Yihao Zhou

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RESEARCH INTERESTS

Keywords: cosmological hydrodynamic simulations, gravitational waves, the dynamics of massive black holes, massive black hole seeding, AGN feedback

EDUCATION

Carnegie Mellon University, *Pittsburgh, PA* — *Aug 2022 – Present*
Ph.D. Physics
Advisors: Tiziana Di Matteo

Xi'an Jiaotong University, *Xi'an, China* — *Sep 2017 – May 2021*
B.S. Physics (with honours)
Advisors: Jun Feng, HaiGuang Xu
Thesis: A Semi-Analytical Model for the Formation and Evolution of Radio Relics in Galaxy Clusters

Honours and Awards

Future Investigators in NASA Earth and Space Science and Technology (FINESST) ($150,000)	2025-2028
Outstanding Graduate, *Xi'an JiaoTong University*	2021
Exchange Program Scholarship for Excellent Undergraduate, *Xi'an JiaoTong University*	2019
Siyuan Scholarship, *Xi'an JiaoTong University*	2018-2021

PUBLICATIONS

First-Author Publications

Y. Zhou, T. Di Matteo, S. Bird, R. Croft, Y. Ni, Y. Yang et al., *The ASTRID Simulation at z=0: from Massive Black Holes to Large-scale Structure*, *arXiv e-prints* (2025) arXiv:2510.13976 [2510.13976]

Y. Zhou, T. Di Matteo, N. Chen, L. Z. Kelley, L. Blecha, Y. Ni et al., *Central Cluster Galaxies: A Hot Spot for Detectable Gravitational Waves from Black Hole Mergers*, ApJ **988** (2025) L74 [2502.01845]

Y. Zhou, D. Mukherjee, N. Chen, T. D. Matteo, P. H. Johansson, A. Rantala et al., *MAGICS. II. Seed Black Holes Stripped of Their Surrounding Stars Do Not Sink*, ApJ **980** (2025) 79

Y. Zhou, H. Chen, T. D. Matteo, Y. Ni, R. A. C. Croft and S. Bird, *Modeling quasar proximity zones in a realistic cosmological environment with a self-consistent light curve*, MNRAS (2024) stae172

Y. Zhou, H. Xu, Z. Zhu, Y. Zhao, S. Fan, C. Shan et al., *A semi-analytical model for the formation and evolution of radio relics in galaxy clusters*, MNRAS **517** (2022) 1299

Y. Zhou and P. L. Plante, *Understanding the impact of semi-numeric reionization models when using cnns*, PASP **134** (2022) 044001

Publications with Major Contributions

N. Chen, **Y. Zhou**, E. Dadiani, T. Di Matteo, C. Wang, A. Palmese et al., *Connecting current and future dual AGN searches to LISA and PTA gravitational wave detections*, *arXiv e-prints* (2025) arXiv:2512.16844 [2512.16844]

B. Y. Wang, **Y. Zhou**, W. Chen, N. Chen, T. Di Matteo, R. Croft et al., *Gravitational Waves from Massive Black Hole Mergers in ASTRID: Predictions for LISA*, *arXiv e-prints* (2025) arXiv:2503.24304 [2503.24304]

D. Mukherjee, **Y. Zhou**, N. Chen, U. N. Di Carlo and T. Di Matteo, *MAGICS. III. Seeds Sink Swiftly: Nuclear Star Clusters Dramatically Accelerate Seed Black Hole Mergers*, ApJ **981** (2025) 203 [2409.19095]

N. Chen, T. Di Matteo, **Y. ZHOU**, L. Z. Kelley, L. Blecha, Y. Ni et al., *The Gravitational-wave Background from Massive Black Holes in the ASTRID Simulation*, ApJ **991** (2025) L19 [2502.01024]

Y. Ni, N. Chen, **Y. ZHOU**, M. Park, Y. Yang, T. Di Matteo et al., *The Astrid Simulation: Evolution of Black Holes and Galaxies to z = 0.5 and Different Evolution Pathways for Galaxy Quenching*, ApJ **990** (2025) 120 [2409.10666]

Other Co-author Papers

P. LaChance, A. K. Bhowmick, R. A. C. Croft, T. Di Matteo, **Y. ZHOU**, F. Pacucci et al., *From ASTRID to BRAHMA – The role of overmassive black holes in little red dots in cosmological simulations*, *arXiv e-prints* (2025) arXiv:2512.13957 [2512.13957]

P. LaChance, R. A. C. Croft, T. Di Matteo, **Y. ZHOU**, F. Pacucci, Y. Ni et al., *The Properties of Little Red Dot Galaxies in the ASTRID Simulation*, *arXiv e-prints* (2025) arXiv:2505.20439 [2505.20439]

R. Croft, P. Shaw, A.-M. Alexis, N. Chen, **Y. ZHOU**, T. D. Matteo et al., *Large-scale surveys of the quasar proximity effect*, *The Open Journal of Astrophysics* **8** (2025) 124 [2504.03848]

J. Feng, J.-J. Zhang and **Y. ZHOU**, *Thermality of the unruh effect with intermediate statistics*, *Europhysics Letters* **137** (2022) 60001

PRESENTATIONS

Texas Symposium on Relativistic Astrophysics, *Arizona State University* *Dec 2025*
Talk: From Nano- to Milli-Hz: Predicting PTA and LISA Signals with the ASTRID Simulation

Gravity in the Local Group, *Carnegie Mellon University* *Jun 2025*
Poster: The Seed Massive Black Hole Mergers in Dwarf Galaxies What can we learn about the LISA sources from the cosmological simulation ASTRID and MAGICS

Ten Years to LISA, *Jet Propulsion Laboratory* *Apr 2025*
Talk: Understanding Massive Black Hole Seed Mergers: Insights from the MAGICS Simulations and Implications for LISA Observations

Aspen 2025 Winter Conferences, *Aspen Center for Physics* *Feb 2025*
Poster with Flash Talk: Central Cluster Galaxies: A Hotspot for Detectable Gravitational Waves from Black Hole Mergers

Frontera User Meeting, *the Texas Advanced Computing Center* *Aug 2024*
Talk: Gravitational wave emitted by massive blackholes: predictions from cosmological simulation Astrid

Cosmology Seminar, *Max Planck Institute for Astrophysics, remote* *July 2024*
Talk: MAGICS: The Crucial Role of Tidal Stripping in Seed Black Hole Binary Evolution

European Astronomical Society Annual Meeting, *Padova Congress, Italy, remote* *July 2024*
ePoster with short presentation: Modeling Quasar Proximity Zones in a Realistic Cosmological Environment with a Self-consistent Light Curve

Galaxies Group Talk, *University of Michigan, remote* *Feb 2024*
Talk: Modeling quasar proximity zones with self-consistent light curves and cosmological environment.

SAZERAC regular specialist sessions: Learning the high-redshift Universe, *remote* *Feb 2022*
Talk: Understanding the Impact of Semi-Numeric Reionization Models when using CNNs.

4th Global 21-cm Workshop, *University of Colorado Boulder, remote* *Oct 2021*
Poster: Understanding the Impact of Semi-Numeric Reionization Models when using CNNs.

OUTREACH & SERVICES

Referee
Monthly Notices of the Royal Astronomical Society (MNRAS)
The Open Journal of Astrophysics (OJAp)
Member: Laser Interferometer Space Antenna (LISA) Astrophysics Working Group
Conference LOC: Gravity in the Local Group, *Carnegie Mellon University* Jun 2025

Mentoring & Teaching

Student Advising

Fatemeh Hafezianzadeh (Graduate student, CMU)
Cici Wang (Undergraduate student, CMU)
Abdulla Alhosani (Graduate student, CMU)
Bonny Wang (Master student, CMU)
William Chen (Undergraduate student, CMU)
Ines Rodriguez Hsu (Undergraduate student, CMU)