

Search for double beta decay of ^{106}Cd with TGV-2 spectrometer

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Search for double beta decay processes (EC/EC, β^+/EC , $\beta^+\beta^+$) of ^{106}Cd was performed at the Modane underground laboratory (LSM, France, 4800 m w.e.) using the low-background multi-detector spectrometer TGV-2 and enriched ^{106}Cd . The detector part of the TGV-2 is composed of 32 HPGe planar type detectors with the sensitive volume of 2040 mm² x 6 mm each. The total sensitive volume of the detectors is about 400 cm³. TGV-2 detectors are arranged in 16 sandwich-like pairs of face-to-face detectors with 16 thin double beta emitters placed between them. The total mass of 16 investigated ^{106}Cd foils (with an enrichment of 99.57% of ^{106}Cd) have a total mass of ~23.2 g. The distance between the detectors and the emitters is < 1.5 mm. The 16 pairs are mounted one over another in a common cryostat tower. The energy resolution of the detectors ranged from 3.0 to 4.0 keV at 1332 keV (^{60}Co). The total efficiency of the TGV-2 spectrometer is 50-70% depending on the energy threshold. The detector design delivers high detection efficiency for multiple coincidence events resulting in strong suppression of the background. The detector part of the TGV-2 spectrometer is surrounded by a copper shielding (> 20 cm), a steel airtight box against radon, a lead shielding (> 10 cm), and a neutron shielding made from borated polyethylene (16 cm). The TGV-2 spectrometer provides a high possibility of detection of double beta processes in ^{106}Cd . Experiment started in February 2014. The preliminary results of data accumulated during 42500h will be presented with sensitivity level of $T_{1/2} \sim 1 \times 10^{21}$ y at 90% C.L.

Reference to paper (DOI or arXiv)

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