# Laser Initiated Time Resolved Spectroscopy and Wide Angle X-ray Scattering on Molecular Systems in the Hard X-ray Range

Klaus Attenkofer
Advanced Photon Source

Structural changes of molecular systems triggered by electronic excitations play an important role for the functionality of biological systems, light-harvesting chemical systems and, last but not least, in the rational design of synthetic structures mimicking biological systems which convert chemical energy to motion. Pulsed X-ray sources such as storage rings provide a new stroboscopic tool, often complementary to laser-based techniques, to probe not only the electronic excitations but also the structural response of molecules. Some examples of laser-initiated X-ray spectroscopy and wide angle x-ray scattering will demonstrate the strength of these techniques which presently find its limitations due to limited photon flux and time-resolution, mostly determined by the X-ray pulse strength and length (~100ps). Alternative detection mechanisms, including optoelectronic techniques, and improved beamline concepts will be presented which have the potential to overcome these obstacles resulting in time resolution of about 1ps.