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Description of three-body resonances and two-neutron decays

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Nuclei that present a three-body character have attracted special interest over the past few decades. Of particular relevance is the case of Borromean two-neutron halo nuclei, e.g., 6He, 11Li or 14Be, which exhibit exotic features in nuclear collisions [1]. The correlations between the valence neutrons, often described in terms of pairing, are known to play a fundamental role in shaping the properties of these systems [2,3]. The evolution of these correlations beyond the driplines gives rise to two-neutron emitters, e.g., 13Li, 16Be or 26O [4]. Since they have a marked core+N+N character, three-body models are a natural choice to analyze their structure and processes involving them [5, 6]. The description of the continuum in three-body nuclei, however, is not an easy task. In Ref. [7] we proposed a method to characterize few-body resonances from the time evolution of the lowest eigenstates of a resonant operator in a discrete basis, with the aim of studying the population of these systems in knockout reactions. The relative-energy distributions in their decay can be computed by solving an inhomogeneus equation with a source term involving the resonance eigenstate [8]. The method has been applied to 16Be [9] and 13Li [10], showing signatures of direct two-neutron decay, and in good agreement with recent experimental observations. These unpublished results will be presented, together with prospects for future developments and applications.

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Collaboration

Primary author: Dr CASAL, Jesús (Universidad de Sevilla)

Presenter: Dr CASAL, Jesús (Universidad de Sevilla)

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