Qian Hu

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EDUCATION

University of Science and Technology of China (USTC)   **Hefei, China**

B.S. (Hon.) in Astrophysics, Expected in July 2021

REASEARCH INTERESTS

- **Gravitational-Wave (GW) Astronomy**: Data analysis, multi-messenger astronomy & GW's physical implications, next generation GW detectors.
- **Numerical Relativity**: Simulation of compact objects.

RESEARCH EXPERIENCE

Semi-analytical algorithm of source localization of gravitational waves   **June 2020 - Present**

Advisor: Prof. Linqing Wen @The University of Western Australia

- Analyzed the realistic distribution of rearranged parameters of GWs using Monte Carlo simulation, and proposed a novel bimodal prior distribution function.
- Derived a semi-analytical solution for the Bayesian posterior probability of GW source sky location.
- According to injection tests on design noise and O2 noise of LIGO&Virgo, this localization algorithm was rapid and fairly self-consistent. It will be implemented to the online GW detection pipeline SPIIR.
- Paper will be submitted to PRD. (As the first author, now in proofreading.)

Research on joint observations of space-borne GW detectors   **Feb 2020 - June 2020**

Advisor: Prof. Wen Zhao @USTC

- Modified the Python package Bilby, and enabled it to perform Bayesian parameter estimation for supermassive black hole binaries on space-borne GW detectors.
- Investigated the improvements of GW source localization and constraint on parity-violating gravity given by space-borne GW detector networks.
- Illustrated that detector networks could significantly improve source localization (especially for overhead binaries), while for constraining parity-violating gravity, the improvement was not distinct.
- Paper was accepted by PRD. (As the first author.)

Fast gravitational wave localization based on null SNR   **July 2019 - Aug 2019**

Advisor: Prof. Linqing Wen @The University of Western Australia

- Used the stability of distribution of null SNR to reduce the influence caused by non-Gaussian noise during GW source localization.
- Constructed probability skymap based on null SNR and coherent SNR, and gave GW source localization.

Model-Independent test of the parity symmetry of gravity using GWs   **Feb 2019 - Aug 2020**

Advisor: Prof. Wen Zhao @USTC

- Developed a waveform-independent method to extract right-hand and left-hand polarizations of GWs from GW data.
- By comparing arrival time of circular polarizations, gave the constraint on velocity birefringence in parity-violating gravity.
- Paper was published on EPJC. (As a coauthor.)

PUBLICATIONS

1. 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*, The European Physical Journal C, 80(7), Jul 2020.
2. **Qian Hu**, Mingzheng Li, Rui Niu, and Wen Zhao. *Joint Observations of Space-borne Gravitational-wave Detectors: Source Localization and Implication for Parity-violating Gravity*, Phys. Rev. D 103, 064057
3. [**in preparation**] **Qian Hu**, Cong Zhou, Jhao-Hong Peng, Linqing Wen, Qi Chu, Manoj Kovalam, *Semi-analytical Approach for Sky Localization of Gravitational Waves.*

TEACHING

Physical experimental software design & development   **July 2020 - Dec 2020**
National virtual experimental teaching project
- Designed and developed an educational application of GW data simulation, data analysis and Bayesian parameter estimation for physical experimental teaching.
- The software will be employed in experimental teaching for junior students major in astronomy at USTC from 2021.

Classical Mechanics and Electrodynamics   **2020 Fall @USTC**
Teaching assistant
- Correct homework, answer questions and give refresher classes.

AWARDS

- National Scholarship (top $\sim 2\%$), USTC, 2020
- National Astronomical Observatory Scholarship, USTC, 2020
- Outstanding Student Scholarship (Grade 3), USTC, 2019
- CGN Scholarship (Gold), USTC, 2019
- Outstanding Student Scholarship (Grade 2), USTC, 2018

STANDARDIZED TEST

- TOEFL 101 (R: 28 L: 29 S: 22 W: 22). TOEFL Best Score: 105

PROFESSIONAL SKILLS

- Python, C, Matlab, Mathematica, LaTeX.