INVESTIGATION OF THE CLUSTER STRUCTURE OF ^{9}Be BY REACTIONS WITH A DEUTERON BEAM

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The cluster structure of nuclei arises from a correlated motion of nucleons inside a nucleus. In this regime a simple subgroup can be seen as a single particle. This kind of behaviour can give insights into numerous characteristics of the nucleus, as well as affect the processes of nuclear reactions. Investigation of the cluster structure in nuclei is still one of the priority problems of modern nuclear physics in connection with the intensive developments of experimental devices.

Angular distributions of protons, deuterons, tritons and alpha particles emitted in the d + ^{9}Be reaction at E_{lab} = 19.5 and 35.0 MeV are measured. The elastic channel is analyzed in the framework of both the Optical Model and the Coupled Channel approach.

Two kind of optical potentials are analyzed: the semi-microscopic Double Folding potential and the phenomenological Woods–Saxon potential. The deformation parameter β_2 is obtained for the transition $5/2^- \rightarrow 3/2^-$ ^{9}Be. The (d,p) and (d,t) one nucleon exchange reactions are analyzed within the coupled reaction channel approach. The spectroscopic amplitudes for the different nuclear cluster configurations are calculated.

Differential cross sections for the reaction channel ^{9}Be (d,α)^{7}Li are calculated within the coupled reaction channel method including all possible reaction mechanisms. Corresponding contributions to the cross sections are analyzed.