SEARCH FOR A RARE SHAPE PHASE OF PROLATE NON-COLLECTIVE IN NEUTRON RICH ^{100}MO TO PROTON RICH ^{100}SN ISOBARS

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Temperature and spin induced shape transitions are investigated to search for prolate non-collective – a rare shape phase [1] in A=100 isobars over a range of nuclei that varies from neutron rich ^{100}Mo to the neutron deficient ^{100}Sn nuclear systems within a microscopic theoretical framework using statistical theory of hot rotating nuclei [1,2]. So far it has been well recognized that the the intrinsic shape [1-4] of a nucleus undergoes a variety of shape transitions with changing isospin, spin and temperature. The study of such shape-phase transition in hot and rotating nuclei has emerged as a very active field of research in nuclear physics. Prediction of a rare shape phase of prolate non-collective first anticipated by Goodman [5] and then predicted by us [1] for proton rich ^{94}Ag in agreement with the speculation of prolate shape by Mukha et al. [6] had opened up new avenues to explore domains of periodic table with such rare shape phases. This rare shape phase is generated directly by rotation at certain spin value in a narrow domain bound by two spin dependent very low critical temperatures and undergoes the expected transition to the oblate non-collective phase at higher spin values.

Search for rare shape phase of prolate non-collective and the nature and the consequences of structural transitions in neutron rich to neutron deficient regions of A=100 isobars for spins 0 - 60$\hbar$ and T= 0.7 -1.6 MeV are presented here. Nuclear systems ^{100}(Mo,Tc,Ru) on the neutron rich side show triaxial deformation ($\beta \geq 0.2$) at all temperatures and very low spins with shape transition to oblate non-collective at higher spins whereas on the neutron deficient side ^{100}(Pd,Ag,Cd, In,Sn) we find the rare shape phase of prolate non-collective at T(=0.7 -1.0 MeV) and low and medium spins with a shape transition to oblate at higher spin. Hence it appears that the prolate non-collective shape phase is more predominant phase on the proton rich side although there is no taboo to its presence in neutron rich systems which is presently under study. Neutron rich ^{100}Mo is well deformed β=0.24 at a high temperature of T=1.6 MeV which makes it a good candidate for GDR investigation for nuclear shapes.

Financial support from DST under WOS-A scheme is acknowledged.

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