

Non-equilibrium processes in Heavy Ion induced Fission Reactions

R.K. Choudhury and R.G. Thomas
*Nuclear Physics Division, Bhabha Atomic Research Centre,
Trombay, Mumbai - 400085, India*

Heavy ion induced reactions offer a wide range of possibilities in exploring the collective behavior of nuclei and nuclear processes. Recent years have seen a spurt in the experimental and theoretical studies to understand the mechanism of the fission process in heavy target projectile systems, arising from the interest to produce elements in the superheavy region. A number of new features are observed experimentally with respect to the kinetic energy, mass and angular distributions of fission fragments and their correlations, implying prevalence of non-equilibrium phenomena in the fission process in many target projectile systems. Depending on the degree and nature of equilibration, various processes such as fast-fission, quasi-fission and pre-equilibrium fission have been invoked that can compete with the fully equilibrated compound nuclear fission process. Fig.1 below provides a glimpse of the various systems denoted by points corresponding to projectile and target nuclei studied by different authors.

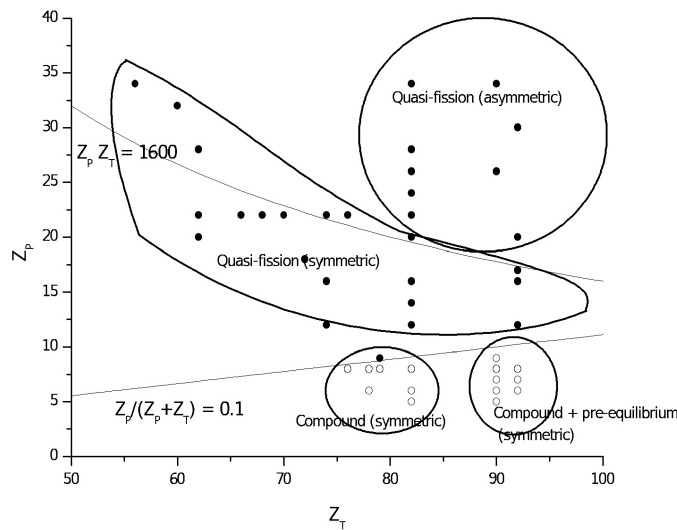


Fig.1

There are many theoretical attempts both in terms of static potential energy considerations and dynamics to understand the important degrees of freedom that govern the evolution of the nuclear system from initial interaction to the final fission stages. We have also recently carried out some experimental studies by measuring the kinetic energy, mass and angular correlations in different mass regions. The present talk will cover the experimental observations and theoretical understanding of the non-equilibrium processes taking place in fissile, highly fissile and less fissile composite systems.