Contribution ID: **12** Type: **Oral presentation**

New results of the experiment to search for double beta decay of ^{106}Cd using $^{106}CdWO_4$ scintillator

Monday, June 23, 2025 2:45 PM (30 minutes)

A low-background experiment to study double-beta decay processes in ^{106}Cd using a $^{106}CdWO_4$ crystal scintillator (mass 215.4 g) enriched in ^{106}Cd to 66%, has been performed at the National Laboratories of Gran Sasso (LNGS), in Italy. Events in the $^{106}CdWO_4$ detector are recorded in (anti)coincidence with two large-volume $CdWO_4$ scintillation counters. The setup, designed for high detection efficiency and background suppression, was operated for 1075 days. Energy and timing calibrations, pulse-shape discrimination, and Monte Carlo simulations were used to characterize the detector response and background components. No evidence of double-beta decay was observed. New half-life limits were set for various decay modes and channels, reaching sensitivities in the range $T_{1/2} \sim 10^{20} - 10^{22}$ yr. In particular, the limit on the $2\nu\varepsilon\beta^+$ decay to the ground state of ^{106}Pd was established at $T_{1/2} > 7.7 \times 10^{21}$ yr (90% C.L.), approaching the region of theoretical predictions.

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Session Classification: Experiment

Track Classification: Experiment