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Study on the origin of 10B in 6Li+12C reaction at energies around Coulomb barrier

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The weakly bound nuclei with relatively low binding energy and a greater breakup possibility, such as 6Li,7Li, 9Be, will result in complex reaction processes, such as CF (complete fusion), ICF (incomplete fusion), NCBU(non-capture breakup) and transfer processes, etc. The transfer reaction includes stripping and pickup processes. From the above processes, the reactions induced by weakly bound nuclei can produce the same residues. Therefore, different processes cannot be separated by only measuring the characteristic ⊠-rays. The 6Li + 209Bi experiments were performed at the Tandem-XTU accelerator of Legnaro National Laboratory of INFN in Italy. In this experiment, several gamma rays of 10B are observed. There are several possible reactions to form 10B. First of all, 6Li reacts with the 209Bi target, 6Li + 209Bi ⟶10B + 205Tl, which is direct a pickup reaction channel. Besides, 6Li reacts with the 12C foil, it also has two reaction channels, (1) 6Li + 12C ⟶18F ⟶ 10B + 2α, which is fusion-evaporation reaction, (2) 6Li + 12C ⟶10B + 8Be (2α), which is a direct deuteron/alpha pickup reaction, one-step process. It should be noted here that α pickup and deuteron pickup reaction can lead to the same products. All of the above processes can produce the 10B nucleus. It is difficult to give a very clear origin of 10B only on basis of gamma ray analysis. A coincident method of gamma rays with light charged particles can further select the reaction channels.

Field of your work

Experiental nuclear physics

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