Yi Qiu

School of Astronomy Space Science | Nanjing University
No. 163, Xianlin Avenue, Qixia District, Nanjing

✉ yiqiu@nju.edu.cn   My website

RESEARCH INTERESTS

- **Cosmology**: gravitational waves, numerical relativity, black hole physics, modified gravity.

- **Astrophysics**: hydrodynamics simulation and N-body simulation, structure formation/evolution.

EDUCATION

Dalian University of Technology, *Dalian, China*
Bachelor of Science in Applied Physics   *Sep. 2017 – June. 2021*
Advisors: Weijie Fu, Lixin Xu

Major GPA: 3.87/4.00(from WES iGPA)
Ranking: 3/41 overall, 1/41 in junior academic year
TOEFL iBT score: 100 (R: 29 L: 24 S: 21 W: 26)
GRE score: 322 (Q: 170 V: 152 AW: 3.5)

PUBLICATIONS

1. **Yi Qiu***, Xisco Jiménez Forteza, Pierre Mourier, *"Testing the uncertainty of overtone models."* will submit to Physical Review D soon. (drafted)

2. Jianhua He, **Yi Qiu***, Ke Wang *"Numerical simulation of gravitational waves passing through a rotating binary lens."* will submit to Physical Review Letter. (in preparation)

PREVIOUS RESEARCH EXPERIENCE

Research Assistance, *School of Astronomy and Space Science of Nanjing University, China*
Finite element method numerical relativity   *Sep. 2021 – present.*
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* (C++ based).
- 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 uncertainty of overtone models   *May. 2021 – Sep. 2021*
Advisor: Xisco Jiménez Forteza, Pierre Mourier

- Analyze the uncertainty of ringdown overtones through both the quasi-normal modes (QNMs) deviation to Kerr spectrum and alternative forms of damped-sinusoids.
- Implement 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.
- Provide a new reference as the intrinsic uncertainty ranges inside ringdown overtone models without assuming any priors while sampling the recurrently used 2 tone model.

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.

Summer Internship, *Institute of Modern Physics, Chinese Academy of Sciences, China*

Experimental nuclear astrophysics   *July. 2020 – Aug. 2020*

Advisor: Xiaodong Tang

- Calculate the cross sections of nuclear fusion in star core and compare them with results of well-defined experiments.
- Manipulate and test the TPC (Time Projection Chamber) helium-3 neutron detector.
- Analyze the data and plot the energy spectrum of several decay processes using CERN ROOT.

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.

Chinese Undergraduate Physics Tournament (CUPT), *Shenyang, Haerbing, Qingdao. China*

The insights of 3 fundamental physics phenomena   *Sep. 2018 – Aug. 2019*

Advisors: Hongliang Bai

- Design experiments to study the thermal lens effect, and investigate the phenomena in regard to how different parameters determine the "lens" formation.
- Compare the experiments and numerical simulation results to study the funnel and ball problems.
- Establish analytical model of popsicle chain reaction events, look into its mechanical origin through dozens of elaborate tests.

VOLUNTEER WORKS

AIESEC 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 hlep them carry out their volunteer works

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AWARDS/ HONOURS/ SCHOLARSHIPS

Highest merit scholarship (Top 1/41)	Sep. 2020
Second-class prize in China Undergraduate Mathematical Contest in Modeling	Sep. 2019
First-class prize in Physics Experiment Competition in Dalian University of Technology	Sep. 2019
National second-class prize in Chinese Undergraduate Physics Tournament (CUPT)	Aug. 2019
First-class prize in Division of Northeast China of CUPT	July 2019
First-class prize in Optoelectronic Design Competition at Dalian University of Technology	June 2019
First-class prize in Division of Liaoning province of CUPT	May 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
Second-level Certificate for National Computer Rank Examination	Mar. 2019

COMPUTER SKILLS

- **Operating Systems**: Unix/Linux, Mac, Windows

- **High-level numerical languages**: Mathematica, Matlab, Numerical Python, C++

- **Applications**: LaTeX, COMSOL, IBM SPSS, Origin, Microsoft suite, Apple suite, Adobe suite (some of them), HTML5, CSS, Bootstrap, HTCondor.