

Progress of PandaX-III readout electronics

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The PandaX-III (Particle And Astrophysical Xenon Experiment III) experiment, with the scientific objective of searching for neutrinoless double beta decay, is going to be carried out at the China Jin Ping underground Laboratory (CJPL). In the first phase of the experiment, a Time Projection Chamber (TPC) with 200 kg Xenon gas at the pressure of 10 bar is to be constructed. A total of 82 Micromegas modules using the Microbulk technique will be installed for the two endcaps of the TPC. For each Micromegas module, there are 64 X, 64 Y readout strips and one mesh, which results in 10496 strip signals and 82 mesh signals for one TPC.

In order to accomplish the readout task for the 10496 strip signals and 82 mesh signals of the Phase-I TPC, an electronics system following a modular and multi-level design concept is proposed. At the bottom level, there are 42 FEC (Front-end Card) based on the 64-channel ASIC chips named AGET, and 2 MRC (Mesh Readout Card) modules. At the higher level, there are the back-end electronics, including two S-TDCMs (Slave Trigger and Data Concentration Modules) and one MTCM (Master Trigger and Clock Module), which collect the event data and perform the trigger function.

Currently the first version of the FEC module and MRC module, as well as a DAQ (Data Acquisition) Board which plays the role as the prototype of back-end electronics, have been successfully developed. Joint-test with a prototype TPC was performed at Shanghai and preliminary results which consisted with expectation were obtained. The details of the electronics design and the progresses will be described in this paper.

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