

# Bin Xia

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## EDUCATION

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- 2021 - present Ph.D. Candidate, Physics, Georgia Institute of Technology  
*Advisor: John Wise*
- 2015 - 2019 B.S., Physics with Highest Honor, Jilin University, China  
*Advisor: Coleman Miller, the University of Maryland, College Park*  
*Rank: 1/289, GPA: 3.95/4*

## SELECTED HONORS & AWARDS

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- Top 10 Distinguished Students Award, Jilin University (0.02%) 2019
- President Scholarship, Jilin University (0.02%) 2019
- Dean Scholarship, College of Physics (0.5%) 2019
- First-class Scholarship, Jilin University 2019
- China National Scholarship (0.2%) (Twice) 2017 & 2018

## SELECTED RESEARCH EXPERIENCE

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**Graduate Research Assistant** May 2022 - present

- Simulated the temperature evolution of baryons and dark matter (DM) during the early universe
- Explored the heating effect of the relative velocity between baryons and milli-charged DM
- Extended the *Accelerated Reionization Era Simulations (ARES)* python package to include the baryon-DM interactions when generating a global 21cm signal model
- Developed an inference program to estimate the mass of DM and the streaming velocity between DM and gas, given a 21cm signal intensity and redshift
- Developed an interpolation scheme to produce an all-sky map of the foreground emission from the Milky Way, including absorption and scattering from intervening gas. This product informs the instrument design for the minimum resolution required for a space-based radio telescope

**Undergraduate Thesis** Jan. 2019 - July 2019

- Explored the formation mechanisms of intermediate-mass black holes (IMBHs) within globular clusters
- Designed numerical programs to estimate the gravitational recoil velocity of binary black hole mergers
- Calculated the final recoil of IMBH after black hole merges in a globular cluster with particular distributions of mass ratios, spins, relative spin orientations, and orbital eccentricity
- Simulated the retention probability of IMBHs as a function of initial mass by *Monte Carlo methods*

## TEACHING & MENTORING EXPERIENCE

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**Research Mentor**

Vanessa Montgomery 2022 - 2024

**Teaching Assistant**

Introductory Mechanics Labs (4 sections) Aug. 2021 - May 2022

Kentucky-Rutgers-Jilin University International Courses May - June 2018

Atomic Physics, where I edited a *Question & Answer Manual* for about 200 students 2017

## PUBLICATIONS

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S. Henry, M. Mancini, **Bin Xia**, J. H. Wise, S. Storm, K. Burkhardt, D. Richardson, G. Badura, V. Montgomery, J. A. Christian, “Space-Based Radio Astronomy with Spacecraft Formations”. *Acta Astronautica*. *In Prep*.

C. Brummel-Smith, D. R. Skinner, S. Sethuram, J. H. Wise, **Bin Xia**, K. Taori, 2023, “Inferred galaxy properties during Cosmic Dawn from early JWST Photometry Results”. *MNRAS*, 525, 4405.

## ACADEMIC ACTIVITIES

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Peking University & Tsinghua University visiting student	Aug. 2023
Delivered a presentation on How to Be an Outstanding Student at <i>TEDxJLU</i>	Oct. 2019
Gave Astrophysics lectures for outstanding elementary school students in Jilin Province	2018 - 2019
Harbin Institute of Technology-Jilin University Everest Project Exchange	June 2019
Sun Yat-sen University Fu Lan Physics Festival (Twice)	Dec. 2017, 2018
Gave a lecture on black holes for Harbin Institute of Technology visiting students	Nov. 2018
Cambridge-JLU Summer Academic Programme in Computational Physics	Aug. 2018
Delivered a presentation on How to Achieve Academic Success for about 1000 students	Apr. 2018
Nagoya University-Jilin University TAQ Class Summer Program	July - Aug. 2017

## SKILLS

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Programming	Python, Linux/Unix, Bash scripting, Slurm, Git, MATLAB, C, $\LaTeX$
Machine learning	Diffusion model, Consistency model, Generative adversarial network, Convolutional neural network, Transformer, Long short-term memory, Random forest
Scientific skills	data analysis, data visualization, data reduction, feature engineering, unstructured data, qualitative data, volumetric data, technical writing, statistics

## EXTRACURRICULAR ACTIVITIES

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Served as a coach of regular trampolines and skiing activities in Changchun	Sept. 2018 - June 2021
Served as the leader of a game development team; released the video game <i>JLU Defence</i>	2019
Volunteered at an orphanage in Atlanta, USA	Apr. 2018
Leading role of the film <i>Reverse</i> , calling the public to care for people with depression or autism	2017
Learning breakdancing since 2010; serving as a coach of the University Street Dance club since	2015