

The CMS Muon Spectrometer Upgrade

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The luminosity delivered to the experiments by the High Luminosity Large Hadron Collider (HL-LHC) is expected to be at least five times the original design, exceeding the value of $5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$. The detectors will therefore undergo critical upgrades to sustain the higher particle fluxes and improve the tracking and triggering performance. In the current CMS muon system, different detector technologies have been chosen to optimize the CMS detector with respect to performance. Drift Tubes (DT) and Resistive Plate Chambers (RPC) are installed in the barrel, complemented by the two endcaps hosting cathode strip chambers (CSC) and RPC. The upgrade of the Muon Spectrometer will act on the improvement of the electronics installed on DT and CSC and on the extension of the coverage with the installation of additional muon stations in the endcaps - ME0, GE1/1, GE2/1, RE3/1 and RE4/1. Due to the extended lifetime now expected of the LHC experiments (2008-2040) and the significantly larger integrated luminosity accumulated, additional aging tests are required and taking place for the existing muon detectors. The CSC electronics upgrade is planned to take place during the current Long Shutdown 2 (LS2) and is almost completed. The electronics upgrade of the DT is planned for LS3; currently, a slice test exercise is installed and giving the first results. The production, qualification and installation of GE1/1 detectors has completed in spring 2020, followed by the ongoing commissioning in the CMS experiment. The production of GE2/1 is about to start, while the R&D for ME0 and improved RPC (iRPC) is now in the final phase. The presentation will give an overview of the Muon Spectrometer upgrades, describing the aging studies conducted and the frontend on-chamber electronics developments for the DT and CSC. We will provide an overview on the design of GEM and iRPC detectors, as well as a detailed report on the preliminary results obtained during the production, qualification, installation and commissioning of GE1/1 in CMS.

I read the instructions

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