- Magnetic field, origin of magnetism, spin and orbital magnetic moments, magnetism of atoms: Hartmut Zabel, Ruhr-Uni. Bochum, Germany.
- Towards solids: crystal field and moments, magnetism of free electrons, paramagnetism and diamagnetism etc.: Hartmut Zabel, Ruhr-Uni. Bochum, Germany.

Basics of Magnetism: from atoms towards solids

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First lecture: Starting from the basic concept of magnetic fields, as being generated by a current distribution, we will continue to explore the response of electrons in atoms to magnetic fields. From this we derive the diamagnetic and paramagnetic properties of single isolated atoms and of the free electron gas. *Second lecture:* Being in a crystal environment, magnetic atoms experience a local crystal electrical field, which may modify the spin-orbit coupling expected from atomic physics. We will discuss the competition between spin–orbit coupling and crystal electric fields for transition metals and for rare earth metals and rationalize the measured effective magnetic moments. *Third lecture:* Of particular interest are intermetallic compounds with a combination of itinerant and local moments. This opens a myriad of novel magnetic properties, such as compensation points for the local magnetic moments on the one hand and extremely strong magnetic anisotropy on the other hand.