CFEL SCIENCE

# SEMINAR

**25th June, 2014 - 13:00**
bldg. 99, seminar room IV (O1.111)

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## Precision experiments in strong-field and attosecond science


In strong-field and attosecond science, the interpretation of experiments relies on highly complex theoretical simulations. Often theory and experiment do not agree, throwing these interpretations into doubt. I will describe efforts to achieve highly accurate measurements in strong-field ionisation and high-harmonic generation at the Australian Attosecond Science Facility (AASF). Using atomic hydrogen, we have achieved few-percent accuracy in measuring photoionisation yields, photoelectron energies, and laser peak intensities. Our measurements on $H_2$ strongly challenge theory: the data are known to be accurate at the 3% level, but disagree with state-of-the-art simulations at the tens of percent level. From the $H_2$ data, we have derived an intensity calibration standard that is readily accessible to other laboratories. In another set of experiments, we have demonstrated a new kind of HHG interferometer, based on Gouy phase evolution of the drive laser. With only passive stabilisation, this technique provides zeptosecond timing stability in measuring time delays between HHG pulse pairs. We are preparing experiments to investigate nuclear effects on HHG using the microradian phase precision of this interferometer.


Host: Franz X. Kärtner, CFEL-UX Seminar