

Dissociative Recombination and ro-vibrational excitation of molecular cations by electrons: new datasets (cross sections and rate coefficients) - impact in astrophysics

Nicolina Pop¹, E. Djuissi², J. Bofelli², J. Zs Mezei³, F. Iacob⁴ and
 I. F. Schneider^{2,5}

¹ *Department of Physical Foundations of Engineering, Politehnica University of Timisoara 2 Vasile Parvan Blvd, 300223 Timisoara, Romania*

E-mail: nicolina.pop@upt.ro

² *Laboratoire Ondes & Milieux Complexes CNRS- UMR-6294, Université du Havre, 76058 Le Havre, France*

³ *Institute for Nuclear Research, Hungarian Academy of Sciences, H-4001 Debrecen, Hungary*

⁴ *Physics Faculty, West University of Timișoara, Timișoara, Romania*

⁵ *Laboratoire Aimé Cotton, CNRS, ENS Cachan and Univ. Paris-Sud, 91405 Orsay, France*

The Multichannel Quantum Defect Theory (MQDT) has been used in computing cross sections and Maxwell rate coefficients for electron-driven reactions involving molecular cations. These data are useful in the modelling of the kinetics of various cold ionized media of fundamental and applied interest. Rotational and vibrational transitions (RVT) and dissociative recombination (DR) rate coefficients, an extension of our previous studies (Motapon et al., 2014, Epée et al., 2016, Djuissi et al., 2020) and outline several important features, as isotopic and resonant effects are presented. The provided collisional data are useful in the kinetics modeling in astrochemistry - early Universe, interstellar molecular space and cold plasma physics.

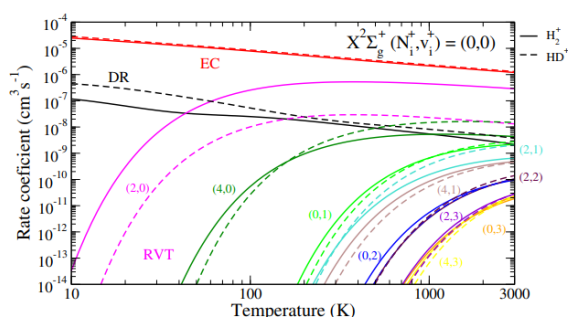


Fig. 1. Electron-impact DR and ro-vibrational transitions of HD⁺ and H₂⁺.

References

- Djuissi, E., Pop, N., et al., 2020, *Rom. Astron. J.* **30**, 101
Epée, M. D., Mezei, J. Zs, Motapon,O., Pop, N., Schneider, I. F., 2016, *MNRAS* **455**, 27
Motapon, O., Pop, N., Argoubi, F., Mezei, J. Zs, Epée Epée, M. D., Faure, A., Telmini, M., Tennyson, J., and Schneider, I. F., 2014, *Phys. Rev. A* **90**, 012706