# Jinning LIANG

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## EDUCATION

**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)

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

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

## 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.,
Ready to be submitted, 2023

**[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,
Submitted to ***Monthly Notices of the Royal Astronomical Society***, under second review, Jan 2023

**[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

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| 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*