

Lucas Flores

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SKILLS

LANGUAGES	(Proficient) C/C++, Python, Bash (Good) HTML, CSS (Basic) Java, JavaScript, Mathe- matica
SOFTWARE	(Proficient) Linux/Unix, git, CI, ROOT, \LaTeX (Good) Docker, pandas, numpy, scipy
OTHER	Hypothesis testing, statistics, re- gression analysis, scraping, web design, Arduino microcontrollers

EXPERIENCE

JULY 2015 – SEPT. 2021

University of Pennsylvania

Research Assistant

- Investigated petabytes of proton-proton collision data (quadrillions of instances) at the [Large Hadron Collider \(LHC\)](#) with the [ATLAS collaboration](#) in a search for theorized subatomic particles, furthering our knowledge of the particle composition of the universe.
- Developed C++/Python framework with ROOT libraries to clean, analyze, transform, and visualize data, engineering new features and using them to optimize selections.
- Developed a framework for the preservation and re-usability (analysis reinterpretation using other theoretical physics models) of a physics analysis using git, Continuous Integration, 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 upstream datasets (C++ & Python).

AUG. 2015 – MAY 2016

University of Pennsylvania

Teaching Assistant

- Lead lab sections in both classical mechanics and electromagnetism.
- Laid out the purpose of each lab. Guided students to complete each lab with a good understanding of the experimental techniques and physics principles as well as how the lab connected to the lecture component.
- Graded bi-weekly homework assignments for physics lecture component of 40+ undergraduate students.

EDUCATION

AUG. 2015 – SEPT. 2021	PhD – Physics <i>University of Pennsylvania, Philadelphia, PA</i>
AUG. 2015 – JUNE 2017	MS – Physics <i>University of Pennsylvania, Philadelphia, PA</i>
SEPT. 2010 – JUNE 2015	BS – Physics & Applied Math. <i>University of California, Riverside, Riverside, CA</i>

SELECTED PUBLICATIONS

- 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 million billion proton-proton collisions (instances). Model-independent limits are set at a 95% confidence level for a wide range of masses for particles beyond the standard model that have a three lepton final state.
[\[doi.org/10.1103/PhysRevD.103.112003\]](https://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.
[\[doi.org/10.1140/epjc/s10052-019-7140-6\]](https://doi.org/10.1140/epjc/s10052-019-7140-6)

PROJECTS

- 2018 **keypacitance – PennApps XVII Hackathon**
Adds capacitive touch layer input to keyboard. Built VR keyboard object in Unity in demonstrated application.
blog post: lucasflores.com/blogfolio/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/