conductivity spectra are dominated by a sequence of interband transitions which agree very well with those predicted by LDA calculations. The free charge carrier response is, however, heavily damped. This implies that the electronic states near the Fermi surface are strongly renormalized. From our optical measurements we address
i) electron-electron correlation effects [1],
ii) electron-phonon coupling, and
iii) dynamic charge and spin ordering [2]
as possible renormalization factors.

[1] A.V.Boris et al., preprint at arXiv:0806.1732;
[2] I.I. Mazin and M.D. Johannes, Nature Physics (in press), preprint at arXiv:0807.3737.

Topical Talk TT 36.7 Thu 12:30 HSZ 03

C-axis transport of pnictide single crystals — •Paul Müller[1], Yuri Koval[1], Günter Behr[2], and Bernd Büchner[2] — [1]Department of Physics, Universität Erlangen-Nürnberg — [2]IFW Dresden

Mesa structures were fabricated on the (ab) plane of small $LaO_{0.9}F_{0.1}FeAs$ single crystals. Resistance vs. temperature measurements showed metallic behavior with a residual resistance ratio higher than 10. Both magnetic susceptibility and c-axis transport measurements showed the same value for the critical temperature, i.e. ∼20K. Current-voltage characteristics are typical for overdamped Josephson junctions with a critical current density of $\sim 10^5$ A/cm^2. Moreover, the critical current vs. temperature dependence follows the Ambegaokar-Baratoff relation for the maximum dc Josephson current. One possible explanation could be that we have observed an intrinsic Josephson effect in <c>-direction. This is supported by recent measurements of radiation emission between 11 and 12 GHz. Finally, we discuss current injection effects on Josephson critical current and T_c.

TT 37: Transport: Nanoelectronics II - Spintronics and Magnetotransport

Time: Thursday 9:30–13:00 Location: HSZ 105

TT 37.1 Thu 9:30 HSZ 105

Anisotropic magnetoresistance in ferromagnetic atomic-sized metal contacts — •Michael Häfner[1,2], Janne Viljas[1,3], and Juan Carlos Cuevas[2] — [1]Institut für Theoretische Festkörperphysik, Universität Karlsruhe, D-76128 Karlsruhe — [2]Departamento de Física Teórica de la Materia Condensada, Universidad Autónoma de Madrid, E-28049 Madrid — [3]FZ Karlsruhe, Institut für Nanotechnologie, D-76021 Karlsruhe

Recent experiments in ferromagnetic atomic-sized contacts have shown that the anisotropic magnetoresistance (AMR) is greatly enhanced and has an asymmetric angular dependence as compared with that of bulk samples. The origin of these effects is still under debate. In this work [1] we present a theoretical analysis of the AMR in atomic contacts of the 3d ferromagnetic materials. Our results strongly suggest that the anomalous AMR stems from the reduced symmetry of the atomic contact geometries. We also present calculations supporting the idea that the pronounced voltage- and temperature dependence in some experiments can be attributed to impurities near the constrictions.

[1] M. Häfner et al., arXiv:0811.4491.

TT 37.2 Thu 9:45 HSZ 105

Spin-Polarized Conductance in a Single Magnetic Atom? — •Cormac Toher and Gianaurelio Cuniberti — Institute for Materials Science and Max Bergmann Center of Biomaterials, Dresden University of Technology, D-01062 Dresden, Germany.

Single atom conductance measurements can be performed by forming nanocontacts using a scanning tunnelling microscope (STM). In the case of fully spin-polarized transport, a spin resolved conductance quantum of $0.5G_0 = \frac{e^2}{h}$ is expected, in contrast to the value of $G_0 = \frac{2e^2}{h}$ expected in normal atomic nanocontacts with one full spin degenerate open channel. A spin-resolved conductance has been observed in the experiments carried out by Néel *et. al.* [1] on cobalt atoms. When the cobalt atom is placed on a copper surface and contacted by a tungsten tip, a conductance of G_0 is observed, whereas when it is placed on a cobalt island and contacted by a nickel tip, a conductance of $0.5G_0$ is observed. Here we present the results of calculations to explore the mechanism underlying this effect, investigating whether or not spin-polarized transport is actually present. These calculations were performed using the ab initio transport method SMEAGOL [2], which combines the non-equilibrium Green function formalism with the DFT implementation SIESTA [3].

[1] N. Néel, J. Kröger, and R. Berndt, Phys. Rev. Lett. (submitted).
[2] A. R. Rocha *et. al.*, Phys. Rev. B **73**, 085414 (2006).
[3] J. M. Soler *et. al.*, J. Phys. Cond. Matter **14**, 2745 (2002).

TT 37.3 Thu 10:00 HSZ 105

Transport through an interacting quantum dot tunnel coupled to a ferromagnet with time-dependent magnetisation — •Nina Winkler, Michele Governale, and Jürgen König — Theoretische Physik · Universität Duisburg-Essen

We study adiabatic pumping through a system consisting of a quantum dot coupled to a normal and a ferromagnetic lead. Adiabatic pumping is typically studied in systems in which the properties of the scattering region are changed, e.g. gate voltages to vary the tunnel couplings and the level position of the quantum dot. Here, we consider a different pumping scheme. By changing slowly in time the lead properties, e.g. the magnetisation, we can generate a pumped DC current. To this aim, we generalise a diagrammatic real-time approach for adiabatic pumping through quantum dots with ferromagnetic leads [1, 2] to account for a time-dependent magnetisation.

We consider two different pumping situations: First, we choose the amplitude of the magnetisation of the ferromagnetic lead and the level position of the dot or the tunnel coupling to the normal lead as pumping parameters. Second, we pump by periodically changing the direction of the magnetisation. We investigate the adiabatic charge and spin transport through the system by performing a systematic perturbative expansion in powers of the tunnel-coupling strengths but treating the on-site Coulomb interaction on the quantum dot exactly.

[1] J. Splettstoesser *et al.*, Phys. Rev. B **74**, 085305 (2006).
[2] J. Splettstoesser *et al.*, Phys. Rev. B **77**, 195320 (2008).

TT 37.4 Thu 10:15 HSZ 105

Spin-Electric Coupling in Molecular Magnets — •Mircea Trif[1], Filippo Troiani[2], Dimitrije Stepanenko[1], and Daniel Loss[1] — [1]Department of Physics, University of Basel, Klingelbergstrasse 82, CH-4056 Basel, Switzerland — [2]CNR-INFM National Research Center S3 c/o Dipartimento di Fisica via G. Campi 213/A, 41100, Modena, Italy

We study the triangular antiferromagnet Cu3 in external electric fields, using symmetry group arguments and a Hubbard model approach. We identify a spin-electric coupling caused by an interplay between spin exchange, spin-orbit interaction, and the chirality of the underlying spin texture of the molecular magnet. This coupling allows for the electric control of the spin (qubit) states, e.g., by using an STM tip or a microwave cavity. We propose an experimental test for identifying molecular magnets exhibiting spin-electric effects.

TT 37.5 Thu 10:30 HSZ 105

Magnetic and transport properties of ferromagnet / semiconductor Heterostructures (Ga,Mn)As/GaAs — •S R Dunsiger[1], T Goko[2,3], J P Carlo[2], G Nieuwenhuys[4], T Prokscha[4], E Morenzoni[4], D Chiba[5], T Tanikawa[5], F Matsukura[5], H Ohno[5], R H Heffner[6], and Y J Uemura[2] — [1]Physik Dept E21, TU München, Garching, Germany — [2]Dept of Physics, Columbia University, New York, USA — [3]TRIUMF, Vancouver, Canada — [4]PSI, Villigen, Switzerland — [5]Laboratory for Nanoelectronics and Spintronics, RIEC, Tohoku University, Sendai, Japan — [6]LANL, Los Alamos, USA

Ferromagnet-Semiconductor heterostructures show immense promise for device applications, in particular in the injection of polarised spins into a semiconducting substrate. More fundamentally, the III-V semiconducting materials (Ga,Mn)As exhibit unusual long range indirect exchange interactions between Mn ions, where the Mn atoms simultaneously act as a magnetic species and charge donors. An intriguing link between the magnetic and transport properties is hence implied.

Low-energy μSR, in addition to magnetization and transport measurements on specimens with Mn concentrations between 1.0 and 3.4 % are reported. Ferromagnetism with a sharp onset temperature and