

A solution for the inner area of CBM-TOF with pad-MRPC

The Compressed Baryonic Matter (CBM) experiment, constructed at the Facility for Antiproton and Ion Research (FAIR) in Darmstadt, has decided to use the MRPC technology to build its Time-Of-Flight (TOF) wall. Tsinghua University is a group member of CBM-TOF and is doing research on low-resistivity glass and high rate MRPC. The volume resistivity of our glass is on the order of $10^{10} \Omega\text{cm}$. High rate MRPCs preserve an excellent 60ps intrinsic time resolution under a load of as much as 40 kHz/cm². According to the particle flux rate distribution, the whole CBM-TOF wall is divided into four rate regions named Region D, C, B and A (from inner to outer). The particle flux at the inner region D can be excess 20kHz/cm². A pad-MRPC assembled with low resistive glass was designed to construct this area. This module consists of 10 0.22mm-gap and 16 readout pads (2cm x 2cm).

The prototype has been tested in the 2014 October GSI beam time and 2015 February CERN beam time. The calibration is done with CBM ROOT. A couple of corrections has been considered in the calibration and analysis process (including time-walk correction, gain correction, strip alignment correction and velocity correction) to access actual counter performances such as efficiency and time resolution. An efficiency of 98.8% and time resolution of 60ps are obtained. All these results show that the prototype is fully capable of the requirement of the CBM-TOF.

Primary authors: DEPPNER, Ingo-Martin (Physikalisches Institut der Universität Heidelberg); Prof. WANG, Yi (Tsinghua University)

Co-authors: XIE, Bo (Tsinghua University (CN)); Mr SIMON, Christian (Physikalisches Institut der Universität Heidelberg); Mr FRÜHAUF, Jochen (GSI); PETRIS, Mariana (IFIN-HH Bucharest (RO)); PETROVICI, Mihai (National Institute for Physics and Nuclear Engineering (IFIN-HH)); KIS, Mladen (GSI - Helmholtzzentrum für Schwerionenforschung GmbH (DE)); HERRMANN, Norbert (Univ. Heidelberg); LYU, Pengfei (Tsinghua University); Dr LOIZEAU, Pierre-Alain (GSI); SUN, Yongjie (USTC)

Presenter: Prof. WANG, Yi (Tsinghua University)

Track Classification: Gaseous Detectors