



UNIVERSITÀ DEGLI STUDI
DI PERUGIA



AVVISO DI SEMINARIO

Giovedì 16 giugno 2016 - ore 11:00
Aula E 3° piano

Dr. Filippo Bencivenga

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"Non-linear experiments with free electron lasers"

Abstract:

The advent of free electron laser (FEL) sources have permitted to develop advanced table-top methods, such as those based on non-linear optics, into the extreme ultraviolet (XUV) and x-ray domain. In this context we exploited the fully coherent XUV pulses delivered by the FERMI FEL facility to demonstrate a four-wave-mixing (FWM) response stimulated by XUV transient gratings (X-TG) [1]. More recently we used the unique two-colour seeded FEL emission available FERMI [2] to carry out an XUV coherent Raman scattering (X-CRS) experiment. Both X-TG and X-CRS represent relevant stepping stones towards the development of more sophisticated FWM methods, which, so far, have been only theoretically conceived [3]. In particular, the X-TG approach can be used for probing collective atomic dynamics in the "mesoscopic" ($0.1-1 \text{ nm}^{-1}$) wavevector range [4], which is of the highest relevance to understand the thermal and mechanical properties of disordered systems and nanostructures. On the other hand X-CRS can probe the ultrafast dynamics of high energy excitations, such as, e.g., valence band excitons, with the unique option of atomic-selectivity; the latter may turn into the capability to follow, in real-time, the dynamics of selected excitations among different and selectable atoms in a sample [3]. Such FWM applications will be further developed at FERMI in user-dedicated experimental infrastructures [5].

[1] F. Bencivenga et al., Nature 502, 205 (2015)

[2] E. Allaria et al., Nat. Commun. 4, 2476 (2013)

[3] S. Tanaka and S. Mukamel, Phys. Rev. Lett. 89, 043001 (2002)

[4] F. Bencivenga and C. Masciovecchio, NIMA 606, 785 (2009)

[5] F. Bencivenga et al., J. Sinc. Rad. 23, 132 (2016)

Tutti gli interessati sono invitati a partecipare

Il Responsabile:

Dr. Lucia Comez

Il Direttore:

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