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Vibrationally Resolved NonDissociative Charge Transfer in Collisions between Hydrogen or Deuterium Molecules and Atomic or Molecular Ions[1] V.M. ANDRIANARIJAONA, J.G. KING, M.F. MARTIN, Department of Physics, Pacific Union College, Angwin CA 94508, USA, X. URBAIN, Université Catholique de Louvain, Institute of Condensed Matter and Nanosciences, Chemin du Cyclotron 2, B-1348 Louvain-la-Neuve, Belgium — Using a 3-D imaging technique, the vibrational distributions of slow H_2^+ or D_2^+ produced by charge transfer (CT) between an H_2 or D_2 target and various fast ions (H^+, D^+, H_2^+, D_2^+, He^+, and H_3^+) were measured from 10 eV to few keV energies in the laboratory frame. The atomic/molecular ions are extracted from a duoplasmatron ion source, accelerated and decelerated to enter the collision cell hosting neutral molecules from an effusive jet. The CT daughter molecular ions are extracted sideways and accelerated to 2keV before crossing an effusive potassium jet to undergo resonant dissociative CT. The positions and flight time difference of the two resulting particles give access to the vibrational distribution of the CT products. At 50 eV and above, our results on the (H_2,H^+) system benchmark state-to-state calculations [1]. At lower energies, deviations from theory suggest that rovibrational modes start to play an important role in the CT dynamics.

[1] L. F. Errea, L. Fernandez, L. Méndez, B. Pons, I. Rabadán and A. Riera *Phys. Rev. A* ***75*** *032703 (2007).*

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