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Mitigation of Cosmogenically Induced Background from $^{42}\text{Ar}/^{42}\text{K}$ using Encapsulation with Ultra-Pure Plastic for the LEGEND Experiment

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Neutrinoless double beta ($0\nu\beta\beta$) decay is a most compelling approach to determine the Majorana nature of neutrino and measure absolute value of neutrino mass. The LEGEND collaboration is aiming to look for a rare nuclear decay, $^{76}\text{Ge} \rightarrow ^{76}\text{Se} + e^- + e^-$. Cosmologically induced isotope ^{42}Ar and its decay progeny ^{42}K in a liquid argon could create irreducible background for the $0\nu\beta\beta$ signal. We are studying the methodologies to mitigate the ^{42}K background. In order to do this, encapsulation to germanium detectors with 3D printing technologies using low background material are currently under investigation. Simulation results of Poly Ethylene Naphthalate (PEN) encapsulation to germanium detectors and plans to study other perspective materials are presented.

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