Zhenwei Lyu

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Fields of Interest

My current research focuses on gravitational waves astrophysics. The objective is to unravel physics buried within the data, include but not limited to: finite size effects of neutron stars (tidal effect, spin induced quadrupole moment, QNMs, etc.), any other potential effects within Einstein general relativity and beyond theories, merger rates and formation channels of compact objects (stellar mass and Extreme Mass Ratio Inspirals (EMRIs)), implementations of gravitational waves in measuring Hubble parameter, dark mattera and dark energy in the consmology.

Education

Kavli Institute for Astronomy and Astrophysics at Peking University **2022 – current**
Boya Fellow cooperate with Lijing Shao *Beijing, China*

University of Guelph and Perimeter Institute for Theoretical Physics **2018 – 2022**
Ph.D. supervised by Huan Yang, Physics *Guelph, ON, Canada*

Beijing Normal University **Sep. 2015 – Jun. 2018**
M.Sc supervised by Fan Zhang, Astronomy *Beijing, China*

Harbin Institute of Technology **Sep. 2011 – Jun. 2015**
B.Sc supervised by Ye Sun, Physics *Harbin, China*

Teaching Endeavours

Mathematical Physics **Fall semester 2020**

– As a Teaching Assistant under the supervision of Prof. Huan Yang. My main responsibility was grading their assignments

Physics for Life Sciences **Five semesters in 2018 – 2021**

– As a Teaching Assistant, my responsibilities were mainly conducting labs, grading quiz and labs, helping hours and invigilating exams.

Methods of Mathematical Physics **Two semesters in 2016 – 2017**

– As a Teaching Assistant, I have helped more than 20 students finish their assignments, graded their work and invigilated exams every semester.

Publications and Presentations

[1] **Zhenwei Lyu**, Nan Jiang, and Kent Yagi. "Constraints on Einstein-dilation-Gauss-Bonnet gravity from Black Hole-Neutron Star Gravitational Wave Events". *Phys. Rev. D* 105 (6 Mar. 2022). DOI: 10.1103/PhysRevD.105.064001. arXiv: 2201.02543 [gr-qc].

[2] **Zhenwei Lyu**, Michael LaHaye, Huan Yang, and Béatrice Bonga. *Probing Spin-Induced Quadrupole Moments in Precessing Compact Binaries*. 2023. arXiv: 2308.09032 [gr-qc].

[3] Jun Zhang, **Zhenwei Lyu**, Junwu Huang, Matthew C. Johnson, Laura Sagunski, Mairi Sakellariadou, and Huan Yang. "First Constraints on Nuclear Coupling of Axionlike Particles from the Binary Neutron Star Gravitational Wave Event GW170817". *Phys. Rev. Lett.* 127.16 (Oct. 2021). ISSN: 1079-7114. DOI: 10.1103/PhysRevLett.127.161101. arXiv: 2105.13963 [hep-ph].

[4] Zhen Pan, **Zhenwei Lyu**, Béatrice Bonga, Néstor Ortiz, and Huan Yang. "Probing Crust Meltdown in Inspiraling Binary Neutron Stars". *Phys. Rev. Lett.* 125.20 (Nov. 2020). DOI: 10.1103/PhysRevLett.125.201102. arXiv: 2003.03330 [astro-ph.HE)].

[5] Xuefeng Feng, **Zhenwei Lyu**, and Huan Yang. "Black-hole perturbation theory with post-Newtonian theory: Towards hybrid waveforms for neutron-star binaries". *Phys. Rev. D* 105 (10 May 2022). DOI: 10.1103/PhysRevD.105.104043. arXiv: 2104.11848 [gr-qc].

[6] Zhen Pan, **Zhenwei Lyu**, and Huan Yang. "Wet extreme mass ratio inspirals may be more common for spaceborne gravitational wave detection". *Phys. Rev. D* 104.6 (Sept. 2021). DOI: 10.1103/PhysRevD.104.063007. arXiv: 2104.01208 [astro-ph.HE)].

[7] Zhen Pan, **Zhenwei Lyu**, and Huan Yang. "Mass-gap extreme mass ratio inspirals". *Phys. Rev. D* 105 (8 Apr. 2022). DOI: 10.1103/PhysRevD.105.083005. arXiv: 2112.10237 [astro-ph.HE].

[8] Michael LaHaye, Huan Yang, Béatrice Bonga, and **Zhenwei Lyu**. "Efficient fully precessing gravitational waveforms for binaries with neutron stars". *Phys. Rev. D* 108 (4 Aug. 2023). DOI: 10.1103/PhysRevD.108.043018. arXiv: 2212.04657 [gr-qc].

[9] Ning Jiang, Huan Yang, Tinggui Wang, Jiazheng Zhu, **Zhenwei Lyu**, Liming Dou, Yibo Wang, Jianguo Wang, Zhen Pan, Hui Liu, Xinwen Shu, and Zhenya Zheng. *Tick-Tock: The Imminent Merger of a Supermassive Black Hole Binary*. 2022. arXiv: 2201.11633 [astro-ph.HE].

Presentations:

- Mini Workshop on Compact Objects and Gravitational Waves (KIAA, April 2023).
  Title: "Probing spin-induced quadrupole moments in precessional compact binaries"
- The Postdoc Workshop on Gravitational Waves (KIAA, Oct. 2022), organized and attended.
  Title: "Gravitational Wave Astrophysics, Cosmology and Fundamental Physics"
- Canadian Association of Physics(CAP) (2021). Title: "Constraints on Axions from GW170817"
- Canadian Student and Postdoc Conference on Gravity(CSPCG) (2021)
- Midwest Relativity Meeting (2020)

Membership, Honors and Awards

- Member of LIGO Scientific Collaboration at Perimeter Institute (from 2021)
- CSC Scholarship (2018-2022)

- Second Prize for Academic Scholarship (2017)
- Excellent Teaching Assistant of undergraduate (2017)
- First Prize for Academic Scholarship (2016)
- Excellent Student Cadre (2016)
- Excellent Teaching Assistant of undergraduate (2016)
- Honorable Mention of Mathematical Contest In Modeling (2013)
- The Star of Self-improvement of Chinese University students (2013)