

Shape phase transitions and shape coexistence through two-neutron transfer

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Two-neutron transfer reactions are sensitive to Quantum shape phase transitions along isotopic chains through two-neutron intensities, as calculated for example in the framework of the Interacting Boson Model [1-3]. Alternatively, the ground state of an isotope can also change along the isotopic chain, for example from spherical to deformed, due to shape coexistence.

In this contribution we will discuss the possibility of distinguishing these two cases through two-neutron transfer reactions [4,5]. We will take as example two isotopic chains: Samarium and Zirconium, as respective examples of shape phase transition [1] and shape coexistence [6].

Two-neutron transfer cross sections are calculated in second-order DWBA from two-neutron intensities obtained in the IBM model [1,7] for the Samarium and from two-neutron amplitudes calculated in Monte Carlo Shell Model framework from T. Togashi and collaborators [6] for the Zirconium. A good agreement with available experimental data is found in both cases [8,9]. More importantly, qualitative differences are found in the cross sections along both isotopic chains, allowing us to use two-neutron transfer as a probe to distinguish among the two scenarios.

- [1] R. Fossion, C. E. Alonso, J. M. Arias, L. Fortunato, and A. Vitturi, Phys. Rev. C 76, 014316 (2007).
- [2] Y. Zhang and F. Iachello, Phys. Rev. C 95, 034306 (2017).
- [3] J.E. Garcia-Ramos; J.M. Arias, and A. Vitturi, 2020, Chinese Physics C 44: 124101
- [4] A. Vitturi, L. Fortunato, I. Inci, and J. A. Lay, JPS Conf. Proc. 23, 01201 (2018).
- [5] J. A. Lay et al., arXiv:1905.12976
- [6] T. Togashi et al., Phys. Rev. Lett. 117, 172502 (2016).
- [7] P. Jodidar et al., In preparation.
- [8] J. H. Bjerregaard, O. Hansen, O. Nathan and S. Hinds, Nucl. Phys. 86, 145 (1966).
- [9] E.R. Flynn, J.G. Beery, and A.G. Blair, Nucl. Phys. A 218, 285 (1974)

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