Yong Gao

Contact Information

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Education

Ph.D. candidate, Physics, Peking University, Beijing, China **August 2018-Present**

Dissertation Advisor: Prof. Lijing Shao

Dissertation Title: *Probing Structures of Neutron Stars with Gravitational Waves*

B.S., Physics, Dalian University of Technology, Dalian, Liaoning Province, China **July 2018**

Degree conferred with honor.

Senior Thesis Advisors: Prof. Renxin Xu and Prof. Chong Li

Thesis Title: *The Electron Distributions of Strangelets in the Thomas-Fermi Model*

Research Interests

Understanding composition and state of matter inside neutron stars (NSs). Measuring mass, radius, spin frequency, and moment of inertia via pulsar timing. Modelling gravitational waves (GWs) from systems involving NSs: tidal/spin effects in inspiralling binary NS systems, oscillating NSs, and "mountains" on NSs. Studying dynamics of freely precessing magnetars and searching for free precession from timing and polarization of radio signals.

Probing strong-field gravity with pulsar timing and GWs. Constructing timing model and testing gravity with pulsar timing. Analyzing timing data and doing parameter estimation. Calculating global properties of NSs and modelling GW waveform in alternative theories of gravity.

Honors and Awards

Principal Scholarship, Peking University **2022-2023**

Tung Scholarship, Peking University **2021–2022**

Merit Student, Peking University **2021–2022**

The Second Prize for Oral Presentation, Physics Five Universities **April 2021**

Vela Prize for Oral Presentation, FAST/Future Pulsar Symposium 9 (FPS9) **August 2020**

National Scholarship, Peking University **2019–2020**

Excellent Teaching Assistant Award, Peking University **2019–2020**

Principal Scholarship, Peking University **2018–2019**

Learning Excellence Award (First Prize), Dalian University of Technology **2015–2016**

National Encouragement Scholarship, Dalian University of Technology **2015–2016**

Teaching Experience

Teaching Assistant, Peking University

Electrodynamics (B) **Fall 2022**

General Physics I, *incl. Mechanics & Electromagnetism **Fall 2021**

Theoretical Mechanics (A), **Excellent Teaching Assistant Award** **Fall 2019**

Co-advised Students

Ph.D. Student, Peking University

Hongbo Li, co-advise with Prof. Lijing Shao and Prof. Renxin Xu **2021–present**
Oscillations of neutron stars and gravitational-wave asteroseismology

Undergraduate Students, Peking University

Haoyang Qi, co-advise with Prof. Lijing Shao **2021-Present**
Constraints on ultralight dark matter with pulsar timing

Huimei Wang, co-advise with Prof. Lijing Shao **2020-2021**
Undergraduate thesis: The structure of neutron stars with anisotropic pressure

Jingyuan Deng, co-advise with Prof. Lijing Shao **2020-2021**
Undergraduate thesis: Forced precession of neutron stars

Zexin Hu, co-advise with Prof. Lijing Shao **2020-2021**
Scalarized neutron stars in massive scalar-tensor gravity

Professional Activities, Outreach, and Service

KAGRA Collaboration

Member of KAGRA Future Strategy Committee (FSC) **2021–Present**

Chair of conference session/group meeting

KAGRA Future Working Group 1st Open Meeting (*online*) **November 2021**

Chair of the group meeting, KIAAGRAVITY **2020-2021**

Journal referee

Classical and Quantum Gravity (CQG) **2021-Present**

Research in Astronomy and Astrophysics (RAA) **2021-Present**

Science China Physics, Mechanics & Astronomy (SCPMA) **2021-Present**

Computer Skills

Proficient in MATHEMATICA, Python, and Matlab. Experience in C, Bash, and HPC.
Markup languages: LaTeX, Markdown.

Code development— Most contributions can be found at https://github.com/GravYong.

Submitted Publications

13. **Y. Gao**, L. Shao, G. Desvignes, D. I. Jones, M. Kramer, G. Yim, *Precession of magnetars: dynamical evolutions and modulations on polarized electromagnetic waves*, submitted to MNRAS.
12. **Y. Gao**, R. Xu, L. Shao, *Precession of spheroids under Lorentz violation and observational consequences for neutron stars*, submitted to Proceedings of the Ninth Meeting on CPT and Lorentz Symmetry.

Refereed Publications

11. **Y. Gao**, X.-Y. Lai, L. Shao, R.-X. Xu, (2022) *Rotation and deformation of strangeon stars in the Lennard-Jones model*, Mon. Not. R. Astron. Soc. **509**, 2758 [arXiv:2109.13234].
10. **Y. Gao**, L. Shao, R. Xu, L. Sun, C. Liu, R.-X. Xu, (2020) *Triaxially-deformed freely-precessing neutron stars: continuous electromagnetic and gravitational radiation*, Mon. Not. R. Astron. Soc. **498**, 1826 [arXiv:2007.02528].
9. Z. Hu, **Y. Gao (Corresponding author)**, R. Xu, L. Shao, (2021) *Scalarized neutron stars in massive scalar-tensor gravity: X-ray pulsars and tidal deformability*, Phys. Rev. D **104**, 104014 [arXiv:2109.13453].

8. H.-B. Li, **Y. Gao (Corresponding author)**, L. Shao, R.-X. Xu, R. Xu, (2022) *Oscillation modes and gravitational waves from strangeon stars* Mon. Not. R. Astron. Soc. **516**, 6172 [arXiv:2206.09407].
7. R. Xu, **Y. Gao**, L. Shao, (2022) *Neutron stars in massive scalar-Gauss-Bonnet gravity: Spherical structure and time-independent perturbations*, Phys. Rev. D **105**, 024003 [arXiv:2111.06561].
6. R. Xu, **Y. Gao**, L. Shao, (2021) *Precession of spheroids under Lorentz violation and observational consequences for neutron stars*, Phys. Rev. D **103**, 084028 [arXiv:2012.01320].
5. R. Xu, **Y. Gao**, L. Shao, (2020) *Strong-field effects in massive scalar-tensor gravity for slowly spinning neutron stars and application to X-ray pulsar pulse profiles*, Phys. Rev. D **102**, 064057 [arXiv:2007.10080].
4. J. Zhao, L. Shao, **Y. Gao**, C. Liu, Z. Cao, B.-Q. Ma, (2021) *Probing dipole radiation from binary neutron stars with ground-based laser-interferometer and atom-interferometer gravitational-wave observatories*, Phys. Rev. D **104**, 084008 [arXiv:2106.04883].
3. C. Liu, L. Shao, J. Zhao, **Y. Gao**, (2020) *Multiband observation of LIGO/Virgo binary black hole mergers in the gravitational-wave transient catalog GWTC-1*, Mon. Not. R. Astron. Soc. **496**, 182 [arXiv:2004.12096].
2. **Y. Gao**, L. Shao, (2021) *Precession of triaxially deformed neutron stars*, Astron. Nachr. **342**, 364 [arXiv:2011.04472].
1. R. Xu, **Y. Gao**, L. Shao, (2021) Signature of Lorentz violation in continuous gravitational-wave spectra of ellipsoidal neutron stars, Galaxies **9**, 12 [arXiv:2101.09431].

Popular Science Articles

3. **Y. Gao**, L. Shao, R.-X. Xu, (2019) The waltz of a binary neutron star system (an article about GW170817, *in Chinese*).
2. **Y. Gao**, (2022) The structures of neutron stars (an article about dense matter in neutron stars, *in Chinese*).
1. **Y. Gao**, L. Shao, (2022) Does Einstein's theory of gravity hold up to the latest LIGO/VIRGO/KAGRA observations? (**translated** from the English version).

Invited Talks

4. Yangzhou University, School of Physics Science and Technology, Seminar — September 2022
3. Peking University, School of Physics, CuiYing Graduate Student Salon — February 2021
2. Max Planck Institut f. Gravitationsphysik Colloquium (*online*) — September 2020
1. University of Tartu, Theoretical Physics Laboratory Colloquium (*online*) — October 2020

Contributed Talks

9. SKA Pulsar Science Symposium 2022 — August 2022
8. FAST/Future Pulsar Symposium 11 — August 2022
7. Summer Science Day, KIAA, Peking University — July 2022
6. The 60th Anniversary of X-Ray Astronomy (*online*) — June 2022
5. Ninth Meeting on CPT and Lorentz Symmetry (*online*) — May 2022
4. FAST/Future Pulsar Symposium 10 — July 2021
3. Gravitation and Relativistic Astrophysics, Chinese Physical Society — April 2021
2. Gravitation and Cosmology Symposium — December 2020
1. FAST/Future Pulsar Symposium 9 — August 2020

References

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