EXPERIMENTAL STUDY OF CLUSTER STRUCTURE OF ^{9}Be NUCLEI IN THE MECHANISM OF THEIR INTERACTION

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The inelastic scattering and multi-nucleon transfer reactions was studied by bombarding a ^{9}Be target with a ^{3}He beam at the incident energy of 30, 40 and 47 MeV. The experimental angular distributions for ^{9}Be(^{3}He, ^{3}He)^{9}Be, ^{9}Be(^{3}He, ^{4}He)^{8}Be, ^{9}Be(^{3}He, ^{7}Be)^{5}He, ^{9}Be(^{3}He, ^{6}Li)^{6}Li and ^{9}Be(^{3}He, ^{7}Li)^{5}Li reaction channels were measured on the extracted beams of the cyclotrons K-120 of the University of Jyväskylä (Jyväskylä, Finland) and U-120 of the Institute of Nuclear Physics (Řež, Czech Republic). Registration and identification of the scattered reaction products was carried out by the ΔE–E telescope of silicon semiconductor detectors [1].

Experimental angular distributions for the corresponding ground states (g.s.) were analyzed within the framework of the optical model, the coupled-channel approach and the distorted-wave Born approximation. The contributions of different exit channels have been determined confirming that the ($\alpha + {}^{5}$He) configuration plays an important role [2]. ^{9}Be consisting of two bound helium clusters (^{3}He + ^{6}He) is significantly suppressed, whereas the two-body configurations ($n + {}^{8}$Be) and ($\alpha + {}^{5}$He) including unbound ^{8}Be and ^{5}He are found more probable. From the analysis of these data, the probabilities of cluster configurations $n + {}^{8}$Be and $\alpha + {}^{5}$He were determined, which were 69% and 25%, respectively.

1. S.M.Lukyanov, K.Mendibayev, Yu.E.Penionzhkevich, *et al.* // Preprint of JINR E-7-2017-65.
2. S.M.Lukyanov, Yu.E.Penionzhkevich, *et al.* // Journ. Phys.: Conf. Ser. 2017. V.863. 012027.