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I N V I T A T I O N

for a

V E R A - S E M I N A R

with

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# The quest for Majorana neutrinos with GERDA and LEGEND

Since neutrinos have no electric charges, they may be their own antiparticles, referred to as Majorana neutrinos, and thus violate lepton number conservation. Neutrinoless double beta decay would be a direct consequence, and the search for this decay mode is the most sensitive method to unravel the Majorana nature of neutrinos. By operating bare germanium diodes, enriched in Ge-76, in an active liquid argon shield, the GERDA experiment achieved an unprecedently low background index of $5.2 \cdot 10^{-4}$ counts/keV kg yr in the signal region and collected an exposure of 100 kg yr in a background-free regime. No signal was observed, and a limit on the half-life of $0\nu\beta\beta$ decay in Ge-76 is set at $T_{1/2} > 1.8 \cdot 10^{26}$ yr (90 % C.L.). Hence, Majorana neutrino masses are constrained to $m_{\beta\beta} < 79–180$meV (90 % C.L.). The LEGEND Collaboration builds on the success of GERDA and the Majorana Demonstrator, and develops a phased, Ge-76-based double-beta decay experimental program with a $T_{1/2}$ - discovery potential beyond $10^{28}$ years. Its first stage, LEGEND-200, started data-taking in early 2023, and LEGEND-1000 is under preparation. In this talk, I will present the final results of GERDA, the performance of LEGEND-200 and discuss the preparatory works and plans for LEGEND-1000.

Thursday, 18.01.2024, 16:30 o'clock

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