



Investigation of the role of multi-neutron transfer channels on sub-barrier fusion enhancement

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The heavy-ion fusion reactions are greatly influenced by various degrees of freedom of colliding partners, e.g., inelastic excitations, deformation, and positive Q-value neutron transfer (PQNT) channels, below the Coulomb barrier [1,2]. However, the role of PQNT channels in sub-barrier fusion enhancements is somewhat dramatic and not yet fully understood. Thus, an experiment has been performed to measure the fusion excitation functions for $^{28,30}\text{Si}+^{158,156}\text{Gd}$ reactions, which forms the same compound nucleus $^{186}\text{Pt}^*$ at energies well below to above the Coulomb barrier using the Heavy-Ion Reaction Analyzer (HIRA) at Inter University Accelerator Center (IUAC), New-Delhi, India. The measured fusion cross sections and derived fusion barrier distribution have been analyzed within the coupled channel (CC) calculations framework using the CCFULL and ECC [3,4]. The measured sub-barrier fusion cross sections for both reactions were enhanced compared to the one-dimensional barrier penetration (1D-BPM) model. Thus, the systematic effect of PQNT channels and inelastic excitations in colliding partners have been investigated to decipher the role of neutron transfer channels on sub-barrier fusion. Detailed analysis and the obtained results will be discussed during the talk.

References

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