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The mirror system of the CBM RICH detector

The Compressed Baryonic Matter (CBM) experiment will be installed at the Facility for Antiproton and Ion Research (FAIR). It aims to explore the phase structure of strongly interacting (QCD) matter at large net-baryon densities and moderate temperatures by means of heavy-ion collisions in the energy range $\sqrt{s_{NN}} = 2.9-4.9$ GeV. A key observable for the anticipated first order phase transition or even critical point is electromagnetic radiation from the dense system.

Electron identification will be performed with a large ring imaging Cherenkov (RICH) detector followed by a transition radiation detector (TRD). The RICH detector will use CO_2 as radiator gas allowing for electron-pion separation of up to 6-8 GeV/c. The RICH detector design is at an advanced stage with construction of first elements already ongoing. Key elements for the RICH detector are the mirror system and the photon detector.

This poster presentation will focus on the aspects important for the mirror system which has to ensure high quality, high efficiency Cherenkov photon reflection with low material budget. This requires thin, high reflectivity mirrors featuring a homogeneous surface. These mirrors then have to be fixed in a low weight but stable holding structure allowing for precise alignment and alignment control. Prototypes of all elements have been investigated and constructed allowing for a complete design of the full mirror wall. Start of construction is planned for early spring 2025.

Category

Experiment

Collaboration (if applicable)

CBM

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