Huimin Qu

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Building 17, Xiamen University, Xiamen, Fujian, China

EDUCATION

BSc in Astronomy: Department of Astronomy, Xiamen University **Sep. 2018 - Present**

- **Modules:** Calculus, Linear Algebra, C Language Programming, Methods of Mathematical Physics A, Theoretical Mechanics, Electrodynamics, Observational Astrophysics, General Relativity, Modern Physics Laboratory, Atomic Physics, Quantum Mechanics, Thermodynamics and Statistical Physics A, Modern Cosmology, High Energy Astrophysics, Introduction to Particle Astrophysics and Neutrino Physics
- **GPA:** 3.90/4.00 (Rank: 1%)

RESEARCH EXPERIENCE

Study the turn-around radius near galaxy clusters using gevolution **July. 2021 - Present**
Advisor: *Prof. David F. Mota, Dr. Farbod Hassani* University of Oslo

- **Overview:** The research was motivated by the potential of relativistic cosmological simulation, gevolution, to explore nonlinear structures, and the specialty of the turn-around radius as cosmological observable.
- **Research Method:** i) Learned gevolution scheme which is a relativistic N-body code (e.g., its weak field scheme and related studies); ii) Ran gevolution based on Ubuntu system and extracted halo catalogs using the particle snapshots with Rockstar halo finder.
- **Research Outcomes:** Calculating the turn-around radius and studying the dependence of the turn-around radius on cosmological properties (Ongoing).

Evolutions of Stellar-mass Black Holes in the Accretion Scenarios **Sep. 2020 - Oct. 2021**
Advisor: *Prof. Tong Liu* Xiamen University

- **Overview:** Analyzed and defined the evolution of accretion in stellar-mass black holes (BHs).
- **Research Method:** i) Calculated the growth of BH mass based on the analytical model for the evolutive central engine of gamma-ray bursts (GRBs) proposed, considering the observational data constraint; ii) Proposed the distribution of BH masses within the framework of hyperaccretion system; iii) Tested and proved the existence of lower mass gap; iv) Demonstrated the contribution of different powering mechanisms on lower mass gap formation.
- **Research Outcomes:** Research paper **"***Revisiting Black Hole Hyperaccretion in the Center of Gamma-Ray Bursts for the Lower Mass Gap"* (Submitted to *The Astrophysical Journal*)

Study the Intergalactic Structures via Simulations **Aug. 2020 - Present**
Advisors: *Prof. Ling Zhu* Shanghai Astronomical Observatory, Chinese Academy of Sciences

- **Overview:** Understood fundamental statistical characteristics of galaxies and learned Illustris Simulation theory (e.g., data structure and related studies).
- **Research Method:** i) Analyzed galaxy properties (e.g., M_{star} vs half-mass radius; M_{star} vs M_{DM}) in the Illustris Simulation; ii) Extracted information regarding the merging process and star particles to explore galaxy's evolution process and stellar orbit distribution.
- **Research Outcomes:** Determining the galaxies which have similar properties to the galaxy in TNG100, and disentangling the corresponding dynamic structures via the intrinsic stellar population distribution (Ongoing).

The Nucleosynthesis of NDAFs in Stellar-mass Black Holes **Nov. 2019 - Aug. 2020**
Advisors: *Prof. Tong Liu* Xiamen University

- **Overview:** The research was motivated by the problem of the origin of heavy elements in the universe and the nucleosynthesis condition in NDAFs (Neutrino-dominated Accretion Flows) in previous studies, to investigate the physical environment of NDAFs with outflows.
- **Research Method:** i) Developed an empirical method to provide effective solutions for the calculation of temperature and ignition condition of NDAFs; ii) Determined the reasonable calculation range of BHs' mass, enhanced the procedure of calculating the radius of BHs accretion, and mapped the nucleosynthesis conditions and contribution on ^{56}Ni yields for black holes with different masses; iii) Compared and linked the two nucleosynthesis mechanisms: core-collapse supernovae and NDAF outflows.
- **Research Outcomes:** Research paper "Neutrino-dominated Accretion Flows: Second Nucleosynthesis Factory in Core-collapse Supernovae and Regulation of Iron Markets in Galaxies" (Published in *The Astrophysical Journal*)

PUBLICATIONS

i. **Hui-Min Qu**, Tong Liu, Revisiting Black Hole Hyperaccretion in the Center of Gamma-Ray Bursts for the Lower Mass Gap, 2021, *The Astrophysical Journal*. (Submitted)

ii. Tong Liu, Yan-Qing Qi, Zhen-Yi Cai, Mou-Yuan Sun, **Hui-Min Qu**, Cui-Ying Song, Neutrino-dominated Accretion Flows: A Second Nucleosynthesis Factory in Core-collapse Supernovae and Regulating the Iron Markets in Galaxies, 2021, *The Astrophysical Journal*, 920(5).

PROGRAMMING SKILLS

Skilled in: Python, MATLAB, Mathematica, LaTeX, Origin, Git, LABVIEW

Basic Proficiency: C/C++, Fortran, Machine Learning, Shell, SQL, XSPEC

PRESENTATIONS

Undergraduate Astronomy Symposium of Peking University **Sep. 2020**

Gave a talk entitled "*A second nucleosynthesis factory in core-collapse supernovae: outflows from neutrino-dominated accretion flows*".

The 10th China Undergraduate Physics Tournament (CUPT) **Aug. 2019**

Presentations of *problem No.2 Aerosol*, *problem No.6 Hurricane Balls*, and *problem No.8 Sci-Fi Sound*.

HONORS & AWARDS

National Scholarship, Ministry of P.R. China	**Oct. 2021**
Excellent camper, 2021 Summer Camp at Department of Astronomy, Tsinghua University	**Jul. 2021**
First Prize, 9th Xiamen University Astronomy Competition	**May. 2021**
National Scholarship, Ministry of P.R. China	**Oct. 2020**
Lin-bridge Prize for Excellent Undergraduate Research, Peking University	**Sep.2020**
Provincial First Prize, Contemporary Undergraduate Mathematical Contest in Modeling	**Sep. 2020**
First Prize of Guangqi Scholarship, Shanghai Astronomical Observatory	**April. 2020**
National Scholarship, Ministry of P.R. China	**Oct. 2019**
Second Prize, 10th China Undergraduate Physics Tournament (CUPT)	**Aug. 2019**
First Prize in East China Division, 10th China Undergraduate Physics Tournament	**May. 2019**
Second Prize of Guangqi Scholarship, Shanghai Astronomical Observatory	**April. 2019**
First Prize, Xiamen University Physics Competition	**2019, 2020, 2021**

EXTRACURRICULAR ACTIVITIES

Teaching Assistant in 'Modern Cosmology' Module **2021 - Present**

- Course material preparation, tutorial and cosmology simulation instruction

Host of XMU Undergraduate Astrophysical Research Colloquium **2021 - Present**

- Organized monthly colloquiums to provide cutting-edge astrophysical research sharing.

Chairman of Sci-Tech Innovation Center (STIC) of College of Physics, Xiamen University **2019 - 2021**

- Organized a variety of academic activities, including academic salons, discipline competitions and seminars to promote the academic connection of the community.

Member of Xiamen University Youth Astronomy Club **2020 - Present**

- Gave talks for astronomical popularization, and participated in regular academic seminars.

Class Representative **2018 - 2020**

- Managed class affair, activities recording, assisted teachers and classmates with daily issues.
- Awarded *Excellent Class, Excellent League Member of Xiamen University* in 2019 and 2020 academic year.

Volunteer **2018 - Present**

- Contributed more than 240 hours volunteer activities, including providing science lectures, and was awarded as *Outstanding Volunteer of Xiamen University*.