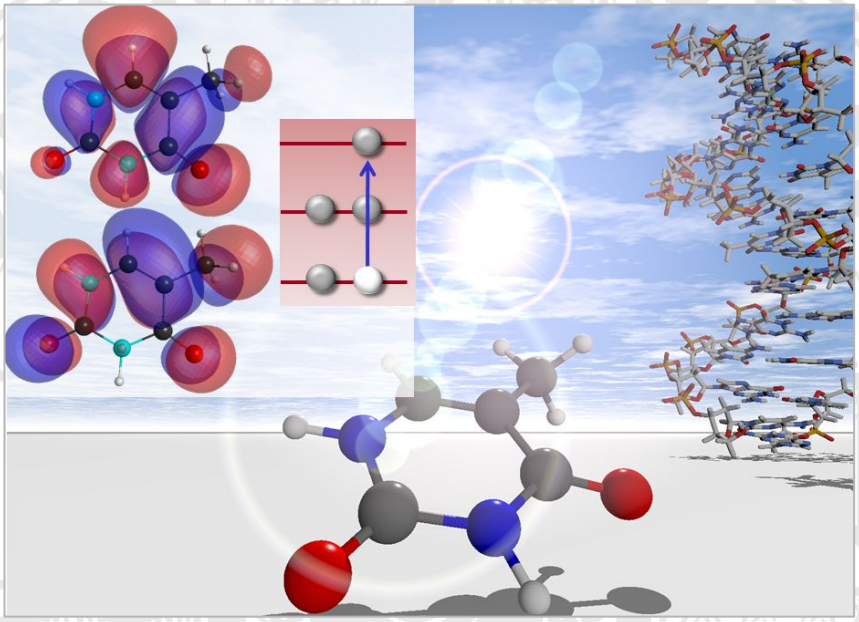
UNI FREIBURG
Physikalisches Institut
Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg

SONDERKOLLOQUIUM

AM 26. JUNI 2014 UM 15 UHR S.T.

IM HÖRSAAL II IM PHYSIKHOCHHAUS



Probing light induced dynamics with high photon energies

DR. MARKUS GÜHR

PULSE INSTITUTE, SLAC NATIONAL ACCELERATOR LABORATORY AND STANFORD UNIVERSITY

Many quantum systems selectively transform light energy into other forms of energy like heat, electricity, or chemical energy with high quantum efficiency. The energy conversion process is the result of a concerted and ultrafast motion of electrons and nuclei after photoexcitation. This talk is about ultrafast experiments aimed at resolving the light induced dynamics with probe pulses in the vacuum-ultraviolet to the soft x-ray spectral domain. Inner-shell to valence transitions, accessible at these high photon energies, help to disentangle the electronic and nuclear degrees of freedom.

After a general introduction, I will concentrate on the phenomenon of nucleobase photoprotection. We recently determined a photoprotection path using UV excitation followed by soft x-ray probing. I will show how the element sensitivity, which is typical for soft x-ray spectroscopy, helps us in disentangling nuclear from electronic relaxation. The second part of the talk will be about experiments with high photon energies generated by nonlinear laser interactions. In particular, I will demonstrate the extension of the transient grating method into the element selective extreme ultraviolet domain. The measurement is sensitive to insulator-to-metal transitions in materials, as shown on the case of vanadium dioxide. I will finish with a general outlook to developments and future possibilities in the field.