IMPROVEMENT OF THE DATA PROCESSING TECHNIQUE IN TANGRA SETUP

Fedorov N.A.[1,2], Tretyakova T.Yu.[3], Kopatch Yu.N.[1], Bystritsky V.M.[1], Grozdanov D.N.[1,4], Aliyev F.A.[1,5], Ruskov I.N.[1,4], Skoy V.R.[1], Hramco C.[1,6], Kumar A.[7], Gandhi A.[7], Wang D.[8], Bogolyubov E.P.[9], Barmakov Yu.N.[9], TANGRA collaboration

[1] *Joint Institute for Nuclear Research (JINR), Dubna, Russia;* [2] *Faculty of Physics, Lomonosov Moscow State University (MSU), Moscow, Russia;* [3] *Skobeltsyn Institute of Nuclear Physics Lomonosov Moscow State University (SINP MSU), Moscow, Russia;* [4] *Institute for Nuclear Research and Nuclear Energy of Bulgarian Academy of Sciences (INRNE-BAS), Sofia, Bulgaria;* [5] *Institute of Geology and Geophysics, Baku, Azerbaijan;* [6] *Institute of Chemistry, Academy of Science of Moldova, Chisinau, Republic of Moldova;* [7] *Banaras Hindu University, Varanasi, India;* [8] *Xi'an Jiao Tong University, Xi'an, China;* [9] *All-Russia Research Institute of Automatics (VNIIA), Moscow, Russia*

E-mail: na.fedorov@physics.msu.ru

The correct determination of the full-energy absorption peak area in a gamma-spectrum obtained by a scintillation detector is quite complex task in case if there are a lot of peaks in it. There are several processes of gamma-quantum interaction with the scintillator crystal, as a result there are several components in the measured gamma-spectrum appear. The correct description of the gamma-detector response can significantly improve our data analysis procedure results.

Moreover, the influence of the neutron and gamma-quanta absorption and scattering in the experimental setup construction elements and in the surrounding items has to be taken into account. There are several sources distorting the measured data: the absorption of neutrons and gamma-quanta in the irradiated sample, interaction of direct and scattered neutrons with BGO detectors, random (α–γ) coincidences, neutron scattering from the setup construction and environment materials.

To take into account the impact of these effects and improve our results for gamma-quanta angular distributions, we used Monte-Carlo simulation-based methods for estimation of the neutrons and gamma-rays absorption inside the irradiated sample and the cases of the detectors. A similar method was used for estimation of the data uncertainties.

In this work a prototype of the gamma-ray detector response function Geant4 simulation-based is presented.