Lifetime measurement in ^{188}Pt

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Introduction

The neutron deficient platinum isotopes are well known for exhibiting the shape co-existence phenomenon [1, 2]. The platinum isotopes exist in the transitional region where the nuclei are soft and show shape co-existing shapes that can be related to the different deformation [3]. Different shapes related to the prolate, oblate and triaxial shapes within the same nucleus have been identified experimentally [1, 2], and the ground state shape transitions for the isotopic chains have been observed [4-5]. The TRS calculations [6] indicate that with increasing neutron number the Pt nuclei observe shape change for neutron deficient Pt isotopes with A≤187, the ground state shape is predicted to be oblate while for A =188-192, these nuclei assume prolate shape. In the lifetime measurement done on $^{182\text{-}186}$Pt [7, 8], the deformation observed clearly demonstrate this fact. For A≥188 the deformation measurements are highly needed to test the predictions of oblate-prolate shape transition in Pt nuclei. So, in this quest, as a first in the present manuscript we report the RDM lifetime measurement in 188Pt, done at IUAC, Delhi. The high spin γ-ray spectroscopy has been done by S. Mukhopadhyay [9].

Experimental Setup

High spin states in ^{188}Pt were studied using the fusion reaction ^{174}Yb (^{18}O, 4n). Beam energy of 84MeV was delivered by 15UD Pelletron present at IUAC. ^{174}Yb target of thickness ~700μg/cm^2 deposited on ^{181}Ta of thickness ~3mg/cm^2 was used and ^{197}Au of thickness ~8mg/cm^2 as stopper was used. For experimental measurements GDA setup equipped with 6 compton suppressed HPGe detectors, 14 element BGO multiplicity filter and RDM plunger device was used which is present at IUAC. Four of the detectors were mounted in GDA backward ring at an angle of 144º and the remaining 2 were mounted in the forward ring at 50º.

Data analysis

The data was taken for different distances between the target and stopper and 22 steps were given to the motor in between 3-10000 micron. The highly populated levels of ^{188}Pt are shown in fig.1.

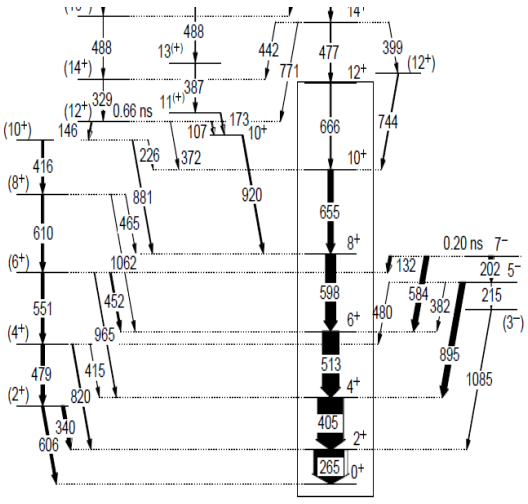

Fig.1 shows the partial level scheme of ^{188}Pt [9] with populated band of interest.

The intensity measurement of shifted and un-shifted peaks of the obtained levels of interest was done and variation in the intensity for the γ-

peaks at different distances in between the target and stopper are shown in fig.2.

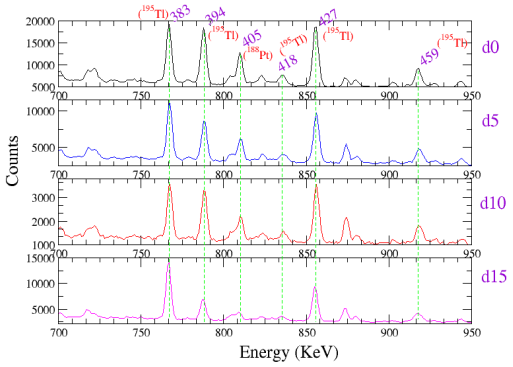

Fig.2 shows the peaks at different distances in between the target and stopper at backward angle (144º)

To understand the nuclear shape for ^{188}Pt, total Routhian surface (TRS) calculations will be performed using Cranked Hartree-Fock Bogoliubov (CHFB) Framework with strutinsky shell correction procedure. The results presented above are preliminary results for the data acquired during the experiment. Data analysis is still in progress and the results will be presented later.

Summary

High spin states of ^{188}Pt were populated using fusion reaction ^{174}Yb (^{18}O, 4n) at beam energy 84MeV. The maximum populated band for the nuclei of interest has been shown in Fig.1 and the intensity of the respective unshifted peaks of interest was measured at different distances in between the target and stopper. The experiment was performed using the GDA setup equipped with compton suppressed Ge detectors and RDM plunger setup at IUAC, New Delhi.

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