Jinning LIANG

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EDUCATION

The Institute for Computational Cosmology, Durham University Oct 2023 - Oct 2026
Ph.D. in Physics, Advisor: Prof. Cedric Lacey

School of Physics and Technology, Wuhan University (WHU) Sep 2019 - Jun 2023
Bachelor of Science in Physics

- **Astronomy Class** Sep 2020 - Jun 2023
  (Selected from pool of 280 students due to outstanding performance and enthusiasm for astronomy)
- **GPA: 3.79/4.00; 90.12/100; Ranking: 1/196**
- **Core coursework and Grades:**

Fluid Mechanics (98), Thermodynamics and Statistical Physics (98), Machine Learning (96), Computational Physics (95)

The Kavli Institute for Astronomy and Astrophysics, Peking University Mar 2023 - Apr 2023
Visiting Scholar

Department of Astronomy, Peking University Jul 2022
CSST-Galaxies Observation Summer School Student

Shanghai Academic Observatory (SHAO) Jan 2022 - Feb 2022
Visiting Scholar

PUBLICATIONS

[1] Constrain the Dark Matter Distribution of Ultra-diffuse Galaxies with Globular-Cluster Mass Segregation: A Case Study with NGC5846-UDG1
Jinning Liang, Fangzhou Jiang et al.,
Submitted to ApJ, 2023, https://arxiv.org/abs/2304.14431

[2] The Dynamics and Structure of Massive Galaxies in Cosmological Simulation
Jinning Liang, H.J. Mo et al.,
In preparation, 2023

[3] Assessing stellar yields in Galaxy chemical evolution: benchmark on observational stellar abundance patterns,
Jinning Liang, E. Gjergo & X. Fan,
Monthly Notices of the Royal Astronomical Society, Apr 2023, https://doi.org/10.1093/mnras/stad1013

[4] Deflection and Gravitational lensing of null and timelike signals in the Kiselev black hole spacetime in the weak field limit
H. Liu (co-first author), **Jinning Liang** (co-first author) & J. Jia,
Classical and Quantum Gravity, Volume 39, Number 19, Sep 2022, https://doi.org/10.1088/1361-6382/ac8b56

[5] GalCEM I - A Publicly-Available Detailed Isotopic Chemical Evolution Code
E. Gjergo, A.G. Sorokin, A. Ruth, E. Spitoni, F. Matteucci, X. Fan, **Jinning Liang** et al.,
The Astrophysical Journal Supplement, Volume 264, Issue 2, id.44, 22 pp. Feb 2023,
https://doi.org/10.3847/1538-4365/aca7c7

RESEARCH EXPERIENCE

Evolution of Globular-Clusters in Ultra-Diffuse Galaxies with *SatGen* | Peking University | Research Assistant
Apr 2022 - Present

Advisor: Fangzhou Jiang, Assistant Professor at Peking University

- Developed a physical model of the dynamical evolution of globular clusters in the semi-analytical simulation *SatGen*
- Created a practical and simplified stellar density profile to fit stellar density profile of NGC5846-UDG1
- Applied novel model to the Milky Way and NGC5846-UDG1 and compared results to observational globular-clusters data
- Tested parameter degeneracy and constrained parameters of dark matter halo of UDG1 using Markov Chain Monte Carlo in multiprocessing

Invited Talk (online): **University of Arizona**
Title: Globular Clusters in UDGs

Investigation of Massive Galaxy Dynamics in *IllustrisTNG100* | UMass | Research Assistant Mar 2022 - Present
Advisor: Houjun Mo, Professor at University of Massachusetts Amherst

- Performed gaussian mixture model to decompose structures of massive galaxies ($>10^{11}M_{\odot}$) in *IllustrisTNG100* into halos, bulges and disks

- Performed principal component analysis to dynamical, age and metallicity distribution of stellar particles of massive galaxies in different structures and reconstructed them
- Generated a dynamical template for massive galaxies based on eigenvectors of principal component analysis with a series of principal components as parameters

Formation of Galaxies through Galaxy Merger and Galaxy Falling in *IllustrisTNG100*| SHAO | Research Assistant
Jul 2021 - Feb 2022

Advisor: Ling Zhu, Researcher at Shanghai Academic Observatory
- Investigated kinematics, age and metallicity distributions for galaxies and clusters in *IllustrisTNG100*
- Studied the mass-dependent relation between the galaxy infall time and merger time with merger tree and stellar assembly histories for galaxies in *IllustrisTNG100*

Galaxy Chemical Evolution through Yields Analysis in *NuPyCEE*| WHU | Research Assistant Feb 2021 - May 2022
Advisors: Xilong Fan, Professor at Center of Astrophysics, School of Physics and Technology, WHU;
Eda Gjergo, Postdoc at Center of Astrophysics, School of Physics and Technology, WHU
- Ran GCE simulation *NuPyCEE* for the Milky Way and analyzed the effect of different stellar yields on the simulation
- Proposed a new statistical method for characterizing the comparison of data with theoretical prescriptions from the results of GCE simulation
- Categorized sixteen stellar yields tables into three stellar yields groups according to their physical background
- Accomplished extensive overview and comparison of sixteen collected current stellar yields tables for the first time
- Obtained abundance ratios in the Milky Way and nearby dwarf galaxies for both the *GalCEM* simulation and for this project

Conference Presentation Talk: **ISM Physics and Chemistry Seminar**
Title: Galactic stellar abundance scatter investigated through yield analysis in galaxy chemical evolution
Yichang, Hubei Province, China Aug 2022

Gravitational Lensing Calculation in Kiselev Black Hole Spacetime | WHU | Research Assistant Jul 2020 - Apr 2022
Advisor: Junji Jia, Associate Professor at Center of Astrophysics, School of Physics and Technology, WHU
- Calculated the deflection angle and total flight time of weak gravitational lensing with a perturbative method
- Solved the lensing equations in the Kiselev black hole spacetime with a perturbative method to obtain impact parameters, apparent angle, magnification and time delay
- Analyzed parameters (α, ω) dependence in Kiselev black hole spacetime on deflection angle, apparent angle, magnification and time delay

SELECTED PROJECT EXPERIENCES

Unsinkable Disk| WHU | Team Leader
Contest: China Undergraduate Physics Tournament Feb 2022 - Mar 2022
- Built a hydrodynamical model for hydraulic jump and studied how the height and radius of hydraulic jump affect the pressure gradient force

Power Profile of a Cyclist | WHU | Team Programmer
Contest: Mathematical Contest in Modeling/Interdisciplinary Contest in Modeling 18^{th} - 22^{th}, Feb 2022
- Built parametrized power output equations and power profile for various types of cyclists
- Proposed and solved the decision optimization model via Monte Carlo to provide suggestions to cyclists, specifically for the real race in Tokyo, Flanders and for the simulated race

Saxon Bowl | WHU | Team Leader
Contest: China Undergraduate Physics Tournament Jan 2020 - Jul 2020
- Built a hydrodynamical model and studied how the mass, heights and diameters of Saxon Bowl influence falling time

SELECTED HONORS AND AWARDS

Yu Gang - Song Xiao Scholarship of Wuhan University	45/30000	2022
First-class Scholarship of Wuhan University	Top 5%	2022
MCM&ICM Finalist Award	Top 2%	2022
National Astronomical Observatories Scholarship	3/600	2021
Second-class Scholarship of Wuhan University	Top 10%	2021/2020

LEADERSHIP AND ACTIVITIES

Student Union | School of Physics and Technology, WHU | Vice Minister in Secretary Department Sep 2019 - Sep 2021

- Took charge of Student Union Training for different departments and was awarded excellent ministry

Enrollment Office | WHU | Admissions Assistant Jul 2020 - Aug 2021

- Led a team in the enrollment and worked with teachers in the WHU Enrollment Office to assist in enrollment

SKILLS

Programming Languages & Software: Python (Extensively), Mathematica (Extensively), Matlab and LaTex
Language: Mandarin (native), English (TOEFL 103)
Simulation Packages: *IllustrisTNG, EAGLE, NuPyCEE* and *SatGen*