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Collective structure in ^{116}Sb

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Structure of nuclei near Z=50 proton magic shell closure and neutron number near Z=64 subshell closure are found to exhibit the single-particle structure that coexist with the collective structure and therefore, gives the possibility to investigate both the structures within the single nuclear system [1-3]. The collective band structures have been systematically observed in both odd-odd and odd-even Sb (Z=51) isotopes along with the single particle structure [4-5]. The collective structures are understood as due to promotion of proton from β-upsloping $1g_{9/2}$ to the β-downsloping $1d_{5/2}$, $1g_{7/2}$ and $1h_{11/2}$ orbitals. In particular, due to presence of negative parity $1h_{11/2}$ orbital, collectivity is further induced in the system. The aim of present work is to study the structure of ^{116}Sb nucleus.

The excited states of the ^{116}Sb have been populated by using the reaction ^{115}In(α, 3n)^{116}Sb, at a beam energy of 40 MeV from the K-130 Cyclotron at VECC, Kolkata, and the de-exciting γ-rays were detected with the Compton suppressed clover detector setup of the Indian National Gamma Array (INGA) coupled to a digital data acquisition system.

A new level scheme of ^{116}Sb has been proposed with significant extension of level scheme compared to previous work [6-9]. The deformed bands have been extended to higher spin. Earlier a band like structure of strong M1 transitions with missing crossover E2 transitions was observed, and predicted to be a magnetic rotational band [9]. In the present work, the corresponding E2 transitions of this band have been found and placed in the level scheme. The neutron pair breaking has also been found to occur in one of the bands.

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1. A. Savelius et al., Nucl. Phys. A 637, 491 (1998).
2. S. Y. Wang et al., Phys. Rev. C 81, 017301 (2010).
3. G. J. Laneet al.,Phys. Rev. C 58, 127 (1998).
4. S. Y. Wang et al., Phys. Rev. C 82, 057303 (2010).
5. R. Banik et al. Phys. Rev. C 101, 044306 (2020).
6. P. Van Nes et al., Nucl. Phys. A 379, 35 (1982).
7. Z. Gácsi et al., Phys. Rev. C 44, 642 (1991).
8. M. Fayez-Hassan et al., Nucl. Phys. A 624, 401 (1997).
9. S. Y. Wang et al., Phys. Rev. C 86, 064302 (2012).

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