Emma Castiglia

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Education

Yale University New Haven, CT — ***Ph.D. Physics***, May 2022

Relevant Courses: Deep Learning Theory Applications, Unsupervised Learning for Big Data, Intro to Database Systems

***Summer Schools*:** Deep Learning for Science School (LBNL, 2019), Third Computational and Data Science School for High Energy Physics (Princeton, 2019)

Awards: Leigh Page Award for Excellence in Graduate Student Teaching, D. Allan Bromley Graduate Fellowship, Leigh Page Prize Graduate Fellowship

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

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

Skills & Interests

Languages: Python, pandas, SQL, Tensorflow, PyTorch, Keras, C++/ROOT, LaTeX
Tools & Packages: Data Structures, Git version control, Distributed Systems, Toolkit for Multi Variate Analysis, Jupyter, NumPy, scikit-learn, Visual Studio, Matplotlib
Techniques: Machine Learning Algorithms (BDT, BRT, MLP, CNN), Time Series Predictions, NLP, Clustering, Dimensionality Reduction, Data Visualization, Statistical Modelling
Service: Seminar Organizer for Yale Physics Professional Development Organization (yppdo.yale.edu), Volunteer at Girl's Science Investigations (gsi.yale.edu) and Yale Physics Olympics (ypo.yale.edu)
Interests: Visiting Art Museums, Running, Classical Music, Sketching, Baking

Research Experience

Meta, Infrastructure Data Science New York, NY

Research Data Scientist — Aug 2022 - present

- Executed a formal study and created methods for monitoring ML model performance in privacy systems
- Prototyped a pipeline applying ML to find privacy commitments in external sources reducing manual hours, compared vendors with formal study, and reviewed legal contracts for technical requirements
- Pioneered creation of a transparent commitments risk score to prioritize actions to reduce risk
- Collaborated with SWEs, DEs, TPMs, and lawyers to establish a data-driven framework for the privacy program with North Star Metrics and OKRs to ensure compliance with user data commitments

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 and compute costs
- Queried JSON databases, cleaned and scaled raw data, resolved missing entries
- Created replay simulation to show expected reduction in wait times and decrease in CPU overhead

ATLAS and Mu2e Experimental Analyses and Software Contributions New Haven, CT

Doctoral Researcher — Sep 2016 - May 2022

- Defined analysis in Python to optimize measurement of rare Higgs boson decay incorporating kinematic filters and particle identification requirements; performed initial statistical fit for model
- Trained neural network to target dominant background and improved measurement sensitivity
- Developed data engineering components to convert 10TB of particle physics data to pandas dataframes
- Explored using a Lorentz equivariant neural network to improve tau particle identification and benchmarked performance with a Deep Sets architecture
- Improved tau particle energy measurement in comparison with previously trained model using a BRT with information from multiple subdetectors working remotely with the Tau Trigger Convener
- 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

Selected Leadership Experience

Equity in the Job Search Symposium New Haven, CT

Co-Chair Aug 2018 - July 2021

- Led board of ten PhD students and postdocs to plan annual symposium to prepare students in both the academic and non-academic job search, with an emphasis on increasing gender equity in STEM careers
- Oversaw 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

- Ran board of five graduate students to secure funding, plan social and diversity focused events, and mentor undergraduates with our Family Tree program
- Established Allies to Women in Physics group and led discussions on ally-ship, creating more diverse speaker lists for conferences, and intersectionality in physics
- Advocated for diversity initiatives within department: improved course requirements and qualifying exam, ensured student input with Department Chair selection and Open House organization, increased representation of women physicists in hallway displays

Selected Research Presentations & Publications

*designates invited talk

Machine Learning for Tau Identification and the Associated Production of the Higgs Boson*, Fermilab Research Seminar 2022

How can Machine Learning Improve our Compute Systems: Predictive Autoscaling on Titus, Netflix Research Intern Presentations 2021

MVA in V(lep)H*, Tau and HLeptons Workshop, Virtual 2021

Energy Calibration in the ATLAS Tau Trigger, American Physical Society April Meeting 2020

Tau Energy Scale at the ATLAS Detector, USLUA Lightning Talk 2019

Lightning Round Winner: engagingly explaining research in 10 minutes to general physics audience; prize covered travel to DC to meet with members of Congress to advocate for particle physics funding