Contribution ID: **54** Type: **not specified**

Analysis and Validation of PMT's Waveforms in ICARUS LArTPC Using Monte Carlo Simulations

Wednesday 23 October 2024 17:50 (20 minutes)

ICARUS (Imaging Cosmic and Rare Underground Signals), will operate as the Far Detector in the Short Baseline Neutrino (SBN) program at Fermilab. It plays a key role in detecting the potential existence of sterile neutrinos in the eV mass region. The ICARUS detector consists of two large liquid Argon time projection chambers (LArTPCs), each holding 760 tons of liquid Argon. A crucial component of the detector is its array of 360 photomultiplier tubes (PMTs), which detect the scintillation light produced by charged particles in liquid Argon.
The light scintillation signal is fast enough for accurate event timing, triggering, and reconstruction in the detector. Specifically, the PMTs, together with TPC and CRT, allow precise determination of the interaction time, which is important for distinguishing between neutrino events and cosmic-ray background.
The PMTs used in ICARUS are Hamamatsu R5912-MOD tubes, 8 inches in diameter, optimized for cryogenic temperatures. These PMTs have a high quantum efficiency, and also feature excellent timing resolution and a low dark current (around 10 nA at 1500 V). The PMTs'sensitivity spans
from 300 to 650 nm, making them efficient at detecting scintillation light over a broad spectrum.
In my research, I analyze the waveforms of the light signals detected by the PMTs to ensure that the experimental data aligns with Monte Carlo simulations. This comparison is crucial for validating the accuracy of the experimental data and enhancing our understanding of the detector's
performance. By improving this comparison, we aim to refine the reconstruction of neutrino events and ensure that the detector is properly calibrated for ongoing and future operations.

Author: Dr BRIO, Vanessa (INFN catania)

Presenter: Dr BRIO, Vanessa (INFN catania)

Session Classification: Parallel Session 6