

Neutron halos in excited states of ^{12}B

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An experiment was done to search for states with a neutron halo in ^{12}B . The measurements were carried out at the cyclotron of the University of Jyväskylä (Finland) using Large Scattering Chamber (LSC). The idea of the work was to search for two states with the expected neutron halo, 1^- and 2^- . Differential cross sections with excitation of ^{12}B states, including abovementioned states, were observed. The preliminary calculations on halo radii by the method of asymptotic normalization coefficients for the 2^- and 1^- states gave following values: 5.9 fm and 7.7 fm, which is much larger than the radius of the valence neutron in the ground state. This confirms the presence of a neutron halo in these states, which are in a discrete spectrum. An unexpected result was obtained for the 3^- , 3.39 MeV state, which is in continuum 19 keV above the decay threshold $^{12}\text{B} \rightarrow ^{11}\text{B} + n$, estimation for its halo radius is ~ 6.5 fm. This indicates that the halo is present in this state as well. Until now, the neutron halo in unbound states has been observed only for the members of the rotational bands.

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