others

Study of the reaction ^{11}B(p,α)αα in the 0.3-2.15 MeV proton beam energy range

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The credible value of the ^{11}B(p,α)αα reaction cross-section is essential for the proton therapy of cancer, the thermonuclear fusion, and the nuclear astrophysics. Despite the relevance, the mechanism of the reaction is still an open question. The goal of the study consists in acquiring new knowledge about the reaction, modernization and clarification of the preliminary studies data in the 0.3-2.15 MeV proton beam energy range.

To achieve the aim, a thick boron-containing target was irradiated with protons at the Vacuum Insulated Tandem Accelerator (VITA) at the Budker Institute of Nuclear Physics in Novosibirsk, Russia. The spectra of the emitted α-particles and backscattered protons were measured using the silicon semiconductor α-spectrometer PDPA-1K (Institute of Physical and Technical Problems, Dubna, Russia) at 135° with respect to the beam moment. Using SIMNRA version 7.03 (Max Planck Institute for Plasma Physics, Germany), we modeled the interaction of a proton beam with the boron-containing target and succeeded to reveal the accurate composition of the irradiated target. The obtained results proved that the reaction ^{11}B(p,α)αα has two channels - ^{11}B(p,α_1)^{8}Be* and ^{11}B(p,α_0)^{8}Be with different cross-sections which agrees with the nowadays conceptions.

In future we plan to study a thin boron target to measure the cross sections of each channel.

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