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Quarteting in N=Z nuclei

The phenomenon of quarteting in even-even $N = Z$ nuclei has a long history in nuclear structure [1].
In a recent work [2] we have highlighted on analytic grounds the key role played by the isovector pairing in such a phenomenon. We have indeed shown that α-like quartets, i.e., correlated four-body structures made by two protons and two neutrons, do represent the distinctive feature of the exact eigenstates of this Hamiltonian in $N = Z$ even-even systems.
But how do quartets develop in the presence of a general Hamiltonian?
I will provide a description of deformed $N = Z$ nuclei in the sd and pf shells in a formalism of α-like quartets.
I will show how these quartets have been built by resorting to the use of proper intrinsic states [3].
As a peculiarity of this approach, which improves a technique employed in previous works [4,5], it will be shown that the spectra of these nuclei can be organized in bands associated to the various intrinsic states built in terms of quartets. The quartet structure of both the ground and excited states of these $N = Z$ nuclei is expected to influence significantly the outcomes of alpha transfer and scattering processes.

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Topic

Theory

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