Study of Angular Distribution of Cosmic Muons using INO-ICAL Prototype Detector at TIFR

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The India-based Neutrino Observatory (INO) collaboration is planning to set up a magnetized 50kton Iron-CALorimeter (ICAL) with Resistive Plate Chambers (RPC) as active detectors to study neutrino oscillations and precisely measures its parameters. A prototype detector stack (without magnet) comprising of 12 layers of RPCs of 1m × 1m in area has been set-up in TIFR to track cosmic ray muons.

The detector performance is well understood through its continuous operation for more than 3 years. Using the muon data, collected so far, an attempt has been made to reproduce the cosmic muon intensity distribution on the earth's surface. The general form of this distribution is $I = I_0 \cos^n \Theta$. Detector differential aperture, i.e., solid angular coverage of the detector is estimated and statistical minimization procedure is used to get the best fit value for 'I_0' and 'n'. A detailed discussion on detector solid angle acceptance and minimization routine is presented here.

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