

Maya Wallach

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EDUCATION

Michigan State University, East Lansing, MI

PhD Physics

July 2024 – Present

Michigan State University, East Lansing, MI

BS Physics (Honors)

Aug 2021 – April 2024

RESEARCH EXPERIENCE

Michigan State University, East Lansing, MI

Graduate Research Assistant

July 2024 – Present

- Creating ML methods for reducing uncertainties in DUNE experiment
- Built RT-DETR and Faster R-CNN for identifying particle interactions in bubble chamber
- Utilizing Particle Flow Network for reweighting Monte Carlo data onto experimental data

Fermi National Accelerator Laboratory, Batavia, IL

Student Researcher

May 2023 – July 2024

- Machine learning for track identification in bubble chambers
- Used Faster R-CNN and DCGAN

IRIS-HEP @ Davidson College, Davidson, NC

Undergraduate Fellow

May 2022 – Aug 2022

- Track classification @ AT-TPC reducing dependence on supervised training data
- Presented at Division of Nuclear Physics Meeting (2022)

Los Alamos National Laboratory, Los Alamos, NM

Undergraduate Research Assistant

Sept 2021 – Sept 2022

- Simulated k - L turbulence and Rayleigh-Taylor instabilities

Facility for Rare Isotope Beams, East Lansing, MI

Undergraduate Research Assistant

Aug 2020 – July 2024

- Predicted unstable particle radii using computational methods

PROJECTS

KlaudOS — Hobby Operating System

- Custom bootloader, filesystem, interrupts, FPU support
- Interactive shell with built-in commands
- Languages: C, x86 Assembly

- [GitHub Repository](#)

40kAI — Reinforcement Learning for Warhammer 40k

- DQN using PyTorch
- Custom Gymnasium environment + GTK GUI
- Web scraping pipeline for unit data
- Languages: Python, C++, C
- [GitHub Repository](#)

Number Station Identification

- CNN built from scratch (NumPy)
- PyQt5 GUI for interaction
- Languages: Python
- [GitHub Repository](#)

KlaudSynth — Lightweight Command-Line Synthesizer

- Real-time audio synthesis supporting sine, sawtooth, triangle, and square waveforms
- Implemented digital filters including low/high-pass, band-pass, notch, shelving, and parametric EQ
- Designed ADSR envelope system for precise amplitude shaping
- Integrated audio effects: chorus, delay, flanger, reverb, and phaser
- Developed accompanying synthesizer PCB schematic for hardware implementation
- Language: C
- [GitHub Repository](#)

Obsidian-kak

- Kakoune plugin for Obsidian integration
- Language: KakouneScript, C, Bash
- [GitHub Repository](#)

Solved CrackMes

- Reverse engineering challenges solved in C
- [GitHub Repository](#)

HONORS & AWARDS

Thomas Osgood Award

Excellence in physics academics and research

April 2024

University Distinguished Fellowship (UDF)

Merit-based annual scholarship of \$10,000 for 5 years

Feb 2024

LEADERSHIP & OUTREACH

Women and Minorities in the Physical Sciences (WaMPS) - Treasurer, Michigan State University

- Manage organizational budget, including allocation of funds for events, travel, and programming
- Coordinate funding requests and reimbursements in accordance with university policies

- Support initiatives that promote inclusion and professional development in physics

National Society of Black Physicists (NSBP) - Secretary, Michigan State University

- Maintain records of meetings, including agendas and minutes
- Coordinate internal communications and assist with event planning
- Contribute to outreach and mentorship efforts supporting underrepresented students in physics
- Founding member of MSU NSBP chapter

SKILLS

Programming: Python, C/C++, Bash, R, JavaScript, HTML/CSS, Rust, x86 Assembly

Frameworks: PyTorch, TensorFlow, scikit-learn, OpenCV

Systems: Linux (Debian, Arch), Windows, Git, LibreOffice, Microsoft Office

Tools: Ghidra, Radare2, IDA Pro, KiCAD