Contribution ID: **433** Type: **Poster report**

COMPARATIVE STUDY OF NEUTRON-DEFICIENT 178Pt, 180Hg, 182Hg NUCLEI EXHIBITING ASYMMETRIC FISSION

Wednesday, October 14, 2020 6:50 PM (20 minutes)

A new region of asymmetric nuclear fission zone of extremely neutron deficient sub-lead island has been emerged out in recent years from the discovery of unusual mass-asymmetry in 180Hg [1-4]. These extremely neutron-deficient exotic nuclei play an important role to understand the influence of microscopic effects near saddle point on the fission process [1]. The asymmetric nature of fission fragments of 180Hg examined in β-delayed fission of 180Tl at the excitation energy of 10.4 MeV is found to persist towards high excitation energies up to 85 MeV formed in the 36Ar+144Sm [2,3]. To test the relative presence of asymmetric distributions nearby fissioning nuclei 180Hg, 182Hg, and 178Pt formed via 36Ar+144Sm, 40Ca+142Nd, and 36Ar+142Nd, respectively [3,4], a comparative study has been carried out at similar excitation energies and angular momenta. The mass and total kinetic energy distribution of fission fragments of 180,182Hg was determined from the measured velocity and position information of coincident fission fragments using the double-arm time-of-flight spectrometer CORSET utilizing the U400 cyclotron at FLNR, JINR, Dubna. Fission fragment mass distributions of 182Hg, 180Hg, and 178Pt is shown in the figure at similar excitation energies and angular momenta. It is clearly evident from the figure that there are variations in the width of mass distributions at lower excitation energy that vanishes at higher excitation energy. However, significant variations at the central part of mass distributions indicate that the contribution of asymmetric distribution in 182Hg is relatively large in comparison to its nearby fissioning nuclei 182Hg/178Pt differing by only two neutrons/protons, respectively.

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Session Classification: Poster session 2 (part 2)

Track Classification: Section 2. Experimental and theoretical studies of nuclear reactions.