MA 6: Invited Talks Suga / Münzenberg

Time: Monday 14:00–15:00 Location: EB 301

Invited Talk MA 6.1 Mon 14:00 EB 301

Genuine bulk electronic structures of strongly correlated transition metal oxides revealed by high energy photoelectron spectroscopy — •Shigemasa Suga — Graduate School of Engineering Science, Osaka University, Toyonaka, Osaka, Japan

It was gradually revealed that conventional photoelectron spectroscopy (PES) in the 20-130 eV energy range mainly probes the surface electronic structures - noticeably different from bulk electronic structures - in strongly correlated electron systems such as ruthenates, high Tc cuprates, manganites as well as vanadates.

Soft X-ray angle-resolved PES in several hundred eV energy region is very powerful to probe three dimensional (3D) bulk band dispersions and 3D Fermi surface topology by properly tuning the photon energy. The Fermiology in such phases and such crystals, which are not accessible by dHvA measurements, can be performed by this methodology.

Further bulk sensitive PES is now available in the hard X-ray region in several keV with modest resolution down to 50 meV. This technique (HAXPES)is not only available for core level spectroscopy but also for valence band spectroscopy in spite that the photoionization cross sections are generally several orders of magnitude lower than in the conventional PES. Genuine bulk electronic structures as well as surface and subsurface electronic structures can be studied by changing the photon energy from few keV up to 10 keV. Long standing controversies are now gradually solved by the state of the art photoelectron spectroscopy.

Invited Talk MA 6.2 Mon 14:30 EB 301

Probing spin excitations in magnetic nanostructures and half metals — •Markus Münzenberg — IV. Phys. Institute, University of Göttingen

The understanding of single spin-flip processes, ps pulsed excitation of magnetic spin packets and spin currents is of importance to develop a magnetic switching concept for spin-electronic devices beyond the 50 ps time scale. A tool to study these processes is the demagnetization by intense laser pulses. The first systems presented are half metals. They are most interesting because of their electronic properties; in particular the peculiar property that one spin-channel has no states at the Fermi energy: the ultrafast electronic demagnetization channel via spin-flip processes is prohibited. Only the very slow channel, via anisotropic fluctuations of the crystal field, thermalizes the spin system with the lattice. This can be used as a new method to identify the half metallic character of a material. Second, in magnetic nanostructures magnetic inhomogeneities are generated and self amplified in spin-torque experiments. Here I will present mechanisms that connect the high energy spin waves with the magnetic eigen modes of the nanostructures. The mechanism generates a broad spectrum of modes that can be identified by a resistance reduction or increase respectively. The experiments support the role of an Elliot-Yafet type like electron-spin interaction responsible for the THz response of the ultrafast demagnetization in ferromagnets. Research was supported by the DFG priority research program 1133 Ultrafast magnetization processes.