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NEW RESULTS FOR DOUBLE BETA DECAY OF 106Cd

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Search for β+β+, β+EC, EC/EC decay of 106Cd was performed at the Modane underground laboratory (LSM, France, 4800 m w.e.) using the low-background multi-detector spectrometer TGV-2 [1] and 106Cd with enrichment of 99.57%. The detector part of the spectrometer is composed of 32 HPGe planar type detectors each with sensitive volume of 20.4 cm2 ⊠ 0.6 cm. 16 foils of 106Cd with a thickness of 70(10) μm, and a total mass of ˜23.2 g (˜1.3 × 1023 atoms of 106Cd) were inserted between the entrance windows of detectors. The distance from foils to detectors is about 1.5 mm. The 16 pairs of detectors with cadmium foils were mounted one over another in a common cryostat tower. The energy resolution of detectors are ranged from 3.0 to 4.0 keV at 1332 keV γ-line of 60Co. The design of the detector part of TGV-2 delivers high detection efficiency for useful events (single and multiple coincidence) and strong suppression of external background. The passive shielding of the TGV-2 consist of copper (⊠20 cm)„ an airtight box against radon, lead (⊠10 cm) and a neutron shielding made of borated polyethylene (16 cm). Additional suppression of background was achieved by using coincidence techniques and filtering electronic and microphone noise in the low energy region (<50 keV) by digitizing the detector response with different shaping times (2 and 8 μs) [1]. Double coincidences between two characteristic KX- rays of Pd detected in neighboring detectors were analyzed to search for 2νEC/EC decay of 106Cd to the ground 0+ state of 106Pd. From the preliminary calculation of experimental data accumulated with TGV-2 spectrometer and ˜23.2 g of 106Cd during 43000 h (phase III of experiment TGV-2), new limit on 2νEC/EC decay of 106Cd to the ground 0+ state of 106Pd - T1/2 > 1.7 × 1021y (90% C.L) was obtained. Limits on 2νECEC decay of 106Cd to excited states of 106Pd and 2νβ+β+, 2νβ+EC decay of 106Cd to the ground 0+, and excited states of 106Pd were significantly improved in comparison with previous phase II of the TGV-2 experiment [2]. They are ranged from 5.0 × 1020 y to 1.2 × 1021 y at 90% C.L.

1. P. Beneš et al.,Nucl. Instr. Meth. in Phys. Res. A 569, 737 (2006)
2. N. I. Rukhadze et al., J. Phys.: Conf. Ser. 375, 042020 (2012)

The speaker is a student or young scientist

No

Section

1. Neutrino physics and nuclear astrophysics

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