Study of halo nature via reaction and neutron removal cross sections

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Neutron-rich nuclei near the neutron dripline have exotic properties such as the halo structure in which a core nucleus is surrounded by a halo of orbiting extra neutron(s). For example, ^{11}Be and ^{15,19}C are *s*-wave one-neutron halo nuclei, ^{31}Ne and ^{37}Mg are expected as *p*-wave one-neutron halo nuclei, while ^{6}He, ^{11}Li, ^{14}Be, and ^{22}C are Borromean nuclei with two-neutron halo. These halo nuclei have been found through a sudden enhancement in measured reaction cross section for the isotopes and large neutron removal cross section. Thus reaction and neutron removal cross sections are a good indicator of halo nuclei.

To extract halo nature from reaction and neutron removal cross sections accurately, an accurate analysis for neutron removal reactions is highly desired. In this work, we perform systematical analyses of reaction and neutron removal cross sections of one- and two-neutron halo nuclei based on CDCC method, which is one of a reliable method of describing breakup processes of halo nuclei. Furthermore we propose a parameter $\mathcal{H}$ quantifying the halo nature, and properties of $\mathcal{H}$ are also discussed.