

Laser Seminar

Monday, May 15, 2017

Time	New: 17.15
Location	ETH Zurich, Hönggerberg, HPF G6
Speaker	Prof. André Bandrauk Department of Chemistry, University of Sherbrooke, Canada
Title	Circularly Polarized Molecular High Order Harmonics - Generation and Applications in Attosecond Science
Abstract	MHOHG, Molecular high order harmonic generation is a highly nonlinear nonperturbative response of molecules to ultrashort(fs) intense($I > 10^{14} \text{ W/cm}^2$) laser pulses leading to multiphoton ionisation and laser induced electron recollisions in linear polarisation[1]. MHOHG is suppressed with intense single circularly polarized pulses but has been shown in 1995 to be generated with co- or counter-rotating pairs of bichromatic ($w_1/w_2 = n_1/n_2$) circularly polarised pulses [2-3] leading to the generation of circularly polarised attosecond(10^{-18} s) pulses, the time scale of electron motion in atoms and molecules [4]. Parallel computer simulations of TDSE,s, Time Dependent Schroedinger Equations coupled with Maxwell,s equations show that molecules are the ideal systems for circular polarised harmonic and attosecond pulse generation due to lower rotational symmetries than atoms. The TDSE simulations confirm the electron-parent ion recollision mechanism in the presence of bichromatic circular pulses and maximum circular polarised MHOHG efficiency is obtained when the net time dependent electric field of the combined pulses is compatible with molecular symmetry. The resulting circularly polarised attosecond pulses are shown to generate in molecules coherent attosecond quantum electron currents from which one can create intense attosecond magnetic pulses [5] for studying ultrafast magnetism and dynamical symmetry in molecules [6-7] [1] P B Corkum, Phys Rev Lett 71, 1994 (1993) [2] T Zuo, A D Bandrauk, J Nonl Opt Phys Mater 04, 533 (1995) [3] S Long, W Becker, J K McIver, Phys Rev A 52, 2262 (1995) [4] K J Yuan, A D Bandrauk, Phys Rev Lett 110, 023003 (2013) [5] K J Yuan, A D Bandrauk, Phys Rev A 92, 063401 (2015) [6] D Baykusheva, M S Ahsan, N Lin, H J Woerner, Phys Rev Lett 116, 123001 (2016) [7] A D Bandrauk, F Mauger, K J Yuan, in "Progress in Ultrafast Intense Laser Science", edit K Yamanouchi, vol XVI (Springer, Tokyo, Berlin, 2017)
Host	Hans Jakob Wörner, Laboratory of Physical Chemistry
More Info	http://www.fastlab.ethz.ch/laser-seminar.html

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