High spin structures in ^{107}In

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Introduction

Nuclei in the A =110 mass region have been of considerable interest for the past few years especially due to the occurrence of Δ I = 1 magnetic dipole transition sequences [1]. In most of the cases these rotational like bands have been interpreted to be generated by 'shears mechanism' which is described within the framework of tilted axis cranking model (TAC). The mechanism was discovered first in Pb region [2]. Here angular momentum in a band is generated by the closing of 'shears' blades and the bands are termed as magnetic rotational bands. In A=110 region these bands are build on high Ω $g_{9/2}$ proton hole coupled with low Ω neutron particles in $h_{11/2}$, $g_{7/2}$ and $d_{5/2}$ orbits [1]. In this paper we report the results of investigation of such bands and the high spin structures in ^{107}In.

Experimental Details

High spin states in ^{107}In were populated in the reaction ^{94}Mo(^{16}O,2np)^{107}In with beam energy of 70 MeV. The experiment was carried out with γ detector array INGA at IUAC which at the time of experiment consisted of 17 clover detectors. The target of thickness 0.9 mg/cm^2 with 6.5mg/cm^2 thick ^{197}Au as backing was used for the experiment. The data were taken in coincidence mode with a total of one billion γ-γ events being recorded. The data were sorted using INGASORT program. After gain matching of 0.5MeV/channel different 4k $\otimes$ 4k matrices were made and the symmetrized matrix compatible with radware format was used in RADWARE program for coincidence analysis.

Results and Discussion

The level scheme from the present experiment is shown in Fig. 1. Along with confirmation of previous level scheme [3], we found new sequences of transitions grouped in bands. The placement of new transitions are based on coincidence and intensity arguments. A noteworthy aspect of the present result is the extension of band 1 with the addition of 701 keV, 841 keV and 589 keV gamma transitions at the top. The observed spins I as a function of angular frequency is plotted for this band in Fig. 2. As also pointed in Ref. [3], the negative parity of the band suggests that it is build on configuration involving neutrons in $h_{11/2}$, $g_{7/2}$ and $d_{5/2}$ orbitals with the band head configuration as $\pi(g_{9/2})^{-1}\otimes\nu[h_{11/2}(g_{7/2},d_{5/2})]$. There is a change of configuration at the backbending as a consequence of alignment of neutrons in $(g_{7/2},d_{5/2})$ orbitals. Furthur confirmation of magnetic rotation in the band can be obtained from B(M1) values deduced from the lifetime measurement of the transitions.

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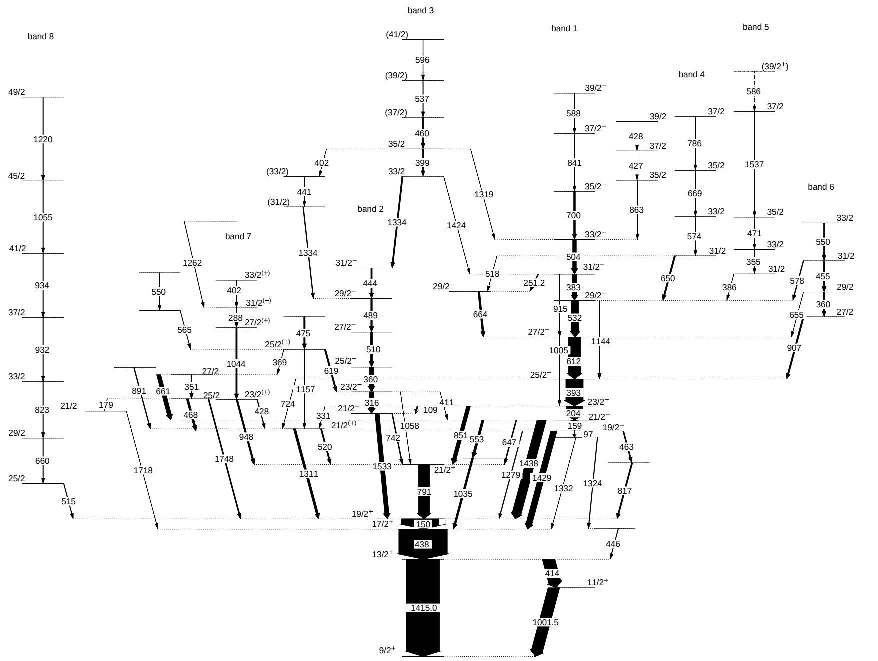

FIG. 1: Level scheme of ^{107}In deduced from the present work.

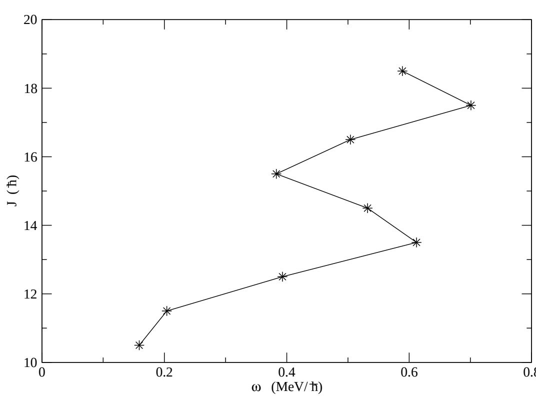

FIG. 2: Angular momentum as a function of rotational frequency.

We have done such measurements using the DSAM. The results will be discussed in the presentation.

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