Neutron source, other

Experimental study of the interaction of the proton and deuteron with the atomic nuclei of lithium and boron for therapy application

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The interaction of deuteron and proton beams with light nuclei is characterized by a wide variety of reactions of interest for both medical and fundamental applications. The reaction ^{7}Li(d,n)α is characterized by a high neutron yield and high neutron energy (13.125 MeV), which is relevant for conducting therapy of fast neutrons [1].

For the reaction ^{11}B(p,α)αα, reliable knowledge of the cross section is relevant for proton therapy of cancer [2]. Despite the long-standing interest in these processes, the experimental data on cross-sections vary greatly among different authors, and for a number of reactions, cross-section values are not available in the databases. At the Institute of Nuclear Physics of the Siberian Branch of the Russian Academy of Sciences, at the VITA accelerator neutron source, the cross-sections of the following reactions were measured experimentally in the energy range of 0.3-2.3 MeV: ^{6}Li(d,α)α, ^{6}Li(d,p)^{7}Li, ^{6}Li(d,p)^{7}Li*, ^{7}Li(d,α)^{5}He, ^{7}Li(d,nα)α, ^{10}B(d,α_0)^{8}Be, ^{10}B(d,α_1)^{8}Be*, ^{10}B(d,p_2)^{9}Be*, ^{11}B(d,α_0)^{9}Be, ^{11}B(d,α_2)^{9}Be*, ^{11}B(p,α)αα, ^{11}B(p,α_0)^{8}Be, ^{11}B(p,α_1)^{8}Be*.

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