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Background free search for neutrinoless double beta decay with GERDA Phase II

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The GERDA experiment searches for neutrinoless double beta ($0\nu\beta\beta$) decay of ^{76}Ge using high purity germanium (HPGe) detectors operated in liquid argon (LAr).
The aim is to explore half-lives of the order of 10^{26}\,yr.
Therefore, GERDA relies on improved active background reduction techniques such as pulse shape discrimination (PSD) in which the time structure of the germanium signals is analyzed to discriminate signal- from background-like events.
Phase II of the experiment includes a major upgrade: for further background rejection, the LAr cryostat is instrumented to detect argon scintillation light (LAr veto).
In a first data release, a new limit on the half-life of $0\nu\beta\beta$ decay of ^{76}Ge is set to
$T^{0\nu}_{1/2} > 5.3 \cdot 10^{25}$ yr at 90 % C.L., with a median sensitivity of $T^{0\nu}_{1/2} > 4.0 \cdot 10^{25}$ yr at 90 % C.L.

GERDA Phase II proved to be a high resolution experiment and background-free: together, PSD and LAr veto achieve a BI of the order of $10^{-3}\ \frac{counts}{keV \cdot kg \cdot yr}$. With this unprecedented BI, less than one background event is expected until an exposure of 100 kg·yr. The talk presents the current status of the experiment.

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Classification de Session: Neutrinos & Astroparticles

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