

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

A Study of Wavelength Scaling in Strong-field Optical Ionization

By

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Strong-field optical physics continues to be an excellent means to both study fundamental atom-light interactions as well as pursue advanced applications. By using ultrafast laser pulses, we can subject atoms to external electric fields that rival their own. In doing so, we can witness exotic phenomena such as simultaneous multiple ionization and high harmonic generation. The laser has been used to generate the shortest pulses of radiation measured to date and enable study of atomic dynamics in the time domain.

Two new ultrafast mid-infrared laser light sources are used to study the photoionization dynamics of noble gases. The new results are compared with the results where most work has been performed previously (800 nm wavelength).

By moving to mid-infrared wavelengths (2, 3.6 μm), we study the changes in ion ratios and concurrent photoelectron spectra. Theory predicts that the increase in ponderomotive energy will produce electrons with higher energy but that the longer time that the electron spends in the continuum should decrease the probability of rescattering. As predicted, we find that indeed our photoionized electrons present themselves with ever higher energies. Also, we measure a decrease in the double to single ion ratio which confirms the predicted reduction in rescattering probability.

Date: August 13, 2007

Time: 11:00 am

Place: Physics Building, Room S-141

Program: Physics

Dissertation Advisor: Prof. Louis DiMauro