CHARGE AND VELOCITY DEPENDENCES OF TRANSFER IONIZATION TO SINGLE CAPTURE RATIO FOR FAST MULTIPLY CHARGED IONS ON HE

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In this paper, we report on the velocity and projectile charge dependences of the ratio of Transfer Ionization, TI, to Single Capture, SC, for high velocity multiply charged ions on He.

Measurements were performed in the J. R. Macdonald Laboratory at Kansas State University. Ion beams of interest were extracted from the EN tandem Van de Graaff accelerator, post-stripped when necessary, momentum analyzed, and the desired charge state directed to the collision area. The target was provided using a supersonic He jet with a two-stage collimation.[1]

The q-dependence of the ratio, R, of TI to SC for 2 MeV/u projectiles is presented in Fig. 1. The present results indicated by triangles are for F and Si beams. The solid curve indicates the q^2 dependence of R. Anti-screening leads to cross sections greater than the values predicted by the q^2 dependence.

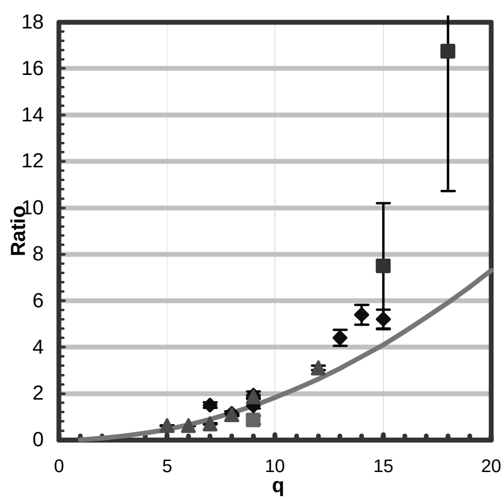

Fig. 1. The ratio of the TI to SC cross sections for dressed and bare projectile ions incident on He is shown. The data included in the paper by Montenegro et al.[2], are given together with the present results (triangles).

Fig. 2 shows the velocity dependence of R for F^{q+} on He in the range of $v = 6$ to 9 au. The cross section is scaled by $1/q^2$ and compared to the H^+ on He results of Mergel et al.[3] R for the two cases show a stark contrast. Coupled channel calculations for F^{9+} on He follow the trend of the present data.[4]

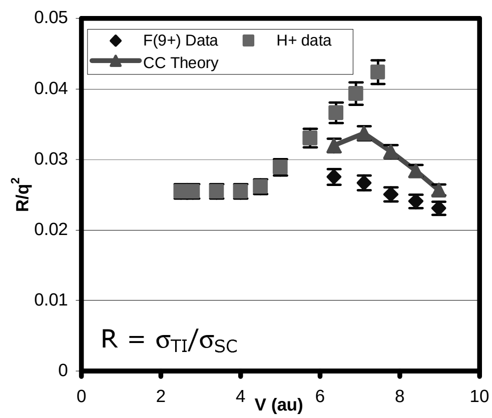

Fig.2. A scaled ratio of transfer ionization to single capture for bare projectiles incident on He. Included are the data of the present work, data of Mergel et al.[3] and a coupled channel calculation for F^{9+} on He.

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