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The CMS Muon System Upgrades for the HL-LHC

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Physicists anticipate that new physics phenomena will be discovered and/or confirmed during the High Luminosity Large Hadron Collider (HL-LHC) program. The primary argument is that the instantaneous luminosity will increase to 5-7.5 x 10ˆ34 cm-2 s-1, approximately ten times the expected integrated luminosity of the LHC. This high-rate environment presents new challenges for the muon system of the Compact Muon Solenoid (CMS) experiment. To maintain high performance under these new data-taking conditions and to enhance the current tracking and triggering capabilities, the muon system will undergo targeted upgrades. These upgrades will affect all legacy muon sub-systems: Drift Tubes (DT) and Resistive Plate Chambers (RPC) in the barrel region, as well as Cathode Strip Chambers (CSC) and RPCs in the endcap region. The upgrades include replacing the on-detector and backend electronics of the existing detectors. Additionally, to ensure redundancy in the high-eta region and extend coverage up to |η| ˜2.8 , new stations utilizing triple Gas Electron Multipliers (GEM) and Improved RPCs (iRPC) will be installed. This report presents performance results of the installed muon sub-systems using Run-3 data. It also provides an update on the production and validation tests of the new detectors scheduled for installation before and during LS3.

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