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# Perturbative EFT model of core excitations in one-neutron halo nuclei

Halo nuclei are fascinating short-lived nuclear objects found near the dripline.
In standard reaction models, halo nuclei are usually described as an inert core with one or two weakly bound neutrons. However, some breakup data suggest that the excitation of the core to its excited states to have a significant influence in the dynamics of the reaction [1]. In order to shed more light on this phenomenon, we study the typical one-neutron halo nucleus $^{11}$Be and we propose a simple structure model of it based on the rigid rotor model. We assume the core to be weakly deformed, which we treat at the first order of perturbations to couple it to its $2^+$ first excited state. In this way, we explicitly account for core excitations as a new degree of freedom while still describing the interaction between the core and the neutron in halo-EFT [2].
Our calculations were performed using the calculable R-Matrix method on a Lagrange mesh [4]. We have been able to reproduce with a good agreement, the coupled-channels results [3], improve the halo-EFT model [2] and bring another physical insight on the structure of the bound states of $^{11}$Be.

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