

T -ODD CORRELATIONS IN $(n,\gamma\gamma)$ -, $(n,\alpha\gamma)$ - AND $(n,f\gamma)$ - REACTIONS

Tchuvil'sky Yu.M.

Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, Russia

E-mail: tchuvl@nucl-th.sinp.msu.ru

The results of the measurements of exotic three- and five-vector pseudo- T -noninvariant correlations of fission products – so-called TRI and ROT effects – look intriguing. It is generally recognized that the effects are not consequences of the actual T -invariance break up. More or less consistent approaches in the frame of classical mechanics are built to explain the data related to simultaneous three-body decay processes such as the ternary fission $(n,f\alpha)$ process.

Due to the smallness of γ -radiation width the $(n,f\gamma)$ -process may be cited as typical sequential cascade as well as $(n,\alpha\gamma)$ - and $(n,\gamma\gamma)$ -reactions. As it was shown in Ref. [1], the TRI effect is negligibly small in sequential cascades so the attention should be focused on the ROT effect. A general approach to the description of the T -odd correlations in these three processes is discussed in the present work. The theory of angular correlations is used. Selection rules, impact of properties of the nuclear spectra on the values of the correlations are studied.

T -odd effects in $(n,\alpha\gamma)$ -reactions on light nuclei were investigated in [2]. In that case the basic origin of the ROT effect is the interference of α -emission amplitudes with different angular momenta.

Both this and another mechanism originating the T -odd correlations are studied in the present work. It is shown that for reactions induced by neutron absorption by heavy nuclei three discussed T -odd correlations all are the result of one and the same effect – the interference of amplitudes related to neutron resonances with different spins in the reaction entrance channel.

The T -odd $(n,f\gamma)$ -correlations measured by now are explained in this way. A broad assortment of target nuclei promising for search for $(n,\gamma\gamma)$ -correlation exist. Due to that the measurements of the ROT effect may be involved in considerable use as a method of investigation of the properties of neutron resonances in various nuclei. An unique example is ^{149}Sm target. By use of it not only $(n,\gamma\gamma)$ - but also $(n,\alpha\gamma)$ -correlation may be measured; in so doing one can expect a large effect for the latter process.

1. A.L.Barabanov *et al.* // Phys. At. Nucl. 2003. V.63. P.679.

2. I.S.Okunev, Yu.M.Tchuvil'sky // PEPAN Lett. 2013. V.10. P.706.