High Spin spectroscopy of ^{105}Pd

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Nuclei of mass∼100 region exhibit prolate, oblate and triaxial shapes. In addition, the phenomenon of shape co-existence has also been observed. The equilibrium deformation of these nuclei depends on the interplay of shape driving forces of neutrons in $h_{11/2}$ and protons in $g_{9/2}$ orbitals. Thus the study of the high spin behaviour in these nuclei is very informative.

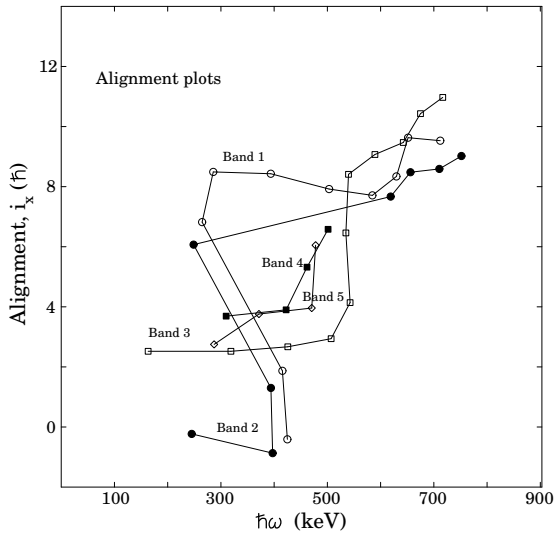

FIG. 2: Alignment plots for ^{105}Pd.

In the present work the detailed high spin level structure of ^{105}Pd has been established using the ^{96}Zr(^{13}C, $4n$) reaction. The 63 Mev ^{13}C was delivered by 14-UD Pelletron at TIFR. The γ -rays were detected in the INGA [1] array consisting of 18 Compton suppressed clover detectors. The level lifetimes of the high spin states have been measured using detectors at 40^0 and 157^0 with respect to the beam direction.

Fig 1(next page) shows the partial level scheme established from the present work. The high spin levels are grouped in seven bands and the corresponding alignment plots (i_x vs ω) for these bands are shown Fig 2. The lifetimes of several high spin states of band 1, 2 and 3 have been measured using DSAM technique [2]. The corresponding B(E2) values have been plotted in Fig 3.

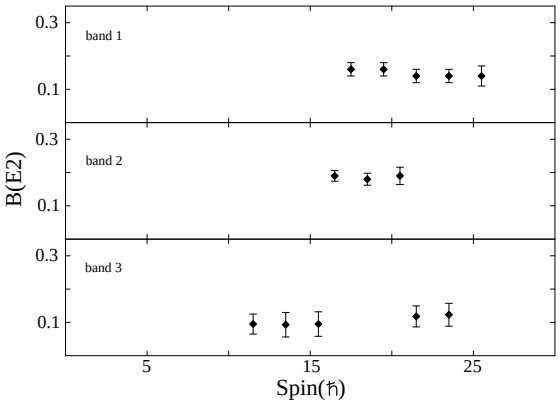

FIG. 3: B(E2) values vs Spin as obtained from lineshape analysis.

The following single particle configurations for these bands have been assigned from the measured band crossing frequencies, alignment gains and B(E2) values:

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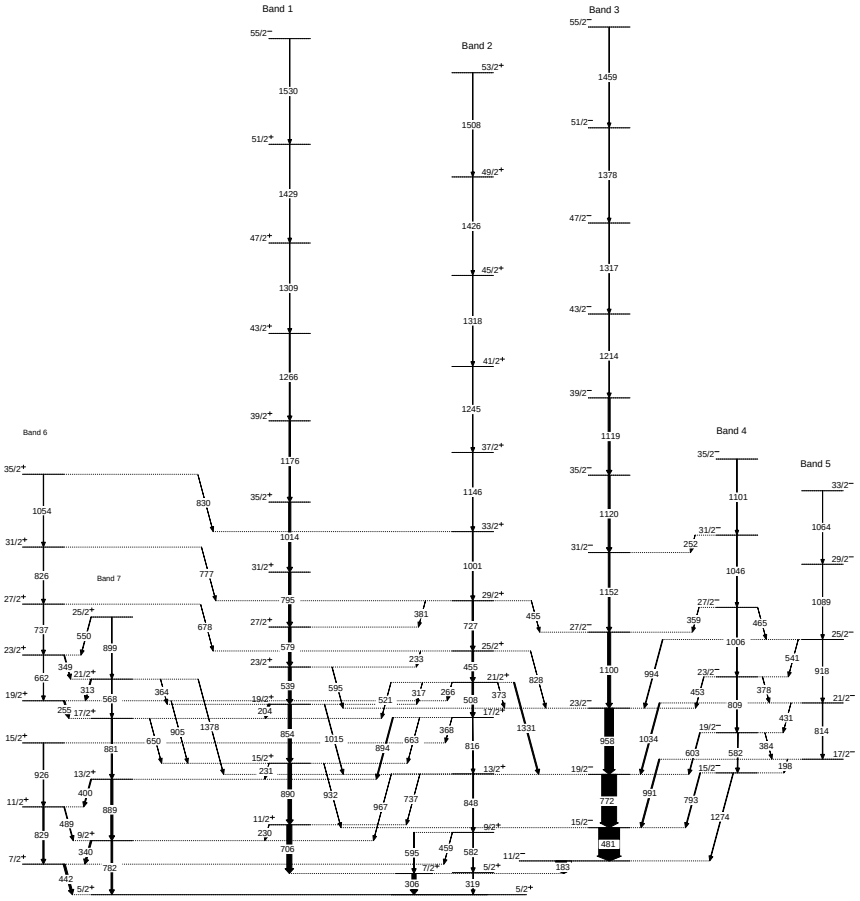

FIG. 1: Partial level scheme of ^{105}Pd established in the present work.

Band 1 is built on $\nu g_{7/2}$ configuration. The first alignment is the ν-EF crossing followed by π-AB crossing. **Band 2** is built on $\nu d_{5/2}$ configuration. At high spin, the ν-EF crossing is followed by π-AB crossing. The delayed π-AB crossing frequency seems to indicate prolate deformation for these bands. **Band 3** is built on $\nu h_{11/2}$ configuration. At high spin ν-FG crossing is followed by ν-AB crossing.

Bands 4 and 5 are signature partners built on $\nu[h_{11/2}, (d_{5/2}, g_{7/2})^2]$ configuration. **Bands 6 and 7** constitute a quasi gamma band [3].

Acknowledgements

The authors would like to thank the technical staff of TIFR-BARC pelletron facility for its smooth operation throughout the experiment. The first and second author(grant no. PSW-26/11-12) would also like to thank UGC for research support.

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