

Joint CQSE and CASTS Seminar

Weekly Seminar
Oct. 13, 2017 (Friday)

TIME Oct. 13, 2017, 14:30 ~ 15:30
TITLE Probing and Guiding Electron Dynamics
SPEAKER Dr. John Heslar
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PLACE Rm716, CCMS & New Physics Building, NTU

Abstract

In this talk, we discuss some recent highlights regarding the nonperturbative study of novel highly nonlinear optical phenomena in intense ultrashort laser fields. Multiple high-order harmonic generation (HHG) is the most important metrology for the generation of ultrashort attosecond (10^{-18} sec) laser pulses. Table-top XUV and soft X-ray sources based on high harmonic upconversion of femtosecond laser pulses represents a viable alternative to large-scale sources for many applications, due to their unique ability to generate bright and ultrashort light with an energy spectrum reaching the keV region. Knowledge of the exact mechanisms and steering electrons for the production of high-order harmonics can give guidance in probing atomic and molecular dynamics on an attosecond time scale.

Our new methods allow accurate probing of electron paths as a function of energy, time and position for molecules subject to intense laser fields. We find that with the use of different driving laser pulse shapes, we can control the harmonic generation of diatomic molecules to either be linearly or circularly polarized sources of bright light. We also show how these XUV and soft X-ray sources of radiation are useful for analyzing the structural, electronic, and magnetic properties of materials.

