TT 7.34 Mon 14:00 P1

Spectroscopic investigations on Na_xCoO_2 — •T. Kroll[1], A.A. Aligia [2], J. Geck[1], D. Hawthorn [3], C. Hess[1], T. Schwieger[1], G. Krabbes[1], C. Sekar[1], D. Batchlor[4], M. Knupfer[1], J. Berger[5], J. Fink[1], G.A. Sawatzky[3], and B. Büchner[1] — [1]IFW Dresden, P.O. Box 270016, D-01171 Dresden, Germany — [2]Centro Atomico Bariloche (CAB), Av. Bustillo 9500, 8400 S.C. de Bariloche, Argentina — [3]Advanced Materials and Process Engineering Laboratory (AMPEL), 2355 East Mall, Vancouver, BC, V6T 1Z4, Canada — [4]Universität Würzburg, Am Hubland, D-97074 Würzburg — [5]Institute of Physics of Complex Matter, EPFL, CH-1015 Lausanne, Switzerland

Since the discovery of superconductivity in 2003 in $Na_{0.3}CoO_2 1.3H_2O$ many investigations have been performed on these materials. In order to understand the physics behind the rich phase diagram of Na_xCoO_2 in more detail a good knowledge of its electronic structure is crucial. In this poster we present the results of different spectroscopic methods such as NEXAFS and XPS on a wide doping range for different temperatures and polarisation as well as cluster calculations which helps to understand the electronic structure of Na_xCoO_2.

TT 7.35 Mon 14:00 P1

Pressure-induced changes in the quasi-one-dimensional superconductor β-$Na_{0.33}V_2O_5$ studied by Raman spectroscopy — •S. Frank[1], C. A. Kuntscher[1], I. Gregora[2], T. Yamauchi[3], and Y. Ueda[3] — [1]1.Physikalisches Institut, Universität Stuttgart, D-70550 Stuttgart, Germany — [2]Institute of Physics ASCR, Praha, Czech Republic — [3]Institute for Solid State Physics, University of Tokyo, Tokyo

β-$Na_{0.33}V_2O_5$ is one of the first known inorganic quasi-one-dimensional superconductors. The pressure - temperature phase diagram is remarkable, showing a superconducting phase for pressures higher than 7 GPa in direct vicinity to a charge-ordered phase. The mechanism of the superconductivity and its relation to the charge ordering is not clear.

In a recent infrared study under pressure major changes in the reflectivity spectra were observed above 12 GPa, in particular the appearance of additional, relatively broad excitations [1]. A redistribution of charge with a possible relation to structural changes was suggested as a possible explanation. To obtain a deeper understanding of the changes occurring at 12 GPa we carried out polarization-dependent Raman spectroscopy under pressure at room temperature. The results are discussed in terms of a possible structural phase transition at 12 GPa.

Supported by the DFG, Emmy Noether-program.

[1] C.A. Kuntscher et al., Phys. Rev. B **71**, 220502(R) (2005)

TT 7.36 Mon 14:00 P1

Interaction corrections in Andreev reflection processes — •Markus Müller and Wolfgang Belzig — Universität Konstanz, Fachbereich Physik, D-78457 Konstanz, Germany

Understanding the conductance properties is of elementary interest when investigating electronic transport in nanostructures. We focus on the junction between a conventional superconductor and a normal metal. We consider a system of a one-dimensional weakly interacting electron gas on one and a superconductor on the other side, separated by a single potential localized in the interface region. Due to electron-electron interaction the Andreev reflection amplitudes are modified. A Poor Man's renormalization group procedure is used to handle logarithmic divergencies appearing in a perturbative treatment. Our approach is similar to the studies of conduction of a weakly interacting one-dimensional electron gas through a single barrier, realized by Matveev, Yue, and Glazman [Phys. Rev. Lett. **71**, 3351 (1993)]. The renormalized Andreev reflection amplitudes are calculated for any energy, and interface potentials of arbitrary strength. We discuss the temperature and voltage dependence of the Andreev conductance and compare with experimental results found by Morpurgo et al. [Science **286**, 263 (1999)]

TT 7.37 Mon 14:00 P1

Impact of the transport supercurrent on the zero-bias conductance peak — •Sergei Shevchenko and Alexander Omelyanchouk — Institute for Low Temp. Phys. and Eng., Lenin Ave. 47, 61108 Kharkov, Ukraine.

The impact of the supercurrent on the density of states in superconducting structures is investigated. Namely two situations were studied: (i) of a film containing a weak link and (ii) a film of a d-wave superconductor. In Ref. [1] we have shown that in the situation when the transport supercurrent flows in the region of suppressed order parameter (in the vicinity of the weak link as in the case (i) or at the boundary of a d-wave superconductor, case (ii)) the quasiparticles create the countercurrent. In this work we show that these quasiparticles are responsible for the appearance of the zero-bias conductance peak. Particularly we investigate the impact of the transport supercurrent flowing in parallel to the boundary on the conductance of the SIN-structure and discuss its observability with the scanning tunneling spectroscopy, as in Ref. [2]. We also discuss the relation of our results to the experiment, presenting alternative explanation of the experimental results of Ref. [2].

[1] Yu.A. Kolesnichenko, A.N. Omelyanchouk, and S.N. Shevchenko, Phys. Rev. B 67, 172504 (2003); Low Temp. Phys. 30, 213 (2004). [2] J. Ngai, P. Morales, and J.Y.T. Wei, Phys. Rev. B 72, 054513 (2005).

TT 7.38 Mon 14:00 P1

Proximity effect in superconducting MgB_2/Fe/MgB_2 trilayer — •B. Sahoo[1], W. Keune[1], V. Kuncser[2], A. I. Chumakov[3], and R. Rueffer[3] — [1]Fachbereich Physik, Universität Duisburg-Essen, Duisburg, Germany — [2]National Institute for Physics of Materials, Bucharest-Magurele, Romania — [3]European Synchrotron Radiation Facility, Grenoble, France

By Mössbauer spectroscopy (CEMS) we have observed, at about Tc, an anomaly in a annealed superconducting MgB_2(500 Å)/ ^{57}Fe(40 Å)/MgB_2(500 Å) trilayer (Tc = 25 K) in the T-dependence of the spectral center-line shift, which does not follow the usual Debye behavior. This anomaly is absent in a nonsuperconducting multilayer. We have not observed anomalies in the T-dependence of the magnetic hyperfine field, and also not in the ^{57}Fe phonon density of states (PDOS) measured by nuclear resonant inelastic X-ray scattering with 3 meV resolution. Hence the observed anomaly at Tc may be either due to the modification of the low-energy part ($<$ 3 meV) of the PDOS (at present not accessible experimentally), or due to the change of the s-electron density at the ^{57}Fe nucleus, because of Cooper pair formation in the superconducting state.

Sponsored by DFG (GRK277)

TT 7.39 Mon 14:00 P1

Proximity effect and multiple Andreev reflections in diffusive superconductor-normal-metal-superconductor junctions — •Jan C. Hammer[1], Juan Carlos Cuevas[1,2,3], Juha Kopu[1,4], Janne K. Viljas[1], and Matthias Eschrig[1] — [1]Institut für Theoretische Festkörperphysik, Universität Karlsruhe, 76128 Karlsruhe, Germany — [2]Departamento de Física Teórica de la Materia Condensada, Universidad Autónoma de Madrid, 28049-Madrid, Spain — [3]Forschungszentrum Karlsruhe, Institut für Nanotechnologie, 76021 Karlsruhe — [4]Low Temperature Laboratory, Helsinki University of Technology, P.O.Box 2200, FIN-02015 HUT, Finland

We present a theory of the current-voltage characteristics in diffusive superconductor-normal-metal-superconductor junctions. By solving the time dependent Usadel equation we are able to describe the phase-coherent transport for arbitrary length of the normal wire and arbitrary temperature. We show how the interplay between proximity effect and multiple Andreev reflections gives rise to a rich subgap structure in the conductance and how it is revealed in the non-equilibrium distribution function.

TT 7.40 Mon 14:00 P1

Diamagnetic screening properties of Nb/Ag and Nb/Ag/Fe layered structures — •C. Sürgers[1], H. Stalzer[1], A. Cosceev[1], and H. v. Löhneysen[1,2] — [1]Physikalisches Institut and DFG Center for Functional Nanostructures (CFN), Universität Karlsruhe, 76128 Karlsruhe, Germany — [2]Forschungszentrum Karlsruhe, Institut für Festkörperphysik, 76021 Karlsruhe, Germany

The diamagnetic properties of Nb/Ag and Nb/Ag/Fe layered structures of various thicknesses are investigated by means of SQUID and vibrating sample magnetometry. Data were taken for different temperatures in magnetic fields slightly tilted from the orientation parallel to the surface. For Nb/Ag double layers, below the diamagnetic transition of the Nb layer a second transition caused by the proximity-induced screening currents in the Ag layer is observed. Furthermore, a peculiar position dependence of the Ag magnetization signal is likely to be due to the missing formation of Andreev bound states along the lateral extensions of the film. While for Ag layers thicker than the coherence length or penetration depth of Nb an additional Fe layer on top of Ag destroys the coherence of Andreev pairs, the diamagnetic signal of Ag is recovered if the Ag layer thickness is strongly reduced. This is interpreted as being due to the competition of proximity-induced superconductivity by Nb