of the confusion foreground and parameter uncertainty of resolvable galactic binaries on the networks of space-based gravitational-wave detectors," *Phys. Rev. D*, **108**, 12, 124047, (Dec. 2023). arXiv: 2307.05568.

[11] **Jie Wu**, Jin Li* and Qing-Quan Jiang*, "Application of Newtonian approximate model to LIGO gravitational wave data processing," *Chin. Phys. B*, **32**, 9, 090401, (Sep. 2023).