CFEL SCIENCE

SEMINAR

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Building 99, room IV – O1.111

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Generation and characterisation of few-cycle visible-IR, mid-IR, and attosecond XUV and VUV laser pulses for attosecond-pump--attosecond-probe spectroscopy

I will show latest results of our efforts in attosecond light source development. This involves the generation of CEP stable few-cycle pulses in the vis-IR and also mid-IR spectral ranges, XUV and VUV attosecond pulse generation as well as the exploration of novel HHG media. We have extensively studied HHG in underdense plasma plumes. I show that we can generate spectrally isolated sub-fs pulses from this source. In this talk I also like to put some focus on metrology and will introduce the concepts of laser pulse characterisation with special focus on interferometric methods. I will present the use of novel methods for the characterisation of few-cycle femtosecond pulses in the visible/IR, and mid-IR spectral range. I will briefly show the 'classic' SPIDER and the more recent developments enabling the single shot characterisation of complex (=pathological) pulses with SEA-CAR-SPIDER. For the spatio-temporal characterisation of few-cycle pulses I show SEA-f-SPIDER measurements of sub-2-cycle pulses from hollow-fibre compressors in the vis-IR and mid-IR. For the characterisation of (attosecond) XUV pulses I show interferometric measurements of the spectrally resolved spatial phase of HHG. These measurements are important to understand space-time coupling of attosecond pulses. Further I show some results of attosecond streaking measurements analysed with the FROG-CRAB method and also work towards simplified chrono-cyclic tomography. I will also show some work towards generating the "perfect wave" for HHG and attosecond pulse generation by sub-cycle waveform shaping and combining multiple colour laser fields and applications of attosecond pulses for the temporal characterisation of surface nano-plasmons via attosecond streaking.

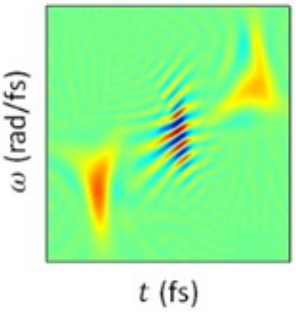

Figure 1. Wigner function of a bichromatic double femtosecond pulse.

Host: Franz X. Kärtner, CFEL UX Seminar