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Generalised seniority for isomers and low- lying excitations in nuclei

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Isomers are the long-lived excited states of nuclei and are of particular interest due to their capacities to provide insights into the nuclear structure [1]. The reason behind their occurrence depends mostly upon the structural surroundings and can vary from region to region. Symmetries of pairing Hamiltonian for the shell model in terms of seniority and generalized seniority are known to play a crucial role in explaining the semi-magic spherical/ near-spherical isomers, particularly for the Sn isotopes [2, 3]. Our recent works provide more credence to the generalized seniority approach to decipher the decay probabilities as well as moments of isomers and other low-lying excited states [4–7]. In this conference, I will focus on the solution for the puzzle of finding consistent nuclear configurations to understand both the decay probabilities and moments of the 9/2−, 8+, and 21/2− isomers in and around N = 126 closed shell in terms of generalized seniority [8]. Though h9/2 is the dominant orbital for these isomers, the role of configuration mixing from the surrounding f7/2 and i13/2 orbitals is found to be very important for the consistent explanation of all the isomeric properties such as the B(E2) rates, Q−moments, and g−factors. Further, recent efforts to understand the B(E3) rates in both odd-A and even-A N = 80, 82, 84 isotones using the generalized seniority will also be discussed [9].

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