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Electronics and data acquisition systems for the RPC based INO ICAL detector

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The India based Neutrino Observatory (INO) collaboration is planning to build a 50 kton magnetized iron calorimeter (ICAL). ICAL will use about 28,800 single gap glass Resistive Plate Chambers (RPCs) of about 2m × 2m in size and operated in the avalanche mode, as its active detector elements. About 3.6 million electronic channels need to be instrumented in ICAL. ICAL's Data Acquisition (DAQ) system records on receiving physics trigger signal, pattern of RPC pickup strips hit by the charged particles as well as precise time of crossing the detectors. The DAQ system performs a number of slow control and monitoring functions in the background.

Architecture of the ICAL DAQ system is based on designating RPC as a standalone minimum unit. Therefore, the current scheme is to mount preamplifier and leading edge discriminators on two orthogonal edges of the RPC units and also mount rest of common processing electronics on the RPC unit. A processor, equipped with an optical data link is a part of this electronics. The processor takes care of all the DAQ needs, configuration of the front-end as well as data transfer needs between the RPC unit and backend servers.

In this paper, we will describe the design features of the front-end systems and our current studies on their prototypes. We will also dwell on the controller or backend system options on which work is in progress.

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