

Run-Chao Chen



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I am currently a third-year PhD student in astrophysics at Nanjing University. My research focuses on high-energy transients associated with ultra-magnetized neutron stars (magnetars). My published work to date has primarily involved timing analyses of gamma-ray bursts (GRBs), particularly the study of kilohertz quasi-periodic oscillations (QPOs) in the prompt emission. In addition, I have recently initiated a radio observational project as the principal investigator, aimed at exploring potential coherent radio emission from compact-object merger remnants related to magnetar formation.

EDUCATION

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|----------------|--|
| 2023 – PRESENT | PhD student in Astrophysics
School of Astronomy and Space Science
<i>Nanjing University</i> |
| 2020 – 2023 | Master of Science in Astrophysics
School of Physical Science and Technology
<i>Guangxi University</i> |
| 2014 – 2018 | Bachelor of Engineering
<i>Wuhan University of Science and Technology</i> |

RESEARCH INTERESTS

- Astrophysical transients associated with (candidate) magnetar central engines, including GRBs, soft gamma repeaters, magnetar giant flares and fast radio bursts (FRBs)
- Timing analysis of astrophysical time-series data, including QPOs, periodicity searches, and burst morphology analyses
- Machine-learning applications in astrophysics

RESEARCH EXPERIENCE

NJU GRB Group

Member

As a member of Professor Bin-Bin Zhang's GRB research group, I have participated in collaborative analyses of multiple individual GRB events, with a primary focus on temporal and spectral analysis (e.g. Yin et al. 2024, ApJL). Between 2024 and 2025, I assisted in supervising undergraduate research projects and theses on machine-learning-based GRB identification and classification.

I led the development of a statistical framework for searching high-frequency QPOs in GRB prompt emission, and applied it to merger-driven GRBs, leading to the identification of millisecond periodic signal that provides evidence for the presence of a newborn millisecond magnetar as the central engine (Chen et al. 2025, Nature Astronomy; Chen et al. 2026, ApJ in press). I also provided methodological guidance for a collaborative study of low-frequency quasi-periodic variability in GRB prompt emission (Chen et al. 2024, ApJL).

JULY 2023 – PRESENT

Space-based multi-band astronomical Variable Objects Monitor Mission

Associate scientist, burst advocate

The Space-based multi-band Astronomical Variable Objects Monitor (SVOM) is a space mission dedicated to the detection and multi-wavelength characterization of high-energy transient phenomena. As an associate scientist and burst advocate, I participate in the monitoring and scientific assessment of SVOM-detected events, with a focus on rapid source validation and preliminary analysis (e.g., E_p – E_{iso} diagram plotting). I have contributed to SVOM-related science projects, including the case study of GRB 241030A (Varun et al. 2026, ApJ, in press). I routinely fulfill burst-advocate duty shifts, during which I report and disseminate triggers of multiple transient events to the community through GCN Notices and Circulars (e.g., GCN Circulars 39662, 39701).

OCTOBER 2024 – PRESENT

Einstein Probe Mission

NJU EP Team

The Einstein Probe is a mission of the Chinese Academy of Sciences dedicated to time-domain high-energy astrophysics. Its first detection of a bright X-ray transient, EP240219a, was confirmed to be an untriggered GRB (Yin et al. 2024, ApJL), to which I contributed through the identification of the GRB sub-threshold counterpart and accompanying spectral analysis. I also participated in the analysis of EP250404a (Yin et al. 2025, ApJL), contributing to the analysis of afterglow emission, as well as to internal discussions on spectral hardening feature observed across multiple EP-detected events.

OCTOBER 2020 – JUNE 2023

GXU Observation Group

Member

During my Master's studies at Guangxi University, I was a member of the observation group in the Department of Astrophysics. My research focused on the analysis of gamma-ray observational data from *Fermi*/GBM, with an emphasis on temporal and spectral analyses of hard X-ray bursts from soft gamma repeaters (SGRs). In particular, I investigated potential associations between SGR bursts and fast radio bursts, motivated by the FRB200428–SGR 1935+2154 event (Chen et al., 2023, RAA).

In addition to data analysis, I participated in observational duty shifts for optical facilities, including the submission of rapid follow-up proposals for triggered GRBs, long-term monitoring proposals for active galactic nuclei, and opportunity-driven monitoring programs for repeating FRB sources. The observational facilities involved included the telescopes of the LCOGT network and the GWAC F-60 telescopes at the Xinglong Observing Station.

PROFESSIONAL EXPERIENCE/ACTIVITIES

2025 **Oral Talk**, Annual Conference on Compact Star Physics (2025), Yancheng, China

- **Oral Talk**, Einstein Probe: Extragalactic Fast Transients and Multi-messenger Time-domain Astronomy (2025) Workshop, Beijing, China
- **Teaching Assistant**, Gravitational Wave and Related Astrophysics, Nanjing University

2024 **Volunteer/Poster**, The Third Nanjing GRB Conference, Suzhou, China

PUBLICATIONS

First Author:

- 2026 **Detection of a Millisecond Periodicity in BATSE Short Gamma-Ray Bursts.** R.-C. Chen, J. Yang, Y.-H. I. Yin, B.-B. Zhang, ApJ, in press.
- 2025 **Evidence for a brief appearance of gamma-ray periodicity after a compact star merger.** R.-C. Chen, B.-B. Zhang, C.-W. Wang, et al., Nature Astronomy, DOI: <https://doi.org/10.1038/s41550-025-02649-w>
- 2023 **Detection of Quasi-periodic Oscillations in SGR 150228213.** R.-C. Chen, C.-M. Deng, X.-G. Wang, et al., RAA, DOI: <https://doi.org/10.1088/1674-4527/acdabe>

Co-author:

- 2025 **Spectral Hardening Reveals Afterglow Emergence in Long-duration Fast X-Ray Transients: A Case Study of GRB 250404A/EP250404a.** Y.-H. I. Yin, Y. Fang, B.-B. Zhang, et al., ApJL, DOI: <https://doi.org/10.3847/2041-8213/adf552>
- 2024 **Triggering the Untriggered: The First Einstein Probe-Detected Gamma-Ray Burst GRB 240219A and Its Implications.** Y.-H. I. Yin, B.-B. Zhang, J. Yang, et al., ApJL, DOI: [10.3847/2041-8213/ad8652](https://doi.org/10.3847/2041-8213/ad8652)
- **Repeated Partial Disruptions in a White Dwarf–Neutron Star or White Dwarf–Black Hole Merger Modulate the Prompt Emission of Long-duration Merger-type GRBs.** J.-P. Chen, R.-F. Shen, W.-J. Tan, et al., ApJL, DOI: <https://doi.org/10.3847/2041-8213/ad7737>
 - **A Comptonized Fireball Bubble Fits the Second Extragalactic Magnetar Giant Flare GRB 231115A.** Y.-H. I. Yin, Z. J. Zhang, J. Yang, et al., ApJL, DOI: [10.3847/2041-8213/ad2839](https://doi.org/10.3847/2041-8213/ad2839)

OBSERVING PROPOSALS

- 2025 **Searching for Coherent Radio Bursts from the Magnetar Remnant of GRB 230307A.** R.-C. Chen (PI), et al. Parkes 64-m Radio Telescope (Murriyang), Proposal P1380, 2025OCTS. Full allocation awarded and completed. Example dataset DOI: [10.25919/mgb2-ef72](https://doi.org/10.25919/mgb2-ef72)