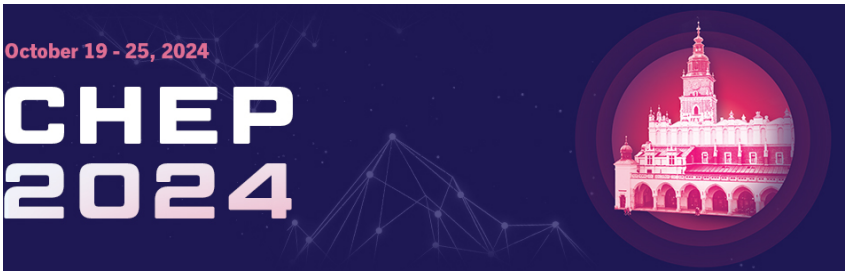

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A Geometry Agnostic Heterogenous Framework for Track Reconstruction for HEP Experiments

Monday 21 October 2024 15:57 (18 minutes)

The future development projects for the Large Hadron Collider towards HL-LHC will constantly bring nominal luminosity increase, with the ultimate goal of reaching, e.g., a peak luminosity of $5 \cdot 10^{34} cm^{-2} s^{-1}$ for ATLAS and CMS experiments. This rise in luminosity will directly result in an increased number of simultaneous proton collisions (pileup), up to 200, that will pose new challenges for track reconstruction in such a dense environment.

In response to these challenges, many experiments have started rewriting an increasing fraction of their track reconstruction software to run on heterogeneous architectures. While very successful in some cases, most of the time these efforts have stayed confined to single experiment projects.

In this work we will show the potentiality of a unique standalone software, running on multiple backends (CPUs, NVIDIA GPUs and AMD GPUs) aiming at the reconstruction of the tracker detector of multiple HEP experiments with a cylindrical geometry. We will discuss both the physics and computational performance for different detectors.

This represents the first step towards a unique standalone tool capable of carrying out the reconstruction of a model detector for HL-LHC leveraging on heterogeneous resources. A detector defined solely by its constituent elements: a silicon tracker, at least one calorimeter and a muon detector.

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