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Level 1 muon triggers algorithms for the CMS upgrade at the HL-LHC

In view of the HL-LHC, the Phase-2 CMS upgrade will replace the entire trigger and data acquisition system. The detector readout electronics will be upgraded to allow a maximum L1A rate of 750 kHz, and a latency of 12.5 μs. The upgraded system will be entirely running on commercial FPGA processors and should greatly extend the capabilities of the current system, being able to maintain trigger thresholds despite the harsh environment as well as trigger on more exotic signatures such as long-lived particles to extend the physics coverage. The function of the muon trigger is to identify muon tracks in the experiment and measure their momenta and other parameters for use in the global trigger menu. In addition to the muon detector upgrades that include improved electronics and new sub-detectors, the presence of a L1 track finder in CMS will bring some of the offline muon reconstruction capability to the L1 trigger, delivering unprecedented reconstruction and identification performance. We review the current status of the algorithm developments for a highly efficient L1 muon trigger reconstruction from prompt and displaced muons and the measured performance on emulators and firmware demonstrators

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CMS

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