



# Institutskolloquium

Am Mittwoch, 9. Juli 2008 um 16:00 Uhr spricht

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Group (QOLS)

## “Controlling and Measuring Structure with Sub-Optical Cycle Electron Dynamics in a Strong Field”

Abstract: It is well known that strong field processes, such as high order harmonic generation (HHG), depend upon the sub-optical cycle dynamics of the strongly driven electrons. We will discuss some of our recent work where the sub-optical cycle dynamics of the driven electrons are examined using both theoretical and experimental approaches. Techniques for making sub-optical cycle temporal resolution measurements are identified and control methods that may soon be used in practice are treated theoretically. We will discuss the probing of proton rearrangements within laser field ionised molecules via HHG using the chirp encoded property of the electron recollisions. The initial experimental confirmation of this technique in H<sub>2</sub> and CH<sub>4</sub> are presented and discussed. New observations of transient two-centre interference in the H<sub>2</sub> molecule are obtained via the same method. In this case the two-centre destructive interference condition is briefly satisfied as the internuclear separation expands through the appropriate value around  $\sim 1.4$ fs after field ionization; this offers a new way to directly measure extremely fast intra-molecular structural change. Next we discuss the optimal electric field waveform for maximising the electron recollision energy. This was found, to be a simple saw-tooth form with a DC off-set. We briefly discuss practical routes for approaching this ideal. We also examine the control of an electron wavepacket when strong fields of different frequency and perpendicular polarisation are employed.

**Ort: Max-Born-Saal, MBI, Max-Born-Str. 2a**

Prof. Dr. W. Sandner