

Potential Impact of a New GEM-Based Muon Detector on CMS Triggering

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Following the increases in the LHC instantaneous luminosity, maintaining effective triggering and avoiding dead time will become especially challenging. As the sensitivity of many physics studies, including higgs measurements, depends critically on the ability to maintain relatively low muon momentum thresholds, the identification of potential improvements in triggering is particularly important. We show that the addition of a new muon detector with high spatial resolution to the existing CMS muon system in the very forward region, where the background rates are especially high, allows for a substantial improvement in the performance of muon triggering. Integration of the new detector and the existing Cathode Strip Chamber system allows for a substantial improvement in muon trigger momentum resolution due to an increase in the lever arm for the measurement of the muon bending angle. We demonstrate that a detector based on triple GEM chambers is an excellent candidate for maintaining efficient muon triggering at CMS, owing to its high spatial precision and the ability to operate in the high rate environment of the very forward region.

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