Production and Quality Control of the new chambers with GEM technology in CMS Muon System



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The GE1/1 Project - Motivations



Therefore the CMS collaboration approved the installation of 36 double-layered trapezoidal triple-GEM [6] chambers in the first muon station (GE1/1) [5], in front of the first CSC station (ME1/1) (left). The GE1/1 can improve the measurement of the muon tranverse momentum, thanks to the increased lever arm between GEM and CSC. The increased path length improves the L1 standalone muon trigger momentum resolution and reduces its large contribution to the L1 muon trigger rate (right).

During the next LHC run, the instantaneous luminosity of the colliding beams will approach twice the design value leading to an increased number of pile-up interactions per event. A general upgrade of the present detector is mandatory to ensure to keep the same performance of the CMS detector as in the present run [1,2].



GE1/1 Chambers Design

- 3 layers of copper-clad kapton foils • Holes of 140 µm pitch and 70 µm diameter • Single-mask photolithographic technique. • Gap configuration: 3/1/2/1 mm • Electric field inside GEM holes ~ 80 kV/cm. • Trapezoidal shaped active area of 990 mm² • Readout electrode segmented in 384 radial strips • 3 sectors along the azimuthal coordinate • 8 sectors along the η coordinate. • Strip width = $230 \mu rad$.
- Strip pitch = $463 \mu rad$.
- sector read out by one VFAT chip [8].
- Argon-CO₂(70/30) gas mixture.

• A pair of triple-GEM chambers is combined to form a superchamber that provides two measurement planes



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The Quality Control procedure of GE1/1 chambers

