

**Stony Brook University
The Graduate School**

Doctoral Defense Announcement

Abstract

Strong-field Dissociative Ionization as a Probe of Molecular Dynamics and Structure

by

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We present work on strong-field ionization of polyatomic molecules. Strong-field ionization has been in focus of recent research efforts in ultrafast atomic, molecular and optical science, due to its role in the generation of attosecond pulses and as a probe both nuclear and electronic dynamics, and in imaging of molecular orbitals.

Ultrafast relaxation of excited state DNA and RNA bases, instrumental for their photostability, was tracked using strong-field dissociative ionization. Relaxation through multiple pathways has been observed and interpreted in terms of the excited state wavepacket dynamics. The example of cytosine is presented in detail.

The electronic dynamics associated with the strong-field ionization process were explored, in particular the role of the symmetry of the neutral orbital from which the electron was removed. For ionization from the highest lying occupied orbital, the ionization yields are shown to reflect the symmetry of the orbital. Ionization from a deeper bound orbital is found to be more complicated. Further, we find that a detailed treatment of ion-electron interactions that take place during the ionization process is necessary to achieve a qualitative agreement between final-state-resolved calculations and experiments.

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Time: 11:00 am

Place: Physics Building, Room S-141

Program: Physics

Dissertation Advisor: Thomas Weinacht