25th November 2014 – 10:00 a.m.

CFEL Building, Ground Floor, Seminar Room II

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Two-photon double ionization of noble gases: First applications of the High intensity HHG beamline at Lund Laser Center

The process of nonlinear ionization using high photon energies is very interesting as a tool for probing electron correlation and dynamics of highly exited systems. With photon energies of several 10 eV the absorption of one photon often leads to single ionization of the target atom, while absorption of a second or more photons can lead to multiple ionization and excitation of the target. So far these experiments has been limited to Free-Electron-Lasers [1] as light source which have very high pulse energy but limited time resolution. But in the last years intense high harmonic generation sources reaching pulse energies in the micro joule range have been developed at Forth [2], RIKEN [3] and recently at the Lund Laser Center [4], which are uniquely suited to extend the studies of the multiple ionization/excitation dynamics using XUV light in the sub-femtosecond timescale. I will present the Lund HHG beamline generating high energy pulses in the spectral range from 20 eV to 45 eV, reaching a peak intensity of 10^13 W/cm2 and first application results, in which we were able to measure the two photon double ionization of Neon and Argon. These serve as benchmark experiments for upcoming XUV pump-probe studies.

[1] N. Berrah , J. Bozek , J.T. Costello , S. Düsterer , L. Fang , J. Feldhaus , H. Fukuzawa , M. Hoener , Y.H. Jiang , P. Johnsson , E.T. Kennedy , M. Meyer , R. Moshammer , P. Radcliffe , M. Richter , A. Rouzée , A. Rudenko , A.A. Sorokin, K. Tiedtke , K. Ueda , J. Ullrich and M.J.J. Vrakking, Journal of Modern Optics, 57:12, 015-1040 (2010)

[2] N. A. Papadogiannis, L. A. A. Nikolopoulos, D. Charalambidis, G. D. Tsakiris, P. Tzallas, and K. Witte, Phys. Rev. Lett. 90, 133902 (2003).

[3] E. Takahashi, Y. Nabekawa, and K. Midorikawa, Opt. Lett. 27, 1920 (2002).

[4] P. Rudawski, C. Heyl, F. Brizuela, J. Schwenke, A. Persson, E. Mansten, R. Rakowski, L. Rading, F. Campi, B. Kim, et al., Review of Scientific Instruments 84, 073103 (2013).

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