

Measurements of differential cross sections of inelastic scattering of 14.1 MeV neutrons on light nuclei using the tagged neutron method

Authors: Yuri Kopatch¹; Nikita Fedorov²; Dimitar Grozdanov³; Pavel Prusachenko²; Polina Filonchik⁴; Ivan Ruskov³; Vadim Skoy²; Tatiana Tretyakova⁵; Petr Kharlamov⁵; Alexandr Andreev⁶; Grigory Pampushik⁶; Constantin Hramco²

¹ *Joint Institute for Nuclear Research*

² *JINR*

³ *JINR, INRNE*

⁴ *JINR, MIPT*

⁵ *JINR, SINP, MSU*

⁶ *JINR, MSU*

Corresponding Author: nfedorov@jinr.ru

A study of the inelastic scattering of neutrons with an energy of 14.1 MeV on the light nuclei was carried out at the TANGRA facility at JINR (Dubna) using the tagged neutron method (TNM) [1]. The D-T neutron generator ING-27 with built-in position sensitive detector of α -particles was employed as a source of tagged 14.1 MeV neutrons. Different types of detector systems were used to register gamma quanta and scattered neutrons from reactions induced by the neutrons hitting the target used. The γ -rays were measured by means of two high-purity germanium (HPGe) detectors and four LaBr₃ scintillators positioned at specific angles [2]. The most complete data were obtained with a carbon target, for which the scattered neutrons and γ -rays were measured by an array of plastic scintillator detectors surrounding the graphite target. The neutron/gamma separation and determination of scattered neutron energies were done by the time-of-flight method.

New results on differential cross sections of γ -ray emission, as well as neutron-gamma angular correlations will be presented.

This work is supported by the RSCF grant N 23-12-00239.

References:

1. Yu. N. Kopach and M. G. Sapozhnikov, *Physics of Particles and Nuclei*, 2024, Vol. 55, No. 1, pp. 55–102.
2. Yu. N. Kopatch et al., *Moscow University Physics Bulletin*, 2024, Vol. 79, No. 3, pp. 308–317.

Notes: