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Coupling of single neutron and proton configurations to collective core excitations in ¹⁶²Yb.

The excited states of ¹⁶²Yb have been studied at iThemba Laboratory for Accelerator Based Sciences (iThemba LABS), using the ¹⁵⁰Sm (¹⁶O, 4n) ¹⁶²Yb fusion-evaporation reaction. The beam of 83 MeV ¹⁶O was provided by the Separated-Sector Cyclotron (SSC) and used to bombard a 3 mg/cm² ¹⁵⁰Sm target. The gamma rays emitted from the reaction products were detected using the AFRODITE gamma-ray spectrometer, comprised of 8 Compton-suppressed clover detectors. Attempts have been made in identifying the low-lying positive parity bands in ¹⁶²Yb, particularly the beta and gamma vibrational bands, which are traditionally associated with the first excited K^π = 0⁺ and K^π = 2⁺ respectively. Many levels have been found. In particular the first excited 0⁺ band and the even and odd sequences of the gamma band have been firmly established. The 0⁺ band and the even spin members of the gamma band are observed to exhibit a Laundau-Zenner crossing. This crossing demonstrates that the signature splitting in gamma bands is mainly caused by band mixing. The data will be discussed in terms of the Triaxial Projected Shell Model and also with the predictions of the 5-Dimensional Collective Model (5-DCM).

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