Electron Loss Studies of Many-Electron, Heavy Ions

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Charge-changing processes, i. e. loss or capture of electrons, occurring in ion-atom and ion-ion collisions belong to the most basic interactions in all types of plasmas. Moreover, in accelerators interactions between projectile ions and the residual gas can lead to a change of the projectile charge state. In the presence of dispersive ion optical elements, the trajectories of up- or down-charged ions do not match the one of the reference charge state, resulting in a successive defocussing and, as a consequence, loss of beam intensity.

Studies of electron loss of many-electron, heavy ions that were performed at the Experimental Storage Ring of GSI, Darmstadt [1,2,3] will be presented together with recent theoretical works. Particular emphasis will be given to the cross sections of U^{28+}, as this ion species was chosen as a reference ion for the planning of the future FAIR facility [4] currently being built at the GSI campus.

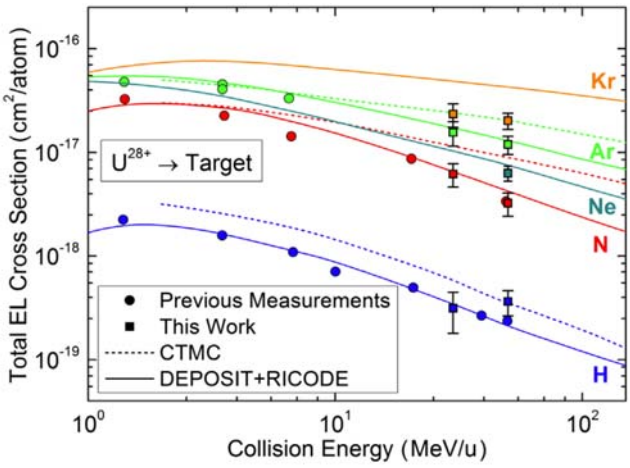

Figure 1: Compilation of total electron loss cross sections for U^{28+}, reproduced from [2].

References

[1] G. Weber et al., Phys. Rev. ST Accel. Beams **12**, 084201 (2009).

[2] G. Weber et al., Phys. Rev. ST Accel. Beams **18**, 034403 (2015).

[3] P.-M. Hillenbrand et al., Phys. Rev. A **93**, 042709 (2016).

[4] L. Dahl et al., *DEVELOPMENT OF THE INTENSITY AND QUALITY OF THE HEAVY ION BEAMS AT GSI*, in: Proceedings of HIAT 2012, Chicago, IL USA (2012).