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Upgrade of the CMS muon trigger system in the barrel region

To continue triggering with the current performance in the LHC's Run-2 the Level-1 Trigger of the Compact Muon Solenoid experiment will have to undergo a significant upgrade. One part of this upgrade is the reorganisation of the muon trigger path from a subsystem-centric view in which hits in the Drift Tubes (DT), the Cathode Strip Chambers (CSC), and the Resistive Plate Chambers (RPC) were treated separately in dedicated track-finding systems to one in which complementary detector systems for a given region (barrel, overlap, and endcap) are merged at the track-finding level. This in turn requires the development of a new system to sort as well as cancel-out the muon tracks found by each system.

An overview will be given of the new Track-finder system for the barrel region, the Barrel Muon Track Finder (BMTF) as well as the cancel-out and sorting layer, the upgraded Global Muon Trigger (uGMT). Both the BMTF and uGMT will be implemented in a Xilinx Virtex-7 card utilizing the uTCA architecture. While the BMTF will improve on the proven and well-tested algorithms used in the Drift Tube Track Finder during Run-1, the uGMT is an almost complete re-development due to the re-organisation of the underlying systems from complementary track finders to regional track finders. Additionally the uGMT will calculate a muon' s isolation using energy information received from the calorimeter trigger. This information is added to the muon objects forwarded to the Global Trigger.

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