Yueying Ni

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Academic Positions

ITC Postdoctoral Fellow   Sep. 2022 -
Harvard-Smithsonian Center for Astrophysics

Education

Carnegie Mellon University   Pittsburgh, PA
Ph.D. in Physics   *Sep. 2017 – Aug. 2022*

Fudan University   Shanghai, China
B.S. in Physics   *Sep. 2013 – June 2017*

Research Interests

High-z galaxies and quasars: cosmological hydrodynamic simulations, constrained Gaussian realizations, large-scale structures, growth of the first quasars, galaxy formation, AGN feedback, the dynamics of supermassive black holes

Deep Learning: generative model, super-resolution simulations

Alternative dark matter: astrophysical probes of Fuzzy Dark Matter (FDM) model

Selected Talks

BlueWater Symposium   June 2019
Talk: BlueTides simulation: first galaxies and QSOs at the cosmic dawn   *Sunriver,OR*

Big Eyes On the Early Universe conference   January 2019
Talk: High-z quasar outflows and obscuration   *University of California, Los Angeles, CA*

Cosmology group meeting   Nov 2020
Talk: Super resolution cosmological simulations   *virtual, Harvard-CfA, MA*

NSF AI Institute seminar   March 2021
Talk: Super resolution cosmological simulations   *virtual, Carnegie Mellon University*

IPMU (Kavli Institute for the Physics and Mathematics of the Universe) seminar   May 2021
Talk: Cosmological simulations with super resolution   *virtual, IPMU*

Tsinghua Astrophysics seminar   May 2021
Talk: Cosmological simulations with super resolution   *virtual, Tsinghua University*

LISA Astrophysics Working Group Meeting   June 2021
Recorded Talk: Massive BH binaries and their EM counterparts in the Asterix simulation   *virtual, LISA collaboration*

Cosmos'21 Conference   Aug 2021
Talk: Cosmological simulations with super resolution   *virtual, University of Illinois*

Galaxy formation group meeting   Nov 2021
Talk: the ASTRID simulation   *Center for Computational Astrophysics, Flatiron Institute, NY*

CCAPP (Center for Cosmology and Astro-Particle Physics) seminar   Jan 2022
Invited Talk: Cosmological simulations of high-redshift supermassive black holes   *Ohio State University*

KICP (Kavli Institute for Cosmological Physics) seminar   Feb 2022
Invited Talk: Cosmological simulations from cosmic web to black holes   *University of Chicago*

Awards

McWilliams Graduate Fellowship   *Carnegie Mellon University, 2021-2022*
Guy C. Berry Graduate Research Award   *Carnegie Mellon University, 2022*
ITC Postdoctoral Fellowship   *CFA, Harvard University, 2022-2025*

STUDENT MENTORING

Kerry Jappe (Physics undergraduate, CMU)
Cosmological simulation of the fuzzy dark matter   *Oct. 2019 - Apr. 2020*

Patrick Lachance (Graduate students, CMU)
Super resolution simulations   *Sep. 2019 - Sep. 2021*

SERVICE

Simulation data portal: BlueTides database (http://bluetides.psc.edu)

A project with Pittsburgh Supercomputing Center. Build the public available database that provides access and API for BLUETIDES simulation.

Code publicly available: GaussianCR (https://github.com/yueyingn/gaussianCR)

A python module that impose constraints on Gaussian primordial density field and generate constrained initial conditions for cosmological simulations.

Seminar Co-organizer: UPitt/McWilliams Center for Cosmology astrolunch

Referee for Astrophysical Journal (ApJ), MNRAS, since 2021

TEACHING EXPERIENCE

- 33-141 Physics I for Engineering Students, *Spring 2019*
- 33-104 Experimental Physics, *Fall 2018*
- 33-152 Matter and Interaction II, *Spring 2018*
- 33-121 Physics I for Science Students, *Fall 2017*

PRESS RELEASES

Evolving the early universe in 24 hours on Frontera, featured in TACC Press Releases (url: https://www.tacc.utexas.edu/-/evolving-the-early-universe-in-24-hours-on-frontera).

Simulations Show Webb Telescope Can Reveal Distant Galaxies Hidden in Quasars' Glare, featured in NASA's James Webb Space Telescope Science Release (url: https://webbtelescope.org/contents/news-releases/2020/news-2020-51).

Machine learning accelerates cosmological simulations featured in Phys Org Release (url: https://phys.org/news/2021-05-machine-cosmological-simulations.html).

Yueying Ni Wins McWilliams Fellowship featured in MCS CMU news (url: https://www.cmu.edu/physics/news-events/news-archive/2021/0907_ni-mcwilliams-fellowship.html).

New Application of Artificial Intelligence Just Removed One of the Biggest Roadblocks in Astrophysics featured in Simons Foundation Press Release (url: https://www.simonsfoundation.org/2021/05/04/new-application-of-artificial-intelligence-just-removed-one-of-the-biggest-roadblocks-in-astrophysics/).

Machine Learning Accelerates Cosmological Simulations featured in MCS CMU news (url: https://www.cmu.edu/physics/news-events/news-archive/2021/0505_supersims.html).

Physics' Yueying Ni Receives Berry Research Award featured in MCS CMU news (url: https://www.cmu.edu/mcs/news-events/2022/0608_berry-award.html).

First and second author papers

Y. Nɪ, T. DiMatteo, N. Chen, R. Croft and S. Bird, *Ultramassive black holes formed by triple quasar mergers at $z \sim 2$, arXiv e-prints* (2022) arXiv:2209.01249 [2209.01249]

Y. Nɪ, T. Di Matteo, S. Bird, R. Croft, Y. Feng, N. Chen et al., *The ASTRID simulation: the evolution of supermassive black holes*, MNRAS **513** (2022) 670 [2110.14154]

Y. Nɪ, Y. Li, P. Lachance, R. A. C. Croft, T. Di Matteo, S. Bird et al., *AI-assisted superresolution cosmological simulations - II. Halo substructures, velocities, and higher order statistics*, MNRAS **507** (2021) 1021 [2105.01016]

Y. Nɪ, T. D. Matteo and Y. Feng, *Not all peaks are created equal: the early growth of Supermassive Black Holes*, MNRAS (2021) [2012.04714]

Y. Nɪ, T. Di Matteo, R. Gilli, R. A. C. Croft, Y. Feng and C. Norman, *QSO obscuration at high redshift ($z > 7$): predictions from the BLUETIDES simulation*, MNRAS **495** (2020) 2135 [1912.03780]

Y. Nɪ, M.-Y. Wang, Y. Feng and T. Di Matteo, *Predictions for the abundance of high-redshift galaxies in a fuzzy dark matter universe*, MNRAS **488** (2019) 5551 [1904.01604]

Y. Nɪ, T. Di Matteo, Y. Feng, R. A. C. Croft and A. Tenneti, *Gas outflows from the z = 7.54 quasar: predictions from the BLUETIDES simulation*, MNRAS **481** (2018) 4877 [1806.00184]

Y. Nɪ, J. Jiang and C. Bambi, *Testing the Kerr metric with the iron line and the KRZ parametrization*, J. Cosmology Astropart. Phys. **2016** (2016) 014 [1607.04893]

Y. Nɪ, M. Zhou, A. Cárdenas-Avendaño, C. Bambi, C. A. R. Herdeiro and E. Radu, *Iron Kα line of Kerr black holes with scalar hair*, J. Cosmology Astropart. Phys. **2016** (2016) 049 [1606.04654]

T. Di Matteo, **Y. Nɪ**, N. Chen, R. Croft, S. Bird, F. Pacucci et al., *A vast population of wandering and merging IMBHs at cosmic noon*, arXiv e-prints (2022) arXiv:2210.14960 [2210.14960]

N. Chen, **Y. Nɪ**, A. M. Holgado, T. Di Matteo, M. Tremmel, C. DeGraf et al., *Massive Black Hole Mergers with Orbital Information: Predictions from the ASTRID Simulation*, arXiv e-prints (2021) arXiv:2112.08555 [2112.08555]

S. Bird, **Y. Nɪ**, T. Di Matteo, R. Croft, Y. Feng and N. Chen, *The ASTRID simulation: galaxy formation and reionization*, MNRAS **512** (2022) 3703 [2111.01160]

N. Chen, **Y. Nɪ**, M. Tremmel, T. Di Matteo, S. Bird, C. DeGraf et al., *Dynamical Friction Modeling of Massive Black Holes in Cosmological Simulations and Effects on Merger Rate Predictions*, arXiv e-prints (2021) arXiv:2104.00021 [2104.00021]

Y. Li, **Y. Nɪ**, R. A. C. Croft, T. Di Matteo, S. Bird and Y. Feng, *AI-assisted superresolution cosmological simulations*, *Proceedings of the National Academy of Science* **118** (2021) 2022038118 [2010.06608]

M. A. Marshall, **Y. Nɪ**, T. Di Matteo, J. S. B. Wyithe, S. Wilkins, R. A. C. Croft et al., *The host galaxies of z = 7 quasars: predictions from the BLUETIDES simulation*, MNRAS **499** (2020) 3819 [1912.03428]

K.-W. Huang, **Y. Nɪ**, Y. Feng and T. Di Matteo, *The early growth of supermassive black holes in cosmological hydrodynamic simulations with constrained Gaussian realizations*, MNRAS **496** (2020) 1 [1906.00242]

Other co-author Papers

E. J. Weller, F. Pacucci, **Y. Nɪ**, N. Chen, T. Di Matteo and L. Hernquist, *Orbital and Radiative Properties of Wandering Intermediate-Mass Black Holes in the ASTRID Simulation*, arXiv e-prints (2022) arXiv:2210.16319 [2210.16319]

M. Sipp, P. LaChance, R. Croft, **Y. Nɪ** and T. Di Matteo, *Super-resolution simulation of the Fuzzy Dark Matter cosmological model*, arXiv e-prints (2022) arXiv:2210.12907 [2210.12907]

H. Shao, F. Villaescusa-Navarro, P. Villanueva-Domingo, R. Teyssier, L. H. Garrison, M. Gatti et al., *Robust field-level inference with dark matter halos*, arXiv e-prints (2022) arXiv:2209.06843 [2209.06843]

Y. Shen, H.-C. Hwang, M. Oguri, N. Chen, T. Di Matteo, **Y. Nɪ** et al., *Statistics of Galactic-Scale Quasar Pairs at Cosmic Noon*, arXiv e-prints (2022) arXiv:2208.04979 [2208.04979]

N. Chen, T. Di Matteo, **Y. Nɪ**, M. Tremmel, C. DeGraf, Y. Shen et al., *Properties and Evolution of Dual and Offset AGN in the ASTRID Simulation at $z \sim 2$*, arXiv e-prints (2022) arXiv:2208.04970 [2208.04970]

M. A. Marshall, K. Watts, S. Wilkins, T. Di Matteo, J. K. Kuusisto, W. J. Roper et al., *The BlueTides Mock Image Catalogue: Simulated observations of high-redshift galaxies and predictions for JWST imaging surveys*, arXiv e-prints (2022) arXiv:2206.08941 [2206.08941]

A. K. Bhowmick, L. Blecha, **Y. Ni**, T. Di Matteo, P. Torrey, L. Z. Kelley et al., *Probing the $z \sim 6$ quasars in a universe with IllustrisTNG physics: Impact of gas-based black hole seeding models*, *arXiv e-prints* (2022) arXiv:2205.05717 [2205.05717]

F. Villaescusa-Navarro, S. Genel, D. Anglés-Alcázar, L. A. Perez, P. Villanueva-Domingo, D. Wadekar et al., *The CAMELS project: public data release*, *arXiv e-prints* (2022) arXiv:2201.01300 [2201.01300]

M. A. Marshall, S. Wilkins, T. Di Matteo, W. J. Roper, A. P. Vijayan, **Y. Ni** et al., *The Impact of Dust on the Sizes of Galaxies in the Epoch of Reionization*, *arXiv e-prints* (2021) arXiv:2110.12075 [2110.12075]

M. A. Marshall, J. S. B. Wyithe, R. A. Windhorst, T. D. Matteo, **Y. Ni**, S. Wilkins et al., *Observing the host galaxies of high-redshift quasars with JWST: predictions from the BLUETIDES simulation*, MNRAS **506** (2021) 1209 [2101.01219]

K. Ren, M. Trenti, M. A. Marshall, T. Di Matteo and **Y. Ni**, *The Diversity of Environments around Luminous Quasars at Redshift z 6*, ApJ **917** (2021) 89 [2106.07027]