

Magnetization dynamics in nanostructures

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MAGNETISM GROUP

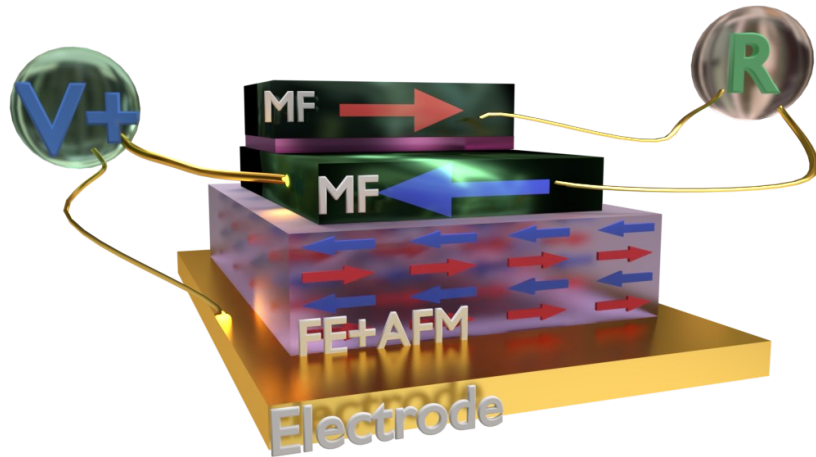
6 permanent members

- FERROMAGNETISM

- ↪ FERROMAGNETIC RESONANCE

- ↪ SQUID MAGNETOMETRY

- ↪ MICROMAGNETISM

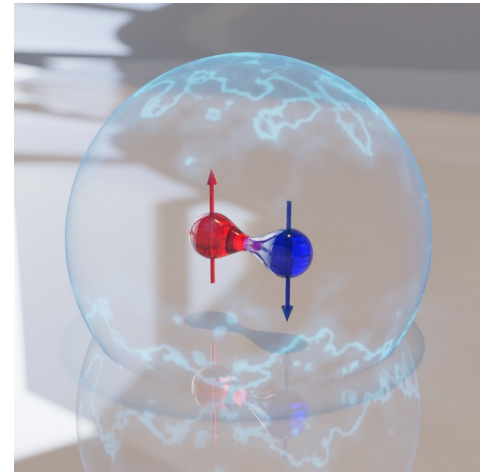


- QUANTUM MAGNETISM

- ↪ ELECTRON SPIN RESONANCE

- ↪ MAGNETIC SEMICONDUCTORS

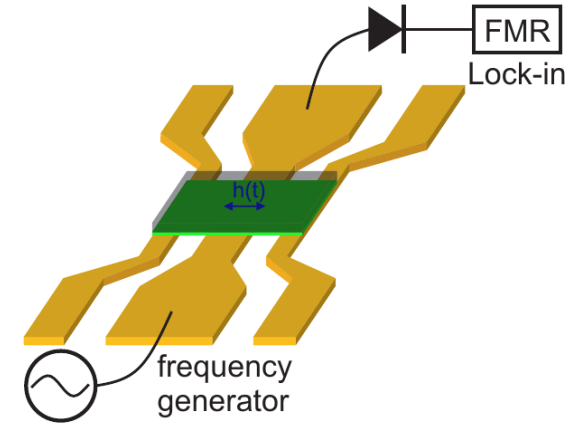
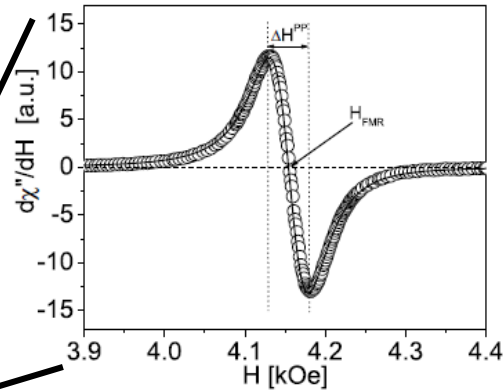
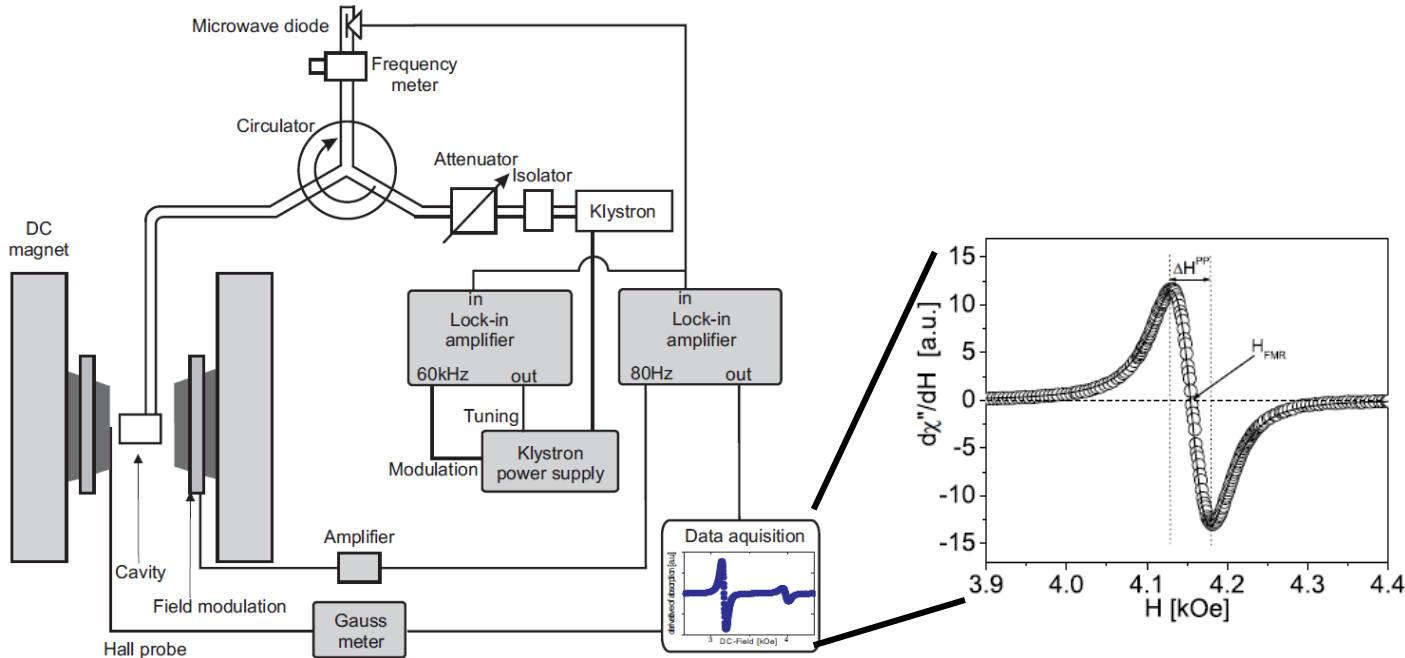
- ↪ SPIN QUANTUM BIT



FERROMAGNETIC RESONANCE

Resonant cavity-based approach (fixed frequency: X-band 9GHz)

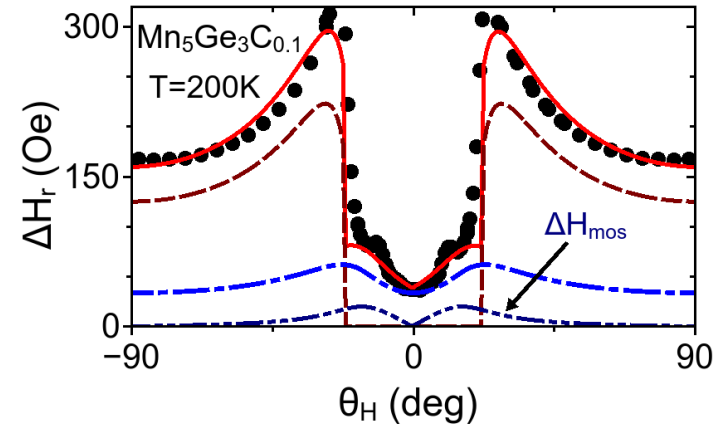
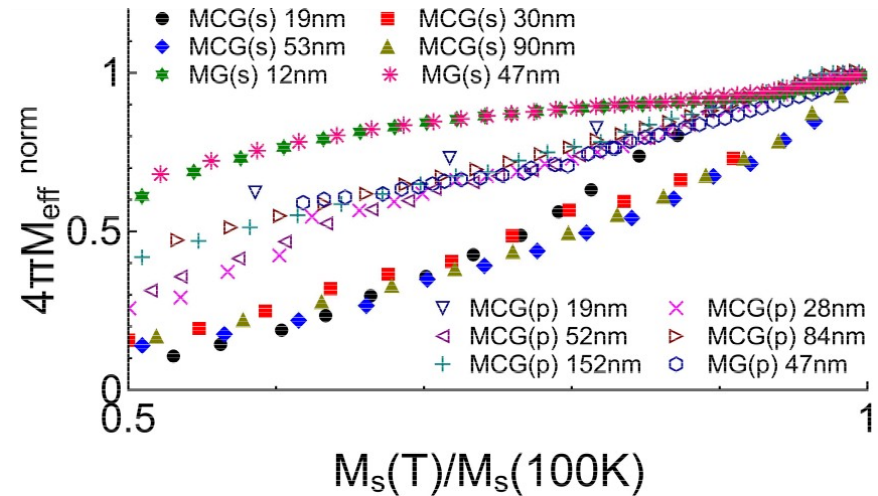
Electrical approach (Broadband FMR: coplanar waveguide + VNA)



Technique of choice to determine magnetic properties like magnetic anisotropy, magnetic relaxation mechanisms (magnetic damping), orbital moment or spin-orbit torques

MAGNETIC RELAXATION AND ANISOTROPY IN MN-GE ALLOYS

- Magnetic thin films are extensively studied for interesting applications in magnetic recording or as magnetic electrodes in spintronics: Mn_5Ge_3 single crystals, soft ferromagnet MnCoGe , semi-metal Heusler compound MnCo_2Ge
- From FMR spectra the magneto-crystalline anisotropy can be determined, which reflects the symmetry of the crystalline lattice, and has its roots in the spin-orbit coupling and anisotropy of the crystal field
- From the study of the FMR linewidth, the magnetic relaxation processes are investigated and the magnetic relaxation parameters are determined



HIGH FREQUENCY DYNAMICS OF MAGNETIC WALLS IN NANOWIRES

- Systematic displacement of magnetic domain walls trapped at artificial constrictions in a ferromagnetic nanowire - at the foundation of emergent and promising technologies for high-density data storage and magnetic logic devices
- Complex non-linear domain wall dynamics under harmonic excitation: magnetic Duffing oscillator → neuromorphic computing

