Auf der Morgenstelle 14, D-72076 Tübingen, Germany — [2]Universität Tübingen, Lehrstuhl für Theoretische Festkörperphysik, Auf der Morgenstelle 14, 72076 Tübingen, Germany — [3]NTT Basic Research Laboratories, Atsugi-shi, Japan — [4]Department of Applied Physics, Tokyo University of Agriculture and Technology, Tokyo, Japan

We show tunnel spectroscopy data of quasiparticle transport in electron doped high-temperature superconductor (HTS) $La_{2-x}Ce_xCuO_4$ bicrystal thin films with a 24° symmetric [001]-tilt grain boundary patterned as Josephson junction SQUIDs ($x \sim 0.08$, slightly underdoped with $T_c \sim 28$ K). The differential conductance in the superconducting state shows a zero bias conductance anomaly (ZBCA), which is attributed to surface Andreev bound states at zero excitation energy due to d-wave symmetry of the order parameter in this electron doped HTS. As the ZBCA is related to the macroscopic phase coherence of the superconducting state it vanishes at T_c in zero field. However, with applied field we observe a persistent ZBCA up to at least 10 T. This is in contradiction to previously reported values of $B_{c2}(0) \sim 7$ T based on $\rho(T)$ measurements. Supported by calculations taking into account the effect of the vortex lattice we suggest a modified $B(T)$ phase diagram with a higher $B_{c2} > 10$ T.

TT 29.3 Thu 16:30 H18

Dynamical spin susceptilibility and the resonance peak in the electron-doped cuprate superconductors — •Jan-Peter Ismer[1,2], Ilya Eremin[1,2], and Dirk Morr[3] — [1]Max-Planck Institut für Physik komplexer Systeme, D-01187 Dresden, Germany — [2]Insitute für Mathematische und Theoretische Physik, Technische Universitaet Carola-Wilhelmina zu Braunschweig, 38106 Braunschweig, Germany — [3]Department of Physics, University of Illinois at Chicago, Chicago, IL 60607

We present a study of the dynamical spin susceptibility in the electron-doped cuprate superconductors. We show that the resonance peak observed recently in $Pr_{0.88}LaCe_{0.12}CuO_{4-\delta}$ represents rather an effect of the magnetic coherence than a bound state seen in the hole-doped counterparts. We further analyze some aspects of the peculiar behavior of the spin excitations in the presence of the spin density wave (SDW) instability in $d_{x^2-y^2}$-wave superconducting state ($T_N << T_C$). We find that the spin resonance will show a remarkable temperature dependence in contrast to the hole-doped cuprates. Furthermore we investigate the influence of a Zeeman-magnetic field on the resonance.

TT 29.4 Thu 16:45 H18

Theory for orthorhombic distortions in high-T_c cuprates — •Dirk Manske[1], Andreas Schnyder[2], Julia Unterhinninghofen[1], and Manfred Sigrist[2] — [1]Max-Planck-Institut für Festkörperforschung, Stuttgart — [2]Institut für Theoretische Physik, ETH Zürich

We re-investigate the theoretical description of inelastic neutron scattering data on detwinned YBCO (Hinkov *et al.*, Nature 2004) and compare our results with LDA calculation as well as recent ARPES results. We find fair agreement within a Fermi-liquid-based approach. Using this approach, we also study the polarization-dependent electronic Raman response of untwinned high-Tc superconductors employing a tight-binding band structure with anisotropic hopping matrix parameters and a superconducting gap with a mixing of d- and s-wave symmetry. Using general arguments we find new screening terms in the B_{1g} scattering channel which are required by gauge invariance. As a result, we find a small but measurable softening of the pair-breaking peak, whose position has been attributed for a long time to twice the superconducting gap maximum. Our results are contrasted to the stripe scenario proposed for the high-T_c cuprates.

TT 29.5 Thu 17:00 H18

Raman study of underdoped $Y_{1-y}Ca_yBa_2Cu_3O_{6+x}$ — •Leonardo Tassini, Wolfgang Prestel, Rudi Hackl, Andreas Erb, and Michael Lambacher — Walther Meissner Institut, Bayerische Akademie der Wissenschaften, 85748 Garching, Germany

The electronic Raman effect has been studied in several $Y_{1-y}Ca_yBa_2Cu_3O_{6+x}$ (Y-123) single crystals, in the doping range $0 \le p \le 0.07$. The temperature, doping and polarization dependence of phonons, magnons, and the electronic continuum were investigated. All types of excitations vary continuously with temperature and doping up to $p \approx 0.06$ where superconductivity sets in. Above this doping level discontinuous changes of the spectra are found at all energies and temperatures highlighting the importance of strong correlations. The results provide evidence of a strongly **k**-dependent interaction becoming effective above $p \approx 0.06$.

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TT 29.6 Thu 17:15 H18

Nernst Effect in $NdBa_2\{Cu_{1-y}Ni_y\}_3O_{7-\delta}$ — •Niko Johannsen[1], Thomas Wolf[2], Thomas Lorenz[1], and John Mydosh[1] — [1]II Physikalisches Institut, Universität zu Köln, Zülpicher Str. 77, 50937 Köln — [2]Forschungszentrum Karlruhe, IFP, 76021 Karlsruhe

More than 20 years after its discovery the mechanism of high-temperature superconductivity is still unsolved. Possible relations to other anomalous phenomena in High-T_c materials such as the pseudogap may play a key role towards an understanding of this mechanism. The Nernst effect is an excellent probe to detect vortices and vortex-like excitations[1]. In $NdBa_2\{Cu_{1-y}Ni_y\}_3O_{7-\delta}$, adding magnetic Ni-impurities leads to a suppression of T_c but at the same time the pseudogap is strongly enhanced[2]. So this is an ideal system to study possible relations between superconductivity and the pseudogap. We present measurements on a series of optimally doped (O_7) and underdoped ($O_{6.8}$) samples with Ni contents ranging from y=0 to 0.12. In all samples an onset of the Nernst signal (T^ν) can be found above T_c. T^ν decreases with increasing Ni content as does T_c for the optimally doped samples. The underdoped samples show a slightly different behaviour. The onset of the Nernst signal is not affected when increasing the Ni content from y=0 to 0.03.

Supported by the DFG through SFB 608.

[1] Wang et al., PRB 73, 024510 (2006)
[2] Pimenov et al., PRL 94, 227003 (2005)

TT 29.7 Thu 17:30 H18

^{63,65}Cu Nuclear Quadrupole Resonance Study of Impurity doped $NdBa_2(Cu,Ni,Zn)_3O_{6+y}$ — •Hans-Joachim Grafe[1], Franziska Hammerath[1], Anastasia Vyalikh[1], Grzegorz Urbanik[1], Vladislav Kataev[1], Thomas Wolf[2], and Bernd Büchner[1] — [1]IFW Dresden, Institut für Festkörperforschung, Postfach 270116, 01171 Dresden, Germany — [2]Forschungszentrum Karlsruhe, IFP, D-76021 Karlsruhe, Germany

We present ^{63,65}Cu Nuclear Quadrupole Resonance (NQR) measurements on slightly underdoped $NdBa_2(Cu,Ni,Zn)_3O_{6+y}$ single crystals with 11.5 % magnetic (Ni) and 12 % non-magnetic (Zn) impurities. Superconductivity is completely suppressed in both samples. By fitting the spectra we can estimate the impurity content of the chains and the planes. At low temperatures the Ni induces a wipeout of the Cu NQR signal intensity comparable to that found in stripe ordered lanthanum cuprates. In contrast, the intensity of the Zn doped sample is not changed down to the lowest temperatures, and the spin lattice relaxation rate is suppressed. This difference enlightens the different effect of nonmagnetic ($S = 0$) and magnetic ($S = 1$) impurities on the spin dynamics in the CuO_2 planes, and directly confirms current theoretical positions on this topic.