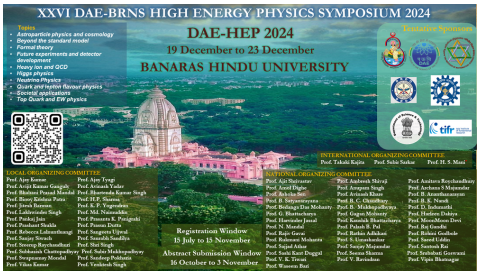

Contribution ID: **21** Type: **Oral**

Mechanical design of a Threshold Cherenkov Detector

Abstract:
A cylindrical threshold Cherenkov detector has been designed and fabricated at the TIFR to determine the shape of the differential cosmic muon flux spectrum at the low energy ranges, which is the dominant component at the earth's surface. This Cherenkov detector is sensitive to muons with an energy threshold from around 1.2 to 6.5 GeV for the pressure of filled nitrogen at -0.5 to 15 bar respectively. It is proposed to measure the integral muon intensity at these thresholds and fit the data based on a diffusion model of muon production by pions in the Earth's atmosphere which describes the integral energy distribution as a power law with exponent ~ −2.7. Through this, we will be able to infer the feasibility of using a threshold Cherenkov detector to accurately measure the shape of the cosmic ray muon energy distribution.
The detector is made using a seamless Stainless Steel tube of size 200 NB (schedule 10) × 1800 mm length filled with Nitrogen gas. The inner surface of the tube will be lined with a metallized Mylar sheet for enhancing the reflectivity of UV light. The bottom of the reflector is in conical form to concentrate the UV light to a 50 mm dia cross section of the PMT face. There is a quartz window at the bottom to mount UV PMT. A custom design scintillator assembly has been made wherein two scintillators are mounted at 90 degrees and connected to one PMT. Two layers of this scintillator assembly are mounted at the top and diagonally at the bottom end of the tube. They form the trigger assembly. The mechanical design details will be described in the talk.

Field of contribution

Experiment

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Track Classification: Future experiments and detector development