

Results from the ICARUS T600 Detector concerning the “Online Method” of Purity Monitoring

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The ICARUS T600 liquid argon time projection chamber (LArTPC) will soon begin taking data on Fermilab’s Booster Neutrino Beamline (BNB). In preparation for its operations, we present an analysis of “online” data quality monitoring of the liquid argon purity. We evaluated the performance of the algorithm on simulated cosmic ray muon interactions in the ICARUS detector. Comparing the measured and simulated electron lifetimes, we found that the lifetime can be measured accurately across a variety of possible purity conditions. To further study the robustness of the algorithm, we also evaluated its performance under varying detector conditions: with different levels of noise from the TPC electronics and with different levels of the “space charge effect”. We found that while both affect the lifetime measurement, the noise effects dominate the deviation from the measured lifetimes. We also found that with some modifications to the algorithm, the effects of noise can be somewhat mitigated.

Summary

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