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Preparations for upgrades to the level 1 track trigger at the Compact Muon Solenoid for the High Luminosity Large Hadron Collider[1]
SHAUN HOGAN, The University of Alabama, EVA HALKIADAKIS, YURI GERSHTEIN, CLARE SHANAHAN, Rutgers, The State University of New Jersey, CMS COLLABORATION COLLABORATION — Upgrades planned for the mid-2020's, designated the High Luminosity Large Hadron Collider (HL-LHC), aim to increase the luminosity (a measurement of how many proton-proton collisions occur in a given time) of the Large Hadron Collider by a factor of ten. With every event, data from the collision gets sent to a Level 1 (L1) Trigger within the Compact Muon Solenoid (CMS), which quickly analyzes whether the event contains useful information or not. With the implementation of the HL-LHC, the amount of data to be processed by the L1 Trigger will increase significantly, and new methods of processing information at this level will be required. Emulations of future L1 Track Trigger upgrades were tested with simulated data of pileup events to analyze the efficiency of detection algorithms. Furthermore, one particular search that will be conducted at the HL-LHC will be that of the Standard Model Higgs boson to light Higgs bosons. These light Higgs are predicted to decay into either of bottom quarks or tau leptons. Simulations of such events were generated, and subsequently analyzed in order to determine how these decays would appear within the detector, so that new detection algorithms may be created, and existing ones may be refined in order to look for signatures of new physical events.

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