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Purity control and measurement in liquid xenon detectors

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The RELICS experiment employs a dual-phase xenon time projection chamber (TPC) to investigate Coherent Elastic Neutrino-Nucleus Scattering (CEνNS) signals from reactor neutrinos. To improve the sensitivity of the detector, the liquid xenon in TPC needs to be ultra-pure. Electronegative impurities, induced by outgassing, can absorb the electrons created by article interactions inside the detector, diminishing the potential CEνNS signals. In order to control the xenon purity, we studied the outgassing character of main materials in TPC and techniques to reduce the oxygen outgassing rate through systematical vacuum tests. Additionally, we developed a purification model to predict and monitor xenon purity evolution. Our findings enable effective xenon purity enhancement in the RELICS prototype, ultimately improving the LXe detector efficiency and sensitivity.

Collaboration you are representing

RELICS

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