Visiting Professors

Visiting Professor
MIDORIKAWA, Katsumi *(from RIKEN)*

XUV Nonlinear Optics and Attosecond Dynamics in Atoms and Molecules

Nonlinear optical process in the XUV region is of paramount importance not only in the field of quantum electronic but also in ultrafast optics. From the viewpoint of quantum electronics, new features of the interaction between intense XUV photons and matters are expected to be revealed through observation of those nonlinear phenomena. On the other hand, those nonlinear processes in the XUV region is indispensable for progress of attosecond science including attosecond atomic/molecular physics and chemistry, because it is very useful for investigating ultrafast phenomena directly in attosecond time scale. Using high harmonic generation by intense femtosecond lasers, we are pursuing extreme optical science including XUV nonlinear optics and attosecond physics/chemistry.

Visiting Professor
TOMINAGA, Keisuke *(from Kobe University)*

Molecular Dynamics in Condensed Phases Studied by Ultrafast Laser Spectroscopy

Molecules in liquids interact with each other in a complex manner, and this complicated interaction is a source of various aspects of the dynamical behaviors in liquids. Mainly, we employ two ultrafast spectroscopic techniques. One is terahertz time-domain spectroscopy. We have studied collective dynamics of liquid methanol from analysis of THz spectra based on the results by molecular dynamics simulation. The other technique is infrared nonlinear spectroscopy such as three-pulse photon echo. By this method we have made data base of time correlation functions of the frequency fluctuation of vibrational transitions of various solute/solvent systems.

Visiting Associate Professor
OKADA, Kazumasa *(from Hiroshima University)*

Study on the Fragmentation of Molecules and Clusters in the Inner-Valence and Inner-Shell Electron Excitation Regions

The knowledge of the mechanisms involved in the ionization helps us to understand various processes in which there exists interaction of molecules and photons or electrons. The fragmentation dynamics of highly-excited or multiply-ionized molecules and clusters is studied by means of time-of-flight mass spectrometry. Multiple modes of measurement are used to obtain branching ratios of fragment ions or breakdown diagrams. Kinetic energy distribution of fragments provides insight into the nature of the fragmentation process.

Visiting Associate Professor
AMEMIYA, Kenta *(from High Energy Accelerator Research Organization)*

Development of Soft X-Ray Optics and X-Ray Absorption Techniques

The soft X-ray region includes absorption edges of light elements such as carbon, nitrogen and oxygen, which are main components of organic molecules. X-ray absorption spectroscopy (XAS) is a powerful technique to investigate atomic and electronic structures of condensed materials, owing to its element and orbital selectivity. Soft X-rays with high energy resolution is necessary, however, in order to obtain significant information from X-ray absorption spectra. We develop a high-resolution soft X-ray beamline in UVSOR, as well as a novel experimental technique, three-dimensional XAS, which combines soft X-ray microbeam with the depth-resolved XAS technique. By applying this technique, lateral and depth profiles of atomic and electronic structures of organic thin films can be determined with lateral and depth resolution of several micron and sub nanometer, respectively.