

Upgrade of the CMS muon spectrometer in the forward region with the GEM technology

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The Large Hadron Collider (LHC) will be upgraded in several phases that will allow to significantly expand its physics program and sustain the requirements to maintain sensitivity for the electroweak and TeV scales. After the expected long shutdown in 2018 (LS2) the accelerator luminosity will be increased to $2 - 3 \times 10^{34} \text{cm}^{-2}\text{s}^{-1}$ exceeding the design value of $1 \times 10^{34} \text{cm}^{-2}\text{s}^{-1}$ allowing the CMS experiment to collect approximately 100 fb⁻¹/year. A subsequent upgrade in 2022-23 will increase the luminosity up to $5 \times 10^{34} \text{cm}^{-2}\text{s}^{-1}$.

To cope with the corresponding increase in background rates and trigger efficiency requirements, the installation of additional muon detectors is a necessity. Three major upgrades are planned for the CMS muon endcap regions, referred to as GE1/1, GE2/1 and ME0. Each of the additional set of detectors is based on the Gas Electron Multiplier (GEM) technology, a choice based on many past R&D activities. While the installation of the GE1/1 chambers has been already approved and scheduled by 2019/20, the GE2/1 project is in an advanced phase of design and the ME0 project is now in the final phase of review.

We present an overview of the muon spectrometer upgrade based on GEM technology, the details of the ongoing GE1/1 chamber production with the first results of the quality assurance tests. Moreover, preliminary results obtained for the GE2/1 single module M4 will be shown along with the design and the technical solution adopted for the foreseen GE2/1 and ME0 chambers.

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