Contribution ID: **17** Type: **Plenary**

Parallelizable Track Pattern Recognition in High-Luminosity LHC

Monday 20 April 2020 21:05 (25 minutes)

The high instantaneous luminosity conditions in the High Luminosity Large Hadron Collider (HL-LHC) pose major computational challenges for the collider experiments. One of the most computationally challenging components is the reconstruction of charged-particle tracks. In order to efficiently operate under these conditions, it is crucial that we explore new and faster methods or implementations of charged-particle track reconstruction than what is being used today. Kalman-filter-based methods of the track pattern recognition that are currently used in the LHC experiments are inherently sequential and iterative and therefore cannot easily be accelerated through parallelization or vectorization by modern processors, such as graphics processing units (GPUs) or multicore processors. There have been attempts with great effort in vectorizing Kalman-filter-based methods of the track pattern recognition on modern processors with success. In this work, we instead start with a segment-linking-based algorithm that can be naturally parallelized and vectorized and is expected to run efficiently on modern processors. We established a preliminary segment-linking-based track pattern recognition for the CMS experiment using the Phase-II outer tracker and our findings and implications are presented here. This work is building on experience gained from a prototype of a similar approach studied in a different tracker layout geometry based on ideal detector simulation previously presented at CHEP2016.

Consider for young scientist forum (Student or postdoc speaker)

Yes

Second most appropriate track (if necessary)

Architectures and techniques for real-time tracking and fast track reconstruction

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Session Classification: Recording sessions