Determining the Relative Efficiency of HPGe and $LaBr_3$ Gamma-Ray Detectors Using ^{60}Co, ^{152}Eu, ^{228}Th and $^{35}Cl(n,\gamma)^{36}Cl$

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The primary goal of the TANGRA project at the Frank Laboratory of Neutron Physics (FLNP) of the Joint Institute for Nuclear Research (JINR) in Dubna, Russia, is to conduct comprehensive studies on the inelastic scattering of 14.1 MeV neutrons on atomic nuclei using the tagged neutron method (TMN). As part of this ongoing research program, we measured the relative photo-peak efficiencies of the HPGe and LaBr3 detectors within a newly constructed experimental facility. We utilized standard gamma-ray point sources including ^{60}Co, ^{152}Eu, and ^{228}Th, as well as the $^{35}Cl(p,\gamma)^{36}Cl$ reaction. Additionally, we determined these efficiencies using Monte Carlo simulation with the GEANT4 program. The simulations demonstrated very good agreement between the results obtained from Monte Carlo calculations and the experimental data. The findings of our research may prove useful for processing and analyzing data obtained during experiments within the TANGRA project, as well as for scientists utilizing HPGe and LaBr3 detectors for gamma-ray spectroscopy.