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## New trigger strategies for CMS during Run 3

*Saturday, 9 July 2022 09:00 (18 minutes)*

The Compact Muon Solenoid (CMS) experiment at the Large Hadron Collider (LHC) features a sophisticated two-level triggering system composed of the Level 1 (L1), instrumented by custom-design hardware boards, and the High Level Trigger (HLT), a software based trigger based on the complete event information and full detector resolution. The CMS L1 Trigger relies on separate calorimeter and muon trigger systems that provide jet,  $e/\gamma$ ,  $\tau$ , and muon candidates along with calculations of energy sums to the Global Trigger, where selections are made based on the candidate kinematics. During its second run of operation, the L1 trigger hardware was entirely upgraded to handle proton-proton collisions at a center-of-mass energy of 13 TeV with a peak instantaneous luminosity of  $2.2 \cdot 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ , more than double the design luminosity for the machine. In view of Run 3 of the LHC, an optimized trigger menu on both the L1 and HLT sides is crucial to successfully record the events necessary to the achievement of the ambitious CMS physics program. A wide range of measurements and searches will profit from the new features and strategies implemented in the trigger system. Dedicated variables and non-standard trigger techniques to target Long Lived Particles searches and measure unconventional physics signatures have been developed. Moreover, the implementation of new kinematic computations in the L1 Global Trigger will improve b-physics measurements and resonance searches. This talk will present these new features and their expected performance measured on benchmark physics signals.

### In-person participation

Yes

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