He Jia

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Research Interests

I am broadly interested in using advanced statistical techniques to optimally extract information from astrophysical data, with the goal of driving new discoveries. While I was initially trained as a cosmologist, a field I continue to actively contribute to, my research has expanded to include black holes since graduate school. My focus on these two areas stems from the vast amounts of increasingly precise data being generated by ongoing and upcoming projects, where sophisticated statistical and machine learning models are crucial for unlocking the deeper insights that would otherwise remain inaccessible. Beyond cosmology and black holes, I am also open to exploring new science areas depending on where the most exciting science opportunities are.

Keywords: Black Holes, Cosmology, Machine Learning

Education

Princeton University | Department of Astrophysical Sciences — Aug 2020 – Present

- Ph.D. in Astrophysics (Advisors: Prof. Eliot Quataert & Prof. David Spergel, expected in July 2025)

University of California, Berkeley | Berkeley Center for Cosmological Physics — July – Aug 2018 | Feb – Sept 2019

- Visiting Research Assistant (Advisor: Prof. Uroš Seljak)

Peking University | School of Physics — Sept 2016 – July 2020

- B.S. in Physics (Advisor: Prof. Zuhui Fan)

Selected Presentations

- Poster Presentation, International Conference on Machine Learning, Vienna, Austria — July 2024
- Oral Presentation, Cosmology in the Adriatic Summer Workshop, Split, Croatia — July 2024
- Seminar, Black Hole Initiative, Cambridge, MA — June 2024
- Seminar, Berkeley Center for Cosmological Physics, Berkeley, CA — Apr 2024
- Seminar, Kavli Institute for Particle Astrophysics and Cosmology, Stanford, CA — Apr 2024
- Oral Presentation, American Physical Society April Meeting, Sacramento, CA — Apr 2024
- Oral Presentation, Vanderbilt University Workshop, Nashville, TN — Feb 2024
- Oral Presentation, American Astronomical Society Winter Meeting, New Orleans, LA — Jan 2024
- Oral Presentation, Institute for Advanced Study Workshop, Princeton, NJ — Nov 2023
- Seminar, Tsinghua University, Beijing, China — July 2023
- Seminar, Peking University, Beijing, China — July 2023
- Seminar, National Astronomical Observatories of China, Beijing, China — July 2023
- Oral Presentation, Berkeley Center for Cosmological Physics Workshop, Berkeley, CA — Jan 2020
- Oral Presentation, National Astronomical Observatories of China Workshop, Beijing, China — Dec 2019
- Poster Presentation, Symposium on Advances in Approximate Bayesian Inference, Vancouver, Canada — Dec 2019

Technical Skills

- **Programming**: Expertise in Python, C++ and Mathematica. Working knowledge of ROOT, Matlab, Origin, Qt and Fortran.
- **Software**: AthenaK (GRMHD simulations); Blacklight (GRMHD ray tracing); PyTorch, NQE (Simulation-Based Inference); FastPM, GADGET (cosmological N-body simulations); Hugo, AWS Amplify (website building).
- **Languages**: Mandarin (Native), English (Fluent).

References

- Prof. Eliot Quataert, Princeton University | quataert@princeton.edu
- Prof. David Spergel, Simons Foundation | dspergel@simonsfoundation.org
- Prof. Alexandru Lupsasca, Vanderbilt University | alexandru.v.lupsasca@vanderbilt.edu

Last updated on Oct 30, 2024

PUBLICATIONS

For the most up-to-date list, please visit hejia.io/pub.

- **He Jia** et al., *Black Hole Spin Measurement with the Shape of the Photon Ring*, to be submitted to **Physical Review Letters** in Nov 2024.
- **He Jia** et al., *Photon Ring Diameter Measurement with Incoherently Averaged Visibility Data*, to be submitted to **Physical Review Letters** in early Nov 2024.
- **He Jia**, *Cosmological Analysis with Calibrated Neural Quantile Estimation and Approximate Simulators*, to be submitted to **Physical Review Letters** in early Nov 2024.
- Michael Johnson et al. (including **He Jia**), *The Black Hole Explorer: Motivation and Vision*, Proceedings of Society of Photo-Optical Instrumentation Engineers, 13092:784-835, 2024, arXiv:2406.12917.
- **He Jia**, Eliot Quataert, Alexandru Lupsasca and George N. Wong, *Photon Ring Interferometric Signatures Beyond The Universal Regime*, Physical Review D, 110:083044, 2024, arXiv:2405.08804.
- **He Jia**, *Simulation-Based Inference with Quantile Regression*, **41st International Conference on Machine Learning**, Proceedings of Machine Learning Research, 235:21731-21752, 2024, arXiv:2401.02413.
- **He Jia** et al., *Millimeter Observational Signatures of Flares in Magnetically Arrested Black Hole Accretion Models*, Monthly Notices of the Royal Astronomical Society, 526(2):2924–2941, 2023, arXiv:2301.09014.
- **He Jia**, Hong-Ming Zhu and Ue-Li Pen, *Galaxy Spin Classification. I. Z-wise versus S-wise Spirals with the Chirality Equivariant Residual Network*, The Astrophysical Journal, 943(1):32, 2023, arXiv:2210.04168.
- **He Jia**, Christopher J. White, Eliot Quataert and Sean M. Ressler, *Observational Signatures of Black Hole Accretion: Rotating Versus Spherical Flows with Tilted Magnetic Fields*, Monthly Notices of the Royal Astronomical Society, 515(1):1392–1403, 2022, arXiv:2201.08431.
- **He Jia** and Uroš Seljak, *Normalizing Constant Estimation with Gaussianized Bridge Sampling*, 2nd Symposium on Advances in Approximate Bayesian Inference, Proceedings of Machine Learning Research, 118:1-14, 2020, arXiv:1912.06073.