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Electron collisions with H2+, HD+ and D2+: computation of cross sections and rate coefficients, and comparison with storage ring measurements

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Dissociative recombination, ro-vibrational excitation and dissociative excitation [1] strongly drive the electron and cation kinetics in the edge of the fusion plasma. They occur via super-excited molecular states of the neutral complex singly or doubly excited, embedded in the ionization continuum of the target ion. Quantum chemistry and R-matrix techniques are used to produce the relevant potential energy states and their mutual interactions. We use these molecular structure data in methods based on the Multichannel Quantum Defect Theory [2, 3] for computing accurate state-to-state cross sections and rate coefficients, displaying a resonant character and a strong dependence on the target's initial state. I will illustrate our most relevant results for H_2^+, HD^+ and D_2^+ in a broad energy range - $0 - 12$ eV - of the incident electron, and for numerous ro-vibrational levels of the ion.

References

[1] I. F. Schneider, O. Dulieu, J. Robert, EPJ Web of Conferences 84 (2015).

[2] O. Motapon et al, Phys. Rev. A 90, 012706 (2014).

[3] K. Chakrabarti et al, Phys. Rev. A 87, 022702 (2013).

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