

Abstract Submitted  
for the DAMOP12 Meeting of  
The American Physical Society

**Single- and Multiple-Electron Removal Processes in Proton-Water Vapor Collisions**<sup>1</sup> MITSUKO MURAKAMI, TOM KIRCHNER, MARKO HORBATSCH, Department of Physics and Astronomy, York University, Toronto ON M3J 1P3, Canada, HANS JÜRGEN LÜDDE, Institut fuer Theoretische Physik, Goethe-Universitaet, D-60438 Frankfurt, Germany — Charge-state correlated cross sections for single- and multiple-electron removal processes due to capture and ionization in proton-H<sub>2</sub>O collisions are calculated by using the non-perturbative basis generator method adapted for ion-molecule collisions [1]. Orbital-specific cross sections for vacancy production are evaluated using this method to predict the yields of charged fragments (H<sub>2</sub>O<sup>+</sup>, OH<sup>+</sup>, H<sup>+</sup>, O<sup>+</sup>) according to branching ratios known to be valid at high impact energies. At intermediate and low energies, we obtain fragmentation results on the basis of predicted multi-electron removal cross sections, and explain most of the available experimental data [2]. The cross sections for charge transfer and for ionization are also compared with recent multi-center classical-trajectory Monte Carlo calculations [3] for impact energies from 20keV to several MeV.

[1] H.J. Lüdde et al, Phys. Rev. A **80**, 060702(R) (2009)

[2] M. Murakami et al, to be submitted to Phys. Rev. A (2012)

[3] C. Illescas et al, Phys. Rev. A **83**, 052704 (2011)

<sup>1</sup>This work has been supported by NSERC Canada and SHARCNET.

Tom Kirchner  
York University

Date submitted: 27 Jan 2012

Electronic form version 1.4