Acamaro Cutcher

acamaro@pdx.edu Portland, OR, USA Acamaro Cutcher Google Scholar

Professional Summary

Multidisciplinary researcher with a triple major background in Mathematics, Physics, and Computer Science. Proven expertise in bridging experimental and theoretical physics, from fabricating thin film devices and conducting reflectance experiments to modeling super-lattice structures using Bloch's theorem and Maxwell's equations. Demonstrated proficiency in abstract algebra, specifically in classifying finite group embeddings and applying Sylow theorems. Currently advancing computational forecasting through hybrid data-driven modeling of monsoon oscillations and adapting Fourier Neural Operators (FourCastNet) for direct wildfire spread prediction.

Education

B.S. in Computer Science, Mathematics & Physics *2022 – 2026*
Portland State University GPA: 3.5/4.0
Academic foundation in Mathematics, Computer Science, and Physics, with specialized research in Minimal Group Embeddings. Leveraged dynamical modeling and deep learning to innovate predictive wildfire forecasting techniques.

Mathematics & Physics *2019 – 2021*
Western Washington University
Introductory Physics and Mathematics classes. Research in Surface Plasmon Polaritons, experimental development of thin film devices and theoretical calculation of electric fields inside finite devices.

Professional Experience

RTG in CADES Fellowship *Summer 2025 - Present*
Portland State University – Department of Mathematics & Statistics
Modified Fourier Neural Operators for Direct Wildfire Spread Prediction: A FourCastNet Adaptation. This research utilizes the FourCastNet architecture for direct wildfire propagation modeling. It integrates critical fire drivers—including fuel moisture, vegetation density (LANDFIRE), and topography—into the model's input channels. By training the system on historical fire perimeters, it learns to predict the fire front's evolution as a discrete state-space variable. This approach leverages FourCastNet's speed, generating subseasonal fire-spread ensembles dramatically faster than traditional physics models.
Skills: Python, C++, Machine Learning, HPC

McNair / CCAR REU *Summer 2024 - Present*
Portland State University – Department of Physics and Astronomy
Hybrid Data-Driven and Dynamical Forecasting of the South Asian Monsoon Intraseasonal Oscillation. This research introduces Ensemble Oscillation Correction (EnOC) to improve predictions of monsoon active/break phases driven by northward-propagating MISOs. Combined physics-based forecasts with data-driven insights for reliable rainfall predictions 3–4 weeks in advance.
Skills: Python/Julia, Machine Learning, Data-Driven Forecasting, Dynamical Models, HPC

Math Honors Thesis / LSAMP Research Scholar *Fall 2023 – Spring 2024*
Portland State University – Department of Mathematics and Statistics
Minimal Group Embeddings. Classified small finite groups and determined minimal embedding degrees using Sylow Theorems. Analyzed prime power subgroups to verify group structures and non-simplicity. Calculated minimum n such that $G \hookrightarrow S_n$, often finding degrees significantly smaller than the group's order.
Skills: Abstract Algebra, Group Theory, Sylow Theorems

Research Assistantship in Theoretical and Experimental Physics *Fall 2023 – Spring 2024*
Western Washington University – Department of Physics and Astronomy
Multiscale Theoretical Modeling of Surface Plasmon Polaritons (SPPs). Investigated SPP dispersion relations by applying Bloch's Theorem to Maxwell's equations. Modeled multilayers as 1D plasmonic crystals to identify band structures and forbidden gaps in metal-insulator-metal devices.
Skills: Maxwell's Equations, Bloch Theorem, Solid State Physics, Mathematica

Research Assistantship in Experimental Physics *Summer 2020*
Western Washington University – Department of Physics and Astronomy
Excitation of "forbidden" guided-wave plasmon polariton modes via direct reflectance using a low refractive index polymer coupling layer. Investigated plasmonic modes in metal-insulator-metal thin film structures using angle-resolved reflectance spectroscopy. Successfully excited and characterized typically inaccessible guided-wave plasmon polariton modes.
Skills: Thin Film Devices, AFM/XRR, Solid State Physics, Surface Plasmon Polaritons

Selected Publications

Marquis CD, McCarley LM, Pollock AL, **Cutcher AS**, Cannella MT, Smith TL, et al. "Excitation of 'forbidden' guided-wave plasmon polariton modes via direct reflectance using a low refractive index polymer coupling layer." *PLOS ONE*, 2022. DOI

Awards & Honors

- **NSF RTG Undergraduate Fellowship** – Portland State University (Summer 2025)
- **Ronald E. McNair Post-Baccalaureate Achievement Scholar** (2024)
- **NSF Undergraduate Research Fellow** – Center for Climate and Aerosol Research, PSU (Summer 2024)
- **Goforth Semiconductor Microelectronics Scholarship** – Portland State University (Summer 2024)
- **Three-Time Mercer Family Foundation Scholar** (2023–2025)
- **PSU EAGLES S-STEM Scholarship** – Portland State University (2025–2026)
- **Jarvis Research Fellow** – Western Washington University (2021)
- **Internal ASCME Research Assistantship** – Western Washington University (Summer 2020)
- **Mickey and Carole Ghio Science Scholarship** – Western Washington University (2020–2021)
- **Multicultural Achievement Program (MAP) Scholarship** – Western Washington University (2020–2021)

Teaching Experience

University Studies Peer Mentor – Portland State University Fall 2024 - Present
Delivered lectures on numerical optimization and machine learning applications.

Math and Physics Tutor 2022 - 2023, 2025
Lead single and group study sessions in Precalculus, Calculus, Linear Algebra, Differential Equations, Group Theory, and Real Analysis. Led weekly recitation sections, graded assignments, and held office hours for 80+ students.

Technical Skills

Programming: Python, C/C++, Java, Bash, HTML/CSS
Frameworks & Tools: NumPy, SciPy, TensorFlow, Matplotlib, Git, Docker, LaTeX, Jupyter, Linux, Mathematica, Deep Learning
Languages: English (Fluent), Spanish (Fluent)

Mathematics: Calculus, Differential Equations, Abstract Algebra, Real & Complex Analysis, Linear Algebra, Number Theory, Discrete Math
Physics: Classical Mechanics, Electromagnetism, Quantum Mechanics, Statistical Mechanics, Thermodynamics, Computational Physics, Thin Film Fabrication (AFM/XRR)
Computer Science: Data Structures & Algorithms, Operating Systems, Cloud Computing, Network Protocols, Software Engineering

Research Interests

Physics Informed Neural Networks • Numerical Methods & Optimization • Data Science • High Performance Computing • Scientific Computing • Experimental Physics