

## On the Algebraic Realization of Collective Dynamics in Nuclei

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### **Abstract**

We explore the possibility of achieving algebraic realization of collective dynamics in spherical, deformed and transitional nuclei. Thus, we aim at the description of variety of collective structures by using combinations of collective model invariants which in the single-shell limit go into Casimir invariants of an algebraic theory related with the pairing and the quadrupole-quadrupole interactions known to be the two most important ingredients in the residual part of the effective nuclear Hamiltonian. This way, we justify the plausibility in the build-up of a mixed-mode method as a universal approach for the description of collective dynamics equally well in both spherical and deformed nuclei. This method will exploit the fair competition between the pairing and the quadrupole-quadrupole terms of a schematic Hamiltonian being taken care on an equal footing. The usefulness of the many-to-single-shell mapping prescription is tested and its degree of success demonstrated by evaluating and comparing the macroscopic collective and the microscopic shell-model Hamiltonian results for the energy spectra and electromagnetic transition strengths.