

ing in the system $\text{La}_{1.8-x}\text{Eu}_{0.2}\text{Sr}_x\text{CuO}_4$. This method is the only one in which static charge ordering can be directly detected. A complete phase diagram could be derived for the charge ordering which will be compared with structural and spin ordering. In addition, information on the amplitude and on the doping dependence of the wave length of the charge ordering is provided. The results support strong coupling scenarios for the mechanism of stripe formation.

TT 25.2 Wed 9:45 HSZ 304

Evidence for Fermi surface reconstruction in the static stripe phase of $\text{La}_{1.8-x}\text{Eu}_{0.2}\text{Sr}_x\text{CuO}_4$, $x = 1/8$ — ●V. B. ZABOLOTNYI¹, A. A. KORDYUK^{1,2}, D. S. INOSOV^{1,3}, D. V. EVTUSHINSKY¹, R. SCHUSTER¹, B. BÜCHNER¹, N. WIZENT¹, G. BEHR¹, S. PYON⁴, T. TAKAYAMA⁴, H. TAKAGI⁴, R. FOLLATH⁵, and S. V. BORISENKO¹ — ¹Institute for Solid State Research, IFW-Dresden, P.O.Box 270116, D-01171 Dresden, Germany — ²Institute of Metal Physics of National Academy of Sciences of Ukraine, 03142 Kyiv, Ukraine — ³Max-Planck-Institut für Festkörperforschung, Heisenbergstraße 1, 70569 Stuttgart, Germany — ⁴Department of advanced materials, University of Tokyo, Kashiwanoha 5-1-5, Kashiwa 277-8561, Japan — ⁵BESSY GmbH, Albert-Einstein-Strasse 15, 12489 Berlin, Germany

We present a photoemission study of $\text{La}_{0.8-x}\text{Eu}_{0.2}\text{Sr}_x\text{CuO}_4$ with doping level $x=1/8$, where the charge carriers are expected to order forming static stripes. Though the local probes in direct space seem to be consistent with this idea, there has been little evidence found for such ordering in quasiparticle dispersions. We show that the Fermi surface topology of the 1/8 compound develops notable deviations from that observed for $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ in a way consistent with the FS reconstruction expected for the scattering on the antiphase stripe order.

TT 25.3 Wed 10:00 HSZ 304

Renormalization of the longitudinal bond-stretching phonon branch in $\text{La}_{1.95}\text{Sr}_{0.05}\text{CuO}_4$ probed by inelastic neutron scattering technique — ●A. HAMANN¹, D. LAMAGO^{1,2}, L. PINTSCHOVIV¹, K. YAMADA³, M. FUJITA³, and D. REZNIK^{1,2} — ¹Institut für Festkörperphysik, KIT, 76021 Karlsruhe, Germany — ²LLB, CEA Saclay, 99191 Gif sur Yvette, France — ³Institute for Materials Research, Tohoku Univ., Katahira, Sendai 980-8577, Japan

$\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ becomes superconducting (sc) for $0.06 \leq x < 0.3$, where optimal doping of $x = 0.15$ results in T_c up to 38 K. The mechanism leading to SC remains to be understood. Neutron scattering experiments revealed anomalous phonon behavior that hints at an enhanced electron-phonon coupling possibly connected to dynamic stripe order [1].

We report our latest measurements on non-sc $\text{La}_{1.95}\text{Sr}_{0.05}\text{CuO}_4$. Shell model predictions including resolution effects were used to fit the data. We found that in comparison to the sc-samples the anomalous phonon behavior becomes much less pronounced.

[1] D. Reznik et al., Nature **440**, 1170 (2006)

TT 25.4 Wed 10:15 HSZ 304

Charge stripes and electron phonon coupling in cuprates — ●A. C. KOMAREK¹, A. HIESS², H. HIRAKA³, K. IKEUCHI³, M. V. ZIMMERMANN⁴, M. FUJITA³, K. YAMADA³, and M. BRADEN¹ — ¹II. Physikalisches Institut, Universität zu Köln, Zùlpcher Str. 77, 50937 Köln, Germany — ²Institut Laue-Langevin, BP 156, 6 rue Jules Horowitz, 38042 Grenoble Cedex 9, France — ³Institute for Material Research, Tohoku University, Katahira, Sendai 980-8577, Japan — ⁴Hamburger Synchrotronstrahlungslabor HASYLAB at Deutsches Elektronen-Synchrotron, 22603 Hamburg, Germany

The role of electron-phonon coupling and its relevance to the pairing mechanism in high-temperature superconductivity is still a matter of controversy. The $(\text{La,Sr})_2\text{CuO}_4$ (LSCO) system appears well suited for a study of the electron phonon coupling as the lattice dynamics is less complex than that of other cuprates. The strongest signatures of electron-phonon coupling are found in the longitudinal bond-stretching branches. In general these modes couple to charge fluctuations on the metal sites. In particular, the polarization patterns of modes propagating along the [100]-direction correspond to the distortions expected for the stripe ordering, which occurs in Nd-codoped LSCO and in $\text{La}_{1.88}\text{Ba}_{0.12}\text{CuO}_4$. We have searched for charge stripe order and studied the electron phonon coupling in the spin glass phase of LSCO ($x = 0.05$). Furthermore, the response of the electron phonon anomaly in LSCO ($x \approx 0.12$) on Zn- and Ni-doping was analysed.

TT 25.5 Wed 10:30 HSZ 304

Static and fluctuating stripe order in 1/8-doped LNSCO and

LSCO — ●HSUEH-HUNG WU^{1,2}, MARCEL BUCHHOLZ¹, CHRISTOPH TRABANT¹, FRANZISKUS HEIGL³, ENRICO SCHIERLE⁴, MATTHIAS CWIK¹, MARKUS BRADEN¹, LIU-HAO TJENG¹, and CHRISTIAN SCHÜSSLER-LANGEHEINE¹ — ¹II. Physikalisches Institut, Universität zu Köln, Germany — ²NSRRC, Hsinchu, Taiwan — ³ALBA, Barcelona, Spain — ⁴Helmholtz-Zentrum Berlin

We have studied the stripe order in $\text{La}_{1.475}\text{Nd}_{0.4}\text{Sr}_{0.125}\text{CuO}_4$ (LNSCO) and $\text{La}_{1.88}\text{Sr}_{0.12}\text{CuO}_4$ (LSCO) using resonant soft x-ray diffraction (RSXD). In both systems, a pronounced charge order (CO) peak was found at the oxygen K and copper $L_{2,3}$ edges. While for LNSCO, Nd stabilizes the static CO, no static CO has been found in LSCO [1]. In fact, earlier experiments from the isostructural nickelate system indicates that RSXD is suited to observe not only static, but also fluctuating order. This is particularly interesting for fluctuating CO, which is very difficult to probe with inelastic neutron diffraction. For LNSCO, the CO signal vanishes near the tetragonal to orthorhombic structural transition; in LSCO, the signal vanishes slightly above the critical temperature similar to what has been found for the spin order [2]. The resonance of the CO signal in both samples looks very similar at the O K edge, while some differences at the Cu $L_{2,3}$ edges are found. The spectroscopic interpretation of these findings will be discussed.

[1] M. Fujita et al., Phys. Rev. Lett. **88**, 167008 (2002).

[2] H. Kirmura et al., Phys. Rev. B **59**, 6517 (1999).

TT 25.6 Wed 10:45 HSZ 304

Interplay of charge stripe order with structural distortions: a high pressure x-ray study — ●M. V. ZIMMERMANN¹, M. HUECKER², J.M. TRANQUADA², M. DEBESSAI³, J.S. SCHILLING³, and G.D. GU² — ¹Hamburger Synchrotronstrahlungslabor HASYLAB at Deutsches Elektronen-Synchrotron, 22603 Hamburg, Germany — ²Brookhaven National Laboratory, Upton, New York 11973, USA — ³Dept. of Physics, Washington University, St. Louis, Missouri 63130, USA

The stability of charge stripe order in $\text{La}_{2-x}\text{Ba}_x\text{CuO}_4$ (LBCO) is still poorly understood. At $x=1/8$ LBCO exhibits a pronounced suppression of superconductivity and a static ordering of spins and charge into a stripe pattern. At the same doping a structural transition from the usual orthorhombic phase (LTO) into the low temperature tetragonal phase (LTT) is observed. By the application of pressure the stability of the LTT and the LTO phase can be tuned and thus the influence of these structural distortion on the stripe order be studied. Using high energy x-ray diffraction the presence of charge stripes in a lattice without long range distortions could be found, indicating that electronic effects also contribute to the stability if stripe order.

15 min. break

TT 25.7 Wed 11:15 HSZ 304

Electron-Phonon Interaction in Strongly Correlated Systems — ●GIORGIO SANGIOVANNI¹ and OLLE GUNNARSSON² — ¹Vienna University of Technology — ²Max-Planck Institute - Stuttgart

Oxygen isotope effect on the low-energy dispersion kink has been recently reported by Iwasawa et al. using high-resolution laser photoemission [1], suggesting a major role of the half-breathing oxygen phonon in high-temperature superconducting cuprates. The same phonon mode displays a huge anomaly approximately half-way to the zone boundary in the dispersion and in the width detected by inelastic neutron scattering [2]. In order to get a strong coupling to the half-breathing and other phonon modes in theoretical calculations electronic correlations turn out to be an essential ingredient.

[1] H. Iwasawa, et al., Phys. Rev. Lett. **101**, 157005 (2008)

[2] D. Reznik, et al., Nature **455**, E6 (2008)

TT 25.8 Wed 11:30 HSZ 304

Momentum dependence of the electron-phonon coupling, phonon-induced pairing interaction, and self-energy effects in $\text{YBa}_2\text{Cu}_3\text{O}_7$ within the local density approximation — ●DIRK MANSKE¹, ROLF HEID², ROLAND ZEYHER¹, and KLAUS-PETER BOHNEN² — ¹Max-Planck-Institut für Festkörperforschung, Stuttgart, Germany — ²Forschungszentrum Karlsruhe, Germany

Using the local density approximation (LDA) and a realistic phonon spectrum we calculate the momentum and frequency dependence of the electron-phonon coupling in $\text{YBa}_2\text{Cu}_3\text{O}_7$ and determine its consequences for the phonon-induced pairing interaction and for the electronic self-energy in the normal state.