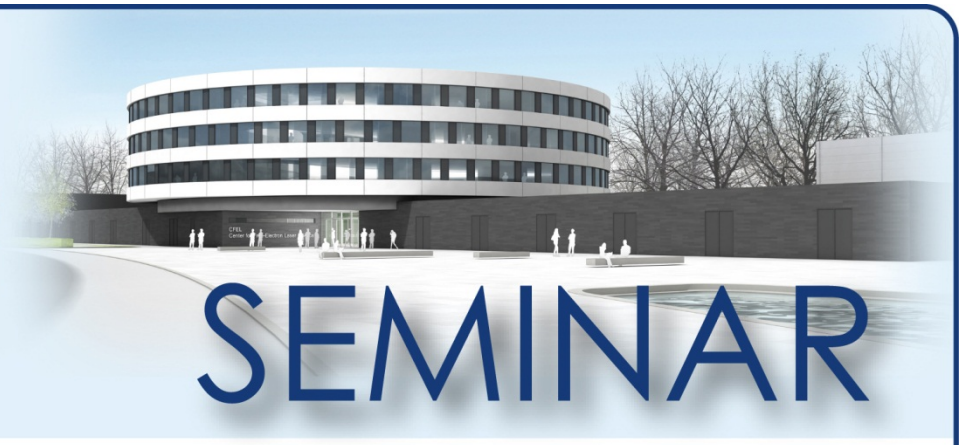
CFEL SCIENCE



SEMINAR

14th July 2011 - 10:15 a.m.

DESY Building 28 c (FLASH Hall), Seminar Room

Katharine Reid

University of Nottigham, School of Chemistry

Quantitative characterization of dynamical processes using variants of photoelectron spectroscopy

In this talk I will discuss how photoelectron velocity map imaging with optimized energy resolution can be used to determine (a) radial dipole matrix elements controlling photoionization and (b) coupling matrix elements controlling intramolecular vibrational distribution.

In both cases an initial state is prepared with a laser photon and ionized with a second laser photon of different frequency, leaving the cation with a relatively low internal energy.

In case (a) the use of nanosecond laser pulses enables the resolution of rotational levels in the ground state of the ammonia cation, and the imaging technique allows the measurement of a photoelectron angular distribution corresponding to each rotational level which can be analyzed quantitatively.

In case (b) the use of laser pulses of 1 ps duration enables the preparation of a nonstationary superposition of eigenstates in p-fluorotoluene whose evolution can be monitored by delaying the probe pulse with respect to the pump pulse.

Crucially, the sensitivity to this wavepacket evolution is dependent on the ion vibrational state that is formed, and these states are resolved in the photoelectron spectra. Characteristic quantum beating patterns corresponding to each ion vibrational state are observed and these are analyzed quantitatively.

Host: Jochen Küpper - Coherent Imaging Division - Controlled Molecule Imaging Group