SESSION 18

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Stripes and charge dynamics

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Stripe effects on the superconducting charge responses in $(La,Nd,Sr)_2CuO_4$

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The stripe effects on the in-plane and the out-of-plane charge responses have been investigated for $(La,Nd,Sr)_2CuO_4$, focusing on the superconducting responses. In the out-of-plane spectra, it was found that the static stripe order pinned by the low-temperature tetragonal distortion radically suppresses the superconductivity phase coherence, decreasing the Josephson plasma frequency and degrading the plasma edge profile. For E/ab, no spectral change is observed below T_c in far-infrared conductivity spectra, even in the Nd-free samples, implying that the missing area in the optical conductivity spectrum is extremely small. We attribute this anomaly to a dramatic change in kinetic energy of carriers that are confined into the stripes.

Keywords: *stripe order, optical spectrum, La214, superconductivity*.

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Finite-wavevector Jahn-Teller pair dynamics in cuprates

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Group theoretical analysis of local probe data in $La_{2-x}Sr_xCuO_4$ (inelastic neutron scattering, EXAFS, neutron PDF and ESR) reveals a strong Jahn-Teller-like interaction between finite-wavevector in-plane O vibrations and degenerate electronic states, which can lead to pairing and stripe formation. The properties of the appropriate invariant Hamiltonian constructed on the basis of symmetry analysis will be discussed in relation to data from different spectroscopies which have relevant characteristic time-scales of $<10^{-12}$ s.

Keywords: *superconductivity, pairing models, ultrafast spectroscopy.*

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The optical conductivity of materials with interacting polarons

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In this talk, we present a review of the optical measurements on materials with interacting polarons. In particular the optical conductivity of the High-Tc superconductor $Nd_{2-x}Ce_xCuO_{4-y}$ where polaron aggregates survive in the metallic and superconducting phase will be reviewed. In this material, polaron aggregates are in a dynamical equilibrium with free charges in the Cu-O plane. This coesistence is also observed in $Bi_2Sr_2CuO_6$ where, below the critical temperature Tc, infrared spectral weight is lost both in the Drude component and in the polaron one.

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Chain/plane transport in $YBa_2Cu_4O_8$ above and below T_c

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$YBa_2Cu_4O_8$ is unique within the cuprate family in that it is a stoichiometric, underdoped cuprate with negligible disorder, whose normal state resistivity is metallic along all three crystallographic directions. We review here our studies of the normal state charge transport in $YBa_2Cu_4O_8$ and its structural derivatives, that confirm the critical role of the highly conducting 1D chains in metallising the *c* axis below 200K. In order to follow the fate of quasiparticle transport down to the zero-temperature limit, we have recently measured the in-plane thermal conductivity of $YBa_2Cu_4O_8$ below 1K. Our measurements reveal a surprising absence of quasiparticle conductivity in $YBa_2Cu_4O_8$ at low *T*, despite its highly conducting nature above T_c and despite the absence of large levels of disorder. We discuss possible origins of this surprising result, including the possibility of charge localisation of the nodal quasiparticles at low-*T*.

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