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Dimuon measurements with the CBM experiment at FAIR

The Compressed Baryonic Matter (CBM) experiment at FAIR is designed to explore the QCD phase diagram in the region of large baryochemical potentials. One of the important experimental observables are dileptons, which probe the properties of the matter in the fireball from the first stage of the collision until freezeout. Dileptons will be produced over a wide range of invariant mass region and offer the possibility to investigate the properties of low-mass vector mesons in the dense medium, the temperature of the fireball at intermediate masses, upto the production of charmonia. In order to obtain a complete and high-precision dilepton data set, the CBM setup features both electron and muon detection systems.

A novel Muon Chamber system (MUCH) is under development for CBM consisting of alternating layers of detector triplets sandwiched between absorber slices of varying thickness. Detailed simulations have been performed using both using GEANT and FLUKA to optimize the detector configurations. MUCH will consist of a combination of five sets of absorber and detector stations. The tracks from the Silicon Tracking Station (STS) of CBM will be extrapolated to MUCH to identify muons.

In order to handle the high particle rate on the detectors corresponding to an interaction rate of 10 MHz of Au+Au collisions at CBM, GEM-based gaseous detectors will be used in the first two stations. Large size trapezoidal shaped, triple GEM detectors having progressively increasing pad-sizes will be read out using self-triggered electronics. Prototype detectors with realistic sizes (˜2000 sq. cm) have been designed, fabricated and tested in a self-streaming mode using cosmic muons and particle beams. The tests satisfy the basic design criteria of detection efficiency and rate capability of the detector. The design optimization and performance of prototype detectors will be presented.

Preferred Track

Future Experimental Facilities, Upgrades, and Instrumentation

Collaboration

Other

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