

# The background simulation of experiment for searching of 2K-capture in $^{124}\text{Xe}$

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During several years at the Baksan Neutrino Observatory INR RAS is undergoing the experiment for searching of 2K ( $2\nu$ )-capture in  $^{124}\text{Xe}$ . This isotope has several advantages: 1) it has the largest kinetic energy of transition  $Q - 2.866$  MeV, among candidates of nuclei for which predicted the existence of ECEC; 2) since xenon is the noble gas, then it could be easily use as a system isotope-detecting medium in a gas detector. To search for 2K-capture in  $^{124}\text{Xe}$  the large volume copper proportional counter (LPC) is used.

In our work, we present the results of the simulation, with the Geant4 package, of LPC background from the decays of  $^{238}\text{U}$  and  $^{232}\text{Th}$  nuclei in the construction materials of the LPC case, as well as in elements of the low-background shield. The influence of neutrons produced in the rock of the underground laboratory from the decay of  $^{238}\text{U}$  and  $^{232}\text{Th}$ , where the experimental setup is located, on the production of the  $^{125}\text{I}$  isotope in the working gas of the detector, upon capture of thermalized neutrons by the  $^{124}\text{Xe}$  isotope is considered. The  $^{125}\text{I}$  isotope can have a significant influence on the background of the experiment since the total energy release in its decay belongs to the same energy region as ROI of 2K-capture in  $^{124}\text{Xe}$ .

**Primary author(s)** : KAZALOV, Vladimir (INR RAS); GAVRILYUK, Yu. M. (INR RAS); Dr. GANGAP SHEV, A. M. (INR RAS); Dr. KUZMINOV, V. V. (INR RAS); Dr. PANASENKO, S. I. (V.N.Karazin Kharkiv National University); Dr. RATKEVICH, S. S. (V.N.Karazin Kharkiv National University); TEKUEVA, D. A. (INR RAS); YAKIMENKO, S. P. (INR RAS); PETRENKO, A.D. (V.N.Karazin Kharkiv National University)

**Presenter(s)** : KAZALOV, Vladimir (INR RAS)

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