

LINDA ZHENYU JIN

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I am a physicist and machine learning researcher specializing in physics-informed AI models that bridge large-scale cosmological simulations with the high-performance computing demands of modern astrophysical observations. My deep-learning emulators have saved tens of millions of computational node hours, dramatically accelerating the extraction of scientific insights in cosmology. I aim to adapt generalized AI systems to drive breakthroughs across domains—from uncovering the universe’s deepest mysteries to advancing climate modeling—ensuring that cutting-edge technology delivers transformative global impact.

EDUCATION

University of Washington, Seattle

PhD, Physics

University of California, Santa Barbara

Bachelor of Science, Physics | Minor, Comparative Literature

- Major GPA: 3.93/4.00; GPA: 3.90/4.00

September 2025

Seattle, WA

September 2020–December 2023

Santa Barbara, CA

EXPERIENCE

AI Research Data Analyst

Professor Uros Seljak, The Berkeley Center for Cosmology Physics (BCCP)

September 2024–July 2025

Department of Physics, UC Berkeley

- Improve field-level cosmological inference with AI models by building a conditional U-Net (Convolutional Neural Network) in Pytorch for baryonification of dark matter field from weak lensing maps.
- Modify the kernels and the loss function with physics constraints in both Euclidean and Fourier space.
- Stack and augment 3D **Astrid** hydrodynamical simulations to generate datasets for map-to-map training.
- Compare generation performance with conditional Diffusion Model variations, Gaussian Processors, and Normalizing Flows.
- Achieve superior field-level performance for total matter density map generation compared to previous models.
- Develop through National Energy Research Scientific Computing (NERSC) Perlmutter supercomputer.
- Present progress at the BCCP group weekly meeting, attend weekly DESI meeting at LBNL.

Machine Learning Astrophysics Research Assistant

Professor Joseph F. Hennawi ENIGMA Group

April 2022–September 2024

Department of Physics, UCSB

- Developed and implemented a Neural Network Emulator in **JAX** on Ly α forest from high resolution **Nyx** hydrodynamics simulations to extract the thermal evolution of intergalactic medium (IGM) at redshift 5.4 – 6.
- Trained emulation error to 0.5% with hyper-parameter optimization and training time within 5 seconds, superior than previous emulators for Ly α data.
- Ran **NumPyro** Hamiltonian Monte Carlo with Bayesian inference for accurate parameter estimation within 10 seconds, reduced the cost per effective sample by 20 times in comparison with the traditional interpolation model.
- Incorporated uncertainty propagation to pass inference credibility test for out-of-distribution data.
- Achieved same-level parameter constraints while using only 10% of original simulations, saving $\sim 17\text{M}$ GPU hours.
- Accelerated the computational time for thermal parameter inference by 99.3%.

Worster Physics Research Fellow

2023 Worster Summer Research Fellowship

July 2023–November 2023

Department of Physics, UCSB

- Awarded the fellowship sponsored by the Worster family among 6 awardees in the department.
- Designed and Implemented a replicable multi-layer perceptron neural network in Astrophysics data processing.
- Presented the progress and final project overview to the committee of the Physics department.
- Showcased the functionality of machine learning in Astrophysics to the Worster family and a general audience.

Observational Astrophysics Laboratory Assistant

Professor Philip Lubin upper-division lab course

March 2023–June 2023

Department of Physics, UCSB

- Worked with the LCO’s SBIG STL-6303 0.4m telescope.
- Led a team to analyze Hertzsprung–Russell diagrams for clusters M13 and M6.
- Succeeded completing the lab with a research report paper and presentation, archived as writing samples for the course. [View the report here.](#)

AWARDS AND FELLOWSHIPS

High Honors (Top 8% of undergraduate students) <i>College of Letters & Science, UCSB</i>	December 2023
Worster Summer Research Fellowship <i>Department of Physics, UCSB</i>	July 2023–November 2023
Dean's Honors <i>College of Letters & Science, UCSB</i>	Winter 2021–Spring 2022

TALKS

The University of Chicago Cosmology Group Meeting Presentation <i>Online</i>	November 2024
• Presentation: <i>Neural network emulator to constrain the high-z IGM thermal state from Lyman-α forest flux auto-correlation function</i> in Prof. Nick Gnedin's group	
2023 Worster Summer Research Fellowship Presentation <i>Department of Physics, UCSB</i>	November 2023
• Presentation: <i>Constraining the High-z Intergalactic Medium Thermal State with Neural Network Emulator for the Lyman-α Forest Flux Auto-correlation Function</i>	
2022 Undergraduate Physics Research Symposium <i>KITP, UCSB</i>	September 2022
• Presentation: <i>Neural Network Emulator for the Lyα Forest Flux Auto-Correlation Function</i> , https://online.kitp.ucsb.edu/online/undergrad22/ .	

PUBLICATION AND POSTER

- Jin, Z.** (2025). AI-assisted Field-level Emulator for Cosmological Simulations [Poster presentation]. International HPC Summer School. <https://www.hpc-training.org/poster>.
- Jin, Z.**, Wolfson, M., Henna, J. F., & González-Hernández, D. (2024). Neural network emulator to constrain the high-z IGM thermal state from Lyman- α forest flux auto-correlation function. Monthly Notices of the Royal Astronomical Society. <https://doi.org/10.1093/mnras/stae2741>.
- Jin, Z.** (January 2023). *Constraining the High-z Intergalactic Medium Thermal State with Neural Network Emulator* [Poster presentation]. Conference for Undergraduate Women in Physics 2023, University of California, Merced, CA, United States. https://sites.ucmerced.edu/files/cuwip/files/poster_abstract_book.pdf.

LEADERSHIP / EXTRACURRICULAR

Academic Advisor	March 2022–June 2023
<i>College of Letters & Science Academic Advising</i>	<i>University of California, Santa Barbara</i>
• Provided individual consultation with students to complete their bachelor's degree in a timely manner.	
• Collaborated with full-time advisors to operate the appointment and drop-in advising systems.	
VP of Finance	October 2022–April 2023
<i>The Women's Network</i>	<i>University of California, Santa Barbara</i>
• Managed finance systematically for the chapter of 30+ members and oversaw budgets on individual projects.	
• Coordinated with campus funding sources and executed fundraisers to maximize financial resources.	
VP of Events	August 2020–February 2022
<i>UCSB Chinese Students and Scholars Association</i>	<i>University of California, Santa Barbara</i>
• Planned and hosted student-recreational activities, including an online streaming show with 4k people engaged during COVID.	
• Regularly created content for the social media platforms with 1k interactions on average.	

TECHNICAL SKILLS

- *Languages:* Python, MATLAB, Fortran, HTML, SCSS, C++
- *Machine Learning Frameworks:* JAX, Pytorch, Tensorflow, Optuna
- *Developer Tools:* GitHub, SSH to supercomputers, PyCharm, Z Shell, Conda, Jupyter, Hugging Face, AWS, Docker
- *General Computer:* LATEX, Graphic design, Figma, Canva

RELATED COURSEWORK

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| • Advanced Experimental Physics | <i>Graduate-level classes:</i> |
| • Observational Astrophysics | • Cosmology |
| • Quantum Mechanics | • Stellar Evolution |
| • Electromagnetism | • Statistics, Data Analysis, and Machine Learning for Physicists |
| • Gravitation and Relativity | |