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Effects of pairing through the intermediary continuum in a 2n transfer process

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Two particle transfer reactions provide realistic tools to understand reaction mechanisms due to the enhanced matrix elements connecting systems of neighbouring nuclei differing by two units. The resultant pairing interactions in the (A+2) nuclei, if present in a weakly bound system near the drip lines, can develop diffused Borromean halos as the Cooper pair of the nucleons can scatter into the continuum states of the intermediary nucleus [1]. The ^{6}He nucleus presents a perfect candidate to study such pairing effects in a diffused halo near the neutron drip line. In fact, apart from the nuclear physics viewpoint, an understanding of 6He structure is also crucial due to its vital role in stellar astrophysics [2].
We, therefore, perform two neutron transfer calculations for the reaction ^{18}O(^{4}He,^{6}He)^{16}O using a modified version of the Transformed Form Factors (TFF) code [3]. We generate the spectra of the intermediary ^{5}He via the pseudostates (PS) approach, for which we use the analytical transformed harmonic oscillator (THO) basis [4]. THO maintains the lucidity of the harmonic oscillator functions, converting, however, their Gaussian asymptotic behavior to a better suited exponential mode [4]. We differentiate three cases of interest on the basis of the ground state of ^{5}He. In the two hypothetical cases, it is bound with one neutron separation energies S_n of 1 and 0.1 MeV. For the realistic case, a state in our discretized continuum (at 0.69 MeV) represents the resonance at 0.79 MeV.
Our results indicate that pairing enhancement is largest for the continuum case and can significantly enhance the two neutron transfer cross-sections in the cases when the intermediary nucleus does not have a bound state. This provides a way to study the formation of Borromean halos near the neutron drip line in the light mass region.
References
[1] W. von Oertzen and A. Vitturi, Reports on Progress in Physics 64, 1247 (2001).
[2] A. Bartlett, J. G orres, G. J. Mathews, K. Otsuki, M. Wiescher, D. Frekers, A. Mengoni, and J. Tostevin, Phys. Rev. C 74, 015802 (2006).
[3] L. Fortunato, I. Inci, J.-A. Lay, and A. Vitturi, Computation 5(3), 36 (2017).
[4] J. Casal, M. Rodrguez-Gallardo, and J. M. Arias, Phys. Rev. C 88, 014327 (2013); J. A. Lay, A. M. Moro, J. M. Arias, and J. G omez-Camacho, Phys. Rev. C 85, 054618 (2012).

Topic

Theory

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