

Performance study of glass RPC detectors for INO-ICAL experiment.

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Resistive plate chamber (RPC) detectors are known for their excellent timing and good spatial resolution, which make them favourable candidates for the tracking and triggering in many high energy physics experiments. The Iron Calorimeter (ICAL) detector at India-based Neutrino Observatory (INO) is one such experiment, which will use RPCs as an active detector element. The ICAL experiment is designed to study atmospheric neutrinos and various issues related with neutrino physics. The INO-ICAL has geometry that utilizes about 29000 RPC'S of 2m x 2m in size, interleaved between thick iron plates, producing muons via the interaction of atmospheric neutrinos with iron. The tracking information of the muons will be extracted from the two dimensional readout of the RPC's and its position in respective layer along with the upward and downward directionality determined from the timing information. As a result, a precise measurement of timing response of these RPC detectors is quite important. Further, to design readout system for the ICAL detector, induced signal study and charge information is needed as well. In this paper, we present the detailed timing and charge spectra study for various glass RPC candidates. We also report the effect of various gas compositions on the timing and charge spectra of these RPC detectors.

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