Adam Field

Physics Undergraduate — Computational Astrophysics Researcher
www.adamfield.org

Research Profile

Physics undergraduate specializing in computational astrophysics with expertise in neural network-based galaxy shear estimation and large-scale astronomical data processing. Active contributor to open-source astronomical software and physics education content creation.

Education

Worcester Polytechnic Institute, Worcester, MA *Expected May 2027*
B.S. Physics, Minor in Mathematics — GPA: 3.50/4.0 — Dean's List Spring 2025
Advanced Coursework: Graduate-level Classical Mechanics & Mathematical Methods, Differential Geometry

Research Experience

ShearNet — Neural Network Shear Estimator **June 2025 – Present**
Research Assistant — Northeastern University (Dr. Sayan Saha)

- Developing JAX-accelerated neural network processing 10,000 galaxy observations per minute
- Implementing deconvolution neural network for metacalibration, drastically improving bias estimation

Weak Gravitational Lensing Study **Oct 2024 – May 2025**
Independent Research — Worcester Polytechnic Institute (Prof. Källan Berglund)

- Processed astronomical FITS files using SuperBIT lensing pipeline
- Conducted literature review focusing on *Lensing in the Blue II* methodologies

Computational Thermodynamics & Game Theory **July 2025 – Present**
Quantum Games Research — Worcester Polytechnic Institute (Dr. Jackson Henry)

- Extended research on community formation, implementing zero-sum game simulations
- Working on alternative characterizations of system entropy, new network topologies, and better visualizations of evolution.

Gravitational Lensing Visualization **June 2024 – Jan 2025**
Research Developer — Harvard Black Hole Initiative (Dr. Dominic Chang)

- Developed real-time black hole lensing algorithms using JavaScript, Three.js, and GLSL
- Created iOS app "Black Hole Vision" for public science education

Biophysics Laboratory **Oct 2023 – May 2024**
Lab Assistant — Worcester Polytechnic Institute (Prof. Izabela Stroe)

- Analyzed experimental datasets using Igor Pro, developing automated Python visualization reducing analysis time by 50%

Projects & Applications

Chaotic Double Pendulum Analysis **April 2025**

- Developed numerical simulation and software for tracking real-world pendulum motion from video analysis
- Delivered presentation and poster at Intermediate Physics Lab showcase

Differential Geometry Capstone Lecture **April 2025**

- Delivered comprehensive lecture on curvature computation for surfaces, covering Weingarten maps and principal curvatures
- Presented interdisciplinary applications including brain development analysis, computer graphics optimization, and spacetime curvature in General Relativity

Technical Skills & Contributions

Programming: Python, JAX/Flax, JavaScript, Java — **HPC:** GPU Computing, SLURM, Linux
Analysis: Astronomical FITS processing, Machine Learning, Statistical modeling
Open Source: ShearNet ML codebase (MIT license) — **Memberships:** APS, SPS
Outreach: Physics education videos (on YouTube), technical blogs, interactive simulations
Teaching: Peer Learning Assistant (undergraduate TA)

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