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Use of GPUs at the CMS High-Level Trigger during Phase-1

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Starting from 2017, during CMS Phase-I, the increased accelerator luminosity with the consequently increased number of simultaneous proton-proton collisions (pile-up) will pose significant new challenges for the CMS experiment.

The primary goal of the HLT is to apply a specific set of physics selection algorithms and to accept the events with the most interesting physics content. To cope with the incoming event rate, the online reconstruction of a single event for the HLT has to be done within 220ms on average.

The increasing complexity of events will make track reconstruction especially challenging. For this reason, reconstruction of Pixel Tracks is not executed for every event or is executed in ROIs.

The quest of retaining those events which are potentially interesting for searches of new physics phenomena, led to the evaluation of GPUs for the enhancement of the existing computing infrastructure used at High-Level Trigger (HLT).

We will show the results of the effort in reducing the effect of pile-up in CMS Tracking by redesigning the seeding with novel algorithms which are intrinsically parallel and executing these new algorithms on massively parallel architectures.

We will also show how Pixel Tracks can be evaluated globally for every event on GPUs.

Author: PANTALEO, Felice (CERN)

Presenter: PANTALEO, Felice (CERN)

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