Lucas Corcodilos

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Education

Ph.D. Particle Physics — *Baltimore, MD*
Johns Hopkins University — *Sept. 2016 - Dec. 2021*
B.S. Physics, Minor Mathematics — *New Brunswick, NJ*
Rutgers University — *Sept. 2012 - May 2016*

Research Experience

CMS Analysis Lead
CMS Collaboration (CERN) — *Sep. 2016 - Dec. 2021*

- Responsible for solving research problems independently, presenting solutions to stakeholders, and turning feedback into improvements.
- Wrote and maintained python-based analysis workflow and accompanying documentation and paper.
- Developed a novel modeling technique to leverage in-situ data measurements that increased the world-best sensitivity to detect specific particle decays by almost 10x (arXiv:2104.12853).
- Produced reports on object identification performance that informed software decisions by the CMS Collaboration.

Statistics Contact
CMS Collaboration (CERN) — *Sep. 2019 - Nov. 2021*

- Advised teams on domain specific statistics software, often helping to refine and test likelihood based models.
- Responsible for reviewing statistical models for a dozen analyses/year with authority to approve projects for the next stage of review.

Projects

2D Alphabet

- Novel technique to construct a binned likelihood from 2D parametric distributions that are constrained by simulations.
- Launched Python framework with exposed API that is now being used by other collaborators to build, fit, and test 2D Alphabet models for other analyses.

TIMBER

- Python library to make fast data manipulation technologies more accessible to existing analysis workflows.
- Builds a directed acyclic graph from successive data manipulations so internal methods can leverage data provenance.
- Interface makes analysis development quicker while plug-and-play C++ modules reduce computation time by up to 20x.

Better ROOT Browser

- Interactive web application built with Plotly/Dash to improve the EDA experience with ROOT data formats.

Job App Manager

- Django-based website to track and manage job applications, interviews, and other application information.

Communication

Research

- Experience giving both weekly technical presentations to groups of 10-20 and general talks to groups of 100s at conferences and large workshops.
- Lead two CMS Data Analysis School exercises where I helped students re-create an analysis from scratch using TIMBER.

Teaching and Outreach

- Taught physics to Johns Hopkins freshmen aspiring to major in the subject with a focus on intuitive thinking.
- Served as revision-based writing tutor at the Rutgers Plangere Writing Center.
- Designed and ran a virtual reality exhibit for the public as a part of the JHU physics outreach program.

Technologies and Skills

Languages + Tools Python, Git, Linux, C++, GitHub Actions, Doxygen, HTML, CSS, ROOT, LaTeX, Jekyll
Packages Pandas, Plotly/Dash, Django, scikit-learn, Keras, Pytest
Techniques Statistical/ML modeling, multi-processing, batch server computing, user support