Maya Wallach

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EDUCATION

Michigan State University East Lansing, MI
PhD Physics and Computational Mathematics, Science and Engineering (CMSE) 2024 – Present
BS Physics (Honors) 2021 – 2024

EXPERIENCE

Graduate Research Assistant, Michigan State University 2024 – Present

- Develop statistical inference methods to quantify and reduce uncertainty in neutrino experiments
- Built object detection models (RT-DETR, Faster R-CNN) for particle track identification
- Using Particle Flow Network to develop novel reweighting techniques for Monte Carlo simulations

Student Researcher, Fermi National Accelerator Laboratory 2023 – 2024

- Designed deep learning models (Faster R-CNN, DCGAN) for track reconstruction in bubble chambers

IRIS-HEP Undergrad Fellow, Davidson College 2022

- Track classification for the AT-TPC reducing dependance on supervised training data

Undergrad Research Assistant, Los Alamos National Laboratory 2021 – 2022

- Simulated k-L turbulence and Rayleigh-Taylor instabilities

PROJECTS

Portfolio Predictor (Time Series Modeling)

- Built a pipeline for predicting asset returns using historical price data (10y) and technical indicators
- Implemented and benchmarked multiple models (Random Forest, XGBoost, LSTM, etc) to evaluate prediction accuracy and generalization
  - Created parallelized versions of these models using MPI
- Designed a backtesting framework incorporating transaction costs; evaluated strategies using Sharpe ratio and max drawdown to quantify risk-adjusted performance

Warhammer 40k AI (Reinforcement Learning)

- Formulated strategy optimization as a sequential decision problem and trained a Deep Q-Network to learn near-optimal policies in a custom 40k game environment
- Built full pipeline including environment simulation, reward shaping, and data ingestion

KlaudOS (Operating System from Scratch)

- Built a 32-bit operating system from scratch (bootloader, filesystem, interrupts, FPU support)
- Implemented interactive shell and core system libraries in C and x86 assembly

LEADERSHIP

National Society of Black Physicists (NSBP) - Secretary & Founding Member

- Co-founded the MSU chapter, creating a community for underrepresented physicists

Women and Minorities in the Physical Sciences (WaMPS) - Treasurer

- Manage organizational budget, including allocation of funds for events, travel, and programming

SKILLS

Programming: Python, C/C++, Rust, Bash, x86 Assembly, OpenMPI, CUDA
ML: PyTorch, TensorFlow, scikit-learn
Mathematical Methods: Numerical methods for ODEs/PDEs (explicit & implicit schemes, stability analysis), numerical linear algebra (convergence & error analysis)

AWARDS/FELLOWSHIPS

SMART AI Fellowship - 2026

- Competitive summer cohort funded by the MSU College of Natural Sciences to support AI/ML research

University Distinguished Fellowship - 2024

- Merit-based fellowship awarded to 40 of 500+ incoming PhD students; covers first and final years of study plus a $10,000 annual stipend over 5 years

Thomas Osgood Award - 2024

- Awarded to 2–3 graduating physics seniors annually for exceptional academic and research achievement