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The single layered superconductor $Bi_{2-y}Pb_ySr_{2-x}La_xCuO_{6+\delta}$ ($x = 0.4$) around optimal doping has been investigated by scanning tunneling microscopy (STM). Continuously changing the amount of lead showed a fascinating structural development and revealed new modulations in the BiO layer.

Special attention has been given to the "inhomogeneous" background modulation. It is suggested, like in [1], that this background is not just caused by electronic reasons, but has structural origin. Because of the short range of this modulation it could influence the electronic structure of the CuO_2 plane and the charge transfer between this plane and the carrier reservoir (BiO-SrO). In this context the question arises if a "good" and a "bad" background with respect to superconductivity exists.

[1] H. Mashima et al., Phys. Rev. B **73**, 060502 (2006).

TT 15.14 Tue 14:00 Poster B

Possibility of hole density modulation in highly overdoped Bi(Pb)-2201 single crystals: XAS measurements — •Ariffin Ahmad Kamal, Beate Müller, Rüdiger Mitdank, Lenart Dudy, Helmut Dwelk, Alica Krapf, Christoph Janowitz, and Recardo Manzke — Institut für Physik, Humboldt-Universität zu Berlin

The polarization i.e. angular dependence of the relative intensity of the satellite peak and the main peak of the CuL_3 edge of highly overdoped Bi(Pb)-2201 single crystals was studied by XAS. The spectrum near the CuL_3 edge displays the interaction of the Cu atom with the oxygen localized holes. The relative intensity of the satellite peak and the main peak, which gives the value and distribution of the hole content, has been measured by varying the angle of the electrical field vector E of the synchrotron light within the ab-plane. We have found that the relative intensity of the satellite peak and the white line of highly overdoped Bi(Pb)-2201 single crystals is polarization dependent. The modulation shows that the maximum occurs at nearly 60^0 intervals. This suggests the hole density being distributed with some form of periodicity.

TT 15.15 Tue 14:00 Poster B

The nature of the sharp peak — •Beate Müller, Lenart Dudy, Helmut Dwelk, Alica Krapf, Christoph Janowitz, and Recardo Manzke — Humboldt-Universität zu Berlin, Institut für Physik, Newtonstr. 15, 12489 Berlin

In the high-T_c cuprates the excitations investigated by photoemission in the antinodal direction are incoherent. Only at low temperatures a quasiparticle like excitation, the so-called sharp or superconducting peak, emerges. Mainly the sharp peak is interpreted as a coherent excitation marking e.g. a dimensional crossover [1] but it was also seen as the signature of superfluid density [2,3] or the consequence of the coupling to the magnetic resonance mode [4]. The distinction between the different approaches is the definition of the sharp peak as a consequence of a change in lineshape of the band theory derived excitations or as an additional excitation. In our opinion ARPES measurements at different photon energies point towards the sharp peak being an additional excitation. From this point of view it is possible to reevaluate the various models.

[1] T. Valla, P. Johnson, Z. Yusof, B. Wells, Q. Li, S. Loureiro, R. Cava, M. Mikami, Y. Mori, M. Yoshimura, Nature 417, 627 (2002)

[2] R. H. He, D. L. Feng, H. Eisaki, J.-I. Shimoyama, K. Kishio, and G. D. Gu, Phys. Rev. B 69, 220502 (2004)

[3] D. Feng, D. Lu, K. Shen, C. Kim, H. Eisaki, A. Damascelli, R. Yoshizaki, J.-i. Shimoyama, K. Kishio, G. Gu, Science 289, 277 (2000)

[4] M. Eschrig and M. R. Norman, Phys. Rev. Lett. 89, 277005 (2002)

TT 15.16 Tue 14:00 Poster B

Probing the superconducting state via Andreev bound states in $(La,Ce)_2CuO_4$ — Michael Wagenknecht[1], •Sebastian Scharinger[1], Dieter Koelle[1], Reinhold Kleiner[1], Siegfried Graser[2], Nils Schopohl[2], Boris Chesca[3], Aiko Tsukada[4], Sebastian T. B. Goennenwein[5], and Rudolf Gross[5] — [1]Physikalisches Institut – Experimentalphysik II and Center for Collective Quantum Phenomena, Universität Tübingen, Germany — [2]Institut für Theoretische Physik, Universität Tübingen, Germany — [3]Department of Physics, Loughborough University, United Kingdom — [4]NTT Basic Research Laboratories, Atsugi-shi, Japan — [5]Walther-Meissner-Institut, Bayerische Akademie der Wissenschaften, Garching, Germany

We present quasiparticle tunneling data of $(La,Ce)_2CuO_4$ thin film bicrystal junctions. The differential conductance in the superconducting state shows a pronounced zero bias conductance peak (ZBCP). This peak is attributed to zero energy surface Andreev bound states due to the d-wave symmetry of the order parameter in this electron doped cuprate. Such bound states are closely related to the macroscopic phase coherence of the superconducting state. Hence the ZBCP due to these bound states must disappear at or below the upper critical field $B_{c2}(T)$. By following the disappearance of the ZBCP in the $B-T-$phase diagram we find a lower bound for $B_{c2}(0) \approx 25\,\mathrm{T}$ which is higher than values reported previously for any electron doped cuprate. Following this observation we suggest a modified $B-T-$phase diagram with a larger region of superconductivity, leaving less room for a possible pseudogap phase.

TT 15.17 Tue 14:00 Poster B

Dynamical spin susceptibility in different phases of the electron-doped cuprate superconductors — •Jan-Peter Ismer[1], Ilya Eremin[1], Enrico Rossi[2], and Dirk Morr[3] — [1]MPI für Physik komplexer Systeme, Dresden — [2]University of Maryland, College Park, USA — [3]University of Illinois at Chicago, USA

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 ($T_N \ll T_C$). We find that the spin resonance will show a remarkable temperature dependence in contrast to the hole-doped cuprates.

TT 15.18 Tue 14:00 Poster B

Raman spectroscopy study of the pyrochlore superconductors KOs_2O_6 and $RbOs_2O_6$ — •Ana Maria Racu[1], Joachim Schoenes[1], Zbigniev Bukowski[2], and Janusz Karpinski[2] — [1]Institut für Physik der Kondensierten Materie, TU Braunschweig, Germany — [2]Laboratorium für Festkörperphysik, ETH Zürich, Switzerland

The discovery of superconductivity in the pyrochlore oxides KOs_2O_6, $RbOs_2O_6$ and $CsOs_2O_6$ has attracted much interest due to their unusual properties. Crystallographic studies proposed two different structures whithin the centrosymmetric $Fd\bar{3}m$ and the non-centrosymmetric $Fd\bar{4}3m$ [1] space groups. Both reveal a very special feature: the alkali atom is situated in an oversized Os-O cage. It is believed that the anharmonic rattling of the alkali atom in the cage strongly influences the electronic structure and the superconductivity [2]. We performed Raman measurements on single crystals of KOs_2O_6 and $RbOs_2O_6$. The experimental results are compared with a factor group analysis for the two proposed crystal structures. The number and the symmetry of the observed modes is compatible with the centrosymmetric space group. In the low energy range we observe a mode which is strongly dependent on the alkali atom. Its energy corresponds to one of the fine structures observed in KOs_2O_6[3] in the photoemission spectra. We attribute this low energy mode to the Raman active rattling vibration of the K and Rb atoms.

[1] Schuck et al., PRB 73, 144506 (2006)
[2] Hiroi et al., J. Phys. Soc Jpn. 74, 3400 (2005)
[3] Shimojima et al., PRL 99, 117003 (2007)

TT 15.19 Tue 14:00 Poster B

Superconductivity on the Border of Weak Itinerant Ferromagnetism in UCoGe — N. T. Huy[1], A. Gasparini[1], D. E. de Nijs[1], Y. Huang[1], J. C. P. Klaasse[1], T. Gortenmulder[1], A. de Visser[1], •A. Hamann[2], T. Görlach[2], and H. v. Löhneysen[2,3] — [1]Van der Waals-Zeeman Institute, University of Amsterdam, Valckenierstraat 65, 1018 XE Amsterdam, The Netherlands — [2]Physikalisches Institut, Universität Karlsruhe, D-76128 Karlsruhe, Germany — [3]Forschungszentrum Karlsruhe, Institut für Festkörperphysik, D-76021 Karlsruhe, Germany

We report the coexistence of ferromagnetic order and superconductivity in UCoGe at ambient pressure [1]. Magnetization measurements show that UCoGe is a weak ferromagnet with a Curie temperature $T_C \approx 3\,\mathrm{K}$ and a small ordered moment $m_0 \approx 0.03\,\mu_B$. Superconductivity is observed with a resistive transition temperature $T_s \approx 0.8\,\mathrm{K}$ for the best sample. Thermal-expansion and specific-heat measurements provide solid evidence for bulk magnetism and superconductivity. The

proximity to a ferromagnetic instability, the defect sensitivity of T_s, and the absence of Pauli limiting, suggest triplet superconductivity mediated by critical ferromagnetic fluctuations.

[1] N. T. Huy et al., PRL 99, 067006 (2007)

TT 15.20 Tue 14:00 Poster B

Electronic and structural properties of two novel Palladium-based Heusler superconductors. — •Jürgen Winterlik, Gerhard H. Fecher, and Claudia Felser — Institut für Anorganische und Analytische Chemie, Johannes Gutenberg - Universität, 55099 Mainz, Germany

This work reports the two novel superconducting Heusler compounds Pd_2ZrAl and Pd_2HfAl. Magnetization and resistance measurements were carried out to verify their transitions to the superconducting states. The compounds exhibit transition temperatures of 3.2 K for Pd_2ZrAl and 3.4 K for Pd_2HfAl. From their behavior in external magnetic fields, it was determined that both compounds are type II superconductors. Similar to the half-metallic ferromagnets, the superconducting Heusler compounds follow an electron counting scheme based on theoretical considerations, the van Hove scenario. As found from *ab initio* calculations, the superconductivity can be explained by a valence instability at the L-point, that has been used as design criterion.

TT 15.21 Tue 14:00 Poster B

Superconductivity, magnetic order and intermediate valence in the new platinum germanium skutterudites MPt$_4$Ge$_{12}$ (M = Sr, Ba, La, Ce, Nd, Pr, Eu) — •Roman Gumeniuk, Michael Nicklas, Helge Rosner, Walter Schnelle, Ulrich Burkhardt, Andreas Leithe-Jasper, and Yuri Grin — Max-Planck-Institut für Chemische Physik fester Stoffe, Dresden, Germany

In the new germanium-platinum compounds with the filled-skutterudite crystal structure MPt$_4$Ge$_{12}$ superconductivity was observed for the non-magnetic cations $M = Sr^{2+}$, Ba^{2+}, La^{3+} and for Pr^{3+} which has a singlet crystal field ground state [1,2]. The isostructural compound with cerium shows no superconductivity above 0.45 K but displays intermediate valence. With the cations Nd^{3+} and Eu^{2+} magnetic order is found at temperatures below 1.8 K. Interestingly, from Curie-Weiss fits to magnetic susceptibility data much stronger antiferromagnetic interactions could be inferred.

[1] R. Gumeniuk *et al.* Phys. Rev. Lett. submitted. ArXiV 0710.1413v1.
[2] W. Schnelle *et al.* Talk, this conference.

TT 15.22 Tue 14:00 Poster B

Unusual Property of Spin Dynamical Susceptibility and its Effect on Superconductivity in Non-centrosymmetric Systems — •Tetsuya Takimoto and Peter Thalmeier — max planck institute for chemical physics of solids, dresden

Recently, non-centrosymmetric superconductors like $CePt_3Si$ attract much attention. For centrosymmetric system, Hubbard model consisting of hopping term and on-site interaction term will be a minimal model. In addition to these terms, the model hamiltonian of non-centrosymmetric system involves Rashba-field term, by which inversion symmetry is broken. In order to study effect of the Rashba-field on relation between spin fluctuation and superconductivity, we calculate spin dynamical susceptibility in the system. It is shown that unlike centrosymmetric system, spin dynamical susceptibilities show unusual momentum dependences, which is induced by Rashba-field. In order to explain these unusual features, group theoretical consideration is carried out. We will discuss its effect on superconductivity.

TT 15.23 Tue 14:00 Poster B

Theory for cooper pairing in non-centrosymmetric superconductors — •Ludwig Klam and Dirk Manske — Max Planck Institute for Solid State Research, Heisenbergstrasse 1, 70569 Stuttgart, Germany

With the discovery of superconductivity in the non-centrosymmetric heavy Fermion compound $CePt_3Si$ by E. Bauer *et al.* a new field of research has developed. Since in this compound the order parameter is – due to a large antisymmetric spin-orbit coupling – a superposition of a spin singlet and spin triplet state, many new interesting properties have been observed. The pairing interaction giving rise to this mixed parity order parameter can be parameterized, and depending on the strength of the different interaction contributions we explore the phase diagram and the nodal structure.

We use a Green's function approach in order to calculate response and transport functions such as the Knight shift and the spin susceptibility. Furthermore we investigate the role of the band-structure obtained from LDA calculations and use a parametrization for the so-called β-band of $CePt_3Si$ in order to compare our numerical results to the experiments.

TT 15.24 Tue 14:00 Poster B

Contribution of the surface dipole to deformation of superconductors — Pavel Lipavsky[1,2], •Klaus Morawetz[3,4], Jan Kolacek[4], Ernst Helmut Brandt[5], and Michael Schreiber[3] — [1]Faculty of Mathematics and Physics, Charles University, Ke Karlovu 3, 12116 Prague 2, Czech Republic — [2]Institute of Physics, Academy of Sciences, Cukrovarnická 10, 16253 Prague 6, Czech Republic — [3]Institute of Physics, Chemnitz University of Technology, 09107 Chemnitz, Germany — [4]Max Planck Institute for the Physics of Complex Systems, Noethnitzer Str. 38, 01187 Dresden, Germany — [5]Max Planck Institute for Metals Research, 70506 Stuttgart, Germany

The interaction of the ionic lattice with the superconducting condensate is treated in terms of the electrostatic force in superconductors. It is shown that the surface dipole supplies the force responsible for the volume difference of the normal and superconducting states. Assuming this mechanism we argue that the usual parametrization of the theory of deformable superconductors should be revisited.
arXiv:0708.3760

TT 15.25 Tue 14:00 Poster B

The nonadiabatic regime in optically excited BCS superconductors — •Thomas Papenkort[1], Vollrath Martin Axt[2], and Tilmann Kuhn[1] — [1]Institut für Festkörpertheorie, Universität Münster, Wilhelm-Klemm-Str. 10, 48149 Münster — [2]Institut für Theoretische Physik III, Universität Bayreuth, 95440 Bayreuth

We have calculated the coherent dynamics of a BCS superconductor excited by short laser pulses using the density matrix formalism in mean field approximation. For very short pulses a nonadiabatic regime emerges in which the superconductor is put into a state with nonvanishing quasiparticle coherences. For such states the modulus of the BCS order parameter performs a damped oscillation in time. It turns out that this oscillation cannot be measured by means of pump-probe spectroscopy as only its temporal mean is reflected in the spectra. However we will show that this drawback can be overcome by using two coherent pump pulses.

TT 15.26 Tue 14:00 Poster B

Pump-probe spectra and nonlinear dynamics of BCS superconductors — Thomas Papenkort[1], •Norina Richter[1], Vollrath Martin Axt[2], and Tilmann Kuhn[1] — [1]Institut für Festkörpertheorie, Universität Münster, Wilhelm-Klemm-Str. 10, 48149 Münster — [2]Institut für Theoretische Physik III, Universität Bayreuth, 95440 Bayreuth

We present numerical calculations of the reaction of a BCS superconductor to short laser pulses. Starting from the BCS ground state, a laser pulse decreases the modulus of the order parameter, $|\Delta|$. The intensity dependence of this shift depends strongly on the temporal width of the laser pulse. It may be measured using pump-probe spectroscopy: $|\Delta|$ ist directly linked to the energy gap of the superconductor which in turn is clearly visible in the absorption spectra. If the probe pulse precedes the pump pulse, an oscillation is superimposed on the spectrum and both the gap before and after the pump pulse can be seen. After very short pump pulses $|\Delta|$ does not remain constant but instead oscillates. The time dependence of this oscillation is in very good agreement with exact results obtained for the dynamics of a BCS system without external driving following a sudden change into a nonequilibrium state.

TT 15.27 Tue 14:00 Poster B

Microwave conductivity of superconducting aluminum films — •Katrin Steinberg and Martin Dressel — 1.Physikalisches Institut, Universität Stuttgart, Pfaffenwaldring 57, 70550 Stuttgart, Germany

BCS-Superconductors show a coherence peak in real part of the conductivity below the energy gap. We investigated the development of the coherence peak in thin aluminum films with different mean free path. Microwave measurements of the complex conductivity were done in a range from 45 MHz to 40 GHz down to 1.2 K. The temperature and frequency dependence of the coherence peak gives information about