Christopher Ewasiuk

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Linkedin | Portfolio | Github

SUMMARY

PhD researcher in applied signal processing and physics-based modeling, with expertise in phase-coherent analysis, matched filtering, and robust PSD estimation for large-scale simulation and experimental data. Author of multiple first-author publications in *JHEP* and *Physical Review D*, developing high-performance numerical pipelines that combine statistical inference and machine-learning methods to extract weak signals from noisy, physics-driven systems. Experienced in translating theoretical models into scalable, reproducible simulation and analysis workflows used for large parameter sweeps, sensitivity studies, and data-driven modeling.

SKILLS

- **Programming & Software Engineering:** Python (NumPy, SciPy, pandas, PyTorch), C/C++, Git, Linux/Unix, HDF5, YAML/JSON, LaTeX, algorithms and data structures
- **Machine Learning & Data Science:** Deep learning (CNNs, U-Net), supervised learning, model evaluation (Dice, IoU, ROC), uncertainty quantification, feature engineering, data preprocessing, end-to-end ML pipelines
- **Signal Processing & Applied Statistics:** FFT/rFFT, matched filtering, power spectral density estimation (Welch, robust stacking), time–frequency analysis, noise modeling, statistical inference
- **Numerical & Scientific Computing:** High-performance numerical pipelines, Monte Carlo methods, numerical integration, ODE solvers, parameter sweeps, interpolation/resampling, performance-aware computing

RESEARCH EXPERIENCE

UC Santa Cruz | Santa Cruz, CA **Sept. 2022 – Present**

PhD Researcher — Gravitational Waves & Black Hole Physics

- Designed and implemented numerical simulation pipelines in Python to model black-hole evolution and gravitational-wave signals, supporting parameter scans and sensitivity studies across large model spaces
- Developed and applied statistical frameworks to constrain dark sectors and light bosonic fields using black-hole evaporation and stochastic gravitational-wave backgrounds
- Collaborated with ADMX scientists at Lawrence Berkeley National Laboratory to adapt resonant microwave cavity detectors for MHz–GHz gravitational-wave searches
- Led development of reproducible, phase-coherent signal-processing pipelines (FFT binning, receiver flattening, matched filtering, Welch PSD estimation) for high-resolution microwave cavity data, enabling sensitivity to weak, narrowband gravitational-wave signals
- 4 peer-reviewed papers (2 first-author) in *JHEP* and *Physical Review D* on gravitational waves and black hole physics

PROFESSIONAL EXPERIENCE

Stanford Linear Accelerator | Menlo Park, CA **Dec. 2021 – July 2022**

Accelerator Operator

- Monitor and tune the accelerator systems to maintain and improve the performance of the electron and photon beams they produce
- Diagnose accelerator hardware and control system software problems
- Operating the safety systems that allow access to the accelerator tunnels, including clearing the tunnels of personnel during beam activity

SELECTED PROJECTS

MRI Tumor Segmentation and Severity Classifying Neural Net

Erdős Institute — Data Science Capstone | Columbus, OH **Aug. 2025 – Dec 2025**

- Designed and trained a deep neural network to segment brain tumors from MRI scans and predict tumor grade and severity
- Delivered an end-to-end ML system from raw data to evaluated predictions, selected as top project by an independent industry review panel

EDUCATION

University of California Santa Cruz | PhD, Physics **Sep. 2022 – Present**

- Fourth-year doctoral researcher specializing in gravitational-wave physics, black-hole dynamics, and advanced signal processing
- Coursework and research emphasize theoretical modeling, numerical simulation, and data analysis of complex physical systems

University of California Santa Barbara | BS, Physics **Sep. 2017– Mar. 2021**

- Graduated Magna Cum Laude