Highlight Papers

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Study of the 133Ba Nucleus with the (d,p) Reaction

In a recent article Suliman et al. present a study of the single-neutron levels of the 133Ba nucleus using the 132Ba(d,p)133Ba reaction with a polarised deuteron beam. Many unambiguous spin-parity assignments were made, up to an excitation energy of 2.2 MeV, due to the sensitivity of the angular distributions of the vector analysing powers to the total spin, J, of the final state (it will be recalled that angular distributions of the differential cross section are only sensitive to the transferred angular momentum, L). These assignments enabled a detailed comparison with the results of different structure models.

Along the chain of odd-A Ba isotopes it is conspicuous that the lowest 1/2+ and 3/2+ states cross each other, the 133Ba nucleus forming the point at which these states are almost degenerate. It thus forms a severe constraint on structure models in this mass region. It may also be considered as a single fermion (a neutron hole) coupled to a nearly E(5) 134Ba core, making it a suitable nucleus for comparison with IBFM (Interacting Boson-Fermion Model) calculations.

Suliman et al. show that in fact none of the IBFM schemes that they investigated was able to provide a satisfactory description of the low-lying levels of 133Ba, suggesting that the structure is rather more complicated than this simple picture suggests. This conclusion seems to be borne out by spherical shell model calculations which provided the best overall description of the low-lying levels.

[G. Suliman et al., Eur. Phys. J. A 41, 299-313 (2009)]

(this paper will appear in the 40/5 issue of EPN – *Europhysics News*)