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Aligned neutron-proton pairs in N=Z nuclei

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It is shown that the aligned neutron-proton pair with angular momentum J=9 and isospin T=0 plays a central role in the low-energy spectroscopy of the N~Z nuclei approaching 100Sn. This observation is made in the context of the spherical shell model on the basis of a realistic two-nucleon interaction constructed for the g9/2 orbit. Shell-model results are analyzed in terms of a variety of two-nucleon pairs corresponding to different choices of their coupled angular momentum J and isospin T. The analysis is performed exactly for four holes (96Cd) and carried further for six and eight holes (94Ag and 92Pd) by means of a mapping to an appropriate version of the interacting boson model.

On the basis of these results one concludes that a realistic model can be formulated in terms of s (with J=0) and b (i.e., aligned J=9) bosons. Due to its simplicity, such a model could be of use to elucidate the main structural features of N~Z nuclei in this mass region. Examples of simple predictions of such a model will be given.

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