



Contribution ID: 465

Type: **Poster presentation**

Quality Evaluation Electronics for CBM-TOF Super Module

Thursday, June 14, 2018 3:50 PM (15 minutes)

The Time-of-Flight (TOF) system, a spectrometer for charged hadron identification in the Compressed Baryonic Matter (CBM) experiment, is comprised with super modules. Each super module contains several multi-gap Resistive Plate Chambers (MRPCs) and provides up to 320 electronic channels in total for high-precision time measurement. During mass production of the MRPCs, it is necessary and important to do quality control work to ensure that the detectors achieve the targeted performance. In this paper, the electronics based on the PXI platform is proposed for the super module. The time of flight indicated by MRPC signals are digitized and buffered by the Time-to-Digital Converter (TDC). Around the same time, the dedicated trigger decision is generated and distributed to the TDC for selection of the effective time data from the buffer according to the arrival time. Then, the matched time data are transmitted to the TDC readout motherboard (TRM) for aggregation. In the end, the data readout module (DRM) allocated in a 6U PXI chassis exports the merged time data from the TRM through optical links to the data acquisition (DAQ) system through the Ethernet. The laboratory test results show that the quality evaluation electronics has the time resolution better than 20 ps. The initial cosmic ray test with MRPC detectors was also conducted to confirm the performance of data readout. The evaluation system can subsequently be used for quality evaluation of the CBM-TOF super module.

Description

QE board

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Yes

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Session Classification: Poster 2

Track Classification: Data Acquisition