



ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

PHYSICS COLLOQUIUM

Thursday, 24 May 2012

17:00 -18:00

3rd Floor Seminar Room

“Taming light waves: Triggering and clocking the motion of electrons”

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Abstract

Real-time control of electrons in the microcosm calls for electromagnetic forces confinable and tunable over sub-femtosecond time intervals. I will discuss how recent progress in lightwave technologies [1-4] has enabled important steps towards this essential milestone in science and technology. With novel types of light synthesizers that manipulate ultrawideband light sources, spanning the visible and flanking spectral ranges, it is now possible to sculpt [5] and trace [1] the waveform of light with a precision higher than its own field oscillation.

To explore the potential of the new tools for advancing microscopic manipulation of matter, we have used synthesized light transients to demonstrate basic elements of ultrafast control of electrons such as attosecond triggering and clocking of electron dynamics in the valence shell of ions [6] and real-time tracing of atomic ionization in strong fields [5].

- [1] E. Goulielmakis *et al.*, *Science* **320**, 1614 (2008).
- [2] R. Kienberger *et al.*, *Nature* **427**, 817 (2004).
- [3] E. Goulielmakis *et al.*, *Science* **305**, 1267 (2004).
- [4] E. Goulielmakis *et al.*, *Science* **317**, 769 (2007).
- [5] A. Wirth *et al.*, *Science* **334**, 195 (2011).
- [6] E. Goulielmakis *et al.*, *Nature* **466**, 739 (2010).