MO 31: Poster: Collisions, Energy Transfer

Time: Thursday 16:00–18:00 Location: P1

MO 31.1 Thu 16:00 P1

Vibrational state-to-state reactive ion-molecule scattering — •Martin Stei[1], Sebastian Trippel[2], Rico Otto[2], Jonathan Brox[2], James Cox[2], Thorsten Best[1], and Roland Wester[1] — [1]Institut für Ionenphysik und Angewandte Physik, Universität Innsbruck, Technikerstrasse 25/3, A-6020 Innsbruck — [2]Physikalisches Institut, Universität Freiburg, Hermann- Herder-Str. 3, 79104 Freiburg

We present our latest studies on reactive scattering in crossed ionic and molecular beams. With an improved 3D-VMI setup we have measured vibrational state-to-state differential cross-sections of the reaction $Ar^+ + N_2 \rightarrow Ar + N_2^+$ with significantly increased resolution. We find qualitative agreement with the theoretical predictions of Candori et al.[1] concerning the excitation of higher v and their scattering into larger angles, thus approaching a consistent description of this long-puzzling reaction[2]. We also report recent developments to study the influence of microsolvation on ion-molecule reactions. The combination of crossed-beam imaging with a multipole radio frequency ion trap allows us to prepare the ionic water clusters under well-defined initial conditions. First data have been obtained for the reaction of $OH^- \cdot (H_2O)_n$ with CH_3I. Finally we will give an outlook on our plans to scatter IR-laser excited CH_3I to study the influence of vibrational spectator modes.

[1] R. Candori, S. Cavalli, F. Pirani, A. Volpi, D. Cappelletti, P. Tosi, and D. Bassi , J. Chem. Phys. **115**, 8888 (2001)
[2] J. H. Futrell, Adv. Chem. Phys. **82**, 501 (1992)

MO 31.2 Thu 16:00 P1

Transfer ionization in deuterium-hydrogen-collisions — •Markus Waitz, Florian Trinter, Christian Müller, Christoph Goihl, Annika Jung, Hong-Keun Kim, Jasmin Titze, Markus S. Schöffler, Till Jahnke, Achim Czasch, Lothar Ph. H. Schmidt, Horst Schmidt-Böcking, and Reinhard Dörner — Institut für Kernphysik, Goethe-Universität Frankfurt, Max-von-Laue-Straße 1, 60438 Frankfurt

To our knowledge the transfer ionization process has only been investigated for atomic targets so far. As highly differential measurements show, the binary encounter and the shake off process can be distinguished by means of the electron longitudinal momentum [1]. Similar to that, we were able to observe a simliar dependency for the case of a molecular target. In addition, a KER-dependence of the ratio of forward to backward electron emission was found.

[1] M. S. Schöffler, PhD thesis, Goethe university Frankfurt (2006)

MO 31.3 Thu 16:00 P1

Double-Auger Emission of Carbon Monoxide following Core-Excitation and Ionization — •Florian Trinter[1], Markus S. Schöffler[2], Till Jahnke[1], Irina A. Bocharova[2], Arno Vredenborg[1], Renaud Guillemin[3], Felix P. Sturm[2], Nadine Neumann[1], Kyra Cole[1], Joshua B. Williams[4], Marc Simon[3], Allen Landers[4], Thorsten Weber[2], and Reinhard Dörner[1] — [1]Institut für Kernphysik, Goethe-Universität Frankfurt am Main, D-60438 Frankfurt, Germany — [2]Chemical Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, California 94720, USA — [3]Physics Department, Auburn University, Auburn, Alabama 36849, USA — [4]Laboratoire de Chimie Physique Matière et Rayonnement, UPMC Université Paris 06, F-75005 Paris, France

We have studied double Auger decay after $C1s \rightarrow 2\pi^*$ core-level photo excitation (287.4 eV photons) and after ionization (306 eV photons) using synchrotron radiation in gas phase carbon monoxide. In this experiment the aim is to understand the dissociation pathways during the Auger decay and the photo-electron valence-electron correlation. This is a fundamental correlation yet unexplored, which plays an important role in the understanding of the energy-bond-length correlation of the shape resonance in chemical compounds. Moreover, we want to investigate the role of the initial and final state correlation as well as post collision interaction effects in the emission patterns of the outgoing electrons and thus hunt for a breakdown of the widely accepted 2-step mechanism in small molecules. First results will be presented and discussed.