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The CMS Calorimeter Trigger for LHC Run II

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The Compact Muon Solenoid (CMS) experiment has implemented a sophisticated two-level online selection system that achieves a rejection factor of nearly 10e5. During Run II, the LHC has increased its centre-of-mass energy up to 13 TeV and will progressively reach an instantaneous luminosity of 2e34cm-2s-1. In order to guarantee a successful and ambitious physics programme under this intense environment, the CMS Trigger and Data acquisition (DAQ) system has been upgraded. A novel concept for the L1 calorimeter trigger is introduced: the Time Multiplexed Trigger (TMT). In this design, which is similar to the CMS DAQ or High Level Trigger (HLT) architecture, nine main processors each receive all of the calorimeter data from an entire event via 18 preprocessors. The advantage of the TMT architecture is that a global view and full granularity of the calorimeters can be exploited by sophisticated algorithms. The goal is to maintain the current thresholds for calorimeter objects and improve the performance for their selection. The introduction of new triggers based on the combination of calorimeter objects is also foreseen. The performance of these algorithms will be presented, both in terms of efficiency and rate reduction using the proton collision data collected in 2016. The challenging aspect of pile-up mitigation will be addressed. The impact of the improved selection criteria on benchmark physics channels such as Higgs and Supersymmetry will be presented as well in this talk.

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