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Data Acquisition Software for quality evaluation of CBM-TOF super module detector

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Time-of-Flight system in CBM experiment is composed of super modules based on MRPCs for high resolution time measurement. In order to evaluate the quality of detectors during the mass production, a distributed data readout system is developed, in which each data readout module (DRM) board is based on the System-on-Chip technique and the Ethernet, so that data can be parallel transmitted to the back-end computer to meet with the high data rate of 6Gbps. In this paper, the data acquisition (DAQ) software is focused on event building, status monitoring, system controlling and data analyzing. It consists of three parts connected with Ethernet: Data Forwarding Node (DFN), Data Aggregation Node (DAN) and Graphical User Interface (GUI). DFN runs on the DRM board, aims at forwarding data to DAN or transmitting status and commands with GUI. DAN and GUI both run on the back-end computer. DAN is mainly responsible for data receiving and event building. GUI provides friendly and interactive interface for users to control and monitor the electronics system. It also contains offline data analysis which can call MATLAB engines to evaluate the quality of detector. Such hierarchical design is easy to upgrade, as the number of DFN can be configured according to the requirement of experiment, which is suitable for the distributed readout system, and GUI can be customized without any code modification. Laboratory test results show that the data transfer rate of a single data transmission path is about 550Mbps and confirm the function of the DAQ software.

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Description

overall DAQ

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