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Algebraic Models for Structure of Heavy N=Z Nuclei

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Abstract

One important aspect of N=Z nuclei is that protons and neutrons in these nuclei occupy the same orbits and therefore isospin is important for these nuclei. Heavy N=Z nuclei start from ^{62}Ga and end with ^{100}Sn - these are the focus of many present and future experiments with RIB facilities. Heavy $N = Z$ odd-odd nuclei in particular are expected to give new insights into isoscalar vs isovector pairing and also carry signatures of Wigner's $SU(4)$ symmetry. Incorporating these, within the shell model with $L - S$ coupling, led to the basic $SO(8)$ algebraic model. The $SO(8)$ model admits three subalgebras and results for complete classification of shell model states with $SO(8)$ seniority $v = 0, 1, 2, 3$ and 4, for the three algebras, will be presented. With Dyson boson mapping and adding quadrupole degree of freedom, $SO(8)$ model goes into the algebraic spin-isospin (ST) invariant interacting boson model (IBM) with s (scalar or $\ell = 0$) and d (quadrupole or $\ell = 2$) bosons, i.e. sdIBM-ST. Using a basis defined by the $SO_{sdST}(36) \supset SO_{sST}(6) \oplus SO_{dST}(30)$ limit of sdIBM-ST, results obtained for heavy N=Z nuclei for deuteron transfer intensities, GT strengths and α-transfer strengths, as a function of a parameter measuring the competition between $T = 0$ and $T = 1$ pairing, will be presented.