

## INVESTIGATIONS OF THE EXCITED STATES OF 1P SHELL NUCLEI IN INTERACTION WITH DEUTERONS AT LOW ENERGIES

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The differential cross-sections of the elastic and inelastic  $d + {}^{13}\text{C}$  scattering were measured at  $E(d)=14.5$  and  $18$  MeV on U150M cyclotron of Institute of Nuclear Physics (Almaty, Kazakhstan).

The first  $3.09$  MeV ( $1/2^+$ ) excited state of  ${}^{13}\text{C}$  nucleus is of special interest because, it is a state with increased radius, where we can talk about a neutron halo-like structure.

The most probable candidate having the structure of  $\alpha$ -particle condensate is still considered a known Hoyle state of  $7.65$  MeV ( $0_2^+$ ) in the  ${}^{12}\text{C}$  nucleus. In the context of  $\alpha$ -particle hypothesis, the level of  $7.65$  MeV in the  ${}^{12}\text{C}$  nucleus is the simplest example of  $\alpha$ -particle condensate state and plays an important role in Astrophysics problem. In the work [1], it is proposed that similar Hoyle state can be detected in some neighboring nuclei, such as excited state  $8.86$  MeV ( $1/2^-$ ) in the  ${}^{13}\text{C}$  nucleus.

In this paper we show the results of the calculations of the radii of the excited states:  $3.09$  ( $1/2^+$ ) and  $8.86$  ( $1/2^-$ ) which were determined by the Modified diffraction model (MDM)[2] at  $E(d)=14.5$  MeV.

[1] M. Milin and W. von Oertzen, EPJ A V 14 (2002);

[2] A.N. Danilov et.al. Phys.Rev. C 80 (2009);

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