Yong Gao — Curriculum Vitae

CONTACT INFORMATION

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EDUCATION

Postdoctoral Researcher, Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Potsdam, Germany **September 2023-Present**

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

Thesis Advisor: Prof. Lijing Shao

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

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

RESEARCH INTERESTS

Understanding composition and state of matter inside neutron stars (NSs). Modelling gravitational waves (GWs) from NSs: tidal/spin effects in binary NS and NS-black hole systems, global non-radial oscillations of NSs, mountains on NSs. Studying dynamics and observational consequences of free/forced precession of NSs. Numerical simulations of compact binary mergers involving NSs.

Testing strong-field gravity. Modelling GW waveform from compact binaries and oscillating compact objects beyond general relativity. Constructing timing model and testing gravity with pulsar timing. Studying the structures of rotating, tidally-deformed, and oscillating NSs in alternative theories of gravity. Numerical simulations of compact binaries 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 **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**

Teaching Experience

Lecturer, Max Planck Institute for Gravitational Physics

Introductions to the Fundamentals of Neutron Stars **Spring 2025**

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-advised 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-advised with Prof. Lijing Shao **2021-Present**
Constraints on ultralight dark matter with pulsar timing

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

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

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

Computer Skills

Proficient in Mathematica, Julia, Fortran, 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.

Professional Activities, Outreach, and Service

KAGRA Collaboration

Member of KAGRA Future Strategy Committee (FSC) **2021–2023**

Chair of conference session/group meeting

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

Chair of the Kiaagravity group meeting **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**

Submitted Publications

26. M. Z. Han, **Y. Gao**, K. Kiuchi and M. Shibata, *Dependence of post-merger properties on the thermal heating efficiency in neutron star mergers*, submitted to Phys. Rev. D, [arXiv:2504.08514]
25. **Y. Gao**, K. Hayashi, K. Kiuchi, A. T. L. Lam, H. J. Kuan and M. Shibata, *Convective stability analysis of massive neutron stars formed in binary mergers*, submitted to Phys. Rev. D, [arXiv:2501.19053]

Refereed Publications

24. A. T. L. Lam, **Y. Gao**, H. J. Kuan, M. Shibata, K. Van Aelst and K. Kiuchi, *Accessing universal relations of binary neutron star waveforms in massive scalar-tensor theory*, Phys. Rev. Lett. **134**, 15, 151402 [arXiv:2410.00137]
23. Z. Wang, **Y. Gao**, D. Liang, J. Zhao and L. Shao, *Vetting quark-star models with gravitational waves in the hierarchical Bayesian framework*, JCAP **11**, 038, [arXiv:2409.11103]
22. Y. Liu, H. B. Li, **Y. Gao**, L. Shao, Z. Hu, Effects from dark matter halos on X-ray pulsar pulse profiles, Phys. Rev. D **110**, 083018, [arXiv:2408.04425]
21. S. C. Chen, **Y. Gao**, E. P. Zhou, R.-X. Xu, *Free energy of anisotropic strangeon stars*, Res. Astron. Astrophys. **24**, 025005, [arXiv:2305.19687].
20. E. P. Zhou, **Y. Gao**, Y. R. Zhou, X. Y. Lai, L. Shao, W. Y. Wang, S.-L. Xiong, R.-X. Xu, S. X. Yi, H. Yue, Z. Zhang, *The precursor of GRB211211A: a tide-induced giant quake?*, Res. Astron. Astrophys. **24**, 025019, [arXiv:2305.19687]
19. G. Yim, **Y. Gao**, Y. Kang, L. Shao and R. Xu, *Continuous gravitational waves from trapped magnetar ejecta and the connection to glitches and antiglitches*, Mon. Not. Roy. Astron. Soc. **527**, 2, 2379-2392 (2023) doi:10.1093/mnras/stad3337, [arXiv:2308.01588]
18. C. Zhang, **Y. Gao**, C. J. Xia, R. Xu, *Rescaling strange-cluster stars and its implications on gravitational-wave echoes*, Phys. Rev. D **108** 6, 063002 [arXiv:2305.13323]
17. Y. Kang, C. Liu, J. P. Zhu, **Y. Gao**, L. Shao, B. Zhang, H. Sun, Y. H. I. Yin and B. B. Zhang, *Prospects for detecting neutron star–white dwarf mergers with decihertz gravitational-wave observatories*, Mon. Not. Roy. Astron. Soc. **528**, 3, 5309-5322, [arXiv:2309.16991]
16. **Y. Gao**, L. Shao, Jan Steinhoff, *A tight universal relation between the shape eccentricity and the moment of inertia for rotating neutron stars*, Astrophys. J. **954** 1, 16 [arXiv:2303.14130]
15. H.-B. Li, **Y. Gao**, L. Shao, R.-X. Xu, *The g-mode of neutron stars in Pseudo-Newtonian gravity*, Phys. Rev. D 108 **6**, 064005 [arXiv:2302.03856].
14. G. Desvignes, P. Weltevrede, **Y. Gao**, D. I. Jones, M. Kramer, M. Caleb, R. Karuppusamy, L. Levin, K. Liu, A. G. Lyne, L. Shao, B. Stappers, *A freely precessing magnetar following an X-ray outburst*, Nature Astron. **8**, 617-627.
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*, Mon. Not. Roy. Astron. Soc. **1**, 1080-1097 [arXiv:2211.17087].
12. **Y. Gao**, R. Xu, L. Shao, *Precession of spheroids under Lorentz violation and observational consequences for neutron stars*, in Proceedings of the Ninth Meeting on CPT and Lorentz Symmetry, published.
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. **Y. Gao**, L. Shao, (2021) *Precession of triaxially deformed neutron stars*, Astron. Nachr. **342**, 364 [arXiv:2011.04472].
8. Z. Hu, **Y. Gao** , 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].
7. H.-B. Li, **Y. Gao** , 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].
6. 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].

5. 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].
4. 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].
3. 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].
2. 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].
1. 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].

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

5. Yangzhou University, Seminar, December 2024
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 für Gravitationsphysik Colloquium (*online*) September 2020
1. University of Tartu, Theoretical Physics Laboratory Colloquium (*online*) October 2020

Contributed Talks

10. Brainstorming workshop: Deciphering the equation of state using gravitational waves from astrophysical sources, University of Warsaw, Poland August 2024.
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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