

MECHANISMS OF HYDROGEN ISOTOPE FORMATION DURING PREEQUILIBRIUM STAGE OF STOPPED PION ABSORPTION REACTION

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Results on the investigation of the spectra and the yields of the hydrogen isotopes formed in stopped pion absorption by nuclei are presented. This study is based on the experimental results obtained on the pion channel of PNPI synchrocyclotron using the semiconductor spectrometer [1]. Unique data on charged particle formation following pion absorption on 17 target nuclei in wide mass range ($6 < A < 209$) have been obtained. Spectra were measured in energy range from 10 MeV to the kinematic threshold (~ 100 MeV).

Phenomenological model developed by us [2,3] has been used for data analysis and separation of different stages' contributions: primary pion absorption on intra-nuclear clusters, pre-equilibrium processes (pick-up, knock-out, coalescence, scattering of primary particles) and evaporation. Contributions of these stages in the yields have been defined. It was shown that pre-equilibrium processes have a dominant contribution in the particle formation.

The analysis of the A -dependences of the yields allows to specify the main mechanisms of the formation of hydrogen isotopes during the pre-equilibrium stage. Assuming that for deuterons the main mechanism is pick-up by primary nucleon near the nucleus surface we manage to describe successfully the A -dependence of yields (with 10-15% error). It was shown that for tritons the deuteron pick-up by primary neutron near surface is dominant only for heavy nuclei while for light and medium nuclei other processes are need to take into account. Contributions of scattered primary tritons and knocked-out tritons are analyzed. The empirical dependence was proposed which allows to describe triton yields with 10-15% error.

1. M.G.Gornov *et al.* // Nucl. Inst. and Meth in Phys.Res. A. 2000. V.446. P. 461.
2. L.Yu. Korotkova *et al.* // Bull. of RAS: Phys. 2012. V.76. P.446.
3. Yu.B.Gurov *et al.* // Bull. of RAS.: Phys. 2013. V.77. P.415.