SEARCH FOR ALPHA CLUSTER STATES IN ^{11}B

Belyaeva T.L.[1], Goncharov S.A.[2], Danilov A.N.[3], Demyanova A.S.[3], Ogloblin A.A.[3], Maslov V.A.[4], Sobolev Yu.G.[4], Trzaska W.[5], Khlebnikov S.V.[6], Burtebaev N.[7], Zholdybayev T.[7], Saduyev N.[8], Heikkinen P.[5], Julin R.[5], Tyurin G.P.[5]

[1]*Universidad Autonoma del Estado de Mexico, Toluca, Mexico;*
[2]*Moscow M. V. Lomonosov State University, Skobeltsyn Institute of Nuclear Physics, Russia;*
[3]*RRC Kurchatov Institute, Moscow, Russia;* [4]*JINR, Moscow region, Russia;* [5]*JYFL, Jyvaskyla, Finland;* [6]*Khlopin Radium Inst., St.-Petersburg, Russia;* [7]*Nuclear Phys. Inst., Almaty, Kazakhstan;* [8]*Al-Farabi Kazakh National University, Kazakhstan*
E-mail: danilov1987@mail.ru

There are predictions [1,2] based on the model of antisymmetrized molecular dynamics (AMD) and alpha-condensate models that two states in ^{11}B: $½^-$, $E^* = 8.56$ MeV and $½^+$ (possibly E^*=12.56 MeV), have mean-square radii RMS, which are much larger than the radius of the ground state.

For verification of this prediction two experiments on ^{11}B+α scattering were performed at E_α=65MeV and 40MeV (last data were partly published in [3]). Goal of these experiments was to determine radius values of exciting states in ^{11}B using Modified Diffraction Model (MDM). Preliminary value of 8.56 MeV state radius was determined: $\langle R \rangle = 2.68 \pm 0.15$ fm, which is 0.4 fm larger than radius of the ground state. This value is in agreement with previous data [5] and AMD calculations [1].

For the 12.56 MeV ($½^+$) state [6] of ^{11}B there exists contradictory information concerning its isospin. The model [2] suggest that $T = ½$. In the case of $T = 3/2$, this state cannot be excited in the inelastic alpha particle scattering.

In our experiment we observed state with excitation energy 12.6 MeV. As it is excited in alpha scattering, so it's with $T = ½$. Also this state was detected in the resonance reaction ^{7}Li + α [6].

We got preliminary results for differential cross-section of inelastic scattering with excitation of this state. We estimated RMS radius for 12.6 MeV state using MDM. Its value is rather smaller than predicted in [2]. Thus, we can conclude that the predictions [2] were not confirmed.

We got preliminary results for the differential cross-section of the inelastic scattering leading to 10.34 and 13.1 MeV states. These states are considered [7] to be the second and the fourth members of the rotational band based on the 8.56 MeV state.

1. Kanada-En'yo Y // Phys. Rev. C. 2007. V.75. 024302.
2. T.Yamada, Y.Funaki // Phys. Rev. C. 2010. V.82. 064315.
3. N.Burtebaev *et al*. // Physics of Atomic Nuclei. 2005. V.68. P.1356.
4. A.N.Danilov *et al*. // Phys.Rev. C. 2009. V.80. 054603.
5. A.S.Demyanova *et al*. // Int. J. of Modern Physics. E. 2011. V.20. P.915.
6. H.Yamaguchi *et al*. // Phys. Rev. C. 2011. V.83. 034306.
7. T.Sahara, Y.Kanada-En'yo // Phys. Rev. C. 2012. V.85. 054320.