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K. Mendibayev^{1,6,7}, S.M. Lukyanov¹, B. Urazbekov^{1,2}, A.S. Denikin¹, N. Itaco², D. Janseitov¹, J. Mrazek³, W.H. Trzaska⁴, M.N. Harakeh⁵, Yu. Penionzhkevich¹, K. Kuterbekov⁷ and T. Zholdybayev⁶

1) Joint Institute for nuclear research, 141980 Dubna, Russia

2) Dipartimento di Matematica e Fisica, Universita degli Studi della Campania Luigi Vanvitelli, I-8110 Caserta, Italy

3) Nuclear Physics Institute CAS, 25068 Řež, Czech Republic

4) Department of Physics, University of Jyväskylä, FIN-40014, Finland

5) KVI-CART, University of Groningen, 9747 AA Groningen, The Netherlands

6) Institute of Nuclear Physics, 050032 Almaty, Kazakhstan

7) L.N.Gumilyov Eurasian National University, 010008 Nur-Sultan, Kazakhstan

Angular distributions of protons, deuterons, tritons and alpha particles emitted in the reaction $d+^9\text{Be}$ at $E_{\text{lab}}=19.5$ and 35 MeV were measured with an aim to shed light on the internal cluster structure of ^9Be and to study possible cluster transfer of ^5He . The experimental angular distributions for $^9\text{Be}(d, d)^9\text{Be}$, $^9\text{Be}(d, ^4\text{He})^8\text{Be}$, $^9\text{Be}(d, ^7\text{Be})^5\text{He}$, $^9\text{Be}(^3\text{d}, ^6\text{Li})^6\text{Li}$ and $^9\text{Be}(d, ^7\text{Li})^5\text{Li}$ 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 (Rez, Czech Republic) [1, 2].

Experimental angular distributions for the corresponding ground states (g.s.) were analyzed. The calculated double-folding potential within the framework of the optical model, the coupled-channel approach and the distorted-wave Born approximation has been applied successfully in describing the cross sections of elastic and inelastic scatterings, one-nucleon transfer and cluster-transfer reactions.

The strong coupling effects have been shown for the (d, p) and (d, t) one nucleon transfer nuclear reactions. Furthermore, it was found that in the $^9\text{Be}(d, ^7\text{Li})^5\text{Li}$ nuclear reaction the ^5He heavy cluster is transferred mainly simultaneously, and the contribution of its sequential transfer is an order of magnitude lower. The importance of taking into account the mechanism of sequential transfer of the n - p system has been revealed. Based on these observations from studying the interaction of the deuteron with ^9Be , it can be concluded that the ^9Be nucleus has cluster structure.

The analyze confirms a significant contribution of simultaneous five-nucleon transfer in the reaction channel $^9\text{Be}(d, ^4\text{He})^7\text{Li}$ with an agreement with the conclusion [3].

Keywords: cluster structure, optical model, CRC, DWBA, spectroscopic amplitudes, double folding, elastic and inelastic scattering

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Primary author: Mr MENDIBAYEV, Kairat (JINR, Institute of Nuclear Physics, L.N. Gumilyov Eurasian National University)

Co-authors: JANSEITOV, Daniyar (Joint Institute for Nuclear Research); LUKYANOV, Sergey; Prof. PENIONZHKEVICH, Yuri (JINR); MRAZEK, Jaromir (Nuclear Physics Institute); Dr TRZASKA, Wladislaw (Department of Physics, University of Jyväskylä); KUTERBEKOV, Kairat (L.N.Gumilyov Eurasian National University); Mr ZHOLDYBAYEV, T.

Presenter: Mr MENDIBAYEV, Kairat (JINR, Institute of Nuclear Physics, L.N. Gumilyov Eurasian National University)

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