

Abstracta

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Trabalhos Aceitos para Publicação
A038-01 à A042-01

Trabalho Aceito para Congresso
C008-01 à C009-01

Livros Publicados
L001-01 à L003-01

Trabalhos Publicados
P062-01 à P091-01

ACCEPTED PAPERS

[A038-01] "The Finite Temperature Random Phase Approximation as a Coupled-channel Problem and the Implementation of the Single-channel Random Phase Approximation SCRPA for the He atom in a Finite Temperature Dense Plasma."

G. Csabak and G. D. Meneses

A theoretical approach for the description of "excited states" of an atom/ion in hot and dense plasmas is presented. It is based on the random phase approximation (RPA) for finite temperature fermion systems discussed earlier by des Cloizeaux and Csanak and Kilcrease. It is shown here that after angular momentum and spin analysis is performed, the fundamental equations of the finite temperature RPA equations obtain the form of a coupled channel, coupled component integro-differential equation system, just as in the $T=0$ temperature case. Subsequently, the single-channel, uncoupled component approximation is introduced. A computer code written for this approximation was tested and results for He plasma at $kT=10\text{eV}$ and densities ranging from 10^{18} to 10^{23} atoms/cc are presented and discussed.

Journal of Quantitative Spectroscopy & Radiative Transfer 71 (2-6), 281-294, 2001

[A039-01] "Semiclassical Approximation in Phase Space with Coherent States."

M. Baranger, M. A. M. Aguiar, F. Keck, H. J. Korsch, and B. Schellhaaß

We present a complete derivation of the semiclassical limit of the coherent state propagator in one dimension, starting from path integrals in phase space. We show that the arbitrariness in the path integral representation, which follows from the overcompleteness of the coherent states, results in many different semiclassical limits. We explicitly derive two possible semiclassical formulae for the propagator, we suggest a third one, and we discuss their relationships. We also derive an initial value representation for the semiclassical propagator, based on an initial gaussian wavepacket. It turns out to be related to, but different from, Heller's thawed gaussian approximation. It is very different from the Herman-Kluk formula, which is not a correct semiclassical limit. We point out errors in two derivations of the latter. Finally we show how the semiclassical coherent state propagators lead to WKB-type quantization rules and to approximations for the Husimi distributions of stationary states.

Journal of Physics A: Mathematical and General 34 (36), 7227, 2001

[A040-01] "Magnetic Carbon."

Tatiana L. Makarova, Bertil Sundqvist, Pablo Esquinazi, Roland Höhne, Yakov Kopelevich, Peter Scharff, Valerii Davydov, Ludmila S. Kashevarova, and Aleksandra V. Rakhmanina.

The discovery of nanostructured forms of molecular carbon has led to a renewed interest in the amazingly varied properties of this element. Both graphite and C₆₀ can be doped by alkali metals to become superconducting. For doped C₆₀, critical temperatures T_c may exceed 30 K, and pure C₆₀ can be hole doped in a FET geometry to reach $T_c = 52$ K. Also, recent experiments and theory have suggested that electronic instabilities in pure graphite may give rise to superconducting and ferromagnetic properties even at room temperature. Searching for superconductivity in polymerised C₆₀, we have instead serendipitously discovered strong magnetic signals, including a large hysteresis, in rhombohedral C₆₀. It appears that high pressure - high temperature treatment of C₆₀ to produce a two-dimensional polymer may also result in a magnetically ordered state. This state shows features typical of ferromagnetic behaviour: saturation magnetisation, a hysteresis loop, and attachment to a magnet at room temperature. The temperature dependence of the saturation and remanent magnetisation shows a Curie point near 500 K.

Nature 413, 716-718, 2001

[A041-01] "Indication of Superconductivity at 35 K in Graphite-Sulfur Composites."

R. Ricardo da Silva, J. H. S. Torres, and Y. Kopelevich.

We report magnetization measurements performed on graphite-sulfur composites which demonstrate a clear superconducting behavior below the critical temperature $T_{c0} = 35$ K. The Meissner-Ochsenfeld effect, screening supercurrents, and magnetization hysteresis loops characteristic of type-II superconductors were measured. The results indicate that the superconductivity occurs in a small sample fraction, possibly related to the sample surface.

Physical Review Letters 87[14], 147001, 2001

[A042-01] "Energy Transport in a Mesoscopic Thermo-Hydrodynamics."

David Jou, José Casas-Vásquez, J. R. Madureira, A. R. Vasconcelos, and R. Luzzi.

We analyse the question of transport of energy in fluids, done, for specificity, for the case of a system of fermions interacting with a boson system. Resorting to a generalized thermo-hydrodynamics based on a nonequilibrium ensemble formalism, the so-called MaxEnt-NESON, we derive the equations of evolution for the energy density and its first and second fluxes in a truncated description. It is obtained a generalized Fourier's law, relating the flux of energy with extended thermodynamic forces which include contributions of the Guyer-Krumhansl-type. An extended evolution equation for the density of energy is derived, and the conditions when it goes over restricted forms of the type of the telegraphist equation and the traditional Fourier heat diffusion equation are discussed.

Journal of Modern Physics B 15[32], 4211-4222, 2001

ACCEPTED PAPERS FOR CONFERENCE

[C008-01] "Dynamics of two atoms coupled to a cavity field."

A. Vidiella-Barranco, J.A. Roversi and H. Moya-Cessa

We investigate the interaction of two two-level atoms with a single mode cavity field. One of the atoms is exactly at resonance with the field, while the other is well far from resonance and hence is treated in the dispersive limit. We obtain the exact total system's time dependent state vector, and find that the presence of the non-resonant atom produces a shift in the Rabi frequency of the resonant atom, as if it was detuned from the field. We discuss the (individual) evolution of the three subsystems, two atoms and the field, by focusing on their reduced density operators.

8th Rochester Conference on Coherence and Quantum Optics, Rochester, USA, June 13-16, 2001, accepted on May, 2001.

[C009-01] "Generation of Bell-like States using Cold Ions in a Cavity."

F.L. Semiao, A. Vidiella-Barranco and J.A. Roversi

We present a novel method of generation of Bell-type entangled states of light and the vibrational motion of a single trapped ion. The trap itself is supposed to be placed inside a high Q cavity sustaining a single mode quantized electromagnetic field. Entangled light-motional states may be readily generated if a conditional measurement of the ion's internal electronic state is made after an appropriate interaction time and a suitable preparation of the initial state. We show that all four Bell states may be generated using different motional sidebands (either blue or red), as well as adequate ionic relative phases.

7th International Conference on Squeezed States and Uncertainty Relations, Boston, USA, June 4-8, 2001, accepted on May, 2001.

ACCEPTED PAPERS FOR BOOKS PUBLISHED

[L001-01] "Optical Properties of Dielectric and Semiconductors Thin Films"

I. Chambouleyron, and J. M. Martinez,

To be published in Vol. 3, Handbook of Thin Film Materilas, Ed. H. Nalwa(Academic Press, USA) Ch.12.

[L002-01] "Current-Induced Superconductor-Insulator Transition in Granular High-Tc Superconductors."

Y. Kopelevich, C. A. M. dos Santos, S. Moehlecke, and A. J. S. Machado.

To be published in International Book Serie: studies of high temperature superconductors, v.39, p.201, Ed. a. V. Narlikar (Nova Sci. Pub., N. York, 2001).

[L003-01] "Regulação Energética e Meio Ambiente: proposta para a região amazônica isolada."

Ennio Peres da Silva e Carla Kazue Nakao Cavaliero.

Este livro apresenta um estudo de caso na Região Amazônica Brasileira, no qual se analisa a situação energética desta região eletricamente isolada do país e verifica-se a aplicabilidade de mecanismos regulatórios, incentivos, etc. no que se refere à geração de energia elétrica descentralizada, como é a situação atual de boa parte da Região Amazônica. Ênfase especial é dada às fontes renováveis de energia, procurando-se minimizar os impactos ambientais decorrentes da geração, distribuição e usos da energia, uma vez que a região considerada apresenta uma enorme biodiversidade, ainda pouco conhecida, e tem sido alvo de preocupações constantes no Brasil e no exterior.

Publicação: NIFE ; Série: Políticas Públicas, Planejamento e Regulação dos Mercados de Energia.

PUBLISHED PAPERS

[P062-01] "Acceleration, streamlines and potential flows in general relativity: analytical and numerical results".

Ujevic, M. and Letelier, P. S.

Analytical and numerical solutions for the integral curves of the velocity field (streamlines) of a steady-state flow of an ideal fluid with a $p = \rho$ equation of state are presented. The streamlines associated with an accelerate black hole and a rigid sphere are studied in some detail, as well as the velocity fields of a black hole and a rigid sphere in an external dipolar field (constant acceleration field). In the latter case the dipole field is produced by an axially symmetric halo or shell of matter.

For each case the fluid density is studied using contour lines. We found that the presence of acceleration is detected by these contour lines. To the best of our knowledge this is the first time that the integral curves of the velocity field for accelerated objects and related spacetimes have been studied in general relativity.

Classical and Quantum Gravity 18[15], 2917-2932. 2001.

[P063-01] "Angular alignment of a polarization-maintaining optical fiber".

Maionchi, D. D., Campos, W., and Frejlich,

We describe a simple, fast, and accurate technique for the angular alignment of a polarization-maintaining monomode optical fiber. The method uses simple mechanical supports and is based on the detection of the ellipticity of the light polarization at the fiber output, with the help of a simple rotating polarizer, a photodetector, and an oscilloscope.

J. Optical Engineering 40[7], 1260-1264. 2001.

[P064-01] "Co doping effects on the magnetic and magnetoresistance in $Sm_{0.35}Nd_{0.35}Pb_{0.30}Mn_{1-x}Co_xO_3$ ($x=0, 0.1, 0.2$)".

Moreno, N. O., Campoy, J. C. P., Blanco, J. J., Insausti, M., Rojo, T., and Barberis, G. E.

Polycrystalline samples of the $Sm_{0.35}Nd_{0.35}Pb_{0.35}Mn_{1-x}Co_xO_3$ ($x = 0, 0.1, 0.2$) at low magnetic fields has been studied by AC susceptibility, and field cooled and zero field cooled magnetisation measurements. We conclude that a small amount of Co substitution tends to destroy the double exchange and broadens the coexistence region of the cluster-glass and ferromagnetic states. Also. the Co doping suppresses the large negative magneto resistance and it becomes small for $x = 0.2$.

Journal of Magnetism and Magnetic Materials 226-230, Pt-1, 834-836. 2001.

[P065-01] "Crystal field effect on the f-levels of $R_{1+x}Ba_{2-x}Cu_3O_{6+\delta}$ ($R = Sm, Nd$)".

Nekvasil, V., Jandl, S., Barba, D., Martin, A. A., Cardona, M., Divis, M., Marysko, M., and Wolf, T.

Infrared (IR) spectroscopy has been used to observe the crystal field (CF) levels of the five lowest J multiplets of Sm^{3+} in regular D-4h symmetry sites in $Sm_{1+x}Ba_{2-x}Cu_3O_{6+\delta}$. From a fit to these levels., we have calculated a set of the CF parameters. Doublet features in the IR spectra have been tentatively associated with the anisotropic Sm-Cu exchange interaction. Theoretical analysis, using the superposition model, as well as density functional based ab initio calculations of the CF interaction have indicated that some of the IR bands arise from the Sm^{3+} ions occupying the C-4v symmetry Ba sites. The magnetic susceptibility of single- crystalline $REBa_2Cu_3O_6$ ($Re = Nd, Sm$) has been measured and compared with calculations using the phenomenological CF parameters.

Journal of Magnetism and Magnetic Materials 226, 985-987. 2001.

[P066-01] "Dark conductivity, photoconductivity, and lightinduced absorption in photorefractive sillenite crystals"

Mosquera, L., de Oliveira, I., Frejlich, J., Hernandez, A. C., Lanfredi, S., and Carvalho, J. F.

We measure the bulk and light-induced absorption as well as the dark- and photoconductivity in doped and undoped photorefractive Bi₁₂TiO₂₀ crystals and compare the results obtained using different techniques. From these data we compute the quantum efficiency for the photogeneration of charge carriers and the carriers mobility-lifetime product, and characterize the suitability of these crystals for holographic recording. A two-center model theory is shown to adequately describe absorption and photoconduction in these materials.

Journal of Applied Physics 90[6], 2635-2641. 2001.

[P067-01] "Design of optical biosensor using polymeric waveguides integrated with an MSM photodetector".

Borges, B. H. V., de Barros, L. E. M., and Flamino, R. S.

A detailed design of a new optical biosensor using polymeric waveguides intended for blood glucose concentration measurements is presented. The device is based on a vertically stacked two-waveguide ARROW structure integrated with an MSM photodetector, simplifying fabrication and avoiding posttuning of sensor parameters. Simulated results obtained for this device represent a significant improvement in performance when compared to conventional Mach-Zehnder sensors.

Microwave and Optical Technology Letters 31[1], 33-37. 2001

[P068-01] "Domain wall dynamics in 1D quantum antiferromagnets".

Ferrer, A. V. and Caldeira, A. O.

The problem of dissipative motion of domain walls (DW) in the case of tetramethyl ammonium manganese chloride (TMMC) is studied as a function of the external magnetic field and the temperature. Two specific situations are analyzed separately: the first, above the transition temperature T-N, in which the classical motion of the spin degree of freedom may be described by a sine-Gordon equation of motion and, the second, below T-N, in which the system may be described by a double sine-Gordon equation of motion. The existence of a dissipative regime for the DW motion and its influence on the dynamical structure factor - which might be experimentally detected - are investigated.

Journal of Magnetism and Magnetic Materials 226, 510-511. 2001.

[P069-01] "Electronic correlations in a two-level dimer".

Macedo, L. A. and Lagos, R. E.

The exact solution for the full electronic Hamiltonian for a two-level dimer is obtained. The parameter constellation (roughly 20) is reparametrized via orthogonal Gaussian atomic orbitals, yielding a five-parameter model. With the dimer embedded in a thermal bath, the specific heat and several temperature-dependent dynamical susceptibilities are computed. (C) 2001 Elsevier Science B.V. All rights reserved.

Journal of Magnetism and Magnetic Materials 226, 105-106. 2001.

[P070-01] "Epitaxial pulsed laser crystallization of amorphous germanium on GaAs".

Santos, P. V., Trampert, A., Dondeo, F., Comedi, D., Zhu, H. J., Ploog, K. H., Zanatta, A. R., and Chambouleyron, I.

We have investigated the crystallization of amorphous germanium films on GaAs crystals using nanosecond laser pulses. The structure and composition of the crystallized layers is dominated by nonequilibrium effects induced by the fast cooling process following laser irradiation. Perfect epitaxial films are

obtained for fluencies that completely melt the Ge film, but not the substrate. For higher fluencies, partial melting of the substrate leads to the formation of a (GaAs)_(1-x)Ge_{-2x} epitaxial alloy with a graded composition profile at the interface with the substrate. Since Ge and GaAs are thermodynamically immiscible in the solid phase, the formation of the alloy is attributed to the suppression of phase separation during the fast cooling process. Lower laser fluencies lead to polycrystalline layers with a patterned surface structure. The latter is attributed to the freeze-in of instabilities in the melt during the fast solidification process.

Journal of Applied Physics 90[5], 2575-2581. 2001.

[P071-01] "ESR of Gd³⁺ in Y_{1-x}Yb_xGd_yInNi₄".

Medina, A. N., Rojas, D. P., and Gandra, F. G.

Electron spin resonance (ESR) results of Gd³⁺ diluted in (Y_{1-x}Yb_x)InNi₄ for 0 less than or equal to x less than or equal to 0.8 are reported. It is found that for x = 0 the linewidth presents the usual temperature linear behavior and a negative g-shift. As x is increased the residual linewidth also increases, and a non-linear temperature dependence is observed. An additional relaxation channel through the RKKY interaction is suggested to explain the results. The Yb exchange parameter is determined as function of the concentration.

Journal of Magnetism and Magnetic Materials 226, 77-79. 2001.

[P072-01] "Evaluation of the thermophysical properties of modified and dyed poly(ethylene terephthalate) films".

Olenka, L., da Silva, E. N., Santos, W. L. F., Muniz, E. C., Rubira, A. F., Cardoso, L. P., Medina, A. N., Miranda, L. C. M., Baesso, M. L., and Bento, A. C.

In this work we report thermal diffusivity and specific heat measurements in N,N-dimethylacrylamide modified poly(ethylene terephthalate) (PET) films for incorporating the dye blue Samaron HGS. These thermophysical properties were studied by changing the sample preparation conditions, such as the temperature and time of N,N-dimethylacrylamide treatment, and the time and temperature of dyeing. The results showed that the heat conduction was improved when the PET film was dyed at a temperature below the glass transition (T < 70 <degrees>C). On the other hand the thermal diffusivity decreased for samples dyed at T > 70 <degrees>C. This behaviour can be attributed to microstructure changes in the polymer chains, as shown by the change in the amorphous/crystalline ratio, observed in the x-ray diffraction data.

Journal of Physics D-Applied Physics 34[15], 2248-2254. 2001.

[P073-01] "Evidence for the precipitation of the Fe₂Pr phase in the Fe-Pr binary system".

Santos, I. A., Coelho, A. A., Ribeiro, C. A., and Gama, S.

Directional solidification experiments were employed on Fe-Pr alloys at several low cooling rates in order to observe the solidification sequence displayed along the length of the samples. Measurements of the transition temperatures around the eutectic temperature of this system were also performed using a Calvet-type calorimeter. The results show the precipitation of the Fe₂Pr phase and its peritectic formation, described as Fe₁₇Pr₂+L→Fe₂Pr. The calorimetric measurements give the temperature of this reaction as being 669 <degrees>C. The system presents only one eutectic reaction at 664 <degrees>C, described as L→Fe₂Pr+Pr, with a feathered morphology under metallographic analysis. Thermomagnetic measurements give the Curie temperature of the Fe₂Pr phase as 44 <degrees>C. A

sequence of reactions during solidification of the alloys around the eutectic point for the Fe-Pr binary system is proposed.

Journal of Applied Physics 90[6], 2934-2938. 2001.

[P074-01] "Field dependence of second-harmonic amplitude of magnetoimpedance in FeCoSiB joule heated wires".

Gomez-Polo, C., Vazquez, M., and Knobel, M.

The existence of a second-harmonic component of the giant magnetoimpedance (GMI) voltage in an amorphous FeCoSiB Joule heated wire is analysed. The evolution of the first-harmonic component of the GMI voltage with the axial DC applied magnetic field can be suitably described in terms of the evolution of the circumferential magnetic permeability. With regard to the second-harmonic component, its amplitude sensitively evolves with the axial DC magnetic field and its appearance is associated to an asymmetry in the circular magnetization process. A simple rotational magnetization model is presented where the harmonic components of the GMI voltage are estimated through Fourier analysis.

Journal of Magnetism and Magnetic Materials 226, 712-714. 2001.

[P075-01] "Griffiths phase of the Kondo insulator fixed point".

Miranda, E. and Dobrosavljevic, V.

Heavy-fermion compounds have long been identified as systems which are extremely sensitive to the presence of impurities and other imperfections. In recent years, both experimental and theoretical work has demonstrated that such disorder can lead to unusual, non-Fermi liquid behavior for most physical quantities. In this paper, we show that this anomalous sensitivity to disorder, as well as the resulting Griffiths-phase behavior, directly follow from the proximity of metallic heavy-fermion systems to the Kondo insulator fixed point.

Journal of Magnetism and Magnetic Materials 226-230, 110-114. 2001.

[P076-01] "Josephson coupling between superconducting clusters in high-T_c materials".

de Lima, O. F., Awana, V. P. S., Ribeiro, R. A., and Avila, M. A.

Diamagnetic moment for Bi₂Sr₂CaCu₂O_{8+δ} (Bi:2212) and YBa₂Cu₃O_{7-δ} (Y:123) crystals were measured at different fields H and temperatures. For the higher fields two distinct transition temperatures T_g and T_j are identified, with T_g > T_j. By increasing H the line T_g(H) shifts very slowly while T_j(H) shifts much faster to lower temperatures, displaying an upward curvature well described by a theory based on Josephson coupling between superconducting clusters. Here, we show data mainly for the Bi:2212 crystals, where sample dependent T_j(H) lines are clearly observed.

Journal of Magnetism and Magnetic Materials 226, 367-369. 2001.

[P077-01] "Magnetoresistance of Fe-Ta-O films prepared by RF plasma jet method".

Kraus, L., Chayka, O., Tous, J., Fendrych, F., Pirota, K. R., Sicha, M., and Jastrabik, L.

The structure, magnetic and electric properties of Fe-Ta-O films prepared by the RF plasma jet technique were investigated. With increasing content of O the conductance changes from metallic to tunnelling one. In some films with the Fe/Ta ratio close to 0.25 the superparamagnetic properties and spin-dependent tunnelling magneto resistance (with $\Delta\rho/\rho$ up to 1.5% at 77.3 K) were observed.

The behavior can be explained by the nanogranular structure consisting of ferromagnetic metallic grains embedded in an insulating amorphous matrix.

Journal of Magnetism and Magnetic Materials 226, 669-670. 2001.

[P078-01] "Magnetostriction and GMI in Joule-heated CoFeSiB glass-covered microwires".

Pirota, K. R., Kraus, L., Chiriac, H., and Knobel, M.

Magnetic properties (magnetostriction and hysteresis loops) and giant magnetoimpedance (GMI) are investigated in CoFeSiB amorphous glass-covered microwires Joule-heated with or without axial applied stress.

Journal of Magnetism and Magnetic Materials 226, 730-732. 2001.

[P079-01] "Matrix characterization using synchrotron radiation X-ray diffraction".

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

X-ray spectrometry is a non-destructive and multi-elemental technique widely used for elemental analysis. This technique has inherent complexities for quantitative analysis because of matrix effects. Matrix absorption is the most important determining factor when accurate measurements are required for thick samples. Therefore, new methods have to be developed in order to evaluate matrix effects. In this work, the feasibility of using the synchrotron X-ray diffraction for matrix characterization has been investigated. All measurements were performed at the Laboratorio Nacional de Luz Sincrotron (LNLS), in Campinas, Brazil. Diffraction patterns for boric acid and cellulose matrix containing different oxides were recorded. The preliminary results encourage us to examine further the application of X-ray diffraction analysis combined with energy-dispersive X-ray fluorescence analysis for characterization of thick samples.

Radiation Physics and Chemistry 61[3-6], 739-741. 2001.

[P080-01] "Nonlinear Hanle effect in an open V-type level system".

Cruz, F. C. and Pereira, D.

We carried out an exact density matrix analysis for the nonlinear Hanle effect in an open V-type level system. Steady-state analytical solutions of the Liouville equation have been obtained and the dependence of the populations of the upper and lower states on the applied magnetic field is discussed. These curves, corresponding to experimental ones when fluorescence or absorption is detected, are dependent on the excitation and decay rates and can be used as a tool for analysing population inversion in laser transitions

Journal of Physics B-Atomic Molecular and Optical Physics 34[15], 3107-3118. 2001.

[P081-01] "Optical and magneto-optical response of a doped Mott insulator."

Laad, M. S., Craco, L., and Muller-Hartmann, E.

We study the optical, Raman, and ac Hall response of the doped Mott insulator within the dynamical mean-field theory ($d = \infty$) for strongly correlated electron systems. The occurrence of the isosbestic point in the optical conductivity is shown to be associated with the frequency dependence of the generalized charge susceptibility. We compute the Raman response, which probes the fluctuations of the "stress tensor", and show that the scattering is characterized by appreciable incoherent contributions. The calculated ac Hall constant and Hall angle also exhibit the isosbestic points. These results are also compared with those obtained for a non-FL metal in $d = \infty$. The role of low-energy coherence (FL) or incoherence (non-FL) in determining the finite frequency response of strongly correlated metals in $d = \infty$ is discussed in detail. As an application of interest, we compute the dielectric figure-of-merit (DFOM), a quantity that is of potential importance for microwave device applications. We demonstrate explicitly that systems near the filling driven Mott transition might be good candidates in this respect, and discuss the influence of real-life factors on the DFOM.

Physical Review B 64[7], 075108, 2001

[P082-01] "Ordinary and extraordinary giant Hall effects in Co-SiO₂ granular films".

Denardin, J. C., Pakhomov, A. B., Knobel, M., Liu, H., and Zhang, X. X.

Magnetization, resistance and Hall effect are studied in granular magnetic Co-SiO₂ nanocomposites in the temperature range 5-300K and fields up to 6T. Relative contributions from spin-independent and spin-dependent processes to the giant Hall effect near the metal-insulator transition are analysed.

Journal of Magnetism and Magnetic Materials 226, 680-682, 2001.

[P083-01] "Periodic Anderson model from the atomic limit: magnetic and transport properties of FeSi".

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

The exact Green's functions (GF) of the periodic Anderson model (PAM) for $U \rightarrow \infty$ can be formally expressed within the cumulant expansion in terms of an effective cumulant that was approximated in a previous work by the value it takes for the exactly soluble atomic limit of the PAM. Expressions for the magnetic susceptibility $\chi(T)$, static conductivity $\sigma(T)$ and optical conductivity $\sigma(\omega, T)$ of the PAM have been obtained with these approximate GF and they are employed here to fit the experimental values of FeSi, a compound that behaves like a Kondo insulator with the two first quantities vanishing rapidly for $T \rightarrow 0$. It was possible to find good agreement between theory and experiment for a set of parameters in the intermediate valence region.

Journal of Magnetism and Magnetic Materials 226, 184-185, 2001.

[P084-01] "Phenomenological approach of multiple particle production at high energies: Energy distribution of produced particles by data of direct observation".

Ohsawa, A., Shibuya, E. H., and Tamada, M.

The energy distribution of produced particles in multiple particle production is formulated empirically based on the data of direct observations by accelerator and cosmic-ray experiments at 10(12)-10(14) eV. The formulated distribution indicates violation of the Feynman scaling law, which was shown to be valid in the low energy region of less than or equal to 10(12) eV.

That is, the particle density is suppressed in the forward region and enhanced in the central region, compared with the distribution of the Feynman scaling law. The consequences of the formulated distribution, such as multiplicity, inelasticity, etc., are discussed at high energies of less than or equal to 10(15) eV by extrapolation. The distribution is also compared with those of nuclear interaction models which are used widely in simulations of accelerator and cosmic-ray experiments.

Physical Review D 64[5], 054004, 2001

[P085-01] "Raman scattering study of crystal-field excitations in ErNi₂B₂C".

Martinho, H., Sanjurjo, J. A., Rettori, C., Canfield, P. C., and Pagliuso, P. G.

In this work we present Raman scattering and specific heat measurements in the superconducting magnetic borocarbide ErNi₂B₂C. The data is interpreted in terms of crystal electric field splitting (CEF) of the Er³⁺ ground-state multiplet. Two Raman CEF active transitions were observed, at 46 and 146 cm⁻¹, with polarization selection rules corresponding to $\Gamma_6 \rightarrow \Gamma_7$ electronic transitions. A Schottky anomaly in the specific heat was also observed. The fitting of the C_p/T vs. T curve enabled us to obtain the CEF energy splitting of the Er³⁺ ($J = 15/2$) ground-state multiplet, which is in agreement with the observed Raman CEF transitions. These results are comparable to those previously reported in inelastic neutron scattering and magnetic susceptibility measurements.

Journal of Magnetism and Magnetic Materials 226, 978-979, 2001.

[P086-01] "Rupture force of adsorbed self-assembled surfactant layers - Effect of the dielectric exchange force".

Teschke, O., Ceotto, G., and de Souza, E. F.

The tip applied force necessary to obtain tip/substrate contact, i.e., rupture force between adsorbed layers of self-assembled surfactant films and atomic force microscope (AFM) tips in water has been measured. A substantial contribution of this rupture force is due to the dielectric exchange force (DEF). The DEF model is in agreement with the observation that the surfactant layer rupture forces are smaller in the thickest layers, where the compactness of the adsorbed film results in the smallest values of the dielectric permittivity. Within experimental accuracy a dielectric permittivity value of similar to 4 for bilayers and of similar to 36 for monolayers is found.

Chemical Physics Letters 344[5-6], 429-433, 2001.

[P087-01] "Some optical properties of amorphous hydrogenated carbon thin films prepared by rf plasma deposition using methane".

Alves, M. A. R., Rossetto, J. F., Balachova, O., Braga, E. D., and Cescato, L.

Amorphous hydrogenated carbon (a-C:H) films were prepared by plasma enhanced chemical vapor deposition (PECVD) using methane. The optical properties of a-C:H films were investigated by reflectance and transmittance spectrometry in the visible and near-infrared regions. The dependence of refractive index, optical gap, and absorption coefficient are examined as a function of plasma power.

Microelectronics Journal 32[9], 783-786, 2001.

[P088-01] "The effects of radiation on the density of an aluminoborosilicate glass".

Prado, M. O., Messi, N. B., Plivelic, T. S., Torriani, I. L., Bevilacqua, A. M., and Arribere, M. A.

Glasses used for nuclear waste immobilization are subjected to high levels of radiation, and this may affect their physicochemical properties. Alpha radiation is responsible for an important fraction of the radiation energy dissipated in these glasses. It has been reported previously that some borosilicate glasses increase their density during irradiation while the density of other glasses decreases. Although the density increase of silica after irradiation has been understood, thanks mainly to molecular dynamics calculations and diffraction experiments, the processes involved in more complex glasses could be more varied. In this work we irradiated an aluminum-borosilicate glass which is a candidate for the aforementioned purposes and which increases density during alpha irradiation from the B-10 (n, alpha) Li-7 reaction. We studied the effects of alpha irradiation on its microstructure, using several experimental techniques, and subsequently correlated the results. Small angle X-ray scattering (SAXS) measurements revealed the presence of inhomogeneities of about 10 Angstrom in the untreated samples. After annealing these samples, TEM images displayed a contrast structure and helium pycnometry revealed density changes, both typical of glass phase separation. After irradiation, the glass density increased and the SAXS intensity decreased, indicating a compositional homogenization process in the samples subject to a higher dose of irradiation. Atomic displacements were calculated by means of the TRIM [1] computer code. The number of displacements produced by each $10B(n, \alpha) Li-7$ reaction was estimated at 580 and involved distances of up to 15 Angstrom. An increase in the density of the irradiated samples can be explained in terms of the atomic displacements produced by the nuclear reaction cascades of the reaction B-10 (n, alpha) Li-7, in the scenario of pre-existing phase separation in the samples. In the case of the aluminum-borosilicate glasses studied here, which exhibit a fine phase separation, the density of the Si-rich phase increases with the incorporation of Na and B atoms. The B-rich phase also increases its density with the flow of Si atoms from the matrix. Vacancies created by irradiation in the glass structure, are responsible for a density decrease. The final effect is due to the sum of all contributions described, which in this case results in a net density increase of the irradiated samples. An understanding of this phenomenon can lead to the design of new glasses which overcome radiation with a minimum of density change.

Journal of Non-Crystalline Solids 289[1-3], 175-184. 2001.

[P089-01] "Towards the detection of a new ferromagnetic spinwave mode".

Farinas, P. F., Blagoev, K. B., Bedell, K. S., and Studart, N.

We carry a theoretical study of an electron-spin-resonance setup aimed at finding a massive magnon in ferromagnets. We present the transmitted patterns expected for small moments.

Journal of Magnetism and Magnetic Materials 226, 490-491. 2001.

[P090-01] "Transport and thermodynamic properties of $YbInNi_4-xCu_x$ system".

Rojas, D. P., Medina, A. N., Gandra, F. G., and Cardoso, L. P.

We report on specific heat and resistivity results on $YbInNi_4-xCu_x$ with 0 less than or equal to x less than or equal to 4. The magnetic resistivity for x less than or equal to 1 presents two temperature regions with a -ln T dependence due to the crystal field (CF) and show that the splitting of the first excited state increases with the Cu concentration. The specific heat results are in agreement with resistivity and lead to the evaluation of crystal field splitting for the first and second excited states. The energy level scheme remains unaltered when Cu replaces Ni. The unit cell volume increases linearly with x, but the Kondo temperature obtained from the specific heat does not change monotonically as expected for the whole series.

Journal of Magnetism and Magnetic Materials 226, 72-74. 2001.

[P091-01] "X-slave boson approach to the periodic Anderson model".

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

The periodic Anderson model (PAM) in the limit $U = \infty$, can be studied by employing the Hubbard X operators to project out the unwanted states. In a previous work, we have studied the cumulant expansion of this Hamiltonian employing the hybridization as a perturbation, but probability conservation of the local states (completeness) is not usually satisfied when partial expansions like the "chain approximation (CHA)" are employed. To consider this problem, we use a technique similar to the one employed by Coleman to treat the same problem with slave-bosons in the mean-field approximation. Assuming a particular renormalization for hybridization, we obtain a description that avoids an unwanted phase transition that appears in the mean-field slave-boson method at intermediate temperatures.

Journal of Magnetism and Magnetic Materials 226, 194-195. 2001.

Abstracta

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