



Graduate Seminar (EEL 6936)
Department of Electrical Engineering
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**Monday, September 29, 2014, 11:00 a.m. – 12:00 p.m.
Center for Urban Transportation Research, Room 202 (CUTR 202)**

High Power Tabletop Ultrafast Laser Sources Extending from Terahertz Through X-Ray

Abstract

High peak power ultrashort laser pulses from picoseconds (10^{-12} sec) down to attoseconds (10^{-18} sec) in duration have enabled a whole range of fundamental and applied research areas as well as industrial applications. The cryogenically-cooled laser technology combined with the ytterbium-doped gain media with excellent thermo-optical property has played a key role to demonstrate the amplification of short pulses with high beam quality and high average power.

In this talk, I will first present the developments of our few-cycle optical parametric chirped-pulse amplifier (OPCPA) laser system and cryogenically-cooled chirped-pulse amplifier (CPA) laser system at MIT for delivering ultrashort pulses with high energy and high repetition rate. Second, I will introduce our laser applications which are the high-energy sub-cycle parametric waveform synthesizers for studying attoscience and the high-efficiency intense ultrafast terahertz generation for direct electron acceleration. Third, I will report our progress of compact ultrafast coherent X-ray source based on high harmonic generation (HHG) and inverse Compton scattering with high photon flux. Particularly, the photon energies in the water window and keV range can open up unprecedented capabilities for in-vivo studies of biological specimens, and respectively, for many inner-shell absorption edges in catalytic, magnetic, and electron materials.

Biography



Dr. Chun-Lin Louis Chang is a postdoctoral research fellow in the Optics and Quantum Electronics (OQE) group in the Department of Electrical Engineering and Computer Science (EECS) and Research Laboratory of Electronics (RLE) at the Massachusetts Institute of Technology (MIT). He received the B.S. and M.S. degrees in Engineering Physics from the Department of Engineering and System Science (ESS), National Tsinghua University (NTHU) at Taiwan, in 2000 and 2002, respectively, and the Ph.D. degree from the Institute of Photonics and Optoelectronics (IPO), National Taiwan University (NTU) at Taiwan in 2013. From 2003 to 2007, he was the research staff of the Institute of Atomic and Molecular Science (IAMS), Academia Sinica at Taiwan under the National Defense Service Program to

study the laser-plasma electron accelerator driven by terawatt femtosecond laser system in lieu of the two-year conscript military service. During his research career over one decade, he has published over 30 papers in prestigious international journals and conferences. His research interest is strong-field laser-plasma photonics device and its practical applications, focusing on the development of high intensity all-solid-state and all-fiber lasers, and laser-plasma experiments for particle and x-ray generation.