

LEGEND's Search for Neutrinoless Double-Beta Decay in ^{76}Ge *

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The LEGEND collaboration is searching for neutrinoless double-beta decay ($0\nu\beta\beta$) in ^{76}Ge . Discovery of $0\nu\beta\beta$ would prove that the neutrino is a Majorana fermion and demonstrate the existence of lepton-number violation in nature. LEGEND's ultimate goal is to achieve a half-life discovery potential beyond 10^{28} years, which will require observing one ton of isotope for ten years in an ultra-low background, underground environment. To achieve this, the experiment will operate an array of high purity germanium (HPGe) detectors, isotopically enriched to $> 90\%$ in ^{76}Ge , in a liquid argon active shield. Using similar approaches, the GERDA and MAJORANA DEMONSTRATOR experiments have achieved the lowest background levels and best energy resolution at the decay Q-value to date. Building upon their successes, LEGEND will pursue a phased approach to achieving greater sensitivity. The first phase, LEGEND-200, will operate about 200 kg of detectors for a targeted half-life sensitivity of $> 10^{27}$ yr. LEGEND-200 is currently operating 140 kg of HPGe detectors at LNGS, with plans to install additional detectors in the near future. LEGEND-1000 represents the next phase of this program, with plans to deploy 1000-kg of p-type, inverted-coaxial point contact HPGe detectors. In this talk I will present initial results from the first months of data-taking with LEGEND-200; then, I will present the innovation behind the LEGEND-1000 design, its technical readiness, and its discovery potential.

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