

# New band mechanism of doubly-odd nuclei around mass 130

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A number of  $\Delta I = 1$  doublet bands built on the unique-parity  $0h_{11/2}$  valence neutron and proton orbitals have been observed in many doubly-odd nuclei in the  $A \sim 130$  region [1-4]. From the theoretical side, these bands were extensively investigated in terms of mean field approaches. However, no study was made using a fully microscopic theory that conserves the nucleon number and the total spin.

Recently, we have studied the doubly-odd nuclei in the  $A \sim 130$  mass region by means of a pair-truncated shell model (PTSM) [5,6]. In this model, the shell model basis states are restricted to the collective subspace where angular momentum zero ( $S$ ) and two ( $D$ ) pairs are used as the building blocks. This approach reproduces well experimental energy spectra and ratios  $B(M1; I \rightarrow I-1)/B(E2; I \rightarrow I-2)$  of the doublet bands. From analysis of the wave functions and transition rates, it turns out that the level scheme of the doubly-odd nuclei arises from “chopsticks configurations” of the unpaired neutron and the unpaired proton in the  $0h_{11/2}$  orbitals, weakly coupled with the quadrupole collective excitations of the even-even part of the nucleus.

The theoretical result for  $^{134}\text{La}$  is summarized in Fig. 1. The solid arrows indicate  $E2$  transitions, and the dotted arrows indicate  $M1$  transitions. The numerals on the right side of the  $E2$  transitions denote the  $B(E2)$  values (in  $10^{-2} e^2 b^2$ ), and those beneath the  $M1$  transitions denote the  $B(M1)$  values (in  $\mu_N^2$ ). Our model gives five  $\Delta I = 2$   $E2$  bands. The states within four  $\Delta I = 2$   $E2$  bands with the bandhead states of  $8_1^+$ ,  $9_1^+$ ,  $10_1^+$  and  $11_1^+$  are connected by the strong  $E2$  transitions to the same members of the  $\Delta I = 2$   $E2$  bands, and by the strong  $M1$  transitions to the states in the neighboring  $\Delta I = 2$   $E2$  bands. Schematic illustrations of the chopsticks configurations are presented below each  $\Delta I = 2$   $E2$  band. The results of these calculations will be presented and discussed in this conference.

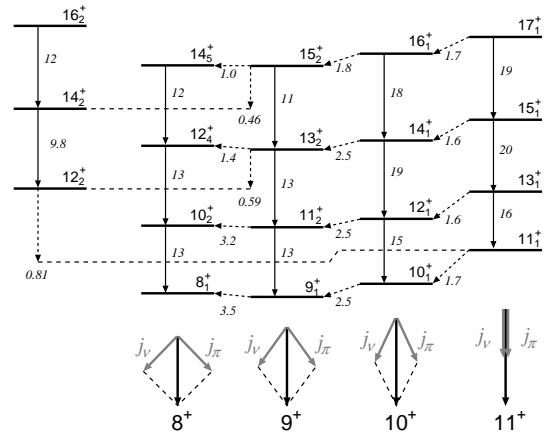


Figure 1: Partial level scheme of  $^{134}\text{La}$  suggested by the PTSM calculation.

## References

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