

Jiahui Xie

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EDUCATION

California Institute of Technology, Pasadena, CA

B.S. Physics (expected June 2028), GPA: 3.9

Relevant Coursework:

Math: Ma 1B/1C (Linear Algebra and Multivariable Calculus), Ma 2 (Differential Equations), Ma 3 (Probability and Statistics), Ph 129b (PDE's, Complex Analysis and Special Functions)

Physics: Ph12a (Waves), Ph125ab (Quantum Mechanics I & II), Ph 5 (Analog Electronics for Physicists); Ph 6 (Physics Lab)

Computer Science: CS 1 (Python)

Relevant Coursework for Spring 2026: Ph 12c (Intro to Statistical Mechanics), Ph 129c (Mathematical Methods of Physics), Ay 119 (Astroinformatics), Ph 7 (Physics Lab)

Brooklyn Technical High School, Brooklyn, NY

June 2024

Physics; Top 5 GPA in Class of 2024 (Class size: [1292](#)); 103.46

RELEVANT EXPERIENCE

Undergraduate Researcher, Caltech, Pasadena, CA

Fall 2025 - Present

Advisors: Phil Hopkins, Isabel Sands

- Extending diffuse gamma-ray emission modeling [from Milky Way–mass](#) to LMC–mass galaxies using cosmological MHD simulations with full cosmic ray physics (FIRE).
- Do Fermi bubble–like structures still appear at lower galaxy masses? What does this reveal about cosmic ray transport and galactic feedback across mass scales?
- Using existing FIRE analysis tools to generate diffuse gamma-ray cubes from simulation snapshots and extract observational quantities (intensity profiles, spectra).

SURF Fellow, Fermilab (CMS Experiment)/Caltech, Batavia, IL —On-site

Summer 2025

Advisors: Maria Spiropulu, Cristián H. Peña, Christina Wang, Si Xie

- Modelled Z-boson mass resolution in CMS Run 3 (2022–2024) Monte Carlo (MC) and data to improve sensitivity to the rare $H \rightarrow \mu^+ \mu^-$ decay.
- Evaluated the impact of Beam Spot Constrained (BSC) reconstruction by fitting invariant mass spectra in both Z control and Higgs signal regions.
- Compared mass resolution across Higgs production modes (ggH, VBF, ttH), observing consistent improvements with BSC, with the largest gains in the ttH category (~10%).
- Investigated data–MC resolution differences using pseudorapidity distributions and muon momentum residuals to probe remaining sources of mismodeling

Student Researcher, Virginia Tech & SUNY Old Westbury, New York, NY

Fall 2022 - Summer 2024

Advisors: Michael Kavic, Christopher League

- Processed and analyzed data from a radio telescope, Long Wavelength Array, in New Mexico, in search of Fast Radio Bursts and radio transients using custom Python analysis pipelines.
- Wrote a research paper with a dataset containing a Giant Pulse from the Crab Pulsar and submitted it to the New York Science Fair.
- Co-authored an [iposter](#) that sets limits and parameters of current Fast Radio Burst detection and was presented at the 242nd conference meeting of the American Astronomical Society.

Student Researcher, University of California, Berkeley, Berkeley, CA

Summer 2023

Advisor: Yasnouri Nomura

- Derived the Friedmann equations from Einstein's field equations using the FLRW metric and the perfect-fluid energy–momentum tensor.
- Solved the resulting differential equations for multiple equations of state to estimate the timing of radiation–matter equality, nucleosynthesis, and late-time accelerated expansion, and to analyze heat death and Big Crunch scenarios.

TECHNICAL SKILLS

Programming & Analysis: Python (NumPy, Pandas, Matplotlib, PyROOT), ROOT, Jupyter

Computing: Linux/Unix (command-line), Git/GitHub

Physics Methods: Monte Carlo analysis, invariant mass reconstruction, Gaussian fitting, data–MC comparison

Languages: Cantonese (native), Mandarin (native)

OUTREACH & SERVICE

Vice President of Blacker Hovse, Caltech

Winter 2026 - Present

President, Caltech Puzzle Club

Fall 2025 - Present

Head Title IX Advocate of Blacker Hovse, Caltech

Fall 2025 - Present

Blacker Hovse Representative, Advocacy Committee of Caltech Interhove Committee (IHC)

Fall 2025 - Present

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Tutor, Caltutors

Winter 2025 - Present

- Tutored 10+ students in physics, math, and Chinese subjects, ranging from preparation for the SAT and AP Physics C Mechanics & Electromagnetism to the Math and Physics portions of the Caltech Transfer Exam.

President, Mentor, Girls Who Code, New York, NY

Fall 2021 - Summer 2024

- Led weekly workshops for over 70 students on coding in Python and utilizing data analysis and machine learning libraries to process and analyze data.
- Hosts workshops and enrichment opportunities such as technical interviews and job preparation, hands-on projects, helpful resources, guest speaker events, and beginner hackathons.

Youth Researcher, CUNY Intergenerational Change Initiative, New York, NY

Summer 2022 - Spring 2023

- Designed the ICI website with tasks on web design, graphics, HTML coding, and WordPress.
- Conducted a survey-based research project on the social issues of educational inequity and food insecurity, and performed statistical data analysis and management on qualitative and quantitative data.
- Co-leads an annual policy breakfast that invites policy officials of NYC to a meeting where each social issue section's project research findings and policy recommendations are presented.
- Organized youth rallies and testimonies for public hearings to advocate for more education and economic opportunities for students of all socioeconomic backgrounds.

AWARDS & FELLOWSHIPS

- SURF Fellowship, California Institute of Technology (2025)
- QuestBridge National College Match Scholar (2023)
- First Place, Girls Who Code Hackathon (2022)