

The role of the CMS electron and photon trigger in the study of the Higgs boson and other resonances

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The Compact Muon Solenoid (CMS) experiment implements a sophisticated two-level triggering system composed of the Level-1, instrumented by custom-design hardware boards, and a software High-Level-Trigger. A new Level-1 trigger architecture with improved performance is now being used to maintain the thresholds used in LHC Run I for the more challenging conditions experienced during Run II.

We present the performance of the upgraded CMS electron and photon trigger in the context of Higgs boson decays into final states with photons and electrons. The calorimeter trigger system plays a central role in achieving the ambitious physics program of Run II. The upgraded trigger uses the full granularity of the calorimeters to optimally reconstruct and calibrate the electromagnetic trigger objects. It also implements combinations of calorimeter objects to provide new Level-1 quantities such as invariant mass. Optimized software selection techniques have been developed and advanced algorithms to mitigate the impact of event pileup have been implemented. The performance of these new algorithms will be presented, based on proton-proton collision data collected in 2016. The selection techniques used to trigger efficiently on these benchmark analyses will be presented, along with the strategies employed to guarantee efficient triggering for new resonances and other new physics signals involving electron/photon final states.

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