

Abstracta

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P 001/04 à P 030/ 04

P 001- 04 "A two band model for superconductivity: Probing interband pair formation"

Lagos, R. E. and Cabrera, G. G.

We propose a two band model for superconductivity. It turns out that the simplest nontrivial case considers solely interband scattering, and both bands can be modeled as symmetric (around the Fermi level) and flat, thus each band is completely characterized by its half-band width W_n ($n=1,2$). A useful dimensionless parameter is δ , proportional to $W_2 - W_1$. The case $\delta = 0$ retrieves the conventional BCS model. We probe the specific heat, the ratio gap over critical temperature, the thermodynamic critical field and tunneling conductance as functions of δ and temperature (from zero to T_c). We compare our results with experimental results for MgB2 and Good quantitative agreement is obtained, indicating the relevance of interband coupling. Work in progress also considers the inclusion of band hybridization and general interband as well as intra-band scattering mechanisms.

Brazilian Journal of Physics 33[4], 713-717. 2003.

P 002- 04 "Analysis of mineral water from Brazil using total reflection X-ray fluorescence by synchrotron radiation"

Costa, A. C. M., Anjos, M. J., Moreira, S., Lopes, R. T., and de Jesus, E. F. O.

The total reflection X-ray fluorescence using synchrotron radiation (SRTXRF) has become a competitive technique for the determination of trace elements in samples that the concentrations are lower than 100 ng ml⁻¹. In this work, thirty-seven mineral waters commonly available in supermarkets of Rio de Janeiro, Brazil, were analyzed by SRTXRE. The measurements were performed at the X-Ray Fluorescence Beamline at Brazilian National Synchrotron Light Laboratory (LNLS), in Campinas, Sao Paulo, using a polychromatic beam with maximum energy of 20 keV for the excitation. Standard solutions with gallium as internal standard were prepared for calibration of the system. Mineral water samples of 10 μ l were added to Perspex sample carrier, dried under infrared lamp and analyzed for 200 s measuring time. It was possible to determine the concentrations of the following elements: Si, S, K, Ca, Ti, Cr, Mn, Ni, Cu, Zn, Ge, Rb, Sr, Ba and Pb. The elemental concentration values were compared with the limits established by the Brazilian legislation.

Spectrochimica Acta Part B-Atomic Spectroscopy 58[12], 2199-2204. 2003.

P 003- 04 "Anisotropy in MgB2"

de Lima, O. F. and Cardoso, C. A.

The first direct measurement of an anisotropic superconducting property in MgB2 was achieved for the bulk nucleation field H_{c2} , in a sample of aligned crystallites. It was found a ratio $\gamma(T) = H_{c2}(ab)/H_{c2}(c) = 1.6 - 1.9$, for T varying from 32 K to 26K, between H applied parallel to the ab plane, and along the c direction. The anisotropy of the induced critical current density was evaluated through the Bean model to be $J(c)(ab)/J(c)(c)$ approximate to 1.5. We present here a brief review of these studies in connection with current results found in the literature

Brazilian Journal of Physics 33[4], 709-712. 2003.

P 004- 04 "Avoided antiferromagnetic order and quantum critical point in CeCoIn5"

Bianchi, A., Movshovich, R., Vekhter, I., Pagliuso, P. G., and Sarrao, J. L.

We measured the specific heat and resistivity of heavy fermion CeCoIn5 between the superconducting critical field $H_{c2}=5$ T and 9 T, with the field in the [001] direction, and at temperatures down to 50 mK. At 5 T the data show a non-Fermi liquid (NFL) behavior down to the lowest temperatures. At the field above 8 T the data exhibit a crossover from the Fermi liquid to a non-Fermi liquid behavior. We analyzed the scaling properties of the specific heat and compared both the resistivity and the specific heat with the predictions of a spin-fluctuation theory. Our analysis leads us to suggest that the NFL behavior is due to incipient antiferromagnetism (AFM) in CeCoIn5 with the quantum critical point in the vicinity of H_{c2} . Below H_{c2} the AFM phase which competes with the paramagnetic ground state is superseded by the superconducting transition

Physical Review Letters 91[25]. 2003.

P 005 - 04 "Calcium magneto-optical trap loaded from a decelerated atomic beam"

Cavasso, R. L., Manoel, D. A., Ortega, D. R., Scalabrin, A., Pereira, D., and Cruz, F. C.

We describe a new system for laser cooling and trapping of neutral Calcium atoms employing the $S-1(0) - P-1(1)$ resonant transition at 423 nm. An on-axis magneto-optical trap (MOT) is loaded from a Zeeman decelerated atomic beam. When a single laser is used, in order to avoid perturbation of the trap by the deceleration laser beam, this one has been tightly focused near the MOT center, with a waist size much smaller than the atomic cloud. In order to test the efficiency of this novel technique, we have then employed a second, independent decelerating laser, with a profile mode matched to the atomic beam. For an oven temperature of 580degreesC this system can load $1.2 (2) \times 10(7)$ atoms in 16 (1) μ s. By the spatial extension of the atomic cloud the one dimension rms velocity was estimated to be 136 (12) cm/s, corresponding to a temperature of 9 (2) mK. The variation of the number of trapped atoms as a function of laser detuning and intensity, trap magnetic field gradient and oven temperature is analyzed. Spatial structures of the trapped atoms, like stable rings created by vortex forces, have been observed. This is the first time that these structures, already observed in alkali-metal elements, are reported in MOTs of alkaline-earth elements

Brazilian Journal of Physics 33[2], 355-362. 2003.

P 006 -04 "CNGS beam monitor with the LVD detector"

Aglietta, M., Antonioli, P., Bari, G., Castagnoli, C., Fulgione, W., Galeotti, P., Garbini, M., Ghia, P. L., Giusti, P., Kemp, E., Malguin, A. S., Menghetti, H., Pesci, A., Pless, I. A., Porta, A., Rysasny, V. G., Ryazhskaya, O. G., Saavedra, O., Sartorelli, G., Selvi, M., Vigorito, C., Votano, L., Yakushev, V. F., Zatsepin, G. T., and Zichichi, A.

The importance of an adequate CNGS beam monitor at the Gran Sasso Laboratory has been stressed in many papers. Since the number of internal $\nu(\mu)$ CC and NC interactions in the various detectors will not allow to collect statistics rapidly, one should also be able to detect the $\nu(\mu)$ CC interactions in the upstream rock. In this study, we have investigated the performances of the LVD detector as a monitor for the CNGS neutrino beam. Thanks to its wide area (13×11 m²) orthogonal to the beam direction) LVD can detect about 120 muons per day originated by $\nu(\mu)$ CC interactions in the rock. The LVD total mass is similar to 2 kt. This allows to get 30 more CNGS events per day as internal (NC + CC) $\nu(\mu)$ interactions, for a total of similar to 150 events/day. A 3% statistical error can be reached in 7 days. Taking into account the time characteristics of the CNGS beam, the cosmic muon background can be reduced to a negligible level, of the order of 1.5 events/day.

Nuclear Instruments & Methods in Physics Research Section A-Accelerators Spectrometers Detectors and Associated Equipment 516[1], 96-103. 2004.

P 007 - 04 "Consolidation and break-up of the South American platform in southeastern Brazil: Tectonothermal and denudation histories"

Hackspacher, P. C., Ribeiro, L. F. B., Ribeiro, M. C. S., Fetter, A. H., Neto, J. C. H., Tello, C. E. S., and Dantas, E. L.

The different tectonic stages that occurred at the end of the Proterozoic and during the Phanerozoic have an important bearing on the tectonothermal history of the South American Platform and its consolidation. Geochronological data (U/Pb monazite, Ar-40/Ar-39 whole rock) and apatite fission-track analysis, from Precambrian rocks of the southeastern Brazilian coastline, permit the modeling of a long-term thermal history of the crust and constrain variable denudation rates. Using these data, a temperature-time diagram reflects a period of accelerated exhumation during the end of the Brasiliano Orogeny, followed by long stability and reactivation of the platform during the Rifting Phase of the South Atlantic Ocean. U/Pb zircon and monazite (blocking temperature of ca. 650degreesC) data from a series of igneous bodies suggest that a tangential and transpressional tectonic regime occurred between 625 and 610 Ma. During the following escape tectonics, between 610 and 590 Ma the exhumation process indicates cooling rates of ca. 12degreesC/Ma. Ar-40/Ar-39 biotite ages between 540 and 510 Ma (ca. 300degreesC) and a corrected fission-track age on apatites (100degreesC) of 480 Ma indicate an exhumation event related to block tectonics with huge vertical displacement along shear zones. A long stabilization phase, with low exhumation, and cooling rate around 0.25degreesC/Ma was recorded from the Cambro/Ordovician to the Mesozoic. At 65 Ma an acceleration of the exhumation through denudation and reworking of the South American surface with cooling rate of 1.5degreesC/Ma is observed. The uplift of the Mantiqueira and Serra do Mar mountain ranges along the southeast Brazilian coastline works as a climatic barrier provoking lateral erosional processes causing long-term scarp retreat, combined with intense, but progressive denudation towards the continent. A denudation of 2.5 to 4 km was calculated for such processes. This lateral retreat of escarpments and flexural response can provide important insights regarding marginal isostatic uplift and the evolution of offshore sedimentary basins of southeast Brazil

Gondwana Research 7[1], 91-101. 2004.

P 008 - 04 "Distinguishing models for the pseudo-gap in cuprate superconductors by probing the spatial distribution of impurity states"

Kubert, C.

We argue that the spatial distribution of resonant impurity states in underdoped high-T_c superconductors serves as a probe for distinguishing different theoretical models for the pseudogap state. Superconducting pairing fluctuations are characterized by off-diagonal short-range order which distinguishes them from other possible instabilities that could give rise to the pseudogap phenomena. Due to the mixture of particle and hole states in a superconductor an impurity resonant state is composed of both a particle and a hole-like component. On the contrary a state with a gap induced by a particle-hole instability, like a d-density wave (DDW) or spin-density wave (SDW), exhibits no off-diagonal short-range order and consequently a resonant impurity state consists of only one either particle or hole-like component. Furthermore, a charge-spin separated state shows no resonance state at all inside the gap region

Brazilian Journal of Physics 33[4], 754-757. 2003.

P 009- 04 "Double-helix current drive revisited"

Clemente, R. A. and Farengo, R.

The conditions required for efficient Current drive in a weakly resistive plasma column, subject to a double helix traveling magnetic field, are examined in detail by using a simple non-linear Ohm's law for the plasma. In agreement with previous numerical work on the subject by Bertram [5], it is shown that field penetration is indeed strongly limited when large external bias longitudinal magnetic fields are used. However, there is a range of small external bias fields that allow for significant penetration when reasonable driving fields are used. This should be of interest for sustaining reversed-field pinches and toroidal screw pinches

Brazilian Journal of Physics 33[4], 867-872. 2003.

P 010- 04 "Effects of the antimicrobial peptide PGLa on live Escherichia coli"

da Silva, A. and Teschke, O.

The activity of PGLa, an antimicrobial peptide isolated from hemocytes of frog skin and its secretions on living Escherichia coli, was investigated by imaging the cells with atomic force microscopy (AFM) in physiological conditions and by measuring its cellular stiffness. The treatment of bacteria with the antimicrobial peptide PGLa in the culture medium had two stages. The first was characterized by the loss of surface stiffness and consequent loss of bacteria topographic features and the formation of micelles probably originating from the disruption of the outer membrane. The formation of outer membrane originated micelles is in agreement with the carpet-like mechanism of action proposed for antimicrobial peptides of the magainin family. The peptide action also resulted in the removal of bacterial pili. In a second stage there was further damage which resulted in total cell rupture. The addition of Mg²⁺ ions prior to peptide treatment partially inhibited the effects of PGLa on bacteria. This result suggests that PGLa interacts with the outer membrane by displacing Mg²⁺ from LPS, inserting itself into the bilayer and cross-bridging the negative charges of LPS lipids as proposed in the self-promoted pathway mechanism. The peptide effect on the bacteria was compared to the activity of the chelating agent EDTA that damages the bacterial outer membrane by removing Mg²⁺ ions.

Biochimica et Biophysica Acta-Molecular Cell Research 1643[1-3], 95-103. 2003.

P 011 -04 "Elastic positron scattering by C2H2: Differential cross sections and virtual state formation"

de Carvalho, C. R. C., Varella, M. T. D., Lima, M. A. P., and da Silva, E. P.

We present calculated elastic differential cross sections for positron-acetylene scattering, obtained by using the Schwinger multichannel method. Our results are in very good agreement with quasielastic experimental data of Kauppila [Nucl. Instrum. Meth. Phys. Res. B 192, 162 (2002)]. We also discuss the existence of a virtual state (zero-energy resonance) in e⁽⁺⁾-C₂H₂ collisions, based on the behavior of the integral cross section and of the s-wave phase shift. As expected the fixed-nuclei cross section and annihilation parameter (Z_{eff}) present the same energy dependence at very low impact energies. As the virtual state energy approaches zero, the magnitude of both cross section and Z_{eff} are extremely enhanced (at zero impact energy). The possibility of shifting from a low-lying virtual state to a shallow bound state is not expected to significantly affect room-temperature annihilation rates

Physical Review A 68[6]. 2003.

P 012 -04 "Estimate of control voltage tolerances for a photo-electron Analyzer of toroidal design"

Azimonte, C., de Castro, A. R. B., Tadich, A., Riley, J. D., and Leckey, R. C. G.

We have run electron optics simulations and determined the tolerance in the control voltages of all elements (retarding input lens, analyzer, accelerating exit lens) of the La Trobe University photoelectron analyzer, recently redesigned to reach a spectral resolution of 5000, and which will be installed at LNLS (Campinas Brasil) and BESSY II (Berlin, Germany)

Brazilian Journal of Physics 33[4], 788-791. 2003.

P 013-04 "Fishtail effect studied by ac susceptibility in ErBa₂Cu₃O₇-delta single crystal"

Cardoso, C. A. and de Lima, O. F.

The second magnetization peak (SMP), also known as the fishtail effect, is studied by a scaling procedure for ac susceptibility measurements. From this scaling law the frequency dependence of the critical current $J_c(nu)$ and the flux creep exponent n can be determined. A striking correlation between n and the SMP is observed, which indicates a clear change in the rate of flux creep around the peak position. This result points to the relevance of the dynamical contribution for the peak formation. However, we could not observe a transition between two different regimes of vortex motion at the SMP. The dependence of the SMP with sample dimensions is also discussed.

Journal of Applied Physics 95[3], 1301-1306. 2004.

P 014 - 04 "Graphite as a bose metal"

Kopelevich, Y.

Although a considerable amount of the research work has been done on graphite, its physical properties are still not well understood, and novel phenomena such as the magnetic-field-driven metal-insulator transition (MIT), the quantum Hall effect, ferromagnetic and superconducting correlations have recently been revealed. Theoretical analysis suggests that the MIT in graphite is the condensed-matter realization of the magnetic catalysis phenomenon known in relativistic theories of $(2 + 1)$ -dimensional Dirac fermions (DF), i. e. that the applied field opens an insulating gap in the spectrum of DF, associated with the electron-hole pairing. On the other hand, we demonstrate in this paper that a two parameter scaling analysis proposed by Das and Doniach [D. Das and S. Doniach, Phys. Rev. B 64, 134511 (2001)] to characterize the magnetic-field-tuned Bose metal - insulator transition can be well applied to the MIT observed in graphite. We discuss the possibility that the MIT in graphite is associated with the transition between Bose metal and excitonic insulator states.

Brazilian Journal of Physics 33[4], 737-739. 2003.

P 015 - 04 "Local superconductivity and ferromagnetism interplay in graphite-sulfur composites"

Moehlecke, S., Kopelevich, Y., and Maple, A. B.

The superconductivity of graphite-sulfur composites is highly anisotropic and associated with the graphite planes. The superconducting state coexists with the ferromagnetism of pure graphite, and a continuous crossover from superconducting to ferromagnetic-like behavior could be achieved by increasing the magnetic field or the temperature. The angular dependence of the magnetic moment $m(\alpha)$ provides evidence for an interaction between the ferromagnetic and the superconducting order parameters.

Brazilian Journal of Physics 33[4], 762-765. 2003.

P 016- 04 "MHD solar fluctuations and solar neutrinos"

Reggiani, N., Guzzo, M. M., and de Holanda, P. C.

We analyze how solar neutrino experiments could detect time fluctuations of the solar neutrino flux due to magnetohydrodynamic (MHD) perturbations of the solar plasma. We state that if such time fluctuations are detected, this would provide a unique signature of the Resonant Spin-Flavor Precession (RSFP) mechanism as a solution to the Solar Neutrino Problem.

Brazilian Journal of Physics 33[4], 767-774. 2003.

P 017- 04 "Near band-edge optical properties of cubic GaN with and without carbon doping"

Fernandez, J. R. L., Cerdeira, F., Meneses, E. A., Soares, J. A. N. T., Noriega, O. C., Leite, J. R., As, D. J., Kohler, U., Salazar, D. G. P., Schikora, D., and Lischka, K.

We report the results of studying the optical properties of cubic GaN thin films with photoluminescence and photoluminescence excitation spectroscopies. The films are deposited by plasma-assisted molecular beam epitaxy on GaAs (001) substrates, with and without intentional doping with carbon atoms (p-type doping). The evolution of the optical spectra of the C-doped samples is consistent with a picture in which carbon enters into N-vacancies at low concentrations, producing a marked improvement in the crystalline properties of the material. At higher concentrations it begins to form complexes, possibly due to interstitial occupation. The temperature dependence on the absorption edge of the doped material is also measured and is analyzed with standard theoretical models. (C) 2004 Elsevier Ltd. All rights reserved

Microelectronics Journal 35[1], 73-77. 2004.

P 018- 04 "Near infra-red photoluminescence of Nd³⁺ in hydrogenated amorphous silicon sub-nitrides a-SiN_x : H < N >"

Biggemann, D. and Tessler, L. R.

Neodymium-doped hydrogenated amorphous silicon sub-nitrides a-SiN_x:H(Nd) thin films were deposited by rf-sputtering using a Si target partially covered by metallic Nd chips and Ar + N₂ + H₂ sputtering gas. Characteristic Nd³⁺ near infra-red (NIR) photoluminescence (PL) was detected between 10 and 300 K with peaks at similar to 935, similar to 1090 and similar to 1390nm, corresponding to the intra-4f transitions F-4(3/2) -> I-4(9/2), F-4(3/2) -> I-4(11/2) and F-4(3/2) -> I-4(13/2), respectively. Measurements using different excitation wavelengths indicate that the Nd³⁺ excitation occurs through the a-SiN_x:H matrix. Varying the nitrogen content x from 0 to nearly 1.3 increases the matrix bandgap. The PL efficiency is maximum when the bandgap corresponds to twice the F-4(3/2) -> I-4(9/2) transition, indicating a defect-related energy transfer mechanism. The temperature quenching can be as low as less than a factor 3 between 10 and 300 K for 2.8 eV gap samples. Thermal annealing can enhance the PL intensity by a factor 10. Neodymium concentrations above similar to 3 x 10²⁰ atoms/cm³ slightly reduce the PL intensity probably due to excess of inactive defect centers. Along with erbium-doped amorphous silicon alloys, a-SiN_x:H(Nd) can be used in the development of photonic devices in the future. (C) 2003 Published by Elsevier B.V

Materials Science and Engineering B-Solid State Materials for Advanced Technology 105[1-3], 188-191. 2003.

P 019- 04 "Phase separation, effects of biaxial strain, and ordered phase formations in cubic nitride alloys"

Teles, L. K., Marques, M., Ferreira, L. G., Scolfaro, L. M. R., and Leite, J. R.

The thermodynamics as well as the energetics and the structural properties of cubic group-III nitrides alloys have been investigated by combining first-principles total energy calculations and cluster expansion methods. In particular results are shown for the ternary $\text{In}_x\text{Ga}_{1-x}\text{N}$ and the quaternary $\text{Al}_x\text{Ga}_y\text{In}_{1-x-y}\text{N}$ alloys. Phase separation is predicted to occur at growth temperatures, for both fully relaxed alloys. A remarkable influence of an external biaxial strain on the phase separation, with the formation of ordered phase structures has been found for the InGaN alloy. These findings are used to clarify the origin of the light emission process in InGaN -based optoelectronic devices. Results are shown for the composition dependence of the lattice constant and of the energy gap in quaternary $\text{Al}_x\text{Ga}_y\text{In}_{1-x-y}\text{N}$ alloys. (C) 2004 Elsevier Ltd. All rights reserved.

Microelectronics Journal 35[1], 53-57. 2004.

P 020- 04 "Properties of localized pulses through the analysis of temporal modulation effects in Bessel beams and the convolution theorem"

Dartora, C. A., Nobrega, K. Z., Hernandez-Figueroa, H. E., and Recami, E.

In this paper we analyze the effects of the time modulation of (zeroth-order) Bessel beams, by considering a few different pulse shapes. Namely, three modulating functions are considered: a train of rectangular waves, a single rectangular pulse, and a gaussian pulse. The influence of the carrier frequency, and of shape and spectral bandwidth of the modulating function, is also discussed; while further support to our results is met by using the convolution technique in the time domain. At the beginning, a brief review of the X-shaped solutions to the wave equation, and of some properties of theirs, is presented. (C) 2003 Elsevier B.V. All rights reserved

Optics Communications 229[1-6], 99-107. 2004.

P 021- 04 "Rabi oscillations, coherent properties, and model qubits in two-level donor systems under terahertz radiation"

Brandi, H. S., Latge, A., and Oliveira, L. E.

Quantum confinement, magnetic-field effects, and laser coupling with the two low-lying states of electrons bound to donor impurities in semiconductors may be used to coherently manipulate the two-level donor system in order to establish the appropriate operational conditions of basic quantum bits (qubits) for solid-state based quantum computers. Here we present a theoretical calculation of the damped Rabi oscillations and time evolution of the $1s$ and $2p(+)$ donor states in bulk GaAs under an external magnetic field and in the presence of terahertz laser radiation, and their influence on the measured photocurrent. We also discuss the possible experimental conditions under which decoherence is weak and qubit operations are efficiently controlled

Physical Review B 68[23]. 2003.

P 022 - 04 "Self-stabilized holographic recording in reduced and oxidized lithium niobate crystals"

de Oliveira, I., Frejlich, J., Arizmendi, L., and Carrascosa, M.

We investigate the behavior of non-stabilized and self-stabilized holographic recording kinetics in reduced and oxidized Fe-doped lithium niobate crystals. We show that self-stabilization modifies the recording process, always leads to 100% diffraction efficiency gratings for widely varying experimental conditions and any degree of oxidation and produces, in general, running holograms. The main features of self-stabilized recording are explained using the conventional dynamic coupled wave theory. The present conclusions are applicable to other photorefractive materials either photovoltaic or not.

Optics Communications 229[1-6], 371-380. 2004.

P 023 - 04 "Semiclassical coherent-state propagator via path integrals with intermediate states of variable width"

Parisio, F. and de Aguiar, M. A. M.

We derive a semiclassical approximation for the coherent state propagator $\langle z'' | e^{-iHt/\hbar} | z' \rangle$ using a path integral formulation in which the intermediate coherent states can have arbitrary widths. Our semiclassical formula involves complex trajectories of the smoothed Hamiltonian $H(q,p,b) = \langle z | H \rangle / \langle z | z \rangle$ where b , the width of the coherent state $|z\rangle$, is a free function that can be chosen conveniently. The generality of this formalism enables us to derive a semiclassical approximation which contains, as particular cases, other similar approximations known in the literature, providing a natural link between them. We present numerical results showing that the semiclassical propagation can be very sensitive to the choice of b and we suggest an energy dependent value $b=b(E)$ that results in considerable improvement over other choices. This value for the width will be generally different from the widths σ_i or σ_f of the initial and final states $|z_i\rangle$ and $|z_f\rangle$

Physical Review A 68[6]. 2003.

P 024 - 04 "Small angle x-ray scattering from lipid-bound myelin basic protein in solution"

Haas, H., Oliveira, C. L. P., Torriani, I. L., Polverini, E., Fasano, A., Carlone, G., Cavatorta, P., and Riccio, P.

The structure of myelin basic protein (MBP), purified from the myelin sheath in both lipid-free (LF-MBP) and lipid-bound (LB-MBP) forms, was investigated in solution by small angle x-ray scattering. The water-soluble LF-MBP, extracted at $\text{pH} < 3.0$ from defatted brain, is the classical preparation of MBP, commonly regarded as an intrinsically unfolded protein. LB-MBP is a lipoprotein-detergent complex extracted from myelin with its native lipidic environment at $\text{pH} > 7.0$. Under all conditions, the scattering from the two protein forms was different, indicating different molecular shapes. For the LB-MBP, well-defined scattering curves were obtained, suggesting that the protein had a unique, compact (but not globular) structure. Furthermore, these data were compatible with earlier results from molecular modeling calculations on the MBP structure which have been refined by us. In contrast, the LF-MBP data were in accordance with the expected open-coil conformation. The results represent the first direct structural information from x-ray scattering measurements on MBP in its native lipidic environment in solution.

Biophysical Journal 86[1], 455-460. 2004.

P 025 - 04 "Temperature independent Er³⁺ photoluminescence lifetime in a-Si:H and a-SiO_x:H"Er"

Tessler, L. R. and Biggemann, D.

The photoluminescence (PL) lifetime of Er³⁺ in a-Si:H<Er> and a-SiO_x:H<Er> was measured between 15 and 300 K in a set of samples containing similar to 1 at.% Er and up to similar to 10 at.% O. The room temperature PL intensity increased and the temperature quenching decreased with O content. The maximum PL intensity at 15 K, however, is obtained from samples with no intentional oxygen added. The PL lifetimes were obtained using the quadrature frequency resolved spectroscopy (QFRS) technique. The QFRS signal was well fitted supposing two lifetimes, the fast decay in the 20-150 ns range and the slow decay in the 200-830 ns range, consistently increasing with the O content of the samples. For all samples both the fast and the slow lifetimes did not depend on the temperature within experimental uncertainty. Our results are interpreted supposing two different lattice sites for Er³⁺ in the hosts. Moreover, the de-excitation of the Er³⁺ ions by multiple phonon emission is negligible in this class of materials.

Materials Science and Engineering B-Solid State Materials for Advanced Technology 105[13], 165-168. 2003.

P 026- 04 "Theoretical investigations on giant magnetocaloric effect in MnAs_{1-x}Sb_x"

von Ranke, P. J., de Oliveira, N. A., and Gama, S.

In this work we apply a model to describe the magnetocaloric effect for the MnAs_{1-x}Sb_x series of compounds, 0 less than or equal to x less than or equal to 0.4. The behavior of the material under first order phase transitions is well described, and we are able to obtain the magnetocaloric potential for the series of compounds presenting first order magnetic phase transitions. Based on these results we predict the performance of a composite comprising a combination of compositions of this compound to work as active element in a magnetic refrigerator using an Erickson cycle spanning a great temperature range down from room temperature.

Physics Letters A 320[4], 302-306. 2004.

P 027- 04 "Thermodynamic properties of the periodic Anderson model: X-boson treatment"

Franco, R., Figueira, M. S., and Foglio, M. E.

We study the specific-heat dependence of the periodic Anderson model (PAM) in the limit of U=infinity employing the X-boson treatment in two different regimes of the PAM: the heavy fermion Kondo (HF-K) and the local magnetic moment regime (HF-LMM). We obtain a multiple peak structure for the specific heat in agreement with the experimental results as well as the increase of the electronic effective mass at low temperatures associated with the HF-K regime. The entropy per site at low T tends to zero in the HF-K regime, corresponding to a singlet ground state, and it tends to k(B)ln 2 in the HF-LMM, corresponding to a doublet ground state at each site. The linear coefficient gamma(T)=C-v(T)/T of the specific heat qualitatively agrees with the experimental results obtained for different materials in the two regimes considered here.

Physical Review B 68[20]. 2003.

P 028- 04 "Trace elements determination in red and white wines using total-reflection X-ray fluorescence"

Anjos, M. J., Lopes, R. T., de Jesus, E. F. O., Moreira, S., Barroso, R. C., and Castro, C. R. F.

Several wines produced in different regions from south of Brazil and available in markets in Rio de Janeiro were analyzed for their contents of elements such as: P, S, Cl, Ca, Ti, Cr, Mn, Fe, Ni, Cu, Zn, Rb and Sr. Multi-element analysis was possible with simple sample preparation and subsequent analysis by total-reflection X-ray fluorescence using synchrotron radiation. The measurement was carried at the X-ray fluorescence beamline in the Synchrotron Light Source Laboratory in Campinas, Brazil. The levels of the various elements obtained were lower in the Brazilian wines than the values generally found in the literature. The present study indicates the capability of multi-element analysis for determining the contents of various elements present in wines coming from Brazil vineyards by using a simple, sensitive and precise method.

Spectrochimica Acta Part B-Atomic Spectroscopy 58[12], 2227-2232. 2003.

P 029- 04 "Wave-function mapping conditions in open quantum dot structures"

Mendoza, M. and Schulz, P. A.

We discuss the minimal conditions for wave-function spectroscopy, using resonant tunneling as the measurement tool, in open quantum dots. The present results establish a parameter region where the wave-function spectroscopy by resonant tunneling can be achieved. A breakdown of the mapping condition is related to a change into a double quantum dot structure induced by the local probing potential. The precise control over shape and extension of the potential probes is irrelevant for wave-function mapping. Moreover, the present system is a realization of a tunable Fano system beyond the wave-function mapping regime, as well as a system where the states can be selectively manipulated

Physical Review B 68[20]. 2003.

P 030- 04 "X-ray multiple diffraction as a probe to determine all the piezoelectric coefficients of a crystal: Rochelle salt case"

dos Santos, A. O., Cardoso, L. P., Sasaki, J. M., Miranda, M. A. R., and Meo, F. E. A.

The x-ray multiple diffraction method, which allows us to determine the piezoelectric coefficients of a single crystal under an external electric field (E), was applied to Rochelle salt (dos Santos et al 2001 J. Phys.: Condens. Matter 13 10497) for E parallel to the piezoelectric Y direction. In this work, the theory was extended to consider an observed monoclinic-triclinic distortion under E application into the other two piezoelectric X and Z directions. Renninger scans carried out using the chosen (060) primary reflection have provided the four remaining coefficients through the measurement of the properly chosen Secondary peaks. so that all eight piezoelectric coefficients (d(14), d(16), d(21), d(22), d(23), d(2), d(34) and d(36)) for Rochelle salt were determined. *Journal of Physics-Condensed Matter* 15[46], 7835-7842. 2003.

Abstracta

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