Contribution ID: **148** Type: **Poster**

States of 13C with abnormal radii

**Click here to download the template: <a href="https://agenda.infn.it/materialDisplay.py?mater
Word , <a href="https://agenda.infn.it/materialDisplay.py?materialId=2&confId=5235">Lat**

The 12th International Conference on Nucleus-Nucleus Collisions, June 21-26, 2015, Catania, Italy

States of 13C with abnormal radii

A. Demyanova1, A. Ogloblin1, A. Danilov1, T. Belyaeva2, S. Goncharov3, W. Trzaska4

1NRC Kurchatov Institute, Moscow 123182, Russia
2Universidad Autonoma del Estado de Mexico, Toluca, 50000, Mexico
3Lomonosov Moscow State University, Moscow, 119991, Russia
4JYFL, Jyvaskyla, Finland

In our previous experiment on the inelastic scattering 13C (α,α') at E(α) = 65 MeV [1] we claimed the observation of three excited states whose radii differed from that of the ground state: 3.09 MeV (1/2+), 8.86 MeV ($1/2^-$) and 9.90 MeV ($3/2^-$). In this paper we continued the analysis including in it some other data. The evaluation of radius of the 3.09 MeV state was performed by three independent methods, Modified diffraction model (MDM) [2], Nuclear rainbow method (NRM) [3, 4] and method using the asymptotic normalization coefficients (ANC) [5, 6]. The radius occurred to be enhanced in good agreement with theoretical predictions [7] demonstrating the existence of a neutron halo in this state. All three approaches gave similar values verifying the validity of the used methods. Application of MDM and NRM to the 8.86 MeV state showed that the latter also has an enhanced radius close to that of the Hoyle state (7.65 MeV, 0+) of 12C [2]. The radius value of the 9.90 MeV remains an open question. The estimates done both by MDM and NRM methods gave the value less than that of the ground state. As this state is considered to be the head of the $3/2^-$ rotational band [8], and its enhanced radius is predicted [9] a more elaborate analysis of the problem is required. Because of the importance of the obtained result new measurements of the inelastic scattering 13C (α,α') at E(α) = 90 MeV were performed. The analysis is in progress.

[1] A.S. Demyanova et al., EPJ Web of Conferences 66, 02027 (2014)
[2] A.N. Danilov et al., Phys. Rev. C 80, 054603 (2009)
[3] S.Ohkubo and Y. Hirabayashi, Phys. Rev. C 75, 044609 (2007)
[4] A.S. Demyanova et al., Int. J. Mod. Phys. E 20, No 4, 915 (2011)
[5] Z.H. Liu et al., Phys. Rev. C 64, 034312 (2001)
[6] T.L. Belyaeva et al., Phys.Rev. C 90, 064610-1 (2014)
[7] T. Yamada and Y. Funaki, Int. J. Mod. Phys. E 17, 2101 (2008)
[8] M. Milin and W. von Oertzen, Eur. Phys. J. A 14, 295 (2002)
[9] N. Furutachi, M. Kimura, Phys. Rev. C 83, 021303® (2011)

Primary author: Dr DEMYANOVA, Alla (NRC Kurchatov Institute)

Co-authors: Prof. OGLOBLIN, Alexey (Kurchatov institute); Mr DANILOV, Andrey (Kurchatov Institute, Moscow, Russia); Prof. GONCHAROV, Sergey (MSU, Moscow, Russia); Prof. BELYAEVA, Tatyana (Universidad Autonoma del Estado de Mexico); Dr TRZASKA, Wladislaw (JYFL, Jyvaskyla, Finland)

Presenter: Dr DEMYANOVA, Alla (NRC Kurchatov Institute)

Track Classification: Nuclear Structure