Qian Hu

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EDUCATION

University of Glasgow **Start from Oct. 2021**

PhD Student in gravitational-wave astronomy

Advisor: Dr. John Veitch & Prof. Ik Siong Heng

University of Western Australia **Jul. 2019 - Aug. 2019, June 2020 - Jul. 2021**

Undergraduate Research Intern. Research topic: Gravitational wave source localization.

Advisor: Prof. Linqing Wen

University of Science and Technology of China (USTC) **Sep. 2017 - Jul. 2021**

B.S. (Honor) in Astrophysics, GPA: 3.90/4.30.

Thesis: Rapid Sky Localization of Gravitational Waves from Compact Binary Coalescences (in Chinese)

Advisor: Prof. Wen Zhao & Prof. Linqing Wen

REASEARCH INTERESTS

- **Gravitational-Wave (GW) Astrophysics**
  - Higher order characteristics from compact binaries: Precession, eccentricity, higher modes etc.
  - Testing GR with GWs.
  - Multi-messenger astronomy.
  - Data-driven GW waveform modelling: surrogate models and machine learning techniques.
- **GW Data Analysis Techniques**
  - Waveform systematics in parameter estimation and ways of mitigating it.
  - Analysis of overlapping signals.
  - Fast parameter estimation (including fast localization) of CBC sources.
  - Application of machine learning on GW data analysis: detection, localization, and parameter estimation.

SELECTED PUBLICATIONS

- **Qian Hu**, John Veitch, Rapid pre-merger localization of binary neutron stars in third generation gravitational wave detectors. arXiv:2309.00970. Submitted to ApJL.
- Qianyun Yun, Wen-Biao Han, **Qian Hu**, Haiguang Xu, Precessing Binary Black Holes as Better Dark Sirens. MNRAS Lett. 527 (1), L60-L65 (2024).
- **Qian Hu**, John Veitch, Accumulating errors in tests of general relativity with gravitational waves: overlapping signals and inaccurate waveforms. ApJ 945 (2023) 2, 103.
- **Qian Hu**, John Veitch, Assessing the model waveform accuracy of gravitational waves. PRD 106, 044042 (2022).
- **Qian Hu**, Cong Zhou, Jhao-Hong Peng, Linqing Wen, Qi Chu, Manoj Kovalam, Semianalytical Approach for Sky Localization of Gravitational Waves. PRD 104, 104008 (2021).
- **Qian Hu**, Mingzheng Li, Rui Niu, and Wen Zhao. Joint Observations of Space-based Gravitational-wave Detectors: Source Localization and Implication for Parity-violating Gravity. PRD 103, 064057 (2021).

- Wen Zhao, Tan Liu, Linqing Wen, Tao Zhu, Anzhong Wang, **Qian Hu**, and Cong Zhou. Model-independent test of the parity symmetry of gravity with gravitational waves, EPJC, 80(7), Jul 2020.

TALKS & PRESENTATIONS

- Realtime pre-merger localization of BNS in 3G GW detectors, National Astronomy Meeting 2023 (NAM23), July 7 2023, Cardiff, UK.
- Systematic error accumulation in testing GR: Overlapping signals and waveform systematics, XIII ET Symposium, May 10 2023, Cagliari, Italy.
- Systematic error accumulation in parametric tests of general relativity with gravitational waves: overlap signals and inaccurate waveforms, ET-OSB-Div10 meeting (online), Oct 10 2022.
- Assessing the model waveform accuracy of gravitational waves, invited talk for TianQin group at SYSU (online), June 9 2022.
- On the model waveform accuracy of gravitational waves, BritGrav 2022 (online), Apr 4 2022.
- Quantitative measurement of model differences for CBCs, 2022 March LVK Collaboration Meeting (online), Mar 14 2022.
- Semi-analytical Approach for Sky Localization of Gravitational Waves, CBC East Call (online), Sep 14 2021.

LVK COLLABORATION CONTRIBUTION

- Implementing the fast localization algorithm SealGW to SPIIR online detection pipeline.
- Waveform accuracy check for parameter estimation runs (ongoing).

TEACHING

Astronomy 1 **2022-2023, 2023-2024 @UofGlasgow**
Teaching assistant

Physics 1 **2021-2022 @UofGlasgow**
Teaching assistant

Physical experimental software development **July 2020 - Dec 2020 @USTC**
National virtual experiment teaching project

Classical Mechanics and Electrodynamics **2020 Fall @USTC**
Teaching assistant

HONORS & AWARDS

- Lord Kelvin / Charles Lindie Mitchell Bequest Postgraduate Scholarship, University of Glasgow, 2023
- Honorary Undergraduate, USTC, 2021
- Outstanding Talk, USTC Talent Program Academic Seminar, 2021
- National Scholarship, Ministry of Education of the PRC, 2020
- National Astronomical Observatory Scholarship, National Astronomical Observatories of the Chinese Academy of Sciences, 2020
- Outstanding Student Scholarship, USTC, 2019
- CGN Scholarship (Gold), USTC, 2019
- Outstanding Student Scholarship, USTC, 2018

PROFESSIONAL SKILLS

- **Skilled in:** Python, C, Cython, Matlab, Mathematica, LaTeX.
- **GW-relevant packages:** Bilby, PyCBC, GWPy.