Xing Liu

xingyzt@berkeley.edu

I'm a second-year undergraduate at UC Berkeley with an interest in the computational and theoretical sides of stellar, cosmological, and high-energy physics. I intend to major in physics and applied math.

EXPERIENCE

Dark Energy Spectroscopic Instrument, S. Bailey, LBNL. *Jan 2024 →*
Under the mentorship of Anthony Kremin, I developed a NERSC-to-AWS data pipeline and a cross-platform Docker environment that together make accessing and analyzing terabytes of DESI data as seamless a process to outside scientists as it is to people within the DESI collaboration.

Undergraduate Lab for Physics & Astronomy, W. Haxton, UC Berkeley. *Aug 2023 – May 2024*
Under the mentorship of Cooper Jacobus, I prototyped a deep learning convolutional neural network to paint baryonic matter into dark-matter-only N-body simulations, generating statistically-accurate mock data at a fraction of the time it takes to run traditional full hydrodynamic simulations.

Physics department peer tutoring program, UC Berkeley. *Jan 2024 →*
I work to support students in lower-division physics courses, with an emphasis on helping new students develop good study habits and feel welcome in the Berkeley physics community.

Society of Physics Students outreach program, UC Berkeley. *Aug 2023 →*
My group travels weekly to elementary, middle, and high schools across the Bay Area to inspire them with a curiosity for science. For *Splash@Berkeley*, I have wrote and taught several introductory special relativity, cosmology, and programming lessons for high schoolers.

FTC 15303 robotics team, Arcadia High School. *Aug 2019 – May 2023*
I led the design and autonomous programming of our robot's drivetrain, using a combination of CAD, 3D printing, and machining to create many custom parts. In our final season, I created an autonomous navigation program based on computer vision odometry, which mitigated the usual errors from IMU integration drift.

TECHNICAL COURSEWORK

Upper division

Physics 105: *Analytical Mechanics* (C. Chiang)	A
Physics 110A: *Electromagnetism and Optics I* (C. Chiang)	A
Physics 137A: *Quantum Mechanics I* (W. Haxton)	A^+
Physics 139: *Special and General Relativity* (O. Ganor)	A^+
Math 104: *Introduction to Analysis* (Z. Ding)	A^-
Math 110: *Abstract Linear Algebra* (O. Holtz)	A

Lower division

Physics 5A: *Introductory Mechanics and Relativity* (S. Kolkowitz)	A^+
Physics 5B: *Introductory Electromagnetism, Waves, and Optics* (J. Orenstein)	A^+
Physics 5BL: *Introduction to Experimental Physics I* (D. Barsky)	A
Physics 5C: *Introductory Thermodynamics and Quantum Mechanics* (C. Chiang)	A^+
Physics 24: *Freshman Seminar on Particle Physics* (H. Wang)	P

Credits by examination

AP Calculus BC	5
AP Physics C: *Mechanics*	5
AP Physics C: *Electricity and Magnetism*	5
AP Chemistry	5

ADDITIONAL SKILLS

Data analysis and machine learning
Experienced with making numerical simulations, analyses, and visualizations in Python with NumPy, SciPy, and OpenCV. Have implemented deep-learning convolutional neural networks (CNNs) with PyTorch. Familiar with C, C^{++}, and OpenGL. Currently experimenting with generative adversarial networks (GANs).

System administration
Uses Linux (Ubuntu). Experienced with bash scripting, git/GitHub, and other command-line tools, as well as Google Cloud, Colab, and Firebase for cloud computing, databases, hosting, and APIs.

Web design and development
Experienced with vanilla HTML/JS/CSS, as well as Jekyll, Node/NPM, React, and WebGL/ThreeJS.

CAD and electrical engineering
Experienced with OnShape CAD. Familiar with Arduinos and basic breadboard circuitry.

Miscellaneous
Dabbles in fractal art and graphic design. Fluent in English, French, Mandarin Chinese, and LaTeX.

SIDE PROJECTS

Starherd, independent work (xingyzt.net/starherd) *Summer 2023 →*
An interactive website for teaching stellar evolution, built in JS/WebGL.

Polarizar, FTC Robotics (github.com/flyorboom/polarizar) (demo) *Fall 2022 → Spring 2023*
A real-time computer vision algorithm for autonomous navigation, built in Python/OpenCV.

Map.ahs.app, App Dev Team (github.com/ahsappdevteam/voxmap) (demo) *Fall 2021 → Fall 2022*
An interactive 3D map of Arcadia High School, supporting location tags and featuring real-time ray-marched rendering, built in C/C^{++}/JS/WebGL.

ACES, App Dev Team (github.com/ahsappdevteam/aces) *Fall 2019 → Fall 2022*
A web-based content editing system for the Arcadia High School app, supporting rich text formatting, media embeds, and article recommendations, built in JS with a Google Cloud/Firebase backend.