Miles Cochran-Branson

PhD Student · Physics

University of Washington, Seattle, WA

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Education

University of Washington *Seattle, WA*

PhD in Physics *September 2023 - present*

- Courses taken and in progress: Deep Learning, Quantum Field Theory
- Advisor: Quentin Buat

University of Washington *Seattle, WA*

Masters in Physics *September 2023 - June 2023*

- Courses taken: Quantum Mechanics, Electricity and Magnetism, Statistical Physics, Mechanics

Lawrence University *Appleton, WI*

BA in Physics and Mathematics *September 2019 - June 2023*

- Independent research in scientific machine learning and physics-informed neural networks
- Developed physics-informed neural network to solve Einstein's field equations to numerically obtain the Schwarzschild metric
- Advisors: Megan Pickett, Alexander Heaton

Professional Experience

2024-2025	**Pre-doctoral Gratudate Research Associate**, Physics Department, University of Washington
2023-2024	**Graduate Research Assistant**, Physics Department, University of Washington
2023	**Gradutate Teaching Assistant**, Physics Department, University of Washington
2021-2023	**Undergraduate Teaching Assistant**, Physics and Math Departments, Lawrence University
2022	**REU Student**, Physics Department, University of Washington
2021	**REU Student**, Physics Department, University of California, Davis
2020	**Undergraduate Research Fellow**, Physics Department, Lawrence University

Publications

Published

The ATLAS Collaboration (2024). "Differential cross-section measurements of Higgs boson production in the $H \to \tau^+\tau^-$ decay channel in pp collisions at $\sqrt{s} = 13$ TeV with the ATLAS detector". In: arXiv: 2407.16320 [hep-ex].

Awards, Fellowships, & Grants

2024	**Western Advanced Training for Computational High-Energy Physics (WATCHEP) Fellowship**, Department of Energy (DOE)	*$ 65,000 / year*
2023	**Provost Award**, University of Washington	*$ 10,000*
	Physics Department Fellowship, University of Washington	*$ 5,000*
2022	**J. Bruce Brackenridge Prize for exlleence in physics**, Lawrence University	*$ 500*
	Mauruce Cunningham Phi Beta Kappa Prize for highest GPA in junior class, Lawrence University	*$ 100*
2021	**Sir Isaac Newton (SIN) award for creativity in computational physics problem-solving**, Lawrence University	*$ 100*
	Ralph White Prize in Mathematics, Lawrence University	*$ 100*

Presentations

Miles Cochran-Branson, Xiangyang Ju, Yuan-Tang Chou, Haoran Zhao. 2024. GPU-Accelerated Particle Tracking as-a-Service. Presentation: US LHC Useres Association Annual Meeting. SLAC, Menlo Park CA

Miles Cochran-Branson, Xiangyang Ju, Yuan-Tang Chou, Haoran Zhao. 2024. Implementation of `traccc` as-a-service. Presentation: A3D3 All-Hands Meeting and Fast Machine Learning Conference. Purdue University, Lafayette ID.

Miles Cochran-Branson, Quentin Buat, Matt Foresi, Chris Young. 2024. Search for CP violation in the $Z \to \tau\tau$ channel. Presentation: US-ATLAS conference, University of Washington, Seattle WA

Miles Cochran-Branon, Manuel Calderon de La Barca Sanchez. 2021. A Model for the Production of Double Quarkonium in PbPb Collisions at $\sqrt{s_{NN}} = 5.02$ TeV. Poster: APS Division of Nuclear Physics conference.

Teaching Experience

2023 **Electricity and Magnetism**, Teaching Assistant — *University of Washington*

2024 **Waves, Light, and Heat**, Teaching Assistant — *University of Washington*

Research Experience

University of Washington — Department of Physics — *Seattle, WA*
Advisor: Quentin Buat — *Sep. 2023 - Present*
- Search for CP violation in $Z \to \tau\tau$ events with the ATLAS detector
- Measurement of the $H \to \tau\tau$ cross-section in the boosted regime

University of Washington and Berkeley National Lab — *Seattle, WA and Berkeley, CA*
Advisors: Xiangyang Ju and Shih-Chieh Hsu — *Jun. 2024 - Present*
- Tracking as-a-service for the ATLAS detector

Lawrence University - Department of Physics — *Appleton, WI*
Advisors: Alexander Heaton and Megan Pickett — *Sep. 2023 - Feb. 2024*
- Using Scientific Machine Learning to solve Partial Differential Equations

University of Washington — Department of Physics — *Seattle, WA*
Advisor: Quentin Buat — *Jun. 2023 - Sep. 2023*
- Tau lepton energy scale calibration using Mixture Density Networks

University of California, Davis - Department of Physics — *Davis, CA*
Advisor: Manuel Calderon de La Barca Sanchez — *Jun. 2022 - Sep. 2022*
- Estimating production of double quarkonium in PbPb collisions with the CMS detector

Outreach & Professional Development

Service and Outreach

2024 **Exploring the Quantum Universe with Artificial Intelligence**, Undergraduate Symposium Moderator and Mentor

2024 **IMOD outreach with Rainier Prep. Middel School**, Introduced experimental science to 90 fifth grade students through fun interactive activities

Development

Machine Learning for Fundamental Physics School. *Lawrence Berkeley National Lab, Summer 2024*. This workshop focused on tools to deploy machine learning models for a variety of computing needs. Most relevant topics included deployment of models on FPGAs, Differential Programming, Transformers, and Unfolding using machine learning.

Memberships

Phi Beta Kappa (National Honors Society)
Sigma Pi Sigma (Physics Honors Society)
American Physical Society