

Expanding Horizons of the Seniority Isomers

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Nuclear isomers are beginning to play an ever important role in unravelling the nuclear structure changes at higher spins and excitations. The seniority isomers constitute a separate class of isomers which are not exactly spin isomers. Very recently, we have shown the emergence of a new class of seniority isomers for the first time, which decay by odd-multipole transitions. This finding has led to many additional findings and explanations of some of the longstanding puzzles in nuclear structure physics. For example, we could address one of the long standing puzzles in nuclear structure physics, that of a asymmetric and double hump behavior of the $B(E2; 2+ \rightarrow 0+)$ values across the chain of Sn isotopes. Using the simple Generalized Seniority approach, we are able to show that a change of dominating orbitals from $g_{7/2}$ to $h_{11/2}$ after the mid-shell is responsible for the observed behavior. This simple yet robust interpretation is supported by the shell model calculations. We further strengthen this interpretation by expanding the Generalized seniority approach to magnetic moments and quadrupole moments, which is also able to explain the observed features in other isotopic chains.

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