Study of entrance channels effects on fusion-fission and quasi-fission processes

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The reaction dynamics of heavy and super-heavy nuclei is scrutinized extensively by investigating the competition between fusion-fission (FF) and quasi-fission (QF) processes. Signatures of these processes are confirmed through different experimental probes like fission fragment angular distribution, mass distribution (MD), mass-energy distribution (MED), and mass-gated neutron multiplicity. The role of entrance channel effects (deformation, orientation and shell effects of colliding partners) on the QF and FF processes are used to explore the properties of these processes. Neutron emission is the leading technique employed for the heavier systems where MD and MED are unable to disentangle QF and FF processes [1]. That said, we have investigated the MD, MED and mass-angle correlations, average neutron multiplicity, mass-gated, and energy-gated neutron multiplicity, and neutron angular distributions for the ^{48}Ti + ^{208}Pb and ^{28}Si + ^{232}Th reactions populating the near super-heavy nuclei ^{256,260}Rf. The choice of these reaction systems offers a possibility to compare the fission dynamics of different isotopes of Rf nuclei, and to study the role of entrance channel deformation and shell effects on the QF and FF processes. In the current work, we are reporting the results from the experiments performed for the aforementioned reactions using the NAND array [2] at IUAC, New Delhi. Furthermore, a comparison between the predictions from dynamical and statistical models will be presented.

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[2] P. Sugathan *et al.*, Pramana **83** (2014) 807.

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