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Spectroscopy of quadrupole excitations at low spin in even-even $N \sim 90$ nuclei

Vibrational levels are well known in atomic nuclei but despite many decades of research, some of their properties still remain elusive. In particular, low-lying rotational bands based on the first excited 0^+ state, which are traditionally understood as β vibrational bands nevertheless show properties at odds with this interpretation, more especially in the transitional rare earth region with $N \sim 90$ [Gar01]. An alternative is that they can be better described as a “second vacuum”, or coexisting minimum in the pairing degree of freedom [Sch11a]. In order to produce a complete and definitive microscopic picture of the so-called β and γ bands, an extensive systematic review is performed for nuclides in the 160 mass region, between $N = 88$ and 92 and Sm to Yb . The data are explained using a five dimensional collective Hamiltonian for quadrupole rotational and vibrational degrees of freedom [Li09, Nik09]. A good qualitative agreement is obtained between measured energies and electromagnetic transition rates across the entire $A \sim 160$ mass region. The implication of these findings on the interpretation the first excited 0^+ states is there from discussed.

[Gar01] P. E. Garrett, J. Phys. G27, R1 (2001)

[Li09] Z.P. Li et al., Phys. Rev. C 79, 054301 (2009)

[Nik09] T. Nikšić, Phys. Rev. C 79, 034303 (2009)

[Sch11a] J.F. Sharpey-Schafer et al. Eur. Phys. J. A47 (2011) 6

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