

THE CHANNEL COUPLING AND TRITON CLUSTER EXCHANGE EFFECTS IN ^3He SCATTERING ON ^6Li NUCLEI

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The cluster aspects play a very important role in interaction of particles with light nuclei ($A \leq 16$). From this point of view, a typical example is the nucleus ^6Li , whose ground state, according to the theory, is defined by two overlapping configurations $\alpha + d$ and $^3\text{He} + t$ [1]. This structure affects not only the nuclear reaction cross sections, but also cross sections of the elastic scattering of deuterons, tritons, ^3He and α -particles due contribution the exchange mechanisms with clusters transfer.

The aim of this work is to obtain a unified description of existing data on the ^3He scattering on ^6Li nuclei with accounting the coupling channels including the mechanism of triton cluster exchange.

Experimental data on elastic and inelastic scattering of ^3He projectiles in the energy range from 18 to 217 MeV were analyzed within the framework of the coupled reaction channels [2]. The coupling of the elastic and inelastic scattering with the transition to the excited state of 2.186 MeV (3^+) and triton-exchange mechanism were taken into account in calculations. Phenomenological potentials with depths depending on the energy at fixed values of the geometric parameters were found. These potentials describe well the experimental angular distributions for both the elastic and inelastic scattering. Energy dependence of the volume integrals of the real potential for $^3\text{He} + ^6\text{Li}$ system is consistent with similar data for other systems $p + ^6\text{Li}$, $d + ^6\text{Li}$, $\alpha + ^6\text{Li}$, $^{12}\text{C} + ^{12}\text{C}$ and also with the predictions of the microscopic theory.

1. K.Wildermuth, Y.C.Tang. A Unified Theory of the Nucleus. Vieweg, Braunschweig, 1977.
2. J.Thompson. FRESCO. Department of Physics, University of Surrey, July 2006, Guilford GU2 7XH, England, version FRESCO 2.0, <http://www.fresco.org.uk/>.