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GERDA - Phase I results and news from the Phase II upgrade

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The Gerda experiment, located at Laboratori Nazionali del Gran Sasso (LNGS) of INFN, conducts neutrinoless double beta decay (0nbb) search in the candidate isotope 76Ge. In a first experimental phase a lower limit of the half-life, 2.1x10²⁵ yr (at 90% CL), was determined. This result strongly disfavors the famous claim from 2004. The half-life of the ordinary double beta decay (2nbb) of 76Ge was re-measured using Phase I data, achieving a significant reduction of uncertainties. Furthermore, the possibility of 0nbb decay with Majoron emission was evaluated for different spectral indices. Recently, the decay of 76Ge into excited states of 76Se was investigated. Lower half-life limits for three transitions have been published which are about two orders of magnitude larger than the previously reported values. Several models could be excluded by this analysis.

Gerda has just entered the Phase II data taking. The experimental setup has been modified in order to meet the competitive goal to reach half-lives in the range of 10^{26} yr. A new lock-system has been installed which can hold up to seven detector strings. This gives the possibility to deploy new detectors, augmenting the experimental active mass. To supplement Gerda Phase II, detectors of Broad Energy Germanium (BEGe) type were produced in 2012 and 2013, which have excellent Pulse Shape Discrimination (PSD) properties. In contrast to Phase I, all detectors are now contacted by wire bonds and the detector holders have been improved. Another major development is the implementation of a new veto system utilizing Argon scintillation light in order to identify background from radioactive decays and Compton events in the vicinity of the detectors in the Gerda liquid Argon (LAr). Fist light from the LAr veto was measured and very promising results have been obtained. Background rejection by PSD and the new veto system are a key feature in Gerda Phase II in order to achieve the design goal of a background index of 10^{-3} cts/(keV kg yr).

In this talk, results from Gerda Phase I will be discussed and news from the Gerda Phase II upgrade will be presented.

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