

Design and performance of the upgrade of the CMS L1 trigger

Thursday, July 5, 2018 4:54 PM (12 minutes)

During its second run of operation, the LHC delivered proton-proton collisions at a centre-of-mass energy of 13 TeV with a peak instantaneous luminosity larger than $2 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$, more than double the peak luminosity reached during Run1 and far larger than the design value. The upgraded CMS Level-1 trigger is designed to improve the performance at high luminosity and large number of simultaneous inelastic collisions per crossing (pile-up). During the technical stop at the beginning of 2016, all the electronic boards of the CMS Level-1 trigger have been replaced and the upgraded electronics tested, and commissioned with data. Smarter, more sophisticated, and innovative algorithms are now the core of the first decision layer of CMS: the upgraded trigger system implements pattern recognition and MVA (Boosted Decision Tree) regression techniques in the trigger boards for p_T assignment, pile-up subtraction, and isolation requirements for electrons and taus. In addition, the new global trigger is capable of evaluating complex selection algorithms such as those involving the invariant mass of trigger objects. The upgrade reduces the trigger rate and improves the trigger efficiency for a wide variety of physics signals. In this presentation the upgraded CMS Level-1 trigger design and its performance are described.

Primary author: DAVIGNON, Olivier (University of Bristol (GB))

Presenter: DAVIGNON, Olivier (University of Bristol (GB))

Session Classification: Detector: R&D for Present and Future Facilities

Track Classification: Detector: R&D for Present and Future Facilities