

Nicholas Haubrich

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EDUCATION

Princeton University

PhD., Department of Physics

Princeton, NJ

Sep 2017-May 2024

Thesis - *Cross-section Measurements of $VH \rightarrow b\bar{b}$ at 13 TeV with CMS*

Experimental Project - *Estimating the Sensitivity of a Search for Exotic Decays of the Higgs Boson to Four Bottom Quarks*

Honors - Physics Department Teaching Award 2018

Courses - Fundamentals of Machine Learning, Biophysics, Quantum Field Theory, General Relativity

Northeastern University

Bachelors in Physics & Math

Boston, MA

2013-2017

Honors - Summa cum Laude, Presidential Global Scholar, Lawrence Award for Scholastic Excellence

EXPERIENCE

Princeton University

Graduate Researcher

Princeton, NJ

Sep 2017-Present

- Studied decays of Higgs boson for CMS collaboration at CERN's Large Hadron Collider
- Developed pipelines to analyze terabytes of data on distributed HPC grid
- Trained machine learning algorithms to identify Higgs boson signals
- Designed statistical model to incorporate uncertainty into signal measurement
- Lead group on improving detector capability with convolutional and graph neural networks

Northeastern University Plasma Lab

Research Assistant

Boston, MA

Sep 2016-Jun 2017

- Created optical devices to collimate and collect light from plasma sources
- Characterized plasma spectral lines with high-resolution spectrometry

CERN

Research Assistant

Geneva, Switzerland

Jan 2016-Jun 2016

- Developed C++ software to visualize real-time data acquisition
- Redesigned muon detector geometry for use in irradiation aging studies. Ref. Emanuela Barberis et al. "Longevity studies of CSC prototypes operating with Ar+CO₂ gas mixture and different fractions of CF₄". In: *Eur. Phys. J. Plus* 139.2 (2024), p. 166. DOI: 10.1140/epjp/s13360-023-04679-7. arXiv: 2402.04181 [physics.ins-det]

Parker Hannifin - Chomerics

Radar & Materials Science Co-op

Woburn, MA

Jan 2015-Jul 2015

- Designed tests for measuring radar-absorbing properties using a network analyzer
- Synthesized metal powders with electroless-plating chemistry and evaluated their properties

Case Western Reserve University

Undergrad Researcher

Cleveland, OH

Jun 2014-Aug 2014

- Wrote a finite-element analysis software in MATLAB to model MRI magnetic field

SKILLS

Programming - Python, C++, Git, Tensorflow, Pandas, Keras, XGBoost, Docker, Linux, PyTorch

Machine Learning - CNNs, GNNs, Boosted Decision Trees, Autoencoders, Kernel Density Estimation

Statistics - Frequentist Hypothesis Testing, Jackknife & Bootstrap Resampling, Bayesian Inference

HOBBIES

- Chess and other games, running, baking, hosting trivia quizzes, tinkering with Raspberry Pi