



PAUL SCHERRER INSTITUT

# PHOTON SCIENCE - SEMINAR

## Nanomagnetism in the Light of Coherent X-Rays

**Stefan Eisebitt**

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**DATE:** Friday, 26 September 2014  
**Coffee:** 11:00 h  
**SEMINAR:** 11:15 h  
**PLACE:** WBGB/019

***Abstract:***

Magnetism exhibits phenomena on intrinsic timescales spanning many orders of magnitude, due to its electronic nature including ultrafast phenomena on short length scales. Optical transitions are a unique probe of magnetization, and the rapid development of laser- and accelerator-driven light sources now provides us with the short pulses at few nm wavelength required to address dynamic magnetic processes at their intrinsic time and length scales. In particular, soft x-ray holography can exploit the pulsed, *coherent* photon beams to study domain motion, switching and demagnetization phenomena. I will outline recent advances in x-ray holography and coherent scattering, with the focus on applications in the study of nano- and femtomagnetism using synchrotron radiation sources and free electron lasers. Examples range from switching bits for magnetic data storage via the observation of the GHz gyrotropic motion of skyrmionic spin structures to sub-ps optical demagnetization, where the influence of superdiffusive spin currents is investigated. The combination of ultrashort pulses in different spectral regimes in conjunction with our ability to tailor-design sample systems on the nanoscale offers tremendous opportunities to understand and ultimately control material properties - in magnetism and beyond.

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