

Abstracta

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Trabalhos Publicados

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Trabalhos Aceitos para Publicação

P 175-07 “A study of the mechanism of suppression of superconductivity by Pr³⁺ substitution for Ba²⁺ in the YBCO(123) system”

Gaur, S. K., Singhal, R. K., Garg, K. B., Shripathi, T., Deshpande, U. P., Bittar, E. M., Pagliuso, P.G., and Saitovitch, E. M. B.

We present a systematic structural, transport, iodometric, susceptibility and x-ray photoemission study of the Y (Ba_{1-x}Pr_x)₂Cu₃O_{7- δ} system for $\chi = 0.00, 0.025, 0.05, 0.075$ and 0.10 with Pr³⁺ (smaller in ionic radii but higher in valence than Ba²⁺) substituted at the Ba site. It is successfully shown that a higher valence cation can be substituted for a lower valence one. The rate of the T_c depression in these is observed to be much higher than that in the case when Pr³⁺ is substituted at the Y³⁺ site. This is explained as being due to a composite effect of the depletion of itinerant holes due to the progressive depletion of the oxygen content in the samples, the Pr 4f-O 2p hybridization and change in the in-plane coherence length (ξ_{ab}) resulting from change in the in-plane atomic distances, using Ginzburg-Landau theory

Journal of Physics-Condensed Matter 22[50]. 509802. 2007.

P 176-07 “Absorption effects for electron-molecule collisions”

Castro, E. A. Y., de Souza, G. L. C., Iga, I., Machado, L. E., Brescansin, L. M., and Lee, M. T.

In a recent work, we have proposed an empirical scaling factor to the quasi-free scattering model absorption potential of Staszewska et al., in order to account for many-body interactions in the electron-molecule scattering problem. In this work we extend the application of this modified potential to the study of electron collisions with three molecular targets of different geometric arrangements: linear (CO), angular (H₂O), and tetrahedral (CH₄), in a wide energy range. The calculations were performed using the same scaling factor without any additional adjustment. We have observed a significant improvement in the agreement between the calculated results and the experimental data available in the literature, in comparison with that of the calculated results without the scaling factor. Also, this study reinforces the fact that the proposed correction factor is independent of targets and therefore can be used for predictive purposes for a general target.

Journal of Electron Spectroscopy and Related Phenomena 159[1-3], 30-38. 2007.

P 177-07 “Ambient pressure colossal magnetocaloric effect in Mn_{1-x}Cu_xAs compounds”

Rocco, D. L., de Campos, A., Carvalho, A. M. G., Caron, L., Coelho, A. A., Gama, S., Gandra, F. C. G., dos Santos, A. O., Cardoso, L. P., von Ranke, P. J., and de Oliveira, N. A.

Magnetic refrigeration is a good alternative to gas compression technology due to higher efficiency and environmental concerns. Magnetocaloric materials must exhibit large adiabatic temperature variations and a large entropic effect. MnAs shows the colossal magnetocaloric effect under high pressures or with Fe doping. In this work the authors introduce a class of materials-Mn_{1-x}Cu_xAs-revealing a peak colossal effect of -175 J/(K kg) for a 5 T field variation at 318 K and ambient pressure.

Applied Physics Letters 90[24]. 242507. 2007.

P 178-07 “Atomistic simulations of the mechanical properties of ‘super’ carbon nanotubes”

Coluci, V. R., Pugno, N. M., Dantas, S. O., Sgalvao, D., and Jorio, A.

The mechanical properties of the so-called ‘super’ carbon nanotubes (STs) are investigated using classical molecular dynamics simulations.

The STs are built from single-walled carbon nanotubes (SWCNTs) connected by Y-like junctions forming an ordered carbon nanotube network that is then rolled into a seamless cylinder. We observed that the ST behaviour under tensile tests is similar to the one presented by fishing nets. This interesting behaviour provides a way to vary the accessible channels to the inner parts of STs by applying an external mechanical load. The Young’s modulus is dependent on the ST chirality and it inversely varies with the ST radius. Smaller reduction of breaking strain values due to temperature increase is predicted for zigzag STs compared to SWCNTs. The results show that, for STs with radius similar to 5 nm, the junctions between the constituent SWCNTs play an important role in the fracture process. The Young’s modulus and tensile strength were estimated for hierarchical higher-order STs using scaling laws related to the ST fractal dimension. The obtained mechanical properties suggest that STs may be used in the development of new porous, flexible, and high-strength materials

Nanotechnology 18[33]. 335702. 2007.

P 179-07 “AZ-1518 Photoresist analysis with synchrotron radiation using high-resolution time-of-flight mass spectrometry”

Mendes, L. A. V., Pinho, R. R., Avila, L. F., Lima, C. R. A., and Rocco, M. L. M.

With the aim of identifying molecular modifications among photoresists unexposed and previously exposed to the ultraviolet light the photon stimulated ion desorption (PSID) technique was employed in the study of the AZ-1518 photoresist. Data acquisition was performed at the Brazilian Synchrotron Light Source (LNLS), during a single-bunch operation mode of the storage ring and using high-resolution time-of-flight mass spectrometry (TOF-MS) for ion analysis. PSID mass spectra on both photoresists (unexposed and exposed) were obtained following the SK-shell photoexcitation and desorption ion yield curves have been determined for the main fragments as a function of the photon energy. The AZ-1518 photoresists presented different PSID spectra, showing characteristic fragments. Most of the analyzed ions showed larger relative yields for the exposed photoresist. Fragments related to the photochemical decomposition of the photoresist could be clearly identified. These results showed that the PSID technique is adequate to investigate structural changes in molecular level in unexposed and exposed photoresists.

Polymer Degradation and Stability 92[6], 933-938. 2007.

P 180-07 “Bose-Einstein condensates relative phase measurements through atomic homodyne detection”

da Cunha, B. R. and de Oliveira, M. C.

The dynamics of a two-mode Bose-Einstein condensate trapped in a double-well potential results approximately in an effective Rabi oscillation regime of exchange of population between both wells for sufficiently strong overlap between the modes functions and sufficiently large condensates. Facing the effective Rabi oscillation as a temporal atomic beam splitter we propose a nondestructive measurement process allowing an atomic homodyne detection, thus yielding indirect relative phase information about one of the two-mode condensates. This proposal is achieved through a secondary optical homodyne detection, in which the field is allowed to dispersively interact with one of the condensate modes inside an optical cavity.

Physical Review A 75[6]. 063615. 2007.

P 181-07 “Calculation of direct and indirect excitons in GaAs/Ga_{1-x}Al_xAs coupled double quantum wells: The effects of in-plane magnetic fields and growth-direction electric fields”

Dios-Leyva, M., Duque, C. A., and Oliveira, L. E.

The variational procedure, in the effective-mass and parabolic-band approximations, is used in order to investigate the effects of crossed electric and magnetic fields on the exciton states in GaAs/Ga_{1-x}Al_xAs coupled double quantum wells. Calculations are performed for double quantum wells under applied magnetic fields parallel to the layers and electric fields in the growth direction. The exciton envelope wave function is obtained through a variational procedure using a hydrogenic 1s-like wave function and an expansion in a complete set of trigonometric functions for the electron and hole wave functions. We take into account intersubband mixing brought about by the Coulomb interaction of electron-hole pairs in double quantum wells and present a detailed analysis of the properties of direct and indirect exciton states in these systems. The present study clearly reveals anticrossing effects on the dispersion with applied voltage (or growth-direction electric field) of the photoluminescence peaks associated with direct and indirect excitons. Calculated results are found in good agreement with available experimental measurements on the photoluminescence peak position associated with direct and indirect excitons in GaAs-Ga_{1-x}Al_xAs double quantum wells under growth-direction applied electric fields or under applied in-plane magnetic fields

Physical Review B 76[7]. 075303. 2007.

P 182-07 “Charge ordering in amorphous WO_x films”

Kopelevich, Y., da Silva, R. R., Rougier, A., and Luk'yanchuk, I. A.

We report on the observation of highly anisotropic viscous electronic conducting phase in amorphous WO_{1.55} films that occurs below a current (I)- and frequency (f)-dependent temperature T* (I, f). At T < T*(I, f) the rotational symmetry of randomly disordered electronic background is broken leading to the appearance of mutually perpendicular metallic- and insulating-like states. A rich dynamic behavior of the electronic matter occurring at T < T* (I, f) provides evidence for an interplay between pinning effects and electron-electron interactions. The results suggest a dynamic crystallization of the disordered electronic matter, viz. formation of sliding Wigner crystal, as well as the occurrence of quantum liquid-like crystal or stripe phase at low drives.

Physica B: Condensed Matter 403[5-9], 1211-1212. 2008.

P 183-07 “Coherent quantum engineering of free-space laser cooling”

Dunn, J. W., Thomsen, J. W., Greene, C. H., and Cruz, F. C.

Two distinct lasers are shown to permit controlled cooling of a three-level atomic system to a regime particularly useful for group-II atoms. Alkaline-earth-metal atoms are difficult to laser cool to the micro- or nanokelvin regime, but this technique exhibits encouraging potential to circumvent current roadblocks. Introduction of a sparse-matrix technique permits efficient solution of the master equation for the stationary density matrix, including the quantized atomic momentum. This overcomes long-standing inefficiencies of exact solution methods, and it sidesteps inaccuracies of frequently implemented semiclassical approximations. The realistic theoretical limiting temperatures are optimized over the full parameter space of detunings and intensities. A qualitative interpretation based on the phenomenon of electromagnetically induced transparency reveals dynamical effects due to photon-atom dressing interactions that generate non-Lorentzian line shapes. Through coherent engineering of an asymmetric Fano-type profile, the temperature can be lowered down to the recoil limit range

Physics Letters A 76[1]. 011401. 2007.

P 184-07 “Derivative dispersion relations above the physical threshold”

Ávila, R. F., Menon, M. J.

We discuss some formal and practical aspects related to the replacement of Integral Dispersion Relations (IDR) by derivative forms, without high-energy approximations. We first demonstrate that, for a class of functions with physical interest as forward scattering amplitudes, this replacement can be analytically performed, leading to novel Extended Derivative Dispersion Relations (EDDR), which, in principle, are valid for any energy above the physical threshold. We then verify the equivalence between the IDR and EDDR by means of a popular parametrization for total cross sections from proton-proton and antiproton-proton scattering and compare the results with those obtained through other representations for the derivative relations. Critical aspects on the limitations of the whole analysis, from both formal and practical points of view, are also discussed in some detail

Brazilian Journal of Physics 37[2a]. 358-367. 2007

P 185-07 “Detection of resonance space-charge wave peaks for holes and electrons in photorefractive crystals”

de Oliveira, I. and Frejlich, J.

We report nonstationary photorefractive holograms in absorbing Bi₁₂TiO₂₀ samples with different degrees of hole-electron competition exhibiting resonance peaks due to electron and hole charge carriers. One sample with moderate hole-electron competition and another with a much larger effect were studied. Experimental data from these samples were analyzed using a theoretical model accounting for electrical hole-electron coupling, wave coupling, and response-time variation along the sample thickness due to bulk light absorption. Comparing experimental data and theoretical results allows finding out material parameters adequately describing hole and electron photoactive centers in these samples.

Journal of the Optical Society of America B-Optical Physics 24[6], 1298-1302. 2007.

P 186-07 “Detection of ultra high-energy tau-neutrinos with fluorescence detectors”

Moura, C. A. and Guzzo, M. M.

We calculate the possible number of Extensive Air Showers originated by tau neutrinos in Fluorescence Detectors like the ones of the Pierre Auger Observatory. We consider models of production of electron and muon neutrinos in extra galactic objects and Topological Defects, as well as the possibility of neutrino flavor change in the propagation of the neutrinos between the source and the Earth. The neutrino cross section was calculated by the extrapolation of the standard model parton distribution functions until energies of the order of 10⁽²¹⁾ eV. However, due to uncertainties in the extrapolation for energies higher than 10⁽¹²⁾ eV the results are not robust. We conclude that, depending on the relation between flux and cross section, there is a strict range of energy for the tau neutrinos to generate double extensive air showers detectable in Fluorescence Detectors. The tau neutrino energy must be approximately 10⁽¹⁸⁾ eV and the event rate can vary some orders of magnitude around one event per year, depending on the flux-cross section relation and detector characteristics

Brazilian Journal of Physics 37[2B], 617-621. 2007.

P 187-07 “Diffraction enhanced imaging and x-ray fluorescence microtomography for analyzing biological samples”

Rocha, H. S., Pereira, G. R., Anjos, M. J., Faria, P., Kellermann, G., Perez, C. A., Tirao, G., Mazzaro, I., Giles, C., and Lopes, R. T.

In this work, breast tissue samples were investigated in order to verify the distribution of certain elements by x-ray fluorescence computed tomography (XRFCT) correlated with the characteristics and pathology of each tissue observed by diffraction enhanced imaging (DEI). The DEI system can show details in low attenuation tissues. It is based on the contrast imaging obtained by extinction, diffraction and refraction characteristics and can improve reduction in false positive and false negative diagnoses. XRFCT allows mapping of all elements within the sample, since even a minute fluorescence signal can be detected. DEI imaging techniques revealed the complex structure of the disease, confirmed by the histological section, and showed microstructures in all planes of the sample. The XRFCT showed the distribution of Zn, Cu and Fe at higher concentration.

X-Ray Spectrometry 36[4], 247-253. 2007.

P 188-07 “Divacancies in graphene and carbon nanotubes”

Amorim, R. G., Fazzio, A., Antonelli, A., Novaes, F. D., and da Silva, A. J. R.

Divacancies are among the most important defects that alter the charge transport properties of single-walled carbon nanotubes (SWNT), and we here study, using ab initio calculations, their properties. Two structures were investigated, one that has two pentagons side by side with an octagon (585) and another composed of three pentagons and three heptagons (555777). We investigate their stability as a function of tube diameter, and calculate their charge transport properties. The 585 defect is less stable in graphene due to two broken bonds in the pentagons. We estimate that the 555777 becomes more stable than the 585 for a diameter of about 40 angstrom (53 angstrom) for an armchair (zigzag) SWNTs, indicating that they will prevail in large diameter multiwalled carbon nanotubes and graphene ribbons

Nano Letters 7[8], 2459-2462. 2007.

P 189-07 “Effects of gamma radiation on beta-lactoglobulin: Oligomerization and aggregation (vol 85, pg 284, 2007)”

Oliveira, C. L. P., de la Hoz, L., Silva, J. C., Torriani, I. L., and Nett, F. M.

Biopolymers 87[1], 93-93. 2007.

P 190-07 “Effects of solar neutrinos scale on atmospheric neutrino flux”

Grating, D. R. and Peres, O. L. G.

In this work we try to understand the phenomena of neutrino oscillations, and use this to obtain a more precise description of the atmospheric neutrino data. The two neutrino oscillation mechanism solves the problem of the up-down muon neutrino asymmetry successfully. Our main motivation is to describe the excess of events of electron-neutrino type found in the SuperKamiokande results at low energies when compared with the predictions of the two-generation neutrino oscillation. To do this we generalize the oscillation model from two to three neutrino flavors, opening the possibility of oscillation between electron neutrino type and the others. Then we obtain a semi-analytic solution of the three flavors problem using the neutrino phenomenological limits on oscillation parameters, squared masses differences and mixing angles. For this we must take into account matter effects on the electronic neutrino when it cross the Earth and has its oscillation pattern changed.

Brazilian Journal of Physics 37[2b], 626-629. 2007.

P 191-07 “Electrical and magnetic properties of new compounds of the conductor anion [Ni(dmit)₂] and nitronyl nitroxide magnetic radicals”

Dias, M. C., Stumpf, H. O., Sansiviero, M. T. C., Pernaut, J. M., Matencio, I., Knobel, M., and Cangussu, D.

Three compounds have been synthesized with formulae [3-MeRad][Ni(dmit)(2)] (1), [4-MeRad][Ni(dmit)(2)] (2) and [4-PrRad][Ni(dmit)(2)] (3) where [Ni(dmit)(2)](-) is an anionic pi-radical (dmit = 1,3-dithiol-2-thione-4,5-dithiolate) and [3-MeRad](+) is 3-N-methylpyridinium alpha-nitronyl nitroxide, [4-MeRad](+) is 4-N-methylpyridinium alpha-nitronyl nitroxide and [4-PrRad](+) is 4-N-propylpyridinium alpha-nitronyl nitroxide. The temperature-dependent magnetic susceptibility of 1 revealed that an antiferromagnetic interaction operates between the 3-MeRad(+) radical cations with exchange coupling constants of $J(1) = -1.72 \text{ cm}^{-1}$ and antiferromagnetism assigned to the spin ladder chains of the Ni(dmit)(2) radical anions. Compound 1 exhibits semiconducting behavior and 3 presents capacitor behavior in the temperature range studied (4 - 300 K)

Quimica Nova 30[4], 904-908. 2007.

P 192-07 “Electron spin resonance study of the local environment for the Gd³⁺ and Eu²⁺ ions in Ca_{1-x}RxB₆ (R = Gd, Eu) (0.0001 <= x <= 0.30)”

Duque, J. G. S., Urbano, R. R., Pagliuso, P. G., Rettori, C., Schlottmann, P., Fisk, Z., and Oseroff, S. B.

The environment of Gd³⁺/Eu²⁺ (4f(7), S = 7/2) in Ca_{1-x}RxB₆ (R = Gd; Eu; 0.0001 <= x <= 0.30) is studied by electron spin resonance (ESR). For x less than or similar to 0.001 the spectra show Lorentzian shape (insulating phase). As x increases, the spectra present a superposition of Lorentzian and Dysonian resonances (coexistence of insulating and metallic phases). For x greater than or similar to 0.01, the line shape becomes pure Dysonian (metallic phase). Thus, the intermediate concentration regime of Ca_{1-x}RxB₆ is intrinsically inhomogeneous. These compounds show no weak ferromagnetism.

Journal of Magnetism and Magnetic Materials 310[2], 864-866. 2007.

P 193-07 “Electron spin resonance (ESR) in multiferroic TbMnO₃”

Moreno, N. O., Duque, J. G. S., Pagliuso, P. G., Rettori, C., Urbano, R. R., and Kimura, T.

We report temperature dependent X-Band (ν similar to 9.4 GHz) electron spin resonance (ESR) measurement in a single crystal of TbMnO₃. A single Lorentzian ESR line with an isotropic g similar to 1.96 was observed for T >= 120K up to 600K. The ESR signal is attributed to the Mn³⁺ ions in a insulator environment. For the three crystallographic axes the temperature dependence ESR linewidth shows a strong broadening as the temperature decreases due to the presence of short range magnetic correlations.

Journal of Magnetism and Magnetic Materials 310[2], E364-E366. 2007.

P 194-07 “Exchange bias in Fe/EuTe(111) bilayers”

Macedo, W. A. A., Martins, M. D., Pires, M. J. M., Oliveira, R. B., Pombo, C. J. S. M., Nunes, W. C., Knobel, M., Rappl, P. H. O., and Motisuke, P.

We report on the investigation of the exchange bias effect in Fe layers on EuTe(111), an antiferromagnetic semiconductor. For this ferromagnet (FM)/semiconducting antiferromagnet (AFM) exchange bias system, we have found positive and negative exchange bias effect (EB). Fresh samples exhibit positive EB, independently of the applied cooling field, indicating antiferromagnetic coupling between the FM and the AFM layers at the Fe/EuTe(111) interface. The change in EB with time, from positive EB for fresh samples to negative EB after short time, is attributed to aging effects at the Fe/EuTe interface.

Journal of Applied Physics 102[3]. 033908. 2007.

P 195-07 "Exchange interaction effects in the ESR spectra of Eu²⁺ in LaB₆"

Duque, J. G. S., Urbano, R. R., Venegas, P. A., Pagliuso, P. G., Rettori, C., Fisk, Z., and Oseroff, S. B.

The electron spin resonance (ESR) spectra of Eu²⁺ (4f⁷, S = 7/2) in LaB₆ single crystal show a single Dysonian resonance for the localized Eu²⁺ magnetic moments. It is shown that the Eu²⁺ ions are covalent exchange coupled to the (B) 2p-like host conduction electrons.

Physica B-Condensed Matter 398[2], 424-426. 2007.

P 196-07 "Fabrication and characterization of Ge nanocrystalline growth by ion implantation in SiO₂ matrix"

Mestanza, S. N. M., Doi, I., Swart, J. W., and Frateschi, N. C.

Ge nanocrystallites (Ge-nc) have been formed by ion implantation of Ge⁺⁷⁴ into SiO₂ matrix, thermally grown on p-type Si substrates. The Ge-nc are examined by Raman spectroscopy, photoluminescence (PL) and Fourier transform infrared spectroscopy (FTIR). The samples were prepared with various implantation doses [0.5; 0.8; 1; 2; 3; 4] x 10¹⁶ cm⁻² with 250 keV energy. After implantation, the samples were annealed at 1,000 degrees C in forming gas atmosphere for 1 h. Raman intensity variation with implantation doses is observed, particularly for the peak near 304 cm⁻¹. It was found that the sample implanted with a dose of 2 x 10¹⁶ cm⁻² shows maximum photoluminescence intensity at about 3.2 eV. FTIR analysis shows that the SiO₂ film moved off stoichiometry due to Ge⁺⁷⁴ ion implantation, and Ge oxides are formed in it. This result is shown as a reduction of GeO_x at exactly the doses corresponding to the maximum blue-violet PL emission and the largest Raman emission at 304 cm⁻¹. This intensity reduction can be attributed to a larger portion of broken Ge-O bonds enabling a greater number of Ge atoms to participate in the cluster formation and at the same time increasing the oxygen vacancies. This idea would explain why the FTIR peak decreases at the same implantation doses where the PL intensity increases.

Journal of Materials Science 42[18], 7757-7761. 2007

P197-07 "First-order quantum phase transitions"

Continentino, M. A. and Ferreira, A. S.

Quantum phase transitions have been the subject of intense investigations in the last two decades. Among other problems, these phase transitions are relevant in the study of heavy fermion systems, high-temperature superconductors and Bose-Einstein condensates. More recently there is increasing evidence that in many systems which are close to a quantum critical point (QCP) different phases are in competition. In this paper we show that the main effect of this competition is to give rise to inhomogeneous behavior associated with quantum first-order transitions. These effects are described theoretically using an action that takes into account the competition between different order parameters.

The method of the effective potential is used to calculate the quantum corrections to the classical functional. These corrections generally change the nature of the QCP and give rise to interesting effects even in the presence of non-critical fluctuations. An unexpected result is the appearance of an inhomogeneous phase with two values of the order parameter separated by a first-order transition. Finally, we discuss the universal behavior of systems with a weak first-order zero temperature transition in particular as the transition point is approached from finite temperatures. The thermodynamic behavior along this line is obtained and shown to present universal features.

Journal of Magnetism and Magnetic Materials 310[2], 828-834. 2007.

P 198-07 "From integral to derivative dispersion relations"

Avila, R. F. and Menon, M. J.

We demonstrate that integral dispersion relations for hadron-hadron scattering amplitudes can be replaced by differential relations, without the usual high-energy approximation. We obtain analytical expressions for the corrections associated with the low energy region and exemplify the applicability of the novel relations in the context of an analytical parametrization for proton-proton and antiproton-proton total cross sections.

Brazilian Journal of Physics 37[2b], 661-664. 2007.

P 199-07 "Helium ion irradiation of polymer films deposited from TMS-Ar plasmas"

Gelamo, R. V., Durrant, S. F., Trasferetti, B. C., Davanzo, C. U., Rouxinol, F. P. M., and de Moraes, M. A. B

Polymer films synthesized from plasmas of a tetramethylsilane - Ar mixture were modified by irradiation with 170 keV He ions at fluences ranging from 1 x 10¹⁴ to 1 x 10¹⁶ cm⁻². As revealed by infrared spectroscopy, the ion beam produced intense bond rearrangements, such as the depletion of bonding groups (C-H and Si-H), and induced the formation of new ones, such as O-H and Si-O. From the nanoindentation measurements, a remarkable increase in the surface hardness of the films was observed as the ion fluence was increased. The increases in hardness were accompanied by an increase in the film compaction as shown by using a combination of RBS and film thickness measurements. From both hardness and infrared measurements it was concluded that, under the He ion bombardment, the polymer structure is transformed into a silicon oxycarbide network.

Plasma Processes and Polymers 4[4], 489-496. 2007.

P 200-07 "Interaction of low-energy electrons with the pyrimidine bases and nucleosides of DNA"

Winstead, C., Mckoy, V., and Sanchez, S. D.

We report computed cross sections for the elastic scattering of slow electrons by the pyrimidine bases of DNA, thymine and cytosine, and by the associated nucleosides, deoxythymidine and deoxycytidine. For the isolated bases, we carried out calculations both with and without the inclusion of polarization effects. For the nucleosides, we neglect polarization effects but estimate their influence on resonance positions by comparison with the results for the corresponding bases. Where possible, we compare our results with experiment and previous calculations.

Journal of Chemical Physics 127[8]. 085105. 2007.

P 201-07 “Investigation of antiferromagnetic domains in Cr”

de Oliveira, A. J. A., de Souza, P. E. N., Giles, C., Mazzaro, I., and de Camargo, P. C

Incommensurate spin-density wave (SDW) in chromium presents Q-domain configurations that can be studied through X-ray diffraction (XRD) due to charge-density wave satellites at (00 1) and (1 1 1) crystal faces. In the present work, we investigated superficial domains reorientation in the bulk multi-Q state, after the crystal had been maintained in the bulk single-Q state artificially prepared by field cooling under 90 kOe applied in (0 1 0) direction. Reciprocal lattice scans were performed along the three directions H, K and L to ensure proper CDW satellite measurements. Our results are in agreement with previous experiments where observed that the preferential orientation of CDW occurs naturally with Q perpendicular to the surface, parallel to (100).

Journal of Magnetism and Magnetic Materials 310[2], E316-E318. 2007.

P 202-07 “Itinerant electron metamagnetism and magnetocaloric effect in RCo₂-based Laves phase compounds”

Singh, N. K., Suresh, K. G., Nigam, A. K., Malik, S. K., Coelho, A. A., and Gama, S.

By virtue of the itinerant electron metamagnetism (IEM), the RCo₂ compounds with R = Er, Ho and Dy are found to show first-order magnetic transition at their ordering temperatures. The inherent instability of Co sublattice magnetism is responsible for the occurrence of IEM, which leads to interesting magnetic and related physical properties. The systematic studies of the variations in the magnetic and magnetocaloric properties of the RCo₂-based compounds show that the magnetovolume effect plays a decisive role in determining the nature of magnetic transitions and hence the magnetocaloric effect (MCE) in these compounds. It is found that the spin fluctuations arising from the magnetovolume effect reduce the strength of IEM, which subsequently lead to a reduction in the MCE. Most of the substitutions at the Co site are found to result in a positive magnetovolume effect, leading to an initial increase in the ordering temperature. Application of pressure, on the other hand, causes a reduction in the ordering temperature due to the negative magnetovolume effect. A comparative study of the magnetic and magnetocaloric properties of RCo₂ compounds under various substitutions and applied pressure is presented. Analysis of the magnetization data using the Landau theory of magnetic phase transitions has shown that there is a strong correlation between the Landau coefficients and the MCE. The variations seen in the order of magnetic transition and the MCE values seem to support the recent model proposed by Khmelevskiy and Mohn for the occurrence of IEM in RCo₂ compounds. Metastable nature of the transition metal sublattice in RCo₂-based compounds and its role in determining the magnetic and magnetocaloric properties is explained.

Journal of Magnetism and Magnetic Materials 317[1-2], 68-79. 2007.

P 203-07 “Light controlled spin polarization in asymmetric n-type resonant tunneling diode”

Dos Santos, L. F., Gobato, Y. G., Marques, G. E., Brasil, M. J. S. P., Henini, M., and Airey, R.

The authors have observed a strong dependence of the circular polarization degree from the quantum well emission in an asymmetric n-type GaAs/AlAs/AlGaAs resonant tunneling diode on both the laser excitation intensity and the applied bias voltage.

The sign of the circular polarization can be reversed by increasing the light excitation intensity when the structure is biased with voltages slightly larger than the first electron resonance. The variation of polarization is associated with a large density of photogenerated holes accumulated in the quantum well, which is enhanced due to the asymmetry of the structure.

Applied Physics Letters 91[7]. 073520. 2007.

P 204-07 “Liquid-core, liquid-cladding photonic crystal fibers”

de Matos, C. J. S., Cordeiro, C. M. B., dos Santos, E. M., Ong, J. S. K., Bozolan, A., and Cruz, C. H. B.

We experimentally demonstrate a simple and novel technique to simultaneously insert a liquid into the core of a hollow-core photonic crystal fiber (PCF) and a different liquid into its cladding. The result is a liquid-core, liquid-cladding waveguide in which the two liquids can be selected to yield specific guidance characteristics. As an example, we tuned the core-cladding index difference by proper choice of the inserted liquids to obtain control over the number of guided modes. Single-mode guidance was achieved for a particular choice of liquids. We also experimentally and theoretically investigated the nature of light confinement and observed the transition from photonic bandgap to total internal reflection guidance both with the core-cladding index contrast and with the PCF length.

Optics Express 15[18], 11207-11212. 2007.

P 205-07 “Magnetic properties of NiFe₂O₄ nanoparticles produced by a new chemical method”

Duque, J. G. S., Souza, E. A., Meneses, C. T., and Kubota, L.

We have investigated the magnetic properties of nickel ferrite (NiFe₂O₄) nanoparticles obtained through a new chemical route. X-ray diffraction (XRD) confirms that the spinel phase is already formed at 300 degrees C. Magnetization measurements, M(T, H), have been done in order to compare the results with that found in the literature. As one can see the magnetic moment is not saturated for fields up to 20 kOe and an irreversible behavior of the high field ZFC-FC moment is also found. The effective magnetic moment per molecule evaluated from hysteresis loops at a magnetic field of 20 kOe is smaller than 2 mu(B)/molecule.

Physica B-Condensed Matter 398[2], 287-290. 2007.

P 206-07 “Magnetic properties of frustrated y-doped GdInCu₄”

Duque, J. G. S., Miranda, E., Belon, A. M. O., Bufaical, L., Rettori, C., and Pagliuso, P. G.

We report temperature dependent magnetic susceptibility and electron spin resonance (ESR) measurements on single crystals of the frustrated antiferromagnet Gd_{1-x}Y_xInCu₄ (x = 0, 0.01, 0.05 and 0.1). The magnetic susceptibility data revealed, as expected, a decreasing in the antiferromagnetic ordering temperature as function of the Y-concentration, while the high-T Curie-Weiss temperatures remain nearly unaffected by the doping. For T greater than or similar to 100 K, a single Dysonian Gd³⁺ ESR line with a nearly temperature independent g similar to 1.989(8) is observed, and its linewidth follows a Korringa-like (Delta H/Delta T similar to 0.75(5) Oe/K) behavior as a function of temperature. Below T approximate to 100 K both the ESR g-value and linewidth are affected by the presence of strong short-range magnetic correlation in the paramagnetic phase well above T-N, consistently with the frustrated character of this compound. The role of chemical disorder and dilution effects induced by Y-doping in the properties of this highly frustrated material is discussed.

Physica B-Condensed Matter 398[2], 430-433. 2007.

P 207-07 "Magnetism of epitaxial Fe_xNi_{1-x} films on Cu₉₀Au₁₀(100)"

Martins, M. D., Gastelois, P. L., Landers, R., and Macedo, W. A. A.

We have investigated the effect of an expansion of the lattice parameter on the magnetic properties of fcc FeNi films. Epitaxial Fe_xNi_{1-x} ultrathin films (0.58 < x < 0.92) were grown on a Cu₉₀Au₁₀(100) single crystal, a substrate with lattice parameter 1.4% larger than the pure copper. The magnetism of the FeNi films was explored by using linear magnetic dichroism in the angular distribution of the photoelectrons (LMDAD). The LMDAD measurements were carried out at 160 K, using synchrotron radiation with an energy of 140 eV. Although we have observed a gradual decrease of the Fe 3p LMDAD asymmetry in the 67-80 at% Fe concentration range, as already reported for Fe_xNi_{1-x} on Cu(100), for the Fe-rich region (x > similar to 0.80) we have obtained a Fe 3p asymmetry of 6%, suggesting that the lattice expansion of the FeNi due to the epitaxy on Cu₉₀Au₁₀(100) stabilizes the high-spin ferromagnetic state up to higher Fe concentration values.

Journal of Magnetism and Magnetic Materials 310[2], 2274-2276. 2007.

P 208-07 "Magnetocaloric effect and transport properties of Gd₅Ge₂(Si_{1-x}Sn_x)(2) (x=0.23 and 0.40) compounds"

Campoy, J. C. P., Plaza, E. J. R., Nascimento, F. C., Coelho, A. A., Pereira, M. C., Fabris, J. D., Raposo, M. T., Cardoso, L. P., Persiano, A. I. C., and Gama, S.

We report a study about the structural properties of polycrystalline samples of nominal composition Gd₅Ge₂(Si_{1-x}Sn_x)(2) (x = 0.23, 0.40) that closely influence their physical behavior particularly related to electric resistivity and magnetocaloric (MCE) effect. The samples were characterized by X-ray diffraction (XRD) using the Rietveld refinement method, metallographic analyses, Sn-119 Mossbauer spectroscopy, DC magnetization and electrical transport measurements. It was identified a Gd₅Si₂Ge₂-monoclinic phase for x = 0.23 and a Sm₅Sn₄-orthorhombic phase (type II) for x = 0.40, both with two non-equivalent crystallographic sites for the Sn ions. We were able to infer on the role of tin on the magnetic and transport properties in these compounds.

Journal of Magnetism and Magnetic Materials 316[2], 368-371. 2007.

P 209-07 "Magnetocaloric effect in FeCr soft magnetic nanocrystalline alloys"

Gomez-Polo, C., Socolovsky, L. M., Denardin, J. C., Knobel, M., Perez-Landazabal, J. I., and Recarte, V.

In this work the magnetocaloric effect in a Fe_{63.5}Cr₁₀Si_{13.5}B₉CuNb₃ soft magnetic nanocrystalline alloy is analysed. High resolution transmission electron microscopy indicates the precipitation of the desired nanocrystalline structure (grains around 10nm in size surrounded by a residual amorphous phase) upon suitable treatments of the initial amorphous sample. The temperature dependence of the magnetic entropy variation, Delta S-M(T), calculated from the magnetization curves displays a maximum negative value around the Curie temperature of the residual amorphous phase (T-C,T-a approximate to 180 K). The dependence of Delta S-M(T) on the applied field and its evolution with the nanocrystalline volume fraction indicates the main contribution of the residual amorphous phase to the magnetic entropy

Journal of Magnetism and Magnetic Materials 316[2], E876-E878. 2007.

P 210-07 "Magnetostatic interactions between two magnetic wires"

Piccin, R., Laroze, D., Knobel, M., Vargas, P., and Vazquez, M.

The results of the magnetic dipolar field in a simple set of two amorphous ferromagnetic wires Of composition Fe_{77.5}Si_{12.5}B₁₅ placed side by side are presented. Owing to their peculiar domain structure, they could, in principle, be approximated by macroscopic magnetic dipoles, allowing the analysis of the magnetostatic field between these magnetic entities. Magnetization measurements as a function of the distance between the parallel wires were performed. Results can be explained considering the magnetostatic field created by one wire in the neighboring one. It is clearly shown that this field is responsible for changes of the reversal field of the wires, leading to the appearance of plateaux during the demagnetization process. Instead of pure dipolar model that does not fit experimental data, a multipolar model has been developed, showing a rather good agreement with the experimental results.

Epl 78[6]. 67004. 2007.

P 211-07 "Morphological evaluation of Silicone/Clay slurries by Small-angle/Wide-angle x-ray scattering"

Kaneko, M. L. Q. A., Torriani, I. L., and Yoshida, I. V. P.

Silicone/clay slurries were prepared by mechanical blending of different silicone fluids and montmorillonite clays. Two dispersion series containing (1) a natural montmorillonite (MMT) and (2) an organic montmorillonite (O-MMT) were prepared using poly(dimethylsiloxane) with -Si(CH₃)(2) OH end groups (PDMS-OH), poly(dimethylsiloxane-comethylpropylethylene oxide siloxane) (PDMS-PEO) or a poly(dimethylsiloxane-coaminoethylaminopro pylmethylsioxane)/water emulsion (PDMS-NH 2) as dispersion fluids. The resulting morphology of the silicone/clay slurries was characterized by small-angle/wide-angle X-ray scattering using a two-dimensional imaging plate detector (2D-SAXS/WAXS). The PDMS-OH/clay slurries showed only a slight increase in the layer separation while a more pronounced effect was found for the PDMS-NH, and PDMS-PEO slurries, which resulted in expanded tactoids. Analyses in the SAXS region also indicated the existence of thin platelets for the MMT slurries prepared with PDMS-NH 2 and PDMS-PEO fluids. This hierarchical structure, formed by thin platelets and expanded tactoids, was also found in the O-MMT/silicone slurries

Journal of the Brazilian Chemical Society 18[4], 765-773. 2007

P 212- 07 "Multichannel detector for ion temperature determination in vacuum ultraviolet spectrum"

Daltrini, A. M. and Machida, M.

A vacuum ultraviolet spectrometer equipped with a charge coupled device and an open multichannel plate has been used to analyze the temperature of carbon and oxygen ions in the NOVA-UNICAMP tokamak. The detection system was optimized and aligned to minimize the instrumental broadening. Also, higher order diffractions of the emissions were analyzed, resulting in lower experimental errors. The ion temperature was monitored during the tokamak discharge, presenting values between 30 and 70 eV.

Review of Scientific Instruments 78[6]. 066101. 2007.

P 213- 07 “Nitrogen diffusion enhancement in a ferrous alloy by deuterium isotopic effect”

Figuroa, C. A., Czerwiec, T., Driemeier, C., Baumvol, I. J. R., and Weber, S.

Studies of nitrogen implantation in an iron alloy using photoemission electron spectroscopy, sputtered neutral mass spectrometry, and elastic recoil detection analysis, reveal an enhancement of nitrogen diffusion when deuterium replaces hydrogen in the gas. Compared to hydrogen, deuterium reduces NO_x species on the surface (geometric barrier), increasing the nitrogen activity at the surface and consequently nitrogen diffusion into the solid solution.

Journal of Applied Physics 101[11]. 116106. 2007.

P 214- 07 “Non-random coextinctions in phylogenetically structured mutualistic networks”

Rezende, E. L., Lavabre, J. E., Guimaraes, P. R., Jordano, P., and Bascompte, J.

The interactions between plants and their animal pollinators and seed dispersers have moulded much of Earth's biodiversity(1-3). Recently, it has been shown that these mutually beneficial interactions form complex networks with a well-defined architecture that may contribute to biodiversity persistence(4-8). Little is known, however, about which ecological and evolutionary processes generate these network patterns(3,9). Here we use phylogenetic methods(10,11) to show that the phylogenetic relationships of species predict the number of interactions they exhibit in more than one-third of the networks, and the identity of the species with which they interact in about half of the networks. As a consequence of the phylogenetic effects on interaction patterns, simulated extinction events tend to trigger coextinction cascades of related species. This results in a non-random pruning of the evolutionary tree(12,13) and a more pronounced loss of taxonomic diversity than expected in the absence of a phylogenetic signal. Our results emphasize how the simultaneous consideration of phylogenetic information and network architecture can contribute to our understanding of the structure and fate of species-rich communities

Nature 448[7156], 925-928. 2007.

P 215- 07 “On model-independent analyses of elastic hadron scattering”

Avila, R. F., Campos, S. D., Menon, M. J., and Montanha, J.

By means of an almost model-independent parametrization for the elastic hadron-hadron amplitude, as a function of the energy and the momentum transfer, we obtain good descriptions of the physical quantities that characterize elastic proton-proton and antiproton-proton scattering (total cross section, rho parameter and differential cross section). The parametrization is inferred on empirical grounds and selected according to high energy theorems and limits from axiomatic quantum field theory. Based on the predictive character of the approach we present predictions for the above physical quantities at the Brookhaven RHIC, Fermilab Tevatron and CERN LHC energies

Brazilian Journal of Physics 37[2B], 675-678. 2007.

P 216-07 “Organometallic precursors as catalyst to grow three-dimensional micro/nanostructures: Spheres, clusters & wires”

Sacilotti, M., Cheyssac, P., Patriarche, G., Decobert, J., Chiamonte, T., Cardoso, L. P., Pillis, M. F., Brasil, M. J., Iikawa, F., Nakaema, M., Lacroute, Y., Vial, J. C., and Donatini, E.

This paper presents the growth and characterization of three-dimensional structures using metal-organic (or organometallic) chemical precursors like $M(\text{CH}_3)_3$, where M is a metal. Their morphology depends principally on growth temperature and conditions at the surface of the substrate. These 3D structures can be separated into two classes: i) one with (Ga, Al, In) metallic alloys shaped as sphere, sceptre or cylinder and a carbon membrane covering the alloy; ii) the other with semiconductor or oxide nanowires capped by a metallic sphere. The metal-organic precursors can be seen as catalysts molecules that grow semiconductors with micro and nanostructures similar to the role of gold particles used to grow nanowires in the VLS mechanism. We present the MOCVD growth of Ga₂O₃, CuGa_xO_y and (Ga,In)P nanowires using the metal-organic precursors on metallic or metal containing substrates.

Surface & Coatings Technology 201[22-23], 9104-9108. 2007.

P 217-07 “Pattern formation, outbreaks, and synchronization in food chains with two and three species”

Araujo, S. B. L. and de Aguiar, M. A. M.

We study the dynamics of populations of predators and preys using a mean field approach and a spatial model. The mean field description assumes that the individuals are homogeneously mixed and interact with one another with equal probability, so that space can be ignored. In the spatial model, on the other hand, predators can prey only in a certain neighborhood of their spatial location. We show that the size of these predation neighborhoods has dramatic effects on the dynamics and on the organization of the species in space. In the case of a three species food chain, in particular, the populations of predators display a sequence of apparently irregular outbreaks when the predation neighborhood has intermediate values, as compared to the size of the available space. Nonetheless, further increasing their size makes the outbreaks disappear and the dynamics approach that of the mean field model. Our study of synchronization also shows that the periodic behavior displayed by the average populations in a spatially extended system may hide the existence of patches that oscillate out of phase in a highly coordinated fashion.

Physical Review e 75[6]. 061908. 2007.

P 218-07 “Probes of new physics: Neutrino!!”

Peres, O. L. G.

In the last years, we experienced a complete change of the view of weak interaction physics. Robust results from many experiments as Super-Kamiokande, KamLAND, SNO, K2K, show us that the neutrinos have the remarkable phenomena of oscillations, a quantum interference mechanism that operates to distances as large as 100 km and even bigger distances. From this we know that neutrinos change identity from one flavor to another, as was demonstrated by the joint results of SNO and Super-Kamiokande experiments. We show here the review of latest results of neutrino physics, as for example, the first evidence of neutrinos produced in the core of the earth and the updated results of KamLAND and others.

Our understating of all experimental results will be completed by the state-of-art of the theoretical effort to understand such phenomena. For the near future, we expect the new generation of precision physics, like the running experiments of MINOS and Double CHOOZ, and the proposals of SADO and ANGRA shed light on unresolved issues such as the CP-violation for neutrinos and the relative magnitude of solar and atmospheric scales

Brazilian Journal of Physics 37[2B], 572-577. 2007.

P 219-07 “Quantized conductance and giant MR effect in atomic-sized ferromagnetic contacts”

Dartora, C. A., Viana, G. A., and Cabrera, G. G.

In this paper we investigate the origin of the giant magnetoresistance effect in atomic-sized magnetic contacts within the framework of Landauer’s theory, which relates scattering to conductance in a direct way. It is believed that in magnetic contacts the scattering mechanism is spin-dependent, provided by the exchange interaction between local spin and itinerant electrons. In our model the local spin distribution is explained in terms of localized d-electrons obeying a Heisenberg Hamiltonian while the electronic transport is taken into account by itinerant s-like electrons according to the Anderson model. As the main result we show that the MR effect is strongly dependent on spin-flipping probability of conduction electrons.

Physica E-Low-Dimensional Systems & Nanostructures 39[1], 155-158. 2007.

P 220-07 “Scattering of low-energy electrons by isomers of C₄H₁₀”

Bettega, M. H. F., Lima, M. A. P., and Ferreira, L. G.

We report elastic integral, differential and momentum transfer cross sections for low-energy electron collisions with the two isomers of C₄H₁₀, butane and isobutane. We employ the Schwinger multichannel method with pseudopotentials at the static-exchange-polarization approximation, and cover energies from 1 eV to 20 eV. We investigate the influence of polarization on the isomer effect comparing the cross sections of these isomers and concluded that polarization has a small influence in that effect. We also compare our computed elastic cross sections with available total cross sections. Total ionization cross sections by electron impact are computed using the binary-encounter-Bethe (BEB) model and the results compared with available experimental data. The ionization cross sections for butane and isobutane are similar, showing that they also have a small isomer effect in the ionization process

Journal of Physics B-Atomic Molecular and Optical Physics 40[15], 3015-3023. 2007.

P 221-07 “Second-order corrections to neutrino two-flavor oscillation parameters in the wave packet approach”

Bernardini, A. E., Guzzo, M. M., and Torres, F. R.

We report about an analytic study involving the intermediate wave packet formalism for quantifying the physically relevant information which appears in the neutrino two-flavor conversion formula and helping us to obtain more precise limits and ranges for neutrino. avor oscillation. By following the sequence of analytic approximations where we assume a strictly peaked momentum distribution and consider the second-order corrections in a power series expansion of the energy, we point out a residual time-dependent phase which, coupled with the spreading/slippage effects, can subtly modify the neutrino-oscillation parameters and limits.

Such second-order effects are usually ignored in the relativistic wave packet treatment, but they present an evident dependence on the propagation regime so that some small modi. cations to the oscillation pattern, even in the ultra-relativistic limit, can be quantified. These modifications are implemented in the confrontation with the neutrino-oscillation parameter range (mass-squared difference Δm^2) and the mixing angle θ) where we assume the same wave packet parameters previously noticed in the literature in a kind of toy model for some reactor experiments. Generically speaking, our analysis parallels the recent experimental purposes which are concerned with higher precision parameter measurements. To summarize, we show that the effectiveness of a more accurate determination of Δm^2 and θ depends on the wave packet width a and on the averaged propagating energy flux $\langle E \rangle$ over \bar{E} which still correspond to open variables for some classes of experiments

European Physical Journal C 48[2], 613-623. 2006.

P 222-07 “Signatures of electron fractionalization in ultraquantum bismuth”

Behnia, K., Balicas, L., and Kopelevich, Y.

Because of the long Fermi wavelength of itinerant electrons, the quantum limit of elemental bismuth (unlike most metals) can be attained with a moderate magnetic field. The quantized orbits of electrons shrink with increasing magnetic field. Beyond the quantum limit, the circumference of these orbits becomes shorter than the Fermi wavelength. We studied transport coefficients of a single crystal of bismuth up to 33 tesla, which is deep in this ultraquantum limit. The Nernst coefficient presents three unexpected maxima that are concomitant with quasi-plateaus in the Hall coefficient. The results suggest that this bulk element may host an exotic quantum fluid reminiscent of the one associated with the fractional quantum Hall effect and raise the issue of electron fractionalization in a three-dimensional metal

Science 317[5845], 1729-1731. 2007.

P 223-07 “Strain relaxation and stress-driven interdiffusion in InAs/InGaAs/InP nanowires”

Nieto, L., Bortoleto, J. R. R., Cotta, M. A., Magalhaes-Paniago, R., and Gutierrez, H. R.

The authors have investigated strain relaxation in InAs/InGaAs/InP nanowires (NW’s). Transmission electron microscopy images show an additional stress field attributed to compositional modulation in the ternary layer, which disrupts NW formation and drives Ga interdiffusion into InAs, according to grazing incidence x-Ray diffraction under anomalous scattering conditions. The strain profile along the NW, however, is not significantly affected when interdiffusion is considered. Results show that the InAs NW energetic stability is preserved with the introduction of ternary buffer layer in the structure.

Applied Physics Letters 91[6]. 063122. 2007.

P224-07 “Structural aspects of Langmuir-Blodgett and cast films of zinc phthalocyanine and zinc hexadecafluorophthalocyanine”

Gaffo, L., Zucolotto, V., Cordeiro, M. R., Moreira, W. C., Oliveira, O. N., Cerdeira, F., and Brasil, M. J. S. P.

The processing of macrocyclic phthalocyanines (Pc) in the form of thin, nanostructured films has been usually carried out via evaporation techniques, owing to the low solubility exhibited by these compounds. The fabrication of Pc ultrathin films via the Langmuir-Blodgett technique may be advantageous from a technological point of view, since parameters such as film architecture and organization can be achieved without post-thermal treatments. In this study, a parent zinc phthalocyanine (ZnPc) and its fluorinated derivative (F16ZnPc) were synthesized and manipulated in the form of LB films. The morphological and structural features of ZnPc and F16ZnPc Langmuir-Blodgett films containing up to 31 layers were investigated using Fourier transform infrared spectroscopy (FTIR), micro-Raman spectroscopy and X-ray diffraction analyses and were compared to ZnPc and F16ZnPc cast films. The interplanar distance obtained by X-ray specular reflection decreases from 12.64 angstrom for ZnPc to 12.16 angstrom for F16ZnPc. FTIR spectra indicated absence of order in the LB films from ZnPc and F16ZnPc, at least in the direction perpendicular to the substrate surface. Therefore, the order observed in the X-ray diffractograms means that the molecules might be organized in crystallites that are randomly oriented in the film.

Thin Solid Films 515[18], 7307-7312. 2007.

P 225-07 "Study of Frozen Waves' theory through a continuous superposition of Bessel beams"

Dartora, C. A., Nobrega, K. Z., Dartora, A., Viana, G. A., and Filho, H. T. S.

This paper presents a study of a recent solution to Maxwell's equation, the so-called "Frozen Waves", whose main characteristics are to remain static in space, and to keep an arbitrary longitudinal field pattern previously chosen. These waves could be obtained by an adequate, but discrete, superposition of monochromatic Bessel beams. Contrary to that, we have here proposed a new way to get these waves through a continuous superposition of Bessel beams, and discussed some physical aspects and then exemplified for both loss and lossless media.

Optics and Laser Technology 39[7], 1370-1373. 2007.

P 226-07 "Superconductivity of nano-TiO₂-added MgB₂"

Kishan, H., Awana, V. P. S., de Oliveira, T. M., Alam, S., Saito, M., and de Lima, O. F.

We report on the synthesis, phase formation, microstructure, and magnetization, of nano(n)-TiO₂-added MgB₂ polycrystalline compounds. The added n-TiO₂ amounts are varied from 1% to 15% in weight (wt). All the studied samples are near single phase with small amounts of un-reacted Mg/MgO up to 10 wt%. The 15 wt% n-TiO₂ added sample seems to be a multi-phase compound with unusual broadening of the main MgB₂ reflection and additional unidentified lines in its X-ray diffraction (XRD) pattern. The superconducting transition temperature (T_c), as measured by magnetization experiments, decreases marginally with n-TiO₂ addition, for example the T_s are at 37.5 K and 35.5 K, respectively, for pristine and 10 wt% n-TiO₂-added samples. This indicates that Ti has not significantly substituted into the host MgB₂ lattice. The grain morphology of these compounds reveals porous regions and does not change much with TiO₂ addition. High resolution transmission electron microscopy (HRTEM) studies revealed the presence of n-TiO₂ in these samples. The critical current density (J_c) of the MgB₂-n-TiO₂ Samples, as estimated using the Bean model, shows better performance under magnetic fields above 3 T than pristine MgB₂ for up to 4 wt% of addition, and decreases rapidly for additions above 6 wt%. We conclude that n-TiO₂ helps in enhancing the flux pinning centers in MgB₂ superconductor and hence improves the J_c(H) performance for additions up to 4 wt% in fields above 3 T.

Physica C-Superconductivity and Its Applications 458[1-2], 1-5. 2007.

P 227-07 "Surface structure determination of Pd ultrathin films on Ru(0001): Possible magnetic behavior"

de Siervo, A., De Biasi, E., Garcia, F., Landers, R., Martins, M. D., and Macedo, W. A. A.

Nowadays, ultrathin films play a fundamental role in modern materials science and technology. Recently, several theoretical works indicate that the magnetic properties of Pd ultrathin films could be controlled by structural parameters of the film, and much work has been done to study induced magnetic properties of ultrathin Pd films grown on different substrates. For the epitaxy of Pd monolayers on Ru(0001), it was not clear if Pd grows in an hcp or fcc structure and a detailed surface structure determination was not available for this system. In this study, Pd films with thicknesses ranging from submonolayer up to approximately 15 ML were grown on a Ru(0001) single crystal substrate under UHV conditions, and the electronic structure, surface crystallography, and magnetism were investigated by multiple (experimental and theoretical) techniques: x-ray photoelectron spectroscopy and diffraction using conventional Mg K alpha and synchrotron radiation sources, low- and high-energy electron diffraction, magneto-optical Kerr effect measurements, and density-functional theory calculations. The electronic structure, surface crystallography, and magnetism of the Pd films are discussed in detail

Physical Review B 76[7]. 075432. 2007.

P 228-07 "Temperature dependence of magnetic properties of Cu₈₀Co₁₉Ni₁ thin microwires"

Garcia, C., Zhukov, A., Zhukova, V., Larin, V., Gonzalez, J., del Val, J. J., and Knobel, M.

In the present work, we report the studies of temperature dependence of magnetic properties in thin microwires with composition Cu₈₀Co₁₉Ni₁. An extensive study of structural and magnetic characterization was realized. The structure was observed using X-ray diffraction with CuK alpha radiation. The magnetic measurements were carried out using a SQUID at temperatures between 5 and 300 K. The as-prepared Cu₈₀Co₁₉Ni₁ microwire presents a coercivity of about 80 Oe. The variation of the coercivity and remanent magnetization at 5-300 K were obtained from the hysteresis loops. From the difference of the ZFC and FC curves below T = 100 K, we can assume the presence of small superparamagnetic grains embedded in the Cu matrix. Those superparamagnetic grains should be blocked at temperatures below the maximum of the magnetization observed below 50 K. The measurements show an unusual temperature dependence of the coercive field, consequence of a coexistence of blocked and unblocked particles, and the typical decreasing behaviour of the remanence increasing temperature.

Journal of Magnetism and Magnetic Materials 316[2], E71-E73. 2007.

P 229-07 "Temperature induced stress phase transition in CdTe quantum dots observed by dielectric constant and thermal diffusivity measurements"

Moreira, S. G. C., da Silva, E. C., Mansanares, A. M., Barbosa, L. C., and Cesar, C. L.

The authors measured the dielectric constant by capacitance method and the thermal diffusivity by thermal lens technique in the temperature range from 20 to 300 K for CdTe quantum dot doped borosilicate glass samples. Results show a huge difference between the thermal behavior of the pure glass matrix, without quantum dots, and of the doped glass, especially around 90 and 250 K. The authors attributed this difference to the phase transition experienced by the CdTe nanocrystals due to the high pressure exerted by the glass matrix over the CdTe quantum dots.

The temperature induced stress is caused by the thermal expansion coefficient mismatch between the quantum dot and the glass matrix.

Applied Physics Letters 91[2]. 021101. 2007.

P 230- 07 “The completeness problem in the impurity Anderson model”

Lobo, T., Figueira, M. S., Franco, R., Silva-Valencia, J., and Foglio, M. E.

With the recent development of the nanoscopic technology, the impurity Anderson model (AIM) was experimentally realized in quantum dot devices, and there is renewed interest in the study of the Kondo physics of the AIM. Several Green's functions approximations by the equation of motion method (EOM), that incorporates the Kondo effect through a digamma function, have been presented in the literature as an adequate tool to describe, at least qualitatively, the Kondo effect. However, these approximations present several drawbacks: they are no longer valid as the temperature decreases below the Kondo temperature, because the logarithmic divergence of the digamma function makes the spectral density at the chemical potential to vanish, and the Friedel sum rule and the completeness in the occupation numbers are not fulfilled. In this work we present a critical discussion comparing the results of digamma approximations GF with the atomic approach, recently developed by some of us, that satisfy the completeness and the Friedel sum rule. We present results for the density of states, the Friedel sum rule and the completeness.

Physica B-Condensed Matter 398[2], 446-449. 2007.

P 231-07 “Thin disk in higher dimensional space-time and dark matter interpretation”

Coimbra-Araujo, C. H. and Letelier, P. S.

We find a family of exact solutions of Einstein equations describing the field of a static axisymmetric thin disk living in six-dimensional space-time. In particular, we study the disks constructed (by cutting out the central part of the space-time) from the conventional Schwarzschild and Chazy-Curzon solutions with simple extensions in the extra 2 dimensions. The disks are interpreted in terms of two counterrotating streams of particles on free circular orbits. Two extra parameters-the constants of motion resulting from projections of the particle-velocities' extra components-are constrained by the requirement that the orbits within the disk be stable. The requirement is met just in cases when the radial profile of the disk orbital speed fits the rotation curves of many spiral galaxies. It thus turns out that the effective modification of the gravity law by extra dimensions could explain the observed flatness of these curves equally well as the usual dark matter interpretation.

In the second part of the paper we show that the inclusion of extra dimensions also leads to better fits of the gravitational lensing data for galaxy clusters, without changing results obtained in solar system scales. Finally, we discuss whether the effect of extra dimensions could also be translated as following from the occurrence of extra matter (“Kaluza-Klein particles”). A comment on possible properties of such particles and a chance to detect them at the CERN LHC is given in the Appendix

Physical Review D 76[4]. 043522. 2007.

P 232-07 “Type-I optical emissions in Ge/Si quantum dots”

Gomes, P. F., Iikawa, F., Cerdeira, F., Larsson, M., Elfving, A., Hansson, G. V., Ni, W. X., and Holtz, P. O.

The authors studied the optical emission of Ge/Si quantum dots under externally applied biaxial stress using samples grown with different temperatures varying from 430 to 700 degrees C. The optical emission energy of samples grown at low temperatures is rather insensitive to the applied external stress, consistent with the type-II band alignment. However, for samples grown at high temperatures we observed a large blueshift, which suggests type-I alignment. The result implies that recombination strength can be controlled by the growth temperature, which can be useful for optical device applications.

Applied Physics Letters 91[5]. 051917. 2007.

P 233-07 “XPS investigation of plasma-deposited polysiloxane films irradiated with helium ions”

Gelamo, R. V., Landers, R., Rouxinol, F. P. M., Trasferetti, B. C., de Moraes, M. A. B., Davanzo, C. U., and Durrant, S. F.

This work describes an XPS investigation of plasma-deposited polysiloxane films irradiated with 170 keV He⁺ ions at fluences, Φ , ranging from 1×10^{14} to 1×10^{16} cm⁻². Modifications in the atomic concentrations of the surface atoms with Φ were revealed by changes in the [O]/[Si], [O]/[C] and [C]/[Si] atomic ratios. Surface chemical structure modifications were evidenced by the increasing C1s peak width and asymmetry as Φ was increased, due to the formation of ether and carboxyl functionalities. Moreover, structural transformations were indicated by the positive binding energy shift of the Si2p peaks, due to the increasing Si oxidation. Correlations of the XPS data with other results from previous work on polysiloxanes illustrate the role of ion beam-induced bond breaking on the structural modifications

Plasma Processes and Polymers 4[4], 482-488. 2007.

Abstracta

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