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Halo EFT: an effective bridge between ab initio nuclear-structure calculations and nuclear-reaction modelling

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Within the last 20 years, nuclear-structure calculations have made very significant progresses. More and more nuclei can now be computed ab initio. This prowess is not solely limited to the bottom of the valley of stability, but reaches the nucleon driplines [1]. Testing the predictions of ab initio calculations away from stability requires a way to bridge these many-body results to usual few-body models of reactions. Halo-EFT (or Cluster-EFT) provides a simple, yet effective, description of halo nuclei. It is built upon the clear separation of scales in these exotic nuclei: a compact and tightly-bound core to which a diffuse halo is loosely bound [2,3]. This description can be easily included within a model of reactions, such as transfer [4], breakup [5], or knockout [6]. By fitting the low-energy constants of this description to the ab initio predictions, we can test the reliability of these models. Conversely, starting from reaction observables, we can also infer key structure informations such as the one-nucleon separation energy or the asymptotic normalisation constant of the bound state [7].

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