TIME-DEPENDENT DESCRIPTION OF NUCLEON AND α-CLUSTER TRANSFER REACTIONS

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The numerical solution of the time-dependent Schrödinger equation [1, 2] provides the possibility of intuitive study of dynamics of complete and incomplete fusion, α-cluster, single- and multi-nucleon transfer processes in nucleus-nucleus collisions at energies near and above the Coulomb barrier [3]. The evolution of the wave functions of the halo-proton of ^{8}B (Fig. 1) and skin-neutrons of ^{8}He were used for calculation the transfer and breakup cross sections for collisions with ^{28}Si nucleus. These processes are similar to analogies processes for halo-neutrons of ^{11}Li nucleus [4]. The evolution of the wave functions the outer nucleons of both colliding nuclei and α-clusters of ^{18}O in the reaction ^{18}O + ^{197}Au [3] was used for calculation of cross sections of the formation of the reaction products. The analysis of outer nucleons rearrangement during fusion and grazing collisions of ^{64}Ni, ^{70}Zn nuclei with ^{249}Cf nucleus are made.

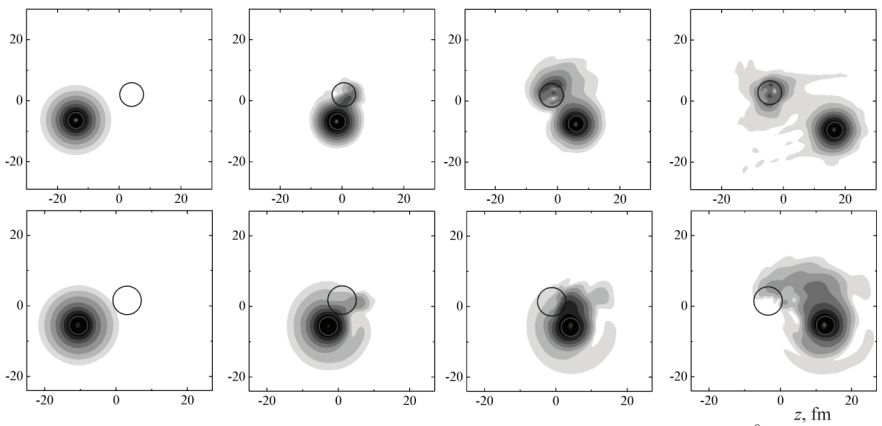

*Fig. 1. The evolution of the probability density ρ(**r**,t) of external protons of the ^{8}B nucleus in its collision with the ^{28}Si nucleus (circle) at energy E_{lab}= 10 A MeV (on top) and 64 A MeV (below); the course of time corresponds to panels from left to right.*

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