

Yi Qiu

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[My website](#)

RESEARCH INTERESTS

- **Cosmology:** gravitational waves, numerical relativity, black hole physics, modified gravity.
- **Astrophysics:** hydrodynamics simulation and N-body simulation, binary neutron stars merger, core-collapse supernovae, machine learning astronomy.

EDUCATION

The Pennsylvania State University, *Pennsylvania, United States*

Ph.D. in Physics

2022 – present

Advisors: David Radice

Dalian University of Technology, *Dalian, China*

Bachelor of Science in Applied Physics

2017 – 2021

Advisors: Weijie Fu, Lixin Xu

PUBLICATIONS

1. **Yi Qiu***, Xisco Jiménez Forteza, Pierre Mourier, "Linear vs. nonlinear modelling of black hole ringdowns." [arXiv:2312.15904](https://arxiv.org/abs/2312.15904)
2. **Yi Qiu***, Ke Wang, Jianhua He, "Numerical simulation of gravitational waves passing through a rotating binary lens.", [arXiv:2205.01682](https://arxiv.org/abs/2205.01682)

TALKS/SEMINARS

1. Neutrino Oscillation simulation in Binary Neutron Stars and Supernovae
Talk, N3AS Summer School at University of California, Santa Cruz, CA, July 20, 2023
2. Kinetic equations of Quantum Neutrino Oscillation
Seminar, Primordial Universe and Gravity (PUG) Seminar at Institute for Gravitation and the Cosmos, The Pennsylvania State University, PA, May 5, 2023

PREVIOUS RESEARCH EXPERIENCE

Research Assistance, *School of Astronomy and Space Science of Nanjing University, China*

Finite element method numerical relativity

Sep. 2021 – June 2022

Advisor: Jianhua He

- Construct the nonlinear 3+1 formalism of GR, while solving numerically the ADM equations with the publicly available finite element method (FEM) code *deal.ii*.
- Investigate into the wave effects of GW in time-domain through the propagation of wavefronts.

Summer Internship, *Max Planck Institute for Gravitational Physics (Albert Einstein Institute), Germany*

Testing the nonlinearity of overtone models

May 2021 – Sep. 2021

Advisor: Xisco Jiménez Forteza, Pierre Mourier

- Analyze the nonlinearity of ringdown overtones through both the quasi-normal modes (QNMs) deviation to Kerr spectrum and alternative forms of damped-sinusoids.
- Implement Bayesian analysis and a second order self-refinement-grid method on the fits to the numerical relativity GW waveform data (from SXS catalog) to compare both the mass and spin consistency and the performance of fitting of different overtone models.

Undergraduate Thesis, Dalian, China

Gravitational waves in modified gravity

Feb 2021 – May 2021

Advisor: Lixin Xu

- Comprehensive study of gravitational waves in scalar-vector-tensor modified gravity (known as STVG or MOG).
- Compare the MOG with general relativity by fitting to the numerical shear modes data of dynamical horizon during black hole merger events. Place constraints on the scalar charge MOG predicted.

Chinese Undergraduate Innovation Training Program, Dalian, China

Application of machine learning in quantum field theory

Mar 2019 – May 2020

Advisor: Weijie Fu

- Use machine learning algorithms (BP, CNN, GAN, etc.) to reconstruct the spectrum function with propagator with some prior data of kernel function.
- Compare the traditional reconstruction methods – maximum entropy method, analytic continuation and Bayesian method – to machine learning, and see if it really help to reduce errors.

AWARDS/ HONOURS/ SCHOLARSHIPS

Highest merit scholarship (Top 1/41)	Sep. 2020
National second-class prize in Chinese Undergraduate Physics Tournament (CUPT)	Aug. 2019
First-class prize in Division of Northeast China of CUPT	July 2019
Excellent Undergraduate Innovation Training Program at Dalian University of Technology	Apr. 2019
Dalian University of Technology Undergraduate Physics Tournament (DUPT) (Top 1/32)	Apr. 2019
National Certificate for Computer Programming using Python	Mar. 2019

OUTREACHES

AIIESEC Dare to Dream Project, Dalian, China

Program organizer, Local volunteer leader

Mar 2018 – Aug 2018

- Contact and interview foreign volunteers, and arrange their trip for coming China
- Help foreign volunteers to find host families in Dalian, and contact local volunteers to accompany foreign volunteers during the project time
- Assisted foreign volunteers to adapt to the Chinese culture environment and help them carry out their volunteer works

AIIESEC Empower Youth Project, Jilin, China

Local volunteer

July 2018 – July 2018

- Organize foreign volunteers to hold global village activities in Yangshulin Junior High School in Jilin province
- Lead foreign volunteers to experience Chinese traditional cultures such as Guzheng and Chinese paper cutting arts

COMPUTER SKILLS

- **Operating Systems:** Unix/Linux, Mac, Windows
- **High-level numerical languages:** Mathematica, Matlab, Python, C++
- **Applications:** \LaTeX , COMSOL, IBM SPSS, Origin, Microsoft suite, Apple suite, Adobe suite, HTML5, CSS, Javascript, Bootstrap, HTCondor, Homebrew.