Science at the Timescale of the Electron: Ultrafast Lasers and Applications to Nano- and Materials Research

Abstract Ever since the invention of the laser 50 years ago, scientists have been striving to extend coherent laser-like beams into the x-ray region of the spectrum. Very recently, we used tabletop femtosecond lasers to create bright beams of x-rays at wavelengths <10Å, by harnessing a new ability to manipulate electrons on their natural, attosecond (10^-18s), time-scales.[1] Ultrafast X-rays are powerful probes of the nanoworld. They penetrate thick samples and can image small objects. This talk will also highlight how ultrafast x-rays can capture the coupled motions of charges, spins, phonons and photons that underlie function in nanosystems on the fastest timescales. Experiences regarding technology transfer can also be discussed.

Host: Alexander Gaeta