Emil Haines

+447905567584
emil.haines.20@ucl.ac.uk
/emilhaines
/emilhaines
emilhaines.github.io

A PhD student at UCL with over three years experience working for international particle physics experiments. Proficient in software development and data analysis using Python and C++, with experience using modern deep learning techniques and frameworks in multiple research projects. Looking forward to applying cutting edge data science skills acquired in research to a machine learning role within industry and projects with meaningful real life applications.

Experience

ATLAS Experiment, CERN — Apr. 2021 – Present
Postgraduate Researcher — *London, UK/Geneva, CH*

- Worked as a member of a large, diverse international collaboration with over 3000 physicists from 40 countries
- Developed and maintained an analysis framework (`C++` and `Python`), version controlled with `git` and using a CI pipeline, incorporating signal selection algorithms for the study of decays of the Higgs Boson to long-lived particles
- Analysed complex petabyte-scale datasets produced via particle collisions at the Large Hadron Collider, using grid computing facilities, and interpreted results with advanced statistical techniques (hypothesis testing, confidence intervals)
- Transformer-based graph neural networks for jet classification; algorithm development and performance optimisation (`PyTorch`); led implementation of conditioning mechanisms in an open-source GNN framework for high energy physics, improving background jet rejection by up to $6\times$; features adopted by multiple analysers across the collaboration
- Completed a one year attachment at CERN (Oct. 2021 - Sep. 2022); undertook shifts as an on-call expert, ensuring daily operations at ATLAS ran smoothly; regularly presented research to fellow students and academics
- Gained skills in scientific writing (`LaTeX`) through thesis writing and internal document notes
- Worked in an organised and efficient manner to prepare research for publication; contributions due to be published in high impact physics journals

Graphcore — July 2019 – Sep. 2019
Silicon Engineer Intern — *Bristol, UK*

- Selected for 10 week internship in the Silicon Verification team on data analytics; processing and visualising validation test data and producing interactive tools for the dashboard
- Presented outcome to the CEO, CTO and VPs of the company, as well as fellow interns

UCL — Oct. 2020 – May 2021, Jan. 2024 – present
Postgraduate Teaching Assistant — *London, UK*

- Organised problem classes for ∼20 students; communicated complex topics clearly to non-experts in demonstration sessions; marked and provided feedback on coursework
- Courses taught: (3^{rd} year) Practical Machine Learning for Physicists, Nuclear and Particle Physics, (1^{st} year) Practical Physics and Computing

Education

UCL — 2020 – present
PhD Particle Physics — *London, UK*

- STFC funded research project developing state-of-the-art techniques for the detection of new particles as a member of the ATLAS experiment
- Completed postgraduate courses in Machine Learning for Big Data, furthering practical understanding of modern machine learning techniques and database technologies, and Statistical Analysis, gaining knowledge of core concepts in probability and statistics

University of Bristol — 2016 – 2020
MSci Physics — *Bristol, UK*

- Graduated with first class honours, with an overall mark of 77%
- Awarded commendation for master's project entitled 'Deep Learning for event classification at LUX-ZEPLIN'; developed a novel convolutional autoencoder for detecting waveforms in time-series data (`Tensorflow, Keras, scikit-learn`), and demonstrated its efficacy when applied to searches for dark matter candidates
- Achieved high marks in computational and mathematical units; covered topics including linear algebra, calculus, probability and parallel computing