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Status Report of the Upgrade of the CMS muon system with triple-GEM detectors

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For the LHC High Luminosity phase (HL-LHC) the CMS GEM Collaboration is planning to install new large size (990 x 440-220 mm2) triple-GEM detectors, equipped with a new readout system, in the forward region of the muon system (1.5< $|\eta|$ <2.2) of the CMS detector. Combining triggering and tracking functionalities the new triple-Gas Electron Multiplier (GEM) chambers will improve the performance of the CMS muon trigger, and will also improve the muon identification and track reconstruction. With the addition of triple-GEM detectors the forward region of the CMS muon spectrometer will recover its originally planned redundancy. Starting from 2009 the CMS GEM Collaboration built several small and full size prototypes with different geometries, keeping improving the assembly techniques. All these prototypes have been tested in laboratories as well as with beam tests at the CERN SPS and at Fermilab. The results show that the triple-GEM detectors are a mature technology satisfying all the requirements to be used in the forward region of the CMS muon system at HL-LHC. In this contribution we will report on the status of the CMS upgrade project with GEMs and its impact on the CMS performance as also the hardware architectures and expected performance of the CMS GEM readout system. We will also present the latest results on the new generation of chamber using 2014 test beam data. During this test beam, the new CMS GEM readout electronics based on the micro-TCA standard has also been used.

Collaboration

CMS

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