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Quasi-exact description of the phase transition from spherical vibrator to γ-unstable rotor

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Abstract

The quasi-exactly solvable sextic potential [1] is applied in [2] to investigate the phase transition from spherical vibrator to the γ-unstable rotor in the frame of the Bohr-Mottelson model [3, 4]. A special attention is accorded to the change of the nuclear structure in the critical point in respect to the quasi-exactly solvability order M, which fixes the size of the Hamiltonian matrix for which exact solutions are possible. The sextic potential was applied before in this case [5, 6], but without paying attention to this later aspect. M was related only to the available experimental data or to the most relevant part of the data. The theoretical results obtained in [2], as well as their applications to experimental data for isotope chains of Ru, Pd and Cd, revealed that different starting values of M can lead to different candidates for the critical point. Moreover, comparing with the previous studies [5, 6] where M is not greater than one, in [2] by considering $M > 1$ could be included in analysis also states with $\tau > 3$. Consequently, for $M > 2$, shape phase transitions have been found within the isotope chains of Pd and Cd, which was not the case for $M = 1$.

References

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