

Linnea M. Wolniewicz

Computer Science Ph.D. Student at the University of Hawai'i at Mānoa and National Science Foundation Fellow

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Education

University of Hawai'i at Mānoa

Honolulu, HI

Ph.D. in Computer Science

August 2024 - May 2027

M.Sc. in Computer Science, GPA 3.95

August 2022 - July 2024

Ph.D. student in Dr. Peter Sadowski's Machine Learning lab. Selected Coursework: Software Quality Assurance, Human-centered AI, Machine Learning, Deep Learning, AI for Dynamic Systems, Random Processes, Complexity Analysis, AI Seminar

University of Colorado Boulder

Boulder, CO

B.A. in Astrophysics and Minor in Music (Harp performance), GPA 3.86

August 2018 - May 2022

Selected Coursework: *Astrophysics*: Classical Mechanics I, II, Electricity and Magnetism I, II, Quantum Mechanics I, Astrophysics I, II *Computer Science*: Algorithms, Principles of Programming Languages, Data Structures, Scientific Programming I, II, III, Computing I

Technical Skills

Programming Languages *Proficient*: Python, C++, bash, \LaTeX . *Working knowledge of*: SQL, Scala, JavaScript, HTML/CSS

Data Science *Proficient*: PyTorch, TensorFlow, HPC, JAX, Pandas, Matplotlib, SLURM. *Working knowledge of*: MATLAB, Mathematica

Employment and Research

University of Hawai'i at Mānoa

Honolulu, HI

Graduate Research Assistant

August 2022 - May 2027, full-time

I research novel **physics-informed machine learning** models that incorporate scientific domain knowledge with Dr. Peter Sadowski. I'm currently exploring autoregressive Fourier Neural Operators and Gaussian processes in **Python** to perform anomaly detection in stellar lightcurves with **PyTorch**. I recently presented my work on accelerating Markov Chain Monte Carlo methods with neural networks as a scheduled talk at SPAICE [1] and as a poster at NeurIPS [3].

Striveworks, Inc

Austin, TX

Data Science Intern

May 2023 - August 2023, full-time

I researched the application of **large language models** to large bodies of text to complete natural language tasks. I employed various strategies such as LoRA finetuning and in-context learning to improve performance.

Laboratory for Atmospheric and Space Physics

Boulder, CO

Undergraduate Research Assistant

August 2020 - July 2022, part-time

I implemented K-means and **convolutional neural networks** in **Python** with **PyTorch** to segment polar coronal holes in images of the Sun [5]. I applied data assimilation methods (3D-Var) to model the fluid dynamics of stellar atmospheres.

Massachusetts's Institute for Technology's Haystack Observatory

Westford, MA

Research Experience for Undergraduates

May 2021 - August 2021, full-time

I created a data pipeline to prepare Antarctic seismic data for machine learning. I applied a Gaussian mixture model and **convolutional neural network** to automatically detect ocean wave events in Antarctica's Ross Ice Shelf.

Institute for Astronomy at the University of Hawai'i at Mānoa

Honolulu, HI

Research Experience for Undergraduates

May 2020 - August 2020, full-time

I analyzed the entire Kepler Space Telescope dataset using **Python** statistical tools such as **Pandas** to evaluate the biases in its selection function [4].

University of Colorado Boulder

Boulder, CO

Physics Learning Assistant

August 2019 - May 2020, part-time

I taught students in an Introductory Experimental Physics and an Introductory Electricity and Magnetism Tutorial course.

Publications

- [1] **Wolniewicz, L. M.**, Sadowski, P., Corti, C., 2024. "Neural Surrogate HMC: Accelerated Hamiltonian Monte Carlo with a Neural Network Surrogate Likelihood" *JGR Machine Learning and Computation*. In Prep. [\[Link\]](#)
- [2] Glaser, Y., Stopa, J. E., **Wolniewicz, L. M.**, Foster, R., Vandemark, D., Mouche, A., Chapron, B., Sadowski, P., 2024. "WV-Net: A foundation model for SAR WV-mode satellite imagery trained using contrastive self-supervised learning on 10 million images" *JGR Machine Learning and Computation*. In Prep. [\[Link\]](#)
- [3] **Wolniewicz, L. M.**, Sadowski, P., Corti, C., 2023. "NeuralHMC: Accelerated Hamiltonian Monte Carlo with a Neural Network Surrogate Likelihood"[Paper presentation]. Machine Learning for the Physical Sciences. Thirty-seventh Conference on *Neural Information Processing Systems*. [\[Link\]](#)
- [4] **Wolniewicz, L. M.**, Berger, T., Huber, D., 2021. "The Stars Kepler Missed: Investigating the Kepler Target Selection Function Using Gaia DR2" *The Astronomical Journal*, Volume 161, Number 5. [\[Link\]](#)
- [5] Tiwari, A. J., Hu, A., Tremblay, B., Smith, B., **Wolniewicz, L. M.**, Penn, M., Kirk, M., Guidoni, S., Samanta, T., 2020. "SEARCH: SEgmentation of polar Coronal Holes"[Paper presentation]. Machine Learning for the Physical Sciences. Thirty-fourth Conference on *Neural Information Processing Systems*. [\[Link\]](#)

Awards and Honors

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| May 2024 | Catalyst Award for Science Advancement (CASA) Grant for Outreach with Graduate Women in Science Hawai'i |
| April 2022 | National Science Foundation Graduate Fellowship |