LINDA ZHENYU JIN

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📞 805-689-0486   ✉ lindazjin@berkeley.edu   🔗 https://www.linkedin.com   ⊙ github.com/enigma-igm/igm_emulator

EDUCATION

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

EXPERIENCE

GenAI Research Data Analyst   September 2024–Present
Professor Uros Seljak, The Berkeley Center for Cosmology Physics (BCCP)   *Department of Physics, UC Berkeley*
- Improve field-level cosmological inference with generative models (GenAI) by building a map-to-map Convolutional Neural Network for baryonification of dark matter field from weak lensing data.
- Stack 3D simulation boxes from Astrid to generate maps for training.
- Experiment with conditional Diffusion Model variations, Gaussian Processors, and Normalizing Flows.
- Develop Python-based code through National Energy Research Scientific Computing (NERSC) Perlmutter supercomputer.
- Funded by the U.S. Department of Energy project "Surrogating High Dimensional Probability Distributions with Deep Learning for Scientific Inference and Data Analysis".
- 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 high-dimensional data to extract the thermal state information of intergalactic medium (IGM) at redshift $5.4 - 6$.
- Trained emulation error to 0.3% and training time within 1 minutes, which are superior than industrial standards.
- Collaborated with PhD mentor Molly Wolfson to get mock models for training from high resolution `Nyx` hydrodynamics simulation.
- Ran `NumPyro` Hamiltonian Monte Carlo with Bayesian inference for accurate parameter estimations with emulator from Lyα forest flux auto-correlation function data within 10 seconds comparing to hours without the emulator.
- Improved the parameter inference from Nearest-neighbor interpolation model by 30% of precision.
- 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.

Experimental and Digital Electronics Honors Laboratory Assistant   September 2021–June 2022
Professor David Patterson Experimental Physics lab course series   *Department of Physics, UCSB*
- Integrated electronic components and instruments (oscilloscopes, function generator, spectrometer, picoammeter, laser, etc.) to perform specific functions.
- Operated machine control with `Python` and analog & digital sensors.
- Manufactured precision machined parts from machine shop.

Remote Cosmology Research Assistant   June 2018–October 2018
Pioneer Academics High School Research Program   *New York University, NY*
- Conducted independent theoretical study on Alan Guth's inflation theory with collaboration with Dr. Gerceida Jones.
- Authored the paper *Eternal Inflation and its Implications*, nominated for the 2019 Pioneer Academic Journal.

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- forest flux auto-correlation function*

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., Wolfson, M., Hennawi, 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." *submitted for publication, Monthly Notices of the Royal Astronomical Society.* arXiv preprint, https://arxiv.org/abs/2410.06505.

Jin, Z. (January 2023). *Constraining the High-z Intergalactic Medium Thermal State with Neural Network Emulator* [Poster presentation]. Conference for Undergraduate Women in Physics 2o23, 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 with executive board.
- Coordinated with campus funding sources and executed fundraisers to maximize financial resources.

UCSB Chinese Students and Scholars Association August 2020–February 2022
Project Manager *University of California, Santa Barbara*
- Planned and ran student-recreational online streaming activities with 3600+ people engaged.
- Regularly wrote and designed content for the social media accounts with 1000 interactions on average.

Technical Skills

- *Languages:* Python, MATLAB, Fortran
- *Machine Learning Frameworks:* JAX, Pytorch, Tensorflow, Optuna
- *Developer Tools:* Git, SSH Remote Server, PyCharm, Z Shell, Conda, Jupyter
- *General Computer:* LaTeX, Graphic design

Related Coursework

- Advanced Experimental Physics
- Analog Electronics
- Observational Astrophysics
- Thermal and Statistical Physics
- Quantum Mechanics
- Electromagnetism
- Gravitation and Relativity
  Graduate-level classes:
- Cosmology
- Stellar Evolution
- Statistics, Data Analysis, and Machine Learning for Physicists