POSTER - II

(September 27, 2000)

Transport properties and theory

PII-1/ S. Arumugam
Hydrostatic and uniaxial pressure effect on $La_{1.85}Sr_{0.15}CuO_4$ superconductor

PII-2/ C. Chen
Superconductivity and phase separation of La_2CuO_4 single crystals

PII-3/ D. Daghero
Signature of charge ordering in the ab-plane resistivity of strongly underdoped LSCO single crystals

PII-4/ D. Di Castro
Doping dependent fluctuations near T_c in the Bi2212 superconductor

PII-5/ M. Farbod
Evidence for stripe phase formation in $HgBa_2CuO_{4+\delta}$ superconductor

PII-6/ A. Tirbiyine
Magnetic measurements of high quality single crystal $YBa_2Cu_3O_{7-\delta}$

PII-7/ S. Sanna
Chain ordering and related electronic transitions along the T-OII border line in oxygen equalized pairs of $YBa_2Cu_3O_{6+x}$

PII-8/ T. Yoshida
Spectral weight mapping and Fermi surface in $La_{2-x}Sr_xCuO_4$

PII-9/ B. Bandyopadhyay
Effect of impurity substitution on bilayer Tl-based high-T_c cuprate

PII-10/ T. B. Charikova
Influence of Ce-doping on in-plane and out-of-plane resistivities of $Nd_{2-x}Ce_xCuO_{4+y}$ single crystals

PII-11/ K. -H. Han
Plastic vortex creep in $YBa_2Cu_3O_{7-\delta}$ thin films by voltage noise

PII-12/ M. Capone
Interplay of strong correlation and Jahn-Teller effect in orbitally degenerate systems

PII-13/ V. Cataudella
Small-large polaron crossover in the Holstein model

PII-14/ J. Coste
The screened polarons and their possible implication in a theory of superconductivity

PII-15/ V. V. Kabanov
Large finite-wavevector Jahn-Teller-pairing and superconductivity in the cuprates

PII-16/ I. Meccoli
Electron-phonon interaction on the comb lattice: A bridge from one to two spatial dimensions

PII-17/ G. Bianconi
Bose condensation out of equilibrium in strongly interacting systems

PII-18/ V. Mastropietro
Anomalous superconductivity in coupled Luttinger liquids

PII-19/ T. Mertelj
Ultrafast optical response in giant magnetoresistance manganites

PII-20/ A. E. Myaniskova
Changes in electronic band structure at autolocalization and their manifestation in ARPES

PII-21/ Yu. G. Pashkevich
Local distortions in the $Ba_{1-x}K_xBiO_3$ observed by Raman studies of low frequency phonon spectra

Hydrostatic and uniaxial pressure effect on $La_{1.85}Sr_{0.15}CuO_4$ superconductor

S. Arumugam[1], N. Mori[2], T. Mori[2], M. Ohasi[2], N. Takeshita[2], H. Takashima[3], H. Eisaki[3] and S. Uchida[3]

[1]Department of Physics, Bharathidasan University, Tiruchirappalli - 620 024, India. [2]Institute for Solid State Physics, University of Tokyo 5-1-5 Kashiwanoha, Kashiwa 277-8581, Japan. [3]Department of Superconductivity, University of Tokyo Bunkyo-ku, Tokyo 113, Japan.

Superconducting crystals of $La_{1.85}Sr_{0.15}CuO_4$ were grown by Travelling Solvent Floating Zone method. The pressure effect on T_c and HTT to LTO transition temperature (Td) were investigated both under hydrostatic and uniaxial pressure along a-, c- and [110] axes. It was found that the Tc increases and Td decreases with pressure along a-axis [(dTc /dPa) = +0.03 K/GPa, (dTd/dPa) = -1.55 K/GPa] and vice versa along c-axis [(dTc/dP) = -0.19 K/GPc, (dTd/dPc) = 0.34 K/GPa]. Tc do not show any change for pressure along [110] axis. However, the T_c increases [(dT_c/dP = 1.7 K/GPa)] and Td decreases and disappears at 1 GPa under hydrostatic pressure. These anisotropic effects are discussed based on the variations of the tilt angle of oxygen octahedra which would affect the pinning of fluctuating stripe order.

Keywords*: $La_{1.85}Sr_{0.15}CuO_4$, uniaxial pressure, hydrostatic pressure and pressure effect on stripes.*

S. Arumugam
Dept of Physics
Bharathidasan University
Tiruchirappalli - 620 024, India
phone: 0091-431-660 357(off)
fax: 0091-431-660 245, 660 320 (Telecom centre)
e-mail:arumugam@bdu.ernet.in

Superconductivity and phase separation of La_2CuO_4 single crystals

C. Chen, F. R. Wondre and J. F. Ryan
Clarendon Laboratory, University of Oxford, Parks Road, Oxford OX1 3PU, UK.

Lanthanum cuprate (La_2CuO_4) is an antiferromagnetic insulator, which becomes superconducting after introducing interstitial oxygen by high-pressure, chemical or electrochemical oxidation. We report here the flux growth of superconducting single crystal in ambient atmosphere, which the morphology is remarkably different from that of insulating crystal. The behaviour of superconductivity is studied by AC-susceptibility measurement. A phase separation makes a strong effect on the superconductivity. The phase separation mainly occurs in the temperature range from 270K to 190K and is reversible in the solid state condition. The transition rate depends on the temperature and the time. As the high T_c sample keeps at the temperature above 270K, Tc decreases more quickly at room temperature than at 0 C^o. At a temperature range below 270K for the low T_c sample in the other hand, T_c increases more slowly as the temperature falls. Compared to the as-grown superconducting crystal, the insulating crystal in as-grown state and the superconducting one after high-pressure oxidation show different features of the phase separation. The mechanism of the phase separation is discussed based on the stage phase diagram of $La_2CuO_{4+\delta}$.As the result of the phase separation by diffusion and order of the mobile oxygen, a network structure of the alternative oxygen-poor and oxygen-rich phase lines (stripes) is self-assembled in the double phase crystal.

Keywords: *$La_2CuO_{4+\delta}$ superconductivity; phase separation; crystal growth.*

C. Chen
Clarendon Laboratory
University of Oxford
Parks Road, Oxford OX1 3PU, UK
phone: (01865) 272270
fax: (01865) 272400
e-mail: C.Chen1@physics.ox.ac.uk

Signature of charge ordering in the *ab*-plane resistivity of strongly underdoped LSCO single crystals

R. S. Gonnelli[1], V. A. Stepanov[2], A. Morello[1], D. Daghero[1], L. Natale[1], A. Calzolari[1] and Francesca Licci[3]

[1]INFM – Dipartimento di Fisica, Politecnico di Torino, Torino, Italy. [2]P.N. Lebedev Physical Institute, Russian Academy of Sciences, Moscow, Russia. [3]Istituto MASPEC del CNR, Parma, Italy.

A signature of the charge ordering along stripes has been recently identified in some features of the *ab*-plane resistivity curves of $La_{2-x}Sr_xCuO_4$ single crystals with $x = 0.10$ and 0.12. In particular, the temperature at which the deviation of the $\rho_{ab}(T)$ curve from its high-temperature linear behaviour exceeds a certain x-dependent threshold is found to coincide with the temperature of charge ordering T_{ch} measured by NQR.
Here we present the results of *ab*-plane resistivity measurements on underdoped $La_{2-x}Sr_xCuO_4$ single crystals ($0.052 \leq x \leq 0.075$) between 4.2 and 300 K. The resistivity was obtained with a multiterminal technique (Van der Pauw method) whose sensitivity was improved by injecting AC current in the sample and by measuring the voltage with the standard lock-in technique.
We discuss the features of $\rho_{ab}(T)$ in terms of charge ordering and progressive pinning of the resulting stripes. We determine the temperature of charge ordering corresponding to the Sr content of our samples by calculating the normalized $\rho_{ab}(T)$ curves and extrapolating the threshold curve reported in literature to the x values of our interest.
The resulting values of T_{ch} well agree with those obtained by NQR for greater Sr contents, and thus extend in a consistent way these data to the very-low doping region of the phase diagram of LSCO.
The dependence of the results on the frequency of the injected AC current (varied from 133 Hz up to 100 kHz) and some anomalous features of $\rho_{ab}(T)$ just few degrees above T_c are also discussed in detail.

Keywords: *Charge ordering, resistivity, La-based cuprates*.

Dario Daghero
Dipartimento di Fisica - Politecnico di Torino
C.so Duca degli Abruzzi 24
10129 Torino, Italy
phone: +39 011 564 7350
fax: +39 011 564 7399
e-mail: ddaghero@polito.it

Doping dependent fluctuations near T_C in the BI2212 superconductor

D. Di Castro, N.L. Saini, A. Bianconi and A. Lanzara
Unità INFM and Dipartimento di Fisica, Università di Roma "La Sapienza", Roma, Italy.

We have measured temperature dependent complex conductivity on $Bi_2Sr_2CaCu_2O_{8+\delta}$ (Bi2212) superconducting system at different doping using single coil technique to determine the superconducting fluctuations near the T_c. The results show that the fluctuation region below T_c evolves linearly with the doping and is mainly controlled by the superfluid density. On the other hand, the fluctuation region above T_c shows an exponential increase with unederdoping and seems to have an intimate relationship with the anomalous electronic structure in the underdoped regime.

Daniele Di Castro
Unità INFM and Dipartimento di Fisica
Università di Roma "La Sapienza"
P. le Aldo Moro 2, 00185 Roma, Italy
e-mail: daniele.dicastro@roma1.infn.it

Evidence for stripe phase formation in $HgBa_2CuO_{4+\delta}$ superconductor

M. Farbod
Department of Physics, Shahid Chamran University, Ahvaz, Iran.

The segregation of charges and magnetic domains in "stripe" form is supported by experimental and theoretical evidences. It is believed that the suppression of superconductivity (T_c) in La-Ba-Cu-O and La-Sr-Cu-O systems around x = 1/8 is due to the formation of stripe phase in these systems. Although theses systems have been the first to look for such effect, in a system such as $HgBa_2CuO_{4+\delta}$which is seen as potential archetypal HTSC compound with no structural instability or lattice mismatching, looking for stripe phase formation would be more informative.
Single phase samples of Hg1201 were prepared using a sealed-tube precursor reactant method. The quality of samples was investigated by x-ray diffraction and Raman spectroscopy and ac scusceptibility measurements. Upon systematic study of the thermoelectric power of Hg1201, we discovered that the system shows a dip in $T_c(p)$ at p~1/8, which is a similar behavior as seen in LBCO and LSCO systems and can be a sign of stripe phase formation in Hg1201 superconductor. The data are discussed in terms of 1D versus 2D stripe phases.

Keywords: *stripe phase, Hg1201.*

M. Farbod
Department of Physics
Shahid Chamran University
Ahvaz, Iran
phone: 0098-611523299
e-mail: FARBOD@AHVAZUNI.NEDA.NET.IR

Magnetic measurements of high quality single crystal $YBa_2Cu_3O_{7-\delta}$

A. Tirbiyine[1], A. Taoufik[1], S. Senoussi[2]
[1]Laboratoir des Mat riaux Supraconducteurs Haute Temp rature Critique, D partement de Physique, Facult des Sciences, Universit Ibn Zohr, B. P : 28/S, Agadir, Maroc.
[2]Laboratoire de Physique des Solides (associ au CNRS. URA. 0002), Universit Paris Sud, B timent 510, 91405 Orsay Cedex, France.

We have investigated the magnetic measurements of high quality single crystals of $YBa_2Cu_3O_{7-\delta}$. Vibrating sample magnetometer method was used for these measurements. Several magnetization hysteresis loops have been obtained for different temperature values, and as a function of the angle θ between the direction of the applied magnetic field and the c-axis of the sample, the measurements are realized at magnetic field up to 6 Tesla.
Magnetization hysteresis loops scale and shape are strongly dependent on the temperature values, the magnetization decreases by several order of magnitude when the temperature increases and a remarkable peak at weak magnetic field was observed. At very high temperature values two peaks were obtained. Above the peak, the magnetization decreases when the applied magnetic field increases, a steep decrease was observed when the temperature increases. The magnetic field where the hysteresis loops disappears decreases as the temperature increases. At that field the irreversible magnetization value is zero. This can be explained by the fact that the flux lines are not pinned and can move freely.
Our results show that the magnetic properties are profoundly affected by flux lines pinning. The irreversible magnetization decreases as the applied magnetic field deviates from the c-axis (θ increases). The flux pinning mechanisms can explain in large part the magnetization hysteresis loops behavior.

Keyswords: *hysteresis loops, magnetization, flux lines pinning, single crystal.*

A. Tirbynie
Université Ibn Zohr
Faculté des Sciences, Département de Physique
Laboratoire des Matériaux Supraconducteurs
B.P. 28/S, Agadir, Morocco
phone: 212 08 220957
fax: 212 08 220100
e-mail: atoufik@hotmail.com

Chain ordering and related electronic transitions along the T-OII border line in oxygen equalized pairs of $YBa_2Cu_3O_{6+x}$

P. Manca[1], S. Sanna[1], G. Calestani[2] & A. Migliori[3], R. De Renzi[4], G. Allodi[4]
[1]Dipartimento di Fisica and INFM, Universit di Cagliari, Monserrato (CA), Italy.
[2]Dipartimento di Chimica Generale ed Inorganica Universit di Parma, Parma, Italy
[3]CNR-LAMEL, Area della Ricerca di Bologna, Via Gobetti 101, Bologna, Italy.
[4]Dipartimento di Fisica INFM, Universita' di Parma, Parma, Italy.

The study of the relationship between the CuOx chain arrangement and superconductivity in $YBa_2Cu_3O_{6+x}$ system is still an open and important topic in view of the increasing experimental evidence for charge ordering and stripe formation in these materials [1]. Experiment that unambigously evidence the specific role of different chain configurations in affecting Tc are difficult or impossible as a result of the difficulty of stabilising and comparing samples with the same oxygen content but different stable oxygen arrangement [2].
In order to overcome such a difficulty we recently proposed a novel strategy based on oxygen-equalised pair-samples (k-pairs): the samples are prepared in the same vial and thermal conditions, one by intercalation and the other by deintercalation of oxygen in the CuO_x chains. Hence the same final oxygen content k is achieved in both samples, but in principle not the same ordering as a conseguence of the different nature of the oxygen intercalation and deintercalation kinetic. We are now able to explore, for the first time in comparative way, the influence of the CuO_x ordering scheme on T_c [3].
Here we give evidence for influence of the CuO_x chain configuration in the emergence of superconductivity, found around x=0.30, comparing the structural and electronic non equivalence of the samples at the same oxygen content. We emphasise the role of the average chain length, detected by nuclear quadrupole resonance, for hole doping efficiency [4].
In the framework of the stripe scenario, these results suggest new experimental insigths in exploring the modulation of the lattice distortion and charges induced by ordering of dopants oxygen ions in the basal Cu(1) plane.

References

[1] 1. A.Bianconi and M.Missori, J.Phys.I France, 4 (1994) 361.
[2] H. Shaked, J.D. Jorgensen et al., Phys. C 205 (1993) 226.
[3] G. Calestani, P. Manca, S. Sanna and A. Migliori, Int.J.Mod Phys.B 13 (1999) 1073.
[4] P. Manca, S.Sanna, G.Calestani, A.Migliori, R.derenzi, G.Allodi, Phys.Rev.B 61.(2000) 15450.

S. Sanna
Dipartimento di Fisica and INFM
Universit di Cagliari,
Cittadella Universitaria
09042 Monserrato (CA), Italy
e-mail: Samuele.Sanna@dsf.unica.it

Spectral weight mapping and Fermi surface in $La_{2-x}Sr_xCuO_4$

T. Yoshida[1], X. J. Zhou[2,3], M. Nakamura[4], S. A. Kellar[2], P. Bogodanov[2,3], E. D. Lu[2], A. Lanzara[2,3], Z. Hussain[2], A. Ino[5], T. Mizokawa[6], A. Fujimori[1,6], Z.-X. Shen[3], H. Eisaki[3], T. Kakeshita[7] and S. Uchida[7]

[1]Department of Physics, University of Tokyo, Bunkyo-ku, Tokyo 113-0033, Japan. [2]Advanced Light Source, Lawrence Berkeley National Lab, Berkeley, CA 94720, USA. [3]Department of Applied Physics and Stanford Synchrotron Radiation Laboratory, Stanford University, Stanford, CA94305, USA. [4]Department of Physics, Nara University of Education, Takabatake-cho, Nara 630-8523, Japan. [5]JAERI, Spring8, Mikazuki, Sayo, Hyogo 679-5198, Japan. [6]Department of Complexity Science and Engineering, University of Tokyo, Bunkyo-ku, Tokyo 113-0033, Japan. [7]Department of Superconductivity, University of Tokyo, Bunkyo-ku, Tokyo 113-8656, Japan.

We have performed an angle-resolved photoemission spectroscopy (ARPES) study of $La_{2-x}Sr_xCuO_4$ (LSCO) in a wide doping range. Mapping of spectral weight distribution near the Fermi level has been made in the k-space. The spectral weight in the underdoped region is confined within $|k_x|<\pi/4$, $|k_y|<\pi/4$ in the first Brillouin zone (BZ), and spectral features in the nodal direction is suppressed, which may represent the one-dimensional electronic structure of fluctuating stripes, in contrast to the band-structure calculation. This spectral weight confinement is similar to the results on Nd-doped LSCO, where the stripes are static. However, in the overdoped region (x=0.22), the spectral weight confinement collapse and the spectra show an electron-like Fermi surface similar to the results of band-structure calculation. Also the nodal states show a sharp dispersive feature in the second BZ. The evolution of the intensity of the nodal quasi-particle features may be interpreted as a collapse of the fluctuating stripes.

Keywords: *LSCO, ARPES, Fermi surface*.

Teppei Yoshida
Shen Group
McCullough Building
476 Lomita Mall, Stanford, CA94305-4045, USA
phone: +1-650-724-4702,
fax: +1-650-725-5457
e-mail: Teppei@leland.stanford.edu

Effect of impurity substitution on bilayer Tl-based high-T_c cuprate

B. Bandyopadhyay, A. Poddar and B. Ghosh
Saba Institute of Nuclear Physics, Calcutta, India.

We have studied the effect of Co impurity substitution at Cu site of bilayer thallium cuprate. The T_c suppression data are analysed within the unitary patr-breaking formalism due to Abrikosov and Gorkov, by fitting data points to a phenomenological relation valid for weak coupling d-wave superconductors with $N(E_F)$ (density of states at the fermi level) as fitting parameter.
The estimated $N(E_F)$ values show a progressive depletion towards underdoping implying the opening up of a gap of growing magnitude. At each doping, the magnitude of this gap (E_g) is estimated within a "fermi-level density of states suppression" picture.
The thermopower (TEP, S) measurements reveal a significant enhancement of thermopower with increasing Co doping. For all the samples S remains positive but a broad peak appears in the S vs. T curve which shifts towards higher temperatures with decreasing carrier concentration. The appearence of the broad peak in the S-T curve with decrease of carrier density is due to the opening of the normal state pseudogap. Theoretically estimated pasudogap magnitude has becn found to be related with the characteristic temperature T* obbained by TEP measurement. Both E_g (pseudogap magnitude) and T* (temperature at which the normal state pseudogap opens) sbows a sharp rise with a power of inverse doping (1/p) towards underdoping suggesting that T* is an energy scale related to E_g. Similar p dependence of T* for the single and double $Cu0_2$ layer superconductor implies that the normal-state pseudogap is common to all of the cuprates and not just related to coupling between the $Cu0_2$ layers in the double CuO_2 layer cuprates. Finally, it may be mentioned that E_g does not identically fall to zero towards overdoping but exists in this region.

B. Bandyopadhyay
Saba Institute of Nuclear Physics
1/AF Bidhannagar
Calcutta- 700 064, India
e-mail: bidisa@cmp.saha.ernet.in

Influence of Ce-doping on in-plane and out-of-plane resistivities of $Nd_{2-x}Ce_xCuO_{4+y}$ single crystals

T. B. Charikova, A.N.Ignatenkov, A. I. Ponomarev
Institute of Metal Physics, Russian Academy of Sciences, Ekaterinburg, Russia.

The temperature dependencies of in-plane $\rho_{ab}(T)$ and out-of-plane $\rho_c(T)$ resistivities of $Nd_{2-x}Ce_xCuO_{4+y}$ single crystals with x=0; 0.12; 0.15 are investigated in the temperature range $1.7K \leq T \leq 300K$.
Both ρ_{ab} and ρ_c resistivities decrease rapidly with increasing of the cerium content (x). The dependencies $\rho_{ab}(T)$ and $\rho_c(T)$ change therewith from semiconducting- to metallic-like. In the temperature range $120K \leq T \leq 300K$ the behaviour of $\rho_{ab}(T)$ and $\rho_c(T)$ of the undoped Nd_2CuO_4 single crystal obey to the law $\rho(T) \sim \exp(\Delta E/k_B T)$ with the activation energy $\Delta E_{ab} \cong 57meV$ and $\Delta E_c \cong 81meV$. For underdoped single crystals with x=0.12 the resistivity ρ_{ab} is proportional to the temperature $\rho_{ab}(T) \sim T$ in the range $100K \leq T \leq 300K$, whereas $\rho_c(T)$ has semiconducting-like behaviour at $1.7K \leq T \leq 300K$. For optimally doped crystals with x=0.15 both $\rho_{ab}(T)$ and $\rho_c(T)$ are metallic-like in the range $100K \leq T \leq 300K$.
An anisotropy coefficient ρ_c/ρ_{ab} is changed also with doping. For Nd_2CuO_4 crystal $\rho_c/\rho_{ab} \cong 3 \cdot 10^4$ at T=130K, whereas for the samples with x=0.12 and x=0.15 $\rho_c/\rho_{ab} \cong 2 \cdot 10^3$ and $8 \cdot 10^3$ respectively at the same temperature.
Besides, the anisotropy coefficient is strongly temperature dependent: in undoped crystal $\rho_c/\rho_{ab}(T)$ increases rapidly with lowering temperature at once from T=300K. For underdoped crystal $\rho_c/\rho_{ab} \cong 10^3$ at T=300K, anisotropy coefficient is temperature independent in the range $100K \leq T \leq 300K$ and increases up to $\rho_c/\rho_{ab} \cong 2.4 \cdot 10^4$ at T=4.2K For optimally doped sample (x=0.15) ρ_c/ρ_{ab} is temperature independent at $1.7K \leq T \leq 300K$. Such behaviour of $\rho_c/\rho_{ab}(T)$ with the doping and temperature was observed on the $La_{2-x}Sr_xCuO_4$ single crystals [1] and may be connected with crossover from 3D anisotropic conductivity to 2D with decreasing of the temperature and increasing of the doping.

This work was supported by Russian Foundation for Basic Research (Grant No.00-02-17427) and Russian Program "Current Problems in Condensed Matter Physics" (Grant No. 98004).

Keywords: *Low doping single crystals, in-plane and out-of-plane resistivity, anisotropy.*

References

[1] Y. Nakamura, S. Uchida, Phys. Rev. B, **47**, 8369 (1993).

T. Charikova
Institute of Metal Physics RAS
GSP-170, S.Kovalevskaya Street, 18
Ekaterinburg 620219, Russia
phone: 007-3432-499233
fax: 007-3432-745244
E-mail: charikova@imp.uran.ru

Plastic vortex creep in $YBa_2Cu_3O_{7-\delta}$ thin films by voltage noise

K. -H. Han, P. C. Ong and C. K. Ong
Center for Superconducting and Magnetic Materials (CSMM), Department of Physics, National University of Singapore, 10 Kent Ridge Crescent, Singapore 119260, Singapore.

The low frequency noise of highly c-axis oriented $YBa_2Cu_3O_{7-\delta}$ thin films near transition temperature (T_c) is measured as a function of magnetic field. Below T_c the noise power spectral density (PSD) increases with magnetic field (B) and shows a peak at the crossover region from elastic to plastic creep and even though the B increases the noise PSD does not change with external magnetic field in plastic flow regime. The shape of the noise PSD also changes from broad-band to narrow-band as the magnetic field increases. This reveals that noise PSD is highly correlated at the early stage of vortex melting, such as plastic flow regime.

Keywords : *Low-frequency Noise, Plastic creep, Plastic Flow.*

Kyoo-Hyun Han
Center for Superconducting and Magnetic Materials (CSMM)
Department of Physics National University of Singapore
10 Kent Ridge Crescent, Singapore 119260, Singapore
phone: 65 – 874 – 2816 (Off.) 65 – 874 – 6238 (Lab.)
fax: 65 – 777 – 6126
e-mail : phyhankh@nus.edu.sg

Interplay of strong correlation and Jahn-Teller effect in orbitally degenerate systems

M. Capone
International School for Advanced and Istituto Nazionale Fisica della Materia, Trieste, Italy.

The dynamical mean-field theory of the Mott-Hubbard transition in systems with orbital degeneracy is carried out, presenting a systematic analysis of the role of filling and of the number of degenerate level. It is shown that the peculiar properties of the alkali-metal doped fullerides can be understood only considering the interplay of strong correlation and the Jahn-Teller effect coupling the electrons to the lattice. The same physical effects are relevant to the manganites: an exact diagonalization analysis shows that the layered antiferromagnetic order in La_2MnO_3 mainly results from the strong cooperative Jahn-Teller deformations. These deformations stabilize a certain type of orbital ordering. The crucial role of the deformation anisotropy is also emphasized: realistic values of Q_2Q_3 are needed to stabilize the layered order. The experimental values of the superexchange couplings can be recovered using reasonable sets of parameters.

Keywords*: Orbital degeneracy; Jahn-Teller effect; metal-insulator transitions.*

Massimo Capone
International School for Advanced Studies (SISSA)
and
Istituto Nazionale Fisica della Materia (INFM)
Via Beirut 2-4, I-34014, Trieste (Italy).

Small-large polaron crossover in the Holstein model

V. Cataudella, G. De Filippis and G. Iadonisi
INFM and Department. of Physics, University of Naples, Italy.

The features of a single polaron in the the Holstein molecular crystal model are investigated by means of a variational approach that is based on a linear superposition of Bloch states that describe large and small polaron wavefunctions. The mean number of phonons, the polaronic kinetic energy, the electron-phonon local correletion function, the ground state spectral weight and the optical absorption are discussed.
The possibility of coexistance of small and large polarons is investigated in the case of many interacting polarons.
Finally the conductivity of manganites in the phase of colossal magneto-resistance is analyzed.

Vittorio Cataudella
Dip. di Scienze Fisiche
Università degli Studi di Napoli
Monte S. Angelo, V. Cintia
I-80126 Napoli, Italy
phone: +39 081 676825
fax: +39 081 676346
e-mail: vit@na.infn.it

The screened polarons and their possible implication in a theory of superconductivity

J. Coste
Université de Nice Sophia Antipolis, Lab. de Physique de la Matière Condensée Nice, France.

We propose a theory of polarons incorporating the screening of the Coulomb interactions and we apply this theory to the case of anisotropic ionic crystals such as the perovskytes. We show that, the screened polarons cannot be treated individually: all the polarons present in the material are coupled via the screening. We evaluate V(r), the interaction potential between two polarons, and we show the existence of pairs of polarons. We propose to associate the pseudo-gap observed in perovskytes with the binding energy of these pairs. Such pairs are obtained as the result of a local coupling process between two polarons, that is ignoring the collective interaction which characterizes the BCS process. We present a rough attempt to investigate the BCS process by simply replacing the free electrons of the standard theory by polarons interacting through V(r).

J .Coste
Université de Nice Sophia Antipolis
Lab. de Physique de la Matière Condensée
Parc Valrose
06108 Nice, France
phone: 04 92 07 6799
e-mail: coste@unice.fr

Large finite-wavevector Jahn-Teller-pairing and superconductivity in the cuprates

V. V. Kabanov and D. Mihailovic
Jozf Stefan Institute, Jamoa 39, 1001 Ljubljana, Slovenia.

A model interaction is proposed in which pairing is caused by a{\em| non-local} Jahn-Teller (JT)-like instability due to the coupling between planar O states and $k\neq 0$ phonons. Apart from pairing, the interaction is found to naturally allow metallic stripe formation. The consequences of the model for superconductivity in the cuprates are discussed. The model is shown to be consistent with numerous sets of experimental data in quite some detail.

V. V. Kabanov
Jozf Stefan Institute
Jamoa 39
1001 Ljubljana, Slovenia
phone: +386 61 1773208
fax: +386 61 219385
e-mail: viktor.kabanov@ijs.si

Electron-phonon interaction on the comb lattice: A bridge from one to two spatial dimensions

I. Meccoli[1] and M. Capone[2]
[1]Dipartimento di Fisica and Istituto Nazionale per la Fisica della Materia, Parma, Italy, [2]International School for Advanced Studies and Istituto Nazionale per la Fisica della Materia, Trieste, Italy.

We study the static and transport properties of a single electron interacting with the lattice for the Holstein model in the adiabatic limit on a comb lattice, when the electron-phonon interaction acts only on the base sites. This lattice can be viewed as a bridge between one and two dimensions. The static properties can be easily deduced from the ones of a linear chain with an appropriate rescaling of the coupling constant. The dynamical properties, that involve the complete spectrum of the system, present an "exotic" behavior. In the weak coupling limit the Drude weight (zero-frequency conductivity) is enhanced with respect to its free-case value, contrary to the linear chain case, where for every finite value one has a suppression of the Drude peak. More interestingly, we find for intermediate coupling, a novel phase characterized by large kinetic energy but no coherent motion.

Keywords: *electron-phonon interaction; bundled structures.*

Ilaria Meccoli
Dipartimento di Fisica, Università di Parma
and
Istituto Nazionale per la Fisica della Materia (INFM)
Parco Area delle Scienze 7a, I-43100 Parma, Italy

Bose condensation out of equilibrium in strongly interacting systems

G. Bianconi
Department of Physics, Notre Dame University, 46556 Indiana, USA.

We introduce a new statistical physics framework for strongly interacting systems driven by an external parameter. We show that Bose condensation can appear in such a system when the relaxation process in the presence of thermal bath is introduced.

Ginestra Bianconi
Department of Physics
Notre Dame University
46556 Indiana, USA
e-mail: gbiancon@nd.edu

Anomalous superconductivity in coupled Luttinger liquids

V. Mastropietro
Dipartimento di Matematica, Università di Tor Vergata, Roma, Italy.

Two interacting fermionic chains coupled via a Cooper tunnelling hamiltonian are considered.
By renormalization group analysis we see that above T_c the system is a Luttinger liquid and below is a superconductor with an anomalous non-BCS gap and T_c. The critical temperature is strongly enhanced if the intrachain interaction is much bigger than the interchain one.

V. Mastropietro
Dipartimento di Fisica
Università di Tor Vergata
Via della Ricerca Scientifica
Roma, Italy
phone: +39 06 72594602
e-mail: mastropi@axp.matuniroma2.it

Ultrafast optical response in giant magnetoresistance manganites

T. Mertelj[1,2], O. Gorbenko[3], A.R. Kaul[3] and D. Mihailovic[1]
[1]Jozef Stefan Institute, P.O.Box 3000, 1001 Ljubljana, Slovenia. [2]University of Ljubljana, Faculty of Mathematics and Physics, Jadranska 19, 1000 Ljubljana, Slovenia. [3]Department of Chemistry, Moscow State University, Moscow 119899, Russia.

We measured optical time-resolved photoinduced reflectivity in (La,Pb)MnO_3 thin films as a function of temperature and doping. The photoinduced signal consists from initial fast relaxation on 200-300 fs scale followed by a slower relaxation on 10-100 ps timescale and extremely slow response on the ns timescale. The fastest component is relatively insensitive to the metal-insulator transition. On the other hand slow components show distinctive changes below metal-insulator transition.

Keywords: *giant magnetoresistance manganites, time resolved photoinduced reflectivity, optical spectroscopy*.

Tomas Mertelj
Josef Stefan Institute
P.O. Box. 3000
1001 Ljubljana, Slovenia
phone: +386 (61) 17 73 900
fax: +386 (61) 12 35 400
e-mail: tomaz.mertelj@ijs.si

Changes in electronic band structure at autolocalization and their manifestation in ARPES

A. E. Myasnikova and E. N. Myasnikov
Department of Mathematics and Physics, Rostov State Pedagogical University, Rostov-on-Don, Russia.

Taking into account Pauli exclusion rule in systems where delocalized and autolocalized (due to electron-phonon interaction) carriers can coexist leads to the conclusion that carriers autolocalization results in prohibition of some set of delocalized carrier states, i.e. in appearance of a window in the electronic conduction band [1] centered at its bottom. However, it can be shown that autolocalization process with formation of polarons and corresponding window can take place in the valence band too. Moreover, carriers with momentums from the vicinity of the valence band top can turn into polaron states with simultaneous appearance of corresponding window in the valence band even at weak electron-phonon coupling. In the case of strong coupling in addition to this ¨top¨ window and polarons ¨bottom¨ polarons and window occur in the valence band similarly to those take place in the conduction band. These windows will manifest themselves in ARPES as regions where carrier states with certain momentums are absent and, consequently, their boundaries will look like additional Fermi surfaces whereas polarons of each types will cause in ARPES spectra a quasiparticle peak.

Keywords: *polarons, electronic band structure, ARPES*.

References

[1] E. N. Myasnikov, A. E. Myasnikova, Zh.Eksp.Teor.Fiz., **116**, 1386 (1999).

A. E. Myasnikova
Department of Mathematics and Physics
Rostov State Pedagogical University
199 Stachki str. Ap. 59
344059 Rostov-on-Don, Russia
e-mail: rocha1@phys.rnd.runnet.ru

Local distortions in the $Ba_{1-x}K_xBiO_3$ observed by Raman studies of low frequency phonon spectra

Yu. G. Pashkevich[1], V. P. Gnezdilov[2], P. Lemmens[3], M. Grove[3], G. G ntherodt [3], V. V. Eremenko[2], S. V. Shiryaev[4], S. N . Barilo[4] and A. G. Soldatov[4]

[1]A. A. Galkin Donetsk Phystech,NASU, Donetsk, Ukraine, [2]B.I.Verkin Inst. for Low Temp. Physics, NASU, Kharkov, Ukraine, [3]2 Physikalisches Institute, RWTH Aachen, Germany, [4]Institute of Physics of Solids & Semiconductors, Minsk, Belarus.

High quality single crystals of $Ba_{1-x}K_xBiO_3$ (x=0; 0.15, 0.2, 0.4, 0.5) have been investigated by Raman light scattering (RLS) in the 10-300K temperature range. There is a difference in the spectra for frequencies below 400 cm^{-1} comparing non superconducting and superconducting ($x \geq 0.4$) samples. A common feature for all samples is the existence of a phonon line at $50cm^{-1}$. The intensity of this line changes upon potassium content. According to inelastic neutron scattering data[1] one can assign it to the lowest tilting distortion phonon mode from the R=(0.5,0,5,0.5) point of the perovskite Brillouin zone (BZ). This line could appear in the RLS spectra only due to the presence of local tilt distortion that possesses R-type translation symmetry. In the x=0.4 sample the intensity of this line depends non monotonically on temperature with a conspicuous hysteresis for the up and down temperature run in between 10 K-200K. The direct comparison of inelastic neutron scattering data[1] and our RLS spectra have shown the presence of phonon lines which belong to the R, M, and X-points of perovskite BZ. The peaks from R-point disappear in the sample with x=0.5. This implies a decrease of the value of R-type tilt local distortions. Such a redistribution of the symmetry and value of local distortions probably directly connected with lowering of superconductive phase transition temperature from 30K to 25K for the samples with x=0.4 and x=0.5, respectively. This work was supported in part by INTAS grant No 97-1371.

Keywords: *Raman light scattering, local distortions, mechanisms for .T_c amplification, $Ba_{1-x}K_xBiO_3$.*

References

[1] M.Braden, W.Reichardt, A.S.Ivanov, A.Yu.Rumyantsev, Europhys Lett. **34**, 531 (1996).

Yurii G. Pashkevich
A. A. Galkin Donetsk Phystech, NASU,
72 R.Luxemburg Str.
83114 Donetsk, Ukraine
phone: (+38-0622) 55-02-21
fax: (+38-0622) 55-74-62
e-mail: pashkevi@kinetic.ac.donetsk.ua