

# エクストリームフォトリクスセミナー

## *Extreme Photonics Seminar*

No.15

Language: **English**

**Date:** Dec. 20th(Mon), 2010, 15:00 ~ 17:00  
**Location:** Cooperation Center, 4F Meeting Room, W425  
(研究交流棟4階会議室 W425)

---

**Title:** Tunable frequency-controlled isolated attosecond pulses characterized by both 750 nm and 400 nm wavelength streak fields and its applications

**Speaker:** Dr. Hiroki Mashiko  
(Lawrence Berkeley National Laboratory)

A novel compact and robust Mach-Zehnder type interferometer coupled with the double optical gating technique provides tunable isolated attosecond pulses and streak field detection with fields centered at both 750 nm and 400 nm. Isolated attosecond pulses produced at 26-67 eV (with measured pulse duration of  $114 \pm 4$  as) and 16-25 eV (with measured pulse duration of  $395 \pm 6$  as) are temporally characterized with a 750 nm wavelength streak field. In addition, an isolated  $118 \pm 10$  as pulse at 26-67 eV is measured with a 400 nm wavelength streak field. The interferometer design used herein provides broad flexibility for attosecond streak experiments, allowing pump and probe pulses to be specified independently. This capability is important for studying selected electronic transitions in atoms, molecules, and solids.

---

**Title :** A Raman Approach for Arbitrary Optical Waveform Synthesis

**Speaker :** Dr. Kanaka Raju Pandiri  
(University of Electro-Communications)

A Molecular modulator similar to an electro-optic modulator is realized by driving Raman process adiabatically in para-hydrogen molecular ensemble. The molecular modulator induces a strong phase modulation onto the propagating laser fields and produces Raman sidebands. The sidebands are mutually coherent in nature, thus we can construct any user-specified ultrashort waveforms by using Fourier-transform relationship. With the combination of a spectral line-by-line phase controller and spectral phase interferometry for direct electric field reconstruction for discrete spectra, we synthesized a 10 THz ultrahigh repetition rate arbitrary optical waveforms (especially Fourier-transform limited pulse train, rectangular- and triangular- type optical waveform). A new, efficient Raman sidebands generation is proposed and demonstrated based on parahydrogen filled kagome-lattice type photonic crystal fibers.