

PHYSICS AND ASTRONOMY COLLOQUIUM

Phil Bucksbaum, Ph.D.

Stanford University and SLAC National Accelerator Laboratory

Quantum control in strong laser fields

The time scale for internal motion in atoms and small molecules is determined by their Angstrom sizes and Rydberg binding energies to be femtoseconds or shorter. The binding fields for the outermost electrons are tens of volts per Angstrom, while inner electrons can be bound by kilovolts or more. I will describe recent experiments designed to study the interaction of atoms and molecules utilizing laser fields on these scales of time, photon energy and field strength.



Two kinds of laser sources are employed: Strong focused infrared lasers create these extreme conditions within a single optical cycle, and thereby induce atomic phenomena that evolve during fractions of a femtosecond. This is the regime of high harmonic generation and above-threshold ionization.

X-ray free electron lasers can also produce these extreme fields, but at much higher oscillation frequencies. This is the regime of rapid inner shell ionization and Auger relaxation.

Both types of strong-field phenomena induce dynamics on femtosecond or faster time scales. Our experiments seek to track this motion and reveal the underlying internal mechanisms responsible for them.

THURSDAY, FEBRUARY 26, 2015 | 4:00 PM | HAWKING AUDITORIUM



PHYSICS & ASTRONOMY
TEXAS A & M UNIVERSITY