HIGH T_C UPDATE

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NOTA BENE:

Theory

A new orbital magnetization mode is predicted in a paper by A. V. Balatsky (Los Alamos) et al., who consider a superconducting state with mixed symmetry order parameter components, e.g., d + is or d + id' with d' = d_{xy}. The new mode corresponds to the oscillations of relative phase ϕ between two components around an equilibrium value of $\phi = \pi/2$ and is similar to the so-called clapping mode in superfluid ^{3}*He*-A. The authors estimate the frequency of the mode $\omega_0(B,T)$ as a function of magnetic field and temperature for the specific case of a magnetic-field-induced d' = d_{xy} state. They find that this mode is tunable with field as $\omega_0(B,T) \propto B\Delta_0$, where Δ_0 is the magnitude of the d-wave order parameter, and they estimate the velocity s(B,T) of this mode. The authors also suggest that this mode could be experimentally detected by ac magnetic susceptibility and possibly by ultrasound attenuation in the mixed state as a function of applied field.

The properties of a d-wave order parameter in the region of a (100) interface between two $d_{x^2-y^2}$ superconductors have been investigated by A. M. Martin (Genève) and J. F. Annett (Bristol). The authors determined how the barrier height at the interface influences the local density of states and the Josephson current. In particular, the authors identified three distinct regimes with qualitatively different behavior, corresponding to weak, intermediate, and strong barriers.

Predictions for non-BCS-like temperature dependencies in thermodynamic and transport properties within the class of short-coherence-length superconductors are presented in a preprint by Q. Chen et al. (Chicago). The authors use a BCS - Bose-Einstein crossover theory below T_C and find that at moderate and strong coupling the predicted behavior reflects the quasi-ideal Bose-gas structure of the underlying ground state. These observations provide a way to distinguish between this crossover scenario and an alternative phase-fluctuation approach applied to the same class of materials. The authors address the Knight shift, superfluid density, and specific heat and find support for their theory in comparisons with existing data on both organic and high-temperature superconductors.

The effects of nonmagnetic impurities on the neutron scattering intensity have been studied by N. Bulut (Koç) for a model of the copper-oxide layers in the normal state. Using the random-phase approximation, the author calculates the contribution to the **Q** = (π,π) neutron scattering intensity from processes involving the scattering of spin fluctuations from an impurity with large momentum transfers. The author finds that this type of scattering could lead to a peak in the neutron scattering intensity in the normal state.

A preprint by A. V. Lopatin (Rutgers) considers a disordered superconducting film in a magnetic field close to the upper critical field. Assuming that the phase transition to the glassy superconducting state exists and that it is of second order, the author shows that it is exactly described by a zero-dimensional replica model having the form of that used to describe the phase transition in the Sherrington-Kirkpatrick spin-glass model. While the total magnetic moment of the film close to the phase transition is diamagnetic, the part emerging due to the phase transition is paramagnetic, thus showing a tendency toward the paramagnetic Meissner effect.

Coulomb-gas ordering in 3D layered systems has been studied by Yu. G. Pashkevich and A. E. Filippov (Donetsk) using a Brownian dynamics approach. At small density, the particles inside the layers can associate into droplets that collectively repel between neighboring layers. These droplets possess a local stripe structure, which orders spontaneously along a certain direction.

A key step in an inversion algorithm to recover a spatially dependent penetration depth $\lambda(z)$ for a superconductor in the Meissner state from one-dimensional magnetic force microscopy (MFM) has been demonstrated numerically by

M. W. Coffey (Colorado). The author shows how to determine the profile $\lambda(z)$ as a function of the distance z into a superconducting half space.

Josephson-Coupled Systems

An approximate analytic solution for an in-plane Josephson vortex (or Josephson fluxon) in layered superconductors and stacked Josephson junctions (SJJs) has been obtained by V. M. Krasnov (Chalmers University of Technology and ISSP-Chernogolovka) for an arbitrary number of layers. For the case of a large number of layers, the variation of the phase and current is confined within the Josephson penetration depth λ_J along the layers, while the magnetic field decays with the effective penetration depth $\lambda_c >> \lambda_J$. To compare with real high-T_c superconducting samples, the author presents large-scale numerical simulations with up to 600 SJJs with in-plane lengths up to 4000 λ_J. The most striking feature of the in-plane vortex is a Josephson core, manifested as a sharp peak in the magnetic induction at the vortex center.

A theoretical study of Cherenkov radiation of Josephson plasma waves by a fast-moving Josephson fluxon in a stack of coupled long Josephson junctions has been carried out by E. Goldobin (Jülich) et al. Using numerical simulations, the authors found that the current-voltage characteristics exhibit back-bending on the fluxon step for some values of the parameters. For another limit, the emission of Cherenkov radiation can occur. The authors discuss the problem of how to detect Cherenkov radiation in linear junctions.

A preprint by E. Goldobin (Jülich) and A. V. Ustinov (Erlangen-Nürnberg) reports an experimental and theoretical study of the influence of a resistive (phase-whirling) state in one junction of a two-junction Josephson stack upon the fluxon motion in the other junction. In the experiment, the authors measure the fluxon velocity versus current in one junction as a function of the state (Meissner or resistive) of the neighboring junction. The analysis, made in the limit of high fluxon density, shows that the interaction with the resistive state results in an increase of the effective damping for the moving fluxon and thus produces a corresponding decrease in its velocity.

The quantum-phase-transition properties of a three-dimensional periodic array of Josephson junctions with charging energy including both the self and mutual junction capacitances have been studied by T. K. Kopec (Wroclaw) and J. V. José (Northeastern). The authors used the phase-fluctuation algebra between number and phase operators, given by the Euclidean group E_2, and they map the problem onto a solvable quantum generalization of the spherical model. The authors obtain a phase diagram as a function of temperature, Josephson coupling, and charging energy, and they analyze the corresponding fluctuation conductivity and its universal scaling form in the vicinity of the zero-temperature quantum critical point.

Vortices

Using a high-angular-resolution vector magnetometer, A. A. Zhukov (Southampton and Karlsruhe) et al. have studied the components of the magnetic moment parallel and transverse to the CuO_2 planes in $YBa_2Cu_3O_{7-\delta}$ *(Y-123)* single crystals. When a magnetic field was applied very nearly parallel to the CuO_2 planes, full shielding of the transverse field component, originating from the infinite tilt modulus of the vortex-locked state, was observed only for the lowest fields. The authors related the suppression of the transverse shielding to entropy-induced fragmentation of the locked state by thermally activated kinks. The authors introduce a simple model that accounts for the reduced shielding and describes the angular behavior of the critical current.

Vortex dynamics at radio frequency (3.3 MHz) has been studied by S. Patnaik (IIT-Kanpur) et al. in flexible tape samples of $Bi_2Sr_2CaCu_2O_{8+\delta}$ *(Bi-2212)* as a function of the temperature, dc magnetic field, and field orientation relative to the plane of the tape. The rf response in the geometry when the dc field is perpendicular to the tape suggests two distinct regimes of vortex dynamics, one corresponding to a moderately pinned 3D vortex solid and the other to a liquid of 2D vortices.

Transport and magnetization properties of $NdBa_2Cu_3O_{7-\delta}$ *(Nd-123)* single crystals grown by the traveling-solvent floating-zone (TSFZ) and self-flux (SF) methods under low O_2 partial pressure have been studied by A. K. Pradhan et al. (SRL-ISTEC). The TSFZ-grown crystal shows a continuous transition exhibiting vortex-glass behavior in the V-I characteristics for H = 1 T. On the other hand, a first-order melting transition, as evidenced by a kink and hysteresis in resistance, was observed in the crystal grown by the SF method under 0.03% O_2 partial pressure. The authors suggest that the different behavior in the two crystals indicates that the presence of twin planes and substitutional defects play a major role in the observed vortex dynamics.

$RBa_2Cu_3O_{7-\delta}$

The magnetization of top-seeded melt-processed $NdBa_2Cu_3O_{7-\delta}$ *(Nd-123)* containing 15 mol% $Nd_4Ba_2Cu_2O_{10}$ *(Nd-422)* has been investigated by H. Hari Babu et al. (IRC-Cambridge) using vibrating-sample magnetometry over a wide temperature (50 K < T < 94 K) and field ($0 < \mu_0 H < 12$ T) range. The authors discuss the origin of

the peak in the M-H loops and the high irreversibility field observed in this system. The normalized pinning force determined from the hysteresis width was found to scale as a function of the reduced magnetic field ($h = H/H_{irr}$) with a peak at $h_{max} = 0.33$, suggesting that normal defects dominate the pinning mechanism in this material. This contradicts recent reports suggesting that the peak effect in *Nd-123* is associated with a local variation in the superconducting transition temperature due to the formation of a distributed solid-solution phase in the *Nd-123* matrix.

The temperature dependence of the optical reflectivity of *$YBa_2Cu_3O_{7-\delta}$ (YBCO)* at the femtosecond time scale has been investigated by O. V. Misochko (ISSP-Chernogolovka and KARC-Kobe) et al. The authors detect oscillations associated with two A_{1g} metal-ion phonon modes in both the normal and superconducting states, and they compare the behavior with that obtained by frequency-domain (Raman) spectroscopy. Even though similar lattice anomalies were observed in both time and frequency domains, the authors' analysis shows that the coherent lattice dynamics is different from the ordinary (thermal state) dynamics probed by frequency-domain spectroscopy.

A cellular-automata model has been developed by D. M. Bubb and J. F. Federici (New Jersey Institute of Technology) to explain persistent photoconductivity (PPC) in underdoped *YBCO*. The authors' model is based on the idea that trapped electrons in the basal plane lead to structural rearrangements when illuminated with light ranging from infrared to ultraviolet wavelengths. Using a single-band model, the authors are able to account for both the magnitude of the PPC effect and the stretched-exponential dependence of the resistivity on illumination time.

Bi Cuprates

The Fermi surface of *$Bi_2Sr_2CaCu_2O_{8+\delta}$ (Bi-2212)* has been studied by H. M. Fretwell (UIC) et al. using angle-resolved photoemission (ARPES) with a momentum resolution of ~0.01 of the Brillouin zone dimensions. The authors show that, contrary to recent suggestions, the Fermi surface is a large hole barrel centered at (π,π), independent of the incident photon energy.

The influence of nanometer-size (10-100 nm) *SiC* particles on the flux-pinning and magnetization critical current density J_{cm} of *Ag*-sheathed *$(Bi,Pb)_2Sr_2Ca_2Cu_3O_X$ [(Bi,Pb)-2223]* superconducting tapes has been studied by Z. Q. Yang (Shenyang) et al. The authors found that below 40 K, *SiC* particles up to 0.5 wt% introduce additional flux-pinning centers and enhance J_{cm}. The authors attribute the enhanced pinning properties to the small *SiC* particles dispersed in the superconducting matrix and to the secondary defects at the interface between the *SiC* particles and the superconducting matrix.

Diffusion studies by P. Majewski (MPI-Stuttgart) of *(Bi,Pb)-2223* tapes wrapped in *Ag* have shown that *Cu* atoms from the *2223* ceramic diffuse into the *Ag* sheath during annealing, resulting in a decrease of the *Cu* content of the ceramic. The authors measured the diffusion coefficient to be 1.8×10^{-11} cm^2/s at 815°C. The authors did not observe diffusion of *Bi, Pb, Sr,* or *Ca* into *Ag*.

Other Cuprates

The observation of low-frequency phonons excited by femtosecond laser pulses in single-crystal *$YBa_2Cu_4O_8$ (Y-124)* is reported by O. V. Misochko (KARC-Kobe and ISSP-Chernogolovka) et al. In the transient time-resolved reflectivity, the authors detected the oscillations associated with two fully symmetric metal-ion phonons. The authors compare the time- and frequency-domain results for *Y-124* and compare the coherent phonons in *Y-124* and *Y-123.*

Neutron-powder-diffraction results and T_c measurements have been carried out by Y. Idemoto (Science University of Tokyo) et al. on *$(Nd_{0.675}Ce_{0.325})_2(Ba_{0.664}Nd_{0.336})_2Cu_{3.00}O_y$* samples with different oxygen contents. The crystal structure of this material can be regarded as a modified *Y-123* structure, in which the *Y* layer is replaced by a *$(Nd,Ce)_2O_2$* block. Superconductivity appears in a narrow range of y = 9.12-9.14, in which the *Cu* valence changes from 2.32 to 2.33, while the *Ce* valence remains at +4.

The evolution with doping and temperature of the polaronic absorption in superconducting *$Nd_{2-x}Ce_xCuO_4$ (NCCO)* has been studied by S. Lupi (Roma) et al. across the whole phase diagram. The authors find that the polaron band softens with increasing doping, is still present in the superconducting phase, and vanishes in the overdoped metallic phase.

Coated Conductors

Magnetron deposition techniques have been used by N. Savvides et al. (CSIRO) to fabricate *YBCO* coated tapes. Biaxially aligned *YSZ* buffer layers, 300 nm thick, were deposited at room temperature onto Hastelloy *(Has)* substrates using magnetron ion-beam-assisted deposition (IBAD). Epitaxial *YBCO* films of thickness 200-400 nm were deposited onto the *YSZ/Has* tapes at 730°C using unbalanced magnetron sputtering. The crystalline quality and texture of the film, determined by x-ray diffraction (θ-2θ, rocking curves or ω-scans, ϕ-scans, and pole figures), showed that the buffer layers were biaxially aligned with

a (111) pole in the direction of the ion beam and minimum $\Delta\phi = 13°$. The best *YBCO* tapes had a (103) pole $\Delta\phi = 10°$. Measurements of the critical current density showed a clear dependence on $\Delta\phi$ ($J_c \propto 1/\Delta\phi$), and the best *YBCO* tapes had $J_c(77\ K) = (0.9\text{-}1.2) \times 10^6\ A/cm^2$. The authors note that this method of tape fabrication is technologically important in that it uses magnetrons, which are easily scalable, to deposit both the IBAD *YSZ* buffer layer and the *YBCO* film.

Pulsed-laser deposition (PLD) has been used by R. Wang et al. (Beijing) to deposit *YBCO* films on biaxially textured *Ag*{110}<211> substrates. Studies by x-ray diffraction revealed that the degree of preferential orientation of *Ag*{110}<211> substrates varied with annealing temperature. The authors found that by depositing a thin *YBCO* template layer at low temperature, *YBCO* films with c-axis orientation and in-plane biaxial alignment could be obtained at high deposition temperature. The best *YBCO* film had a $J_c = 5 \times 10^5\ A/cm^2$ at 77 K and zero field.

Films

By using a field-effect-transistor configuration, T. Doderer et al. (IBM-Yorktown) have demonstrated that it is possible to dope electrons or holes into an initially underdoped $YBa_2Cu_3O_{7-\delta}$ film at room temperature. The results of systematic measurements of the dual-type (electron or hole) transconductance indicate comparable field-effect mobilities for electrons and holes. The authors propose a model based on band bending and localized electronic states within the band gap of the Mott insulator to explain the dual-type charge transport.

The dependence of a- or c-orientation upon substrate temperature T_S (600-700°C) in the growth of $YBa_2Cu_3O_{7-\delta}$ thin films on *MgO* by ion-beam sputtering has been studied by T. Endo et al. (Mie). The sputtering was carried out with a supply of either oxygen molecules or plasma. At 600°C, a-axis growth (a axis normal to the substrate) dominates over c-axis growth, while the fraction of c-axis orientation grows at the expense of a-axis orientation with increasing T_S. The growth of a-axis orientation is enhanced by the plasma supply when $T_S < 660$°C. The authors discuss the mechanisms of a- or c-orientation in terms of surface migration and surface energy during growth.

The effects of oxygen plasma on the early stages of the growth of *Ca*-doped $Bi_2Sr_2CuO_6$ *(Bi-2201)* thin films on lattice-mismatched *MgO* (100) substrates have been investigated by M. Tada (Mie) et al. First an amorphous layer grows at the interface, and then the *Bi-2201* crystal grows on it. The authors found, however, that if the substrate surface is first cleaned by the oxygen plasma, the amorphous layer is reduced in thickness and the *Bi-2201* crystal grows earlier.

The growth of *Tl*-based high-T_c superconducting films prepared by aerosol deposition is reported in a preprint by G. Plesch (Comenius) et al. The authors describe their process techniques, which involve precursors of *Ba-Ca-Cu-O* or *Pb-Sr-Ba-Ca-Cu-O,* which are then thallinated.

Applications

Single and multiphase ac loss measurements in four-layer prototype multistrand conductors (PMCs) of length 1 m wound from HTS *[(Bi,Pb)-2223]* tape are reported by J. O. Willis (Los Alamos) et al. Single-phase losses were found to be purely hysteretic in nature and to vary approximately as I^3. Two-phase losses were measured with no current flowing in the PMC but with an external ac magnetic field generated by two normal conductors arranged at the remaining corners of an equilateral triangle forming a three-phase configuration. The two-phase loss measurements revealed two loss mechanisms with different frequency dependencies: one hysteretic in nature and the second eddy-current-like. The second term saturates near or above power-line frequencies. The magnitude of the total two-phase losses was found to vary approximately as $I^{2.6}$.

Measurements of the ac losses in short pieces (10 cm) of *Bi-2223/Ag* tape conductor in either a unidirectional field of arbitrary direction or a rotating magnetic field are reported by J. J. Rabbers et al. (Twente). The authors found that the magnetization loss in a rotating magnetic field can be described, in most cases, in terms of just the component of the magnetic field perpendicular to the wide face of the tape conductor. The component of the magnetic field parallel to the wide face produces a much smaller contribution to the losses.

A comprehensive data set on the losses of an untwisted *(Bi,Pb)-2223* multifilamentary tape at 77.4 K is presented in a paper by S. P. Ashworth and M. Suenaga (Brookhaven). These losses, measured using a recently developed calorimetric technique, reveal how an applied ac magnetic field interacts with an ac transport current of the same frequency to produce energy losses in the superconductor. The data indicate that the major interaction between the field and current occurs when the applied field is perpendicular to the tape face. This implies that the major contribution to the transport losses must come from the self magnetic field penetrating from the edges of the conductor, not from the faces.

Measurements of the total ac losses *Bi-2223/Ag* tapes in an applied magnetic field (parallel to the tape face but perpendicular to the length) have been measured by T. Hughes (Wollongong) et al. for tapes with twisted and untwisted filaments. The authors found that the losses

for the tape with twisted filaments (pitch = 10 mm) were considerably less than for a corresponding tape with untwisted filaments over the entire range of frequencies (37-200 Hz) and field amplitudes (< 45 mT).

A paper by X. S. Rao et al. (Singapore) reports an anomalous microwave response of *YBCO* microstrip resonators in the presence of a weak dc magnetic field H_{dc}. The authors found that the surface resistance R_S and reactance X_S show a correlated nonmonotonic behavior as a function of H_{dc}. Both R_S and X_S were found to initially decrease with elevated H_{dc} and then to increase after H_{dc} reached a crossover field H_c, which was independent of the amplitude and frequency of the microwave field.

Large fluctuating signals of microwave absorption in *Bi-2212* high-temperature superconductors have been found by K.-I. Itoh et al. (Mie) to be associated with the bubbling of liquid nitrogen. The authors note that this is a new bolometric function of the high-temperature superconductors.

The fabrication and investigation of ferroelectric-superconductor field-effect transistors (FSuFETs) consisting of *$YBa_2Cu_3O_{7-\delta}$ (YBCO)* channels and *$Pb(Zr_{0.54}Ti_{0.46})O_3$ (PZT)* gate insulators are described in a paper by R. Aidam et al. (Karlsruhe). To prevent degradation of the *YBCO* layer, a thin *$SrTiO_3$ (STO)* buffer layer was inserted between the *YBCO* and the *PZT*. Ferroelectric polarization charging effects were observed in *YBCO* channels thinner than 20 nm. Modulations of the resistivity, critical temperature, and critical current density reflected ferroelectric hysteresis of the *PZT* layer. The changes amounted to up to 10%, 1K, and 16%, respectively. The authors attribute the modulations and their polarity dependencies to a charging effect and p-type conduction in *YBCO*. Reversing the polarization state led to a nonvolatile change of the *YBCO* properties.

A preprint by A. Yu. Kidiyarova-Shevchenko (Chalmers University of Technology and Moscow State) et al. reports the investigation of different comparators for flash and Σ-Δ high-temperature-superconducting ADCs (analog to digital converters), designed using three-layer *YBCO* grain-boundary-junction integrated-circuit technology. The spread of junction critical currents was less than 10%, and the feature size was 0.6 μm. Using the theoretical estimations for the bit error rate in RSFQ (rapid single flux quantum) circuits under the restrictions of this technology, the authors estimated the optimal working temperature to be T = 62 K. At this temperature, the circuits were optimized to achieve maximum performance of the related ADCs in terms of input bandwidth, resolution, and operating margins. The authors also describe the development of a new method for inductance calculations with 3D magnetic-field distributions in multilayer superconducting technology, permitting the extraction of the inductance matrix of the equivalent circuit.

Book Chapter

Experiments using μSR (i.e., muon spin rotation, relaxation, or resonance) to investigate the fullerenes are reviewed in a book chapter by E. J. Ansaldo (Saskatchewan). One of the states of the muon is the quasi-free, diamagnetic state, in which the muon acts as a interstitial positively charged particle with a magnetic moment, which is sensitive to local magnetic fields such as those of the vortex lattice in superconducting *RbC_{60}*. The author notes that the vortex-lattice structure and the penetration depth obtained via μSR helped to determine the origin of superconductivity in the superconducting *A_xC_{60}* (*A* = alkali metal) compounds (41 refs.).

Contributed by John R. Clem

Contents:

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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.)*

Dec. 7 - 10, 1999:

6th European Vacuum Conference (EVC 6), Institut de Physique Nucléaire (IPNL), Villeurbanne, France. EVC 6 will provide an overview of research, technology, and special applications in the field of vacuum technology. Program includes four sessions: design, vacuum production, vacuum control, and quality. For further information, contact SFV–19, Rue du Renard, F-75004 Paris, France; phone +33 1 5301 9030; fax +33 1 4278 6320; e-mail sfv1@fd-online.net; Web site http://www.espid. org/evc6/.

*Feb. 20 - Feb. 25, 2000:

Sixth International Conference on Materials and Mechanisms of Superconductivity and High Temperature Superconductors (M^2S-HTSC-VI), George R. Brown Convention Center, Houston, Texas. Hosted by the Texas Center for Superconductivity at the University of Houston and sponsored by federal agencies and industry. Co-Chairs: C. W. Chu, W. K. Chu, and K. Salama. This series of meetings, established in 1988, is dedicated to superconductivity and related phenomena, and the host materials of these phenomena. The Conference will bring together members of the international low- and high-temperature superconductivity community to focus on recent insights into superconductor physics, materials, and devices. Emerging areas and future trends will also be highlighted. General conference topics include, but are not limited to, Experimental and Theoretical Studies of Superconducting Materials – low temperature, high temperature, fullerite, heavy fermion, organic, and new; Physical Properties – mechanisms, magnetic, electrical, optical, thermal, mechanical, and acoustic; Synthesis and Processing – thin films, superlattices, thick films, and bulk; and Applications – small current (SQUIDs, junctions, microwave devices) and large current (cables, transformers, motors, generators, magnetic levitation devices). For information, contact M^2S-HTSC-VI Conference Secretariat, Texas Center for Superconductivity, University of Houston, 3201 Cullen Boulevard, Houston, TX 77204-5932; telefax (713) 743-8216; Web site http://m2s-conf.uh.edu.

March 4 - 7, 2000:

International Workshop on Latest Developments in Low-Density and Low-Dimensional Electronic Systems, University of Florida, Department of Physics, Gainesville, Florida. Main theme of the workshop is the interplay between low dimensionality, low carrier density, and the transport and magnetic properties of novel materials. Program is organized in ascending dimension and includes the following topics: (0-D and 1-D) quantum dots, quantum wires, and nanotubes; (2-D) stripes in high-T_c materials, quantum Hall effect, metal-insulator transition at B=0, and superconductor-insulator transition; (3-D) itinerant ferromagnetism in low-density materials, magnetic field induced transitions, spin- and charge-density waves, and Kondo insulators. Special focus will be on the use of high magnetic fields at the National High Magnetic Field Laboratory in studies of low-density and low-dimensional materials. Invited talks and poster sessions. **Application deadline, February 1, 2000.** For information, contact Alan Dorsey, 2116 New Physics Bldg., Department of Physics, University of Florida, P.O. Box 118440, Gainesville, FL 32611-8440; telephone (352) 392-4031; telefax (352) 392-0524; e-mail dorsey@phys.ufl.edu; Web-site http://www.phys.ufl.edu/workshops/ld3.html.

May 22 - June 2, 2000:

NATO-ASI Modern Trends in Magnetostriction Study & Application, Kiev, Ukraine. Objectives: (1) to determine the state of the art of the basic and applied research of magnetostriction and related phenomena, (2) to define and prioritize directions of investigation for the future, (3) to consider new materials for common applications of magnetostriction-based devices, and (4) to formulate new perspectives on magnetostriction phenomena and applications, using advances in materials design and technology. Applications are invited from research students (financial support available) and from researchers (self-supported). For information, contact Institute for Low Temperature Physics & Engineering, 47 Lenin Avenue, 310164 Kharkov, Ukraine; telephone +380 572 321 223; telefax +380 572 322 370; e-mail ASI-2000@ilt.kharkov.ua.

Sept. 17 - 22, 2000:

The Applied Superconductivity Conference (ASC 2000), Pavilion Convention Center, Virginia Beach, Virginia. Premier conference on applied superconductivity held every two years. The meeting will highlight the latest developments and will feature invited presentations that offer an exciting look into the future. Papers solicited in three general areas of superconductivity: large scale, materials, and electronics. **Abstract deadline, February 11, 2000.** All abstracts must be submitted electronically. Further information available at the Web site http://www.ascinc.org.

RESOURCES

Information

New Book:

Handbook of Superconductivity, by Charles K. Poole. The present volume is the first handbook to address this field and covers both "classic" superconductivity-related topics and high T_c. Numerous properties including thermal, electrical, magnetic, mechanical, phase diagrams, and spectroscopic crystallographic structures are presented for many types of superconductors. Critical fields, critical currents, coherence lengths, penetration depths, and transition temperatures are tabulated. Key features: many data tables, crystallographic structures of over 100 supercon-

ductor types, summary of main results of several theories, and phase diagrams for synthesizing new superconductors. Publ. 1999; price $95; ISBN 0-12-561460-8. For orders, contact Academic Press, Inc., Order Fulfillment Department, 6277 Sea Harbor Drive, Orlando, FL 32887; e-mail apbcs@harcourtbrace.com; Web site http://www.apcatalog.com/.

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