

Seminar: Hard Condensed Matter Theory

Room: Media Raum, 03-431 (Staudinger Weg 9)

Time: November 21st, 2016 at 13:00

Davide Bossini

[Institute for Photon Science and Technology,](#)
[The University of Tokyo, Japan](#)

Towards the ultimate limits of spintronics: ultrafast optical control of magnetism

The rise of the digital information era posed a challenge to develop ever faster and smaller devices for data storage and processing. This scenario ignited an intensive research activity aimed at controlling the macroscopic magnetic order in solid-state compounds by means of ultrashort laser pulses¹, which provide access to the femtosecond time-scale. Moreover all-optical methods can be applied to a wide class of materials including both metals and dielectrics. It is crucial to realize that despite the remarkable potential in terms of applications, the investigation of spin dynamics on the ultrafast timescale revealed a fascinating and poorly understood regime, featured by an interplay of quantum and classical physics.

In this talk I will present the key aspects of the light-spin interaction in the non-dissipative regime on the ultrafast timescale. The main focus will be on antiferromagnetic systems, given the recent surge of interest towards this class of materials. Moreover, I will describe the light-induced dynamics of the spin systems detected in real-time via pump-probe experiments. Different regimes of spin motion (precessional-longitudinal, classical-quantum) are observed on different timescales [2-3].

1. A. Kirilyuk et al Rev. Mod. Phys. **82**, 2731 (2010).
2. D. Bossini et al. PRB **89** (R), 060405 (2014).
3. D. Bossini et al. Nat. Comm. **7**, 10645 (2016).

All interested are cordially welcome!