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Study of internal structures of 9,10Be and 10B in scattering of 2H and 6Li from 9Be

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Angular distributions for the 9Be(d,d)9Be, 9Be(d,p)10Be, 9Be(d,t)8Be, and 9Be(d,4He)7Li channels were measured [1]. Experimental angular distributions were described within the optical model, the coupled channel approach, and the distorted wave Born approximation. The spectroscopic factors for the systems 9Be =alpha+ 5He and 7Li = d + 5He are close to unity, which confirms the contribution of the considered cluster configurations to the structure of ground states. The analysis shows that the contribution of the compound nucleus mechanism is negligible. In the (d, 4He) channel, the deuteron transfer provides only a small contribution, whereas a relatively large contribution of 5He transfer was found.
The results of recent experiment on studying nucleon and cluster transfer processes in the reactions of the 6Li (68 MeV) ions with the 9Be target nuclei are reported. The angular distributions for the reaction channels 9Be(6Li,4He)11Bg.s., and
9Be(6Li,10B)5Heg.s. have been measured. To describe the possible contributions of
sequential transfer of nucleon and alpha clusters, as direct transfer of the 5He cluster, the Coupled Reaction Channel method (FRESCO)[2] is used. The spectroscopic
amplitudes are obtained for the configurations of (9Be+d) and (6Li+5He) in the 11B
nucleus and (6Li+4He) in the 10B nucleus. The results indicate a strong correlation
between a neutron and an , leading to the formation of the 5He-cluster in the transfer processes. Figure shows the experimental differential cross sections for cluster transfer in the reaction channel 9Be(6Li,4He)11Bg.s. (circles) compared with the results of calculations (curves). In the case of 5He transfer, the following mechanisms were taken into account: simultaneous transfer (5He) and sequential transfer (n+4He and 4He+n). The probability of the sequential transfer (alpha-n or n-alpha) is much lower than that for the process of the simultaneous transfer of 5He over the entire range of angles.
[1] S. Lukyanov et al ., J.Phys.(London) G41, 035102 (2014).
[2] http://nrv.jinr.ru

Attendance Type

Primary authors: LUKYANOV, Sergey (FLNR); Dr AZHIBEKO, Aidos

Co-author: Dr MENDIBAYEV, Kayrat

Presenter: LUKYANOV, Sergey (FLNR)

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