**POSSIBLE ROTATIONAL STRUCTURE OF 13C LOW-LYING EXCITED STATES**

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13C is a good example of a “normal” nucleus that is well described in the framework of the shell model. Its level scheme is reliably determined up to excitation energies ~ 10 MeV.

However, some open questions remain regarding the structure of low-lying 13C states. This leads to increased attention to 13C so far.

In [1] a hypothesis was put forward about a new type of symmetry in the 13C structure - D’3h symmetry. Based on this symmetry within the framework of the algebraic cluster model [1] a rotational nature was predicted for low-lying excited states of 13C and almost all low-lying 13C states were distributed among 6 rotational bands. Thus, a critical analysis of the available data is required to answer the question about the nature of low-lying excited states of 13C.

We propose to check the possibility of the existence of these rotational bands based on Modified diffraction model (MDM) analysis. The g.s.-based rotational band proposed in the framework of the algebraic cluster model may exist, since MDM analysis showed that all states of this band have normal, nonincreased root mean square radii. The second rotational band predicted in the framework of the algebraic cluster model, the band based on the 3.09 MeV state, is very interesting and promising, since its first state of this band is the state with a halo. And the question arises about the nature of other states of this band? It is quite natural that the states of one band should have similar features. Is the halo structure preserved for the other members of this band? It should also be noted that all other members of this band are unbound, while 3.09 MeV is bound. Indeed, a preliminary MDM analysis of the existing experimental data on the scattering of light particles showed that the elder members of this band have increased root mean square radius. This result speaks in favor of the possibility of the existence of this rotational band and, possibly, of the halo–like structure of its elder members. The band predicted in the framework of the algebraic cluster model, which contains the 9.90 MeV state, most likely does not exist, since we showed within MDM that the members of this assumed band have different radii. 8.86 MeV has an increased radius, the rest of the states have a non-increased radius. Thus, some of the predicted rotational bands may actually exist. It should be mentioned that negation of at least one rotational band predicted within the D'3h symmetry raises doubts on the applicability of this symmetry to 13C.

1. R. Bijker, Phys. Rev. Lett. 122, 162501 (2019).