

Theoretical calculation of the angular anisotropy of gamma radiation on carbon, chromium and iron nuclei in inelastic neutron scattering

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Within the TANGRA international collaboration [1] at the Frank Laboratory of Neutron Physics (FLNP, JINR), systematic study of fast neutron reactions is being conducted. One of the most significant processes accompanying neutron–nucleus interactions is inelastic scattering, where the target nucleus is left in an excited state and when de-excites by emitting discrete gamma-ray lines. The study of the intensity and angular anisotropy of these gamma rays provides information about population mechanisms of the low-lying nuclear levels. The amount of accumulated experimental data on gamma-ray angular anisotropy and emission cross sections from inelastic neutron scattering ($n, n'\gamma$) enables a comprehensive study of this reaction.

This work focuses on the theoretical description of gamma-ray emission cross sections and angular anisotropy in the ($n, n'\gamma$) reaction. The angular distributions of gamma rays from inelastic scattering were derived using the theory of angular correlations and nuclear reaction theory [2, 3]. Our approach uses the S-matrix formalism for describing inelastic neutron scattering [4]. The influence of cascade feeding on both the cross sections and the angular anisotropy parameters of gamma radiation from neutron-excited nuclei is discussed.

The main goal of this research is to provide a theoretical description of cross sections and angular distributions of neutrons and gamma rays from inelastic scattering of fast neutrons on the nuclei: ^{12}C , ^{52}Cr , and ^{56}Fe .

Список источников

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