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Symplectic particle-core model description of the low-lying rotational bands in ^{167}Er

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Abstract

A recently proposed microscopic shell-model counterpart of the particle-core-type models, termed symplectic particle-core model (SPCM) [1], which physics is governed by the group structure $Sp(6,R)_{core} \otimes Sp(6,R)_{sp} \otimes O(A-2) \otimes O(1) \subset Sp(6(A-1),R)$, is applied to the microscopic shell-model description of the lowest $K^{\pi}_{J} = 7/2^{+}$, $K^{\pi}_{J} = 1/2^{-}$, and $K^{\pi}_{J} = 5/2^{-}$ rotational bands in ^{167}Er. A good description for the structure of the bands of energy levels, as well as for the experimentally known intraband $B(E2)$ transition strengths between the states of the ground band $K^{\pi}_{J} = 7/2^{+}$, is obtained. The low-lying quadrupole collectivity in ^{167}Er is described without the use of an effective charge by introducing a simple vertical mixing term. The results obtained for the $B(E2)$ transition strengths represent a significant achievement of the present many-particle symplectic-based shell-model approach to heavy odd-A nuclear systems.

References

[1] H.G. Ganev, *Nucl. Phys. A* **1072** (2026) 123415.