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Columnar Analysis for Lepton Colliders using Coffea

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Structured columnar data formats have seen significant adoption in LHC analyses, with more than half of modern CMS analyses using “NanoAOD” and its specialized variations. With this lightweight, 2kb/event, data format analysis groups are able to perform primary physics analysis, scale factor derivation, machine learning training and inference with and without expert features, and low level simulation and reconstruction-level detector studies. Much of the high level functionality expected of object-oriented event loop frameworks is made available through pythonic columnar data processing packages like uproot, awkward-array, and coffea. The lepton collider community, including the US Muon Collider concept, has a columnar data format in the EDM4HEP package. We will discuss the addition of EDM4HEP to the ‘nanoevents’ data manipulation package within coffea so that more LHC physicists can easily dive into lepton collider data, so that it can serve as a bridge to better analysis data products, and go through some examples of analysis using this software stack.

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