BRIAN POLLACK, Ph.D.

Data Scientist/Software Engineer

(610) 248 3868

pollackscience.com

brianleepollack@gmail.com

/in/brianleepollack

broverCleveland

Education

Ph.D., Physics
Experimental Particle Physics
Northwestern University
2009 - 2015 | Evanston, IL

B.S., Physics (College Honors)
Add'l. Maj., Philosophy
Carnegie Mellon University
2005 - 2009 | Pittsburgh, PA

Technical Skills

Data Wrangling
Visualization
Statistics
Predictive Modeling
Machine Learning

Expert

python

Proficient

C++ BASH LaTeX

Competent

HTML MATLAB WOLFRAM MATHEMATICA

Experience

May 2015 - Present — **Postdoctoral Research Fellow** — Northwestern University, Fermilab
Mu2e Experiment: ~300 person, ~$300MM Physics Experiment

- Development of semi-analytic magnetic field model for high-precision particle physics experiment. Demanding requirements in noisy, semi-unknown environment lead to entirely new methods of multidimensional modeling in non-Cartesian coordinate systems.
- Identification and calculation of unexpected ultra-rare ($1{:}10^{-20}$) statistical events that could contaminate experiment. Determined associated changes needed for software and hardware.
  Tools: *Python, pandas, scipy, numba, CUDA, MATLAB, Mathematica*
- Software engineering and refactoring for main Mu2e source code, including integration of magnetic field work.
  Tools: *C++, BOOST, gdb, Jenkins, Scons*
- Analysis, application, and modification of histogramming technique (Bayesian Blocks) used in astrophysics. Demonstrated improvements in modeling and visualization during exploratory data analysis. *Submitted for publication, Computer Physics Communications.*
- Conducted dozens of presentations at group and collaboration meetings. Worked individually and in groups of 2-20 people.

May 2009 - May 2015 — **Ph.D. Candidate, Research Assistant** — Northwestern University, CERN
Thesis: *The Search for the Higgs Boson and New Resonances Decaying to a Z Boson and a Photon*
Awarded GAANN Fellowship, 2011-2012 Academic Year
CMS Experiment: 4000 person, part of $10BN Large Hadron Collider

- Lead researcher for the Higgs to Z+photon decay search, applying novel methods of rate estimation in noisy environments that have unknown or unreliable theoretical predictions. Use of nonlinear functions and machine learning methods to model and classify data, improve sensitivity and experimental predictions.
- Renovated and maintained Northwestern data storage C++ classes and framework for use with any CMS analysis, improving class inheritance to mimic physical similarities for subatomic particles.
  Tools: *C++, Python, ROOT, gdb, valgrind*

Projects

Scikit-HEP — Open-source Python software package, bringing cutting-edge data analysis tools to particle physicists. Contributed the visualization and density estimation modules. Included unit tests, automatic documentation, coverage, and support for multiple Python versions.
`http://scikit-hep.org/index.html`
Tools: *Python, numpy, scipy, matplotlib, tox, pytest, Travis CI, sphinx*

Integrated Data Science — Part of interdisciplinary team at Northwestern (High Energy Physics, Astronomy, Geophysics). Goal was to create a 2-week course to teach Python-based data analysis to incoming graduate students. Those who completed the course earned a data analysis certificate.
Tools: *Python, numpy, Jupyter Notebook*

Selected Publications

- B. Pollack *et al.*, "Bayesian Blocks in High Energy Physics" Submitted, Computer Physics Communications [arXiv:1708.00810 [hep-ex]].
- S. Feher *et al.*, "Mu2e Solenoid Field Mapping System Design," IEEE Transactions on Applied Superconductivity, vol. 28, no. 3, pp. 1-5, April 2018
- S. Chatrchyan *et al.* [CMS Collaboration], "Search for high-mass Z-gamma resonances in e+e-gamma and mu+mu-gamma final states in proton-proton collisions at sqrt(s)=8 and 13 TeV," J. High Ener. Phys. (2017) 2017: 76 [arXiv:1610.02960].