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Reactive collisions of electrons with molecular cations of astrophysical interest: effects to H₂⁺, HD⁺, H₃⁺ (poster pitch)

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The dissociative recombination (DR) together with the competing reactions –ro-vibrational excitation/de-excitation of the hydrogen molecular ion plays a decisive role in astrophysical ionized media: stars and interstellar molecular clouds, early Universe.

Using a stepwise method based on Multichannel Quantum Defect Theory (MQDT) [1], cross sections and rate coefficients have been obtained for reactions induced on HD⁺[2], H₂⁺ [3] and D₂⁺ [6].

For H₂⁺, the full rotational computations improved considerably, the accuracy of the resulting dissociative recombination cross sections and Maxwell isotropic rate coefficients [5]. The different mechanisms taken into account for H₂⁺, i.e. direct vs indirect and rotational vs non-rotational processes are presented.

An analytic three-channel model was developed for the description of simultaneous direct and indirect DR cross sections of H₃⁺ [4].

For these analyzed systems the results is in good agreement with the CRYRING (Stockholm) and TSR (Heidelberg) magnetic storage ring results.

References:

- [1] Ch. Jungen, Handbook of High Resolution Spectroscopy, Wiley & Sons, New York, 471(2011).
- [2] O. Motapon, N. Pop, F. Argoubi, J. Zs Mezei, M. D. Epee Epee, A. Faure, M. Telmini, J. Tennyson, and I. F. Schneider, Phys. Rev. A, 90, 012706(2014)
- [3] M. D. Epée Epée, J. Zs Mezei, O. Motapon, N. Pop, I. F. Schneider, MNRAS, 455, 276–281 (2015).
- [4] Ch. Jungen, N. Pop, I. F. Schneider, Phys. Rev. A, 86, 062706 (2012).
- [5] E. Djuissi, N. Pop et al., Rom. Astron. J. 30, 101(2020).
- [6] M. D. Epee´ Epee, ´ O. Motapon, N. Pop et al., MNRAS 512, 424–429 (2022).

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