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Cross Sections for Charge Exchange and Ionization of High Energy Ions in Noble Gases LINCHUN WU, HIROMU MOMOTA, GEORGE H. MILEY, University of Illinois at Urbana-Champaign, FUSION STUDIES LAB TEAM — Interactions of charge exchange and ionization of fast, low-charged heavy ions are very important in heavy ion beam inertial confinement fusion (HIBF). These effects are crucial in determination of the final focusing in the chamber. However, corresponding cross section data is very limited and/or not accurate over the entire range of energies and ions of interest. This paper reports on our recent studies of cross sections for interactions of heavy ions like Cs⁺ with noble gas. Since a quantum mechanical treatments encounters with the many body problem, classical trajectory Monte Carlo method is employed. The distribution of inner electrons is estimated by modified Thomas-Fermi Model for the purpose of decreasing the number of electrons to calculate their orbits. Introduced micro-canonical ensemble for the initial electron probability distribution describes quantum mechanical uncertainty. Cross sections are evaluated over a limited energy range. Corresponding scaling laws are then developed to reflect the change probability of beam charge state over a larger energy range. Special attention is given to multi-electron processes, especially double-fold interactions.

Prefer Oral Session
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