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GEM Detector Development for a Muon tracker for the CBM experiment at FAIR

Content :

The Compressed Baryonic Matter experiment (CBM) planned at the future accelerator facility at GSI(Germany) known as FAIR, aims at studying the heavy ion-collisions in the beam energy range of 10-30 AGeV. The main physics goals include the searches for the deconfinement phase transition, chiral symmetry restoration, critical endpoint and the study of the nuclear equation of state. A fast, high granularity muon detection system having large acceptance has been proposed for the CBM experiment for the measurements of low mass vector mesons (LMVM) and charmonia via their dimuonic decay channels. The present design of the muon detector system consists of 6 detector stations, each having 3 detector layers and several absorber layers placed in between them. In order to cope with a particle flux of about 10 MHz mainly at the stations close to the target, it is proposed to implement high rate micropattern gas detectors as detector layers. At VECC, we have therefore, built several GEM (Gas Electron multiplier) based prototype chambers with pad readout and tested them successfully both with radioactive sources and proton beams. The response of the detector to charged particles has been studied using 2.3 GeV/c proton beams at GSI and at varying GEM voltages. The goal is to optimize the granularity of the detector and to determine the operating conditions. The data were taken in a self triggered mode using a fast readout ASIC, called nXYTER which in a modified form is likely to be used in the actual experiment. Two such beam tests have been carried out. The layout of the prototype chambers, fabrication and assembly details and performances in beam tests will be presented and discussed.

Collaboration :

for CBM collaboration

Primary authors : Dr. DUBEY, Anand (Variable Energy Cyclotron Centre, Kolkata)

Co-authors : Ms. BHOWMIK, Bipasha (Calcutta University, Kolkata)

Presenter : Dr. DUBEY, Anand (Variable Energy Cyclotron Centre, Kolkata)

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