THE NEW TYPES OF GERMANIUM DETECTORS TO SEARCH FOR A NEUTRINOLESS DOUBLE BETA DECAY

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The existence of a neutrinoless double beta decay would prove that the neutrino is a Majorana particle and has a nonzero effective mass. It is also very important that this process is completely forbidden in the Standard Model. Thus, its detection will be equivalent to the discovery of so-called New Physics. At the moment there are many promising experiments to search for a neutrinoless double beta decay, each of them has its own advantages and disadvantages.

Most of contemporary projects are using the active source approach: a detector is made out of isotope-candidate. So far, there is no information about the existence of a neutrinoless double beta decay, but for each isotope, there is a limit on the half-life of this process. Unfortunately, the sensitivities of modern experiments are not sufficient for an unambiguous answer to the question of the hierarchy of neutrino masses, and consequently it is necessary to create new generation experiments that will operate considerably larger masses of isotope candidates for a neutrinoless double beta decay. There is a fundamental necessity to search for some new types of germanium detectors. It is necessary to have a detector that satisfies the following important properties: 1) a significant mass; 2) good spectrometric performance; 3) the ability to operate bare in cryogenic liquid for a long time without deterioration of its characteristics; 4) the possibility to apply the effective pulse shape discrimination methods. Novel point-contact and inverted coaxial germanium detectors are look as promising candidates. Demonstration of the possibility of efficient using the newest types of detectors in liquid argon and/or nitrogen would be a significant step forward in the preparation of the new generation experiment LEGEND [1] to search for a neutrinoless double beta decay.

1. N.Abgrall *et al.* // AIP Conf. Proc. 2017. V.1894. 020027.