HIGH T_C UPDATE

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Dear Subscribers,

Since May 1, 1987, the *High-T_C Update* has provided you with biweekly issues containing the latest information about high-temperature superconductivity. We are grateful to the Division of Materials Science (Basic Energy Sciences Divison of the Department of Energy) for providing start-up funds and well over half the annual financial support for the *High-T_C Update* throughout our existence. We are also grateful to ARPA and ONR for their continued long-time support of the newsletter, and to many other agencies, research institutions, and individuals who have contributed significant amounts of support.

We have been informed, however, that our financial support from the Department of Energy has come to an end. It therefore will become necessary for us to cease publication of the *High-T_C Update* after a few more months.

Over the years, we have told you about new preprints, technological advances, resources, and coming events to keep you informed about novel materials, new experiments, theoretical developments, and applications of the cuprate superconductors. Our popular Web page has enabled you to download current and back issues, and to use a search engine to find references to key words of greatest interest to you. We feel we have facilitated increased international cooperation. Over the years, we have received numerous accolades from you praising the high quality, timeliness, and reliability of the *High-T_C Update*.

In forthcoming issues, we will list various resources that should be of use to you in our absence. We will let you know soon when our last issue will be mailed.

Sincerely,
Sreeparna Mitra (Editor)
John R. Clem (Science Editor)

NOTA BENE:

$RBa_2Cu_3O_{7-\delta}$

The atomic pair distribution functions (PDF) of four powder samples of *$YBa_2Cu_3O_{6+x}$* (x = 0.25, 0.45, 0.65, and 0.94) at 15 K have been measured by M. Gutmann (Michigan State) et al. using pulsed neutron diffraction. Although the authors found no evidence for a split apical oxygen site, they did find a slightly improved fit over the average crystallographic model when the planar *Cu(2)* site is split along the z direction. They note that the origin of such a split can be explained assuming the presence of both *Cu^{2+}* and *Cu^{3+}* in the *CuO_2* planes, as might be expected in the presence of charge stripes or polarons.

$^{63,65}Cu$ nuclear quadrupole resonance (NQR), *$^{63,65}Cu$* nuclear magnetic resonance (NMR), and *Br* K-edge x-ray-absorption fine-structure (XAFS) measurement techniques have been used by D. M. Potrepka (Connecticut) et al. to study the local structures of *Cu* and *Br* in well-characterized samples of deoxygenated and brominated *$YBa_2Cu_3O_{7-\delta}$*. The combined results provide a detailed picture of the role of *Br* in reoxygenating the *YBCO* structure and an explanation

for the partial restoration of superconductivity in the *YBCO* system.

As noted in preprints by A. Bock and by A. Bock et al. (Hamburg), in Raman spectra of cuprate superconductors the gap shows up both directly via a redistribution of the electronic background (the so-called 2Δ peaks) and indirectly via the renormalization of phononic excitations. The authors present a model that permits the study of both effects simultaneously, and they apply this model to the B_{1g} phonon of $Y_{1-x}(Pr,Ca)_xBa_2Cu_3O_7$ films, where the *Pr* and *Ca* substitutions allow investigations of under- and overdoped samples. While various self-energy effects can be explained by the strength and energy of the 2Δ peaks, anomalies remain.

A third preprint by A. Bock et al. (Hamburg) reports an investigation of the Fano-type line shape of the *Ba* mode in $Y_{1-x}Ca_xBa_2Cu_3O_{6+y}$ films observed in Raman spectra with A_{1g} symmetry. The authors use their analysis to determine that the phonon intensity originates almost entirely from a coupling to a low-energy electronic response. In the normal state the authors find that the mass-enhancement factor describing the electron-phonon coupling has the value $\lambda = 6.8 \pm 0.5\%$.

A related paper by S. Ostertun et al. (Hamburg) reports a Raman study of the superconducting gap and electron-phonon coupling in $YbBa_2Cu_3O_{7-\delta}$ *(Yb-123).*

A study of various welding techniques to join two or more single-domain *YBCO* monoliths has been carried out by M. P. Delamare (Göttingen and Québec) et al. The authors used energy-dispersive spectroscopy analysis across the grain boundaries to determine variations of stoichiometry there. The authors also report the effects of using *Yb-123* as a welding agent.

Samples of cation-stoichiometric superconducting $SmBa_2Cu_3O_{7-\delta}$ *(Sm-123)* have been synthesized by H. Suenatsu (Tokyo Tech) et al. using a solid-state-reaction technique without any liquid phases involved, followed by annealing in flowing O_2 gas at 350°C for 40-200 h. The authors observed a peak in J_c vs H for $\mu_0 H \approx 1$ T at 77 K. The authors discuss the origin of this peak in terms of oxygen nonstoichiometry.

The question of whether $PrBa_2Cu_3O_{7-\delta}$ *(Pr-123)* is superconducting or not continues to generate controversy. A. M. Araujo-Moreira et al. (São Carlos) report the observation of superconductivity (superconducting fraction about 5%) in sintered, polycrystalline *Pr-123* samples with $T_c \approx 90$ K and $H_{c1}(0) \approx 870$ Oe. In two preprints by V. N. Narozhnyi (Troitsk and Dresden) et al., the authors suggest that the superconductivity reported by Z. Zou et al. [Phys. Rev. Lett. **80**, 1074 (1998)] in *Pr-123* grown by the traveling-solvent floating zone (TSFZ) method is connected with about half the rare-earth sites being occupied by *Ba,* rather than by *Pr.*

Bi Cuprates

The growth of $Bi_2Sr_{2-x}La_xCaCu_2O_{8+\delta}$ *(Bi-2212)* crystals from the melt is discussed in papers by H. Jin (Hamburg and Hefei) and J. Kötzler (Hamburg) and by H. Jin et al. The authors found that T_c decreases with increasing *La* content according to $T_c(x) = T_c(0)(1 - x/x_c)$, where $x_c = 0.3$ is the critical concentration above which the crystals contain the pure $Bi_2(Sr,La)_2CuO_6$ *(Bi-2201)* phase. The authors also report that $Bi_2Sr_{2-x}La_xCaCu_2O_{8+\delta}$ whiskers can be grown from *Bi*-rich melts containing *La.* Within the doping region x = 0.025-0.3, all the grown whiskers are of the *Bi-2212* pure phase. No whiskers could be obtained from the *La*-free melt with x = 0.

The current-voltage (I-V) characteristics of a mesa structure microfabricated on the surface of a $Bi_2Sr_2CaCu_2O_{8+\delta}$ *(Bi-2212)* single crystal have been measured by Y.-J. Doh (POSTECH) et al. Upon the application of microwaves of frequency 76 and 94 GHz, the I-V characteristics exhibited constant-voltage steps crossing the zero-current axis. These steps satisfied the ac Josephson relation, and the heights of the steps vs the microwave power showed the expected Bessel-function behavior. The data are consistent with modeling a *Bi-2212* crystal as a series array of intrinsic Josephson tunnel junctions stacked along the c axis.

Studies of radiation-induced enhancements of the critical current in ^{235}U-doped $Bi_2Sr_2Ca_2Cu_3O_{10+\delta}$ *(Bi-2223)* tapes are reported by S. Tönies (Atominstitut-Wien) et al. Irradiation by thermal neutrons causes fission of the *U,* and the resulting fission tracks significantly improve flux pinning and shift the irreversibility line to higher fields. The authors found that irradiation enhanced J_c by a factor of 16 at 4.5 T for **H**||ab and a factor of 60 at 0.7 T for **H**||c at 77 K. Irradiation also reduces the anisotropy of J_c with respect to the angle of **H** by an order of magnitude (from 37 to 2.4).

Similar results showing fission-fragment-track enhancements of the critical current and irreversibility line of *U*-doped *Ag*-clad *Bi-2223* tapes following thermal-neutron irradiation are reported by S. X. Dou (Wollongong) et al. In an attempt to reduce the radioactivity of *Ag,* the authors investigated ^{235}U doping levels of 0.15%, 0.2%, 0.4%, and 0.6%. For the same density of fission-fragment tracks in *Bi-2223,* the lowest radioactivity of *Ag* resulted from the combination of a higher *U* doping level and a lower thermal-neutron fluence.

Two preprints by H. K. Liu (Wollongong) et al. report studies of the effects of processing on the properties of

Ag-clad *Bi-2223* tapes. One of these describes phase transformations and liquid phase conversion during the final processing step, and the other compares the properties of tapes processed with and without hot pressing and post-annealing.

Measurements of J_c in *Bi-2223/Ag* tapes (inferred from magnetization hysteresis) vs magnetic field at different temperatures are reported by P. N. Mikheenko (Wollongong and Birmingham) et al. The authors identify slope changes in plots of $\ln J_c$ vs H as the values of H vs T where a surface-barrier-controlled order-disorder transition occurs. The order-disorder line indicates a change in the anisotropy parameter γ from 3.4 at low temperatures to about 50 at high temperatures.

A preprint by B. de Mayo (State University of West Georgia) reports measurements of the critical currents of commercially supplied *Bi-2223/Ag* tapes at 77 K with applied axial stresses of up to 220 MPa. The author found that the critical current density decreased linearly with increasing strain up to the point of plastic deformation, whereupon J_c dropped discontinuously to less than 10% of the unstressed value. The resistivity of a pure silver sample at 77 K was measured as a function of applied axial stress and found to be constant up to the same point of plastic deformation, after which it decreased linearly. The implication is that the dislocations and microcracks responsible for plastic deformation in the *Ag* matrix also result in a drastic reduction in J_c, probably by interrupting continuous current paths.

Other Cuprates

By measuring the temperature dependence of the side-lobes of $I_c(H,T)$, the critical current vs magnetic field, of small Josephson bicrystal junctions in the electron-doped cuprate superconductor $Nd_{1.85}Ce_{0.15}CuO_{4-y}$, L. Alff (Köln) et al. have measured the temperature dependence of the in-plane London penetration depth $\lambda_{ab}(T)$. The authors found that both $I_c(0,T)$ and $\lambda_{ab}(T)$ obey an anomalous temperature dependence below about 4 K: $I_c(0,T)$ decreases and $\lambda_{ab}(T)$ increases with decreasing temperature below 4 K. Because such behavior was found to be absent in $Pr_{1.85}Ce_{0.15}CuO_{4-y}$, the authors conclude that the anomalous behavior in $Nd_{1.85}Ce_{0.15}CuO_{4-y}$ is due to Nd^{3+} paramagnetic moments. The authors explain the anomalous temperature dependence of $\lambda_{ab}(T)$ by including the effects of the Nd^{3+} moments upon the temperature-dependent permeability in $B = \mu(T)\mu_0 H$. The corrected $\lambda_{ab}(T)$ is then found to have the usual exponential temperature dependence expected for isotropic s-wave pairing, as seen in $Pr_{1.85}Ce_{0.15}CuO_{4-y}$.

The influence of defects introduced in the CuO_2 planes of cuprates has been studied by F. Rullier-Albenque (Ecole Polytechnique) et al. for a wide range of hole dopings n. The authors measured the critical temperature T_c and electrical resistivity $\rho(T)$ in electron-irradiated $YBa_2Cu_3O_{7-\delta}$ *(Y-123)* and $Tl_2Ba_2CuO_{6+\delta}$ *(Tl-2201)* single crystals. For all the samples investigated here, the authors found a universal scaling between the decrease in T_c and $\Delta\rho_{2D} \times n$, where $\Delta\rho_{2D}$ is the increase of the 2D resistance induced by the defects. The authors find that n is the relevant parameter to describe the transport properties over the entire phase diagram, in disagreement with a recent suggestion of a change in the number of carriers from n to 1-n at optimal doping.

A preprint by T. Hosomi (Tokyo Tech) et al. reports the magnetic irreversibility field H_{irr} for an unstable phase with T_c = 124 K in the *Ba-Ca-Cu-O* system prepared by high-pressure synthesis, as well as for a derivative phase with T_c = 78 K obtained by exposing the as-synthesized sample to H_2O/N_2 gas. The unstable phase is of the *0223* ($Ba_2Ca_2Cu_3O_y$) structure, consisting of two *BaO* layers between two superconductive $Ca_2Cu_3O_6$ "infinite-layer" blocks. In a plot of $\log H_{irr}$ vs $\log(1 - T/T_c)$, the irreversibility-field lines for the two phases are at nearly the same position, comparable to that reported previously for optimally doped *Hg-1223*.

A single-phase sample of $TlSr_2Ca_2Cu_3O_9$ *(Tl-1223)* in the *Tl-Sr* series has been prepared by S. Adachi (SRL-ISTEC) et al. using high-pressure synthesis. The sample exhibited Meissner signals below 86 K. The resistivity decreased linearly with decreasing temperature above 86 K, and the thermoelectric power at 290 K was found to be nearly zero, suggesting that the hole concentration of the sample was nearly optimized. The dependence of the irreversibility field B_{irr} on the reduced temperature $(1 - T/T_c)$ was found to be similar to that of *(Cu,C)-1223.*

The third and fourth members (n = 3 and 4) of the *Hg-Sr* series $HgSr_2Ca_{n-1}Cu_nO_X$ *[Hg-12(n-1)n]* have been stabilized by E. Kandyel et al. (SRL-ISTEC) with *Bi* under high pressures. A sample with nominal composition $(Hg_{0.7}Bi_{0.3})Sr_2Ca_2Cu_3O_{8.55}$ *[(Hg,Bi)-1223]* was found to be overdoped. It exhibited bulk superconductivity below 105 K as prepared and below 116 K after annealing in an Ar/H_2 atmosphere. The highest T_c of a sample with nominal composition $(Hg_{0.7}Bi_{0.3})Sr_2Ca_3Cu_4O_{10.15}$ *[(Hg,Bi)-1234]* was 96 K in the as-prepared form and did not change with annealing.

As reported by S. Hébert et al. (Caen), the pinning efficiency of orthogonal columnar defects has been investigated in weakly anisotropic $Tl_{2/3}Bi_{1/3}Sr_2CaCu_2O_7$ *[(Tl,Bi)-1212]* single crystals. Columnar defects were introduced by heavy-ion irradiation along two directions tilted by 45° from the c axis, and the results were compared with those in a crystal irradiated along the c axis. The damaged volume was the same in both samples. Magnetic measurements performed with **H**||c showed that the perpendicularly crossed

defects exhibited the highest pinning efficiency over a wide range of fields and temperatures. The authors show that this effect cannot be due simply to the increased columnar-defect cross section in the ab planes. The results instead support the idea that the pinning enhancement observed for orthogonal defects in *(Tl,Bi)-1212* can be attributed to the same splay effect as observed previously in *YBCO*.

Vortices

Two preprints by Y. Yeshurun et al. (Bar-Ilan) and D. Giller et al. (Bar-Ilan) report high-temporal-resolution magneto-optical studies of the vortex structure in *Bi_2Sr_2Ca-$Cu_2O_{8+\delta}$ (Bi-2212)* after a sudden application of a magnetic field H_a in the range around the vortex solid-solid transition field B_{SS}. For low applied fields, initially Bean-like profiles were observed, gradually relaxing into a dome-shaped profile in the equilibrium state of the quasi-ordered phase, the final profiles being characteristic of Bean-Livingston and geometrical barriers. For high fields, however, a boundary between two distinct, coexisting vortex-solid phases is observed. Near the edge of the sample, where the field is larger than B_{SS}, the disordered, high-current-density phase appears, while near the center of the sample, where the field is less than B_{SS}, the quasi-ordered, low-current-density phase is present.

A new explanation of the second peak in the magnetization loops of high-temperature superconductors (the fishtail in *YBCO* or arrowhead in *Bi-2212*) has been proposed by D. K. Jackson et al. (Imperial College). The proposed mechanism involves “dynamical stacking” of vortices, in which pinning centers trap more than one vortex. The authors carried out Monte Carlo simulations using a multiple occupancy model. The results showed a second peak in the magnetization loops and strong effects upon the vortex structure, magnetic relaxation, and the distribution of the local magnetic induction measured in muon spin-relaxation experiments.

A preprint by B. Brown (San Francisco) reports simulations of dc V-I data using Gaussian distributions of depinning currents for the mixed state. The simulated data were subsequently subjected to a critical scaling analysis. Although the simulations assumed no phase transition for the vortex matter, the scaled V vs I exhibit data collapse very similar to what has often been reported in the experimental literature. The resulting “critical parameters” depend on the simulated sensitivity level, thus reinforcing doubts about the universality of the scaling analysis for V-I characteristics in the high-T_c cuprates.

The dependence of the current-voltage (I-V) characteristics of epitaxial *$YBa_2Cu_3O_{7-\delta}$* thin films upon the angle ϕ between the applied field **H** and the ab planes has been studied by S. K. Gupta (BARC-Mumbai) et al. The data show signatures of the vortex-glass transition in the vortex lattice at all angles. The critical exponents and the functional form of the scaling functions were found to be independent of field and angle, indicating universality of the vortex-glass transition. While the field and angle dependencies of the scaling functions were found to be in agreement with the anisotropic Ginzburg-Landau model when $\phi > 10°$, sharp changes in the angular scaling, as well as in the scaling parameters ρ_0, J_0, and T_g, were observed when the field was nearly parallel to the ab planes, indicating strong effects of intrinsic pinning.

An extensive study of the vortex solid-liquid transition in twinned *$YBa_2Cu_3O_{7-\delta}$* single crystals by transport measurements has been carried out by B. Maiorov et al. (Bariloche). The authors establish that this transition is first-order when the magnetic field **H** is applied at an angle θ away from the direction of the twin planes. The authors find that the resistive transitions are hysteretic and the V-I curves are nonlinear, displaying a characteristic S shape at the melting line $H_m(T)$, which scales with θ according to the anisotropic Ginzburg-Landau model. These features are gradually lost when the critical point $H^*(\theta)$ is approached. Above $H^*(\theta)$, the V-I characteristics show a linear response in the experimentally accessible V-I window, and the transition becomes reversible. The authors also show that the first-order phase transition takes place between a solid state of unknown symmetry and a highly correlated vortex liquid in the field direction. The authors thus stress that their data support the scenario of line melting (melting of the vortex solid into a liquid of correlated vortex lines), rather than vortex sublimation (melting into a liquid of uncorrelated pancakes), as recently suggested by T. Sasagawa et al. [Phys. Rev. Lett. **80**, 4297 (1998)].

A preprint by J. Govaerts et al. (Louvain) reports theoretical investigations of the Ginzburg-Landau equations for a disk. The authors numerically obtain axially symmetric solutions (for $\kappa = 1$) depending only upon the radial coordinate. In addition to the well-known singly quantized Abrikosov vortex solution and the multiply quantized giant vortex solution, the authors report annular vortex solutions where the order parameter is zero on concentric rings centered on the origin.

Films

High-quality *$NdBa_2Cu_3O_{7-\delta}$ (NBCO)* thin films have been successfully grown by Y. Li and K. Tanabe (SRL-ISTEC) using on-axis pulsed-laser deposition (PLD) and a large single-crystal *NBCO* target. The authors thoroughly investigated the influence of deposition parameters (including the substrate temperature, oxygen partial pressure, laser energy density, and the target-substrate distance) upon the quality of the resulting *NBCO* thin films. By optimizing the deposition conditions, especially the target-substrate distance, the authors were able to eliminate the formation of misoriented surface particles and outgrowths,

and to obtain smooth *NBCO* films with T_{c0} = 92.5 K and $J_c = 4 \times 10^6$ A/cm^2 at 77 K.

Preprints by A. Di Trolio and A. Morone (Tito Scalo) and by A. Di Trolio (Tito Scalo) et al. report the growth and compositional analysis of $SmBa_2Cu_3O_{7-\delta}$ *(SBCO)* thin films grown by off-axis PLD on different substrates *($SrTiO_3$, MgO, $LaAlO_3$,* and *YSZ).* The best film had a zero-resistance T_c of about 88 K and a transition width of about 1 K. The composition was studied using particles induced x-ray emission (PIXE), Rutherford backscattering spectrometry (RBS), and nuclear reaction analysis (NRA).

As reported by P.V.P.S.S. Sastry et al. (NHMFL-Florida State), thick films of $Hg_{0.8}Pb_{0.2}Ba_2Ca_2Cu_3O_y$ *[(Hg,Pb)-1223]* superconductor have been fabricated on silver by dip coating. *[(Hg,Pb)-1223]* films reacted close to the melting temperature exhibited an optimum superconducting transition temperature of 135 K. The superconducting layer close to the silver interface showed superior magnetization hysteresis in comparison with that at the free surface.

Applications

A preprint by K. A. Kouznetsov et al. (LBNL and UC-Berkeley) describes the fabrication of planar first-derivative gradiometers in which an asymmetric flux transformer patterned in a single-layer $YBa_2Cu_3O_{7-\delta}$ film is permanently bonded to a directly coupled magnetometer based on a dc SQUID. The gradiometer baseline is 48 mm, and the common mode rejection of uniform magnetic fields is typically one part in a few hundred. The outputs of two such gradiometers are subtracted digitally to form a second-derivative gradiometer. In addition, three orthogonal SQUID magnetometers are used to reduce the residual response to uniform magnetic fields to better than 100 ppm. The system is able to detect magnetic signals from a human heart in an unshielded environment.

Theory

Self-consistent calculations of the spin- and charge-density-wave (SDW and CDW) order parameters have been carried out by M. Eremin (Kazan State) et al. for bilayered cuprates on the basis of a singlet correlated band model. The calculations provide an explanation for the experimentally observed evolution of the Fermi surface and the doping dependence of the pseudogap formation temperature. The maximum incommensurability of the SDW or CDW wave vector occurs at a doping level of 0.9-1.1 holes per *Cu* site.

A preprint by J. Zaanen (Leiden) theoretically considers a dynamical stripe state of potential significance to cuprate superconductors: a gas of elastic quantum strings in 2 + 1 space-time dimensions, interacting only via a hard-core condition. The author demonstrates that this gas always solidifies, and that the solidification mechanism is the quantum analog of the entropic interactions known from soft condensed matter physics.

Four preprints listed in this issue describe the consequences of a new band structure for the cuprate superconductors in which the *Cu* $d_{x^2-y^2}$/*O* p_σ ($x^2 - y^2$) and *Cu* d_{x^2}/*O'* p_z (z^2) bands cross at the Fermi level. One preprint by J. K. Perry and J. Tahir-Kheli (First Principles Research) shows that the unusual observations of a pseudo-gap in the normal state of underdoped $Bi_2Sr_2CaCu_2O_{8+\delta}$ *(Bi-2212)* using angle-resolved photoemission spectroscopy (ARPES) are consistent with this new band structure. A second preprint by the same authors applies this new band structure using the 2D Hubbard model to consider superconductivity in $La_{1.85}Sr_{0.15}CuO_4$. The authors introduce c-axis dispersion and find that the z^2 band has considerable anisotropic 3D character. The authors also propose an inter-band pairing theory of superconductivity involving Cooper pairs between the two bands, e.g., ($k\uparrow$ $x^2 - y^2$, $-k\downarrow$ z^2). A preprint by J. Tahir-Kheli describes how the new band structure leads to a microscopic theory for the NMR anomalies of the planar *Cu* and *O* sites in superconducting $La_{1.85}Sr_{0.15}CuO_4$. The theory explains the observations without the need to invoke antiferromagnetic spin fluctuations on the planar *Cu* sites and its discrepancy with the incommensurate spin fluctuations observed by neutron scattering. A preprint by J. K. Perry shows that conventional LDA band-structure calculations for $La_{2-x}Sr_xCuO_4$ and other high-temperature superconductors have failed due to an underestimation of static correlations. The author explains how this problem has been corrected within the framework of a Hubbard model by altering the accounting associated with the self-Coulomb term.

A calculation of quantum interference corrections to the conductivity in a quasi-2D metal as a function of temperature and magnetic field has been carried out by A. A. Abrikosov (Argonne). For the temperature dependence, a crossover between 2D (higher temperatures) and 3D (lower temperatures) behavior is obtained. The magnetic-field dependence of the quantum interference correction in the 3D limit is always proportional to $H^{1/2}$, while in the 2D limit (perpendicular field) it is proportional to ln H in the ab plane and to H^{-1} for the c component.

The value of the Fröhlich electron-phonon interaction in manganites, cuprates, and some other charge-transfer insulators has been calculated by A. S. Alexandrov (Loughborough) and A. M. Bratkovsky (Hewlett-Packard). The authors show that this interaction is much stronger than any relevant magnetic interaction. A polaron shift due to the Fröhlich interaction, which is about 1 eV, suggests that the

carriers in those systems are small (bi)polarons at all temperatures and doping levels, in agreement with the oxygen isotope effect and other data. The authors show that an opposite conclusion, recently suggested in the literature, is incorrect.

Calculations of the upper critical field $H_{c2}(T)$ in superconducting films as a function of increasing disorder, as measured by the normal-state resistance per square, have been carried out by R. A. Smith (Birmingham and Cornell) et al. In contradiction to previous work, the authors find that there is no anomalous low-temperature positive curvature in H_{c2} vs T as disorder is increased, and they show that a previous prediction of this effect is due to an unjustified analytical approximation of sums occurring in the perturbative calculation. The authors' treatment, which includes both first-order perturbation results and a nonperturbative resummation technique, shows no anomalous curvature in either case.

The dc current-voltage characteristics of d-wave Josephson junctions, where the barrier at the interface may have arbitrary strength, have been calculated by T. Löfwander et al. (Chalmers and Göteborg). Dividing the current into n-particle currents (integer n), the authors explicitly show which physical processes are responsible for the subharmonic gap structure (SGS). For orientations where midgap states (MGS) exist, the resonances in the n-particle processes are drastically changed, giving rise to a strongly modified SGS. Introducing a broadening phenomenologically, the authors show that MGS may produce a current peak near zero bias, and they explain which physical processes contribute to this peak.

The evidence for 2D and 3D effective dimensionality of the high-T_c superconductors as seen in the electrical resistivity, thermal conductivity, and specific heat is considered in a preprint by M. Ausloos (Liège).

Sr_2RuO_4

Three papers listed in this issue concern the properties of the layered perovskite Sr_2RuO_4, which is believed to be a p-wave superconductor. C. Bergemann (Cambridge) et al. describe the application of a novel analysis of the field and angle dependence of the quantum-oscillatory amplitudes in Sr_2RuO_4 to map out its Fermi surface in unprecedented detail, and to obtain previously inaccessible information on the band dispersion. The three quasi-2D Fermi surface sheets exhibit not only very diverse magnitudes of warping, but also entirely different dominant warping symmetries. The authors use the data to reassess recent results on c-axis transport phenomena.

The transverse and longitudinal in-plane magnetoresistance in the normal state of superconducting Sr_2RuO_4 single crystals has been measured by R. Jin (Penn State) et al. At low temperatures, both were found to be positive with a linear magnetic-field dependence above a threshold field, a result not expected from electronic band theory. The authors argue that such a behavior is a manifestation of a novel coherent state characterized by a spin pseudogap in the quasiparticle excitation spectrum in Sr_2RuO_4.

A preprint by H.-Y. Lee (UCLA) reports a theoretical study of spin dynamics at the nesting vector associated with α and β bands in the p-wave superconductor Sr_2RuO_4. The author finds a collective mode at the nesting vector in the superconducting phase identified as the odd-parity pairing state that breaks time-reversal symmetry. This mode in the spin channel exists only in the p-wave superconductor, not in s- or d-wave superconductors. The author proposes that probing this mode would help to confirm the pairing symmetry in Sr_2RuO_4. The author also discusses the possibility of a second superconducting phase transition.

Other Activities

As noted in a preprint by J. Mannhart and H. Hilgenkamp (Augsburg), the symmetry of the order parameter in superconducting compounds has generally been considered to be spatially constant, with possible deviations at interfaces and defects. The authors point out that even in the bulk of a superconductor, the order parameter symmetry (the admixture of various symmetry components) may be spatially dependent. This implies that the admixture of symmetry components is not sufficiently described by numbers ε_i (i = s and d, for example) but that general functions $\varepsilon_i(\mathbf{r})$ of real space are required for a complete description. As a consequence, measurements of the order parameter providing results that seem to disagree may not necessarily contradict each other, but may just reflect the fact that the order parameter symmetry is probed at different locations or in different directions of the unit cell.

A novel buckling instability in the critical state of thin type-II superconductors with strong pinning has been predicted by R. G. Mints (Tel Aviv) and E. H. Brandt (MPI-Stuttgart). This elastic instability appears in high perpendicular magnetic fields and may cause an almost periodic series of flux jumps visible in the magnetization curve. As an illustration, the authors determine the conditions for the buckling instability of a long rectangular strip.

Studies by L. Civale (Bariloche) et al. of single-crystal YNi_2B_2C have revealed a four-fold anisotropy of the equilibrium magnetization in the square crystallographic basal plane. This $\pi/2$ periodicity occurs deep in the superconductive mixed state. In this crystal symmetry, an ordinary superconductive mass anisotropy (as in the usual London theory) allows only a constant, isotropic response. In contrast, the experimental

results are well described by a generalized London theory incorporating nonlocal electrodynamics as needed for this clean, intermediate-κ superconductor.

Overview

Some of the early history of the interplay of superconductivity and spin fluctuations has been reviewed by D. J. Scalapino (UC-Santa Barbara). The author notes that antiferromagnetic spin fluctuations have been proposed as the mechanism for d-wave pairing in the heavy-fermion superconductors, in some organic materials, and possibly in the high-T_C cuprates. The author also discusses what has been learned in recent years from numerical studies (35 refs.).

Ph.D. Thesis

The Ph.D. thesis of G.G.N. Angilella (Catania) focuses on a theoretical study of interlayer pair tunneling in layered cuprates. After reviewing some key experimental results that motivate the search for a non-Fermi-liquid ground state and for an unconventional pairing mechanism in high-temperature superconductors, the author reports on studies of the structure of the gap function in **k** space for a bilayer cuprate superconductor, using standard mean-field techniques applied to a two-dimensional extended Hubbard model in the presence of coherent interlayer pair tunneling and quenched coherent single-particle tunneling. An intralayer potential is required as a seed for the superconducting instability (212 refs.).

Contributed by John R. Clem

Contents:

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TECHNOLOGY NEWS

(Also see Applications section of Nota Bene.)

This section describes progress in manufacturing, product development, and technology transfer in the high-T_C superconductivity field. Please send your contributions (product development information, news regarding technology transfer efforts, or any information you would like to share about your corporation or laboratory) to the editor.

In collaboration with the Institute of Cryogenics at the University of Southampton, BICC General Superconductors have designed and built a prototype pair of 13 kA current leads for the Large Hadron Collider project at CERN. Performance tests carried out with the prototype leads surpassed their demanding specifications. The measured heat leak of the current leads was 0.75 W in standby mode and <1 W at nominal current (13 kA). The electrical insulation of the leads withstood a voltage of 3.5 kV between current-carrying elements and ground in a *He* atmosphere, with a partial discharge current $< 2 \times 10^{-6}$ A. The pressure drop along the resistive section of the current leads was within the specification of 50 mbar with a 20 K helium gas flow of < 0.9 gs^{-1} at I = 13 kA.

An important success criterion for a current lead to be used in the LHC is the ability to survive fault conditions. The prototypes were tested under a simulated quench condition with the nominal current being exponentially reduced to zero over 120 s. The integrity of the HTS section was verified after each quench condition signaled by the voltage drop across the top of the HTS elements. The leads were tested with various voltage criteria up to 180 mV. The thermal stability of the prototypes was studied during the loss of the 20 K cooling gas, with the HTS remaining superconducting during the 120 s exponential current decay. For more information or technical data, contact Wolfgang Blendl, BICC General Superconductors, Oak Road, Wrexham LL13 9XP, United Kingdom; telephone +44 1978 662594; telefax +44 1978 662464; e-mail wblendl@biccgeneral-eu.com; Web site http://www.bicc-sc.com.

Contributed by Sreeparna Mitra

PREPRINTS

To obtain a particular preprint, contact the first author at the address given at the end of the citation. Help us expand this list by sending us your complete preprint. **Please specify where and when your paper was submitted.** An * next to an entry indicates it is a correction or revision of a previous entry. PACS codes and/or key words are given at the end of the citation.

A. A. Abrikosov, "Quantum Interference Effects in Quasi-2D Metals." Contact Janice Coble, Materials Science Division, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; telephone (630) 252-5497; telefax (630) 252-9595; e-mail coble@anl.gov. 72.15.Gd; 72.15.Rn; 73.20.Fz.

S. Adachi, T. Shibata, T. Tatsuki, T. Tamura, K. Tanabe, S. Fujihara, and T. Kimura, "Synthesis and Characterization of Single-Phase $TlSr_2Ca_2Cu_3O_y$." To be published in Physica C. Superconductivity Research Laboratory, International Superconductivity Technology Center (ISTEC), 10-13 Shinonome 1-chome, Koto-ku, Tokyo 135-0062, JAPAN; e-mail adachi@istec.or.jp. Key words: *Tl-Sr-Ca-Cu-O, Tl-1223,* irreversibility field, peak effect, resistivity, thermoelectric power. 74.72.Fq; 74.25.Fy; 74.25.Ha; 81.20.Zx.

A. S. Alexandrov and A. M. Bratkovsky, "The Essential Interactions in Oxides and Spectral Weight Transfer in Doped Manganites." Department of Physics, Loughborough University, Loughborough Leicestershire LE11 3TU, UNITED KINGDOM; e-mail asa21@cus.cam.ac.uk; A. M. Bratkovsky's e-mail at Hewlett-Packard Labs alexb@hpl.hp.com; preprint also available at http://xxx.lanl.gov/abs/ cond-mat/9908183. 71.38.+i; 74.20.Mn; 75.30.Vn; 78.20.-e.

L. Alff, S. Kleefisch, S. Meyer, U. Schoop, A. Marx, H. Sato, M. Naito, and R. Gross, "Determination of the Order Parameter Symmetry in Hole and Electron Doped Cuprate Superconductors." To be published in Physica B: Proc. of the 22nd Int. Conf. on Low Temp. Phys. (LT22), Helsinki, Finland, Aug. 5-11, 1999. II. Physikalisches Institut, Universität zu Köln, Zülpicherstr. 77, D-50937 Köln, GERMANY; e-mail alff@ph2.uni-koeln.de. Key words: symmetry of the order parameter, tunneling spectroscopy, Josephson junctions, effects of doping.

L. Alff, S. Meyer, S. Kleefisch, U. Schoop, A. Marx, H. Sato, M. Naito, and R. Gross, "Anomalous Low Temperature Behavior of Superconducting $Nd_{1.85}Ce_{0.15}CuO_{4-y}$." To be published in Phys. Rev. Lett. II. Physikalisches Institut, Universität zu Köln, Zülpicherstr. 77, D-50937 Köln, GERMANY; e-mail alff@ph2.uni-koeln.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908320. 74.25.Fy; 74.50.+r; 74.25.Ha; 74.72.Jt; 74.76.Bz.

C. C. Almasan, G. A. Levin, E. Cimpoiasu, T. Stein, C. L. Zhang, M. C. de Andrade, M. B. Maple, Hong Zheng, A. P. Paulikas, and B. W. Veal, "Relationship Between Conductivity and Phase Coherence Length in Cuprates." To be published in Int. J. Mod. Phys. B. Department of Physics, Kent State University, Kent, OH 44242; G. A. Levin's e-mail levin@physics.kent.edu.

B. Andrzejewski, A. Kaczmarek, J. Stankowski, B. Hilczer, J. Marfaing, and C. Caranoni, "Magnetic Study of *YBCO-PST* Composites." To be published in Physica B. Institute of Molecular Physics, Polish Academy of Sciences, Smoluchowskiego 17, PL-60179 Poznan, POLAND; phone +48 61 861 2300; fax +48 61 868 4524; e-mail and@ifmpan.poznan.pl. Key words: magnetic susceptibility, electron paramagnetic resonance, composites.

Giuseppe G. N. Angilella, "Interlayer Pair-Tunneling in Layered Cuprates." Submitted as a Ph.D. thesis (Università degli Studi di Catania). Dipartimento di Fisica, Università degli Studi di Catania, 57 Corso Italia, I-95129 Catania, ITALY; telephone +39 095 7195 499; telefax +39 095 383023; e-mail angilella@ct.infn.it.

Igor S. Aranson and Len M. Pismen, "Interaction of Vortices in Complex Vector Field and Stability of a 'Vortex Molecule.'" Submitted to Phys. Rev. Lett. Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; e-mail aronson@vortex.msd.anl.gov; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909108. 47.20.Ky; 47.27.Eq.

F. M. Araugo-Moreira, P. N. Lisboa Filho, S. M. Zanetti, E. R. Leite, and W. A. Ortiz, "Superconductivity in Sintered-Polycrystalline $PrBa_2Cu_3O_{7-\delta}$." To be published in Physica B: Proc. of the 22nd Int. Conf. on Low Temp. Phys. (LT22), Helsinki, Finland, Aug. 5-11, 1999. Grupo de Supercondutividade e Magnetismo, Departamento de Física, Universidade Federal de São Carlos, Caixa Postal 676, 13565-905 São Carlos-SP, BRAZIL; phone +55 16 260 8223; fax +55 16 261 4835; e-mail faraujo@power.ufscar.br; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909086. Key words: superconductivity, *PBCO.* 74.72.Jt.

M. Ausloos, "2D and 3D Signatures in High T_c Superconductors." To be published in Molecular Phys. Reports. SUPRAS, Institute of Physics B5, University of Liège, B-4000 Liège, BELGIUM.

C. Bergemann, S. R. Julian, A. P. Mackenzie, S. Nishizaki, and Y. Maeno, "Detailed Topography of the Fermi Surface of Sr_2RuO_4." Low Temperature Physics Group, Cavendish Laboratory, University of Cambridge, Madingley Road, Cambridge CB3 0HE, UNITED KINGDOM; telephone +44 1223 337422; telefax +44 1223 363263; e-mail cb203@

cus.cam.ac.uk; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909027. 71.18.+y; 71.27.+a; 74.25.Jb.

Andreas Bock, "Electronic Raman Scattering and Phonon Self-Energy Effects in the *RE-123* System: Signatures of Gap and Pseudogap." To be published in Annalen der Physik. Institut für Angewandte Physik und Zentrum für Mikrostrukturforschung, Universität Hamburg, Jungiusstrasse 11, D-20355 Hamburg, GERMANY; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908360 or http://www. physnet.uni-hamburg.de/home/vms/bock/annalen.htm. 74.25.Gz; 74.62.Dh; 74.72.Bk; 74.76.Bz; 78.30.-j.

A. Bock, S. Ostertun, R. Das Sharma, M. Rübhausen, K.-O. Subke, and C. T. Rieck, "Anomalous Self-Energy Effects of the B_{1g} Phonon in $Y_{1-x}(Pr,Ca)_xBa_2Cu_3O_7$ Films." To be published in Phys. Rev. B. Institut für Angewandte Physik und Zentrum für Mikrostrukturforschung, Universität Hamburg, Jungiusstrasse 11, D-20355 Hamburg, GERMANY; S. Ostertun's telephone +49 40 42838 6535; telefax +49 40 42838 4368; e-mail ostertun@physnet.uni-hamburg.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908355. 74.25.Gz; 74.62.Dh; 74.72.Bk; 74.76.Bz; 78.30.Er.

A. Bock, S. Ostertun, and K.-O. Subke, "Electron-Phonon Coupling Deduced from Phonon Line Shapes." Presented at the Int. Conf. on Solid State Spectroscopy (ICSSS), Schwäbisch Gmünd, Germany, Sept. 5-7, 1999; to be published in Phys. Status Solidi (b). Institut für Angewandte Physik und Zentrum für Mikrostrukturforschung, Universität Hamburg, Jungiusstrasse 11, D-20355 Hamburg, GERMANY; S. Ostertun's telephone +49 40 42838 6535; telefax +49 40 42838 4368; e-mail ostertun@physnet.uni-hamburg.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908356. 74.25.Gz; 74.62.Dh; 74.72.Bk; 74.76.Bz; 78.30.Er.

V. N. Bogomolov, "Metallic Sulphur: 'Electronic' Mechanism of Superconductivity?" A.F. Ioffe Physico-Technical Institute, Russian Academy of Sciences, 26 Polyteknicheskaya, St. Petersburg 194021, RUSSIA; e-mail v.bogomolov@shuvpop.ioffe.rssi.ru; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908467.

Brandon Brown, "A Simulation of dc Resistivity Data: Questioning Critical Scaling for the High-T_c Copper Oxides." Submitted to Phys. Rev. B. Department of Physics, College of Arts and Sciences, 2130 Fulton Street, University of San Francisco, San Francisco, CA 94117-1080; telephone (415) 422-5065; telefax (415) 422-5155; e-mail brownb@usfca.edu. 74.60.-w; 74.60.Ge; 74.72.-h.

L. Civale, A. V. Silhanek, J. R. Thompson, K. J. Song, C. V. Tomy, and D. McK. Paul, "Four-Fold Basal Plane Anisotropy of the Nonlocal Magnetization of YNi_2B_2C." Submitted to Phys. Rev. Lett. Comisión Nacional de Energía Atómica, Centro Atómico Bariloche, 8400 Bariloche, ARGENTINA; A. V. Silhanek's e-mail silhanek@cabbat1.cnea.gov.ar; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908483.

M. P. Delamare, H. Walter, B. Bringmann, A. Leenders, and H. C. Freyhardt, "Characterization of Natural and Artificial Low-Angle-Boundaries in *YBCO* TSMG Samples." To be published in Physica C. Contact A. Leenders, Zentrum für Funktionswerkstoffe Göttingen, Windausweg 2, D-37073 Göttingen, GERMANY; telephone +49 551 507 1730; telefax +49 551 507 1750; e-mail leenders@umpsun1.gwdg.de. Key words: melt-textured superconductors, *Y*-based cuprates, welding, low-angle boundaries. 81.10.-h; 74.72.Bk; 81.20.Vj.

Ben de Mayo, "Critical Current Dependence on Axial Strain at LN_2 Temperature of *Ag*-Clad *Bi(2223)* Tapes." To be published in Int. J. Mod. Phys. B: Proc. of the Second Int. Conf. on New Theories, Discoveries and Applications of Superconductors and Related Materials (New3SC-2), Las Vegas, Nev., May 31-June 4, 1999. Department of Mathematics and Physics, State University of West Georgia, Carrollton, GA 30118.

A. Di Trolio and A. Morone, "Comparative Analysis of the Growth of $SmBa_2Cu_3O_{7-X}$ Thin Films by Off-Axis Pulsed Laser Deposition on Different Substrates." To be published in Appl. Phys. A. CNR, Istituto per i Materiali Speciali, Via S. Loja, I-85050 Tito Scalo (PZ), ITALY; telephone +39 0971 427243; telefax +39 0971 427222; e-mail ditrolio@ims.pz.cnr.it. 74.76.Bz; 74.72.Jt; 74.62.Bf.

A. Di Trolio, A. Morone, N. De Cesare, E. Perillo, and G. Spadaccini, "Compositional Analysis of $SmBa_2Cu_3O_{7-X}$ Films Produced by Laser Ablation." To be published in Applied Surface Science. CNR, Istituto per i Materiali Speciali, Via S. Loja, I-85050 Tito Scalo (PZ), ITALY; telephone +39 0971 427243; telefax +39 0971 427222; e-mail ditrolio@ims.pz.cnr.it. Key words: laser ablation, superconducting films, $SmBa_2Cu_3O_{7-X}$, PIXE, RBS, NRA.

Yong-Joo Doh, Jinhee Kim, Kyu-Tae Kim, and Hu-Jong Lee, "Microwave-Induced Constant Voltage Steps in Surface Junctions of $Bi_2Sr_2CaCu_2O_{8+\delta}$ Single Crystals." Submitted to Phys. Rev. B. Department of Physics, Pohang University of Science and Technology, Pohang 790-784, SOUTH KOREA; e-mail doooh@anyon.postech.ac.kr; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908459.

S. X. Dou, Y. C. Guo, D. Marinaro, J. W. Boldeman, J. Horvat, P. Yao, R. Weinstein, A. Gandini, R. Sawh, and Y. Ren, "Effect of *U*-Doping Level on Flux Pinning and Radioactivity in Silver-Clad *Bi-2223* Tapes Using Thermal Neutron Irradiation." To be published in the Proc. of the Int. Cryogenic Mater. Conf. (ICMC'99),

Montreal, Quebec, Canada, July 12-16, 1999. Institute for Superconducting and Electronic Materials, University of Wollongong, NSW 2522, AUSTRALIA.

M. Eremin, S. Varlamov, and I. Eremin, "How Large Can SDW and CDW Amplitudes be in Underdoped Cuprates?" Submitted to Appl. Magnetic Resonance: Proc. of the Specialized Colloque AMPERE, Pisa, Italy, June 14-18, 1999. Kazan State University, 420008 Kazan, RUSSIA; S. Varlamov's telephone at Cottbus Technical University, Germany +49 355 693010; telefax +49 355 693011; e-mail sergev@physik.tu-cottbus.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908297.

T. S. Evans and D. A. Steer, "Non-Equilibrium, Time-Dependent Effective Theory of a Weakly Coupled Superconductor at Finite Temperature." Report #Imperial/TP/98-99/50. Theoretical Physics, Blackett Laboratory, Imperial College, Prince Consort Road, London SW7 2BZ, UNITED KINGDOM; e-mail t.evans@ic.ac.uk; D. A. Steer's e-mail d.a.steer@damtp.cam.ac.uk; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909103.

D. Giller, Y. Wolfus, A. Shaulov, and Y. Yeshurun, "High Temporal Resolution Magneto-Optical Study of the Vortex Solid-Solid Transition in $Bi_2Sr_2CaCu_2O_8$ Crystal." Submitted to Physica B. Institute of Superconductivity, Department of Physics, Bar-Ilan University, Ramat Gan 52900, ISRAEL; e-mail giller@mail.biu.ac.il. Key words: high-temperature superconductors, vortex phases, vortex dynamics, magneto-optics.

Jan Govaerts, Geoffrey Stenuit, Damien Bertrand, and Olivier van der Aa, "Annular Vortex Solutions to the Landau-Ginzburg Equations in Mesoscopic Superconductors." Institut de Physique Nucléaire, Université Catholique de Louvain, Chemin du Cyclotron 2, B-1348 Louvain-la-Neuve, BELGIUM; telephone +32 10 47 32 73; telefax +32 10 45 21 83; e-mail govaerts@fynu.ucl.ac.be; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908451. 74.20.De; 74.60.Ec.

Thomas Gramespacher and Markus Büttiker, "Distribution Functions and Current Correlations in Normal-Metal–Superconductor Heterostructures." Département de Physique Théorique, Université de Genève, 24 quai Ernest-Ansermet, CH-1211 Genèva 4, SWITZERLAND. 73.20.At; 74.50.+r; 72.70.+m; 73.23.-b.

S. K. Gupta, Shashwati Sen, J. C. Vyas, S. P. Pai, R. Pinto, and V. C. Sahni, "Angular Dependence of Vortex Glass Transition in $YBa_2Cu_3O_X$ Thin Films." Submitted to Physica C. Technical Physics and Prototype Engineering Division, Bhabha Atomic Research Center, Mumbai 400 085, INDIA; telefax +91 22 550 5151; e-mail tfds@apsara.barc.ernet.in.

M. Gutmann, S.J.L. Billinge, E. L. Brosha, and G. H. Kwei, "Possible Charge Inhomogeneities in the CuO_2 Planes of $YBa_2Cu_3O_{6+X}$ (x = 0.25, 0.45, 0.65, 0.94) from Pulsed Neutron Diffraction." Submitted to Phys. Rev. B. Department of Physics and Astronomy and Center for Fundamental Materials Research, Michigan State University, East Lansing, MI 48824-1116; e-mail gutmann@pa.msu.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908365.

S. Hébert, V. Hardy, Ch. Simon, and J. Provost, "Large Pinning Efficiency of Orthogonal Columnar Defects in a Weakly Anisotropic High-T_c Superconductor." To be published in Phys. Rev. B. Experimental Solid State Physics, Blackett Laboratory, Imperial College, Prince Consort Road, London SW7 2BZ, UNITED KINGDOM; e-mail s.hebert@ic.ac.uk. Key words: *Tl*-based superconductors, heavy-ion irradiation, columnar defects, critical current densities. 74.72.Hs; 74.60.Ge; 74.60.Jg; 61.80.Jh.

H. Hoppe, U. Zülicke, and Gerd Schön, "Andreev Reflection in Strong Magnetic Fields." Institut für Theoretische Festkörperphysik, Universität Karlsruhe, D-76128 Karlsruhe, GERMANY; U. Zülicke's telephone +49 721 608 6030; telefax +49 721 69 8150; e-mail ulrich.zuelicke@phys.uni-karlsruhe.de. 74.80.Fp; 73.20.-r; 71.70.Di; 73.40.-c.

T. Hosomi, H. Suematsu, M. Karppinen, and H. Yamauchi, "Magnetic Irreversibility Characteristics of Highly Unstable Superconducting $Ba_2Ca_2Cu_3O_Y$ and Its Derivative Phase." To be published in Physica C. Contact H. Yamauchi, Materials & Structures Laboratory, Tokyo Institute of Technology, 4259 Nagatsuta, Midori-ku, Yokohama 227, JAPAN; telephone +81 45 924-5315; telefax +81 45 924-5365 or -5360; e-mail yamauchi@materia.titech.ac.jp.

D. K. Jackson, M. Nicodemi, G. Perkins, N. A. Lindop, and Henrik Jeldtoft Jensen, "Stacking of Vortices: The Origin of the Second Peak in the Magnetization Loops of High Temperature Superconductors." Contact Henrik Jeldtoft Jensen, Department of Mathematics, Imperial College, London SW7 2BZ, UNITED KINGDOM; e-mail h.jensen@ic.ac.uk; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908454.

H. Jin and J. Kötzler, "Effect of *La* Doping on Growth and Superconductivity of *Bi-2212* Crystals." To be published in Physica C. Institut für Angewandte Physik, Universität Hamburg, Jungiusstrasse 11, D-20355 Hamburg, GERMANY; telephone +49 40 42838 5254; telefax +49 40 42838 3589; e-mail jinhua@physnet.uni-hamburg.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909077. Key words: crystal growth, *Bi-2212,* substitution effects, structure, transition temperature.

H. Jin, S. Skwirblies, and J. Kötzler, "Growth and Characterization of *BiSCCO 2212* Whiskers from Melts Containing

Various *La* Contents." To be published in J. Cryst. Growth. Institut für Angewandte Physik, Universität Hamburg, Jungiusstrasse 11, D-20355 Hamburg, GERMANY; telephone +49 40 42838 5254; telefax +49 40 42838 3589; e-mail jinhua@physnet.uni-hamburg.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909076. Key words: whiskers, *La*-doped *Bi-2212,* melt growth method, superconducting. 74.62.Dh; 74.62.-c; 74.72.Hs; 81.10.Fq.

R. Jin, Y. Liu, and F. Lichtenberg, "Linear Field Dependence of the Normal-State In-Plane Magnetoresistance of Sr_2RuO_4." To be published in Phys. Rev. B. Department of Physics, Pennsylvania State University, University Park, PA 16802; e-mail jin@phys.psu.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908280. 74.70.-b; 74.25.Fy; 74.25.Ha; 74.72.Yg.

E. Kandyel, S. Adachi, and S. Tajima, "Synthesis, Structure and Superconductivity of $(La_{1.5}Pb_{0.5-x}Sr_x)CuO_z$." To be published in J. Supercond. Superconductivity Research Laboratory, International Superconductivity Technology Center (ISTEC), 10-13 Shinonome 1-chome, Koto-ku, Tokyo 135-0062, JAPAN. Key words: superconductivity, crystal structure, magnetization, *214.*

E. Kandyel, S. Adachi, X.-J. Wu, and S. Tajima, "Structural and Superconducting Properties of $(Hg_{0.7}Bi_{0.3})Sr_2Ca_{n-1}Cu_nO_x$ (n=3,4) Superconductors Synthesized Under High Pressure." To be published in Supercond. Sci. & Technol. Superconductivity Research Laboratory, International Superconductivity Technology Center (ISTEC), 10-13 Shinonome 1-chome, Koto-ku, Tokyo 135-0062, JAPAN.

J. M. Keartland and R. A. Doyle, "Transport Measurements in *BSCCO-2212* in High Magnetic Fields." To be published in Physica B: Proc. of the 22nd Int. Conf. on Low Temp. Phys. (LT22), Helsinki, Finland, Aug. 5-11, 1999. Department of Physics, University of the Witwatersrand, P.O. WITS 2050, Johannesburg, SOUTH AFRICA; telephone +27 11 716 4209; telefax +27 11 339 8262; e-mail ktland@physnet.phys.wits.ac.za; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908354. Key words: vortex-glass transition, transport measurements, single crystal *BSCCO-2212,* angular dependence.

Hae-Young Kee, "Probing Pairing Symmetry in Sr_2RuO_4." Department of Physics, University of California, Los Angeles, CA 90095; e-mail hykee@cooper.physics.ucla.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908486. 75.40.Gb; 74.25.Ha; 74.25.Nf.

S. Khlebnikov, "Thermal Fluctuations in Macroscopic Quantum Memory." Preprint #PURD-TH-99-07. Dept. of Physics, Purdue University, West Lafayette, IN 47907; e-mail skhleb@euler.physics.purdue.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909024. 85.25.Hv; 03.67.Lx.

Hyun-Tak Kim, Yong-Jihn Kim, and Kwang-Yong Kang, "Possible p-Wave Condensed Conductor (or Superconductor) for $La_{1-x}Ca_xMnO_3$ Films." To be published in Int. J. Mod. Phys. B: Proc. of the Second Int. Conf. on New Theories, Discoveries and Applications of Superconductors and Related Materials (New3SC-2), Las Vegas, Nev., May 31-June 4, 1999. Telecom. Basic Research Lab., Electron Telecommunication Research Institute (ETRI), Taejon 305-350, KOREA; telephone +82 42 860 5731; telefax +82 42 860 6836; e-mail htkim@utopia.etri.re.kr. Key words: $La_{1-x}Ca_xMnO_3$ films, LTCMR, HTCMR, p-wave condensation, two-fold degeneracy of e_g orbitals. 75.50.Pp; 71.38.+i; 72.20.My.

K. A. Kouznetsov, J. Borgmann, and John Clarke, "High-T_c Second-Order Gradiometer for Magnetocardiography in an Unshielded Environment." Submitted to Appl. Phys. Lett. Department of Physics, University of California, Berkeley, CA 94720; phone (510) 642-3634; fax (510) 642-1304; e-mail kouznets@socrates.berkeley.edu. 85.25.Dq; 87.80.+s.

Yijie Li and K. Tanabe, "Influence of Deposition Parameters on Superconductivity and Surface Morphology of $NdBa_2Cu_3O_{7-\delta}$ Films Grown by Pulsed Laser Deposition with a Single Crystal Target." To be published in Physica C. Superconductivity Research Laboratory, International Superconductivity Technology Center (ISTEC), 10-13 Shinonome 1-chome, Koto-ku, Tokyo 135, JAPAN; e-mail yjli@istec.or.jp. Key words: $NdBa_2Cu_3O_{7-\delta}$ thin films, pulsed laser deposition, epitaxial growth, surface morphology, microstructure. 68.55.Jk; 73.50.-h; 74.76.Bz; 81.15.Fg.

H. K. Liu, A. Polyanskii, R. Zeng, P. Yao, V. Rouessac, and S. X. Dou, "Comparison of *Ag/Bi-2223* Tapes Processed With and Without Hot-Pressing and Post-Annealing." To be published in the Proc. of the Int. Cryogenic Mater. Conf. (ICMC'99), Montreal, Quebec, Canada, July 12-16, 1999. Institute for Superconducting and Electronic Materials, University of Wollongong, NSW 2522, AUSTRALIA; telephone +61 2 4221 4547; telefax +61 2 4221 5731; e-mail hua_liu@uow.edu.au.

H. K. Liu, R. Zeng, X. K. Fu, and S. X. Dou, "Phase Transformation and Liquid Phase Conversion During the Final Processing of *Bi-2223/Ag* PIT Tapes and Their Influence on Critical Current Density." To be published in Physica C. Institute for Superconducting and Electronic Materials, University of Wollongong, NSW 2522, AUSTRALIA; phone +61 2 4221 4547; fax +61 2 4221 5731; e-mail hua_liu@uow.edu.au. Key words: *Bi-2223* tapes, phase transformation and decomposition, critical current density.

T. Löfwander, G. Johansson, and G. Wendin, "Current-Voltage Relations in d-Wave Josephson Junctions: Effects of Midgap Interface States." To be published in J. Low Temp. Phys.: Proc. of the Int. Conf. on Phys. and Chem. of Molecular and Oxide Supercond. (MOS'99), Stockholm,

Sweden, July 28-Aug. 2, 1999. Department of Microelectronics and Nanoscience, School of Physics and Engineering Physics, Chalmers University of Technology and Göteborg University, S-41296 Göteborg, SWEDEN; e-mail tfstomas@fy.chalmers.se; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908261. 74.50.+r.

B. Maiorov, G. Nieva, and E. Osquiguil, "First Order Phase Transition of the Vortex Lattice In Twinned $YBa_2Cu_3O_7$ Single Crystals in Tilted Magnetic Fields." Submitted to Phys. Rev. B. Comisión Nacional de Energía Atómica, Centro Atómico Bariloche and Instituto Balseiro, 8400 SC de Bariloche RN, ARGENTINA; e-mail maiorov@cab.cnea.gov.ar; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908457.

J. Mannhart and H. Hilgenkamp, "Intrinsic Spatial Variations of the Symmetry Components of the Order Parameter in Superconducting Systems." Submitted to Europhys. Lett. Experimentalphysik VI, Center for Electronic Correlations and Magnetism, Institute of Physics, University of Augsburg, Universitätsstr. 1, D-86135 Augsburg, GERMANY; telephone +49 821 598 3650; telefax +49 821 598 3652; e-mail jochen.mannhart@physik.uni-augsburg.de. 74.72.-h; 74.50.+r; 74.80.Dm.

P. N. Mikheenko, B. Zeimetz, and S. X. Dou, "Surface Barrier Controlled Order-Disorder Transition in *Bi2223/Ag* Tapes." To be published in Physica C. School of Physics and Astronomy, University of Birmingham, Edgbaston, Birmingham B15 2TT, UNITED KINGDOM; phone +44 121 414 7322; fax +44 121 414 4719; e-mail p.mikheenko@bham.ac.uk. Key words: surface barrier, magnetization, critical current density, pinning, order-disorder transition, *Bi2223/Ag* tape. 74.80.Dm; 74.60.Jg; 74.62.Dh; 74.60.Ge; 74.72.Hs.

R. G. Mints and E. H. Brandt, "Buckling Instability in Type-II Superconductors with Strong Pinning." School of Physics and Astronomy, Raymond and Beverly Sackler Faculty of Exact Sciences, Tel Aviv University, Tel Aviv 69978, ISRAEL. 74.60.Ec; 74.60.Ge.

Niels Asger Mortensen, Antti-Pekka Jauho, and Karsten Flensberg, "Modeling of Dephasing in Semiconductor-Superconductor Heterostructures." Submitted to Phys. Rev. B. Mikroelektronik Centret, Bldg. 345 East, Technical University of Denmark, DK-2800 Lyngby, DENMARK; telephone +45 4525 5782; e-mail nam@mic.dtu.dk; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909029. 05.60.Gg; 72.10.-d; 74.50.+r; 74.80.Fp.

V. N. Narozhnyi, D. Eckert, G. Fuchs, K. Nenkov, T. G. Uvarova, and K.-H. Müller, "Magnetic Properties of $Gd_{1-x}Pr_xBa_2Cu_3O_{7-y}$ Single Crystals." To be published in Physica B: Proc. of the 22nd Int. Conf. on Low Temp. Phys. (LT22), Helsinki, Finland, Aug. 5-11, 1999. Institut für Festkörper- und Werkstofforschung Dresden e.V., Abt. 21, Postfach 270016, D-01171 Dresden, GERMANY; telephone +49 351 465 9563; telefax +49 351 465 9537; e-mail narozh@ifw-dresden.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909110. Key words: $Gd_{1-x}Pr_xBa_2Cu_3O_{7-y}$, $PrBa_3Cu_3O_{7-y}$, magnetic anisotropy, antiferromagnetism.

V. N. Narozhnyi, D. Eckert, K. A. Nenkov, G. Fuchs, K.-H. Müller, and T. G. Uvarova, "$PrBa_2Cu_3O_{7-y}$: Superconducting or Anomalously Magnetic?" To be published in Int. J. Mod. Phys. B: Proc. of the Second Int. Conf. on New Theories, Discoveries and Applications of Superconductors and Related Materials (New3SC-2), Las Vegas, Nev., May 31-June 4, 1999. Institut für Festkörper- und Werkstofforschung Dresden e.V., Abt. 21, Postfach 270016, D-01171 Dresden, GERMANY; phone +49 351 465 9563; fax +49 351 465 9537; e-mail narozh@ifw-dresden.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909107.

S. Ostertun, J. Kiltz, T. Wolf, and A. Bock, "Resonant Raman Study of Superconducting Gap and Electron-Phonon Coupling in $YbBa_2Cu_3O_{7-\delta}$." To be published in J. Low Temp. Phys.: Proc. of the Int. Conf. on Phys. and Chem. of Molecular and Oxide Supercond. (MOS'99), Stockholm, Sweden, July 28-Aug. 2, 1999. Institut für Angewandte Physik und Zentrum für Mikrostrukturforschung, Universität Hamburg, Jungiusstrasse 11, D-20355 Hamburg, GERMANY; telephone +49 40 42838 6535; telefax +49 40 428 38 4368; e-mail ostertun@physnet.uni-hamburg.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908273. 74.25.Gz; 74.25.Kc; 74.62.Dh; 74.72.Bk; 78.30.Er.

D. Pal and B. Basu, "Topological Approach to Pairing Mechanism of High-T_c Superconductivity." Physics and Applied Mathematics Unit, Indian Statistical Institute, Calcutta 700035, INDIA; e-mail res9719@www.isical.ac.in; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908140.

J. J. Palacios, "Metastability and Paramagnetism in Superconducting Mesoscopic Disks." Departamento de Física Teórica de la Materia Condensada, Universidad Autónoma de Madrid, Cantoblanco, E-28049 Madrid, SPAIN; e-mail palacios@kim.fmc.uam.es; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908341. 74.60.Ec; 74.76.-w.

Jason K. Perry, "The Importance of Static Correlation in the Band Structure of High Temperature Superconductors." To be published in J. Phys. Chem. First Principles Research, Inc., 8391 Beverly Blvd., Suite #171, Los Angeles, CA 90048; telephone (323) 465-9572; telefax (323) 465-2805; e-mail jkp@firstprinciples.com; Web site http://www.firstprinciples.

com; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9903088.

Jason K. Perry and Jamil Tahir-Kheli, "The ARPES Pseudogap and Anomalous Background of Underdoped $Bi_2Sr_2CaCu_2O_{8+\delta}$ as Evidence for a Fermi Level Band Crossing." Submitted to Phys. Rev. Lett. First Principles Research, Inc., 8391 Beverly Blvd., Suite #171, Los Angeles, CA 90048; telephone (323) 465-9572; telefax (323) 465-2805; e-mail jkp@firstprinciples.com; Web site http://www.firstprinciples.com; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908308.

Jason K. Perry and Jamil Tahir-Kheli, "Electron Correlation and the c-Axis Dispersion of *Cu* $d_{3z^2-r^2}$: a New Band Structure for High Temperature Superconductors." Submitted to Phys. Rev. Lett. First Principles Research, Inc., 8391 Beverly Blvd., Suite #171, Los Angeles, CA 90048; telephone (323) 465-9572; telefax (323) 465-2805; e-mail jkp@firstprinciples.com; Web site http://www.firstprinciples.com; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9907332.

D. M. Potrepka, J. I. Budnick, D. B. Fenner, W. A. Hines, M. Balasubramanian, and A. R. Moodenbaugh, "Role of Bromine in Restoring Superconductivity in $YBa_2Cu_3O_y$." Submitted to Phys Rev. B. U.S. Army Research Laboratory, AMSRL-SE-RE, 2800 Powder Mill Road, Adelphi, MD 20783-1197. 74.72.Bk.

F. Rullier-Albenque, P. A. Vieillefond, H. Alloul, A. W. Tyler, P. Lejay, and J. F. Marucco, "Universal T_c Depression by Irradiation Defects in Underdoped and Overdoped Cuprates." Laboratoire des Solides Irradiés, CEA, CNRS UMR 7642, Ecole Polytechnique, F-91128 Palaiseau Cedex, FRANCE; telephone +33 1 6933 4506; telefax +33 1 6933 3022; e-mail florence.albenque@polytechnique.fr; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908405. 74.62.Dh; 74.25.Fy; 74.72.-h.

P.V.P.S.S. Sastry, Y. Li, J. Su, K. W. Hamill, M. Chatard, and J. Schwartz, "Effect of Silver Interface on the Formation and Stability of *HgPb1223* Superconductors." To be published in Adv. Cryo. Eng. National High Magnetic Field Laboratory, Florida State University, 1800 East Paul Dirac Drive, Tallahassee, FL 32310; telephone (850) 644-1447; telefax (850) 644-0867; e-mail pamidi@magnet.fsu.edu.

D. J. Scalapino, "Superconductivity and Spin Fluctuations." Presented at the Int. Conf. on Phys. and Chem. of Molecular and Oxide Supercond. (MOS'99), Stockholm, Sweden, July 28-Aug. 2, 1999. Department of Physics, University of California, Santa Barbara, CA 93106-9530; e-mail djs@spock.physics.ucsb.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908287.

Robert A. Smith, Beccy S. Handy, and Vinay Ambegaokar, "The Upper Critical Field in Disordered Two-Dimensional Superconductors." School of Physics and Astronomy, University of Birmingham, Edgbaston, Birmingham B15 2TT, UNITED KINGDOM; e-mail ras@th.ph.bham.ac.uk; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908427.

H. Suematsu, M. Kawano, T. Onda, T. Akao, M. Hayakawa, H. Ogiwara, M. Karppinen, and H. Yamauchi, "Peak Effect in Critical Current Density Induced by Oxygen Non-Stoichiometry in Cation-Stoichiometric $SmBa_2Cu_3O_{7-\delta}$ Superconductor." To be published in Physica C. Contact H. Yamauchi, Materials & Structures Laboratory, Tokyo Institute of Technology, 4259 Nagatsuta, Midori-ku, Yokohama 227, JAPAN; phone +81 45 924-5315; fax +81 45 924-5365 or -5360; e-mail yamauchi@materia.titech.ac.jp. Key words: *Sm-123,* peak effect, oxygen deficiency, coulometric titration method, pinning center.

Jamil Tahir-Kheli, "The NMR of High Temperature Superconductors Without Anti-Ferromagnetic Spin Fluctuations." To be published in J. Phys. Chem. First Principles Research, Inc., 8391 Beverly Blvd., Suite #171, Los Angeles, CA 90048; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9903105.

S. Tönies, C. Klein, H. W. Weber, B. Zeimetz, Y. C. Guo, S. X. Dou, R. Sawh, Y. Ren, and R. Weinstein, "Radiation Induced Enhancement of Critical Currents in Uranium-Doped $Bi_2Sr_2Ca_2Cu_3O_x$ Tapes." Submitted to the Proc. of the Fourth European Conf. on Appl. Supercond. (EUCAS'99), Barcelona, Spain, Sept. 14-17, 1999. Atomic Institute of the Austrian Universities, A-1020 Vienna, AUSTRIA; e-mail stoenies@ati.ac.at.

H. Wilhelm, S. Raymond, D. Jaccard, O. Stockert, and H. V. Löhneysen, "From an Antiferromagnet to a Heavy-Fermion System: $CeCu_5Au$ Under Pressure." Département de Physique de la Matière Condensée, Université de Genève, 24 quai Ernest-Ansermet, CH-1211 Genèva 4, SWITZERLAND; telephone +41 22 702 6261; telefax +41 22 702 6869; e-mail heribert.wilhelm@physics.unige.ch; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9908442. Key words: phase transition, high pressure, electrical resistivity, non-Fermi-liquid.

Y. Yeshurun, A. Shaulov, and D. Giller, "Local Magnetic Characterization of Superconductors Based on Magneto-Optics and Hall-Probe Array Techniques." Presented at the conference on Frontiers in Magnetism (FIM99), Stockholm, Sweden, August 12-15, 1999. Institute of Superconductivity, Department of Physics, Bar-Ilan University, Ramat Gan 52900, ISRAEL; D. Giller's e-mail giller@mail.biu.ac.il. Key words: high-temperature superconductors, vortex phases, local magnetic measurements, Hall-probe array, magneto-optics.

J. Zaanen, "Order-Out-of-Disorder in a Gas of Elastic Quantum Strings in 2+1 Dimensions." Instituut-Lorentz for Theoretical Physics, Leiden University, P.O. Box 9506, NL-2300 RA Leiden, The Netherlands; e-mail jan@lorentz.leidenuniv.nl; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909106. 64.60.-i; 71.27.+a; 74.72.-h; 75.10.-b.

Igor Zutic and A. Das Sarma, "Spin-Polarized Transport and Andreev Reflection in Semiconductor/Superconductor Hybrid Structures." Submitted to Phys. Rev. B. Department of Physics, University of Maryland at College Park, College Park, MD 20742-4111; e-mail igor@cooperon.umd.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9909002. Key words: Andreev reflection, spin polarization, differential conductance. 73.40.Gk; 74.80.Fp; 85.90.+h.

COMING EVENTS

*(An * indicates a previously listed event. Also see complete listing of upcoming conferences and workshops at our Web site http://www.iitap.iastate.edu/htcu/comevents.html.)*

Jan. 10 - 14, 2000: Winter School

in Superconductivity, IRC, University of Cambridge. Intended as an introduction to high- and low-temperature superconductivity for new research students in physics, chemistry, materials science, and engineering, and others who may be interested. About five lectures a day plus demonstrations and research seminars. The lectures will cover the following topics: fundamental physical properties, chemistry and structure, experimental techniques, flux lines, type-II behavior and heavy current applications materials, superconducting electronics, and industrial view of applications. Accommodation and meals will be free to EPSRC students. For further information, contact Alicia Kelleher, IRC Secretary, IRC in Superconductivity, University of Cambridge, Cavendish Laboratory, Madingley Road, Cambridge CB3 OHE, United Kingdom; e-mail apk21@cam.ac.uk. Information also available at Web site www.sucon.cam.ac.uk.

*March 31 - April 10, 2000:

Conference on Major Trends in Superconductivity in the New Millennium (MTSC 2000) and Symposium on Itinerant and Localized States in HTSC (SILS), Klosters, Kanton Graubünden, Switzerland. Scope of MTSC 2000 is on recent developments and trends in new superconducting systems with emphasis on experiments and theories which are relevant to the pairing mechanism. Besides the superconducting cuprates, conventional superconductors, organic systems, borocarbides, ruthenates, nanostructures, and fullerenes will be addressed. In order to raise the awareness for novel ideas and results in this rapidly growing field, the physics and chemistry of related materials will be included. Special emphasis on phenomena related to nanoscale phase separation and charge modulation. Symposium on Itinerant and Localized States in HTSC (SILS) will focus on large and small polaron and bipolaron effects in high-T_c materials with special emphasis on their preparative properties. MTSC 2000 is organized in close analogy to the Gordon conferences. Limited number of slots for posters. Total number of participants limited to 130 persons. Proceedings will be published in a special issue of *Journal of Superconductivity.* **Abstract and pre-registration deadline, November 15, 1999.** For more information, contact Annette Bussmann-Holder, Max-Planck-Institut für Festkörperforschung, Heisenbergstr. 1, D-70569 Stuttgart, Germany; telephone +49 711 689 1679; telefax +49 711 689 1091. Or contact Vladimir Z. Kresin, Lawrence Berkeley Laboratory, University of California, 1 Cyclotron Road, Berkeley CA 94720; telephone (510) 486-6951; telefax (510) 486-5401. Information also available at Web site http://www.mpi-stuttgart.mpg.de/CONF/mtsc2000.html.

June 18 - 23, 2000: European

Conference on Energy Dispersive X-Ray Spectrometry (EDXRS 2000), Kraków, Poland. Aim of the conference is to bring together scientists working either in basic research in x-ray spectrometry, detectors and sources, or involved in applications of x-ray spectrometry or some of the related experimental techniques. Main topics: interaction of photons and particles with matter and modeling; new developments in instrumentation (instruments utilizing polarized radiation, synchrotron radiation and other x-ray sources, grazing angle spectrometers, portable instruments); energy dispersive x-ray detectors (cryo-detectors, low-Z detectors, Peltier-cooled detectors, dedicated pulse processing); quantitation and data handling (sample preparation, quality control and quality assurance, simulation, modeling, software); x-ray optics (capillaries, mirrors, multilayers, TXRF, imaging); microanalysis and elemental mapping (micro-XRF, micro-PIXE, EPMA); and x-ray spectrometry applications in life and environmental sciences, earth sciences, art and cultural heritage, material sciences, and industry. **Pre-registration deadline, November 15, 1999; abstract deadline, March 1, 2000.** The official language of the Conference is English. For information, contact EDXRS-2000 Secretariat, Faculty of Physics and Nuclear Techniques, University of Mining and Metallurgy, Al. Mickiewicza 30, 30-059 Kraków, Poland; telefax +48 12 6340010; Web site http://www.ftj.agh.edu.pl/wfitj/conf/edxrs/.

RESOURCES

Information

Proceedings: *Physics and Materials Science of Vortex States, Flux Pinning and Dynamics* – Proceedings

of the NATO Advanced Study Institute, Kusadasi, Turkey,

July 26 - August 8, 1998, edited by Ram Kossowsky, Shyamalendu Bose, Vladimir Pan, and Zafer Durusoy. NATO Science Series: Applied Sciences, Volume 356. Discussion by an assembly of expert physicists and materials scientists embracing the specific features of vortex-pin interactions, modes of different kinds of vortex motion under the action of Lorenz force, and mechanisms of dissipation. Implications for the development of new devices and components in electrical engineering, modern electronics, computer technology, and microwave communication. Publ. 1999; 788 pp.; price $357 (HB) or $117 (PB); ISBN 0-7923-5663-2 (HB) or ISBN 0-7923-5664-0 (PB). For information, contact Kluwer Academic Publishers, Customer Service Department, P.O. Box 358, Accord Station, Hingham, MA 02018-0358; telephone (781) 871-6600; telefax (781) 681-9045; e-mail kluwer@wkap.com. Outside North and South America, contact Kluwer Academic Publishers, Customer Service Department, P.O. Box 989, 3300 AZ Dordrecht, The Netherlands; telephone +31 78 639 23 92; telefax +31 78 639 22 54; e-mail services@wkap.nl.

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Two positions are available at the Institute of Solid State and Materials Research in Dresden, Germany. The researcher or postdoctoral position requires a Ph.D. or related degree in solid-state chemistry or solid-state or materials physics and experience in crystallization from liquid phase. The Ph.D. student position requires a degree in chemistry, physics, mineralogy/crystallography, or materials engineering. For information, contact Prof. G. Krabbes, Institute für Festkörper- und Werkstofforschung (IFW), Postfach 270016, D-01171 Dresden, Germany; telephone +49 351 4659 410; telefax +49 351 4659 480; e-mail g.krabbes@ifw-dresden.de.

Engineers/Scientists needed

for development and process optimization of powder-in-tube (PIT) *Bi-2223* tapes. Nordic Superconductor Technologies (NST), the first company in Europe entirely focusing on developing, producing, and selling high-temperature superconducting tapes for the global market, has openings for the following positions:

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R&D Engineer: Education - Ph.D. in ceramic engineering, chemical engineering, or materials science and 1-3 years industrial or research experience in advanced ceramic materials processing. Experience with *Bi*-superconductors and industrial manufacturing a plus. Working area: R&D work on optimizing the heat treatment of *Bi-2223* in PIT tapes, and improvements of flux pinning by inclusions/substitutions.

R&D Engineer: Education - M.Sc. in mechanical engineering and 1-3 years industrial machine design experience. Metal forming industry experiences a plus. Working area: R&D work on optimizing the mechanical deformation of PIT tapes, develop twisting and stranding equipment, develop mechanical deformation equipment for alternative wire geometries, and general support in mechanical design. Please send your written application to Per Vase, Vice President Engineering, Nordic Superconductor Technologies A/S, Priorparken 685, 2605 Brøndby, Denmark; telephone +45 4348 3592; telefax +45 4348 2501; e-mail p.vase@nst.com (subject – job opportunity); Web site http://www.nst.com.

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Devices & Systems Group (ADS) at IGC is seeking an innovative scientist/engineer to be responsible for setting up systems for thin-film-deposition by techniques such as electron beam evaporation, ion-beam-assisted deposition, pulsed laser deposition, and chemical vapor deposition for manufacturing scale-up, operating such systems, quality control, process optimization, and film characterization. The candidate will play a critical role in the design review and project planning processes to implement cost, design, assembly, and advanced development procedures with senior engineering staff and management. Additional responsibilities include expediting delivery of vendor purchased parts; select engineering components with cost and milestone schedules to ensure project and budgetary goals. Qualifications – B.S. or M.S. in materials, electrical or mechanical engineering, and 2 - 5 years experience in vacuum systems and thin-film deposition. Experience in deposition of oxides, especially high-temperature superconductors and in web coating, large-area deposition, and thin-film manufacturing are preferred. Excellent interpersonal and written communications skills are required to prepare presentations, proposals, budgets and schedules; ability to work effectively with engineering, hourly employees, vendors, customers and management are key. Proficiency in spreadsheets, schedulers, and databases are required. For information, contact T. Lehner, Technology Development/ADS, Intermagnetics General Corporation, 450 Old Niskayuna Road, Latham, NY 12110-0461; e-mail tlehner@igc.com.

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