Emma Castiglia

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Education

Yale University New Haven, CT ***Ph.D. Physics***, May 2022 (expected)

Awards: Leigh Page Award for Excellence in Graduate Student Teaching (2021), D. Allan Bromley Graduate Fellowship (2020), Leigh Page Prize Graduate Fellowship (2016)

University of Chicago Chicago, IL ***B.A. Physics (with Honors), B.A. Math***, June 2016

GPA: 3.62/4.00

Awards: University Scholar, National Merit Scholarship, Dean's List (all years)

Technical Skills

Languages: Python, C++/ROOT, Tensorflow, PyTorch, SQL, LaTeX

Tools: Data Structures (Pandas), Git version control, Distributed Systems, Toolkit for Multi Variate Analysis

Techniques: Machine Learning Algorithms (BDT, BRT, MLP, CNN), Time Series Predictions, Clustering, Dimensionality Reduction

Graduate Courses: Deep Learning Theory Applications (Spring 2018), Unsupervised Learning for Big Data (Fall 2020), ML for Physicists (Summer 2020), Intro to Database Systems (Fall 2018)

Computational Summer Schools: Deep Learning for Science School (LBNL, July 2019), Third Computational and Data Science School for HEP (CodaS) (Princeton, July 2019)

Analytical Experience

Netflix, ML for Systems Los Gatos, CA

Machine Learning Research Intern May 2021 - Aug 2021

- Defined, trained, and optimized PyTorch models for time series predictions of CPU requests on Netflix cluster to allow for predictive autoscaling, decreasing both launch latency times and compute costs
- Created replay simulation to show expected reduction in latency and decrease in CPU overhead
- Queried JSON databases, cleaned and scaled raw data, converted it to pandas dataframes for training
- Presented results in a 30 minute research seminar and 5 minute overview at the intern showcase
- One of 40 interns out of 30,000+ applicants in first official intern class

ATLAS Higgs boson Analyses and Software Contributions New Haven, CT

Doctoral Researcher Oct 2018 - present

- Defined analysis in Python to optimize measurement of Higgs boson decay incorporating kinematic filters and particle identification requirements; trained a neural network for final signal separation
- Developed data engineering components to convert 10TB of particle physics data to pandas dataframes
- Measured lepton false positive rates in 400GB of measured data and validated with Monte Carlo
- Optimizing a Lorentz equivariant neural network to improve tau particle identification; comparing performance to a Deep Sets architecture and current baselines
- Improved tau particle energy measurement in comparison with previously trained weights using a BRT with information from multiple subdetectors working remotely with the Tau Trigger Convener
- Presented results of tau energy calibration studies at the American Physics Society April Meeting (2020) and at the US LHC Users Association Meeting (2019) where I was a Lightning Round Winner

Mu2e Experiment at Fermilab New Haven, CT

Graduate Student Researcher Sep 2017 - Oct 2018

- Created a likelihood function in C++ using ROOT to optimize photon detection via clustering which achieved a signal acceptance of 80% and background rejection of 2300
- Trained and benchmarked performance of MVA algorithms (e.g. MLP and Fisher Discriminant) to efficiently select out signal events in trigger, while meeting strict timing requirements of 3ms per event
- Mentored 3 students by teaching particle physics coding and reviewing presentations for weekly meetings

Selected Leadership Experience

Equity in the Job Search Symposium New Haven, CT
Co-Chair Aug 2018 - July 2021

- Oversaw board of 10 graduate students and postdocs to plan annual day-long symposium to prepare PhD students in both the academic and non-academic job search, with an emphasis on increasing gender equity in STEM careers
- Led fundraising efforts and raised ∼$7000 towards both the 2019 and 2020 symposiums
- Converted the 2020 symposium to be virtual in just 2 weeks and organized keynote for 2021 symposium

Women in Physics+ New Haven, CT
Chair Feb 2018 - June 2021

- Established Allies to Women in Physics group and led discussions on ally-ship, creating more diverse speaker lists for conferences, and intersectionality in physics
- Ran board of 5 graduate students to secure funding, plan monthly events, advocate for diversity initiatives within the department, and mentor undergraduates with our new Family Tree program

Yale Department of Physics New Haven, CT
Graduate Teaching Fellow Sep 2016 - May 2021

- *Lead Teaching Fellow* for 19 TFs (2020) for Instructional Physics Lab for Non-Majors, created all physics introductory material, conceptualized at-home exploration activities to accompany virtual labs
- Directly instructed students by creating and running review sessions for exams; worked one-on-one with students in office hours and in small groups during weekly study halls for Foundations of Physics

Service Experience

Yale Physics Professional Development Organization New Haven, CT
Seminar Organizer Jan 2020 - June 2021

- Coordinated and hosted monthly seminars and panels to prepare graduate students and post-docs for both the academic and non-academic job search
- Planned full year of virtual events including: "Female Alumnae in Academia and Industry", "The Academic Job Search", Coffee Chats with Facebook AI Researcher and Sarah Lawrence Physics Chair

US Large Hadron Collider Users Association and Fermilab UEC High Energy Physics DC Trip
Volunteer Jan 2019 - April 2020

- Met in person with 11 Congressional and Senate offices over 3 days to discuss the importance of funding high energy physics research in March 2019
- Contacted 5 offices virtually in March 2020 to encourage continued particle physics funding

Interests

Volunteer: Girl's Science Investigations (gsi.yale.edu), Yale Physics Olympics (ypo.yale.edu)
Hobbies: Visiting Art Museums, Sketching, Classical Music, Baking, Weight Lifting, Running