

## SEARCH FOR DOUBLE BETA DECAY OF $^{106}\text{Cd}$ WITH THE TGV-2 SPECTROMETER

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Search for EC/EC decay of  $^{106}\text{Cd}$  was performed at the Modane underground laboratory (4800 m w.e.) using the low-background spectrometer TGV-2 (Telescope Germanium Vertical) and 16 foils of  $^{106}\text{Cd}$  with enrichment of 99.57% and a total mass of ~23.2 g. The detector part of the TGV-2 is composed of 32 HPGe planar type detectors mounted one over

another together with double beta emitters in a common cryostat tower. The total sensitive volume of detectors is ~400 cm<sup>3</sup>. The distance between detectors and emitters is < 1.5 mm. The energy resolution of detectors ranged from 3.0 to 4.0 keV at 1332 keV ( $^{60}\text{Co}$ ). 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 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). Further suppression of background was achieved by using coincidence techniques and filtering the electronic and microphone noise in the low energy region (< 50 keV) by digitizing the detector response with different shaping times (2 and 8  $\mu\text{s}$ ). The previous experimental run, performed with TGV-2 spectrometer and ~13.6 g of  $^{106}\text{Cd}$  with enrichment of 75%, showed a small increase in the number of measured KX(Pd)-KX(Pd) coincidences events in the region of ~21 keV which might be the indication of the 2 $\nu$ EC/EC decay of  $^{106}\text{Cd}$ . But the statistics was not enough to make any significant claim about the presence of the process searched. The new run performed with increased mass of  $^{106}\text{Cd}$  should accumulate more statistical information. From the preliminary calculation of experimental data accumulated during 9000h of measurements the limit on 2 $\nu$ EC/EC decay of  $^{106}\text{Cd}$  to the ground  $0^+$  state of  $^{106}\text{Pd}$  -  $T_{1/2}(2\nu\text{EC/EC}, 0^+ \rightarrow 0^+) > 3.9 \times 10^{20}\text{y}$  (90% C.L.) was obtained reaching the region of theoretical prediction for this decay.