The systematic dependence of $E(2_1^+)$ and energy ratio $R_{4/2}(= E(4_1^+)/E(2_1^+))$ on N, N_pN_n, N_B and p-factor for A=120-200 mass region nuclei

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The systematic dependence of energy $E(2_1^+)$ and energy ratio $R_{4/2}(= E(4_1^+)/E(2_1^+))$ on neutron number (N), number of valence proton and valence neutron (N_pN_n), total boson number (N_B) and p-factor ($p = N_pN_n = (N_p + N_n)$) for A=120-200 mass region nuclei. Gupta et al. [1] grouped the A=120-200 nuclei into four quadrants. The first quadrant (Q-I) of $N > 82$ is of Z=50-82, $82 \leq N < 104$ shell space with particle like proton-bosons and neutron-bosons forming the p-p space. Second quadrant (Q-II) of $82 \leq N \leq 104$ is of Z=50-82 shell space, with hole like proton-bosons space and particle like neutron-bosons space forming the h-p space. Third quadrant (Q-III) of $104 \leq N < 126$ of Z=50-82 shell space, with hole like proton-bosons and neutron-bosons forming h-h space. The fourth quadrant (Q-IV) of $N < 82$ of Z=50-82 shell space with particle like proton-bosons and hole like neutron-bosons forming the p-h space. In brief, quadrant I and III for p-p and h-h bosons space, and II, IV for p-h and h-p bosons space respectively. A simple exponential dependence of $E(2_1^+)$ and a smooth variation of $R_{4/2}$ on N, N_pN_n, N_B and p-factor is obtained. For these calculation the experimental data are taken from [2].

[1] J. H. Hamiltonian, A. V. Armayya and J. B. Gupa, *Bull. Am. Phys. Sco.* **32**, 2130 (1987)

[2] www.bnl.nndc.gov / nsdf.