Development of prototype RPC and LVDS/NIM-ECL translator for the INO-DAQ system

V.Prasad[a,*], B.Bhuyan[a], P.Poulose[a], B.Satyanarayana[b], N.K.Mandal[b], A.Redij[b], M.Bhuyan[b], S.Kalmani[b], R.R.Shinde[b], M.Saraf[b], S.Lahamge[b], S.R.Joshi[b], L.V.Reddy[b]

[a] Department of Physics, Indian Institute of Technology Guwahati, Guwahati 781 039 , Assam, India

[b] Department of High Energy Physics, Tata Institute of Fundamental Research, Mumbai 400 005, India

[*]E-mail- vindhyawasini@iitg.ernet.in

Resistive plate chamber (RPC) will be used as an active element of INO-ICAL detector for their low cost and excellent spatial and temporal resolutions. We have fabricated 1×1 m^2 glass RPC (named AB08) consisting of two resistive glass plates with a bulk resistivity of about 10^{12} Ω-cm separated by a distance of 2 mm. An electric field (49 kV/cm) is applied across the glass plates through a semi-resistive graphite coating on their outer surfaces, while for the RPC operation in avalanche a gas mixture of Freon, isobutene and SF6 in a ratio of 95.5: 0.2: 4.3 is flown through the detector. The readout of the RPC has been performed by external orthogonally placed pickup panels. The panels one each for X and Y plane readout are made of 32 copper strips of 50 Ω characteristic impedance. A set of 12 RPCs are arranged in a test stack with an external trigger set up of cosmic muon scintillation telescope. The signal from the RPC is processed through the INO data acquisition (DAQ) system, which mainly consists of three parts: front end (Basically it consist of Analog Front End (AFE) with discriminator & Digital Front end (DFE) modules), routers and back end CAMAC crate modules. The front end is connected to CAMAC crate through two data routers namely Trigger and TDC router and Control and data routers. RPC parameters have been calculated by object oriented based ROOT package software.

Monitoring of RPC's strip is required to record the noise & its health information. This noise may be due to radioactivity, the electrical noise, cosmic ray charged particles of multiple energies and the dark current of the chamber. To reduce the turnaround of monitoring cycle we have designed a LVDS/NIM-ECL translator NIM module to interface between Monitor Scalar and Control and Data Router.

Keyword:- Resistive plate chamber (RPC), data acquisition system (DAQ), translator