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Searching for dark matter with GERDA and beyond

The GERmanium Detector Array (GERDA) experiment at the Laboratori Nazionali del Gran Sasso (LNGS, Italy) searched for the lepton-number-violating neutrinoless double-beta ($0\nu\beta\beta$) decay of ^{76}Ge. The potential discovery of such a phenomenon would have significant implications in cosmology and particle physics, helping unrevealing the Majorana nature of neutrinos.

The main feature of the GERDA experimental design consisted of operating an array of bare germanium diodes enriched in ^{76}Ge in an active liquid argon shield. Starting in December 2015, Phase II physics run reached an unprecedentedly low background index of 5.2×10^{-4} counts/(keV kg yr) in the $0\nu\beta\beta$ signal region, collecting an exposure of 103.7 kg yr while being in a background-free regime.
The shielded environment and the excellent energy resolution of the operated Ge detectors made the experiment suitable for searching for others beyond the standard model processes. GERDA is sensitive to light exotic fermions, including sterile neutrinos in the mass range 100-900 keV/c^2. Here, the most stringent limits obtained with ^{76}Ge were set to date. Additionally, data collected by GERDA are ideal for probing the interaction of pseudoscalar and vector bosonic keV-scale dark matter candidates. Photoelectric absorptions and Compton scatterings of these candidates were included in the final interaction rate, leading to the most stringent coupling constraints in the mass region from 140 keV/c^2 to twice the mass of the electron.

This contribution will review the dark matter searches performed at GERDA, providing on top of that an overview of the broader dark matter program of the next LEGEND (Large Enriched Germanium Detector for Neutrinoless $\beta\beta$ Decay) experiment project.

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all program topics can be contemplated

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