

Abstracta

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P 164-04 "An analysis on extrema and constrained bounds for the soft pomeron intercept"

Luna, E. G. S., Menon, M. J., and Montanha, J

We investigate some aspects and consequences of the extrema bounds for the soft pomeron intercept, recently determined by means of global fits to pp and (p) over bar p total cross section data at both accelerator and cosmic-ray energy regions (scattering data). We also examine the effects of the secondary reggeons by introducing fitted trajectories from Chew-Frautschi plots (spectroscopy data) and determining new constrained bounds for the pomeron intercept. In both cases we extend the analysis to baryon-p, meson-p, baryon-n, meson-n, gamma-p and gamma-gamma scattering, presenting tests on factorization and quark counting rules. We show that in all the cases investigated, the bounds lead to good descriptions of the bulk of experimental data on the total cross sections, but with different extrapolations to higher energies. Our main conclusion is that the experimental information presently available on the above quantities is not sensitive to an uncertainty of 2% in the value of the soft pomeron intercept. At 14 TeV (CERN LHC) the extrema and constrained bounds allow to infer $\sigma(\text{tot}) = 114 \pm 25 \text{ mb}$ and $105 \pm 10 \text{ mb}$, respectively. © 2004 Elsevier B.V. All rights reserved

Nuclear Physics A 745[1-2], 104-120. 2004.

P 165-04 "Analytic approach to the wave packet formalism in oscillation phenomena"

Bernardini, A. E. and Leo, S. D.

We introduce an approximation scheme to perform an analytic study of the oscillation phenomena in a pedagogical and comprehensive way. By using Gaussian wave packets, we show that the oscillation is bounded by a time-dependent vanishing function which characterizes the slippage between the mass-eigenstate wave packets. We also demonstrate that the wave packet spreading represents a secondary effect which plays a significant role only in the nonrelativistic limit. In our analysis, we note the presence of a new time-dependent phase and calculate how this additional term modifies the oscillating character of the flavor conversion formula. Finally, by considering box and sine wave packets we study how the choice of different functions to describe the particle localization changes the oscillation probability

Physical Review D 70[5]. 2004.

P 166-04 "Analytical solution for the dynamic behavior of erbium-doped fiber amplifiers with constant population inversion along the fiber"

Rieznik, A. A. and Fragnito, H. L.

We present an analytical solution for the coupled rate and propagation equations for a dynamic two-level homogeneously broadened system interacting with radiation and with constant population inversion along the longitudinal axis of the fiber, z. We derive an analytical solution for the z dependence of these equations, which greatly simplifies the numerical solution for the output powers' time dependence. Amplified spontaneous emission and background loss influences are considered in the model, in contrast to the previous analytical solution presented by Y. Sun et al. The solution is derived, and the importance of each term for the dynamic modeling of typical erbium-doped fiber amplifiers is analyzed. © 2004 Optical Society of America

Journal of the Optical Society of America B-Optical Physics 21[10], 1732-1739. 2004.

P 167-04 "Anisotropy of thermal conductivity and possible signature of the Fulde-Ferrell-Larkin-Ovchinnikov state in CeCoIn5"

Capan, C., Bianchi, A., Movshovich, R., Christianson, A. D., Malinowski, A., Hundley, M. F., Lacerda, A., Pagliuso, P. G., and Sarrao, J. L.

We have measured the thermal conductivity of the heavy-fermion superconductor CeCoIn5 in the vicinity of the upper critical field, with the magnetic field perpendicular to the c axis. Thermal conductivity displays a discontinuous jump at the superconducting phase boundary below critical temperature $T(0)$ approximate to 1 K, indicating a change from a second- to first-order transition and confirming the recent results of specific heat measurements on CeCoIn5. In addition, the thermal conductivity data as a function of field display a kink at a field H_k below the superconducting critical field, which closely coincides with the recently discovered anomaly in specific heat, tentatively identified with the appearance of the spatially inhomogeneous Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) superconducting state. Our results indicate that the thermal conductivity is enhanced within the FFLO state, and call for further theoretical investigations of the order parameter's real-space structure (and, in particular, the structure of vortices) and of the thermal transport within the inhomogeneous FFLO state

Physical Review B 70[13]. 2004.

P 168-04 "Calculation of the giant magnetocaloric effect in the MnFePO.45As0.55 compound"

von Ranke, P. J., de Campos, A., Caron, L., Coelho, A. A., Gama, S., and de Oliveira, N. A.

We report the theoretical investigations on the giant magnetocaloric compound MnFePO.45As0.55. The magnetic state equation used takes into account the magnetoelastic effect that leads the magnetic system to order under first order paramagnetic-ferromagnetic phase transition. The model parameters were determined from the magnetization data adjustment and used to calculate the magnetocaloric thermodynamic quantities. The theoretical calculations are compared with the available experimental data

Physical Review B 70[9]. 2004.

P 169-04 "Calorimetric and structural investigation of the interaction of lysozyme and bovine serum albumin with poly(ethylene oxide) and its copolymers"

Almeida, N. L., Oliveira, C. L. P., Torriani, I. L., and Loh, W.

This work reports investigations aiming at verifying the occurrence of specific interactions between lysozyme or bovine serum albumin (BSA) and poly(ethylene oxide) and its copolymers with poly(propylene oxide). Thermal stability of these proteins, followed by means of high sensitivity DSC, was found to be mostly unaffected by the presence of these polymers. Chromatographic experiments (reverse-phase HPLC and size exclusion chromatography) did not reveal any sign of specific interaction for these mixtures, either. Isothermal titration calorimetry revealed an increase in enthalpy for the mixtures, represented by a positive enthalpy of transfer for these proteins from buffer to polymer solutions. Moreover, SAXS analyses confirmed that at ambient temperatures these polymers do not affect lysozyme structure. In summary, no evidence is found to support earlier suggestions that some kind of complex could be formed between these proteins and poly(ethylene oxide) or its copolymers, but the present results suggest the occurrence of entropically driven hydrophobic effects. © 2004 Elsevier B.V. All rights reserved

Colloids and Surfaces B-Biointerfaces 38[1-2], 67-76.

2004.

Trabalhos Publicados

P 170-04 "Carbon nanotubes growth by chemical vapor deposition using thin film nickel catalyst"

Moshkalyov, S. A., Moreau, A. L. D., Gutierrez, H. R., Cotta, M. A., and Swart, J. W.

The results of a study of multi-walled carbon nanotubes (CNTs) growth using two different chemical vapor deposition (CVD) techniques (low pressure plasma enhanced and atmospheric pressure thermal CVD) are presented. Thin films of Ni were used as a catalyst. The process of nickel nanoparticles formation during thermal pre-treatment of the catalyst was studied using AFM in a non-contact mode. The effect of different gases used for the catalyst surface pre-treatment (N₂, H₂ or NH₃) was also analyzed. Higher density of nucleation and growth was obtained using hydrogen and ammonia. The results show the critical importance of the initial stage of nanotubes nucleation. © 2004 Elsevier B.V. All rights reserved

Materials Science and Engineering B-Solid State Materials for Advanced Technology 112[2-3], 147-153. 2004.

P 171-04 "Coherence and fluctuation in 3D networks: the superconducting behavior of Nb particles embedded in a Cu matrix"

de Almeida, R. L., Coelho, A. A., and de Lima, O. F.

We show the preparation and properties of granular samples formed by a regular distribution of spherical Nb particles, about 2 μm in diameter, embedded in a Cu matrix. Measurements of magnetization, resistance and $V \times I$ curves show clearly the combined superconducting behavior of the weak coupling and bulk regimes. Our results are interpreted using an effective medium model for the Josephson coupling in a 3D array of grains. In special we have observed the predicted small oscillations in the critical current, measured as a function of the applied magnetic field. © 2004 Elsevier B.V. All rights reserved

Physica C-Superconductivity and Its Applications 408-10, 625-627. 2004.

P 172-04 "Critical analysis of derivative dispersion relations at high energies"

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

We discuss some formal and fundamental aspects related with the replacement of integral dispersion relations by derivative forms, and their practical uses in high energy elastic hadron scattering, in particular pp and p p scattering. Starting with integral relations with one subtraction and considering parametrizations for the total cross sections belonging to the class of entire functions in the logarithm of the energy, a series of results is deduced and our main conclusions are the following: (1) except for the subtraction constant, the derivative forms do not depend on any additional free parameter; (2) the only approximation in going from integral to derivative relations (at high energies) concerns to assume as zero the lower limit in the integral form; (3) the previous approximation and the subtraction constant affect the fit results at both low and high energies and therefore, the subtraction constant cannot be disregarded; (4) from a practical point of view, for single-pole Pomeron and secondary Reggeons parametrizations and center-of-mass energies above 5 GeV, the derivative relations with the subtraction constant as a free fit parameter are completely equivalent to the integral forms with finite (non-zero) lower limit. A detailed review on the conditions of validity and assumptions related with the replacement of integral by derivative relations is also presented and discussed. © 2004 Elsevier B.V. All rights reserved

Nuclear Physics A 744, 249-272. 2004.

P 173-04 "Determination of the calorimetric energy in extensive air showers"

Barbosa, H. M. J., Catalani, F., Chinellato, J. A., and Dobrigkeit, C. The contribution of different components of an air shower to the total energy deposit in the atmosphere, for different angles and primary particles, was studied using the CORSIKA air shower simulation code. The amount of missing energy, parameterized in terms of the calorimetric energy, was calculated. The results show that this parameterization varies less than 1% with angle or observation level. The dependence with the primary mass is less than 5% and, with the high energy hadronic interaction model, less than 2%. The systematic error introduced by the use of just one parameterization of the missing energy correction function, for an equal mixture of proton and iron at 45 degrees, was calculated to be below 3%. We estimate the statistical error due to shower-to-shower fluctuations to be about 1%. © 2004 Elsevier B.V. All rights reserved

Astroparticle Physics 22[2], 159-166. 2004.

P 174-04 "Dirac spinors and flavor oscillations"

Bernardini, A. E. and De Leo, S.

In the standard treatment of particle oscillations the mass eigenstates are implicitly assumed to be scalars and, consequently, the spinorial form of the neutrino wave functions is not included in the calculations. To analyze this additional effect, we discuss the oscillation probability formula obtained by using the Dirac equation as evolution equation for the neutrino mass eigenstates. The initial localization of the spinor state also implies an interference between positive and negative energy components of mass eigenstate wave packets which modifies the standard oscillation probability

European Physical Journal C 37[4], 471-480. 2004.

P 175-04 "The East-West asymmetry of single muons at Campinas"

Fauth, A. C. and Paganini, S.

The EASCAMP experiment, one of the few situated in the Southern Hemisphere, operating at the State University of Campinas, UNICAMP, Brazil, detected for two years single muons in the low energetic range. The primary cosmic rays that produce these muons have a geomagnetic vertical cut-off of 10.6 GV. We studied the azimuthal distribution of three million single muons obtaining an East-West asymmetry of $A(EW) = (8.91 \pm 0.04)\%$. Another analysis concerned with the atmospheric muon propagation index is performed comparing the experimental zenith angular distribution and a simulated isotropic cosmic rays distribution.

Nuovo Cimento Della Societa Italiana di Fisica C-Geophysics and Space Physics 27[1], 1-5. 2004.

P 176-04 "Effect of impurities on the breaking of Au nanowires"

Frederico, D. N. A., da Silva, E. Z., da Silva, A. J. R., and Fazzio, A. Using ab initio density functional theory total energy calculations, we study the influence of H, B, C, N, O, and S in the rupture of a gold nanowire. In particular, using an as realistic as possible model for a suspended gold nanowire under stress, we observe that the Au wire always breaks at an Au-Au bond, with a maximum bond length between 3.0 and 3.1 Angstrom. Therefore, the experimentally observed large Au-Au bonds before the rupture of the nanowire (approximate to 3.6 Angstrom) are probably due to the presence of light impurities (X) forming Au-X-Au bonds. We obtain that the maximum Au-Au distance, for X equals C or N, is of the order of 3.9 Angstrom, whereas for B and O it is of the order of 4.1 Angstrom. On the other hand, for H this maximum distance before the rupture of the wire is approximately 3.6, being the best candidate to explain the experimental results. For both C and H impurities, we present a detailed analysis of the neck atoms electronic structures, and compare them with similar results for the pure nanowire. © 2004 Elsevier B.V. All rights reserved

Surface Science 566, 367-371. 2004.

P 177-04 "Effect of MnAs/GaAs(001) film accommodations on the phase-transition temperature"

Ikawa, F., Brasil, M. J. S. P., Couto, O. D. D., Adriano, C., Giles, C., and Daweritz, L.

The phase-transition temperature of MnAs epitaxial films grown by molecular-beam epitaxy on GaAs(001) with different crystalline accommodations was studied by specular and grazing incidence x-ray diffraction. The transition temperature of MnAs films with tilted hexagonal c-axis orientations with respect to the GaAs substrate is higher than the most investigated nontilted films and reaches a value above room temperature, which is more suitable for device applications. © 2004 American Institute of Physics

Applied Physics Letters 85[12], 2250-2252. 2004.

P 178-04 "Elastic and total cross-sections for electron scattering by acetylene in the intermediate energy range"

Iga, I., Lee, M. T., Rawat, P., Brescansin, L., and Machado, L.

We present a joint theoretical-experimental study on electron scattering by C₂H₂ in the intermediate energy range. We

report calculated elastic differential, integral, and momentum-transfer as well as total (elastic + inelastic) and absorption

cross-sections at impact energies ranging from 10 to 500 eV. Also, experimental absolute elastic cross-sections are reported in the (50-500)-eV energy range. A complex optical potential is used to represent the electron-molecule interaction dynamics. The iterative Schwinger variational method, combined with the distorted-wave approximation, is used to solve the scattering equations. Experimentally, the angular distributions of the scattered electrons are converted to absolute cross-sections using the relative flow technique. The comparison of our calculated with our measured results, as well as with other experimental and theoretical data available in the literature, is encouraging
European Physical Journal D 31[1], 45-51. 2004.

P 179-04 "Electron collisions with the hydrides PH₃, AsH₃ and SbH₃"

Bettega, M. H. F. and Lima, M. A. P.

We report integral cross sections for the elastic scattering of low-energy electrons by the hydrides PH₃, AsH₃ and SbH₃. To calculate the cross sections, we employed the Schwinger multichannel method with pseudopotentials (Bettega et al 1993 Phys. Rev. A 47 1111) at the static-exchange plus polarization level of approximation for incident energies from 0.5 to 8 eV. For PH₃, we compare our integral cross section with the recent total cross section measured by Szymkowski et al (2004 J. Phys. B: At. Mol. Opt. Phys. 37 1833) and find good agreement in shape. In particular, our calculated elastic integral cross section for PH₃ also shows the two structures reported by the experiment. We have found that the three hydrides present a Ramsauer-Townsend minimum at around 1 eV

Journal of Physics B-Atomic Molecular and Optical Physics 37[19], 3859-3864. 2004.

P 180-04 "Electronic phase-separation in Mg_{1-x}B₂ probed by CESR"

Urbano, R. R., Pagliuso, P. G., Rettori, C., and Cheong, S. W.

Temperature dependent conduction electron spin resonance (CESR) was performed in the normal and vortex-state of Mg_{1-x}B₂.

Fine powder of polycrystalline samples with x congruent to 0 and 0.15 were studied at 9.48 GHz (H_y similar or equal to 3380 Oe). Our results suggest the interesting effect associated with the presence of Mg deficiency in this compound: a phase separated Mg-vacancy rich (insulating) and Mg-vacancy poor (superconducting metal) regions for the x similar or equal to 0.15 sample. The depinning temperature, T_p for x similar or equal to 0.15 sample was obtained and confronted with previous results. © 2004 Elsevier B.V. All rights reserved

Physica C-Superconductivity and Its Applications 408-10, 832-833. 2004.

P 181-04 "Exact relativistic static charged perfect fluid disks"

Vogt, D. and Letelier, P. S.

Using the well-known "displace, cut and reflect" method used to generate disks from given solutions of Einstein field equations, we construct static charged disks made of perfect fluid based on the Reissner-Nordstrom solution in isotropic coordinates. We also derive a simple stability condition for charged and noncharged perfect fluid disks. As expected, we find that the presence of charge increases the regions of instability of the disks

Physical Review D 70[6]. 2004.

P 182-04 "Exotic characteristics of Centauro-I: Reexamination of the Centauro event"

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

The cosmic-ray exotic event "Centauro-I" is reexamined. Kopenkin et al. [Phys. Rev. D 68, 052007 (2003).] have recently suggested that the original correspondence of shower clusters in the upper and the lower chambers [C. M. G. Lattes, Y. Fujimoto, and S. Hasegawa, Phys. Rep. 65, 151 (1980).] is not correct, and we confirm this suggestion. By taking into account the relative position of the upper and the lower chambers exactly, we find that the event has no upper part corresponding to the observed shower cluster in the lower chamber. Our analysis shows that showers in the shower cluster in the lower chamber are likely to have originated in a bundle of target interactions (C-jets) and that they are not a simple atmospheric family as was claimed by Kopenkin et al. The event shows peculiar characteristics quite different from commonly observed cosmic-ray events

Physical Review D 70[7]. 2004.

P 183-04 "Fluctuating field model for conduction electron spin resonance in graphite"

Huber, D. L., Urbano, R. R., Sercheli, M. S., and Rettori, C.

We outline a theory for conduction electron-spin resonance (CESR) in highly oriented pyrolytic graphite. The fundamental approximation is to treat the spin-orbit interaction as an effective field. In this approach, the shift in the g factor, which is associated with the mean value of the field, is related to the orbital susceptibility of the electrons. The linewidth comes from fluctuations in the effective field caused by the scattering of the electrons. The theory is used to interpret our CESR measurements

Physical Review B 70[12]. 2004.

P 184-04 "Gene phylogenies and protein-protein interactions: possible artifacts resulting from shared protein interaction partners"

Campos, P. R. A., de Oliveira, V. M., Wagner, G. P., and Stadler, P. F.

The study of gene families critically depends on the correct reconstruction of gene genealogies, as for instance in the case of transcription factor genes like Hox genes and Dlx gene families. Proteins belonging to the same family are likely to share some of the same protein interaction partners and may thus face a similar selective environment. This common selective environment can induce co-evolutionary pressures and thus can give rise to correlated rates and patterns of evolution among members of a gene family. In this study, we simulate the evolution of a family of sequences which share a set of interaction partners. Depending on the amount of sequence dedicated to protein-protein interaction and the relative rate parameters of sequence evolution three outcomes are possible: if the fraction of the sequence dedicated to interaction with common co-factors is low and the time since divergence is small, the trees based on sequence information tend to be correct. If the time since gene duplication is long two possible outcomes are observed in our simulations. If the rate of evolution of the interaction partner is small compared to the rate of evolution of the focal protein family, the reconstructed trees tend towards star phylogenies. As the rate of evolution of the interaction partner approaches that of the focal protein family the reconstructed phylogenies tend to be incorrectly resolved. We conclude that the genealogies of gene families can be hard to estimate, in particular if the proteins interact with a conserved set of binding partners, as is likely the case for transcription factors. © 2004 Elsevier Ltd. All rights reserved *Journal of Theoretical Biology* 231[2], 197-202. 2004.

P 185-04 "High-temperature local superconductivity in graphite and graphite-sulfur composites"

Kopelevich, Y., da Silva, R. R., Torres, J. H. S., Moehlecke, S., and Maple, M. B.

Recently, the existence of localized superconducting domains at elevated temperatures has been demonstrated for both pure graphite and graphite-sulfur composites. In this note we report results of magnetization and magnetoresistance measurements which provide a further evidence for the local high-temperature superconductivity occurrence in these materials. © 2004 Elsevier B.V. All rights reserved *Physica C-Superconductivity and Its Applications* 408-10, 77-78. 2004.

P 186-04 "Investigation of spin-glass behavior in the LnRu-1222 (Ln = Gd, Dy, Ho, Y) system"

Cardoso, C. A., Araujo-Moreira, F. M., Awana, V. P. S., Takayama-Muromachi, E., de Lima, O. F., Yamauchi, H., and Karppinen, M.

The dynamics of the magnetic properties of polycrystalline RuSr(2)Ln(1.5)Ce(0.5)Cu(2)O(10) (LnRu-1222, Ln = Gd, Y, Ho, Nd) have been studied by ac susceptibility. A frequency-dependent cusp was observed in $\chi''(ac)$ vs. T measurements, which is interpreted as a spin-glass transition. These results are contrasted with the regular antiferromagnetic transition observed for YRu-1212. © 2004 Elsevier B.V. All rights reserved *Physica C-Superconductivity and Its Applications* 408-10, 183-184. 2004.

P 187-04 "Ionic dissociation of glycine, alanine, valine and proline as induced by VUV (21.21 eV) photons"

Lago, A. F., Coutinho, L. H., Marinho, R. R. T., de Brito, A. N., and de Souza, G. G. B.

Ionic fragmentation of the sublimated alpha-amino acids glycine, L-alanine, L-proline and L-valine has been studied using a time-of-flight mass spectrometer coupled to a He I lamp ($h\nu = 21.21$ eV). Partial ion yields (branching ratios) and kinetic

energy releases for the fragments have been determined. The spectra basically resemble available mass spectra obtained through electron impact (70 eV) demonstrating that the ionic dissociation of these compounds, induced by energetic electrons, is also dominated by processes involving low-energy valence-shell orbitals. A previously unreported fragment has been observed at $m/z = 32$ (O-2(+)) in the spectra of valine 2 and proline. © 2004 Elsevier B.V. All rights reserved *Chemical Physics* 307[1], 9-14. 2004.

P 188-04 "Laser effects on donor states in low-dimensional semiconductor heterostructures"

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

A theoretical study of the effects of intense laser fields on the ground-state binding energies of donor impurities in low-dimensional semiconductor heterostructures is performed. The laser-heterostructure interaction is treated within an extended dressed-atom approach, so that, for a laser tuned far below any resonances, the effects of the laser-semiconductor interaction correspond to a renormalization of the semiconductor energy gap and conduction/valence effective masses. Calculations are performed for donors in GaAs-(Ga,Al)As quantum wells, cylindrical quantum-well wires, and spherical quantum dots. The binding energies of donors in low-dimensional systems increase with increasing laser intensity, and for a fixed intensity, the influence of the laser is stronger for small detunings. Results obtained within the extended dressed-atom approach are compared with previous calculations performed by using a simplified high-frequency limit of the Kramers-Henneberger approach *Physical Review B* 70[15]. 2004.

P 189-04 "Lock-and-key effect in the surface diffusion of large organic molecules probed by STM"

Otero, R., Hummelink, F., Sato, F., Legoas, S. B., Thostrup, P., Laegsgaard, E., Stensgaard, I., Galvao, D. S., and Besenbacher, F.

A nanoscale understanding of the complex dynamics of large molecules at surfaces is essential for the bottom-up design of molecular nanostructures(1-8). Here we show that we can change the diffusion coefficient of the complex organic molecule known as Violet Lander (VL, C108H104) on Cu(110) by two orders of magnitude by using the STM at low temperatures to switch between two adsorption configurations that differ only in the molecular orientation with respect to the substrate lattice. From an interplay with molecular dynamics simulations, we interpret the results within a lock-and-key model similar to the one driving the recognition between biomolecules: the molecule (key) is immobilized only when its orientation is such that the molecular shape fits the atomic lattice of the surface (lock); otherwise the molecule is highly mobile *Nature Materials* 3[11], 779-782. 2004.

P 190-04 "Lowest Landau level diamagnetic fluctuations in niobium"

Salem-Sugui, S., Friesen, M., Alvarenga, A. D., Schilling, O. F., Gandra, F. G., and Doria, M. M.

We have performed a magnetic study of a bulk metallic sample of Nb with critical temperature $T_c = 8.5$ K. Magnetization measurements taken for magnetic fields greater than 1 kOe show a superconducting transition that becomes broader as the field is increased. The data are well described by lowest Landau level (LLL) fluctuation theory. A scaling analysis yields values for the superconducting transition temperature under field $T_c(H)$ which are consistent with $H_c2(T)$. © 2004 Published by Elsevier B.V. *Physica C-Superconductivity and Its Applications* 408-10, 664-665. 2004.

P 191-04 "Magnetic polaron and Fermi surface effects in the spin-flip scattering of EuB6"

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

The spin-flip scattering (SFS) between conduction and $4f(7)$ Eu^{2+} ($S=8/2$) electrons in the paramagnetic phase of EuB_6 (T greater than or equal to $2T_0$ similar or equal to 30 K) is studied by means of electron spin resonance (ESR) at three frequencies. The single Dysonian resonance observed in all cases suggests a metallic environment for the Eu^{2+} ions. The ESR at high field, H similar or equal to 12.05 kG (similar or equal to 33.9 GHz), has an anisotropic linewidth with cubic symmetry. The low-field, 1.46 kG (4.1 GHz) and 3.35 kG (9.5 GHz), ESR linewidths are unexpectedly broader and have a smaller anisotropy than at the higher field. The unconventional narrowing and anisotropy of the linewidth at higher fields are indicative of a homogeneous resonance and microscopic evidence for a strong reduction in spin-flip scattering between the spins of Eu^{2+} and the states in the electron and hole pockets at the X points of the Brillouin zone by magnetic polarons. *Physical Review B* 70[14]. 2004.

P 192-04 "Magnetocaloric effect in the RNi5 (R=Pr, Nd, Gd, Tb, Dy, Ho, Er) series"

von Ranke, P. J., Mota, M. A., Grangeia, D. F., Carvalho, A. M. G., Gandra, F. C. G., Coelho, A. A., Caldas, A., de Oliveira, N. A., and Gama, S.

In this paper, the magnetocaloric effect in the hexagonal intermetallic compounds belonging to the RNi_5 series was calculated using a Hamiltonian including the crystalline electrical field, exchange interaction, and the Zeeman effect. Experimental work was performed and the two thermodynamics quantities, namely, isothermal entropy change and adiabatic temperature change were obtained for polycrystalline samples, using heat capacity measurements, and compared to the theoretical predictions. *Physical Review B* 70[13]. 2004.

P 193-04 "Novel route for the preparation of nanosized NiFe2O4 powders"

Silva, M. N. B., Duque, J. G. D., Gouveia, D. X., de Paiva, J. A. C., and Macedo, M. A.

Nanosized NiFe_2O_4 powders were prepared by a novel sol-gel route. The powders calcined at 1200 degrees C and quenched to liquid nitrogen temperature showed a mixed spinel phase, with a saturation magnetization of 49 emu/g, crystallite size of 67 nm and hyperfine magnetic field $B-1 = 520$ kOe, $B-2 = 484$ kOe and $A = 488$ kOe.

Japanese Journal of Applied Physics Part 1-Regular Papers Short Notes & Review Papers 43[8A], 5249-5252. 2004.

P 194-04 "Ordering effects of the dipolar interaction in lattices of small magnetic particles"

Bahiana, M., Nunes, J. P. P., Altbir, D., Vargas, P., and Knobel, M.

The hysteresis curves of systems composed of small interacting magnetic particles, regularly placed on a two-dimensional lattice, are obtained with Monte Carlo simulations, for magnetic fields on the plane of the monolayer. The remanence as a function of temperature, in interacting systems, presents a peak that separates two different magnetic states. At low temperatures, small values of remanence are a consequence of antiferromagnetic order due to the dipolar interaction. At higher values of temperature the increase of the component normal to the lattice plane is responsible for the small values of remanence. The value of the temperature corresponding to the maximum value of remanence depends on lattice spacing and size. © 2004 Elsevier B.V. All rights reserved. *Journal of Magnetism and Magnetic Materials* 281[2-3], 372-377. 2004.

P 195-04 "P-representable subset of all bipartite Gaussian separable states"

de Oliveira, M. C.

P-representability is a necessary and sufficient condition for separability of bipartite Gaussian states only for the special subset of states whose covariance matrix are $\text{Sp}(2, R)$ circle times $\text{Sp}(2, R)$ locally invariant. Although this special class of states can be reached by a convenient $\text{Sp}(2, R)$ circle times $\text{Sp}(2, R)$ transformation over an arbitrary covariance matrix, it represents a loss of generality, avoiding inference of many general aspects of separability of bipartite Gaussian states. *Physical Review A* 70[3]. 2004.

P 196-04 "Phase analysis of quantum oscillations in graphite"

Luk'yanchuk, I. A. and Kopelevich, Y.

The quantum de Haas-van Alphen (dHvA) and Shubnikov-de Haas oscillations measured in graphite were decomposed by pass-band filtering onto contributions from three different groups of carriers. Generalizing the theory of dHvA oscillations for 2D carriers with an arbitrary spectrum and by detecting the oscillation frequencies using a method of two-dimensional phase-frequency analysis which we developed, we identified these carriers as (i) minority holes having a 2D parabolic massive spectrum $p(\text{perpendicular to})/2m(\text{perpendicular to})$, (ii) massive majority electrons with a 3D spectrum and (iii) majority holes with a 2D Dirac-like spectrum $+/-vp(\text{perpendicular to})$ which seems to be responsible for the unusual strongly-correlated electronic phenomena in graphite. *Physical Review Letters* 93[16]. 2004.

P 197-04 "A Raman scattering-based method to probe the carrier drift velocity in semiconductors: Application to gallium nitride"

Andrade-Neto, A. V., Vasconcellos, A. R., Luzzi, R., and Freire, V. N.

A single expression relating the carrier drift velocity in semiconductors under an electric field to Raman scattering data is derived resorting to a full nonequilibrium picture for electrons and holes. It allows one to probe with high optical precision both the ultrafast transient as well as the steady state carriers' drift velocity in semiconductor systems. This is achieved by simply modifying the experimental geometry, thus changing the angle between the transferred wave vector Q and the applied electric field E , and measuring the frequency shift promoted by the presence of the field to be observed in the single-particle and plasmon scattering spectra. An application to zinc-blende gallium nitride is presented to highlight the power of the method. © 2004 American Institute of Physics.

Applied Physics Letters 85[18], 4055-4057. 2004.

P 198-04 "Recombination processes in CdTe quantum-dot-doped glasses"

Padilha, L. A., Neves, A. A. R., Cesar, C. L., Barbosa, L. C., and Cruz, C. H. B.

Electron-hole recombination in CdTe quantum dots was studied by photoluminescence and resonant femtosecond pump-probe measurements. A dependence of recombination times with pump pulse intensity was observed and we attribute this to the Auger recombination process. The overall kinetic processes that we observed are a fast decay from the initial excited state to surface trap states, the Auger recombination, the recombination of electrons from the surface states, and a longer time recombination which we attribute to electrons in the deep traps states. © 2004 American Institute Of Physics

Applied Physics Letters 85[15], 3256-3258. 2004.

P 199-04 "Relativistic and interchannel coupling effects in photoionization angular distributions by synchrotron spectroscopy of laser cooled atoms"

Coutinho, L. H., Cavasso, R. L., Rocha, T. C. R., Homem, M. G. P., Figueira, D. S. L., Fonseca, P. T., Cruz, F. C., and de Brito, A. N.

We investigate the angular distribution of photoionization fragments at low photon energies (12-40 eV) in an open shell atom, by synchrotron radiation recoil ion momentum spectroscopy in a laser cooled and trapped sample. For cesium atoms, for which relativistic effects play an important role and the ion recoil is relatively small, we could determine large and rapid changes of the asymmetry parameter beta from two, observed for s electrons outside resonances and far from the Cooper minimum. They can be explained by relativistic effects and interchannel coupling arising from final state configuration mixing

Physical Review Letters 93[18]. 2004.

P 200-04 "An RKKY-induced dimerized phase of the Kondo lattice model"

Miranda, E. and Xavier, J. C.

We clarify the nature of the dimerized ground state found in the one-dimensional Kondo lattice model at quarter conduction electron filling. The conduction electrons mediate, through the RKKY mechanism, the long-range interactions among localized spins necessary to induce dimerization in that sub-system. On the other hand, the feedback of the local moments on the conduction electron fluid does not induce dimerization in the latter, whose spin sector remains gapless. The same feedback, however, is able to open a charge gap. © 2004 Elsevier B.V. All rights reserved

Physica C-Superconductivity and Its Applications 408-10, 179-180. 2004.

P 201-04 "Space-time geometry and thermodynamic properties of a self-gravitating ball of fluid in phase transition"

Polanco, J. D., Letelier, P. S., and Ujevic, M.

A numerical solution of Einstein field equations for a spherical symmetric and stationary system of identical and autogravitating particles in phase transition is presented. The fluid possesses a perfect fluid energy-momentum tensor, and the internal interactions of the system are represented by a van der Waals-like equation of state, able to describe a first order phase transition of the type gas-liquid. We find that the space-time curvature, the radial component of the metric, and the pressure and density show discontinuities in their radial derivatives in the phase coexistence region. This region is found to be a spherical surface concentric with the star, and the system can be thought of as a foliation of acronal, concentric and isobaric surfaces in which the coexistence of phases occurs in only one of these surfaces.

This kind of system can be used to represent a star with a high energy density core and low energy density mantle in hydrodynamic equilibrium

Physical Review D 70[6]. 2004.

P 202-04 "Spin order in one-dimensional Kondo and Hund lattices"

Garcia, D. J., Hallberg, K., Alascio, B., and Avignon, M.

We study numerically the one-dimensional Kondo and Hund lattices consisting of localized spins interacting antiferromagnetically or ferromagnetically with the itinerant electrons, respectively. Using the density-matrix renormalization group we find, for both models and in the small coupling regime, the existence of new magnetic phases where the local spins order forming ferromagnetic islands coupled antiferromagnetically. Furthermore, by increasing the interaction parameter $\backslash J$ we find that this order evolves toward the ferromagnetic regime through a spiral-like phase with longer characteristic wavelengths. These results shed new light on the zero temperature magnetic phase diagram for these models

Physical Review Letters 93[17]. 2004.

P 203-04 "Structural and magnetotransport properties of discontinuous CO/SiO₂ multilayers"

Denardin, J. C., Knobel, A., Dorneles, L. S., and Schelp, L. F.

Results of structural, magnetic and transport properties of magnetic CO/SiO₂ granular multilayers, consisting of successive planes of nanosized cobalt clusters embedded in SiO₂ and produced by sequential deposition, are presented. Microscopy shows that samples can be composed of a periodical array of Co nanoparticles. Relationships between the nanostructure and magnetotransport properties are discussed. © 2004 Elsevier B.V. All rights reserved

Materials Science and Engineering B-Solid State Materials for Advanced Technology 112[2-3], 120-122. 2004.

P 204-04 "Surface effects on vortex dynamics in thin type-II superconducting stripes with random pinning"

Reis, J. D., Venegas, P. A., de Mello, D. F., and Cabrera, G. G.

We analyze the dynamics of a driven vortex lattice moving in a thin Superconducting stripe. The two dimensional stripe is assumed to be finite in the longitudinal direction, where we take into account the Surface effects, and infinite in the transversal direction. The numerical simulations are performed using the Langevin dynamics, including the vortex-vortex interaction, interaction of vortices with the surface current, vortex images, transport current and randomly distributed pinning centers. We show results for the differential resistivity and the vortex trajectories as a function of the external force. © 2004 Elsevier B.V. All rights reserved

Physica C-Superconductivity and Its Applications 408-10, 595-596. 2004.

P 205- 04 “Surface modification with phosphoric acid of SiO₂/Nb₂O₅ prepared by the sol-gel method: Structural-textural and acid sites studies and an ion exchange model”

Francisco, M. S. P., Cardoso, W. S., Gushikem, Y., Landers, R., and Kholin, Y. V.

In this work, the structural and textural properties of the SiO₂/Nb₂O₅ system prepared by the sol-gel method and then modified by phosphoric acid were studied. The different materials were prepared, with three different mol % Nb₂O₅ (2.5, 5.0, and 7.5 mol %), and calcined in the temperature range of 423-1273 K. BET specific surface area determinations, scanning electron microscopy connected to a X-ray emission analyzer, Fourier transform infrared spectroscopy, and X-ray photoelectron spectroscopy (XPS) were used for the investigation. For the lowest temperature of calcination (423 K), the mesopores and micropores of the modified material were blocked, resulting in a decrease of the specific surface area compared to the S-BET values obtained for the SiNb matrix. Under intermediate temperatures of calcination (423-873 K), the modified material acquired textural stability. By XPS analysis, the presence of the dihydrogenphosphate species was identified, the P/Nb atomic ratios being independent of the thermal treatment. P-31 magic angle spinning NMR confirmed the XPS data and also showed that the chemical shift of the (H₂PO₄)⁻ ions strongly depended on the crystallization degree of the Nb₂O₅. Structural thermal stability was also shown by the presence of Bronsted acid sites in the modified material calcined at high temperature (1273 K). The thermal stability is directly associated with obtainment of the same value for K⁺ exchange capacity (0.74 mmol g⁻¹, average value) for the modified materials calcined at 423 and 1273 K. The chemical analyses of phosphorus for the modified materials were made by using the inductively coupled plasma. The value was 0.36 mmol g⁻¹, corroborating the presence of (H₂PO₄)⁻ ions. The ion exchange isotherms presented an S-shaped form characteristic of energetically heterogeneous ion exchangers, permitting application of a model of fixed polydentate centers, in which ion exchange took place
Langmuir 20[20], 8707-8714. 2004.

P 206- 04 “Synthetic melanin thin films: Structural and electrical properties”

da Silva, M. I. N., Deziderio, S. N., Gonzalez, J. C., Graeff, C. F. O., and Cotta, M. A

Scanning probe microscopy was used to investigate the structural and electrical organization at the nanoscopic level of hydrated melanin thin films synthesized by oxidizing L-3-(3,4-dihydroxyphenyl)-alanine (L-dopa) in dimethyl sulfoxide. Atomic force microscopy (AFM) provided the morphologies of the L-dopa melanin films. Electrostatic force microscopy and conductive-AFM were used to spatially resolve the electrical properties of the material. Using a simple parallel plate capacitor model a method to measure the charge distribution on the sample was developed. The correlations between topography, electric charge, and current images of the sample demonstrated that the hydration process produces a restructuring of melanin observed not only through topographic variations, but also through the creation of areas with different electrical properties. © 2004 American Institute of Physics

Journal of Applied Physics 96[10], 5803-5807. 2004.

P 207- 04 “Transport via excitonic complexes in resonant tunneling structures”

Vercik, A., Gobato, Y. G., and Brasil, M. J. S. P.

In this work we study the formation of neutral and negatively charged excitons in double barrier diodes under bias, and how they contribute to transport. We observe a pre-resonance shoulder in the current-voltage curve, which is associated to trion-assisted tunneling of electrons. We analyze this phenomenon by measuring also the quantum-well photoluminescence emission. This trion-assisted mechanism is terminated when trion complexes are dissociated either by thermal excitation or by scattering with free carriers in the quantum well. A simple phenomenological rate equation model allows us confirming the hypothesis of charge transport via a trion state and the proposed methods of termination. © 2004 Published by Elsevier B.V

Materials Science and Engineering B-Solid State Materials for Advanced Technology 112[2-3], 128-130. 2004.

P 208- 04 “Thermodynamic and electronic transport properties of CeNiIn₂”

Rojas, D. P., da Silva, L. M., Gandra, F. G., Seica, J. P., Lopes, E. B., Pereira, L. C. J., and Waerenborgh, J. C.

Thermodynamic and transport properties of CeNiIn₂ are reported. The results indicate that this system undergoes a magnetic transition at T-C = 3.4 K. A Kondo temperature T-K = 2.7 K was also estimated. The electronic coefficient gamma approximate to 1 J/mol K⁻², calculated from specific heat data, is characteristic for heavy-fermion systems and is consistent with the estimated T-K. For T < T-C, the specific heat and resistivity data are better described if an additional contribution from the spin waves with a gap in the magnon spectrum is considered. Crystal field parameters Delta(1) = 80 K and Delta(2) greater than or equal to 200 K were estimated from the temperature dependence of specific heat above T-C. The results obtained for this compound are explained as an interplay of the anisotropy and the competition between RKKY interaction and Kondo effect. © 2004 Elsevier B.V. All rights reserved

Physica B-Condensed Matter 352[1-4], 372-377. 2004.

P 209- 04 “Three-dimensional mapping of the strain anisotropy in self-assembled quantum-wires by grazing incidence x-ray diffraction”

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

Three-dimensional strain mapping of InAs self-assembled nanowires on an InP substrate using grazing incidence x-ray diffraction is reported. A remarkable anisotropy was observed for the strain components, parallel [-220] and perpendicular [220] to the wire axis. The highest strain relaxation was measured along the [220] direction. The relationship between the interatomic distances along the [-220] and [220] directions, for each z position (height) in the nanostructure, was obtained by angular scans in the vicinity of the (040) reciprocal lattice point. © 2004 American Institute of Physics

Applied Physics Letters 85[16], 3581-3583. 2004.

P 210- 04 "Two new sealed sample cells for small angle x-ray scattering from macromolecules in solution and complex fluids using synchrotron radiation"

Cavalcanti, L. P., Torriani, I. L., Plivelic, T. S., Oliveira, C. L. P., Kellermann, G., and Neuenschwander, R.

Two different vacuum tight sample cells for in situ temperature dependent small angle scattering from liquids are presented in this article. In the first one, the sample fills a 1 mm thickness gap sealed on both sides by two thin parallel mica windows (volume 300 μl). In the second one, the liquid is injected into a 1 mm cylindrical capillary tube (volume 130 μl). The cells are lodged into temperature controlled chambers directly connected to the beamline vacuum path. Several important improvements with respect to similar instrumentation previously reported are: (1) versatile application of the mica cell, that can be used for all types of samples (gels, liquid crystals, and dispersions in organic solvents) and (2) the design of the chamber for the capillary cell allows registration of wider angle data and a convenient replacement of the capillary tube after each experiment. Signal to background ratio and data reproducibility were tested using protein solutions. We give a brief report of scattering experiments performed with different protein samples and two-dimensional data collection. © 2004 American Institute of Physics

Review of Scientific Instruments 75[11], 4541-4546. 2004.

P 211- 04 "Uranium and thorium thin film calibrations by particle track techniques"

lunes, P. J., Hadler, J. C., Bigazzi, G., Guedes, S., Zuniga, A., Paulo, S. R., and Tello, C. A.

Particle track techniques, which enable estimation of the uranium and thorium contents in films where energy self-absorption is negligible, are presented. These techniques allow calibration of uranium and thorium thin films with adequate precision to be used in neutron fluence determinations for fission-track dating. Calibration via alpha particles is relatively simple for the case of uranium films, whereas for thorium films it is necessary to use the spectrometric characteristics of the employed track detector. Besides those based on alpha particles, calibration procedures via fission fragments are presented both for uranium as well as for thorium films

Journal of Radioanalytical and Nuclear Chemistry 262[2], 461-468. 2004.

P 212- 04 "Vortex lattice in Bi₂Sr₂CaCu₂O₈ well above the first-order phase transition boundary"

Torres, J. H. S., da Silva, R. R., Moehlecke, S., and Kopelevich, Y. Measurements of non-local in-plane resistance originating from transverse vortex-vortex correlations have been performed on Bi₂Sr₂CaCu₂O₈+ δ single crystals in a magnetic field up to 9 T applied along the crystal c-axis. Our results demonstrate that a rigid vortex lattice does exist over a broad portion of the magnetic field-temperature (H-T) phase diagram, well above the first-order transition boundary H-FOT(T). © 2004 Elsevier B.V. All rights reserved

Physica C-Superconductivity and Its Applications 408-10, 566-567. 2004.

P 213- 04 "Vortex matter behavior dependent on magnetic field orientation in Bi₂Sr₂CaCu₂O₈+ δ crystals"

de Almeida, R. L. and de Lima, O. F.

We have studied Bi₂Sr₂CaCu₂O₈ crystals that present clear signatures of the 3D-2D decoupling transition of Abrikosov vortices along the crystal c-axis. The results are consistent with a model for 2D melting transition, where the Josephson coupling between pancake vortices in different planes are suppressed by thermal fluctuations. The angular dependence with the magnetic field orientation was also measured up to 7 T, showing that only the field component parallel to the crystal c-axis is relevant for the 3D-2D decoupling transition. © 2004 Elsevier B.V. All rights reserved

Physica C-Superconductivity and Its Applications 408-10, 512-513. 2004.

P 214- 04 "Weighted oscillator strengths and lifetimes for the Si II spectrum"

Cavalcanti, G. H., Borges, F. O., Mania, A. J., Orloski, R. V., and Trigueiros, A. G.

The weighted oscillator strengths (gf) and the lifetimes for Si II presented in this work were carried out in a multiconfiguration Hartree-Fock relativistic (HFR) approach. In this calculation, the electrostatic parameters were optimized by a least-squares procedure, in order to improve the adjustment to experimental energy levels. This method produces gf-values that are in better agreement with intensity observations and lifetime values that are closer to the experimental ones. In this work we presented all the experimentally known electric dipole Si II spectral lines. © 2004 Elsevier Ltd. All rights reserved

Journal of Quantitative Spectroscopy & Radiative Transfer 90[3-4], 291-308. 2005.

A TODOS DESEJAMOS FELIZ NATAL E 2005 REFLETO DE ALEGRIAS.



Abstracta

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