Genghao **Liu**

ASTROPHYSICS · ASTRONOMY

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"Make the change that you want to see in the world."

Education

Sun Yat-Sun University — *Zhuhai, China*

B.S. in Physics and Astronomy — *Sep. 2019 - Jun. 2023*

- GPA: 3.9/4 Rank: 7/20.
- Core Curriculum: Quantum Mechanics, Electrodynamics, Hydrodynamics,Thermodynamics,Statistical Mechanics, Astrophysics, Computational physics, Programming etc.
- Supervisor: Prof. Baitian Tang

Sun Yat-Sun University — *Zhuhai, China*

M.S. in Physics and Astronomy — *Sep. 2023 - PRESENT*

- GPA: 94.8/100 Rank: 1/83.
- Supervisor(Collaborator): Prof. Baitian Tang, Prof. Long Wang, Prof. Hui Li(THU)

Research Interests

White dwarf binary spectroscopy | Multiple populations in globular clusters | Giant molecular clouds | Star formation | Hydrodynamical simulation

Publications

First Author

Simulating the formation of multiple populations in globular clusters: taking massive interacting binaries as contamination sources — *To be submitted*

Preliminary Results

- Implemented binary pre-SN yield model into AREPO-RIGEL.
- Revealed "time budget" problem: the mismatch between the timing of pollutant release, mixing, and star formation strongly limits the 2P/1P ratio.
- Even under the most extreme parameter settings, the GMC with numerous initial parameters cloud still only generate no more than 6% of 2P stars, which proves that a GMC of normal size and mass is almost impossible to evolve in isolation.

Cloud-Cloud Collision as a possible scenario for the formation of multiple stellar populations in globular clusters — *To be submitted*

Preliminary Results

- Proposed a new promising scenario for the formation of multiple stellar populations in globular clusters
- Cloud-Cloud Collision model could achieve 80% 2P ratio in certain initial condition settings.

A New Code for Low-Resolution Spectral Identification of White Dwarf Binary Candidates — *Astronomy and AstroPhysics*

Highlights — *Jul. 2024*

- Developed an on-the-fly binary spectrum fitting code
- Obtained stellar parameters of both components using only single epoch low-resolution spectrm
- First obtained the stellar parameters of 14 white dwarf candidates

Co-Author

Revealing the Origins of Galactic Globular Clusters via Their Mg-Al Abundances — *Astrophysical Journal Letters*

Third Auther — *Aug. 2025*

A magnetic white dwarf formed through a binary merger within 35 million years — *Astrophysical Journal Letters*

Fifth Auther — *Aug. 2025*

Experience

Hydrodynamical Simulation based on HLLC Riemann Solver — *Zhuhai,China*

Principal-Investigator — *Apr. 2024 - Jun. 2024*

- Successfully discreted the consider 3D domain using voronoi tessellation.
- Coded Harten-Lax-van Leer-Contact riemann solver and tested its stability under different CFL criterion.

Quantitative Measurement of Off-plane Displacement Based on Digital Shearing Speckle Interference Fringe — *Zhuhai,China*

Co-Investigator — *Oct. 2021 - Dec. 2021*

- Modeled the out-of-plane displacement of materials
- fitted the theoretical two-dimensional speckle pattern with the image and obtained parameters with practical physical significance.

Artificial Intelligence Analysis of Cosmic Web — *Zhuhai, China*

Principal Investigator — *Apr. 2021 - Dec. 2021*

- Developed "DBSCAN + Centroid stacking" Algorithm to explore the Statistical properties of Cosmic Web structure.
- Determined cosmological parameters by using the characteristics of the two-point correlation function of clustering
- Analysis of scale sensitivity of clustering algorithm.
- Achievement summary, thesis writing and defense.

Curriculum Research, Extraction and Recognition of Verification Code — *Zhuhai, China*

Principal Investigator — *Apr. 2021 - Jun. 2021*

- Developed a web crawler program to extract to verification code on the web
- Clustering and noise reduction of verification Codes.
- Train a CNN neural network model for Verification code.

Technical Skills

Programming Python, C/C++,LaTeX,Mathematica,SQL
Code MESA,AREPO,Tensorflow,keras,IRAF
Languages English,Mandarin,Cantonese

Conferences & Seminars

CSST White Dwarf Seminar — *Zhuhai, China*

Oral Presenter <Spectral identification of white dwarf binary candidates> — *Jun. 2023*

CSST Galaxy and Neighbor Galaxy Seminar — *Kunming, China*

Oral Presenter <Spectral identification of white dwarf binary candidates> — *Jan. 2024*

Communication Meeting of Stellar Population Research in Star Clusters — *Zhuhai, China*

Oral Presenter <Spectral identification of white dwarf binary candidates> — *Jan. 2024*

CSST Science Annual Conference — *Hangzhou, China*

Oral Presenter <Spectral identification of white dwarf binary candidates> — *May. 2024*

The First Graduate-Student Academic Forum — *Zhuhai, China*

Oral Presenter <Star clusters forming in a low metallicity starburst - rapid self-enrichment by massive interacting binaries> — *May. 2024*

ICESUN Summer School 2024: Stellar Explosions and Related Objects — *Kunming, China*

Participant — *Aug. 2024*

ICESUN Summer School 2025: Binary Stars and Compact Objects — *Kunming, China*

Participant — *Aug. 2025*

Honors & Awards

International

2020 **Honorable Mention**, Mathematical Contest In Modeling and Interdisciplinary Contest In Modeling — *Zhuhai,China*

Domestic

2025 **First Prize Master Student Scholarship**, Sun Yat-sen University — *Zhuhai, China*
2024 **National Scholarship**, The Ministry of Education of the PRC — *Zhuhai, China*
2024 **First Prize Master Student Scholarship**, Sun Yat-sen University — *Zhuhai, China*
2023 **Shuyouwushi Scholarship**, The Award for Astronomy Students — *Zhuhai, China*
2023 **Master Student Scholarship**, Second Prize, Sun Yat-sen University — *Zhuhai, China*
2021 **Excellent Student Scholarship**, The Third Prize, Sun Yat-sen University — *Zhuhai, China*
2021 **Good**, Innovation training program for College Students — *Zhuhai, China*
2020 **Excellent Student Scholarship**, The Third Prize Scholarship in Sun Yat-sen University — *Zhuhai, China*
2019 **Excellent Student Scholarship**, The Third Prize Scholarship in Sun Yat-sen University — *Zhuhai, China*

Extracurricular Activity

Publicity Department of Roller Skating Association — *Zhuhai, China*

Member — *Sep. 2019 - Oct. 2020*

- Participated in the public welfare performance of the "15th Hundred-Mile Love Walking and Charity 10000 People's Walk" in Zhuhai.

Volleyball Team of Physics and Astronomy Department — *Zhuhai, China*

Outside Hitter — *2021.09 - PRESENT*

- Top eight in 2022 "Recreation Cup" volleyball match in Zhuhai Campus of Sun Yat-sen University
- Runner-up in 2023 YangYue Cup
- Top four in 2023 "Recreation Cup" volleyball match in Zhuhai Campus of Sun Yat-sen University
- Top eight in 2024 "Recreation Cup" volleyball match in Zhuhai Campus of Sun Yat-sen University