

Seminar: Hard Condensed Matter Theory

Room: Galilei-room, Staudinger Weg 9, (01-128)

Time: Tuesday, 21.10.2014, 14:00

Prof. Dr. Helen Gomonay

National Technical University of Ukraine

Spintronics with antiferromagnets: spinning of spin

Nanoscale magnetic devices whose state is controlled by a spin-polarized current now being extensively explored both for probing the fundamental physics of magnetic dynamics and for applications in storage technology. Key elements of the spintronic devices, that enable information coding, control and manipulation by an electric current, are two ferromagnetic (FM) layers. However, recent investigations clearly demonstrate that the free spin may also influence the state of another, generally accessory, element of a nanodevice – an antiferromagnet (AFM), which shows no macroscopic magnetization but still has nontrivial magnetic structure. In my presentation I report on the constitutive spintronic phenomena - spin transfer torque, spin pumping, spin polarization, - in the systems with an active AFM layer. I show how the dynamics of localized magnetic moments in AFM structure in the presence of spin-polarised current can be described from the spin conservation principle. I argue that three factors: sd-exchange, spin-dependent scattering at AFM interfaces and strong exchange coupling of localized moments, -- set conditions for high sensitivity of AFM layer to a spin-polarized current, coupled AFM/FM dynamics via spin transfer torque and spin-pumping effects and pronounced influence of AFM on the state of FM layer. I discuss some typical spintronic phenomena and possibility for experimental observations and finish with open problems and perspectives.

All interested are cordially welcome!