Contribution ID: **67** Type: **Contributed talk**

Reactions with weakly-bound exotic nuclei using deformed two-body models

Thursday 11 July 2024 17:10 (20 minutes)

The study of reactions involving weakly-bound exotic nuclei is an active field due to advances in radioactive beam facilities. Many of these nuclei can be approximately described by a model consisting of an inert core and one or more valence nucleons. For some of these nuclei, the quadrupole deformation is especially relevant and should be included in the structure models. This is the case of ^{11}Be and ^{17}C, which can be approximately described as a core and a weakly-bound neutron. In order to include the effect of the deformation in these two nuclei, two different models have been used: the semi-microscopic particle-plus-AMD (PAMD) model from [Phys. Rev. C 89 (2014) 014333] and the Nilsson model.

The bound and unbound states wavefunctions obtained with both models have been tested by comparing with experimental data for transfer reactions, using as reaction framework the Adiabatic Distorted Wave Approximation (ADWA). In the case of bound states, by applying them to the transfer reactions $^{11}\mathrm{Be}(p,d)^{10}\mathrm{Be}$ and $^{16}\mathrm{C}(d,p)^{17}\mathrm{C}$ [Phys. Rev. C 108 (2023) 024613]. The results are consistent with the data from [Chinese Phys. Lett. 35 (2018) 082501] and [Nucl. Phys. A 683 (2001) 48] in case of $^{11}\mathrm{Be}(p,d)^{10}\mathrm{Be}$, and with the data from [Phys. Lett. B 811 (2020) 135939] for $^{16}\mathrm{C}(d,p)^{17}\mathrm{C}$.

In our calculations, the continuum spectrum of the weakly-bound nuclei is discretized using the transformed harmonic oscillator basis (THO) [Phys. Rev. C 80 (2009) 054605]. This basis has been successfully applied to the discretization of the continuum of two-body and three-body weakly-bound nuclei for the analysis of break up and transfer reactions [Phys. Rev. Lett. 109 (2012) 232502, Phys. Rev. C 94 (2016) 054622]. The obtained ^{17}C wavefunctions are applied to transfer reactions populating unbound states as well as to breakup reactions. In particular, the transfer to the continuum in $^{16}\mathrm{C}(d,p)^{17}\mathrm{C}$ is studied, with the motivation of investigating the N=16 shell gap.

session

I. Nuclear Structure and Reactions

Authors: PUNTA DE LA HERRÁN, Pedro (Universidad de Sevilla); Dr LAY, José Antonio (Universidad de Sevilla); Dr MORO, Antonio (Universidad de Sevilla)

Presenter: PUNTA DE LA HERRÁN, Pedro (Universidad de Sevilla)

Session Classification: I. Nuclear Structure and Reactions