Shell Model Analysis of Multiple $SU(3)$ algebras in Nuclei

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Abstract

Rotational $SU(3)$ symmetry continues to generate new results in the nuclear shell model (SM). Interestingly, it is possible to have multiple $SU(3)$ algebras for nucleons occupying an oscillator shell η. Several different aspects of the multiple $SU(3)$ algebras are investigated using shell model and also deformed shell model (DSM) based on Hartree-Fock single particle states with nucleons in sdg orbits ($\eta = 4$ shell) giving four $SU(3)$ algebras. Numerical results obtained using Antoine code and a DSM code showed that one of the $SU(3)$ algebra generates prolate shapes, one oblate shape and the other two also generate prolate shape but one of them gives quiet small quadrupole moments for low-lying levels. The conclusions from shell model studies are further tested using multiple $SU(3)$ algebras in the sdg interacting boson model. The present study compliments our previous analysis of multiple pairing algebras in shell model and interacting boson model reported in [1]. Some details of the present investigations are available in [2].

R. Sahu and P.C. Srivastava are collaborators in this work.

References

[1] V.K.B. Kota, *Bulg. J. Phys.* **44** (2017) 454-465.
[2] V.K.B. Kota, R. Sahu and P.C. Srivastava, arXiv:1903.01131 [nucl-th] (2019).