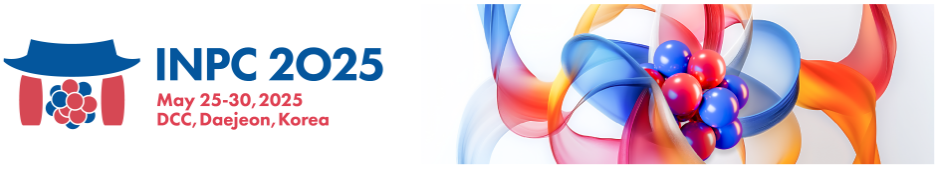

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Octupole phonon excitations on the shell model states in medium and heavy nuclei

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Large-scale nuclear shell-model calculations are performed in Xe, Cs, and Ba isotopes up to mass 142 (Z > 50 and N > 82) assuming tin-132 as a doubly magic core. All the single-particle levels in the one-major shells are considered [1]. For an effective two-body interaction, only one set of the multipole pairing and quadrupole-quadrupole interactions between neutrons and protons is employed and the strengths of the two-body interactions are set constant for all the nuclei considered. These interactions are phenomenologically determined to reproduce the experimental energy spectra in two-body systems. Single-particle energies are set constant for all the nuclei except the neutron intruder orbital. Electromagnetic transitions and moments are also calculated and excelent agreements are obtained.

In this mass region, octupole correlated states are found in the low-lying energy, for which the collective octupole vibrational motion is involved. These states are constructed by phenomenologically introducing a collective octupole-phonon built on top of each shell-model state. Octupole vibrational bandsnaturally emerge in this treatment.

[1] N. Yoshinaga *et al.*, Phys. Rev. C **109**, 064313 (2024).

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