LINDA ZHENYU JIN

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✉ lindajin@uw.edu ⓞ github.com 👤 portfolio website

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   September 2025
PhD, Physics   *Seattle, WA*

University of California, Santa Barbara   September 2020–December 2023
Bachelor of Science, Physics | Minor, Comparative Literature   *Santa Barbara, CA*
- Major GPA: 3.93/4.00; GPA: 3.90/4.00

EXPERIENCE

AI Research Data Analyst   September 2024–July 2025
Professor Uros Seljak, The Berkeley Center for Cosmology Physics (BCCP)   *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   April 2022–September 2024
Professor Joseph F. Hennawi ENIGMA Group   *Department of Physics, UCSB*
- Developed and implemented a Neural Network Emulator in `JAX` on Lyα 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 Lyα 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 ~ 17M GPU hours.
- Accelerated the computational time for thermal parameter inference by 99.3%.

Worster Physics Research Fellow   July 2023–November 2023
2023 Worster Summer Research Fellowship   *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   March 2023–June 2023
Professor Philip Lubin upper-division lab course   *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) | *College of Letters & Science, UCSB*   December 2023
Worster Summer Research Fellowship | *Department of Physics, UCSB*   July 2023–November 2023
Dean's Honors | *College of Letters & Science, UCSB*   Winter 2021–Spring 2022

Talks

The University of Chicago Cosmology Group Meeting Presentation | *Online*   November 2024
- Presentation: *Neural network emulator to constrain the high-z IGM thermal state from Lyman-α forest flux auto-correlation function* in Prof. Nick Gnedin's group

2023 Worster Summer Research Fellowship Presentation | *Department of Physics, UCSB*   November 2023
- Presentation: *Constraining the High-z Intergalactic Medium Thermal State with Neural Network Emulator for the Lyman-α Forest Flux Auto-correlation Function*

2022 Undergraduate Physics Research Symposium | *KITP, UCSB*   September 2022
- Presentation: *Neural Network Emulator for the Lyα Forest Flux Auto-Correlation Function*, 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
College of Letters & Science Academic Advising   *University of California, Santa Barbara*
- 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
The Women's Network   *University of California, Santa Barbara*
- 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
UCSB Chinese Students and Scholars Association   *University of California, Santa Barbara*
- 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

- Advanced Experimental Physics
- Observational Astrophysics
- Quantum Mechanics
- Electromagnetism
- Gravitation and Relativity

Graduate-level classes:
- Cosmology
- Stellar Evolution
- Statistics, Data Analysis, and Machine Learning for Physicists