

Level-1 track trigger for CMS in HL-LHC

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The High Luminosity LHC (HL-LHC) is expected to deliver luminosities of $5 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$, with an average number of overlapping proton-proton collisions per bunch crossing of up to 200. However, a higher number of particle interactions per bunch crossing presents huge challenge to the experiments, as their trigger systems are not designed to accommodate the anticipated rates. For luminosity levels expected after the HL-LHC upgrade of the accelerator, the solution to the problem is to use silicon tracker data at a very early stage of triggering. A key component of the CMS upgrade for HL-LHC is a track trigger system which would identify tracks with transverse momentum above 2 GeV/c already at the first-level trigger. However, due to high bunch-crossing rates, as well as the size and high occupancy of the detectors, there is an enormous challenge in implementing a track trigger. Three different proposals for implementing Level-1 tracking at CMS are presented. The proposed architectures are discussed along with the status of current hardware prototypes and anticipated performance from simulation. Plans for the future development are also outlined.

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