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Uniformity study of large size glass RPC detector using an alternate front-end electronics for INO-ICAL Experiment

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The proposed Iron Calorimeter (ICAL) detector will use approximately 29,000 glass-based Resistive Plate Chambers (RPCs) as sensitive detector elements. A huge 3.7 million electronic channels would be required to read out the full detector. For such a large scale experiment, an optional multichannel front-end ASIC designated as HARDROC has been tested and commissioned with a prototype RPC detector. HARDROC can amplify, shape and discriminate up to 64 signals simultaneously very efficiently. The pre-amplifier gain, DAC threshold and the window size of the data acquisition are optimized according to the RPC raw signal. RPC performance has been measured with cosmic muons with its count rate, efficiency, and cluster size. The present study involves the homogeneity response of the RPC plane by simultaneously reading all the strips at once. Finally, the number of consecutive strips fired at the same time by the passage of a charged particle as a function of electronegative SF_6 gas is presented.

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