

**UCLA**

*Department of Chemistry & Biochemistry*

# BERNSTEIN LECTURE

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*presenting*

## Ultrafast Coherent X-Ray Beams on a Tabletop and Applications in Nano and Materials Science

Ever since the invention of the laser 50 years ago, scientists have been striving to extend coherent laser-like beams into the x-ray region of the spectrum. Very recently, the prospects for tabletop x-ray beams at wavelengths  $<10\text{\AA}$  have brightened considerably, because of a new ability to manipulate electrons on their natural, attosecond ( $10^{-18}\text{s}$ ), time-scales using femtosecond lasers. Bright, laser-like, X-ray beams with photon energies  $>1.6\text{keV}$  (wavelengths  $<8\text{\AA}$ ) can now be produced from tabletop femtosecond lasers [1]. X-rays are powerful probes of the nanoworld. They penetrate thick samples and can image small objects. This talk will also highlight how ultrafast x-rays can capture the coupled motions of charges, spins, phonons and photons that underlie function on the fastest timescales in molecules, quantum dots and materials.

1. Popmintchev et al, Science 336, 1287 (2012).

Monday, April 8, 2013  
4:00 P.M.

2033 Young Hall

Reception  
5:15 P.M.  
3037 Young Hall

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