

## Energy dependence of total cross sections for reactions with ${}^6\text{He}$ , ${}^6,{}^9\text{Li}$ nuclei

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A series of experiments has been performed at Flerov Laboratory of Nuclear Reactions (JINR) on measurement of total cross sections for reactions  ${}^4,{}^6\text{He}+{}^{28}\text{Si}$  and  ${}^6,{}^7,{}^9\text{Li}+{}^{28}\text{Si}$  in the beam energy range 5-40 A·MeV. The transmission method based on registration of energy loss in the material of  $\Delta E$  detector (Si target) as well as registration of n- $\gamma$  radiation by the  $4\pi$  spectrometer was used. The interesting results were the unusual wide enhancement of total cross section for  ${}^9\text{Li}+{}^{28}\text{Si}$  reaction in the energy range  $\sim 10$ -30 A·MeV as compared with  ${}^6,{}^7\text{Li}+{}^{28}\text{Si}$  reactions. The similar weaker behavior was found for  ${}^6\text{He}+{}^{28}\text{Si}$  reaction as compared with  ${}^4\text{He}+{}^{28}\text{Si}$  reaction. The microscopic approach based on the numeric solution of the time-dependent Schrödinger equation for the external neutrons of weakly bound projectile nuclei combined with the optical model is proposed for description of the observed effects. These are explained by the rearrangement of external neutrons and thus the increase of neutron probability density in the region between the two nuclei during their collision in the energy range  $\sim 10$ -30 A·MeV. The corrections to the nucleus-nucleus potential associated with the rearrangement of external neutrons were determined by integration of their probability density over the region between the two nuclei. The probability of leaving the elastic channel was calculated within the optical model. The calculated cross sections are in agreement with the experimental data on the total reaction cross sections for the studied nuclei.

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