

## A 26: Poster II -Attosecond physics

Zeit: Donnerstag 16:30–18:30

Raum: Poster B

A 26.1 Do 16:30 Poster B

**Hydrogen and helium exposed to an attosecond electric field pulse** — ●ULRICH KLEIMAN and JAN-MICHAEL ROST — Max-Planck-Institut für Physik komplexer Systeme, Nöthnitzer Str. 38, D-01187 Dresden, Germany

The characteristics of excitation and ionization of atoms exposed to very short electric field pulses are different from what is known from the long pulse and continuous wave regimes.

We investigate the effect of a linearly polarized short electric field pulse of 1–5 cycles applied to hydrogen and collinear helium quantum mechanically by solving the time-dependent Schrödinger equation by means of the split-operator fast Fourier transform method [1]. After a few modifications [2], one can handle the singularities of the Coulomb potential and the electron-electron interaction term. Stimulated by a recent theoretical study of the hydrogen ground state based on the discrete variable representation [3], we shall check whether or not the initial states of hydrogen and, more interesting, collinear helium can be fully restored by using two alternating linearly polarized one-cycle pulses.

- [1] M.D. Feit et al., J. Comput. Phys. 47, 412 (1982).
- [2] M.R. Hermann and J.A. Fleck Jr., Phys. Rev. A 38, 6000 (1988).
- [3] D. Dimitrovski et al., Phys. Rev. Lett. 93, 083003 (2004).

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**Ground state correlation and dynamical processes in fast ion-helium-collisions** — ●MARKUS SCHÖFFLER<sup>1</sup>, JASMIN TITZE<sup>1</sup>, LOTHAR SCHMIDT<sup>1</sup>, COLM WHELAN<sup>2</sup>, ALEXANDER GODUNOV<sup>2</sup>, JAMES WALTERS<sup>3</sup>, OTTMAR JAGUTZKI<sup>1</sup>, HORST SCHMIDT-BÖCKING<sup>1</sup>, and REINHARD DÖRNER<sup>1</sup> — <sup>1</sup>Johann Wolfgang Goethe-Universität, Frankfurt, Germany — <sup>2</sup>Old Dominion University, Norfolk, USA — <sup>3</sup>The Queens University of Belfast, Belfast, UK

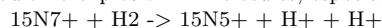
Correlated many-particle dynamics in Coulombic systems, which is one of the unsolved fundamental problems in AMO-physics, can now be approached experimentally with so far unprecedented completeness and precision. The recent development of the COLTRIMS technique (COLd Target Recoil Ion Momentum Spectroscopy) provides a coincident multi-fragment imaging technique for quasi snapshots of the correlated dynamics between electrons and nuclei. Recent transfer ionization studies of fast ion-He collisions will be presented and the direct observation of bound correlated electron pairs will be discussed. We could distinguish between different ionization mechanisms and reveal

the tiny non- $s^2$  contributions from helium groundstate.

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**Dissociative double capture in 15N7+ and H2 collisions** — ●NADINE NEUMANN, DOROTA HANT, LOTHAR SCHMIDT, MARKUS SCHÖFFLER, JASMIN TITZE, OTTMAR JAGUTZKI, and REINHARD DÖRNER — Institut für Kernphysik, J.W. Goethe Universität, Max-von-Laue-Str. 1, 60438 Frankfurt

Because of the high potential energy (up to 30 keV/u) and the low velocity of the ions from the ECR-Source, the main reaction channel in collisions with atoms or molecules is electron capture. The experimental set up will be designed for single capture and double capture with coulomb explosion in molecules, especially for the following reactions:



The highly charged projectile passes the target molecule in a random distance where Rutherford- and atomic scattering are possible reactions. When the projectile scatters on an electron or the core of the molecule it can be detected out of the center of the beam with a time- and position sensitive MCP-Detector with delay-line anode. The deflection angle of the projectile is a parameter how close the projectile passes the target molecule. The knowledge of this impact parameter is one big advantage of ion-atom and ion-molecule experiments compared to photon-atom or photon-molecule interactions.

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**Komplexe Elektronendynamik in He<sup>+</sup>-He-Stößen bei 60 keV/u** — ●MARKUS SCHÖFFLER<sup>1</sup>, JASMIN TITZE<sup>1</sup>, LOTHAR SCHMIDT<sup>1</sup>, OTTMAR JAGUTZKI<sup>1</sup>, SEBASTIAN OTRANTO<sup>2</sup>, RON OLSON<sup>2</sup>, HORST SCHMIDT-BÖCKING<sup>1</sup> und REINHARD DÖRNER<sup>1</sup> — <sup>1</sup>Johann Wolfgang Goethe-Universität, Frankfurt, Germany — <sup>2</sup>University of Missouri, Rolla, USA

Im Allgemeinen, und vor allem bei hohen Projektilgeschwindigkeiten ( $v_P > 3$  a. u.), ist die Dynamik einer Transferionisation,  $P^{n+} + He \rightarrow P^{(n-1)+} + He^{2+} + e$  unabhängig vom genauen Projektilpotenzial. Dies gilt ebenso bei mittleren Projektilgeschwindigkeiten um  $v_P=1,5$  a. u., sofern es sich um nackte Projektilionen, wie  $H^+$  bzw.  $He^{2+}$  handelt. Mittels der Technologie des Reaktionsmikroskops bzw. COLTRIMS (COLd Targe Recoil Ion Momentum Spectroscopy) wurde der Einfluss eines Projektilelektrons auf die Reaktionsdynamik kinematisch vollständig untersucht.