

Systematics of characteristics of pygmy dipole resonances in middle and heavy atomic nuclei with neutron excess

Wednesday 12 November 2025 15:00 (1 hour)

The systematics of energies and contribution to the energy-weighted sum rule of dipole gamma transitions of pygmy dipole resonance (PDR) in middle and heavy nuclei with an excess of neutrons are considered. To describe the energy of the PDR, a macroscopic model of Isacker-Nagarajan-Warner [1] was applied with a relative displacement of the densities of the protons of the crust and surface neutrons. Modified expressions for calculating energy with the number of near-surface neutrons in proportion to the thickness of neutron skin according to the Pethick- Ravenhall approach [2] are presented. Analytical expressions for PDR fraction to the energy weighted sum rule for electric dipole transitions (E1 EWSR) are compared with microscopic calculations and experimental data. Simplified expressions for calculating the PDR contributions in E1 EWSR are presented.

[1] P. Van Isacker, M.A. Nagarajan, D.D. Warner, PRC 45(1), R13(1992).

[2] C.J. Pethick, D.G. Ravenhall, NPA, 606(1-2), 173–182(1996).

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Session Classification: Presentations II