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Developing Detectors for Scintillation Light in Liquid Argon for DUNE

Monday, August 8, 2016 6:30 PM (2 hours)

The concept for the 10-kiloton scale Far Detector modules for the Deep Underground Neutrino Experiment (DUNE) utilizes liquid argon Time Projection Chambers (TPCs). To fully exploit the physics opportunities (measurement of CP violation in oscillations of beam neutrinos, plus non-beam based investigations including studies of supernova neutrino bursts and searches for nucleon decay), the TPC's will be augmented with a system to detect the 128-nm scintillation photons produced in conjunction with the ionization signal. We have carried out detailed studies of the response of prototype photon detectors consisting of light guide assemblies employing wavelength shifter(s) to first convert the VUV light to wavelengths that match the silicon photomultiplier (SiPM) read out. Specifically, we report on a series of experiments conducted in a 460-liter dewar located at the liquid argon detector R&D facility at Fermilab. The large-volume setup provides an opportunity to conduct studies with multiple photon detectors in a controlled environment with filtration and purity monitoring. An external hodoscope allows for the selection of through-going cosmic muons. By simultaneous testing of prototypes of differing designs, we have measured their relative efficiencies. Additional work is underway to determine absolute efficiency. We also report the results of studies of the time-structure of the scintillation signal and detector response under varying experimental conditions.

Presenter: HOWARD, Bruce (Indiana University)**Session Classification:** Poster Session**Track Classification:** Detector: R&D and Performance