

High rate time of flight system for FAIR-CBM

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The Compressed Baryonic Matter experiment (CBM) is one of the big experiments of the international Facility for Antiproton and Ion Research (FAIR) in Darmstadt, Germany. CBM aims to investigate rare probes such as charmed hadrons, multiple strange baryons, di-electrons and di-muons as messengers of the dense phase of strongly interacting matter with unprecedented accuracy. This is achieved by designing all components of the experiment for an interaction rate of 10MHz for the largest reaction systems. Charged hadron identification in the system is realized via the Time-of-Flight (TOF) method. For this purpose the CBM-TOF collaboration designed a TOF wall composed of Multi-gap Resistive Plate Chambers (MRPC). Due to the high interaction rate the key challenge is the development of high rate MRPCs above 25 kHz/cm² which becomes possible due to the development of low resistive glass with extremely good quality. Based on the low resistive glass, we designed several high rate MRPCs of different structure and readout electronics. A couple of beam test have been performed and excellent results were obtained. The TDR of TOF has been approved and the production of low resistive glass, MRPC modules and electronics proceeds smoothly. In this article we present the actual design of the TOF-wall. The design of high rate MRPC, thin glass MRPC, readout chain and beam test results are also discussed in detail.

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