Linda Zhenyu Jin

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Education

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; High Honors (Top 8.5%), Dean's Honors, 2023 Worster Research Fellowship

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 conditional U-Net (map-to-map Convolutional Neural Network) in `Pytorch` for high-resolution hydrodynamical simulations.
- Configure the kernels and the loss function with physics constraints in both Euclidean and Fourier space.
- Compare generation performance with conditional Diffusion Model variations, Gaussian Processors, and Normalizing Flows and achieve superior field-level performance for total matter map generation compared to previous models.
- Develop 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".

Astrophysics-ML Research Assistant **April 2022–September 2024**

Professor Joseph F. Hennawi, ENIGMA Group *Department of Physics, UCSB*

- Created a first machine-learning (ML) solution to extract thermal information of intergalactic medium at post-Reionization epoch.
- 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.
- Propagated uncertainty to pass credibility test for out-of-distribution data with accelerated inference by 99.3%.
- Achieved same-level parameter constraints while using only 10% of original simulations, saving $\sim$ 17M GPU hours.

Observatory Laboratory Assistant **March 2023–June 2023**

Globular and Open Clusters Comparison Study in Professor Philip Lubin lab *Department of Physics, UCSB*

- Led a team to work with the LCO's SBIG STL-6303 0.4m telescope for data collection and conduct the analysis on Hertzsprung-Russell Diagrams for Clusters M13 and M6.
- Produced and presented a research report that would serve as reference for further deduction about the propertied of galaxies based on their locations on the graph, archived as writing samples for the lab course.

Publication & Talks

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.

Northwestern University Prof. Claude-André Faucher-Giguère's Group Meeting | *Online* **January 2025**
The University of Chicago Prof. Nick Gnedin's Cosmology Group Meeting | *Online* **November 2024**
2023 Worster Summer Research Fellowship Awardee Presentation | *UCSB* **November 2023**
Conference for Undergraduate Women in Physics | *University of California, Merced* **January 2023**
2022 KITP Undergraduate Physics Research Symposium | *Kavli Institute for Theoretical Physics* **September 2022**

Leadership & Extracurricular

VP of Finance | The Women's Network, UCSB **October 2022–June 2023**
Peer Advisor | College of Letters & Science Academic Advising, UCSB **April 2022–June 2023**
VP of Events | UCSB Chinese Students and Scholars Association **August 2020–February 2022**

Skills & Related Coursework

- Machine Learning, JAX, Pytorch, Tensorflow, Optuna, Hugging Face
- GitHub, Supercomputer operation, Python, Jupyter, Fortran
- AWS, Amazon SageMaker, ZenML, Comet ML, Docker
- LaTeX, Presentation, Graphic design, Canva, Figma
- Quantum Mechanics
- Cosmology, Gravitation and Relativity
- Statistics, Data Analysis, and Machine Learning for Physicists