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## In a search for the true identity of low-lying positive parity states in the $A \sim 160$ mass region.

For many years, the first excited  $0^+$  bands of well-deformed nuclei were understood as " $\beta$ -vibrations", following the seminal works of Bohr and Mottelson [1, 2]. Nevertheless, over the years it has become apparent that low-lying  $0^+$  bands could also arise due to other effects such as shape-coexistence, and quadrupole pairing [3, 4, 5].

In this work, I will present a comprehensive dataset comprising of low-lying positive parity bands ( $\beta$  and  $\gamma$  bands) in even-even isotopes with  $N \sim 88$  to 92 and proton numbers  $Z \sim 62$  (Sm) to 70 (Yb). In order to produce a complete and definitive microscopic picture of the so-called  $\beta$  bands as well as other related low-lying positive parity excitations, an extensive systematic review is performed for these nuclei. The implication of the findings on the interpretation of the first excited  $0^+$  states and other related low-lying positive-parity excitations is there from discussed.

### Reference

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### Notes

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