Spectroscopy of ^{161}Yb

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Introduction

The spectroscopy of the yrast and near-yrast bands of the N=88-98 isotones of the rare-earth nuclei has been a matter of immense interest. This region is known for the occurence of shape coexistence phenomenon. Most of the high spin data can be understood in terms of aligned high-j nucleons weakly coupled to deformed cores The nuclei $^{159-161}$Yb provide excellent opportunites to test the quasiparticle dependence of collectivity.

The reaction ^{122}Sn (^{44}Ca, 5n) with E_{beam}=200 MeV have been carried out with both unbacked and backed (with Au) targets where $\gamma^{'s}$ were detected using the TESSA 3 array comprised of 16 escape-suppressed Ge detectors and a 50-element BGO inner ball [1]. These authors presented their data in the form of a level scheme only, without quoting any uncertainty for any of the data [2].

Morever, there exists many excited states of ^{161}Yb reported in adopted level scheme of ENSDF [2] for which the J^{π} values are still marked as tentative. No DCO and/or IPDCO measurement has so far been reported in the literature for this nucleus.

Experimental details

The excited states of ^{161}Yb nucleus have been populated by ^{148}Sm (^{16}O, 3n) reaction with E_{beam}=90 MeV. The 900 μg/cm^2 thick Sm target (97 % enriched) was electrodeposited on a 3 mg/cm^2 Pb backing foil. Twenty Compton suppressed Clover detectors of INGA array, arranged in the angles of 23°, 40°, 65°, 90°, 115°, 140° and 157° with respect to the beam direction, were used for the detection of gamma radiations. A PCI-PXI based digital data acquisition system [3] was used for the collection of two and higher fold data in trigger less mode.

Data Analysis and Results

The details of data collection and sorting have been described in Ref. [4]. Fig. 1, 2 and 3 show the gated spectra obtained from the background subtracted $\gamma-\gamma-\gamma$ cube for identifying different bands in the nucleus. The transitions marked with * are not yet placed in the level scheme.

In Fig. 1, the transitions belonging to the band-A (named as per adopted level scheme) have been identified and from the present analysis, the band is visible upto $J^{\pi}=61/2^{-}$ E_x=8194.7 keV. Fig. 2 shows the spectrum of

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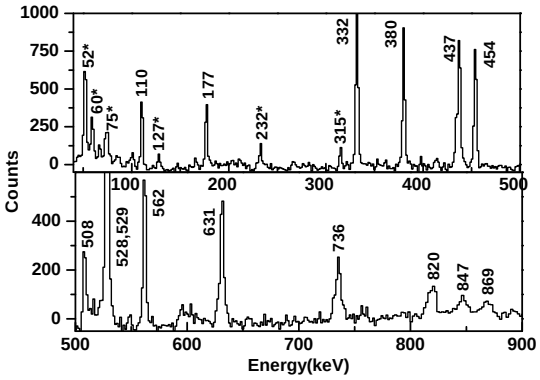

FIG. 1: Added gate 332&454 + 454&529+ 529&562+ 562&380+ 380&437+ 437&528+ 528&631+ 631&736+ 736&820 showing γ lines of band-A.

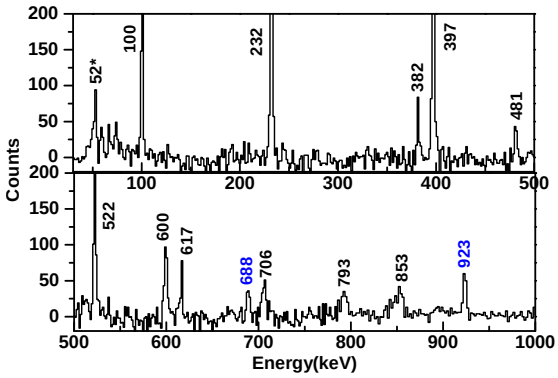

FIG. 2: Added gate 382&481 + 481&600+ 600&706+ 706&793+ 793&853 showing γ lines of band-C upto $(51/2^-)$. The interband transitions are highlighted in **blue**.

the added gate corresponding to the transitions of band-C. The decay of Band-C and D which are known to be interacting with each other have been shown in Fig. 2 & Fig. 3. The presented results are preliminary. The DCO and IPDCO analysis have already been initiated and the results will be presented.

Acknowledgments

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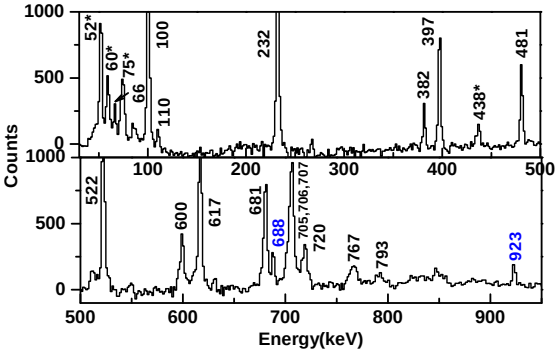

FIG. 3: Added gate 232&397 + 397&522+ 522&617+ 617&681+ 681&707+ 707&705+ 705&720+ 720&767 showing γ lines of band-D upto $(49/2^+)$. γ-rays connecting band-C and D are shown in **blue**.

References

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