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Development of an Impurity Model for Large Liquid Xenon Detectors

nEXO is a 5 tonne liquid xenon (LXe) time projection chamber (TPC) planned to search for the neutrino-less double beta decay of ^{136}Xe with a target half-life sensitivity of about 10^{28} years. Electrons from an event within the TPC will be drifted up to 1.3 m and to ensure minimal charge loss nEXO aims to reach an electron lifetime of 10 ms. This lifetime is inversely proportional to the concentration of electro-negative impurities, for which multiple species with different attachment cross-sections may be important. Various sources for impurities such as diffusion out of commonly used plastics, desorption from metal surfaces and leaks to atmosphere were investigated. We will present the recent measurements of outgassing from plastics and the prospects of an empirically driven model for understanding the electron lifetime in LXe for nEXO.

Mini-abstract

Modeling the Effect of Electronegative Impurities on the Electron Lifetime in Liquid Xenon

Experiment/Collaboration

nEXO

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