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Search for exotic structures in ^{11}C

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The ^{11}C nucleus is a proton-rich, unstable isotope with intriguing exotic features. Unlike its neutron-rich isobar-analogue nucleus ^{11}Be with pronounced neutron halo, ^{11}C doesn't form a strong proton halo due to Coulomb suppression.
^{11}C and ^{11}B are the mirror nuclei. Based on calculations of the antisymmetrized molecular dynamics (AMD), the generator coordinate method, and the orthogonality condition model, the $3/2^-_3$ states in ^{11}C (^{11}B) were suggested to be 2 +^{3}He(t) cluster states, which are analogous to the Hoyle state and have increased radii correspondingly.
One of last experiments on a resonance reaction ^{12}C(^{11}C,α^{7}Be) [1] has shown that the 8.10-MeV state in ^{11}C is a resonance, is a head of the K^π = 3/2$^-$ rotational band and probably has a three-center (2 + ^{3}He) cluster structure, similar to the 8.56-MeV state in ^{11}B. While authors [1] mentioned that the obtained low statistics prevent drawing any strong conclusions.
In order to try to solve open questions regarding excited states of ^{11}C, we made our own experiment ^{10}B(^{7}Li,^{6}He)^{11}C. Experiment was done using ^{7}Li beam (E_{LAB} = 58 MeV) U-400 of cyclotron @ FLNR JINR, Dubna. Angular distributions were measured for the g.s. and the 8.1 MeV states of ^{11}C. DWBA analysis was done for the new experimental data. Radial dependences of the form-factor were obtained.

1. Ziming Li et al., Phys. Rev. C 107, 014320 (2023)

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