XXVIII International Conference on Photonic, Electronic and Atomic Collisions (ICPEAC 2013) IOP Publishing
Journal of Physics: Conference Series **488** (2014) 082007 doi:10.1088/1742-6596/488/8/082007

# State-selective electron capture in collisions of $C^{6+}$, $N^{7+}$ with Hydrogen at intermediate energies.

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**Synopsis** We present a joint study of the electron capture process in multicharged ions on atomic Hydrogen at intermediate energies. We have applied two methods, the Eikonal Impulse Approximation (EIA) and the hydrogenic-Classical Trajectory Monte Carlo (CTMC) method. Good agreement is found in both total and state-selective electron capture cross sections.

The electron capture process, also called charge exchange (CX), between fully stripped ions and Hydrogen atoms is a main subject of interest in fusion research, since cross sections for these processes are needed in different fields, mainly in Charge eXchange Recombination Spectroscopy (CXRS) [1]. The diagnostic of the plasma is based in the injection of a neutral beam, usually H, D or He atoms, which causes collisions with ions existing there and consequently, CX reactions between these impurity ions $A^{q+}$ and the injected atoms take place inside the plasma:

$$A^{q+} + H \rightarrow A^{(q-1)+}(n,l) + H^{+} \qquad (1)$$

Excited states of the ion $A^{(q-1)+}$ are formed which decay radiatively; the analysis of the ensuing emission provides information of plasma parameters such ion temperature, impurity density and charge state of the impurities.

In this work, we have applied our methods, the Eikonal Impulse Approximation [2] and the hydrogenic-CTMC [3, 4] to treat this type of collisions with the aim of obtaining reliable state-selective and total capture cross sections at intermediate-high energy range. As an illustration, we compare in Figure 1 n-resolved partial cross sections for $C^{6+}$, $N^{7+}$ + H(1s) collisions for those levels that radiatively decay in the visible spectrum. Our data are also compared with recent Atomic Orbital Close Coupling (AOCC) calculations from Igenbergs *et al.* [5]. An extended comparison and analysis of the electron capture process will be presented at the Conference.

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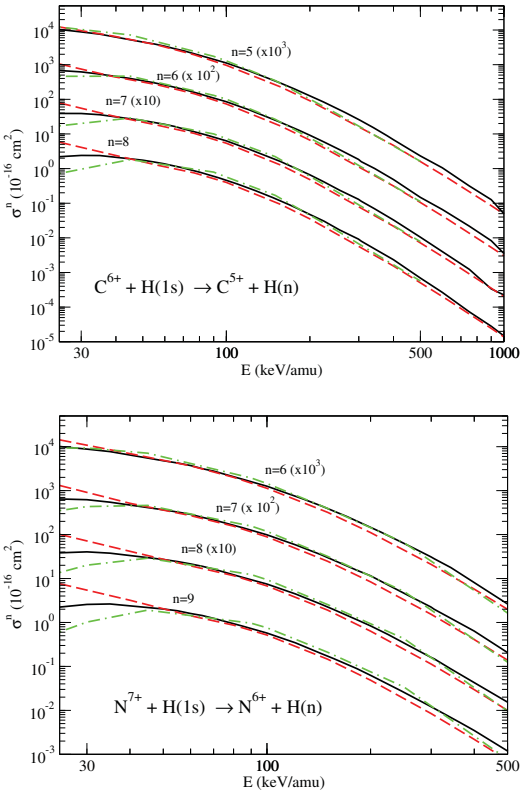


**Figure 1**. n-partial cross sections for $C^{6+}$, $N^{7+}$ + H(1s) collisions: (—) CTMC; (- - -) EIA; (- · -) AOCC results from reference [5].

## References

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