FORMATION OF TWO-NEUTRON HALO IN DRIP-LINE NUCLEI FROM THE LOW- ENERGY NEUTRON-NEUTRON INTERACTION

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The formation of two-neutron halo is described using the neutron-neutron (nn) interaction fixed at the low-energy nn scattering limit. This method is tested for loosely-bound two neutrons in ^{24}O, where a good agreement with experimental data is found. It is applied to halo neutrons in ^{22}C in two ways: with the ^{20}C core being closed or correlated due to excitations from the closed core. This nn interaction is shown to be strong enough to produce a two- neutron halo in both cases, locating ^{22}C on the drip line, while ^{21}C remains unbound. A unique relation between the two neutron separation energy, S_{2n} and the radius of neutron halo is presented. New predictions for S_{2n} and the radius of neutron halo are given for ^{22}C. The appearance of Efimov states is also discussed. Spectra of excited states in ^{22}C are predicted. The n-n interaction used here is large compared to conventional shell-model interactions.
Roles of three-body forces are discussed.
The present method is applied also to two-neutron halo state in ^{11}Li. We find that only $s_{1/2}^2$ configuration is not enough to reproduce both the experimental S_{2n} and halo radius for the two-neutron state but the admixture of $p_{1/2}^2$ configuration is necessary. Experimental S_{2n} and halo radius are reproduced well with nearly equal mixing of $s_{1/2}^2$ and $p_{1/2}^2$ configurations.