



ΓΕΝΙΚΟ ΣΕΜΙΝΑΡΙΟ ΤΜΗΜΑΤΟΣ ΦΥΣΙΚΗΣ

PHYSICS COLLOQUIUM

Thursday, 7 May 2015

17:00 -18:00

3rd Floor Seminar Room

“Ultrafast electron dynamics initiated by attosecond and intense extreme ultraviolet pulses”

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Abstract

The generation and characterization of trains and isolated attosecond ($1\text{as} = 10^{-18}\text{ s}$) pulses have been achieved thanks to the continuous development of ultrafast intense laser sources over the last 20 years [1,2]. Attosecond pulses are the shortest reproducible events produced so far and their duration is approaching the atomic unit of time ($1\text{ a.u.} = 24\text{ as}$) [3, 4]. Experimental and theoretical results on the ultrafast dynamics initiated by isolated attosecond pulses in small molecules such as H_2 , D_2 and N_2 will be presented. In these systems, several states of the neutral molecule (autoionizing states) or of the molecular ion can be accessed due to the large bandwidth of the attosecond pulses. The few-femtosecond and attosecond electron dynamics can be probed and controlled using a synchronized infrared few-cycle pulse [5]. New directions for the investigation of attosecond dynamics in more complex molecules will be discussed. We will present, moreover, novel results on the nonlinear excitation of Interatomic Coulombic Decay and of autoionizing Fano resonances in neon atoms obtained at the FEL FERMI@Elettra in Trieste.

References

- [1] T. Brabec and F. Krausz, *Rev. Mod. Phys.* **72**, 545 (2000).
- [2] M. B. Gaarde, J. L. Tate and K. J. Schafer, *J. Phys. B: At. Mol. Opt. Phys.* **41**, 132001 (2008).
- [3] K. Zhao *et al.*, *Opt. Lett.* **37**, 3891 (2012).
- [4] E. Goulielmakis *et al.* *Science* **320**, 1614 (2008).
- [5] G. Sansone *et al.*, *Nature* **465**, 763 (2010).