

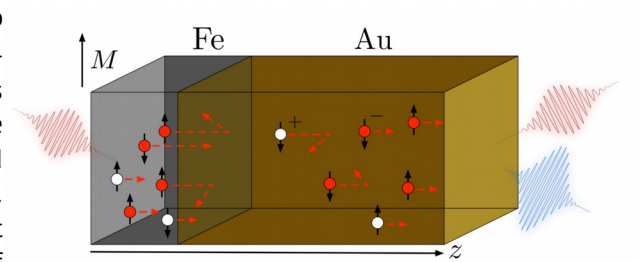
KIDS TALK

“Theory of demagnetization dynamics: Focus on ultrafast transport”

Speaker: Dennis Nenno, AG Schneider

Abstract: Since two decades, researchers try to understand the underlying physical processes of laser-induced ultrafast demagnetization in ferromagnetic layers and more complex material structures. Typically, the magnetization is quenched within less than a picosecond after irradiating the sample with a femtosecond laser pulse. The dynamics observed in a wide range of very different experiments provide an ideal playground for a variety of theoretical models, including purely phenomenological approaches as well as theories based on direct approximations of the many-particle Hamiltonian. The first part of the talk will give a short overview of experimental results, existing theories and their limits.

One of the possible explanations focuses on the influence of the electrons which escape the region of the sample probed in the experiment. The effect of this so called hot-carrier transport was first studied in an experiment almost 15 years after the discovery of ultrafast demagnetization. The second part of the talk will focus on existing theories for electron transport in the context of magnetization dynamics and a theoretical approach using the intuitive picture provided by the Boltzmann Transport equation.


$$\begin{aligned} \frac{\partial \rho(\mathbf{R}, \mathbf{k}, t)}{\partial t} &= \frac{1}{2} \{ \nabla_{\mathbf{R}} \bar{\varepsilon}(\mathbf{R}, \mathbf{k}, t), \nabla_{\mathbf{k}} \rho(\mathbf{R}, \mathbf{k}, t) \} \\ &+ \frac{1}{2} \{ \nabla_{\mathbf{k}} \bar{\varepsilon}(\mathbf{R}, \mathbf{k}, t), \nabla_{\mathbf{R}} \rho(\mathbf{R}, \mathbf{k}, t) \} - \frac{\partial \rho(\mathbf{R}, \mathbf{k}, t)}{\partial t} \Big|_c \\ &= \frac{\partial \rho(\mathbf{R}, \mathbf{k}, t)}{\partial t} \Big|_s. \end{aligned}$$

When: Friday, Dezember 16th 2016, 10:00 am

Where: Room 46-387/388

All undergraduate and graduate students as well as postdocs are welcome and encouraged to join our discussion!

***** COFFEE, TEA AND COOKIES WILL BE SERVED *****

For questions, comments or suggestions: emmerich@physik.uni-kl.de

