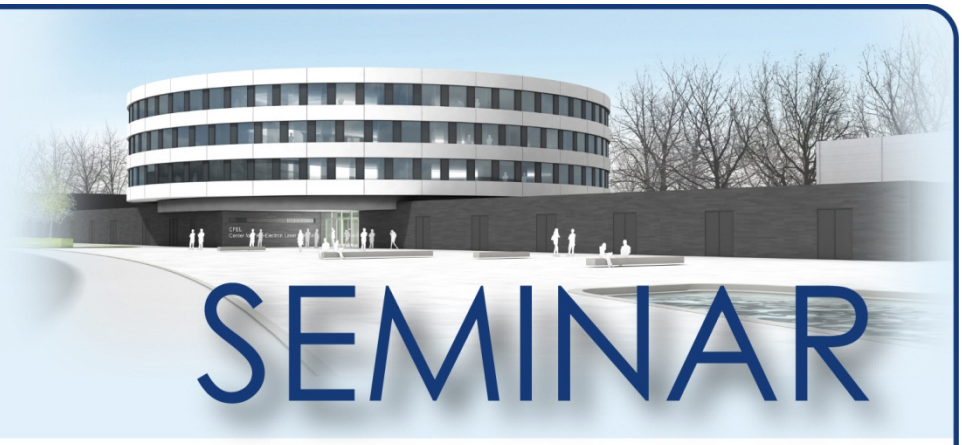
CFEL SCIENCE



SEMINAR

08th March 2011 - 14:15

FLASH HALL (28c), Seminar Room

Wim Ubachs

Free University, Amsterdam, Netherlands

Spectroscopic techniques for the extreme ultraviolet

The generation of laser-based radiation in the domain of the extreme ultraviolet (XUV) range (λ<100nm) is possible via techniques of harmonic generation, which can be applied with pulses of nano-second, pico-seconds or femto-second duration. Tunable narrowband XUV-radiation can be applied in high resolution spectroscopy for the study of high-lying Rydberg states in atoms and molecules, and in the study of photo-dissociation phenomena. Recently the operation of frequency comb lasers has been extended to the domain of the XUV, making frequency metrology possible in this domain. Besides non-linear optical and technological issues concerned with such lasers some remarkable results in the spectroscopic application will be discussed: (1) the measurement of the Lamb shift in the helium atom testing novel bound-state QED calculations, and (2) precision measurements in hydrogen molecules for testing possible variation of fundamental constants on a cosmological time scale. Finally, in addition to laser-based XUV techniques, there is also an interesting development of Fourier-transform spectroscopy in the XUV domain, which will be highlighted.

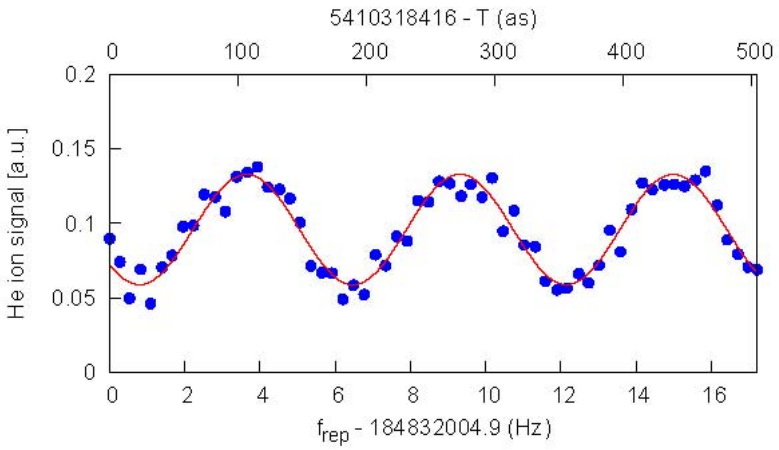


Fig: Spectroscopic Ramsay-interference pattern observed with an XUV-frequency comb laser at 51 nm, exciting the 5p-resonance line in atomic helium.

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