

## Symplectic Extensions of the Proton-neutron Version of the Interacting Boson Model

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We introduce the symplectic extension  $Sp(24, R) \supset U(12) \supset U_\pi(6) \otimes U_\nu(6)$  of the proton ( $\pi$ )-neutron ( $\nu$ ) version of the prominent Interacting Boson Model (IBM - 2). We consider in particular a new reduction chain starting with the direct product  $Sp(4, R) \otimes O(6)$ , where the  $Sp(4, R)$  group is used as a classification group for the even - even nuclei specified by the total number of bosons  $N$ , that build them and the third projection  $F_0$  of the  $F$ -spin. This allows for a unified description of sequences of nuclei with a general Hamiltonian in which the interaction strengths, depend on the classification quantum numbers and interactions are expressed in terms of the Casimir invariants of all the subgroups of  $O(6)$ , defining the dynamical symmetry.