

Charge Transfer in Homonuclear Collisions of Heavy Ions

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Domain : Fusion

Charge-changing collisions due to intra-beam scattering can have a high impact on modern high intensity accelerators and storage rings [1-3]. Using the crossed-beams technique we have measured absolute cross sections for charge transfer in homonuclear collisions of Ar, Kr, Xe, Pb and Bi ions with charge states $q = 2+$, $3+$ and $4+$ and centre-of-mass energies between 2 keV and 94 keV. Typical cross section values are in the order of $2 \times 10^{-17} - 3 \times 10^{-16} \text{ cm}^2$ depending on the collision velocity and Q-value of the reaction. Many systems show a direct correlation of the cross section with the Q-value such that lower Q-values lead to higher cross sections. For the heavier ions and higher charge states however a significant influence of metastable ions is found. Transfer from excited metastable states into the ground state or possible excited target states usually leads to a significantly smaller Q-value than from the ground state. This explains the missing dependence of the measured data on the collision velocity observed for the heavier ions and higher charge states.

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