Contribution ID: **42** Type: **Lightning Talk**

Harnessing charged particle tracks in the Phase-2 CMS Level-1 Trigger with ultrafast Machine Learning

Monday 25 September 2023 17:20 (5 minutes)

The Large Hadron Collider will be upgraded to the High Luminosity LHC, delivering many more simultaneous proton-proton collisions, extending the sensitivity to rare processes. The CMS detector will be upgraded with new, highly granular, detectors in order to maintain performance in the busy environment with many overlapping collisions (pileup). For the first time, tracks from charged particles with a transverse momentum above 2 GeV will be reconstructed in the Level-1 Trigger, the first tier of data processing that accepts no more than 2.5% of collision events for further analysis. Charged particle tracks are crucial in separating signal processes from backgrounds, and in suppressing particles originating from the many pileup collisions. We present developments of Machine Learning algorithms in the reconstruction and usage of the tracks, including the removal of fake tracks, identification of the common vertex (point of origin) of the signal process, and in linking tracks to calorimeter deposits to effectively identify electrons down to low momentum. In all cases, we target a high signal efficiency and background rejection, as well as ultrafast and lightweight deployment in FPGAs.

Primary authors: BROWN, Christopher Edward (Imperial College (GB)); SUMMERS, Sioni Paris (CERN)

Presenter: BROWN, Christopher Edward (Imperial College (GB))

Session Classification: Contributed Talks

Track Classification: Contributed Talks