others

Study of the ^{11}B+p reaction at 0.15-2.15 MeV energy

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There are controversial results on whether boron can increase the efficiency of proton therapy of cancer or not [1]. To resolve the discrepancy, scientists need to have credible and accurate knowledge about the reaction ^{11}B+p. Oliphant and Rutherford [2] in 1933 and Gilbert and Dee [3] in 1936 were pioneers studying the reaction of proton-boron fusion. However, accumulated by many scientists for more than 90 years of research data differ significantly.

Having analyzed the reaction theoretically, we concluded that the reaction can be thought as the three particles decay with an intricate angular distribution. We measured the differential cross-section in the energy range from 0.15 to 2.15 MeV at two angles of detecting 135° and 168° with the respect to the beam momentum at Vacuum-Insulated Tandem Accelerator at Budker Institute of Nuclear Physics. The accelerator allows generating proton beams with the energy and current accuracy of 0.1 % and 0.4 % respectfully [4], the boron targets composition and thickness were defined both directly and indirectly - all this allowed minimizing the experimental error.

As well as understanding of the reaction angular distribution needs further research, and calculations of the total cross-section require knowledge about the angular distribution, in this work we represent only differential cross-section of ^{11}B+p reaction at two angles of detection.

In future we plan to conduct experiments detecting the reaction products at a few more angles to study the angular distribution of the reaction. Then obtained total cross-section of the reaction will help to answer the question of boron usage in proton therapy of cancer.

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