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A high-energy direct reaction study of ^{18}B and ^{21}C

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The investigation of the light neutron-rich dripline nuclei, including those exhibiting halos, is a central theme of nuclear structure physics. In the present paper, a study aimed at exploring the structure of the most neutron-rich isotopes of boron and carbon will be presented. Of particular interest are the heaviest candidate two-neutron halo systems, ^{19}B and ^{22}C and the associated unbound sub-systems ^{18}B and ^{21}C, the states of which are essential to the defining the ^{17}B-n and ^{20}C-n interactions for three-body models. In addition, ^{18}B and ^{21}C are of much interest in terms of the evolution of shell- structure as their structure can shed light directly on the evolution of the neutron $2s_{1/2}$ and $1d_{5/2}$ single-particle orbitals which are predicted to become degenerate in this region.

Motivated by these considerations, we have undertaken an investigation of the structure of ^{18}B and ^{21}C using the complementary probes of neutron and proton knockout from high-energy secondary beams provided by the RIKEN RIBF. The experimental setup incorporated the SAMURAI spectrometer coupled to the large area neutron detector NEBULA and the DALI2 NaI array. The results obtained in terms of the invariant mass spectra will presented as will the momentum distributions obtained for the neutron removal. The interpretation in terms of shell-model predictions will be discussed.

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