Ray Hagimoto

Computational Physics PhD

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PROFILE

Physics PhD with 5+ years of experience in simulation, probabilistic modeling, and **data analysis** using **Python**. Built Monte Carlo pipelines, trained **neural networks** on large synthetic datasets, and applied Bayesian inference techniques to extract model parameters from real-world observations. Experienced with scientific computing, custom **statistical workflows**, and translating **complex data** into actionable insights.

Skills: **Python**, Jupyter, git, UNIX/Linux, Numpy, **Pandas**, LightGBM, SHAP, scikit-learn, machine learning, HDF5, matplotlib, SQL, AWS, statsmodels

EDUCATION

Rice University, *Houston, TX*   Aug 24 2020 - Dec 10 2024
Doctor of Philosophy in Physics, (GPA: 3.90)
∗ Coursework includes probability theory, computational physics (Python, C++), statistical mechanics, quantum field theory.

University of Texas at San Antonio, *San Antonio, TX*   Aug 22 2016 - May 23 2020
Bachelor of Science in Physics, (GPA: 4.00)
∗ Coursework includes linear algebra, multivariable calculus, and advanced physics.

EXPERIENCE

Susquehanna International Group   June 2024 - Aug 2024
Quantitative Researcher PhD Intern, Bala Cynwyd, PA
∗ Developed and deployed short-horizon **predictive models** using tick-level options and equities data, resulting in a 5x PnL performance improvement over the baseline strategy in a simulated trading environment.
∗ Implemented robust rolling train-validation-test pipelines and rigorously **evaluated model performance** by monitoring residuals and validation loss, ensuring model stability and generalization.
∗ Leveraged SHAP values to interpret complex LightGBM boosted tree models, guiding the **engineering of high-impact features** from raw tick data that significantly improved predictive power.
∗ Independently applied and evaluated ARIMA and linear regression models using statsmodels for time-series forecasting, enhancing proficiency in classical econometric techniques relevant to financial data analysis.
∗ Cultivated foundational financial expertise in options trading, including market microstructure, Black-Scholes pricing, and risk-neutral valuation, enabling effective analysis of complex financial products.

Rice University   Aug 2020 - Dec 2024
Graduate Researcher, Houston, TX
∗ Engineered and deployed a robust **Bayesian inference pipeline** in Python, leveraging PyMC to analyze cosmic microwave background (CMB) polarization data, producing the first quantifiable constraints on axion string-wall networks from CMB birefringence data.
∗ Developed and implemented an **end-to-end deep learning workflow using TensorFlow and spherical Convolutional Neural Networks** (CNNs) on a dataset of over 40,000 simulated CMB images, enabling the extraction of previously unidentifiable axion network parameters and demonstrating the power of ML for complex cosmological inference.
∗ Optimized a computationally intensive physics simulation, refactoring key routines with C++ to achieve a 20x reduction in runtime, which significantly accelerated the iterative **development and validation of complex astrophysical models**.
∗ **Communicated complex research findings** through 4 peer-reviewed publications, 1 first author, in top-tier journals and 6 invited presentations at conferences and seminars, effectively translating intricate statistical analyses and simulation results for diverse scientific audiences.

PROJECTS

Real-Time Wildlife Anomaly Detection and Alert System   2025
Independent R&D Project, Remote
∗ Engineered and deployed a scalable, serverless **anomaly detection** pipeline on AWS Lambda and S3 to spot wildlife.
∗ Developed real-time computer vision algorithms to accurately identify the presence of wildlife from live image feeds.

LEADERSHIP & AWARDS

∗ NSF Graduate Research Fellowship Award Honorable Mention (2021)
∗ Rice University Dean's Fellowship (2020-2024)
∗ Vice President, Physics & Astronomy Graduate Student Association, Rice University