SUPPRESSION OF FUSION IN HEAVY ION COLLISIONS

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The formation of new superheavy elements through heavy ion fusion reactions is a topic of great interest in nuclear physics. Not only it is an extremely challenging experimental task but also theoretically, it is important for making a self-consistent model to describe the fusion process and give an insight into the formation of the next heavy element.

The work being presented here aims to investigate factors leading to reduction of fusion, and explore the role of energy dissipation in heavy ion reactions.

To probe energy dissipative processes, we have conducted a series of experiments with a range of projectiles impinging on fissile targets at beam energies from well below to above the fusion barrier. A systematic study of fusion-fission, quasifission, and transfer fission processes has been achieved through analysis of each reaction's kinematic properties and mass-angle distributions (MADs).

From this work, we found that an increasing proportion of quasifission yields has been identified from the presence of strong mass-angle correlations in observed MADs with increasing the charge product. In addition, a significant contribution of transfer-induced fission has been observed, indicating the occurrence of energy dissipative processes. This observation provides important evidence supporting the idea that DIC should be taken into account in models describing the fusion process in heavy ion reactions.