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Particle Flow Reconstruction on Heterogeneous Architecture for CMS

Tuesday, 25 October 2022 11:00 (30 minutes)

The Particle Flow (PF) algorithm, used for a majority of CMS data analyses for event reconstruction, provides a comprehensive list of final-state state particle candidates and enables efficient identification and mitigation methods for simultaneous proton-proton collisions (pileup). The higher instantaneous luminosity expected during the upcoming LHC Run 3 will impose challenges for CMS event reconstruction. This will be amplified in the HL-LHC era, where luminosity and pileup rates are expected to be significantly higher. One of the approaches CMS is investigating to cope with this challenge is to adopt the heterogeneous computing architectures and accelerate event reconstruction. In this talk, we will discuss the effort to adopt the PF reconstruction to take advantage of GPU accelerators.

We will discuss the design and implementation of PF clustering for the CMS Electromagnetic and Hadronic Calorimeters using Cuda, including optimizations of the PF algorithm. The physics validation and performance of the GPU-accelerated algorithms will be demonstrated by comparing these to the CPU-based implementation.

Significance

References

Experiment context, if any

CMS Collaboration

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Session Classification: Poster session with coffee break

Track Classification: Track 2: Data Analysis - Algorithms and Tools