

Abstracta

Ano X - N. 03

Jun.06



Trabalho Aceito para Publicação

A004-06

Trabalhos Publicados

P081-06 à P136-06

Trabalhos Aceitos para Publicação

A004-06 “Decoherence induced by a phase damping reservoir.”

Angelo, R. M., Cardoso, E. S., and Furuya, K.

A phase damping reservoir composed by N-bosons coupled to a system of interest through a cross-kerr interaction is proposed and its effects on quantum superpositions are investigated. By means of analytical calculations we show that: (i-) the reservoir induces a Gaussian decay of quantum coherences, and (ii) the inherent incommensurate character of the spectral distribution yields irreversibility. These results, which have been extended for the thermodynamic limit, show that non-dissipative decoherence can be suitably contemplated within the EID approach. Finally, it is shown that the same mechanism yielding decoherence are also responsible for inducing dynamical disentanglement.

Physical Review A 73[6]. 062107. 2006.

Trabalhos Publicados

P081-06 “A geometrical optics model for electron-molecule collisions”

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

We report the extension of a model, based on geometrical optics, that was developed to explain similarities found in the cross sections of electron collisions with small hydrocarbons. Here we discuss the modifications made in the model and apply it to electron-collisions with molecules containing other atoms besides carbon and hydrogen. We then apply the model to predict the cross sections for the larger molecules C₆H₆, C₈H₈, C-60 and C₆F₆, and find that, even in this case, the model is useful for a first estimate of the theoretically calculated and experimental elastic cross sections.

Journal of Physics B-Atomic Molecular and Optical Physics 39[5], 1045-1053. 2006.

P082-06 “Angra Neutrino Project: status and plans”

Anjos, J. C., Barbosa, A. F., Funchal, R. Z., Kemp, E., Magnin, J., Nunokawa, H., Peres, O. L. G., Reyna, D., and Shellard, R. C.

We present the status and plans of the Angra Project, a new nuclear reactor neutrino oscillation experiment, proposed to be built in Brazil at the Angra dos Reis nuclear reactor complex. This experiment is aimed to measure θ_{13} , the last unknown of the three neutrino mixing angles. Combining a high luminosity design, very low background from cosmic rays and careful control of systematic errors at the 1% level, we propose a high sensitivity multi-detector experiment, able to reach a sensitivity to antineutrino disappearance down to $\sin^2(2\theta_{13}) = 0.006$ in a three years running period, improving present limits constrained by the CHOOZ experiment by more than an order of magnitude

Nuclear Physics B-Proceedings Supplements 155, 231-232. 2006.

P083-06 “Anomalous phonon shifts in the paramagnetic phase of multiferroic RMn₂O₅ (R=Bi, Eu, Dy): Possible manifestations of unconventional magnetic correlations”

Garcia-Flores, A. F., Granado, E., Martinho, H., Urbano, R. R., Rettori, C., Golovenchits, E. I., Sanina, V. A., Oseroff, S. B., Park, S., and Cheong, S. W.

A Raman spectroscopic study of the high-frequency optical phonons in single crystals of the multiferroic system RMn₂O₅ (R=Bi, Eu, Dy) was performed. All studied materials show anomalous phonon shifts, below a new characteristic temperature for these materials, T^{*} similar to 60-65 K. The sign and magnitude of such shifts appear to be correlated with the ionic radius of R, involving from softenings for R=Bi to hardenings for R=Dy and showing an intermediary behavior for R=Eu. Additional phonon anomalies were identified below similar to T(N) similar to 40-43 K, reflecting the onset of long-range ferroelectric and/or magnetic order of the Mn sublattice. Complementary dc-magnetic susceptibility [$\chi(T)$] measurements for BiMn₂O₅ up to 800 K yield a Curie-Weiss temperature $\theta_{CW} = -253(3)$ K, revealing a fairly large frustration ratio (parallel to θ_{CW}) parallel to T-N=6.3). Deviations of $\chi(T)$ from a Curie-Weiss paramagnetic behavior due to magnetic correlations were observed below temperatures of the order of parallel to θ_{CW} parallel to, with the inverse susceptibility showing inflection points at similar to 160 K and similar to T^{*}. Supported by $\chi(T)$ data, the anomalous Raman phonon shifts below T^{*} are interpreted in terms of the spin-phonon coupling, in a scenario of strong magnetic correlations. Overall, these results support significant magnetic frustration, introduce a new characteristic temperature (T^{*}), and suggest a surprisingly rich behavior for the magnetic correlations in the paramagnetic phase of this system.

Physical Review B 73[10]. 104411. 2006.

P084-06 “Characterization and modeling of antireflective coatings of SiO₂, Si₃N₄, and SiO_xN_y deposited by electron cyclotron resonance enhanced plasma chemical vapor deposition”

Mestanza, S. N. M., Obrador, M. P., Rodriguez, E., Biasotto, C., Doi, I., Diniz, J. A., and Swart, J. W.

In this work the optical transmission spectra of silicon oxide (SiO₂), silicon nitrides (Si₃N₄), silicon-rich oxynitrides (SiO_xN_y), and antireflective coatings (ARCs), deposited by the electron cyclotron resonance enhanced plasma chemical vapor deposition onto a silicon substrate at room temperature, are studied. Simulations carried out with the MATHEMATICA program, from 0 to 1000 nm thick coatings, showed maximum transmittance in the three basic colors at 620, 480, and 560 nm for the SiO₂, Si₃N₄, and SiO_xN_y ARCs, respectively. However, a highly significant transmittance over a broad spectral range from visible (VIS) to near the infrared region, with optical gain in the three basic colors above 20%, is observed only at thicknesses of 80, 70, and 60 nm, respectively, for SiO₂, Si₃N₄, and SiO_xN_y ARCs. Among the three evaluated films, the highest transmittance in the broad spectral band in the VIS range was observed for 60 nm thick Si₃N₄ films. The Fourier transform infrared spectroscopy of these films reveal high structural quality and the presence of Si-O, Si-H, N-H, and Si-N bonds, independent of thickness and deposition parameters.

Journal of Vacuum Science & Technology B 24[2], 823-827. 2006.

P085-05 “Chiral symmetry restoration and pion properties in a q-deformed NJL model”

Timoteo, V. S. and Lima, C. L.

We review the implementation of a q-deformed fermionic algebra in the Nambu-Jona-Lasinio model (NJL). The gap equations obtained from a deformed condensate as well as from the deformation of the NJL Hamiltonian are discussed. The effect of both temperature and deformation in the chiral symmetry restoration process as well as in the pion properties is studied

Brazilian Journal of Physics 36[1B], 208-217. 2006.

P086-06 “Classical dissipation and asymptotic equilibrium via interaction with chaotic systems”

Bonanca, M. V. S. and de Agular, M. A. M.

We study the energy flow between a one-dimensional oscillator and a chaotic system with two degrees of freedom in the weak coupling limit. The oscillator's observables are averaged over an initially microcanonical ensemble of trajectories of the chaotic system, which plays the role of an environment for the oscillator. We show numerically that the oscillator's average energy exhibits irreversible dynamics and ‘thermal’ equilibrium at long times. We use linear response theory to describe the dynamics at short times and we derive a condition for the absorption or dissipation of energy by the oscillator from the chaotic system. The equilibrium properties at long times, including the average equilibrium energies and the energy distributions, are explained with the help of statistical arguments. We also check that the concept of temperature defined in terms of the ‘volume entropy’ agrees very well with these energy distributions.

Physica A-Statistical Mechanics and Its Applications 365[2], 333-350. 2006.

P087-06 “Crystal structure and physical properties of Gd₃Co₄Sn₁₃ intermetallic antiferromagnet”

Pires, M. A., Ferreira, L. M., Duque, J. G. S., Urbano, R. R., Agüero, O., Torriani, I., Rettori, C., Bittar, E. M., and Pagliuso, P. G.

We have synthesized single crystalline samples of Gd₃Co₄Sn₁₃ intermetallic compound using a Sn-flux method. This compound crystallizes with a cubic Yb₃Co₄Sn₁₃-type structure, space group Pm-3n, which has 40 atoms per unit cell. Measurements of the magnetic susceptibility, heat capacity, electrical resistivity, and electron spin resonance (ESR) revealed that Gd₃Co₄Sn₁₃ is a metallic Curie-Weiss paramagnet at high temperature and presents an antiferromagnetic ordering below T_N=14.5 K. In the paramagnetic state, a single Gd³⁺ ESR line with a nearly temperature independent g similar to 2.005(2) is observed, and its linewidth follows a Korringa-like behavior as a function of temperature. From the Korringa rate (ΔH/ΔT similar to 4 Oe/K) and g-shift (Δg similar to 0.012) obtained from the ESR experiments combined with the magnetic susceptibility and specific heat data for Gd₃Co₄Sn₁₃, we have extracted the exchange parameters between the Gd³⁺ local moments and the conduction-electrons (c-e) in this compound. This exchange parameter J(fs) approximate to 10 meV was found to be c-e wave-vector independent and the electronic structure of Gd₃Co₄Sn₁₃ has a single band character.

Journal of Applied Physics 99[8]. 08J311-08J311-3. 2006.

P088-06 “Dissipative Stern-Gerlach recombination experiment”

De Oliveira, T. R. and Caldeira, A. O.

The possibility of obtaining the initial pure state in a usual Stern-Gerlach experiment through the recombination of the two emerging beams is investigated. We have extended the previous work of Englert, Schwinger, and Scully [Found Phys. 18, 1045 (1988)] including the fluctuations of the magnetic field generated by a properly chosen magnet. As a result we obtained an attenuation factor to the possible revival of coherence when the beams are perfectly recombined. When the source of the magnetic field is a superconducting quantum interference device (SQUID) the attenuation factor can be controlled by external circuits and the spin decoherence directly measured.

Physical Review A 73[4]. 042502. 2006.

P089-06 “Effect of magnetic field on off-axis donor binding energy in a nanotube”

Orozco, E. A., Gonzalez, J. D., Duarte, O. S., and Mikhailov, I. D.

We analyze the effect of the mixing of the low-lying s and p(x,y) subbands on the ground-state binding energy of the off-axis donors in cylindrical nanotubes in the presence of a magnetic field parallel to the axis. We express the wave function as a product of combinations of s and p subband wave functions and an envelope function that depends only on the electron-ion separation. By using the variational principle we derive a differential equation for the envelope function, which we solve numerically. The curves for the dependence of the ground-state binding energies on the donor distance from the axis are presented and it is shown that the effect of the subband mixing for off-axis donors in nanotubes is considerable. It is found that the magnetic field enhances the binding energies of donors located close to the axis whereas for donors located far from the axis the effect of the magnetic field on the binding energy is the opposite.

Physica Status Solidi B-Basic Solid State Physics 243[6], 1263-1268. 2006.

P090-06”Effective interactions from q-deformed inspired transformations”

Timoteo, V. S. and Lima, C. L.

From the mass term for the transformed quark fields, we obtain effective contact interactions of the NJL type. The parameters of the model that maps a system of non-interacting transformed fields into quarks interacting via NJL contact terms are discussed.

Physics Letters B 635[2-3], 168-171. 2006.

P091-06 “Effects of applied magnetic fields and hydrostatic pressure on the optical transitions in self-assembled InAs/GaAs quantum dots”

Duque, C. A., Porras-Montenegro, N., Barticevic, Z., Pacheco, M., and Oliveira, L. E.

A theoretical study of the photoluminescence peak energies in InAs self-assembled quantum dots embedded in a GaAs matrix in the presence of magnetic fields applied perpendicular to the sample plane is performed. The effective mass approximation and a parabolic potential cylinder-shaped model for the InAs quantum dots are used to describe the effects of magnetic field and hydrostatic pressure on the correlated electron-hole transition energies. Theoretical results are found in quite good agreement with available experimental measurements for InAs/GaAs self-assembled quantum dots.

Journal of Physics-Condensed Matter 18[6], 1877-1884. 2006.

P092-06 “Effects of dipolar interactions on the magnetic properties of gamma-Fe₂O₃ nanoparticles in the blocked state”

Nunes, W. C., Cebollada, F., Knobel, M., and Zanchet, D.

The role played by dipolar interactions in the coercive field and remanence of nanoparticle systems is studied using different concentrations of nearly monodisperse nanoparticles of gamma-Fe₂O₃. The 9.0 nm particles are isolated by organic encapsulation and diluted in paraffin. Magnetic properties were investigated by means of hysteresis obtained at different temperatures,

zero-field-cooled (ZFC) and field-cooled (FC) magnetization curves, and the so-called Delta M technique. The analysis of the experimental data points to the existence of a demagnetizing role played by the dipolar interaction in the coercive field.

Journal of Applied Physics 99[8]. 08N705-08N705-3. 2006.

P093-06 "Elastic properties of nanowires"

da Fonseca, A. F., Malta, C. P., and Galvao, D. S

We present a model to study Young's modulus and Poisson's ratio of the composite material of amorphous nanowires. It is an extension of the model derived by two of us [da Fonseca and Galvao, Phys. Rev. Lett. 92, 175502 (2004)] to study the elastic properties of amorphous nanosprings. The model is based on twisting and tensioning a straight nanowire and we propose an experimental setup to obtain the elastic parameters of the nanowire. We used the Kirchhoff rod model to obtain the expressions for the elastic constants of the nanowire.

Journal of Applied Physics 99[9]. 094310-094310-4. 2006.

P094-06 "Electron inertial effects on rotating magnetic field current drive"

Ferrari, H. E., Farengo, R., and Clemente, R. A

The effect of finite electron mass on the formation and sustainment of a field reversed configuration (FRC) by rotating magnetic fields (RMF) is studied. The importance of inertial effects is measured by the ratio between the RMF frequency (ω) and the electron-ion collision frequency (ν). In the limit where this ratio is very small ($\omega/\nu \rightarrow 0$), previous results corresponding to massless electrons are recovered. When ω/ν increases there are significant changes in the value of the minimum external rotating field needed to sustain the FRC and the time required to reach a steady state. Since ν decreases with increasing temperature and decreasing density, these effects are expected to become more important as fusion relevant temperatures are approached.

Physics of Plasmas 13[3]. 032505. 2006.

P095-06 "Electron spin resonance g shift in Gd₅Si₄, Gd₅Ge₄, and Gd_{5.09}Ge_{2.03}Si_{1.88}"

Pires, M. J. M., Mansanares, A. M., da Silva, E. C., Magnus, A., Carvalho, G., Gama, S., and Coelho, A. A.

Gd₅Si₄, Gd₅Ge₄, and Gd_{5.09}Ge_{2.03}Si_{1.88} compounds were studied by electron spin resonance. The arc-melted samples were initially characterized by optical metallography, x-ray diffraction, and static magnetization measurements. The electron spin resonance results show a negative paramagnetic g shift for Gd₅Si₄ and Gd_{5.09}Ge_{2.03}Si_{1.88}, and a smaller positive one for Gd₅Ge₄. The values of the exchange parameter (j) between the localized Gd-4f spins and the conduction electrons are obtained from the g shifts. These values are positive and of the same order of magnitude for Gd₅Si₄ and Gd_{5.09}Ge_{2.03}Si_{1.88}, and negative one order of magnitude smaller for Gd₅Ge₄. The electron spin resonance data were interpreted considering the strongly bottlenecked solution of the coupled Bloch-Hasegawa equations.

Physical Review B 73[14]. 144404. 2006.

P096-06 "Electrostatic theory for imaging experiments on local charges in quantum Hall systems"

Pereira, A. L. C. and Chalker, J. T.

We use a simple electrostatic treatment to model recent experiments on quantum Hall systems, in which charging of localised states by addition of integer or fractionally charged quasiparticles is observed.

Treating the localised state as a compressible quantum dot or antidot embedded in an incompressible background, we calculate the electrostatic potential in its vicinity as a function of its charge, and the chemical potential values at which its charge changes. The results offer a quantitative framework for analysis of the observations.

Physica E-Low-Dimensional Systems & Nanostructures 31[2], 155-159. 2006.

P097-06 "Er³⁺-Tm³⁺ co-doped tellurite fibers for broadband optical fiber amplifier around 1550 nm band"

Chillce, E. F., Rodriguez, E., Neves, A. A. R., Moreira, W. C., Cesar, C. L., and Barbosa, L. C.

Tellurite fibers with 7500 ppm Er³⁺ concentration and diverse 2500-15,000 ppm Tm³⁺ concentrations were manufactured, and their amplified spontaneous emission (ASE) intensities 1550 nm band around were obtained for 980 and 790 nm pump laser. Maxima 187 nm bandwidth at -3 dB points using Er³⁺-Tm³⁺ co-doped tellurite optical fibers pumping at 790 nm was obtained, and energy transfer (ET) process between I-4(13/2) Er³⁺ and F-3(4) Tm³⁺ levels related with the amplifier quantum efficiency was studied from experimental and calculated lifetime.

Optical Fiber Technology 12[2], 185-195. 2006.

P098-06 "ESR study of the Eu²⁺ g-value in the metallic phase of cubic hexaboride Ca_{1-x}EuxB₆ (0.15 less than or similar to x <= 1.00)"

Urbano, R. R., Pagliuso, P. G., Rettori, C., Malachias, A., Granado, E., Schlottmann, P., Fisk, Z., and Oseroff, S. B.

The angular, magnetic field, and temperature dependence of the Eu²⁺(4f(7), S=7/2) g-value in Ca_{1-x}EuxB₆(0.15 less than or similar to x <= 1.00) is measured by means of electron spin resonance at two microwave frequencies, 9.4 and 34.4 GHz. The g-value is found to be anisotropic and magnetic-field-dependent. The reduction with field of the positive g-shift is interpreted in terms of the exchange interaction between the localized Eu(2+)4f(7) electrons with the conduction Eu²⁺ 5d-like electrons and B 2p-like holes. The angular, temperature, and x dependence of the anisotropy of the g-value can be attributed to demagnetization effects due to the platelet-like shape of the samples. High-resolution synchrotron x-ray diffraction experiments show the absence of distortions larger than $\delta a/a$ similar to 10⁻⁴. However, a mechanism for the anisotropy based on a weak tetragonal lattice distortion arising from the crystal surface cannot be excluded.

Physical Review B 73[11]. 115123. 2006.

P099-06 "Evaluation of copper oxide thin films as electrodes for microbatteries"

Souza, E. A., Landers, R., Cardoso, L. P., Cruz, T. G. S., Tabacniks, M. H., and Gorenstein, A.

In this work, copper oxide thin films have been evaluated for use as electrodes in thin film batteries. The films were deposited by dc sputtering at low power, in order to produce nanoparticulated films. Samples were deposited onto unheated or heated (420 degrees C) substrates. Both kind of samples are nanoparticulated, with distinct grain sizes, and amorphous. The potential profiles and cycling capacity in lithium electrolyte were investigated and are similar to those obtained for copper oxide in powder form. The discharge capacity for samples deposited onto heated substrates depends on the previous treatment of the samples,

and the stabilized capacity values are higher than for the samples deposited without intentional heating of the substrates, and suitable for use in lithium-ion microbatteries.

Journal of Power Sources 155[2], 358-363. 2006.

P100-06 "Evolution of the magnetic properties and magnetic structures along the $RmMln3m+2$ ($R = Ce, Nd, Gd, Tb$; $M = Rh, Ir$; and $m=1,2$) series of intermetallic compounds"

Pagliuso, P. G., Garcia, D. J., Miranda, E., Granado, E., Serrano, R. L., Giles, C., Duque, J. G. S., Urbano, R. R., Rettori, C., Thompson, J. D., Hundley, M. F., and Sarrao, J. L.

We discuss the evolution of the magnetic properties and magnetic structures along the series of intermetallic compounds $RmMln3m+2$ ($R=Ce, Nd, Gd, Tb$; $M=Rh, Ir$; and $m=1,2$). The $m=1,2$ are, respectively, the single layer and bilayer tetragonal derivatives of their cubic $Rln3$ relatives. Using a mean field model including an isotropic first-neighbors Ruderman-Kittel-Kasuya-Yoshida interaction (K) and the tetragonal crystalline electrical field (CEF), we demonstrated that, for realistic values of K and CEF parameters, one can qualitatively describe the direction of the ordered moments and the behavior of the ordering temperature for these series. The particular case, where the rare-earth ordered moments lie in the ab plane or are tilted from the c axis and T-N can be reduced by tuning the CEF parameters, revealed an interesting kind of frustration that may be relevant to the physical properties of complex classes of materials such as the $RmMln3m+2$ ($M=Rh, Ir$, and Co ; $m=1,2$) heavy-fermion superconductors.

Journal of Applied Physics 99[8]. 08P703-08P703-3. 2006.

P101-06 "Ferromagnetic resonance studies in granular CoCu codeposited films"

Pires, M. J. M., Mansanares, A. M., da Silva, E. C., Schmidt, J. E., Meckenstock, R., and Pelzl, J.

Experimental ferromagnetic resonance (FMR) data are presented for CoCu granular films obtained by electron beam codeposition. CoCu100-x films were prepared for $x = 10$ and 30 and were subsequently submitted to a thermal treatment. For the 10% Co samples one found three main resonance modes, one of them constituting of non-interacting Co particles. External field angular variation and temperature-dependent FMR experiments were proceeded and straight calculations of the involved resonance intensities as well. A strict correlation of the presented FMR data with the previous X-Ray diffraction, magnetization, and particle size investigations was possible. The link between structural changes and magnetic properties of the samples could be verified. For the 30% Co samples a broad resonance line for the in-plane configuration was found, which is characteristic for polycrystalline systems. In the perpendicular configuration a spin wave spectra were present on all samples and one could identify some of the modes as surface modes. These samples with 30% Co become more heterogeneous with increasing thermal treatment.

Journal of Magnetism and Magnetic Materials 300[2], 382-391. 2006.

P102-06 "Ferromagnetic resonance studies in granular Co-SiO2 thin films"

Pires, M. J. M., Denardin, J. C., da Silva, E. C., and Knobel, M.

Properties of thin granular Co-SiO2 films have been studied by means of ferromagnetic resonance (FMR). The obtained FMR results are discussed using sample magnetization, electrical conductivity, and transmission electron microscopy analysis.

Co and SiO2 were sequentially deposited for the sample preparation. The general behavior of the applied field for resonance could be described using effective out-of-plane anisotropies. A dipolar interaction model developed for magnetic heterostructures was applied to the interpretation of these anisotropies. The anisotropy terms caused by the magnetic particle shapes and by the film shape can explain the results for two metallic films close to percolation, in which the film shape is the preponderant contribution. In the case of an insulating sample, the consideration of an additional anisotropy term seems to be necessary to explain the results

Journal of Applied Physics 99[6]. 063908-063908-6. 2006.

P103-06 "First observations of separated atmospheric $\nu(\mu)$ and $(\nu)\overline{\nu}(\mu)$ events in the MINOS detector"

Adamson, P., Alexopoulos, T., Allison, W. W. M., Alner, G. J., Anderson, K., Andreopoulos, C., Andrews, M., Andrews, R., Arroyo, C., Avvakou, S., Ayres, D. S., Baller, B., Barish, B., Barker, M. A., Barnes, P. D., Barr, G., Barrett, W. L., Beall, E., Becker, B. R., Belias, A., Bergfeld, T., Bernstein, R. H., Bhattacharya, D., Bishai, M., Blake, A., Bocean, V., Bock, B., Bock, G. J., Boehm, J., Boehnlein, D. J., Bogert, D., Border, P. M., Bower, C., Boyd, S., Buckley-Geer, E., Byon-Wagner, A., Cabrera, A., Chapman, J. D., Chase, T. R., Chernichenko, S. K., Childress, S., Choudhary, B. C., Cobb, J. H., Cossairt, J. D., Courant, H., Crane, D. A., Culling, A. J., Dawson, J. W., DeMuth, D. M., De Santo, A., Dierckxsens, M., Diwan, M. V., Dorman, M., Drake, G., Ducar, R., Durkin, T., Erwin, A. R., Escobar, C. O., Evans, J., Fackler, O. D., Harris, E. F., Feldman, G. J., Felt, N., Fields, T. H., Ford, R., Frohne, M. V., Gallagher, H. R., Gebhard, M., Godley, A., Gogos, J., Goodman, M. C., Gornushkin, Y., Gouffon, P., Grashorn, E., Grossman, N., Grudzinski, J. J., Grzelak, K., Guarino, V., Habig, A., Halsall, R., Hanson, J., Harris, D., Harris, P. G., Hartnell, J., Hartouni, E. P., Hatcher, R., Heller, K., Hill, N., Ho, Y., Howcroft, C., Hylen, J., Ignatenko, M., Indurthy, D., Irwin, G. M., James, C., Jenner, L., Jensen, D., Joffe-Minor, T., Kafka, T., Kang, H. J., Kasahara, S. M. S., Kilmer, J., Kim, H., Koizumi, G., Kopp, S., Kordosky, M., Koskinen, D. J., Kostin, M., Krakauer, D. A., Kumaratunga, S., Ladrán, A. S., Lang, K., Laughton, C., Lebedev, A., Lee, R., Lee, W. Y., Libkind, M. A., Liu, J., Litchfield, P. J., Litchfield, R. P., Longley, N. P., Lucas, P., Luebke, W., Madani, S., Maher, E., Makeev, V., Mann, W. A., Marchionni, A., Marino, A. D., Marshak, M. L., Marshall, J. S., McDonald, J., McGowan, A., Meier, J. R., Merzon, G. I., Messier, M. D., Michael, D. G., Milburn, R. H., Miller, J. L., Miller, W. H., Mishra, S. R., Miyagawa, P. S., Moore, C., Morfin, J., Morse, R., Muallem, L., Mufson, S., Murgia, S., Murtagh, M. J., Musser, J., Naples, D., Nelson, C., Nelson, J. K., Newman, H. B., Nezhric, F., Nichol, R. J., Nicholls, T. C., Ochoa-Ricoux, J. P., Oliver, J., Oliver, W. P., Onuchin, V. A., Osiecki, T., Ospanov, R., Paley, J., Paolone, V., Para, A., Patzak, T., Pavlovich, Z., Pearce, G. F., Pearson, N., Peck, C. W., Perry, C., Peterson, E. A., Petyt, D. A., Ping, H., Piteira, R., Pla-Dalmau, A., Plunkett, R. K., Price, L. E., Proga, M., Pushka, D. R., Rahman, D., Rameika, R. A., Rauffer, T. M., Read, A. L., Rebel, B., Reyna, D. E., Rosenfeld, C., Rubin, H. A., Ruddick, K., Ryabov, V. A., Saakyan, R., Sanchez, M. C., Saoulidou, N., Schneps, J., Schoessow, P. V., Schreiner, P., Schwienhorst, R., Semenov, V. K., Seun, S. M., Shanahan, P., Shield, P. D., Smart, W., Smirnovsky, V., Smith, C., Smith, P. N., Sousa, A., Speakman, B., Stamoulis, P., Stefanik, A., Sullivan, P., Swan, J. M., Symes, P. A., Tagg, N., Talaga, R. L., Tetteh-Lartey, E., Thomas, J., Thompson, J., Thomson, M. A., Thron, J. L., Trendler, R., Trevor, J., Trostin, I., Tsarev, V. A., Tzanakos, G., Urheim, J., Vahle, P., Vakili, M., Vaziri, K., Velissaris, C., Verebryusov, V., Viren, B., Wai, L., Ward, C. P., Ward, D. R., Watabe, M., Weber, A., Webb, R. C., Wehmann, A., West, N., White, C., White, R. F., Wojcicki, S. G., Wright, D. M., Wu, Q. K., Yan, W. G., Yang, T., Yumiceva, F. X., Yun, J. C., Zheng, H., Zois, M., and Zwaska, R.

The complete 5.4 kton MINOS far detector has been taking data since the beginning of August 2003 at a depth of 2070 meters water-equivalent in the Soudan mine, Minnesota. This paper presents the first MINOS observations of $\nu(\mu)$ and $(\nu)\overline{\nu}(\mu)$ charged-current atmospheric neutrino interactions based on an exposure of 418 days.

The ratio of upward- to downward-going events in the data is compared to the Monte Carlo expectation in the absence of neutrino oscillations, giving $R_{\text{up/down}}(\text{data})/R_{\text{up/down}}(\text{MC})=0.62(-0.14)(+0.19)(\text{stat.})\pm 0.02(\text{sys.})$. An extended maximum likelihood analysis of the observed L/E distributions excludes the null hypothesis of no neutrino oscillations at the 98% confidence level. Using the curvature of the observed muons in the 1.3 T MINOS magnetic field $\nu(\mu)$ and $\bar{\nu}(\mu)$ interactions are separated. The ratio of $\bar{\nu}(\mu)$ to $\nu(\mu)$ events in the data is compared to the Monte Carlo expectation assuming neutrinos and antineutrinos oscillate in the same manner, giving $R_{\bar{\nu}(\mu)}/R_{\nu(\mu)}(\text{data})/R_{\bar{\nu}(\mu)}/R_{\nu(\mu)}(\text{MC})=0.96(-0.27)(+0.38)(\text{stat.})\pm 0.15(\text{sys.})$, where the errors are the statistical and systematic uncertainties. Although the statistics are limited, this is the first direct observation of atmospheric neutrino interactions separately for $\nu(\mu)$ and $\bar{\nu}(\mu)$.

Physical Review D 73[7]. 072002. 2006.

P104-06 “YP and YY scattering from pp, pp forward amplitudes in a QCD eikonal model with a dynamical gluon mass”

Luna, E. G. S. and Natale, A. A.

We examine the γp photoproduction and the hadronic $\gamma\gamma$ total cross sections by means of a QCD eikonal model with a dynamical infrared mass scale. In this model, where the dynamical gluon mass is the natural regulator for the tree level gluon-gluon scattering, the γp and $\gamma\gamma$ total cross sections are derived from the pp and pp forward scattering amplitudes assuming vector meson dominance and the additive quark model. We show that the validity of the cross section factorization relation $\sigma_{pp}/\sigma_{\gamma p}=\sigma_{\gamma p}/\sigma_{\gamma\gamma}$ is fulfilled depending on the Monte Carlo model used to unfold the hadronic $\gamma\gamma$ cross section data, and we discuss in detail the case of $\sigma(\gamma\gamma\rightarrow\text{hadrons})$ data with $W_{\gamma\gamma}>10$ GeV unfolded by the Monte Carlo generators PYTHIA and PHOJET. The data seems to favor a mild dependence with the energy of the probability (Phad) that the photon interacts as a hadron.

Physical Review D 73[7]. 074019. 2006.

P105-06 “Generalized teleportation protocol”

Gordon, G. and Rigolin, G.

A generalized teleportation protocol (GTP) for N qubits is presented, where the teleportation channels are nonmaximally entangled and all the free parameters of the protocol are considered: Alice's measurement basis, her sets of acceptable results, and Bob's unitary operations. The full range of fidelity (F) of the teleported state and the probability of success (P-suc) to obtain a given fidelity are achieved by changing these free parameters. A channel efficiency bound is found, where one can determine how to divide it between F and P-suc. A one-qubit formulation is presented and then expanded to N qubits. A proposed experimental setup that implements the GTP is given using linear optics.

Physical Review A 73[4]. 042309. 2006.

P106-06 “Generation of generalized coherent states with two coupled Bose-Einstein condensates”

Sanz, L., Moussa, M. H. Y., and Furuya, K.

We present a scheme to prepare generalized coherent states in a system with two species of Bose-Einstein condensates. First, within the two-mode approximation, we demonstrate that a Schrodinger cat-like state can be dynamically generated and, by controlling the Josephson-like coupling strength, the number of coherent states in the superposition can be varied.

Later, we analyze numerically the dynamics of the whole system when interspecies collisions are inhibited. Variables such as fractional population, Mandel parameter and variances of annihilation and number operators are used to show that the evolved state is entangled and exhibits sub-Poisson statistics.

Annals of Physics 321[5], 1206-1220. 2006.

P107-06 “Low resolution structure and stability studies of human GrpE#2, a mitochondrial nucleotide exchange factor”

Oliveira, C. L. P., Borges, J. C., Torriani, I. L., and Ramos, C. H. I.

GrpE acts as a nucleotide exchange factor for the Hsp70 chaperone system. Only one GrpE isoform is present in Escherichia coli, but for reasons not yet well understood, two GrpE isoforms have been found in mammalian mitochondria. Therefore, studies aimed at evaluating the physico-chemical characteristics of these proteins are important for the comprehension of the function of the Hsp70 chaperone system in different organisms. Here we report biophysical studies on human mitochondrial GrpE isoform 2. Small angle X-ray scattering measurements of human GrpE isoform 2 showed that this protein has a quaternary structure which is similar to those of human GrpE isoform I and E coli GrpE: a dimer with a cruciform elongated shape. However, mitochondrial isoforms differed from each other regarding chemical and thermal denaturation profiles. This fact, combined with results of distinct expression patterns previously reported, point out that these proteins may have different response to external stimuli. Our results also indicate that human GrpE isoform 2 is more similar to the GrpE from E coli than to human GrpE isoform 1. These results are relevant because differences in the conformation of Hsp70 co-chaperones are considered to be one of the reasons for functional diversity of this system.

Archives of Biochemistry and Biophysics 449[1-2], 77-86. 2006.

P108-06 “Morphology of fibroblastic cells cultured on diamond-like carbon coatings produced by plasma immersion using AFM and SEM”

Uzumaki, E. T., Lambert, C. S., Bonugli, L. O., Santos, A. R., and Zavaglia, C. A. C.

For the potential use of diamond-like carbon (DLC) coating for biomedical applications, it would be important to evaluate the biological effects of these coatings. In this study, DLC coatings were deposited on glass coverslips using the plasma immersion process, which produces films with adhesion properties superior to those prepared with conventional techniques. Scanning electron microscopic and atomic force microscopic observations were used to study the morphology of fibroblasts growth on DLC coatings.

Key Engineering Materials: Bioceramics 18. 309-311. 713-716. 2006.

P109-06 “Multi-channel coupling effects for electronic excitations leading to the $b_3\Sigma_u^+$, $a_3\Sigma_g^+$, and $c_3\Pi_u$ states of H₂”

Taveira, A. M. A., Brescansin, L. M., Machado, A. M., and Lee, M. T.

In this work we use the unitarized distorted wave method to study the effect of multi-channel coupling on the calculated electronic excitation cross sections in H-2. Specifically, such an effect for electronic excitations leading to the excited states $b_3\Sigma_u^+$, $a_3\Sigma_g^+$, and $c_3\Pi_u$ for incident energies varying from 15 to 60 eV is studied. Our results have shown that converged cross sections can be obtained with the inclusion of only triplet intermediate states, except for energies near the excitation thresholds,

where the inclusion of singlet intermediate states is important. Also, convergence improves with increasing energies for all excitations considered. Comparison of our calculated cross sections with available experimental and other theoretical results is encouraging.

International Journal of Quantum Chemistry 106[9], 2006-2013. 2006.

P110-06 "Nanostructure and giant Hall effect in $TM_x(SiO_2)_{(1-x)}$ ($TM=Co,Fe,Ni$) granular system"

Socolovsky, L. M., Oliveira, C. L. P., Denardin, J. C., Knobel, M., and Torriani, I. L.

Granular $TM_x(SiO_2)_{(1-x)}$ ($TM=Co,Fe,Ni$) thin films were thermally treated at different temperatures and their magnetotransport and structural properties were studied. Hall resistivity decreases with thermal annealing. Structure was analyzed based on small angle x-ray scattering results. A model of polydisperse system of hard spheres was used for obtaining structural parameters. Analysis reveals that a volume fraction of transition-metal atoms (less than 29%) are forming nanospheres. Changes in giant Hall effect upon annealing can depend on a particular combination of nanoparticle diameter, interparticle distance, and size distribution.

Journal of Applied Physics 99[8]. 08C511-08C511-3. 2006.

P111-06 "New possibilities for the measurement of wavelength-resolved photoconductivity"

Montenegro, R., Inocente Junior, N. R., and Frejlich, J.

We report a new setup for the measurement of photoconductivity that is based on discrete quasimonochromatic light-emitting diodes. This setup allows new possibilities combining preexposure and measurement at different wavelengths as well as the possibility of rapidly switching from one wavelength to any other at will and also varying the irradiance over a comparatively wide range. It is also easy to use an equalized photonic flux over the entire operating wavelength range. We show the interest of using a normalized photoconductivity coefficient that takes into account the distribution of light in the sample's volume and characterizes the specific properties of the material. We report typical results obtained in different conditions for the same undoped $Bi_{12}TiO_{20}$ photorefractive crystal.

Review of Scientific Instruments 77[4]. 043905 - 043905-6. 2006.

P112-06 "Noncubic symmetry in $Ca_{1-x}Eu_xB_6$ ($0.15 < x < 1.00$): An electron-spin-resonance study"

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

The Eu^{2+} ($4f^7$, $S=7/2$) g value in $Ca_{1-x}Eu_xB_6$ ($0.15 < x < 1.00$) was measured by means of electron spin resonance at two frequencies (fields), 9.4 (approximate to 3.4 kOe) and 34.4 GHz (approximate to 12.1 kOe). The g value was found to be anisotropic and magnetic-field dependent. The amplitude of the anisotropy increases at low temperatures. The observed angular and temperature dependences of the g value suggest tetragonal symmetry caused, presumably, by a distortion along a direction perpendicular to the largest crystal face, the [001] direction. Due to the platelet shape of the samples, part of the anisotropy of the g value can also be attributed to demagnetization effects. The g values decrease at higher fields, which is interpreted in terms of a two-band model involving an exchange interaction between the localized Eu^{2+} $4f^7$ electrons with conduction Eu^{2+} $5d$ -like electrons and B $2p$ -like holes.

Journal of Applied Physics 99[8]. 08P701-08P701-3. 2006.

P113-06 "Nonlinear charge transport in III-N semiconductors: Mobility, diffusion, and a generalized Einstein relation"

Rodrigues, C. G., Vasconcellos, A. R., and Luzzi, R.

A theoretical study of nonlinear charge transport in polar semiconductors is presented. It is based on a nonequilibrium statistical ensemble formalism which provides a generalized Boltzmann-style nonlinear quantum kinetic theory. The mobility and the diffusion coefficients are obtained and, relating both, a Nernst-Townsend-Einstein relation is derived extended to the nonlinear regime (i.e., outside the Ohmic domain). Numerical calculations are performed considering the particular case of the strongly polar III nitrides, which have application in blue-emitting diodes.

Journal of Applied Physics 99[7]. 073701-073701-12. 2006.

P114-06 "Photoluminescence of Er-doped silicon nanoparticles from sputtered SiO_x thin films"

Biggemann, D., Mustafa, D., and Tessler, L. R.

We present a study of the Er^{3+} photoluminescence from Er-doped thin SiO_x films prepared by reactive RF sputtering from a silicon target partially covered by metallic erbium platelets in an Ar + O-2 atmosphere. Annealing at 1250 degrees C induces the formation of silicon nanocrystals and modifies the Er^{3+} luminescence spectrum due to changes in the Er^{3+} environment. The photoluminescence efficiency decreases by two orders of magnitude with nanoparticle formation. This decrease may be due to less efficient energy transfer processes from the nanocrystals than from the amorphous matrix, to the formation of more centro-symmetric Er^{3+} sites at the nanocrystal surfaces or to very different optimal erbium concentrations between amorphous and crystallized samples.

Optical Materials 28[6-7], 842-845. 2006.

P115-06 "Planar waveguides by ion exchange in Er^{3+} -doped tellurite glass"

Rivera, V. A. G., Chillce, E. F., Rodriguez, E., Cesar, C. L., and Barbosa, L. C.

This work reports the preparation of planar waveguides by $Ag^+ \rightarrow Na^+$ ion exchange in Er^{3+} -doped tellurite glass with a composition of $75TeO(2)-2GeO(2)-10Na(2)O-12ZnO-1Er(2)O(3)$ (mol%). The metric, of $T_x - T_g$, indicates that the glass has good thermal stability. Measurements of refractive index, absorption spectrum, luminescence and lifetime were made. The glass was chemically stable during the ion exchange process. Monomode and multimode planar waveguides in the tellurite glasses have been prepared. We determined the depth of the guides, effective diffusion coefficient and the activation energy. The depths of the waveguides could be controlled by varying ion exchange temperatures and times (250-280 degrees C, and 3-12 h were used).

Journal of Non-Crystalline Solids 352[5], 363-367. 2006.

P116-06 "Porous bioceramics (open cell foams) expanded in vacuum"

Uzumaki, E. T. and Lambert, C. S.

In this study, porous bioceramics (titanium foam with diamond-like carbon coatings, glass foam and zirconium oxide foam) were produced using expansion in vacuum. The porosity, the pore size and pore morphology can be adjusted in agreement with the application.

The different 3D structures were obtained by varying the parameters of the process. The microstructure and morphology of the porous materials were observed by scanning electron microscopy (SEM) and optical microscopy. The foam exhibit an open-cell structure with interconnected macropores, which provide the potential for tissue ingrowths and the transport of the body fluids.

Bioceramics 18, Pts 1 and 2 309-311, 1023-1026. 2006.

P117-06 "Pseudoscopic imaging in a double diffraction process with a slit: critical point properties"

Lunazzi, J. J. and Rivera, N. I

Pseudoscopic (inverted depth) images that keep a continuous parallax were shown to be possible by use of a double diffraction process intermediated by a slit. One diffraction grating directing light to the slit acts as a wavelength encoder of views, while a second diffraction grating decodes the projected image. The process results in the enlargement of the image under common white light illumination up to infinite magnification at a critical point. We show that this point corresponds to another simple-symmetry object-observer system. Our treatment allows us to explain the experience by just dealing with main ray directions.

Journal of the Optical Society of America A-Optics Image Science and Vision 23[5], 1021-1026. 2006.

P118-06 "Quantum entanglement and fixed point Hopf bifurcation"

Nemes, M. C., Furuya, K., Pellegrino, G. Q., Oliveira, A. C., Reis, M., and Sanz, L.

We present the qualitative differences in the phase transitions of the mono-mode Dicke model in its integrable and chaotic versions. These qualitative differences are shown to be connected to the degree of entanglement of the ground state correlations as measured by the linear entropy. We show that a first order phase transition occurs in the integrable case whereas a second order in the chaotic one. This difference is also reflected in the classical limit: for the integrable case the stable fixed point in phase space undergoes a Hopf type whereas the second one a pitchfork type bifurcation. The calculation of the atomic Wigner functions of the ground state follows the same trends. Moreover, strong correlations are evidenced by its negative parts.

Physics Letters A 354[1-2], 60-66. 2006.

P119-06 "Quantum Monte Carlo simulations of solid 4He"

Whitlock, P. A. and Vitiello, S. A.

Recent experimental investigations [20] of solid 4 He have been interpreted as showing possible superfluidity in the solid at low temperatures, below 0.2 K. A solid behaving this way, exhibiting both long range translational order and superfluidity, has been called a supersolid phase. The existence of a supersolid phase was proposed many years ago [1], and has been discussed theoretically. In this paper we review simulations of the solid state of bulk 4 He at or near absolute zero temperature by quantum Monte Carlo techniques. The techniques considered are variational calculations at zero temperature which use traditional Bijl-Dingle-Jastrow wavefunctions or more recently, shadow wavefunctions; Green's function Monte Carlo calculations at zero temperature; diffusion Monte Carlo, and finally, the finite temperature path integral Monte Carlo method. A brief introduction to the technique will be given followed by a discussion of the simulation results with respect to solid helium

Large-Scale Scientific Computing 3743, 40-52. 2006.

P120-06 "Raman-like light scattering from acoustic phonons in photonic crystal fiber"

Dainese, P., Russell, P. S. J., Wiederhecker, G. S., Joly, N., Fragnito, H. L., Laude, V., and Khelif, A.

Raman and Brillouin scattering are normally quite distinct processes that take place when light is resonantly scattered by, respectively, optical and acoustic phonons. We show how few-GHz acoustic phonons acquire many of the same characteristics as optical phonons when they are tightly trapped, transversely and close to modal cut-off, inside the wavelength-scale core of an air-glass photonic crystal fiber (PCF). The result is an optical scattering effect that closely resembles Raman scattering, though at much lower frequencies. We use photoacoustic techniques to probe the effect experimentally and finite element modelling to explain the results. We also show by numerical modelling that the cladding structure supports two phononic band gaps that contribute to the confinement of sound in the core.

Optics Express 14[9], 4141-4150. 2006.

P121-06 "Reversed field pinch current drive with oscillating helical fields"

Farengo, R. and Clemente, R. A.

The use of oscillating helical magnetic fields to produce and sustain the toroidal and poloidal currents in a reversed field pinch (RFP) is investigated. A simple physical model that assumes fixed ions, massless electrons, and uniform density and resistivity is employed. Thermal effects are neglected in Ohm's law and helical coordinates are introduced to reduce the number of coupled nonlinear equations that must be advanced in time. The results show that it is possible to produce RFP-like magnetic field profiles with pinch parameters close to the experimental values. The efficiencies obtained for moderate resistivity, and the observed scaling, indicate that this could be a very attractive method for high temperature plasmas.

Physics of Plasmas 13[4]. 042515-042515-7. 2006.

P122-06 "Spectroscopic and thermal properties of Ga₂S₃-Na₂S-CsCl glasses"

Barbosa, L. C., Cesar, C. L., Mazali, I. O., and Alves, O. L.

The synthesis and properties of the vitreous system (0.75-x) Ga₂S₃-0.25Na(2)S-xCsCl, with x varying from 0.1 to 0.2, are presented. Thermal, optical, and structural properties such as density, viscosity, thermal expansion coefficient, glass transition temperature, softening point temperature, refractive index, and absorption coefficient were measured using several techniques: X-ray diffraction, Raman scattering, differential thermal analysis, thermal mechanical analysis, and absorption spectroscopy. This glass system presents a high third-order non-linear optical susceptibility that can be significantly increased by increasing the CsCl content without affecting the low phonon frequency.

Journal of the American Ceramic Society 89[3], 1037-1041. 2006.

P123-06 "Strain redistribution at the phase transition of MnAs/GaAs(001) films"

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

We investigated the thermal evolution of the lattice parameters of a MnAs film epitaxially grown on GaAs(001) around its magnetostructural first-order phase transition using x-ray diffraction.

Despite the substrate constraint, large variation of one of the in-plane lattice parameters is preserved, typical of bulk MnAs phase transition, during a large temperature range where two phases coexist. We demonstrated that the condition of the constant film length along this direction, in accord to the substrate length, is always fulfilled during the process. The effect is attributed to the gliding of misfit dislocations present on the film

Applied Physics Letters 88[15], 151906. 2006.

P124-06 "Strong and fast phase modulation for quantitative analysis of photorefractive gratings"

Freschi, A. A., Dos Santos, P. V., and Frejlich, J.

A new approach for studying photorefractive gratings in two-wave mixing experiments by a phase modulation technique is presented. The introduction of a large-amplitude, high-frequency sinusoidal phase modulation in one of the input beams blurs the interference pattern and provides powerful harmonic signals for accurate measurements of the grating diffraction efficiency η and the output phase shift ρ between the transmitted and diffracted waves. The blurring of the light fringes can be used to suppress the higher spatial harmonics of the grating, allowing a space-charge field with sinusoidal profile to be recorded. Although the presence of such a strong phase modulation affects the beam coupling in a rather complicated way, it is shown that for the special case of equal intensity input beams, the effect of the phase modulation on η and ρ is reduced to a weakening of the coupling strength. The potentialities of the technique are illustrated in a study of refractive-index waves excited by running interference patterns in a Bi₁₂TiO₂₀ crystal. Expressions for the diffraction efficiency and the output phase shift are derived and used to match numerically calculated curves to the experimental data. The theoretical model is supported by the very good data fitting and allows the computation of important material parameters

Applied Physics B-Lasers and Optics 83[2], 279-284. 2006.

P125-06 "Structural and electrochemical behavior of tungsten oxide obtained by solid state reaction"

Souza, E. A., Santos, A. O., Landers, R., Cunha, F., and Macedo, M. A

Tungsten oxides have been used successfully as intercalation compounds of high performance batteries. In this communication we present a new and innovative route to obtain orthorhombic WO₃ where the crystallographic structure can be carefully controlled. X-ray diffraction data indicates that a texture is obtained in the [0k0] direction, whereas XPS suggests that the valence of the tungsten atom is +6. The electrochemical behavior of the oriented sample was studied by chronopotentiometry and its charge-discharge capacity was evaluated. The results showed stable values close to 100 mA h/g after the 70th cycle, which compares favorably to the best known WO₃ compounds produced so far.

Solid State Ionics 177[7-8], 697-701. 2006.

P126-06 "Structural basis for nucleic acid binding to the prion protein"

Cordeiro, Y., Lima, L. M., Marques, A., Oliveira, C., Tinoco, L., Sampath, S., Foguel, D., Torriani, I., Caughey, B., and Silva, J

The infectious agent of transmissible spongiform encephalopathies (TSE) is believed to comprise, at least in part, the prion protein (PrP). Other molecules can modulate the conversion of the normal PrP^C into the pathological conformer (PrP^{Sc}) but the identity and mechanisms of action of the key physiological factors remain unclear.

PrP can specifically recognize nucleic acids with high affinity, resulting in a proteinase K-resistant and beta-sheet-rich protein. Here, we report small-angle X-ray scattering, nuclear magnetic resonance spectroscopy and binding assay measurements of the soluble 18-base pair DNA:PrP 1:1 complex. We demonstrate that, although interaction is mediated mainly through the PrP globular domain, the unstructured region is also recruited to the complex. This visualization of the complex provides insight into how nucleic acid binds to PrP and how it chaperones conformational conversion.

The FASEB Journal 20[4], A95. 2006.

P127-06 "The few scales of nuclei and nuclear matter"

Delfino, A., Frederico, I., Timoteo, V. S., and Tomio, L.

The well-known correlations of low-energy three and four-nucleon observables with a typical three-nucleon scale (e.g., the T_{jon} line) is extended to light nuclei and nuclear matter. Evidence for the scaling between light nuclei binding energies and the triton one are pointed out. We argue that the saturation energy and density of nuclear matter are correlated to the triton binding energy. The available systematic nuclear matter calculations indicate a possible band structure representing these correlations.

Physics Letters B 634[2-3], 185-190. 2006.

P128-06 "The semiclassical coherent state propagator for systems with spin"

Ribeiro, A. D., de Aguiar, M. A. M., and Piza, A. F. R. D

We derive the semiclassical limit of the coherent state propagator for systems with two degrees of freedom of which one degree of freedom is canonical and the other a spin. Systems in this category include those involving spin-orbit interactions and the Jaynes-Cummings model in which a single electromagnetic mode interacts with many independent two-level atoms. We construct a path integral representation for the propagator of such systems and derive its semiclassical limit. As special cases we consider separable systems, the limit of very large spins and the case of spin-1/2.

Journal of Physics A-Mathematical and General 39[12], 3085-3097. 2006.

P129-06 "Theoretical study of the thermodynamic and kinetic properties of self-interstitials in aluminum and nickel"

de Debiaggi, S. R., de Koning, M., and Monti, A. M.

The formation thermodynamics and migration properties of self-interstitials in aluminum and nickel are investigated as a function of temperature using atomistic simulation techniques and embedded-atom-type interatomic potentials. Molecular dynamics and nonequilibrium free-energy techniques are employed to investigate anharmonic effects on the H-O < 100 > dumbbell formation properties. The equilibrium concentration of this defect is compared to those of vacancies and divacancies. The results are then analyzed in the framework of the interstitialcy model, according to which very high vibrational formation entropies should be expected for self-interstitials at high temperatures. The kinetics of self-interstitial migration is also investigated using different atomistic techniques, revealing the simultaneous activity of more than one distinct interstitial configuration as the temperature increases.

Physical Review B 73[10]. 104103. 2006.

P130-06 "Time-resolved photoelectron spectroscopy of proton transfer in the ground state of chloromalonaldehyde: Wave-packet dynamics on effective potential surfaces of reduced dimensionality"

Varellaa, M. T. D. N., Arasaki, Y., Ushiyama, H., McKoy, V., and Takatsuka, K.

We report on a simple but widely useful method for obtaining time-independent potential surfaces of reduced dimensionality wherein the coupling between reaction and substrate modes is embedded by averaging over an ensemble of classical trajectories. While these classically averaged potentials with their reduced dimensionality should be useful whenever a separation between reaction and substrate modes is meaningful, their use brings about significant simplification in studies of time-resolved photoelectron spectra in polyatomic systems where full-dimensional studies of skeletal and photoelectron dynamics can be prohibitive. Here we report on the use of these effective potentials in the studies of dump-probe photoelectron spectra of intramolecular proton transfer in chloromalonaldehyde. In these applications the effective potentials should provide a more realistic description of proton-substrate couplings than the sudden or adiabatic approximations commonly employed in studies of proton transfer. The resulting time-dependent photoelectron signals, obtained here assuming a constant value of the photoelectron matrix element for ionization of the wave packet, are seen to track the proton transfer.

Journal of Chemical Physics 124[15]. 154302. 2006.

P131-06 "Tissue response in the femur of rats after implantation of diamondlike carbon coatings on Ti-13Nb-13Zr produced by plasma immersion"

Uzumaki, E. T., Lambert, C. S., Batista, N. A., Belangero, W. D., and Zavaglia, C. A. C.

Diamond-like carbon (DLC) coatings were deposited on titanium alloy (Ti-13Nb-13Zr) by plasma immersion process. DLC-coated Ti alloy and uncoated Ti were investigated in an animal model using the femoral condyles of rats for intervals of 4 and 12 weeks postoperatively. The interface between the implants and bones of the femoral condyles were analysed using scanning electron microscopy (SENI) by backscattering. The results showed that the DLC coatings were well tolerated in both periods.

Key Engineering Materials: Bibliographic detail 309-311. PART 2. 783-788. 2006.

P132-06 "Titanium oxide (TiO₂) coatings produced on titanium by oxygen-plasma immersion and cell behaviour on TiO₂"

Uzumaki, E. T., Santos, A. R., and Lambert, C. S

Plasma immersion process was investigated as a method for producing bioceramics; coatings on metallic implants due to its advantages, which include the production of coatings on three-dimensional workpieces, with high density and superior adhesion. In this process, the oxygen plasma was utilized to form titanium oxide on titanium substrate. The structure, composition and surface morphology were studied using scanning electron microscopy (SEM) and X-ray diffraction. In addition a preliminary study has also been carried out, on TiO₂-coated and uncoated titanium substrates, to analyse the in vitro biocompatibility (cytotoxicity evaluation and cell morphology)

Key Engineering Materials: Bioceramics 18. 309 - 311, 367-370. 2006.

P133-06 "Ultra high energy tau-neutrinos and fluorescence detectors: A phenomenological approach"

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

We investigate the possibility of detecting ultra-high energy cosmic tau-neutrinos by means of a process involving a double extensive air shower, the so-called double-bang phenomenon. In this process a primary tau-neutrino interacts with an atmospheric quark creating a hadronic extensive air shower that contains a tau which subsequently decays creating a second extensive air shower. The number of these events strongly depends on the cross section and on the flux of ultra-high energy tau-neutrinos arriving at the Earth's atmosphere. We estimate the potential of optical detectors to observe double-bang events induced by tau-neutrinos with energies of about 1 EeV whose detection may confirm the maximal mixing observed in the atmospheric neutrinos also for ultra-high energy neutrinos, and give information on the neutrino flux and cross-section. For neutrino-nucleon standard model extrapolated cross-section and thick source model of flux (MPR), we estimate an event rate of 0.48 y⁻¹ for an observatory with two fluorescence detectors with 90% efficiency in the neutrino energy range 0.5 < E-ν < 5 EeV.

Astroparticle Physics 25[4], 277-283. 2006.

P134-06 "Universal magnetic-field-driven metal-insulator-metal transformations in graphite and bismuth"

Kopelevich, Y., Pantoja, J. C. M., da Silva, R. R., and Moehlecke, S

Applied magnetic field induces metal-insulator and reentrant insulator-metal transitions in both graphite and rhombohedral bismuth. The corresponding transition boundaries plotted on the magnetic field-temperature (B-T) plane nearly coincide for these semimetals and can be best described by power laws T similar to (B-B_c)(κ), where B_c is a critical field at T=0 and κ=0.45 +/- 0.05. We show that insulator-metal-insulator (I-M-I) transformations take place in the Landau level quantization regime and illustrate how the insulator-metal transformation in graphite samples with a moderate anisotropy transforms into a cascade of I-M-I transitions, related to the quantum Hall effect in strongly anisotropic, quasi-two-dimensional graphite samples. We discuss the possible coupling of superconducting and excitonic correlations with the observed phenomena, as well as the signatures of quantum phase transitions associated with the M-I and I-M transformations.

Physical Review B 73[16]. 165128. 2006.

P135-06 "Voltage-controlled hole spin injection in nonmagnetic GaAs/AlAs resonant tunneling structures"

de Carvalho, H. B., Gobato, Y. G., Brasil, M. J. S. P., Lopez-Richard, V., Marques, G. E., Camps, I., Henini, M., Eaves, L., and Hill, G.

We have investigated polarization-resolved photoluminescence under applied voltage in p-i-p GaAs/AlAs double-barrier diodes. We have observed oscillations in the degree of polarization up to 36% at B=15 T with sign reversals occurring near to the hole subband resonances. At high voltages a polarization saturation up to 25% at B=15 T is observed. The data are interpreted by using simulations based on a simple theoretical model that considers spin conservation for tunneling and the relaxation processes for carriers at Zeeman states in the quantum well. Our work offers the prospect for the development of voltage-controlled spin filtering systems using standard nonmagnetic semiconductor heterostructures.

Physical Review B 73[15]. 155317. 2006.

P136-06 "X-ray diffraction mapping of strain fields and chemical composition of SiGe : Si(001) quantum dot molecules"

Leite, M. S., Gray, J. L., Hull, R., Floro, J. A., Magalhaes-Paniago, R., and Medeiros-Ribeiro, G.

A variety of surface morphologies can be formed by controlling kinetic parameters during heteroepitaxial film growth. The system reported is a Si_{0.7}Ge_{0.3} film grown by molecular beam epitaxy at 550 degrees C and a 1 Å/s deposition rate, producing quantum dot molecule (QDM) structures. These nanostructures are very uniform in size and shape, allowing strain mapping and chemical composition evaluation by means of anomalous x-ray diffraction in a grazing incidence geometry. Tensile and compressed regions coexist inside QDMs, in accordance with the finite-element calculations of lattice relaxation. The Ge content was found to vary significantly within the structures, and to be quite different from the nominal composition.

Physical Review B 73[12]. 121308. 2006.

Abstracta

Instituto de Física

Diretor: Prof. Dr. Julio Cesar Hadler Neto

Universidade Estadual de Campinas - UNICAMP

Cidade Universitária C.P. 6165

CEP: 13081-970 - Campinas - SP - Brasil

e-mail: secdir@ifi.unicamp.br

Fone: 0XX 19 3521-5300

Publicação

Biblioteca do Instituto de Física Gleb Wataghin

<http://webbif.ifi.unicamp.br>

Diretora Técnica: Rita Aparecida Sponchiado

Elaboração

Tânia Macedo Folegatti

absctact@ifi.unicamp.br

Projeto Gráfico

ÍgneaDesign

Impressão

Gráfica Central - Unicamp