

Lucas Flores

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EXPERIENCE

JULY 2015 – SEPT. 2021

University of Pennsylvania

Research Assistant

- Searched for theorized subatomic particles, furthering knowledge of the particle composition of the universe, by investigating petabytes (quadrillions of instances) of real and simulated data from proton-proton collisions at the Large Hadron Collider (LHC) with the ATLAS collaboration located in Geneva, Switzerland.
- Developed C++/Python framework with ROOT libraries to clean, analyze, transform, and visualize data, engineering new features and using them to optimize selections.
- Developed framework for preservation and re-casting (analysis reinterpretation using other theoretical physics models) of a physics analysis using CI, Docker images and workflows.
- Served as a software expert for the electron-photon performance group. Re-optimizing a multivariate likelihood based electron identification algorithm used in nearly all analyses on ATLAS. Also supported shared software used to process petabytes of upstream datasets (C++ & Python).

AUG. 2015 – MAY 2016

University of Pennsylvania

Teaching Assistant

- Taught introductory labs in both classical mechanics and electromagnetism.
- Laid out the purpose of each lab, guiding students to complete each lab with a good understanding of the experimental techniques and how the lab connected to the lecture component.

SKILLS

LANGUAGES	(Proficient) C/C++, Python, Bash (Good) HTML, CSS (Basic) Java, JavaScript, Mathematics
SOFTWARE	(Proficient) Linux/Unix, git, CI, ROOT, \LaTeX (Good) numpy, scipy, Docker
OTHER	Hypothesis testing, statistics, machine learning, regression analysis, scraping, web design, Arduino microcontrollers

EDUCATION

- AUG. 2015 – SEPT. 2021 **PhD** – Physics
The University of Pennsylvania, Philadelphia, PA
- AUG. 2015 – JUNE 2017 **MS** – Physics
The University of Pennsylvania, Philadelphia, PA
- SEPT. 2010 – JUNE 2015 **BS** – Physics & Applied Math.
The University of California, Riverside, CA

PROJECTS

- 2018 **keypacitance** – PennApps XVII Hackathon
Adds capacitive touch layer input to keyboard. Built VR keyboard object in Unity in demonstrated application.
link – devpost.com/software/keypacitance
- 2017 **cryptoino** – PennApps XV Hackathon
Lightweight symmetric key exchange via Tree Parity Machine neural nets. Targeted small insecure Internet of Things devices. Semi-final qualifier.
Blog post – lucasflores.com/blogfolio/cryptoino/
- 2016 **eyeHUD** – PennApps XIV Hackathon
Smart eye-tracking transparent window 'heads-up' display. Third place overall and Best Public Safety or Video Processing App (presented by Axon).
Blog post – lucasflores.com/blogfolio/eyeHUD/

PAPERS & TALKS

- 2021 **Search for trilepton resonances from chargino and neutralino pair production in $\sqrt{s} = 13$ TeV pp collisions with the ATLAS detector**
→ Optimized background estimation in profile Likelihood ratio fit used in analysis of 13.9 quadrillion (million billion) proton-proton collisions (instances). Developed analysis preservation framework setting up re-usability of analysis on alternative signal hypotheses.
Paper link – doi.org/10.1103/PhysRevD.103.112003
- 2019 **Electron reconstruction and identification in the ATLAS experiment using the 2015 and 2016 LHC proton-proton collision data at $\sqrt{s} = 13$ TeV**
→ Developed, maintained, and optimized a data-driven Likelihood based electron identification algorithm.
Paper link – doi.org/10.1140/epjc/s10052-019-7140-6