

Lucas Flores, Ph.D.

📍 **California, United States** (Open to relocation)

☎ +1 (951) 545-3382 ✉ lucasf@sas.upenn.edu 🌐 lucasflores.com 🌐 github.com/lucasflores 🌐 [Google Scholar](https://scholar.google.com/citations?user=...)

6+ years in Data Science/ML, focused on analyzing petabytes of data from the biggest particle physics collider in the world using Python/C++ and big data tools.

EXPERIENCE

Research Assistant/Physicist, University of Pennsylvania, Philadelphia, PA JUL 2015 – DEC 2021

- Investigated petabytes of proton-proton collision data produced by the Large Hadron Collider in search of theorized subatomic particles, furthering the knowledge of fundamental physics
 - Researched, constructed, optimized and implemented two new features used to form control, validation, and signal regions for robust statistical hypothesis tests
 - Processed big data sets utilizing the LHC Computing Grid (AWS analogue), a powerful distributed computing resource, and distributed computing software HTCondor (TORQUE/SLURM analogue), RUCIO (Hadoop analogue), and PanDA (Airflow analogue)
 - Set exclusion limits at a 95% confidence level over a large parameter space scan for the existence of new fundamental particles via a profile likelihood ratio fit
 - Computed experimental acceptance rates for 42 independent particle decay channels over a large parameter scan and compiled values into striking visualizations
 - Presented technical methods and results to the physics community at two international conferences
- Performed model tuning, software development and new user onboarding/mentorship in an expert level role in a major performance division within the collaboration
 - Maintained, developed and documented the Python/C++ based electron classification analysis framework
 - Instructed, mentored and guided four new technical users and developers of the framework
 - Re-optimized 108 independent multivariate likelihood models designed to identify/classify electrons, AKA "the electron likelihood (LH)." This is integrated in nearly every analysis in the 5000+ member collaboration
 - * Trained models on a 20% larger, most current, and most representative data set
 - * Tuned 324 selection parameters (3 per model), achieving targeted precision/recall benchmarks
 - * Transitioned training models from a 25% simulated 75% real data hybrid to 100% real data
 - Investigated a new metric for tuning the *electron LH* to retain desired signal and background rates for different particle detector environments
 - Re-tuned *electron LH* parameter that created a gain in signal rate in 50% busier detector environments

SELECTED PROJECTS

PermaLost — github.com/lucasflores/PermaLost 🌐 JUL 2022 - PRESENT

- Engineered predictive permafrost loss tool in application to vulnerable "soft" artifact decay in Greenland using Python, (geo)pandas (GIS), scikit-learn, and matplotlib

cryptoino — lucasflores.com/cryptoino/ 🌐 JAN 2017

- In identifying need for secure IoT devices, Implemented Tree Parity Machine neural nets into a lightweight symmetric key exchange protocol between two Arduinos in Python/C#

eyeHUD — lucasflores.com/eyeHUD/ 🌐 SEP 2016

- Built an eye-tracking transparent window 'smart heads-up display' out of a deconstructed monitor, two webcams and Python/OpenCV → won 3rd place over-all

EDUCATION

AUG 2015 – DEC 2021 **PhD & MS** – Particle Physics University of Pennsylvania, Philadelphia, PA

SEP 2010 – JUN 2015 **BS** – Physics & Applied Mathematics UC Riverside, Riverside, CA

SKILLS

LANGUAGES: Python, C++, Mathematica, BASH, SQL, HTML, CSS, YAML, JavaScript

SOFTWARE/TOOLS: UNIX, Git, CI, matplotlib, scikit-learn, pandas, Keras, TensorFlow, Docker, HTCondor, NumPy

OTHER SKILLS: Hypothesis testing, statistics, machine learning, regression analysis, data visualization, JIRA, Jupyter, web design, web scraping

HONORS & AWARDS

MARC U STAR Scholar Fellowship, The University of California, Riverside [Honor] SEP 2014-JUN 2015

- Two year full tuition and research stipend fellowship

Robert T. Poe Memorial Scholarship Award for Outstanding Bachelor of Science Graduate, The University of California, Riverside [Award] JUN 2015