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Reactive collisions of electrons with molecular cations: computation and comparison with storage ring and plasma experiments

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Domain : Low Energy Electron-Molecule Interactions

Electron-impact dissociative recombination, ro-vibrational (de-)excitation and dissociative excitation of molecular cations play a major role in the kinetics and energy balance of various ionized media, occuring in interstellar molecular clouds, supernovae, planetary atmospheres, (plasma assisted) combustion, divertor region of the fusion devices and atmospheric re-entry of spacecrafts [1,2]. We will show - and compare with plasma-type and storage ring experiments - our recently computed [3,4] cross sections and rate coefficients on H_2^+, HD^+, DT^+ and NO^+, for several energy regions and ro-vibrational target states of interest, obtained by using a method [5,6] based on the Multichannel Quantum Defect Theory (MQDT). The rapid progress in energy, state-to-state and angular distribution resolution occuring in the storage-ring technique [1,7] allows presently to address these collisions in increasingly detailed aspects, of huge relevance for practical applications. We will illustrate our progress in the developpment of the existing MQDT tool, as well as on the wave-packet method [8], and compare the theoretical results with the recent TSR storage-ring measurements.

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