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Measurements of the gamma-ray emission cross sections and angular distributions from (n, xγ) reactions with 14.1 MeV neutrons

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The study of inelastic scattering of fast neutrons by atomic nuclei is of great importance for both fundamental and applied neutron-nuclear physics. Reactions induced by neutrons provide a unique source of information for describing the processes of strong interaction between nucleons.
Inelastic scattering processes are utilized to study the characteristics of excited states of target nuclei [1]. The practical application of the (n,n'γ) reaction necessitates the expansion and refinement of experimental data on this process. Research on the inelastic scattering of fast neutrons has recently become more active, driven by new prospects for nuclear energy production using fast neutron reactors.
The purpose of this experiment was to refine the available data on emission cross sections and angular distributions from the inelastic scattering of 14.1 MeV neutrons by certain light nuclei. This work was conducted within the framework of the international TANGRA (TAgged Neutrons and Gamma RAys) project at the Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research in Dubna, Russia.
Inelastic scattering was studied using the Tagged Neutron Method [2], in which neutrons with an energy of 14.1 MeV, produced in the d(t,a)n reaction, are "tagged"by detecting alpha particles. Gamma quanta from the (n,n'γ) reaction were recorded using a new multidetector system [3]. The experimental data are presented and discussed in comparison with previously published results.

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