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Improving nEXO Sensitivity with Radon Distillation

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nEXO is a 5 tonne neutrino-less double beta ($0\nu\beta\beta$) experiment looking for this Standard Model forbidden decay in ^{136}Xe . If this decay is observed it would mean that neutrinos are Majorana fermions, i.e. their own antiparticle, and that lepton number is not conserved. The nEXO experiment is designed to achieve a 1.35×10^{28} year half-life sensitivity (at 90% confidence level), about 10 events in 10 years of running. In nEXO, liquefied enriched xenon (LXe) fills a single drift Time projection Chamber with scintillation readout. The detector is built with ultra-low radioactivity materials, including an electroformed copper xenon vessel. The sensitivity of the experiment could be further increased by virtually eliminating radon dissolved in the LXe. A cryogenic distillation column that reduces the radon in xenon 100-fold would increase nEXO's sensitivity to $> 1.7 \times 10^{28}$ years. We will report on the progress of R&D on cryogenic distillation of LXe ongoing at the SLAC National Accelerator Laboratory.

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