

Heart-shaped nuclei : Condensation of rotationally aligned octupole phonons

octupole phonons

S. Frauendorf¹,

¹Department of Physics and Astronomy, University Notre Dame, USA

Abstract

The high-spin behavior of the octupole bands indicates the presence of octupole phonons carrying $3\hbar$ of angular momentum aligned with the rotational axis of the nucleus (1-b). For most cases the energy difference between the bands of opposite parity decreases, becomes negative and then positive (1a), which deviates from the traditionally claimed merging of the two sequences. The observation is interpreted as the condensation of octupole phonons at the rotational frequency ω_c [1]. Near ω_c the quadrupole rotor and the phonons combine to a rotating heart shape. The pattern of E1 transitions finds a natural explanation from this perspective. The systematic appearance of the condensation phenomenon is demonstrated.

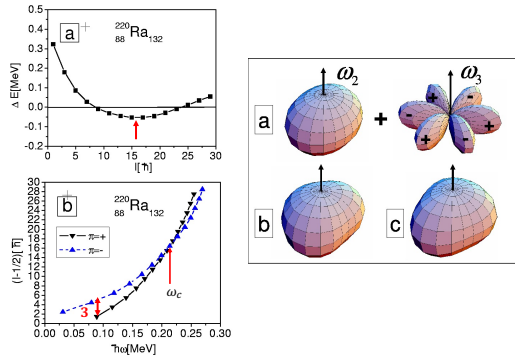


Figure 1. Left: Energy difference between (a) and the angular momentum of (b) the lowest $\pi = -$ and $\pi = +$ bands. Right: At the condensation frequency ω_c the aligned octupole phonons and the rotor combine to a rotating heart shape.

References

- [1] S. Frauendorf *PHYSICAL REVIEW C* **77** (2008) 021304(R) .