



Contribution ID: 14

Type: **not specified**

Measuring the Energy Resolution of MicroBooNE at the MeV-Scale

Tuesday, 17 August 2021 11:30 (15 minutes)

Liquid Argon Time Projection Chambers (LArTPCs) are a common choice for the investigation of neutrinos thanks to their low thresholds and high spatial resolution. MicroBooNE, located along the Booster Neutrino Beamline, is an 85-ton LArTPC and is well understood having taken data from 2015 to 2021. It is now in its R&D phase which provides a unique opportunity to measure the energy resolution of a LArTPC at low (MeV) energies by injecting a radioactive source. Using Monte Carlo simulations, we have been able to map the energy resolution for various detector variables along the three planes. We will use radon decays as a standard candle that provide a beta spectrum in the low MeV energy range. The beta spectrum cuts-off at 3.3 MeV and is produced by the bismuth-214 decay in the radon-222 chain. These results will be extremely useful for future large DUNE, which could extend its program to the low MeV scale.

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Session Classification: Tuesday