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

University of Edinburgh *Edinburgh, UK*

Study Abroad August 2021 - December 2021

Coursework: Foundations of Quantum Mechanics, Scottish Studies, Celtic Civilizations

Technical Skills

Programming Languages *Expert:* Python, C++, bash, LaTeX. *Familiar with:* SQL, Scala, JavaScript, HTML/CSS

Data Science *Expert:* PyTorch, TensorFlow, HPC, JAX, Pandas, Matplotlib SLURM. *Familiar with:* MATLAB, Mathematica, Keras

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.

Massachusett’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.

Northern Colorado Harp Workshop *Fort Collins, CO*

Harp Internship July 2019 - August 2019, full-time

I facilitated a summer workshop for harpists, delivering instructional sessions, conducting rehearsals, and orchestrating the operation of the entire program.

Gamers Guild Boulder *Boulder, CO*

Store Manager August 2017 - May 2018, part-time

I addressed the needs of up to 20 customers simultaneously while overseeing the overall operations and responsibilities of the entire store.

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]

Posters and Talks

SPAICE Conference *Oxford, UK*

Scheduled Talk September 2024

Neural Surrogate HMC: Accelerated Hamiltonian Monte Carlo with a Neural Network Surrogate Likelihood [1].

SUDS Conference *Pasadena, CA*

Poster Presentation August 2024

Neural Surrogate HMC: Accelerated Hamiltonian Monte Carlo with a Neural Network Surrogate Likelihood [1].

Information and Computer Science Department Research Showcase *Honolulu, HI*

Poster Presentation May 2024

NeuralHMC: Accelerated Hamiltonian Monte Carlo with a Neural Network Surrogate Likelihood (Masters Project) [3].

37th Conference on Neural Information Processing Systems (NeurIPS) Machine Learning for the Physical Sciences Workshop *New Orleans, LA*

Poster Presentation December 2023

NeuralHMC: Accelerated Hamiltonian Monte Carlo with a Neural Network Surrogate Likelihood [3].

Information and Computer Science Department Research Showcase *Honolulu, HI*

Poster Presentation May 2023

EINN: Evolutionary-Informed Neural Networks.

Machine Learning in Heliophysics *Virtual*

Poster Presentation March 2022

SEARCH: Segmentation of Active Regions and Coronal Holes.

National Conference on Undergraduate Research *Virtual*

Scheduled Talk April 2021

The Stars Kepler Missed: Investigating the Kepler Target Selection Function Using Gaia DR2 [4].

Cambridge Workshops of Cool Stars, Stellar Systems, and the Sun *Virtual*

Poster Presentation March 2021

SEARCH: Segmentation of polAR Coronal Holes [5].

237th American Astronomical Society (AAS) Meeting *Virtual*

Scheduled Talk No. 211.04 January 2021

The Stars Kepler Missed: Investigating the Kepler Target Selection Function Using Gaia DR2 [4].

34th Conference on Neural Information Processing Systems (NeurIPS) Machine Learning for the Physical Sciences Workshop *Virtual*

Poster Presentation December 2020

SEARCH: Segmentation of polAR Coronal Holes [5].

Science Undergraduate Research Experience Symposium *Honolulu, HI*

Poster Presentation July 2020

The Stars Kepler Missed: Investigating the Kepler Target Selection Function Using Gaia DR2 [4].

Awards and Honors

January 2024	Catalyst Award for Science Advancement (CASA) Grant
April 2022	National Science Foundation Graduate Fellowship
February 2022	T9Hacks Hackathon Outstanding Beginner
January 2019	University of Colorado Women in Physics Scholarship
Undergraduate	University of Colorado Boulder Boulder Dean's List
Undergraduate	University of Colorado Boulder Honors Scholarship
June 2018	Winner of the Harp Colorado Workshop Competition
May 2018	International Baccalaureate Diploma, GPA: 4.67

Service and Outreach

Graduate Women in Science Hawai'i (GWISH) *Honolulu, HI*

Vice President — August 2024 - present

Outreach Coordinator — August 2023 - present

I am the Outreach Coordinator and Vice President of GWISH. In January 2024 and again in May 2024, I was awarded a CASA grant to lead the "Exploring Beyond: Inspiring Future Planetary Explorer-Scientists" outreach program. This program is dedicated to engaging high school students across all the Hawaiian islands to foster an interest in science and higher education, particularly among female and underrepresented students.

Information and Computer Science (ICS) Department *Honolulu, HI*

Graduate Student Community Engagement Co-Chair — August 2023 - present

My co-chair and I regularly apply for university funding to organize weekly Coffee Hours for graduate students and faculty to foster community within the Information and Computer Science (ICS) department at UH Mānoa. We also organize and maintain a communal space for graduate students to engage with each other.

Graduate Student Organization (GSO) *Honolulu, HI*

Information and Computer Science (ICS) Representative — August 2022 - August 2024

I was the representative for the ICS Department at UH Mānoa. I held this role within GSO to develop a healthy environment for ICS graduate students, communicate graduate student needs with UH administration, and award funding to ICS graduate students.

Phi Beta Kappa Honors Society *Boulder CO*

Member — May 2020 - present