

CHARACTERISTICS OF NEUTRON AND GAMMA-RAY DETECTORS

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Abstract

At the Joint Institute for Nuclear Research (JINR, Dubna, Russia), within the framework of the TANGRA project (TAGged Neutron and Gamma RAYs) [1], we continued experiments to study inelastic fast neutron scattering from some isotopes important for nuclear science and technology [2]. We have used several different types gamma detectors such as: NaI (TI), BGO, Stilbene, HPGe, Plastic scintillators, and LaBr₃(Ce) [3–5]. The design of the experimental setup, including a ring of gamma detectors and a neutron generator, allowed us to measure the angular distribution of gamma quanta with good accuracy. The HPGe gamma spectrometer and the ING-27 neutron generator were used to determine the cross section for inelastic neutron scattering reactions. Information about the cross section, energy of gamma rays and their angular distribution allows testing various theoretical models describing neutron-nuclear reactions, as well as increasing the accuracy of elemental analysis with fast neutrons.

This article presents some characteristics of experimental facilities, such as: the efficiency of registration of gamma quanta and neutrons, energy and time resolution obtained at various source-detector geometries, using standard point sources of gamma radiation (¹³⁷Cs, ⁶⁰Co, ²²Na, ¹⁵²Eu, ²²⁸Th) and 14.1 MeV neutrons generated by ING-27.

References

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