Abstracta

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ACCEPTED PAPERS

[A022-01] "New Schemes for Quantum State Generation"

A. Vidiella-Barranco

The generation of quantum states of light has been one of the most discussed topics in quantum optics. Nevertheless, quantum state generation is a difficult task that requires extreme control. Here, I am going to discuss three different schemes of generation of pure quantum states. Those schemes rely upon the appropriate choice of atom-field interaction times, and nonclassical states are build up either from the vacuum state or from mixed states.

[A023-01] "Bio-pitch produced from eucalyptus wood pyrolysis liquids as a renewable binder for carbon electrode manufacture."

J.D.Rochaa, A.R.Coutinho, C.A.Luengo

The interest in biomass as a clean source of fuel, chemicals and materials is growing fast. What is attractive in biomass is its renewability; CO_2 balanced and sulfur free. Biomass pyrolysis produces charcoal, bio-oil and gases in different proportions depending on the technology and raw material. In this study, biopitch a substitute to fossil pitches in electrodes was produced from bio-oil distillation in bench scale equipment. Bio-pitch and charcoal were mixed and thermically modified to give pre-baked electrodes. Physico-chemical and mechanical properties for biopitch and final electrodes were measured and compared with coal tar and petroleum materials. Despite the similar application, the biomaterials are structurally and chemically different from minerals. The oxygen content in bio-pitch is ca 20 wt% and in mineral pitches no more than 2 wt%. Characterization experiments for electrodes samples included electrical resistivity, Young's modulus, rupture strength, density, porosity and proximate analysis.

[A024-01] "Thermodynamics of Nonequilibrium Radiation I. General theory."

A.R.Vasconcellos, J.Fort, D.Jou, R.Luzzi

An in-depth study of the thermodynamics of nonequilibrium radiation is presented. The characterization of its nonequilibrium macroscopic state is performed in the framewok of Informational Statistical Thermodynamics. This is done in terms of a nonequilibrium Dirac-Landau-Wigner single particle density matrix, or, alternatively, in terms of the conjugated intensive nonequilibrium thermodynamics variables. When a local description is not required, the global one can be done by giving the nonequilibrium populations in the different modes. Also, alternatively, we can introduce a nonequilibrium temperature (quasi-temperature) per mode. This is compared to a couple of contracted descriptions. The evolution of the resulting nonequiibrium thermodynamic state and the eventual experimental determination are given in the follow-up article.

[A025-01] "Thermodynamics of Nonequilibrium Radiation II. Irreversible Evolution and Experimental Setup"

A.R.Vasconcellos, J.Fort, D.Jou, R.Luzzi

Giving continuation to the study of the thermodynamics of nonequilibrium radiation presented in the preceding article (J. Chem. Phys. xx,xxx (2000)), we derive the evolution in time of its macroscopic nonequilibrium state. The case of a semiconductor sample and the coupling of radiation and transverse optical phonons is explicitly considered. Excitation of the latter drives the radiation field out of equilibrium. Under constant excitation, a steady state sets in which is analyzed. It is shown that the quasitemperature per mode of the radiation field, wich has been defined in the preceding paper, can be determined in optical experiments such as Raman scattering.

[A026-01] "Relaxation Dynamics of Hot Carriers and Phonons in Semiconductors: influence of the excitation conditions."

A. A. P. Silva, A. C. S. Algarte, A. R. Vasconcellos and R. Luzzi.

The so-called hot-phonon effect that accompanies the rapid relaxation processes in the photoinjected plasma in semiconductors is analyzed, resorting to a nonlinear quantum kinetic theory based on a nonequilibrium ensemble formalism. We concentrate the study on the process of generation and decay of the nonequilibrium LO-phonon population per mode. Particular attention is paid to the question of the influence of the conditions of excitation imposed on the system, which determine the occurrence of different regimes of relaxation by means of carrierphonon interactions. Comparison of the relaxation dynamics in the case of several semiconductors with different polar strengths in done.

[A027-01] "Recoherence in the Entanglement Dynamics and Classical Orbits in the N-atom Jaynes-Cummings Model."

R.M.Angelo, K.Furuya, M.C.Nemes, G.Q.Pellegrino

The rise in linear entropy of a subsystem in the N-atom Jaynes-Cummings model is shown to be strongly influenced by the shape of the classical orbits of the underlying classical phase space: we find a one-to-one correspondence between maxima (minima) of the linear entropy and maxima (minima) of the expectation value of atomic excitation Jz. Since the expectation value of this operator can be viewed as related to the orbit radius in the classical phase space projection associated to the atomic degree of freedom, the proximity of the quantum wave packet to this atomic phase space borderline produces a maximum rate of entanglement.The consequence of this fact for initial conditions recoherence. For chaotic situations the same phenomenon (proximity of the atomic phase space borderline) is in general responsible for oscillations in the entanglement properties.

[A028-01] "Thermomechanical Properties of a-Si:H and a-Ge:H"

M. M. de Lima Jr. and F. C. Marques

The coefficient of thermal expansion, biaxial modulus, and stress of a-Si:H and a-Ge:H films were investigated as a function of the hydrogen concentration. The thermal expansion and the biaxial modulus were measured by the thermally induced bending technique, and the stress was determined by a bending beam method.

The biaxial modulus decreases as the hydrogen concentration increases, due to the reduction of the coordination number. It was observed that the coefficient of thermal expansion of a-Si:H and a-Ge:H is influenced by the network strain, which is related to the macroscopic stress. For high quality films, which are compressive, the thermal expansion coefficient is higher than that of their crystalline counterparts. The structural changing from the crystalline to the amorphous phase appears to interfere little on the magnitude of the thermal expansion coefficient.

[A029-01] "Hardness and Elastic Modulus of Carbon-Germanium Alloys."

J. Vilcarromero and F. C. Marques

In this work it is report mechanical properties of germanium-rich amorphous carbon-germanium alloys prepared by rf sputtering a germanium/graphite target under argon plus hydrogen atmosphere. Nano-hardness, elastic modulus and stress were investigated as a function of the carbon content. The stress, which is reduced by the incorporation of carbon, was related to the film structure and to the difference in the Ge-Ge and Ge-C bond length. Contrarily to what was expected, the hardness and the elastic modulus of the alloys are smaller than that of pure amorphous hydrogenated germanium film, which in turn has both properties also smaller than those of crystalline germanium. These properties are analyzed in terms of the structural properties of the films.

[A030-01] "Irreversible Magnetization Under Rotating Fields and Lock-in Effect on ErBa2Cu3O7-delta Single Crystal with Columnar Defects"

M. A. Avila, L. Civale, A. V. Silhanek, R. A. Ribeiro, O. F. de Lima and H. Lanza

We have measured the irreversible magnetization Mi of an ErBa2Cu3O7 single crystal with columnar defects (CD), using a technique based on sample rotation under a fixed magnetic field H. This method is valid for samples whose magnetization vector remains perpendicular to the sample surface over a wide angle range - which is the case for platelets and thin films - and presents several advantages over measurements of ML(H) loops at fixed angles. The resulting Mi(q) curves for several temperatures show a peak in the CD direction at high fields. At lower fields, a very well defined plateau indicative of the vortex lock-in to the CD develops. The H dependence of the lock-in angle fL follows the 1/H theoretical prediction, while the temperature dependence is in agreement with entropic smearing effects corresponding to short range vortex-defects interactions.

[A031-01] "Angular dependence of the bulk nucleation field Hc2 of aligned MgB2 crystallites."

O. F. de Lima, C. A. Cardoso, R. A. Ribeiro, M. A. Avila, and A. A. Coelho.

The angular dependence of the bulk nucleation field of a sample made of aligned MgB2 crystallites was obtained using dc magnetization and ac susceptibility measurements. A good fitting of the data by the three-dimensional anisotropic Ginzburg-Landau theory attests the bulk nature of the critical field Hc2. We found a mass anisotropy ratio e2 » 0.39 that implies an anisotropy of the Fermi velocity, with a ratio of 1.6 between the in-plane and perpendicular directions, if an isotropic gap energy is assumed. For an s-wave anisotropic gap this ratio could increase to 2.5. Besides the fundamental implications of this result, it also implies the use of texturization techniques to optimize the critical current in wires and other polycrystalline forms of MgB2.

[A032-01] "Phenomenological approach of multiple particle production at high energies: Energy distribution of produced particles by data of direct observation"

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

The energy distribution of produced particles in multiple particle production is formulated empirically based on the data of direct observations by accelerator and cosmic-ray experiments at 1012- 1014 eV. The formulated distribution indicates violation of the Feynman scaling law, which was shown to be valid in the low energy region of ? 1012 eV. That is, the particle density is suppressed in the forward region and enhanced in the central region, compared with the distribution of the Feynman scaling law. The consequences of the formulated distribution, such as multiplicity, inelasticity etc are discussed at high energies of ? 1015 eV by extrapolation. The distribution is also compared with those of nuclear interactions models which are used widely in simulations of accelerator and cosmic-ray experiments.

[A033-01] "Luttinger liquid superlattices"

J Silva-Valencia, E Miranda and Raimundo R dos Santos

We calculate the correlation functions and the dc conductivity of Luttinger liquid superlattices, modelled by a repeated pattern of interacting and free Luttinger liquids. In a specific realization, where the interacting subsystem is a Hubbard chain, the system exhibits a rich phase diagram with four different phases: two metals and two compressible insulators. In general, we find that the effective low-energy description amalgamates features of both types of liquids in proportion to their spatial extent, suggesting the interesting possibility of engineered Luttinger liquids.

[A034-01] "Dark conductivity, photoconductivity, and lightinduced absorption in photorefractive sillenite crystals."

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

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

[A035-01] "The Fractal Dimension of Boron-Doped Diamond Films."

L.L.G. Silva, N.G. Ferreira, M.E.R. Dotto, M.U. Kleinke

Boron-doped diamond films were grown by hot-filament-assisted chemical vapor deposition. These films have received special attention due their superior properties for electrochemical applications such as good electrical conductivity, highly chemical, and mechanical stability. The fractal dimension of these films was investigated by cyclic voltammetry and atomic force microscope and. The scaling behavior is measured for peak current in cyclic voltammetry, height-height correlations and island size distribution in AFM images. Cyclic voltammetry experiments and the mass-radius (or island distribution) analysis have evidenced fractal dimension values lower than two suggesting non-contiguous chemically active sites.

[A036-01] "Angular alignment of a polarization-maintaining optical fiber"

D.O.Maionchi, W.Campos, J.Frejlich

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

[A037-01] "Gain and stability in photorefractive two-wave mixing"

I. de Oliveira, J. Frejlich

We demonstrate that the negative amplitude gain in a photorefractive two-wave mixing experiment under applied electric field measurably reduces the characteristic instability of the recorded hologram. In this sense photorefractive materials behave like electronic amplifiers with feedback. We analyze the case of stationary and running holograms both under an externally applied electric field . A continuous phase-modulation method is used to simultaneously measure diffraction efficiency and phase shift. Measurements carried out on a $Bi_{12}TiO_{20}$ crystal at 514.5 nm wavelenght confirm the occurence of continuous oscillations in both the diffraction efficiency and the phase shift. The perturbations in the diffraction efficiency increase considerably with increasing applied field and are reduced when energy is transferred from the weaker to the stronger beam (negative gain). Our results indicate that the perturbations in our experiments are probably due to resonantly excited transient effects.

ACCEPTED PAPERS FOR CONFERENCE

[C004-01] "Search of Centauro Like Events."

C.R.A.Augusto, S.L.C.Barroso, P.C.Beggio, A.O.Carvalho, M.J.Menon, C.E.Navia, R.Oliveira, E.H.Shibuya .

Since 1971, Brazil-Japan Chacaltaya Emulsion Chamber Experiment is observing unusual events interpreted as Mutiple Hadron Production without p0 events. As previously reported, these events are characterized by high hadron content and no p0 production at the interaction. Two of the five Centauro events have their interaction point determined through microscope measurements in the films of the emulsion chamber exposed at Mount Chacaltaya (5,220 m of altitude). In spite of the fact that exists other Centauro candidates, in this paper we presented analysis on the beforehand mentioned 5 events because all have showers observed at both upper and lower chamber exposed at Chacaltaya and the total showers energy in the range (200-300) TeV. The comparison was done with 285 events through acceptance analysis of similar to the 5 selected Centauro events, using their physical quantities like: total energy (Seshowers), multiplicity (nshowers), emission angle related quantity (rshowers) and so on. It results that only 3 other events are comparable with Centauro events but neither of them has high hadron content. Sideways we compared with 9,360 computer simulated events and the result is only 1 compatible, in terms of the same used observables, with the 5 Centauro events.

[C005-01] "Improved analysis of one Centauro Candidate Event."

C.R.A.Augusto, S.L.C.Barroso, P.C.Beggio, A.O.Carvalho, M.J.Menon, C.E.Navia, R.Oliveira, E.H.Shibuya

In a series of experiments of emulsion chambers exposed at Mt. Chacaltaya a remarkable event with high content of hadrons was observed. Moreover, this event has a hadron that interacts twice at deeper layers of the detector and that has energy between (16 – 20)% of the total energy of main interaction, the former figure for all particles and the last only for hadrons. Due to these facts it was interpreted as a surviving hadronic particle and its transverse momentum results between (460/Kg and 680/Kg) MeV/c. The last is obtained considering the center of only 40 particles identified as hadrons while the first one is obtained with all 60 particles, irrespectively of their identification as g or hadron. Other results, mainly concerned with a g-hadron identification will be presented, showing the reasons to classify this event as a centauro type.

[C006-01] "Algorithms based on isotropic azimuthal angle distribution of interaction secondaries."

C.R.A.Augusto, S.L.C.Barroso, P.C.Beggio, A.O.Carvalho, M.J.Menon, C.E.Navia, R.Oliveira, E.H.Shibuya .

An azimuthal angle distribution of events measured by Brazil- Japan Chacaltaya emulsion chamber experiment (B-J Collaboration) show that the secondaries produced by cosmic ray interaction particle are isotropic. Algorithms based on these observations were analytically calculated and their application to near 372 interaction events will be presented. One of these algorithms is equivalent to Duller-Walker plot and therefore it is possible to analyse the events as having structure of jet emission, through tests of their "sphericity". From the distribution of this ad-hoc defined sphericity it is possible to infer about the jet structure. Another apropriate combination of the calculated moments is used to get insightsof superposition of interactions and/or production of more than one jet simultaneously.

[C007-01] "Efficient simulation of ultra-high energy air showers."

J. Alvares-Muniz, R. Engel, P. Lipari, J. A. Ortiz,and T. Stanev.

We have developed a fast and efficient one dimensional method to calculate the development of extensive air showers. This method allows us to simulate ultra-high energy showers with very high statistics. It is based on pre-calculated pion induced showers and a bootstrap technique, accounting for fluctuations in the electromagnetic and muonic components. As a first application of this code we consider in detail the longitudinal shower development and the number of muons at observation level as predicted by different hadronic interaction models. The relation between the various assumptions in modeling hadron production, in particular its extrapolation to ultra-high energy, and extensive air shower observables is discussed.

PUBLISHED PAPERS

[P042-01] "Anisotropic superconducting properties of aligned MgB_2 crystallites"

de Lima, O. F., Ribeiro, R. A., Avila, M. A., Cardoso, C. A., and Coelho, A. A.

Samples of aligned MgB2 crystallites have been prepared, allowing for the first time the direct identification of an upper critical field anisotropy H-c2(ab)/H-c2(c) = xi (ab)/xi (c) similar or equal to 1.7, with xi (o,ab) similar or equal to 70 Angstrom, xi (o,c) = 40 Angstrom, and a mass anisotropy ratio m(ab)/m(c) similar or equal to 0.3. A ferromagnetic background signal was identified, possibly related to the raw materials purity.

[P043-01] "Crystallization and preliminary X-ray study of haem-binding protein from the bloodsucking insect Rhodnius prolixus"

Nagem, R. A. P., Neto, J. R. B., Forrer, V. P., Sorgine, M. H., Paiva-Silva, G. O., Masuda, H., Meneghini, R., Oliveira, P. L., and Polikarpov, I.

Rhodnius haem-binding protein (RHBP) from the bloodsucking insect Rhodnius prolixus, a 15 kDa protein, has been crystallized using polyethylene glycol as a precipitant. X-ray diffraction data have been collected at a synchrotron source. The crystals belong to the space group P4(1(3))2(1)2, with unit-cell parameters a = b = 64.98, c = 210.68 Angstrom, and diffract beyond 2.6 Angstrom resolution.

[P044-01] "Dislocation core properties in semiconductors"

Justo, J. F., Antonelli, A., and Fazzio, A.

Using ab initio calculations, we computed the core reconstruction energies of {111} 30 degrees partial dislocations in zinc-blende semiconductors. Our results show a direct correlation between core reconstruction energies and the experimental activation energies for the velocity of 60 degrees dislocations. The electronic structure of unreconstructed dislocation cores comprises a half-filled band, which splits up in bonding and antibonding levels upon reconstruction. The levels in the electronic gap come from the core of beta dislocations, while the levels related to or dislocations lie on the valence band.

[P045-01] "Electronic structure of LixNiOy thin films"

Urbano, A., deCastro, S. C., Landers, R., Morais, J., Siervo, A. D., Gorenstein, A., Tabacniks, M. H., and Fantini, M. C. A.

In this work, thin films of LixNiOy were deposited by rf reactive magnetron sputtering, from a LiNiO2 target. The composition of the films was analyzed by Rutherford backscattering spectroscopy. The electronic structure was analyzed by photoelectron spectroscopy, using either X-ray (Al K alpha) or synchrotron light (120 eV). X-ray diffraction showed a clear presence of Li2CO3 in the target material, after some deposition runs. The presence of superficial Lithium carbonate was also evidenced, for all films.

[P046-01] "Exotic solutions to the solar neutrino anomaly"

Guzzo, M. M.

We analyze the status of the exotic solutions to the solar neutrino problem, i.e., those solutions based on new phenomena which are not the usual neutrino oscillations induced by masses and mixing. These solutions are based on different assumptions: a) resonant spin-flavor precession induced by non-vanishing neutrino magnetic moment, b) the existence of non-standard flavorchanging and non-universal neutrino interactions and c) the violation of the equivalence principle. We investigate the quality of the fit provided by each one of these solutions not only to the total rate measured by all solar neutrino experiments but also to the day-night and seasonal variations of the event rate, as well as the recoil electron energy spectrum measured by the SuperKamiokande collaboration.

[P047-01] "High coercivity in a new molecular iron-based imagnet"

Vaz, M. G. F., Ardisson, J. D., Speziali, N. L., Souza, G. P., Stumpf, H. O., Knobel, M., and Macedo, W. A. A.

A new molecule-based magnet containing Fe(II), Fe(III) and Cu(opba)(2-) (opba = ortho-phenylenebis(oxamato)) was synthesized. The samples were characterized by infrared spectroscopy, elemental analysis, atomic absorption, macroscopic magnetometry, X-ray diffraction, and Fe-57 Mossbauer spectroscopy. Magnetic measurements show that the compound presents a transition temperature below 15 K and a high coercivity, around 6.3 kOe at 4.2 K. At room temperature, the Mossbauer spectrum is dominated by a broad doublet characteristic of Fe(II); and a small fraction of Fe(III) ions is also identified. At 4.2 K, the spectrum shows clear magnetic splitting.

[P048-01] "Influence of Al content on temperature dependence of excitonic transitions in quantum wells"

Lourenco, S. A., Dias, I. F. L., Laureto, E., Duarte, J. L., Filho, D. O. T., Meneses, E. A., and Leite, J. R.

AlxGa1-xAs/GaAs double quantum well structures with different well thickness and different barrier aluminum concentration (x = 0.17, 0.30, 0.40) were characterized by the photoluminescence technique. The temperature dependence of excitonic transitions in the temperature range of 2 K to 300 It were investigated, The photoluminescence data obtained give clear evidence of the influence of the aluminum concentration on the temperature dependence of excitonic transitions in the quantum wells. Varshni [Physica (Utrecht) 34, 194 (1967)], Vina et al. [Phys. Rev. B 30, 1979 (1984)] and Passler [Phys. Stab. Sol. (b) 200, 155 (1997)] models were used to fit the experimental points.

[P049-01] "Interfacial water dielectric-permittivity-profile measurements using atomic force microscopy - art. no. 011605"

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

The arrangement of water molecules at charged aqueous interfaces is an important question in biology, electrochemistry, and geochemistry. Theoretical studies suggest that the molecules become arranged in several layers adjacent to a solid interface. Using atomic force microscopy we have measured the water dielectric-permittivity profile perpendicular to mica surfaces.

The measured variable permittivity profile starting at epsilon approximate to4 at the interface and increasing to epsilon =80 about 10 nm from the surface suggests a reorientation of water molecule dipoles in the presence of the mica interfacial charge.

[P050-01] "Irreversible thermodynamics in a nonequilibrium statistical ensemble formalism"

Luzzi, R., Vasconcellos, A. R., and Ramos, J. G.

[P051-01] "Laser effects in semiconductor heterostructures within an extended dressed-atom approach"

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

We extend the dressed-atom approach to treat the interaction of a laser field with a semiconductor system. The semiconductor is modeled via a simple two-band isotropic scheme and the interaction with the laser field is incorporated through the renormalization of the semiconductor energy gap and valence and conduction effective masses. We calculate the effects originated by the laser dressing on the donor and exciton peak energies in quantum-well heterostructures and show that the laser dressing may be quite considerable and readily observable.

[P052-01] "Magnetic properties of the frustrated antiferromagnetic spinel ZnCr2O4 and the spin-glass Zn1-xCdxCr2O4 (x=0.05,0.10) - art. no. 024408"

Martinho, H., Moreno, N. O., Sanjurjo, J. A., Rettori, C., Garcia-Adeva, A. J., Huber, D. L., Oseroff, S. B., Ratcliff, W., Cheong, S. W., Pagliuso, P. G., Sarrao, J. L., and Martins, G. B.

The T dependence (2-400 K) of the electron paramagnetic resonance (EPR). magnetic susceptibility chi (T), and specific heat C-v(T) of the normal antiferromagnetic (AFM) spinel ZnCr2O4 and the spin-glass (SG) Zn1-xCdxCr2O4 (x = 0.05.0.10) are reported. These systems behave as a strongly frustrated AFM and SG with T(N)approximate toT(G)approximate to 12 K and -400 K greater than or similar to Theta (CW)greater than or similar to -500 K. At high-ir the EPR intensity follows the chi (T) and the g value is T independent. The linewidth broadens as the temperature is lowered, suggesting the existence of short range AFM correlations in the paramagnetic phase. For ZnCr2O4 the EPR intensity and chi (T) decreases below 90 and 50 K,respectively. These results are discussed in terms of both nearest-neighbor Cr3+ (S=3/2) spin-coupled pairs and spincoupled tetrahedral clusters with an exchange coupling of \J/k\ approximate to 35-45 K. The appearance of small resonance modes for T less than or similar to 17 K. the observation of a sharp drop in chi (T) and a strong peak in C-v(T) at T-N=12 K confirms,as previously reported, the existence of long range AFM correlations in the low-T phase. A comparison with recent neutron diffraction experiments, that found a neardispersionless excitation at 4.5 meV for T less than or similar toT(N) and a continuous gapless spectrum for T greater than or similar toT(N), is also given.

[P053-01] "Nonresonant microwave absorption in Bi2212 single crystal: Second peak and microwave power dependence"

Srinivasu, V. V., Itoh, K., Hashizume, A., Sreedevi, V., Kohmoto, H., Endo, T., da Silva, R. R., Kopelevich, Y., Moehlecke, S., Masui, T., and Hayashi, K.

Nonresonant microwave absorption (NMA) measurements were carried out at liquid-nitrogen temperature on a high quality Bi2212 single crystal, as a function of microwave power in three mutual orientations of crystal nb plane, de field (H-dc) and microwave magnetic field (H-w). NMA line shapes in Bi2212 crystal are complicated with a narrow peak (PI peak) located near zero field, followed by a much broader second peak (P-2peak) in the particular orientations. More excitingly, we show that the P-2 peak qualitatively evolves as a function of microwave power in the orientation of H-dc perpendicular to ab plane, H-w // ab plane, and H-dc perpendicular to H-w. In this configuration, as the microwave power is progressively increased, the broad Pt peak first gets smeared off and then a multiple peak structure appears, which develops into another narrower second peak (P-s-peak) at high enough microwave powers. In the orientation of H-dc // ab plane, H-w perpendicular to ab plane, and H-dc perpendicular to H-w, we report for the first time the: appearance and disappearance of a new second peak (P-2-like peak) as a function of microwave power.

[P054-01] "Permittivity of amorphous hydrogenated carbon (alpha-C : H) films as a function of thermal annealing"

Balachova, O. V., Swart, J. W., Braga, E. S., and Cescato, L.

New metal-insulator-semiconductor structures with a composite insulating layer, consisting of an amorphous hydrogenated carbon (a-C:H) film and a silicon dioxide, were obtained on silicon substrates. Carbon films were deposited on SiO2 layer by radio-frequency plasma-enhanced chemical vapor deposition (rf PECVD) method from methane. The structures were annealed at the annealing temperature T-a = 250, 275, 300, and 350 degreesC. C-V characteristics of the annealed and as-grown metal-amorphous carbon-oxide-semiconductor (MCOS) structures were examined at room temperature at a frequency of 1 MHz and compared with C-V characteristics of the classic metal-oxide- semiconductor (MOS) system. High-frequency C-V curves of both MCOS and MOS structures were used for extracting the permittivity epsilon (a-C:H) of carbon films before and after thermal annealing. epsilon (a-C:H) showed no variations with subsequent annealing of the structure up to T-a = 250 degreesC but it was observed to decrease from 5.6 to 2.8 as the film was annealed from 250 degreesC up to 300 degreesC with the most rapid changes occuring between 275 and 300 degreesC.

[P055-01] "Prospect of creating a composite Fermi Bose superfluid"

Timmermans, E., Furuya, K., Milonni, P. W., and Kerman, A. K.

We show that composite Fermi-Bose superfluids can be created in cold-atom traps by employing a Feshbach resonance or coherent photoassociation. The bosonic molecular condensate created in this way implies a new fermion pairing mechanism associated with the exchange of fermion pairs between the molecular condensate and an atomic fermion superfluid. We predict macroscopically coherent, Josephson-Like oscillations of the atomic and molecular populations in response to a sudden change of the molecular energy, and suggest that these oscillations will provide an experimental signature of the pairing

[P056-01] "Segregation of dopant atoms on extended defects in semiconductors"

Justo, J. F., Schmidt, T. M., Fazzio, A., and Antonelli, A.

We performed a theoretical investigation on the interaction of dopant atoms with extended defects in semiconductors using ah initio total energy calculations. Dopant atoms (donors and accepters)

were found to segregate in stacking faults in silicon and in gallium arsenide, with segregation energies as large as 0.2 eV. A general trend on the electronic properties of segregated dopants in stacking faults is that the donor (or acceptor) electronic energy levels become deeper in the electronic gap, as compared to those levels for the defect in a crystalline site.

Physica B 302, 403-407. 2001.

[P057-01] "Shallow-donor states in semiconductor heterostructures within the fractional-dimensional space approach"

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

Shallow-donor states in quantum-sized semiconductor heterostructures are studied within the fractional-dimensional space approach. Calculations were performed for the binding energies of the ground state of donors in GaAs-(Ga,Al)As quantum wells, cylindrical quantum-well wires, and spherical quantum dots. Functional-dimensional theoretical results are shown to be in good agreement with previous variational calculations.

Physica B 302-303, 72-76. 2001.

[P058-01] "Structural modification influences the characteristics of Langmuir monolayers from aromatic carboxylic acids"

Dynarowicz-Latka, P., Kita, K., Milart, P., Dhanabalan, A., Cavalli, A., da Silva, D. A., and Oliveira, O. N.

The molecular organization of purely aromatic, polyphenyl carboxylic acids, as Langmuir monolayers at the air/water interface, has been investigated by means of surface pressure and electric surface potential measurements upon film compression. The monolayer characteristics of the basic compound, a symmetrical triphenylbenzene (5'-phenyl-m- terphenyl) ring with a carboxylic group at the 4 position (namely 5'-phenyl-1,1 ': 3' ,1 "-terphenyl-4carboxylic acid), are compared with those of its derivatives containing hydrophilic (nitro) or hydrophobic (phenyl) substituents. The nature of the substituent as well as its position (2' or 4') has a profound influence on the monolayer properties. The results are discussed in view of molecular orientation deduced from values of effective dipole moments.

Journal of Colloid and Interface Science 239[1], 158-167. 2001.

[P059-01] "Temperature dependence of the refractive index near the reentrant-isotropic-calamitic-nematic phase transition"

Pereira, J. R. D., Mansanares, A. M., Palangana, A. J., and Baesso, M. L.

The laser-induced nonlinear optical response of a lyotropic liquid crystal system in the reentrant-isotropic and calamitic- nematic phases is investigated by the use of the thermal lens technique. The occurrence of an inversion in the temperature coefficient of the ordinary refractive index, dn(perpendicular to)/dT, near the reentrant-isotropic-calamitic-nematic phase transition, is discussed. This effect is attributed to the behavior of the electronic polarizability due to the change in micelle shape near. the isotropic-nematic transition, and correlated with the results obtained near the nematic-isotropic transition, previously reported.

Physical Review E 64[1], Pt-1, 012701, 2001

[P060-01] "The energetics of dislocation cores in semiconductors and their role on dislocation mobility"

Justo, J. F., Antonelli, A., and Fazzio, A.

We investigated core properties of dislocations in zinc-blende semiconductors using ah initio total energy calculations. The core reconstruction energy of partial dislocations was found to scale almost linearly with the experimental dislocation activation energy. The electronic band structure related to dislocation cores was also determined. In an unreconstructed core, the gap states comprise a half-filled one-dimensional hand, which splits up in bonding and antibonding states upon reconstruction. The energy states which lie in the electronic gap come from the cores of beta partials, while those related to alpha partials remain resonant in the valence band.

Physica B 302, 398-402. 2001.

[P061-01] "The fractional-dimensional space approach to MBEgrown quantum- sized semiconductor low-dimensional systems"

Reyes-Gomez, E., Matos-Abiague, A., Dios-Leyva, M., and Oliveira, L. E.

Shallow impurities and excitons in MBE-grown quantum-sized semiconductor low-dimension;ll systems are studied within the fractional-dimensional space approach. We present calculations for shallow-donor states in GaAs(Ga,Al)As quantum wells and superlattices and fur excitons in GaAs- (Ga,Al)As quantum wells and symmetric-coupled double quantum wells. Effects of growthdirection applied magnetic fields are also considered. Results are shown to be in good agreement with previous variational calculations and available experimental measurements.

Journal of Crystal Growth 227-228[1-4], 77-82, 2001.