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The CMS GEM alignment with a new back-propagation method

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The muon system of the CMS detector at CERN plays an important role for many searches of the physics phenomena within and beyond the standard model, in particular the Higgs boson discovery and observation of the Bs0 and B0 muon decays. The next phase of high luminosity LHC (HL-LHC) foresee and increase of the instantaneous luminosity in order to extend the discovery potential of the detector. In order to meat the increased particle rates and to ensure a robust and redundant system CMS is adding new detector layers in the forward region of the muon system. The endcap regions will be equipped with Gas Electron Multiplier (GEM) detectors and improved Resistive Plate Chambers (iRPC). The first of three GEM detector systems (called GE1/1) has been already installed and will operate during Run 3 of LHC starting this year. The alignment of the new detector is mandatory for correct muon transverse momentum assignment, thus for muon triggering and reconstruction. We report the status of a newly developed back-propagation method for GEM alignment to reduce the muon momentum dependence due to the multiple scatterings, compared to the standard alignment technique using muon tracks in the CMS tracker system. This new method significantly improves the relative GEM-CSC system alignment.

In-person participation

Yes

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