

Fritz-Haber-Institut der Max-Planck-Gesellschaft

Physikalische Chemie — Direktor: Prof. Dr. Martin Wolf



MAX-PLANCK-GESellschaft

## **Special Seminar:**

**Tuesday, August 15, 2017, at 11:00 a.m.;**

— all are invited to meet at around 10:40 for a chat and coffee —

**Prof. Dr. Hans Christian Schneider** Theoretical Semiconductor Optics  
and Quantum Electronics,  
State Research Center OPTIMAS  
University of Kaiserslautern.

## **Magnetization Dynamics in Ferri- and Ferromagnets: Microscopic Dynamics of Simple Model Systems**

PC Seminar Room **G2.06**, Building G, Faradayweg 4.

T. Kampfrath

### Abstract:

Optically induced magnetization dynamics on sub-picosecond timescales in the ferromagnetic transition metals nickel, iron, and cobalt, has been investigated for 20 years, but there is still a fundamental disagreement about the underlying microscopic mechanism(s). In recent years, intriguing magnetization dynamics have also been found in magnetic systems with exchange coupling between different sublattices, such as GdFeCo.

In this talk I will discuss theoretical models that include the exchange interaction and/or spin orbit coupling and a microscopic description of scattering mechanisms (electron-phonon, electron-electron) that can be used to explain the experimental findings.

In the case of exchange coupled ferrimagnets, our calculations show how the exchange scattering is responsible for ultrafast dynamics and the occurrence of a transient-ferromagnetic-like states. For the 3d ferromagnets, our studies show in microscopic detail how the spin angular momentum is “lost” due to electronic scattering mechanisms, and how a time-dependent quasi-particle band structure may explain the ultrafast demagnetization in materials with a small magnetic exchange splitting.