VOL. 13, NO. 4
FEB. 15, 1999

HIGH T_c UPDATE

DMS/BES/DOE
ARPA

Dear Subscribers,

I regret to inform you that due to increasing operating costs and continuously decreasing funds, we will discontinue the free hard-copy version of the *High-T_c Update* newsletter beginning May 1, 1999. We will e-mail our current hard-copy subscribers a PDF version of the newsletter that looks, for all practical purposes, exactly like the hard copy. You will just need to print out the paper version at your end. (You will need the Adobe Acrobat Reader to decode the file; this software is available free at the Adobe site, http://www.adobe.com/prodindex/acrobat/readstep.html.) This enables us to continue to offer you up-to-date reliable information on current superconductivity research and at the same time alleviate our financial difficulties for a while.

Please fill out and send the form on page 11 informing us of your e-mail address so that we can start conversion of the hard-copy subscription list to an e-mail recipient list. You can also send us this information by e-mail to mitra@ameslab.gov. We would appreciate a prompt response by March 1 (March 15 for foreign subscribers).

Sincerely,
Sreeparna Mitra (Editor)

NOTA BENE:

Theory

A theory for the effects of superconducting pairing fluctuations on the nuclear spin-lattice relaxation rate $1/T_1$ and the NMR Knight shift for layered superconductors in high magnetic fields has been developed by M. Eschrig (Northwestern) et al. The authors stress that the results can be used to clarify the origin of the high-T_c cuprates' pseudogap, which has been attributed to spin fluctuations or pairing fluctuations. The authors present theoretical results for s-wave and d-wave pairing fluctuations, and they show that the pseudogap as revealed in recent experiments in optimally doped $YBa_2Cu_3O_{7-\delta}$ can be accounted for quantitatively by 2D pairing fluctuations with d-wave symmetry. The authors also show that the orthorhombic distortion in $YBa_2Cu_3O_{7-\delta}$ can account for the apparent discrepancy between measurements of $1/T_1$ by NQR and NMR. The authors propose an NMR experiment to distinguish a fluctuating s-wave order parameter from a fluctuating strongly anisotropic order parameter. Observation of the predicted effect in $Nd_{2-x}Ce_xCuO_{4-\delta}$ would be a strong confirmation of s-wave pairing in this compound.

As stressed in a preprint by C.-R. Hu (Texas A&M) and X.-Z. Yan (Texas A&M and Beijing), it has been noted previously that the sizable areal density of midgap states that must exist on any non-{n0m} surface of a d-wave superconductor can lead to a giant magnetic moment. The authors suggest two experiments in which this effect should be observable: (a) direct measurements of the magnetic moment in a system with a large density of internal {110} surfaces or (b) spin-polarized tunneling on a {110} surface. In both cases, a sufficiently large magnetic field should be applied in the [1$\underline{1}$0] direction.

A paramagnetic state in d-wave superconductors may be realized in hole-doped high-T_c cuprates and κ-$(ET)_2$ salts in the presence of a magnetic field within the conducting plane (the ab plane and the ac plane, respectively). H. Won (Hallym) et al. have studied this state and found results for the specific heat, magnetization, and superfluid density within the weak-coupling model. At low temperatures and in small magnetic fields, these quantities are predicted to show simple power-law behaviors, which should be experimentally observable.

The electronic states of underdoped $La_{2-x}Sr_xCuO_4$ *(LSCO)* have been investigated by T. Tohyama et al. (Tohoku) using a microscopic model, i.e., the t-t'-t"-J model, containing charge stripes. The authors find that the model clarifies the differences in the ARPES (angle-resolved photoemission spectroscopy) data between *LSCO* and $Bi_2Sr_2CaCu_2O_{8+\delta}$ *(Bi-2212).* The authors study the effects of the stripes on spin correlations, optical conductivity, and pair correlations. The numerical calculations provide a consistent explanation of the anomalous properties, thus suggesting a crucial role of the stripes in *LSCO*.

A preprint by S. Caprara et al. (Roma) reports a study of the single-particle spectral properties of electrons coupled to quasi-critical charge and spin fluctuations close to a stripe phase, which is governed by a quantum critical point near optimum doping. The authors find that spectral weight is transferred from the quasiparticle peak to incoherent dispersive features. Within this model, the authors also analyze the interplay between repulsive spin and attractive charge fluctuations in determining the symmetry and the peculiar momentum dependence of the superconducting gap parameter. The authors find that when both spin and charge fluctuations are coupled to the electrons, $d_{x^2-y^2}$-wave gap symmetry results for a wide range of parameters. A crossover from d-wave to s-wave gap symmetry is predicted to occur when the strength of charge fluctuations increases with respect to spin fluctuations.

Using a mapping from the three-band extended Hubbard model for cuprate superconductors into a generalized t-J model, and exact diagonalization of the latter in a 4×4 cluster, J. M. Eroles et al. (Bariloche) determine the quasiparticle weight for destruction of *Cu* or *O* electrons with a definite wave vector **k**. The authors also derive an approximate but accurate analytical expression that relates the *O* intensity with the quasiparticle weight in the generalized t-J model. The **k** dependence of *Cu* and *O* intensities is markedly different. In particular the *O* intensity vanishes for **k** = (0,0). The results are relevant for the interpretation of ARPES experiments.

A preprint by J. Friedel (Orsay) and M. Kohmoto (Tokyo) stresses that a phonon- or electron-mediated weak BCS attraction is enough to produce a high critical temperature if a Van Hove anomaly is at work. The authors also note that the observed anisotropy of the superconducting gap might tell us whether its coupling is predominantly through phonons or electrons. The authors suggest several experiments that might shed light on the essence of high-temperature superconductivity.

A preprint by H.-J. Kwon (Florida) presents an investigation of a zero-temperature itinerant antiferromagnetic transition where the fermions possess a d-wave gap. The problem pertains to both the nodal liquid insulating phase and the d-wave superconducting phase of the underdoped cuprates. The author finds that a nontrivial quantum phase transition exists and that the quantum critical point is dominated by a long-ranged interaction of the Néel order parameter, which is induced by the Dirac-like fermions near gap nodes. The author formulates a Ginzburg-Landau functional and studies the quantum critical point via a renormalization-group analysis.

The proximity effect in a mesoscopic normal-metal film (N) in contact with a superconductor (S) has been studied by A. L. Fauchère (ETH-Zürich) et al. Accounting for a repulsive interaction between the electrons in the normal metal, the authors find an enhanced local density of states close to the NS interface. The sharp peak in the density of states is pinned to the Fermi energy and leads to spontaneous paramagnetic interface currents. The induced orbital magnetic moments exhibit the characteristic features of paramagnetic reentrance observed by P. Visani et al. [*Phys. Rev. Lett.* **65**, 1514 (1990)] in superconducting cylinders coated with normal metal.

Vortices

Vortex structure and the melting transition in very anisotropic layered superconductors at fields tilted with respect to the c axis have been investigated by A. E. Koshelev (Argonne). The author shows that even a small in-plane field does not homogeneously tilt the vortex lattice but instead penetrates into the superconductor in the form of Josephson vortices (JVs). At high c-axis magnetic field, the phase field of the JVs is built up from the phase perturbations created by displacements of pancake vortices. The crossing-lattices ground state leads to linear dependencies of the melting field and melting temperature on the in-plane field, in agreement with recent experimental observations. At small fields, stacks of JVs accumulate additional pancake strings, creating vortex rows with enhanced density. This mechanism explains the mixed chains-lattice state observed by Bitter decorations.

Detailed measurements of the magnetization versus temperature in two granular $La_{1.9}Sr_{0.1}CuO_4$ samples, before and after grain alignment, have been carried out by J. Mosqueira (Santiago de Compostela) et al. The authors analyzed these experiments to disentangle the various extrinsic random orientation effects upon the magnetization. Once these are taken into account, the intrinsic crossing point in the magnetization M* at temperature T* can be consistently explained in terms of previous theory based on thermal fluctuations of vortices.

The effect of macroscopic inhomogeneities on the nonlinear transport properties of type-II superconductors has been investigated by A. Gurevich (Wisconsin) and V. M. Vinokur (Argonne). The authors formulated a nonlinear effective-medium theory, which allowed them to derive general relations between the global and local currents and electric fields. The authors found that even weak inhomogeneities can dramatically change the transport characteristics, resulting in a nonmonotonic magnetic-field dependence of the critical current (fishtail effect). Inhomogeneities in layered high-temperature superconductors may cause a negative differential conductivity, giving rise to electric field domains and spatio-temporal hysteretic phenomena analogous to the Gunn effect.

A preprint by G. M. Braverman et al. (Ben-Gurion University of the Negev) reports on numerical calculations of vortex penetration and the magnetization of small, thin superconducting disks containing an array of columnar defects. The authors find that the columnar defects assist vortex penetration, decrease the sample magnetization, and reduce the upper critical field. In a disk with a sufficient number of strong defects, vortices are always found on columnar defects. The presence of the defects can lead to magnetization jumps arising from redistribution of vortices among the defects and not to the penetration of new vortices.

The value of the dynamic critical exponent z has been studied by S. W. Pierson (WPI) et al. for two-dimensional superconducting, superfluid, and Josephson-junction arrays in zero magnetic field via the Fisher-Fisher-Huse dynamic scaling. The authors find $z \approx 5.6 \pm 0.3$, a relatively large value, indicative of nondiffusive dynamics.

$RBa_2Cu_3O_{7-\delta}$

^{63}Cu(2) spin-lattice relaxation-rate measurements of $YBa_2Cu_3O_{6.95}$ in magnetic fields from 2.1 T to 27.3 T, obtained from $^{17}O(2,3)$ nuclear magnetic resonance spin-spin relaxation, are reported by V. F. Mitrovic (Northwestern) et al. For T < 120 K, the spin-lattice relaxation rate is found to increase with magnetic field. The authors can account for this quantitatively using a theory for changes in the density of states due to d-wave pairing fluctuations in 2D. The data are inconsistent with dominant s-wave pairing. The authors also found that the characteristic field scale for the suppression of the fluctuation corrections is ~10 T, which is an order of magnitude smaller than the expected field scale for a purely magnetic scenario for the pseudogap.

A related paper by H. N. Bachman (Northwestern) et al. reports high-precision measurements of the electronic spin susceptibility of $YBa_2Cu_3O_{6.95}$ up to 24 T using ^{17}O nuclear magnetic resonance. Its temperature dependence can be accounted for using a theory accounting for superconducting fluctuations. The transition is best represented as a crossover from normal-state behavior to that of a vortex liquid.

Inelastic neutron-scattering results on the temperature dependence of the quasielastic crystal-field transition of *Tb* in $YBa_2Cu_3O_{7-\delta}$ on samples with $\delta = 0.03$ (metallic and superconducting) and $\delta = 0.9$ (insulating) are presented by U. Staub (PSI) et al. The linewidth as a function of temperature does not show an anomaly at the superconducting transition temperature. Instead, the relaxation of the 4f magnetic moments can be described simply via Orbach processes, which arise from the magneto-elastic interaction with lattice vibrations. The authors conclude that inelastic neutron-scattering results claiming to probe the superconducting gap or the pseudogap should be reexamined in terms of Orbach processes.

Two preprints by M. Muralidhar et al. (SRL-ISTEC) report on the achievement of high critical current densities in superconducting samples of $(Nd_{0.33}Eu_{0.33}Gd_{0.33})$-$Ba_2Cu_3O_{7-\delta}$ *(NEG-123),* melt-processed under a partial oxygen pressure of 0.1%. In these samples, the authors obtained a critical current density J_c of 6.8×10^4 A/cm^2 at 77 K in a field of 2.5 T. The irreversibility field B_{irr} was found to exceed 7 T at 77 K in fields parallel to the c axis. To produce pinning sites in *NEG-123,* the authors introduced up to 40 mol% $(Nd,Eu,Gd)_2BaCaO_5$ *(NEG-211)* plus *Pt*. The *Pt* additions were effective in reducing the size of the *NEG-211* second-phase particles. The authors attribute the strong pinning to a combination of pinning by small (~0.1 µm) *NEG-211* particles and δT_c pinning caused by fluctuations in the local transition temperature, as in ordinary $NdBa_2Cu_3O_{7-\delta}$ superconductors.

The influence of columnar defects created by heavy-ion *(Kr)* irradiation of single-crystalline $(Y_xTm_{1-x})Ba_2Cu_3O_{7-\delta}$ has been studied by L. Trappeniers (Leuven) et al. Magnetization measurements in pulsed fields up to 50 T in the temperature range 2.4-90 K revealed that: (a) in fields up to $B \approx 20$ T, the critical current density $J_c(B,T)$ is considerably enhanced, and (b) down to temperatures T ~ 40 K, the irreversibility field $B_{irr}(T)$ is strongly increased.

Bi Cuprates

The in-plane resistivity, Hall coefficient, and magnetoresistance in a series of high-quality $Bi_2Sr_{2-x}La_xCuO_6$ *(Bi-2201)* crystals with various carrier concentrations from underdoped to overdoped have been measured by Y. Ando and T. Murayama (CRIEPI and Science University of Tokyo). These crystals show the highest T_c (33 K) and smallest residual resistivity ever reported for *Bi-2201* at optimum doping. The authors found that the T dependence of the Hall angle obeys a power law T^α with α systematically decreasing with increasing doping, which questions the universality of the Fermi-liquid-like T^2 dependence of the Hall scattering rate. In particular, the Hall angle of the optimally doped sample changes as $T^{1.7}$, not as T^2, while ρ_{ab} shows T-linear behavior. The systematics of the magnetoresistance indicate an increasing role of spin scattering in underdoped samples.

As noted by J. E. Hirsch (UC-San Diego), reproducible scanning tunneling microscope (STM) spectra of *$Bi_2Sr_2CaCu_2O_{8+\delta}$ (Bi-2212)* consistently exhibit asymmetric tunneling characteristics, with the higher peak conductance corresponding to a negatively biased sample. The author considers various possible sources of this asymmetry that are not intrinsic to the superconducting state, including energy dependence of the normal-state densities of states of sample and tip, bandwidth cutoffs, unequal work functions of tip and sample, and an energy-dependent transmission probability. The author concludes that none of these effects can explain the sign and temperature dependence of the observed asymmetry and that the observed asymmetry must therefore reflect an intrinsic property of the superconducting state: an energy-dependent superconducting gap function with non-zero slope at the Fermi energy. The author notes that the theory of hole superconductivity has predicted the existence of such a slope, of universal sign, in all superconductors, and he suggests further experiments to confirm the existence of this fundamental property of the superconducting state.

A preprint by R. A. Klemm (Argonne) et al. notes that recent experiments by Q. Li et al. have found that the critical current density J_c^J across atomically clean c-axis twist junctions of *$Bi_2Sr_2CaCu_2O_{8+\delta}$ (Bi-2212)* is the same as that of the constituent single crystal J_c^S, independent of the twist angle ϕ_0, even at T_c. The authors theoretically investigated the question of whether a $d_{x^2-y^2}$-wave order parameter might twist by mixing in d_{xy} components, but they found that such twisting cannot explain Li's data near T_c. The authors thus conclude that the order parameter contains an s-wave component but no $d_{x^2-y^2}$-wave component. The authors also note that the c-axis Josephson tunneling is completely incoherent, and they propose a c-axis junction tricrystal experiment, which does not rely upon expensive substrates.

Other Cuprates

The results of Raman scattering experiments on single crystals of *$La_{2-x}Sr_xCuO_4$* that span the range from underdoped (x = 0.10) to overdoped (x = 0.22) are reported by J. G. Naeini (Simon Fraser) et al. The spectra are consistent with the existence of a strong anisotropic quasiparticle interaction that results in a normal-state depletion of spectral weight from regions of the Fermi surface located near the zone axes. The strength of the interaction decreases rapidly with increasing hole concentration, and the spectral evidence for the pseudogap vanishes when the optimum doping level is reached. The results suggest that the pseudogap and the superconducting gap arise from different mechanisms.

The hybrid ruthenocuprates are a class of compounds in which long-range ferromagnetic ordering coexists with superconductivity. One member of this class of materials is *$RuSr_2GdCu_2O_{8-\delta}$ (Ru-1212),* which has a crystal structure consisting of sequences of alternating *CuO_2* double planes, like those in high-T_c superconductors, and *RuO_2* monolayers, similar to those in *$SrRuO_3$*. The *Ru-1212* compound becomes superconducting at T_c = 15-40 K, well below the magnetic transition temperature T_{Curie} = 133-136 K. A preprint by V. G. Hadjiev (MPI-Stuttgart) et al. reports Raman scattering from magnetic excitations in *Ru-1212*. The authors observed two-magnon scattering and phonons that become Raman-active because of magnetic ordering.

Films

A paper by A. Crisan (Rome and Bucharest) et al. reports transport measurements on artificially layered *$(BaCuO_2)_2/(CaCuO_2)_2$* superlattices, engineered by pulsed-laser deposition (PLD), having zero-resistance critical temperatures of about 80 K. The authors discuss the experimental current-voltage characteristics in terms of current-induced unbinding of thermally created vortex-antivortex pairs in zero field or the vortex-glass transition in fields up to about 10 kG. From the dependencies of the vortex-melting field upon temperature and magnetic-field orientation, the authors determined an anisotropy factor $\gamma \approx 20$ for these superlattices.

A preprint by E. Polturak et al. (Technion) presents evidence, based on studies of normal-superconducting (N/S) interfaces, that the healing length of the order parameter near the surface of an anisotropic superconductor is not always the coherence length as in s-wave superconductors. The authors conclude that the healing length is the coherence length only near a surface that is a high-symmetry plane, while near surfaces that are off a high-symmetry plane the healing length is the quasiparticle diffusion length. The authors show that the order parameter near surfaces that are off high symmetry is strongly suppressed, which leads to inferior properties of high-T_c junctions formed across such surfaces.

Applications

Three-terminal devices based on high-T_c superconductors have been intensively studied during the past several years. For the superconducting field-effect transistor (SuFET), the basic idea is to change the superconducting properties, such as the transition temperature T_c or the critical current I_c of a superconducting source-drain (SD) channel, by altering the density of its mobile charge carriers via an applied gate electric field E_g. A preprint by M. Windt et al. (Köln) reports the fabrication and investigation of Josephson field-effect transistors based on *$YBa_2Cu_3O_{7-\delta}$* bicrystal grain-boundary junctions (GBJs) with epitaxial *$SrTiO_3$* films as the gate insulator. The *$SrTiO_3$* shows high products of the breakdown field E_{bd} and the dielectric constant ε_r up to $E_{bd}\varepsilon_r = 1.3 \times 10^{10}$ V/m, allowing measurements over a wide range of applied gate electric field E_g. The authors found a highly nonlinear dependence of the GBJs' I_c upon E_g but also noted a remarkable similarity between the measured $I_c(E_g)$ and $\varepsilon_r(E_g)$ curves. This strongly suggests that the observed electric-field effect (of E_g upon I_c) is not due to a change in carrier concentration in the $YBa_2Cu_3O_{7-\delta}$ source-drain channel, but rather is related to the dielectric properties of the $SrTiO_3$ insulator. A possible explanation may be based on the giant piezoelectric effect in $SrTiO_3$ at low temperatures.

The development of robust $YBa_2Cu_3O_{7-\delta}$ SQUID magnetometer sensors with magnetic-field-noise levels below 50 fT $Hz^{-1/2}$, system bandwidths up to 1 MHz, and slew rates up to 5×10^5 ϕ_0/s is reported in a preprint by F. Ludwig et al. (PTB-Berlin). For signal amplitudes < 1 µT and frequencies < 0.5 kHz, total harmonic distortions below -105 dB were measured. In addition, devices with slotted pickup loops (to avoid trapping of vortices in the superconducting films when the devices are cooled through T_c) were found to show significantly improved performance when exposed to a magnetic field comparable with the earth's field. These properties make the devices attractive for low-noise systems that can be operated in moderately shielded and even unshielded environments.

A related paper by J. Beyer et al. (PTB-Berlin) reports measurements of the linearity of sensitive high-T_c SQUID magnetometers operated in a direct-coupled flux-locked loop with bias reversal. At signal frequencies above about 0.1% of the system bandwidth, the system nonlinearity was found to be caused mainly by the nonlinear behavior of the SQUID magnetometers, while at low frequencies, nonlinearities arising from read-out electronics were found to predominate.

The high-frequency characterization of $DyBa_2Cu_3O_{7-\delta}$ thin-film ramp-type junctions with a $PrBa_2Cu_3O_{7-\delta}$ barrier fabricated on *MgO* substrates using a thin $SrTiO_3$ buffer layer is reported by A. H. Sonnenberg et al. (Twente). Josephson emission was detected over a wide temperature range from 4.2 K to 85 K at millimeter wavelengths using a sensitive receiver. The 0.28 nW maximum detected power of the ramp junction is much higher than that obtained earlier for other high-T_c junctions. Results on frequency down-conversion obtained at higher harmonics of the signal demonstrate the potential for the use of ramp junctions at THz frequencies.

Other Activities

Experimental results for a Bloch transistor, fabricated with small $Al/AlO_x/Al$ tunnel junctions shunted by small *Cr* resistors, are reported by S. V. Lotkhov et al. (PTB-Berlin). A Bloch transistor normally consists of two small Josephson junctions connected in series, but in this case the junctions were replaced by two superconducting interferometer loops, each with two junctions in parallel. A capacitively coupled gate was supplied to control the induced charge of the small intermediate electrode (island) of the transistor. Modulation of the I-V characteristics by the gate was observed, but the performance was far from ideal because the Josephson-to-charging energies ratio E_J/E_C was about 9, well above its optimum value (0.3-1.0).

Overviews

A brief overview of the vortex state in unconventional superconductors has been prepared by K. Maki (USC) et al. After a brief survey of some of the unconventional superconductors, the authors describe some salient features of the vortex state in d-wave superconductors such as the hole-doped high-T_c cuprates and in p-wave superconductors such as the recently discovered Sr_2RuO_4 (50 refs.). The authors' work on the vortex state in p-wave superconductors also has been summarized in another preprint by K. Maki (USC) et al. In a magnetic field along the c axis, the square vortex lattice is most stable except in the immediate vicinity of T_{c0}. The authors show that the effect of impurities on H_{c2} exhibits characteristics of unconventional superconductors. The ab anisotropy of the upper critical field reveals information about the fourfold term arising from the Fermi surface effect (26 refs.).

A preprint by S. Caprara et al. (Roma) presents a summary of the main outcomes of the Rome group's quantum-critical-point scenario for high-T_c superconductors: Phase separation, which commonly occurs in strongly correlated electronic systems, turns into a stripe instability when Coulomb interactions are taken into account. The stripe phase continuously connects the high-doping regime, dominated by charge degrees of freedom, to the low-doping regime, when spin degrees of freedom are most relevant. Critical fluctuations near the stripe instability mediate a singular interaction between quasiparticles, which is responsible for non-Fermi-liquid behavior in the metallic phase and for Cooper pairing with d-wave symmetry in the superconducting phase (45 refs.).

Contributed by John R. Clem

Contents:

Technology News is on page 6; Preprints begin on page 7; Coming Events begin on page 10; FYI is on page 11; and the PDF subscription form is on page 11.

High-T_c Update **is available without charge to interested persons. Recipients are expected to participate in this information exchange by sending us preprints, reprints, meeting news, research news, etc. Contributions to defray the cost of newsletter printing and mailing are welcome.**

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.

Using modern photolithographic techniques, scientists at Argonne are developing a new generation of superconducting materials by precisely controlling their microstructures by establishing pinning centers on a periodic lattice so that each pin site interacts strongly with only one or a few flux lines. Tailoring the size and pattern of the pin sites allows greater control of the critical current; however, the electron beam lithography technique generally used to make the periodic lattice structures is too slow and expensive to cover the large areas needed to make integrated circuits. The researchers are developing an alternative method, laser interferometric lithography, which uses the interference patterns generated by two identical laser beams to produce perfect periodic structures on a silicon substrate covered with a photosensitive resin. The pattern is formed by rotating the substrate and exposing the resin to the lasers at different angles. After exposure, the resin is developed, and the pattern is transferred as a lattice of holes to a superconducting film. Each hole acts as a strong pinning site for flux lines, which permits high critical current values. Laser interferometric lithography can also be applied to fabricate nanoscale periodic structures in hybrid magnetic and superconducting materials for new optical and magnetic storage applications. Argonne is looking for a partner with access to clean-room facilities to collaborate on this research, as well as an industrial partner for further development of the technology. For more technical information, contact Vitali Metlushko, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; phone (630) 252-5512; fax (630) 252-7777.

The first European sale of its superconducting magnetic energy storage (SMES) product to STEWEAG, an Austrian electric utility, was announced by American Superconductor Corporation (ASC). This SMES-based system will be installed in the spring of 1999 at Austria Druckguss, an aluminum foundry in Gleisdorf, Austria that has been experiencing a significant number of plant shut downs owing to momentary sags in electrical voltage caused primarily by lightning storms typical in the region where the foundry is located. Under normal operating conditions, an electric utility grid is designed to minimize long power outages; however, severe weather, traffic accidents, and unforeseen equipment failures can lead to momentary sags in electrical voltage on power lines. Eighty percent of these voltage sags last less than two seconds, which is sufficient to shut down entire industrial manufacturing plants. According to industry data, these momentary voltage sags cost industry billions of dollars annually in damaged equipment and lost production. The SMES unit is anticipated to eliminate 100 percent of these power quality problems.

Along with its industry partners, American Superconductor Corp. has also recently received an award from the U.S. Department of Energy to support the development, manufacture, installation, and field testing of the first high-temperature superconducting (HTS) transformer in the U.S. utility network. ASC and ABB previously worked together to develop the first HTS transformer that was successfully installed, tested, used, and monitored in Geneva, Switzerland in 1997. The DOE award comes on the heels of the signing of agreements in January 1998 between ABB, Electricité de France, one of the largest utilities in the world, and American Superconductor for a $15 million, four-year, joint-development program. The transformer will be manufactured by ABB Power T&D Company using HTS wire supplied by American Superconductor. Air Products and Chemicals, Inc. (APD) will develop the cryogenic cooling system for the transformer, which will be installed and tested at a utility substation to be announced later. Los Alamos National Laboratory will provide special electrical characterization of the HTS wires and components during the course of the project. The prototype transformer, which will have a power rating of 10 MVA, is a crucial step on the path to commercial-scale HTS transformers that are expected to have power ratings above 30 MVA; the market for conventional power transformers with power ratings more than 30 MVA is valued at approximately $3 billion per year worldwide.

For information contact American Superconductor Corporation, Two Technology Drive, Westborough, MA 01581; telephone (508) 836-4200; telefax (508) 836-4248.

The wire manufacturing division of Intermagnetics General Corporation Advanced Superconductors announced recently that it has been awarded an $800,000 order to supply more than one ton of semi-finished superconducting rod to Samsung Advanced Institute of Technology in Japan. The rod, to be delivered about April 1999, will be drawn down to final wire size and cabled in Korea by industrial participants for use in a major Korean fusion reactor project, KSTAR (Korean Superconducting Tokamak Advanced Research). The next phase of the project, commencing in fall 1999, will require another six tons of the Nb_3Sn superconducting material and the overall project is expected to require 25 tons of material. For information, contact Intermagnetics General Corporation, 450 Old Niskayuna Road, P.O. Box 461, Latham, NY 12110-0461; telephone (518) 782-1122.

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.

Yoichi Ando and T. Murayama, "Non-Universal Power Law of the 'Hall Scattering Rate' in a Single-Layer Cuprate $Bi_2Sr_{2-x}La_xCuO_6$." Submitted to Phys. Rev. Lett. Central Research Institute of Electric Power Industry (CRIEPI), 2-11-1 Iwato-kita, Komae, Tokyo 201-8511, JAPAN; e-mail ando@criepi.denken.or.jp; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9812334. 74.25.Fy; 74.62.Dh; 74.72.Hs.

H. N. Bachman, V. F. Mitrovic, A. P. Reyes, W. P. Halperin, M. Eschrig, J. A. Sauls, A. Kleinhammes, P. Kuhns, and W. G. Moulton, "Superconducting Fluctuation Effects on the Electron Spin Susceptibility in $YBa_2Cu_3O_{6.95}$." Submitted to Phys. Rev. Lett. Department of Physics, Northwestern University, 2145 Sheridan Road, Evanston, IL 60208; phone (847) 491-8615; fax (847) 491-9982; e-mail nbachman@nwu.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901231. 74.25.-q; 74.25.Nf; 74.72.Bk.

J. Beyer, D. Drung, F. Ludwig, and Th. Schurig, "Linearity of Sensitive High-T_c dc SQUID Magnetometers." Submitted to J. Appl. Phys. Physikalisch-Technische Bundesanstalt, Institut Berlin, Abbestrasse 2-12, D-10587 Berlin, GERMANY; telephone +49 30 3481 379; telefax +49 30 3481 490; e-mail joern.beyer@ptb.de.

O. Bourgeois, P. Gandit, J. Lesueur, R. Mélin, A. Sulpice, X. Grison, and J. Chaussy, "Enhancement of Andreev Reflection by Spin Polarization in Out-of-Equilibrium Ferromagnet-Superconductor Junctions." Centre de Recherches sur les Très Basses Températures (CRTBT), Laboratoire Associé á l'Université Joseph Fourier, CNRS, B.P. 166, F-38042 Grenoble Cedex 9, FRANCE; e-mail bourgeoi@labs.polycnrs-gre.fr; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901045. 74.50.+r; 74.80.Dm; 75.70.Cn; 85.30.St.

Gregory M. Braverman, Sergey A. Gredeskul, and Yshai Avishai, "Mesoscopic Superconducting Disc with Short-Range Columnar Defects." Submitted to Phys. Rev. B. Ben-Gurion University of the Negev, 84105 Beer-Sheva, ISRAEL; Sergey A. Gredeskul's telephone +972 7 647 2131; telefax +972 7 647 2904; e-mail sergeyg@bgumail.bgu.ac.il; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901040. 74.60.Ge; 74.60.Ec; 74.62.Dh.

S. Caprara, C. Castellani, C. Di Castro, M. Grilli, A. Perali, and M. Sulpizi, "The Stripe-Phase Quantum-Critical-Point Scenario for High-T_c Superconductors." To be published in J. Supercond. Dipartimento di Fisica, Università di Roma 'La Sapienza,' P. Aldo Moro 2, I-00185 Roma, ITALY; A. Perali's e-mail andrea.perali@roma1.infn.it; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9812279.

C. Caprara, C. Di Castro, M. Grilli, A. Perali, and M. Sulpizi, "Fermi Surface and Gap Parameter in High-T_c Superconductors: The Stripe Quantum Critical Point Scenario." To be published in Physica C. Dipartimento di Fisica, Università di Roma 'La Sapienza,' P. Aldo Moro 2, I-00185 Roma, ITALY; A. Perali's e-mail andrea.perali@roma1.infn.it; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9812256. 71.38.+i; 63.20.Kr; 74.20.Mn.

A. Crisan, G. Balestrino, S. Lavanga, P. G. Medaglia, and E. Milani, "Transport Measurements, Vortex Dynamics and Anisotropy in Artificially Layered $(BaCuO_2)_2/(CaCuO_2)_2$ Superconducting Films." To be published in Physica C. Dipartimento di Scienze e Tecnologie Fisiche ed Energetiche, INFM-Università di Roma "Tor Vergata", Via di Tor Vergata, I-00133 Rome, ITALY; telefax +39 6 7259 7145; e-mail ioan@ing.uniroma2.it. Key words: artificial superlattice, $(BaCuO_2)_2/(CaCuO_2)_2$, I-V curves, vortex dynamics.

J. M. Eroles, C. D. Batista, and A. A. Aligia, "Angle Resolved *Cu* and *O* Photoemission Intensities in CuO_2 Planes." Submitted to Phys. Rev. B. Centro Atómico Bariloche and Instituto Balseiro, Comisión Nacional de Energía Atómica, 8400 Bariloche, ARGENTINA; A. A. Aligia's e-mail aligia@cab.cnea.edu.ar; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9812325.

M. Eschrig, D. Rainer, and J. A. Sauls, "Effects of Strong Magnetic Fields on Pairing Fluctuations in High Temperature Superconductors." Submitted to Phys. Rev. B. Department of Physics, Northwestern University, 2145 Sheridan Road, Evanston, IL 60208; telephone (847) 491-5455; telefax (847) 491-9982; e-mail eschrig@snowmass.phys.nwu.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901233. 74.25.Nf; 74.40.+k; 74.25.Ha.

Alban L. Fauchère, Wolfgang Belzig, and Gianni Blatter, "Paramagnetic Instability at Normal-Metal–Superconductor Interfaces." Theoretische Physik, Eidgenössische Technische Hochschule, CH-8093 Zürich, SWITZERLAND; e-mail fauchere@itp.phys.ethz.ch; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901112.

Jacques Friedel and Mahito Kohmoto, "Anisotropy and Magnetism of High Temperature Oxides Superconductors." Laboratoire de Physique des Solides Associé au CNRS, Université de Paris-Sud, Centre d'Orsay, F-91405 Orsay Cedex, FRANCE; Mahito Kohmoto's e-mail at University of Tokyo kohmoto@issp.u-tokyo.ac.jp; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901065. 74.20.-z; 74.20.Fg.

J. Goryo and K. Ishikawa, "On Induced Chern-Simons Term in P- and T- Violating Superconductors." Department of Physics, Hokkaido University, Sapporo 060-0810, JAPAN; e-mail goryo@particle.sci.hokudai.ac.jp; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9812412. 74.25.Fy.

A. Gurevich and V. M. Vinokur, "Nonlinear Electrodynamics of Randomly Inhomogeneous Superconductors." Applied Superconductivity Center, University of Wisconsin-Madison, Madison, WI 53706. 74.20.De; 74.60.-w.

V. G. Hadjiev, A. Fainstein, P. Etchegoin, H. J. Trodahl, C. Bernhard, M. Cardona, and J. L. Tallon, "Raman Scattering from Magnetic Excitations in the Ferromagnetic Superconductor $RuSr_2GdCu_2O_{8-\delta}$." To be published in Phys. Status Solidi. Max-Planck-Institut für Festkörperforschung, Heisenbergstrasse 1, D-70569 Stuttgart, GERMANY; e-mail vgh@cardix.mpi-stuttgart.mpg.de.

J. E. Hirsch, "Slope of the Superconducting Gap Function in $Bi_2Sr_2CaCu_2O_{8+\delta}$ Measured by Vacuum Tunneling Spectroscopy." Department of Physics, University of California at San Diego, La Jolla, CA 92093-0319.

C. R. Hu and X. Z. Yan, "Predicted Giant Magnetic Moment on Non-{n0m} Surfaces of d-Wave Superconductors: Can It Be Observed and How?" Preprint #99:004; submitted to Phys. Rev. Lett. Department of Physics, Texas A&M University, College Station, TX 77843-4242; preprint also available from Texas Center for Superconductivity, University of Houston, Houston, TX 77204-5932; phone (713) 743-8200; fax (713) 743-8201; e-mail preprints@www.tcs.uh.edu.

R. A. Klemm, C. T. Rieck, and K. Scharnberg, "c-Axis Twist $Bi_2Sr_2CaCu_2O_{8+\delta}$ Josephson Junctions: A New Phase-Sensitive Test of Order Parameter Symmetry." To be published in AIP Proc. of the University of Miami Conf. on High Temp. Supercond. (HTS99), Miami, Fla., Jan. 7-13, 1999. Materials Science Division, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; e-mail klemm@anl.gov.

A. E. Koshelev, "Crossing Lattices, Vortex Chains, and Angular Dependence of Melting Line in Layered Superconductors." Submitted to Phys. Rev. Lett. Materials Science Division, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439; e-mail koshelev@twain.msd.anl.gov; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901122.

Hyok-Jon Kwon, "A Novel Antiferromagnetic Quantum Phase Transition in Underdoped Cuprates." Submitted to Phys. Rev. Lett. Department of Physics, University of Florida, Gainesville, FL 32611-8440; e-mail hjk@phys.ufl.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901208. 75.40.-s; 74.20.De; 75.50.Ee; 11.10.Hi.

S. V. Lotkhov, H. Zangerle, A. B. Zorin, T. Weimann, H. Scherer, and J. Niemeyer, "Superconducting Electrometer Based on the Resistively Shunted Bloch Transistor." To be published in IEEE Trans. Appl. Supercond. Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig, GERMANY; e-mail sergei.lotkhov@ptb.de; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901118.

F. Ludwig, J. Beyer, D. Drung, S. Bechstein, and Th. Schurig, "High-Performance High-T_c SQUID Sensors for Multichannel Systems in Magnetically Disturbed Environment." To be published in IEEE Trans. Appl. Supercond.: Proc. of the 1998 Appl. Supercond. Conf. (ASC), Palm Desert, Calif., Sept. 13-18, 1998. Physikalisch-Technische Bundesanstalt, Institut Berlin, Abbestrasse 2-12, D-10587 Berlin, GERMANY; telephone +49 30 3481 434; telefax +49 30 3481 490; e-mail frank.ludwig@ptb.de.

K. Maki, G.-F. Wang, and H. Won, "p-Wave Superconductors in Sr_2RuO_4 and Bechgaard Salts." Presented at Exactly Aligned Magnetic Field Effects in Low-Dimensional Superconductors, Kyoto, Japan, Nov. 16-18, 1998; to be published in J. Supercond. Department of Physics and Astronomy, University of Southern California, Los Angeles, CA 90089-0484; e-mail kmaki@usc.edu. Key words: p-wave superconductivity, Sr_2RuO_4, Bechgaard salts, vortex state.

K. Maki, H. Won, M. Kohmoto, J. Shiraishi, Y. Morita, and G.-F. Wang, "Vortex State in Unconventional Superconductivity." Presented at the First Crete Euroconference on Anomalous Complex Superconductors (ACS-1), Heraklion, Greece, Sept. 25-Oct. 2, 1998; to be published in Physica C. Department of Physics and Astronomy, University of Southern California, Los Angeles, CA 90089-0484; e-mail kmaki@usc.edu.

V. F. Mitrovic, H. N. Bachman, W. P. Halperin, M. Eschrig, and J. A. Sauls, "Comment on 'Magnetic Field Independence of the Spin Gap in $YBa_2Cu_3O_{7-\delta}$.'" Submitted to Phys. Rev. Lett. Department of Physics, Northwestern University, 2145 Sheridan Road, Evanston, IL 60208; telephone (847) 491-8615; telefax (847) 491-9982; e-mail vemi@nwu.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901232. 74.25.Nf; 74.40.+k; 74.72.Bk.

V. F. Mitrovic, H. N. Bachman, W. P. Halperin, M. Eschrig, J. A. Sauls, A. P. Reyes, P. Kuhns, and W. G. Moulton, "Superconducting Fluctuation Effects on the Spin-Lattice Relaxation Rate in $YBa_2Cu_3O_{6.95}$." Submitted to Phys. Rev. Lett. Department of Physics, Northwestern University, 2145 Sheridan Road, Evanston, IL 60208; telephone (847) 491-8615; telefax (847) 491-9982; e-mail vemi@nwu.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901230. 74.25.Nf; 74.40.+k; 74.72.Bk.

J. Mosqueira, M. V. Ramallo, A. Revcolevschi, C. Torrón, and Félix Vidal, "The Crossing Point of the Magnetization Versus Temperature Curves and the Meissner Fraction in Granular $La_{1.9}Sr_{0.1}CuO_4$ Superconductors: Random Orientation and Inhomogeneity Effects." To be published in Phys. Rev. B. Laboratorio de Bajas Temperaturas y Superconductividad, Departamento de Física de la Materia Condensada, Universidad de Santiago de Compostela, E-15706 Santiago de Compostela, SPAIN; Félix Vidal's telephone +34 81 563100, ext. 14019, 14031, or 14023; telefax +34 81 531682; e-mail fmvidal@usc.es. 74.25.Ha; 74.40.+k; 74.72.-h.

M. Muralidhar, M. R. Koblischka, and M. Murakami, "Improvement of Critical Current Densities in Bulk Superconductors of the *123*-Type." To be published in Phys. Status Solidi (a). Superconductivity Research Laboratory, International Superconductivity Technology Center (ISTEC), 3-35-2 Iioka-Shinden, Morioka, Iwate 020-0852, JAPAN; telephone +81 19 635-9015 or -9016; telefax +81 19 635-9017; e-mail miryala1@istec.or.jp.

M. Muralidhar, M. R. Koblischka, and M. Murakami, "Refinement of Secondary Phase Particles for High Critical Current Densities in *(Nd,Eu,Gd)-Ba-Cu-O* Superconductors." To be published in Physica C. Superconductivity Research Laboratory, International Superconductivity Technology Center (ISTEC), 3-35-2 Iioka-Shinden, Morioka, Iwate 020-0852, JAPAN; phone +81 19 635-9015 or -9016; fax +81 19 635-9017; e-mail miryala1@istec.or.jp. Key words: $(Nd,Eu,Gd)Ba_2Cu_3O_y$, $(Nd,Eu,Gd)_2BaCuO_5$, melt processing, *Pt* addition, microstructure, peak effect, flux pinning, critical current density. 74.60.Ge; 74.60.Jg; 74.72.Jt; 74.80.Bj.

J. G. Naeini, X. K. Chen, J. C. Irwin, M. Okuya, T. Kimura, and K. Kishio, "Doping Dependence of the Pseudogap in $La_{2-x}Sr_xCuO_4$." To be published in Phys. Rev. B. Department of Physics, Simon Fraser University, Burnaby, B.C., CANADA V5A 1S6; phone (604) 291-5488; fax (604) 291-3592; e-mail gharavi@sfu.ca; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9804262. 74.25.Gz; 74.72.Dn; 74.25.-q; 78.30.Er.

Stephen W. Pierson, Mark Friesen, S. M. Ammirata, Jeffrey C. Hunnicutt, and LeRoy A. Gorham, "Dynamic Scaling for 2D Superconductors, Josephson Junction Arrays and Superfluids." Department of Physics, Worcester Polytechnic Institute (WPI), Worcester, MA 01609-2280; e-mail pierson@wpi.edu; Web site http://www.wpi.edu/~pierson/pubs.html; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901295.

Stephen W. Pierson and Oriol T. Valls, "Renormalization Group Study of the Intrinsic Finite Size Effect in 2D Superconductors." Dept. of Physics, Worcester Polytechnic Institute (WPI), Worcester, MA 01609-2280; e-mail pierson@wpi.edu; Web site http://www.wpi.edu/~pierson/pubs.html; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901273.

E. Polturak, O. Nesher, and G. Koren, "The Healing Length Near Surfaces of Anisotropic Superconductors." To be published in Phys. Rev. B. Department of Physics, Technion - Israel Institute of Technology, Haifa 32000, ISRAEL; phone +972 4 8292761; fax +972 4 8221514; e-mail emilp@physics.technion.ac.il. 74.80.Fp; 74.50.+r; 74.80.Dm.

A. H. Sonnenberg, L. Amatuni, G. J. Gerritsma, and H. Rogalla, "Frequency Down Conversion and ac Josephson Effect in HTS Ramp-Type Junctions on *MgO* Substrates." Presented at the 1998 Appl. Supercond. Conf. (ASC), Palm Desert, Calif., Sept. 13-18, 1998. Low Temperature Division, Department of Applied Physics, University of Twente, P.O. Box 217, 7500 AE Enschede, THE NETHERLANDS; L. Amatuni's e-mail l.amatuni@tn.utwente.nl.

U. Staub, M. Gutmann, F. Fauth, and W. Kagunya, "Difficulty of Probing the Superconducting Gap with Relaxation Measurements on 4f Crystal-Field Transitions with Neutron Scattering." To be published in J. Phys. Cond. Mat. Swiss Light Source, Paul Scherrer Institute, CH-5232 Villigen PSI, SWITZERLAND; phone +41 56 310 2111; fax +41 56 310 2199; e-mail urs.staub@psi.ch. 74.72.Bk; 71.70.Ch; 76.30.Kg; 25.40.Fq.

Rafael Taboryski, Jonatan Kutchinsky, Jørn Bindslev Hansen, Morten Wildt, Claus B. Sørensen, and Poul Erik Lindelof, "Multiple Andreev Reflections in Diffusive SNS Structures." To be published in Superlatt. and Microstruc. Department of Physics, Technical University of Denmark, Bldg. 309, DK-2800 Lyngby, DENMARK; e-mail rafael.taboryski@fysik.dtu.dk; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901140.

T. Tohyama, S. Nagai, Y. Shibata, and S. Maekawa, "Effect of Stripes on Electronic States in Underdoped $La_{2-x}Sr_x$-CuO_4." Institute for Materials Research, Tohoku University, Sendai 980-8577, JAPAN; e-mail tohyama@imr.tohoku.ac.jp; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901011. 74.20.Mn; 74.72.Dn; 74.25.Jb; 71.10.Fd.

L. Trappeniers, J. Vanacken, L. Weckhuysen, K. Rosseel, A. Yu. Didyk, I. N. Goncharov, L. I. Leonyuk, W. Boon, F. Herlach, V. V. Moshchalkov, and Y. Bruynseraede, "Critical Currents, Pinning Forces and Irreversibility Fields in $(Y_xTm_{1-x})Ba_2Cu_3O_7$ Single Crystals with Columnar Defects in Fields up to 50 T." To be published in Physica C. Laboratorium voor Vaste-Stoffysica en Magnetisme, Katholieke Universiteit Leuven, Celestijnenlaan 200 D, B-3001 Leuven, BELGIUM; telephone +32 16 32 7198; telefax +32 16 32 7983; e-mail lieven.trappeniers@fys.kuleuven.ac.be. Key words: columnar defects, flux pinning, critical current density, magnetisation, pinning force. 74.60.Ge; 74.62.Dh; 74.25.Ha; 74.60.Jg.

M. Windt, H. Haensel, D. Kölle, and R. Gross, "On the Nature of the Electric Field Effect on $YBa_2Cu_3O_{7-\delta}$ Grain Boundary Junctions Employing Epitaxial $SrTiO_3$ Gate Insulators." To be published in Appl. Phys. Lett. II. Physikalisches Institut, Universität zu Köln, Zülpicher Str. 77, D-50937 Köln, GERMANY; D. Kölle's telephone +49 221 470 3583; telefax +49 221 470 5178; e-mail koelle@ph2.uni-koeln.de. 85.25.-j; 85.25.Am; 85.25.Cp; 74.50.+r.

H. Won, H. Jang, and K. Maki, "Paramagnetic State in d-Wave Superconductors." Submitted to Europhys. Lett. Department of Physics and IRC, Hallym University, Chunchon 200-702, SOUTH KOREA; K. Maki's e-mail at University of Southern California kmaki@usc.edu; preprint also available at http://xxx.lanl.gov/abs/cond-mat/9901252. 74.70.Kn; 74.72.-h; 74.25.Bt.

COMING EVENTS

*(An * indicates a previously listed event.)*

June 6 - 10, 1999: 12th International Colloquium on Plasma Processes (CIP'99), Palais des Congres d'Antibes-Juan-Les-Pins, France. Organized by the French Vacuum Society. Topics will include plasma science – plasma generation, ion sources, plasma-surface interaction, diagnostics and modeling, and new trends in reactive plasma; polymers, biomaterials, and sterilization; plasma deposition technology – sputtering, reactive sputtering, magnetron, and ionized PVD; ion plating, arc vacuum deposition, ion-assisted deposition and surface treatment; *in-situ* control of deposition processes, etc.; plasma etching and microtechnology; and metallurgical coatings. For information, contact Societe Francaise du Vide, 19 rue du Renard, F-75004 Paris, France; telephone +33 1 53 01 9030; telefax +33 1 42 78 6320; e-mail sfv@club-internet.fr.

June 13 - June 18, 1999: The Fifth IUMRS International Conference on Advanced Materials (IUMRS-ICAM'99), The Beijing International Convention Center, Beijing, China. Symposium B: High T_c Superconductors, will provide a forum for exchange and discussion of new ideas and achievements related to high-T_c superconducting materials and their applications. Main topics include: Processing – bulk materials, tapes, strands, coated conductors and their substrates, and films; Properties (measurement and theory) – critical current, mechanical properties and strengthening in tapes and cables, and ac loss; and Applications – motors and generators, current leads, fault current limiter, power cables, and electronics. Other symposia topics that may be of interest include nanostructured materials, fullerenes and related materials, intermetallic compounds, thin films and multilayers, rare-earths and applications, surface engineering, forward look to materials science while striding into a new century, advanced processing of materials, and advanced ceramics. Official language is English. For information on superconductivity symposium, contact Lian Zhou, Northwest Institute for Non-ferrous Metal Research, P. O. Box 51, Xian, Shaanxi 710016, China; phone +86 29 626 6570; fax +86 29 623 1103; e-mail lzhou@xanet.edu.cn. For other information, contact the Secretariat, IUMRS-ICAM-1999, C-MRS Office, 7 Baishiqiao Road, Beijing 100081, China; phone and fax +86 10 684 28640; e-mail ICAM99@ihw.com.cn; Web site http://www.chimeb.edu.cn/meeting/e_mrs.htm.

July 17 - 25, 1999:* 5th International Summer School and Scientific Workshop, Eger, Hungary. Organized by the SuperTech Consortium, Hungary. The objective of the Workshop is to provide an overview on the basic and up-to-date information on the theories and newest results both in fundamental research and applications of high temperature superconductors. The main framework of the School is a series of tutorial lectures, each of two-hour duration, presented by well-known scientists and experts. The lectures will be published in textbook form, and in addition, proceedings (containing the lectures and the papers of the conference, videos from the lectures, and the social programs) will be available on a CD-ROM. Round-table sessions to be organized after lectures for free discussion. Last two days of the School will be devoted to a scientific conference for participants willing to present results of their work. **Abstract deadline, March 1, 1999. For more information, contact Istán Vajda, Dept. of Electrical Machines and Drives, Technical University of Budapest, H-1111 Budapest, Egry József u. 18., Hungary; phone +36 1 463 2961; fax +36 1 463 3600; e-mail vajda@ntb.bme.hu.

July 28 - Aug. 2, 1999:* International Conference on Physics and Chemistry of Molecular and Oxide Superconductors (MOS99), Stockholm, Sweden. Satellite to the LT-22 Conference in Helsinki, Finland (Aug. 4 - 11, 1999). Contributions within all aspects of physics and chemistry of molecular and oxide superconductors will be welcome, including: electronic properties, theory, optical properties, lattice dynamics, phonons, electrical properties, thermal properties, critical currents, vortex structure and dynamics, Josephson effects, thin films, material properties, borocarbides, ruthenides, fullerenes, organic superconductors, new superconducting materials, and applications. **Abstract deadline, March 1, 1999. For information, contact Conference Service Bureau, Congrex Sweden AB, Attn. MOS 99, P.O. Box 5619, SE-114 86 Stockholm, Sweden; phone + 46 8 459 6600; fax + 46 8 661 9125; e-mail mos99@congrex.se; Web site http://www.mos99.kth.se.

**Aug. 12 - 15, 1999:* Electron Transport in Mesoscopic Systems, Chalmers University of Technology and Göteborg University, Göteborg Sweden. Satellite to the LT-22 Conference in Helsinki, Finland (Aug. 4-11, 1999). The five main topics are: single charge tunneling, Andreev reflections and proximity effects in S/N structures, transport in quantum dots and wires, time-dependent transport in mesoscopic structures, and superconducting nano-circuits. Format is expected to be two sessions for each main topic with a rapporteur starting the first session (giving an introduction to the topic, the recent progress in the field, and the outstanding problems to be solved with possible projections) and a regular invited speaker starting the other one. Three additional oral contributions and time for extended discussions planned. Attendance limited to about 200 persons. For information, contact Tord Claeson, Conference Chair, Department of Physics, Chalmers University of Technology, S-41296 Göteborg, Sweden; e-mail f4atc@fy.chalmers.se.

Sept. 14 - 17, 1999:* Fourth European Conference on Applied Superconductivity (EUCAS'99), Melia Gran Sitges, Hotel in Sitges, Barcelona, Catalonia, Spain. Aim is to provide a forum for presentation and discussion of the developments in the field of the applications of superconductivity, in both large and small scale, including the most recent advances in the subject. All aspects of applied superconductivity will be covered, from both a scientific point of view (contributions from the fields of physics, electronics, material properties, chemistry, and engineering), and also an industrial perspective. Conference will encourage new cooperation on European and wider international levels. The program will be divided into two main sections. Large Scale & Power Applications will include fusion and SMES, detectors and accelerators, fault current limiters, motors and generators, high magnetic fields, wires and cables, materials related to large-scale applications, system aspects, and other applications. Small Scale & Electronic Applications will include Josephson Junctions, SQUIDs, digital applications, mixers/detectors, passive devices, oscillators and volt standards, materials related to superconducting electronics, system aspects, and other applications. **Abstract deadline, March 15, 1999. For further information, contact Xavier Obradors, Institut de Ciencia de Materials de Barcelona (ICMAB-CSIC), Campus de la UAB, E-08193 Bellaterra (Barcelona), Catalonia, Spain; telephone +34 93 580 18 53; telefax +34 93 580 57 29; e-mail eucas99@icmab.es; Web site http://www.icmab.es/eucas99.

†Sept. 27 - 30, 1999: First Regional Conference on Magnetic and Superconducting Materials (MSM-99), Sharif University of Technology, Tehran, Iran. Conference intends to address the recent developments and improvements in the science and engineering of superconductivity and magnetism and their applications. Themes are designed to attract researchers and educators to share their recent findings and techniques in these fields. The main focus of the conference will be physics, materials science, and applications of magnetic and superconducting materials. Topics will include production, synthesis, and physical chemistry; microstructure; physical properties; flux dynamics; special magnetism; mathematical modeling; and applications. **Abstract deadline, February 28, 1999.** Graduate students and young researchers under 40 are encouraged to participate in the Young Researcher Award Competition. For information, contact The Secretariat, Magnet Research Laboratory, Department of Physics, Sharif University of Technology, P.O. Box 11365-9161, Tehran, Iran; phone and fax +98 21 6019246; e-mail msm-99@sina.sharif.ac.ir; Web Sites http://web.mit.edu/physics/msm99/ or http://www.sharif.ac.ir/~msm-99. †**(Note extended abstract deadline.)**

FYI

(High-T_c Update takes no responsibility for want ads listed.)

Position open: Applications are invited for a research scientist position in the Materials Physics Team of Industrial Research, a New Zealand government-owned research laboratory. The successful applicant will demonstrate well-developed research skills in physics and/or materials science and be willing to contribute to a range of active programs of both a strategic and applied nature. Programs range from high-temperature superconductivity through colossal magnetoresistance to conducting polymers. The team invests significant effort in the development of commercial applications of high-temperature superconductivity in association with industries in New Zealand and abroad. **Application deadline, February 20, 1999.** Send résumé, including list of publications, statement of research interests, and names of referees to Paul Morrissey, Industrial Research Limited, P.O. Box 31310, Lower Hutt, New Zealand, phone +64 4 569 0209; fax +64 4 569 0019; e-mail P.Morrissey@irl.cri.nz; Web site http://www.irl.cri.nz/.

Please mail back (or e-mail back to mitra@ameslab.gov) by
MARCH 1 (US subscribers) or MARCH 15 (foreign subscribers).

Name: ______________________________

Address (at which you are currently receiving newsletter):

E-mail address (please print clearly): ________________________

AMES LABORATORY

Dr. Sreeparna Mitra
A219 Physics
Ames Laboratory
Iowa State University
Ames, Iowa 50011-3020

ADDRESS CORRECTION REQUESTED

1ST CLASS

High-T_c Update is published for the Office of Basic Energy Sciences, U.S. Department of Energy, under Contract W-7405-eng-82 with the Ames Laboratory, Iowa State University. Support is also provided by organizations listed on the masthead and by other donors. Please direct all inquiries to:

Dr. Sreeparna Mitra
A219 Physics
Ames Laboratory
Iowa State University
Ames, Iowa 50011-3020
Telephone: (515) 294-3877
Telefax: (515) 294-1134
E-mail: MITRA@AMESLAB.GOV
MITRA@IASTATE.EDU

Project Director and Editor: Sreeparna Mitra
Science Editor: John R. Clem
ISSN 1048-1141
Homepage: http://www.iitap.iastate.edu/htcu/htcu.html

High-T_c Update is the high-T_c superconductivity information exchange newsletter. It is available twice-monthly as hard copy and as electronic mail. Please send: 1) preprints, reprints, and other T_c-related reports or publications; 2) descriptions of on-going work; 3) meeting news; and 4) etc. Information in *High-T_c Update* is intended for limited distribution. Readers are expected to respect the rights of authors.