$CdWO_4$ SCINTILLATION DETECTOR OPTIMIZATION FOR THE 2β EXPERIMENT WITH ^{116}Cd

I. I. Veretyannikov, F. A. Danevich, Yu. G. Zdesenko, V. V. Kobychev, S. S. Nagorny, D. V. Poda

Improvement of the energy resolution of $^{116}CdWO_4$ scintillation spectrometer from 8% to 4% (FWHM, at the energy of ^{116}Cd 2β-decay – 2,8 MeV) can reduce background by a factor of 3 - 4 times. It allows to improve sensitivity of the new experiment, which is developing in the Solotvina Underground Laboratory, up to the level of $T_{1/2} \approx 10^{25}$ years for 0ν2β-decay of ^{116}Cd, which corresponds to the neutrino mass $m_\nu \approx 0{,}2$ eV. With the $CdWO_4$ crystal (∅ 40 × 30 mm) located in a light guide, 22 % increase of light collection was obtained. Such an improvement of light collection for a scintillation detector with light guide is reached for the first time. The energy resolution of 3,7 % (at energy 2,8 MeV) can be obtained using two light guides and off-line correction of light collection nonuniformity.