Ionization and electron capture processes induced in collisions between singly charged ions and nitrogen atom

M. Al-Ajaleen[1,2], A Taoutioui [1], and K. Tőkési-[1]

[1] *Institute for Nuclear Research (ATOMKI), Debrecen, 4026, Hungary*

[2] *Doctoral School of Physics, University of Debrecen, Debrecen, 4032, Hungary*

The electron processes induced in ion-atom collisions are crucial and central in various research domains such as fusion plasma in tokamak reactors and interstellar space [1]. The modeling and control of these processes rely on the accurate cross sections of the induced electron processes. In particular, we are interested in presenting accurate cross sections for single electron processes, mainly ionization and electron capture in collision between Li^+ and Na^+ ions with nitrogen atom. For sake of simplicity, the considered collisional systems are treated as three-body problem. The nitrogen atom target is described within the single active electron approximation using Garvey model potential where only the outermost electron is involved in the collision dynamics [2]. Regarding the projectile, in the first approximation, it is treated as a frozen core model and the charge of the projectiles are +1 in the entirely time of the collision. In the second approximation, the projectile-target interaction is described by a model potential which takes into account the screening effect by the projectile electrons [2]. The scattering problem is solved within the frame of the classical trajectory Monte Carlo (CTMC) [3].

We present total, angular, and energy differential cross sections for single ionization and single capture processes from intermediate to high impact projectile energies (10 keV-10 MeV). Our results are compared to the available experimental data which allowed us to test the validity of the frozen core approximation.

REFERENCES

[1] R Isler et al., Nucl. Fusion 31 245 (1991).

[2] R. H. Garvey et al., Phys. Rev. A 12, 1144 (1975).

[3] K. Tőkési et al., Nucl. Instrum. Methods Phys. Res. B: Beam Interact. Mater. At. 86, 201 (1994).