

Preliminary Results from INO Detector R & D Programme

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India-based Neutrino Observatory (INO) collaboration is proposing a large magnetized iron tracking calorimeter of total weight 50 kton, using atmospheric neutrinos as source. The proposed detector will have a modular structure of lateral size 48 m¹⁶ m and will consist of a stack of 140 layers of 6cm thick iron plates interleaved with Resistive Plate Chamber (RPC) detector layers. A total of about 27, 000 RPCs of dimension 2mX2m will be needed for his experiment. A dedicated effort for development of RPC detectors, leading to their large scale production is in progress.

A large number of single gap glass RPCs of area 3030 cm² as well as a few of area 12090 cm² were developed, using glass procured from local market. The V-I characteristics of these detectors were studied. The noise rate was found to be a reliable way of monitoring the stability of the RPC. Plateau efficiencies of over 90% for various gas mixtures have been obtained for minimum ionizing particles. Measurements of the charge linearity and time response of the RPC as a function of applied high voltage have been made. The typical time resolution of the RPCs when operated in the operating voltage plateau is about 1.2 nSec. We have also built a couple of chambers using glass imported from Japan. These chambers are now in undergoing a long term stability tests and are in continuous operation for about six months.

We have setup a second RPC test station during the past few months. This is equipped with a sophisticated gas mixing, telescope and data acquisition systems. The gas unit is capable of mixing four input gases in the desired proportion and flow through 16 channels. We are currently operating a stack of 10 RPCs of one square foot in area in the streamer mode in this station. Triggered by a scintillation paddle based telescope, we are able to track cosmic ray muons and record their timing, using this stack.

We will a give summary of earlier results and discuss current status and future directions of this detector R & D programme.

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