Extreme Photonics Seminar

Language: English

Date : April 26(Thu), 2018, 15:00–16:00

Location : W524, 5F, Cooperation Center, Wako Campus, RIKEN

Title : **Ultrafast Molecular Dynamics Induced by Intense Laser Fields**

Speaker :

Prof. Zhi Heng Loh

School of Physical and Mathematical Science
Nanyang Technological University, Singapore

Strong-field laser-molecule interaction forms much of the basis for initiating and probing quantum dynamics on ultrashort timescales. In this talk, I will provide selected examples from our recent studies of vibrational coherences and ultrafast dissociation dynamics of strong-field-ionized molecules in the gas phase and in aqueous solution, probed by differential soft X-ray and optical absorption spectroscopies, respectively. In the case of strong-field-ionized iodoalkanes in the gas phase, probing the iodine 4*d* core-level absorption at ~50 eV reveals spin-orbit state-selective C–I dissociation, accompanied by shifts in the XUV transition energies on the sub-picosecond timescale, as well as conformer-resolved dissociation dynamics. Analysis of the vibrational wave packet dynamics unravels different mechanisms for the generation of vibrational coherences in the neutral species and reveals multimode vibrational wave packet motion in the parent ions. In aqueous solution, strong-field ionization of phenoxide followed by near-ultraviolet probing of the phenoxyl radical absorption reveals a multitude of normal modes that are coupled to the ionization transition. In addition, the results suggest that ionization-induced proton transfer from the solvent to the phenoxyl radical occurs on the sub-10-fs timescale. Our results shed light on the elementary ultrafast dynamics that accompany the interaction of ionizing radiation with polyatomic molecules.

Contact: K. Midorikawa (ext.91-8532), Attosecond Science Reseach Team, RAP