

MA 13 Invited Talk Dürr

Time: Tuesday 09:30–10:00

Room: HSZ 03

Invited Talk

MA 13.1 Tue 09:30 HSZ 03

Femtosecond electron and spin dynamics in ferromagnets —
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Disentangling the influence of many-particle interactions in solids remains a formidable challenge in modern physics. Interactions, such as Coulomb, exchange and spin-orbit coupling are of various strength and lead to different characteristic time scales for energy transfer between orbital, spin and lattice degrees of freedom. The use of fs laser excitation of magnetic solids leads to the exciting prospect of being able to observe the interplay of magnetic and purely electronic interactions in the relaxation processes following optical excitation in real-time.

Of particular interest is whether the relatively weak spin-orbit coupling can cause a fs breakdown of ferromagnetic order via an ultrafast transfer of angular momentum from the spins to the lattice. Such studies are of direct relevance for establishing the ultimate time scale for magnetic switching in future data storage devices. An overview will be given how fs laser based time and spin resolved photoemission spectroscopy as well as time resolved soft x-ray spectroscopy can probe the evolution of electronic and magnetic interactions following fs laser excitation. The combination of pump-probe techniques and photoemission electron microscopy allows us to achieve the necessary spatial resolution for studying nanoscale magnetic structures. Here the excitation is strongly affected by the dielectric response of the nanoparticles.