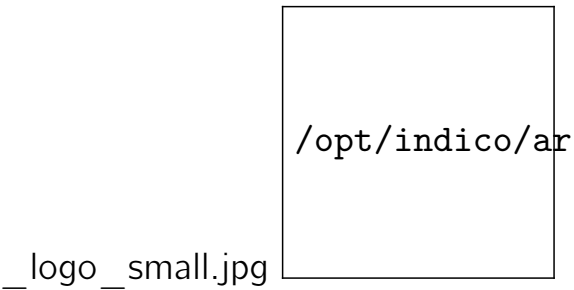

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Study on a new design of a GEM-based technology detector for the CMS experiment

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Content

The muon system of the Compact Muon Solenoid (CMS) experiment at the LHC is currently uninstrumented at pseudorapidity higher than $|\eta|= 2.4$. Therefore, the installation of a chamber in that position would allow track reconstruction beyond the calorimeter at higher pseudorapidity, increasing the muon system's acceptance and improving the tagging of high-eta muons, besides improving muon trigger. Main challenges to such installation are the high particle flux to be substained, high radiation tolerance, and fitting a multi-layered detector in a reduced available space (less than 30 cm). Micropattern Gaseous Detectors (MPGDs) show promising performances responding to the most severe constraints posed by High Energy Physics (HEP) experiments. They use small amplification regions - of the order of tens of microns - allowing for a high rate capability, a very good spatial resolution and radiation tolerance. Lots of MPGDs with different geometries have been developed and tested. An example is the Gas Electron Multiplier (GEM) detector, using copper clad kapton foils on which microscopic holes, hundreds microns apart, have been chemically etched. The cathode and the anode electrodes close the foils that are conveniently spaced to create drift, transfer and induction gaps. A new configuration β" back to back - of such a device is presented with the aim of developing a compact size multi-GEM detector. It is composed by two independent stacked triple GEM detectors, positioned with the anodes toward the outside. In this way, they can share the same cathode, placed at the center of the system, allowing to reduce the total detector's thickness since a single cathode and a single external frame are used. A first prototype has been produced and characterized with an X-Ray source and muon beams. First results on its performance will be presented.

Summary

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