Abstracta

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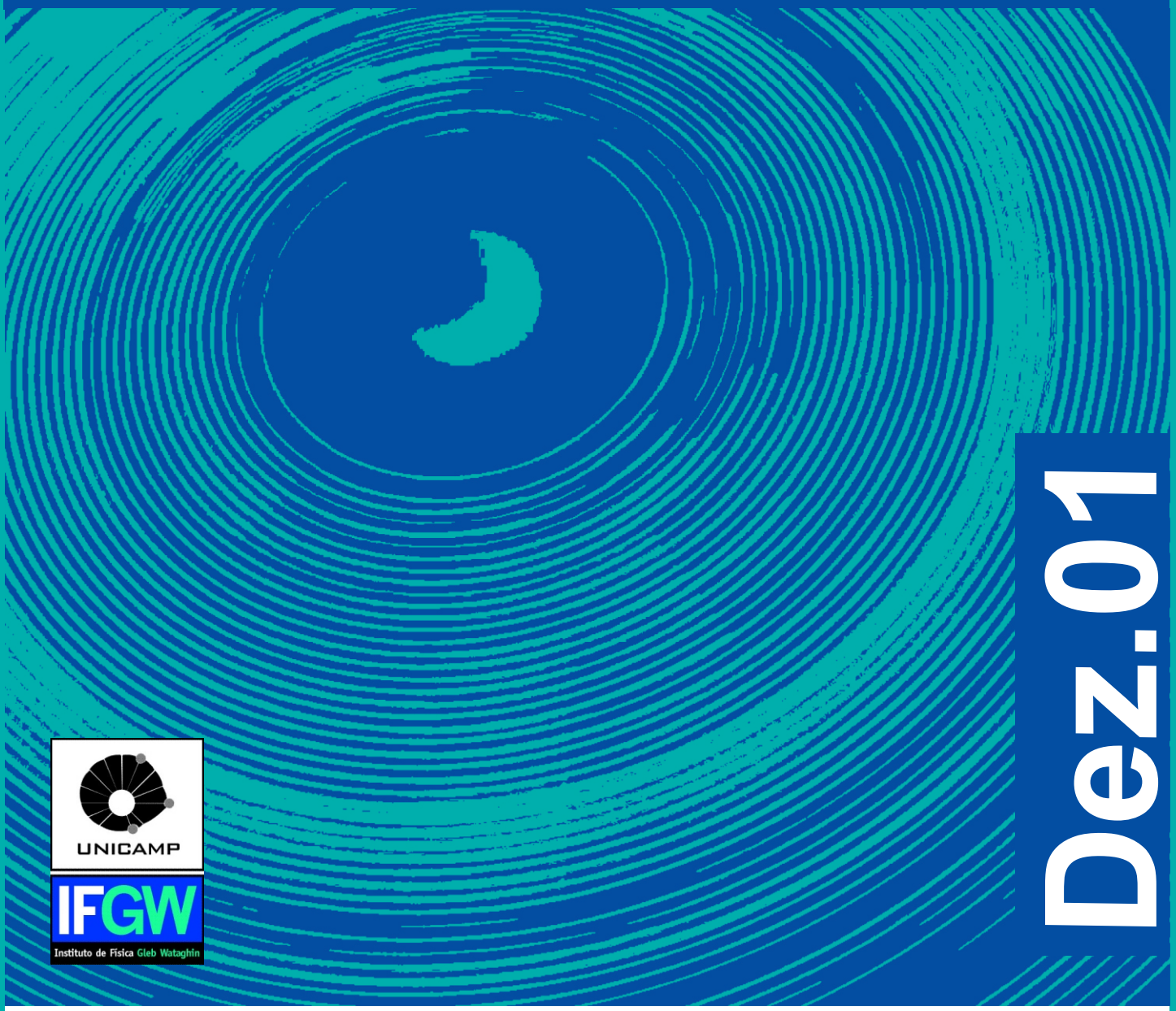

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ACCEPTED PAPERS

A 043 - 01 "Higher-Order Hydrodynamics: Extended Fick´s law, Evolution Equation, and Bobylev´s Instablity".

David Jou, José Casas-Vásques, Justino R. Madureira, Áurea R. Vasconcellos, and Roberto Luzzi.

A higher-order hydrodynamics for material motion in fluids, under arbitrary nonequilibrium conditions, is constructed. We obtain what is a generalized to that conditions-Fick-like law. It includes a representation of Burnett- like contributions of all order, in the form of a continuous-fraction expansion. Also, the equation includes generalized thermodynamic forces, which are characterized and discussed. All kinetic coefficients are given as correlations of microscopic mechanical quantities averaged over the nonequilibrium ensemble, and then are time- and spacedependent as a consequence of accounting for the dissipative processes that are unfolding in the medium. An extended evolution equation for the density of particles is derived, and the conditions when it goes over restricted forms of the type of the telegraphist equation and Fick´s diffusion equation are presented.

Journal of Chemical Physics 116 (4), 1571-1584, 2002

A 044- 01 "Frequency Doubled and Stabilized All-Solid-State Ti: Sapphire Lasers".

Haroldo J. Onisto, Reinaldo L. Cavasso-Filho, Artenio Scalabrin, Daniel Pereira, and Flavio C. Cruz

We describe in detail the design, construction and characterization of and efficient frequency doubled and stabilized all-solid-state Ti: Sapphire laser. The laser frequency has been locked to the resonance of a Fabry-Perot cavity and doubled in a Brewster-cut potassium niobate crystal, placed inside a power enhancement cavity. Up to 200 mW of single frequency blue light with fast frequency instabilities of 40 kHz rms and a drift of 10 MHz/hour has been generated. The spectral distributions of amplitude and frequency noise, for the freerunning laser, have been measured and compared with the case of pumping from an Argon ion laser. Our laser is well suited in atomic physics for high-resolution spectroscopy and for laser cooling and trapping using transitions in the blue-violet region as we demonstrate with the Calcium resonant transition, at 423nm.

Optical Engineering 41[5], 1122-1127, 2002

A 045- 01 "Frequency Doubled Diode Laser in Alternative Extended Cavity".

D. A. Manoel, R. L. Cavasso-Filho, A. Scalabrin, D. Pereira, F. C. Cruz.

We report on an alternative extended cavity scheme used with a 180 mW quantum wellGaAlAs diode laser, operating near 850nm. A dispersing prism and a thin glass plate are employed to enforce stable single mode operation in the strong feedback regime, with no need for laser AR coatings. Compared to other configurations where a grating is used, the lower loss in the extended cavity allows higher fundamental power available for second harmonic generation.For example, by frequency doubling using potassium niobate in a power enhancement cavity, enough power can be generated from a single diode laser to decelerate and trap calcium atoms with radiation at 423-nm.

Optics Communication 201[1-3], 157-163, 2002

A 046- 01 "Study of magnetic and specific heat measurements at low temperatures in Nd0.5Sr0.5MnO3 and Nd0.5Ca0.5MnO3"

J. López, P. N. Lisboa-Filho, O. F. de Lima, and F. M. Araujo-Moreira

The magnetization at low temperatures for Nd0.5Sr0.5MnO3 and Nd0.5Ca0.5MnO3 showed a rapid increase with decreasing temperatures, contrary to a La0.5Ca0.5MnO3 sample. Specific heat measurements at low temperatures showed a Schottky-like anomaly for the first two samples. However, there is not a straightforward correlation between the intrinsic magnetic moment of the Nd+3 ions and the observed Schottky-like anomaly.

Journal of Magnetism and Magnetic Materials 242, 683-685, 2001

A 047 - 01 "Stability and Instability of Polymorphic Populations and the Role of Multiple Breeding Seasons in Phase III of Wright's Shifting Balance Theory".

M. A. M. de Aguiar, H. Sayama. E. Rauch. Y. Bar-Yam, and M. Baranger.

It is generally difficult for a large population at a fitness peak to acquire the genotypes of a higher peak, because the intermediates produced by allelic recombination between types at different peaks are of lower fitness. In his shifting-balance theory, Wright proposed that fitter genotypes could, however, become fixed in small isolated demes by means of random genetic fluctuations These demes would then try to spread their genome to nearby demes by migration of their individuals.The resulting polymorphism, the co-existence of individuals with different genotypes, would give the invaded demes a chance to move up to a higher fitness peak. This last step of the process, namely the invasion of lower fitness demes by higher fitness genotypes, is known as phase III of Wright's theory. Here we study the invasion process from the point of view of the stability of polymorphic populations. Invasion occurs when the polymorphic equilibrium, established at low migration rates, becomes unstable. We show that the instability threshold depends sensitively on the average number of breeding seasons of individuals. Iteroparous species (with many breeding seasons) have lower thresholds than semelparous species (with a single breeding season). By studying a particular simple model, we are able to provide analytical estimates of the migration threshold as a function of the number of breeding seasons. Once the threshold is crossed and polymorphism becomes unstable, any imbalance between the different demes is sufficient for invasion to occur. The outcome of the invasion, however, depends on many parameters, not only on fitness. Differences in fitness, site capacities, relative migration rates, and initial conditions, all contribute to determine which genotype invades successfully. Contrary to the original perspective of Wright's theory for continuous fitness improvement, our results show that both upgrading to higher fitness peaks and downgrading to lower peaks are possible.

Physical Review E 65, 1-7, 2002

BOOKS IN PRESS

L 004- 01 "Predictive Statistical Mechanics: A Nonequilibrium Ensemble Formalism".

Roberto Luzzi, Áurea R. Vasconcellos, and J. Galvão Ramos.

In the framework of Jaynes Predictive Statistical Mechanics, it is presented a detailed derivation of an ensemble formalism for open systems arbitrarily away from equilibrium. It involves a large systematization and extension of the fundamental works and ideas of the outstanding pioneers Gibbs and Boltzmann, and of Bogoliubov, Kirkwook, Green, Mori, Zwanzig, Prigogine, Zubarev, among others. After a description of the philosophy, foundations, and construction (methodology) of the formalism, including the derivation of a nonequilibrium grand-canonical ensemble for far-from-equilibrium systems, the derivation of a quantum nonlinear kinetic theory and a response function theory together with a theory of scattering are presented. In one of the chapters, applications of the theory are cataloged, making comparison with experimental data a basic step for the validation of any theory. Another chapter is devoted to the description of an irreversible thermodynamics founded on the formalism, providing a far-reaching generalization of Informational Statistical Thermodynamics. A last chapter gives an overall picture of the formalism, and questions and criticisms related to it are discussed. Audience: This book is directed to an audience of researchers in the field of, first, Statistical Mechanics and Thermodynamics of open nonequilibrium systems. Moreover, it is relevant for the study of far-from-equilibrium processes in condensed matter, particularly semiconductor physics, as well as of molecular Hydrodynamics, Rheology, many-body systems with complex behavior, areas of engineering, and the like. The book can also be used as a complement to advanced graduate courses in Statistical Mechanics.

to be published in International Book Series on The Fundamental Theories of Physics: Their Clarification, Development and Application , Kluwer Acad. Publishers., Boston/Dordrecht/London.

ACCEPTED PAPERS FOR BOOKS PUBLISHED

L 005- 01 "Thermal Properties of Amorphous Carbon".

F. C. Marques and R. G. Lacerda,

to be published in EMIS DATAREVIEWS SERIES IEE- The Institute of Electrical Engineers(United Kingdon) Chapter 8.6.

PUBLISHED PAPERS

P 092- 01 "Aluminum-induced crystallization of hydrogenated amorphous germanium thin films".

Chambouleyron, I., Fajardo, F., and Zanatta, A. R.

Al-induced crystallization of co sputtered hydrogenated amorphous germanium films, deposited at 220 degreesC, onto crystalline silicon substrates is investigated by Raman and infrared spectroscopies as a function of the Al concentration (2x10(-6)< [Al/Ge]<2.5x10(-2)). Aluminum induces partial crystallization of the films for metal concentrations smaller than similar to1.3 at. %. A sort of explosive crystallization of the films occurs within a narrow Al concentration range (similar to1.3 < [Al/Ge]< similar to1.8 at. %). Raman spectra do not display any crystallization signal for metal concentrations above this narrow range. Data of the extended x- ray absorption fine structure of the coordination and of the local order around gallium, in Gadoped a-Ge:H, are used to propose an overall picture of the microscopic mechanisms behind these results. A comparative analysis suggests that the crystallization seeds are fourfoldcoordinated Al atoms sitting at the center of perfect tetrahedral Ge sites.

Applied Physics Letters 79[20], 3233, 2001.

P 093 - 01 "Amplification of broadband noise pumped by two lasers in optical fibers".

Boggio, J. M. C., Tenenbaum, S., and Fragnito, H. L.

A theoretical and experimental investigation of catastrophic amplification of broadband noise in optical fibers near the zerodispersion frequency (v(0)) pumped by two lasers with frequencies that are symmetrically tuned relative to v(0) is presented. The effect is due to a four-wave mixing (FWM) process, phase matched up to third-order dispersion, between the spectral components of noise and the lasers. We observed a FWM gain of 16 dB (10-dB net gain) over a 22-nm bandwidth (limited by fourth-order dispersion) for 18-dBm power lasers at +/-1 THz (8 nm) from v(0) in a 25-km-long dispersion-shifted fiber. A simple analytical model is proposed that will permit us to investigate this effect numerically in amplified links with concatenated amplifiers and consider random fluctuations of v(0) along the fiber.

Journal of the Optical Society of America B-Optical Physics 18[10], 1428-1435. 2001.

P 094 - 01 "An information-theoretic-based (MaxEnt) approach to social dynamical systems".

Luzzi, R., Mesquita, M. V., and Madureira, J. R.

Jeffreys-Jaynes' Predictive Statistics appears to provide a promising approach for the study of general dynamical systems. We describe an application of such theory to the analysis of the dynamics of interacting social groups. For that purpose the said statistical theory is redirected towards the construction of an equivalent stochastic theory. The working of the formalism is illustrated by applying it to a simplified case of opinion forming in a two-candidates election.

Journal of Mathematical Sociology 25[2], 179-224. 2001.

P 095 - 01 "Angular dependence of the bulk nucleation field Hc2 of aligned MgB2 crystallites .

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

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 to the bulk nature of the critical field H-c2. We found a mass anisotropy ratio epsilon2 approximate to0.39 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.

Physical Review B 64[14], 144517, 2001

P 096 - 01 "Anisotropy in Bi2212 single crystals studied by nonresonant microwave absorption: hysteresis and line shapes".

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

Microwave absorption in a high quality Bi2212 single crystal is studied at 77 K, using non-resonant microwave absorption (NMA) technique. NMA line shape and low field hysteresis are highly anisotropic. Two peaks, a narrow P-1-peak followed by a broad P-2-peak are observed for applied field perpendicular to the abplane For the applied field parallel to the ab-plane, the broad P-2-peak disappears. For an intermediate orientation of the field,

say similar to 55 degrees, to the ab-plane, the P-1- like peak broadens considerably with a possible mixing of both P-1-peak and P-2-peak. While there is a pronounced hysteresis in the P-1- peak just near zero field for applied field parallel to the ab-plane (Cu-O plane), this hysteresis in P-1-peak is nearly absent when the field is applied perpendicular to the ab-plane. In both these orientations, hysteresis is absent in NMA signals beyond the P-1-peak till very high fields. At the intermediate orientation angle of similar to 55 degrees to the ab-plane, the reverse sweep NMA signal collapses into the zero- base line. This is a remarkable hysteresis effect. This may be due to the interaction between Josephson vortices and Abrikosov vortices which can happen in tilted magnetic fields.

Physica C 362[1-4], 282-285. 2001

P 097 - 01 "Antiferromagnetism in alpha-Li3Fe2(PO4)(3)".

Zarestky, J. L., Vaknin, D., Chakoumakos, B. C., Rojo, T., Goni, A., and Barberis, G. E.

Neutron diffraction techniques have been used to determine the magnetic structure of Fe in monoclinic alpha -Li3Fe2(PO4)(3). Rietveld analysis of the room temperature powder diffraction pattern confirms the monoclinic structure of the sample and is in agreement with previous studies. At low temperatures a paramagnetic to antiferromagnetic transition is observed at T-N = 30.0 K. Our analysis shows that at T = 4 K the two inequivalent Fe sites have antiparallel magnetic moments that are aligned along the a-axis. The average magnetic moment, gS = 5.0 mu (B) indicates homogeneous Fe3+ (S = 5/2).

Journal of Magnetism and Magnetic Materials 234[3], 401- 408. 2001.

P 098 - 01 "Application of the method of continued fractions to multichannel studies on electron-impact excitation of the B-1 Sigma(+)(u), (CIIu)-I-1 and E(F)(1)Sigma(+)(g) states in H-2".

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

In the present work, the method of continued fractions at a fivechannel close-coupling level of approximation is applied to study the low-energy electron-impact excitation in linear molecules. Particularly, cross sections for the X(1)Sigma (+)(g)->B(1)Sigma (+)(u), X(1)Sigma (+)(g)-->E(F)(1)Sigma (+)(g), and X(1) Sigma (+)(g)-->(CIIu)-I-1 transitions in H-2 in the (15-40) eV energy range are reported. No orthogonality constraint between the bound and continuum orbitals is imposed in the present study and the one-electron exchange terms are explicitly considered. Comparison between our calculated cross sections with the available experimental data and other theoretical results is made.

Journal of Molecular Structure-Theochem 574, 133-140. 2001.

P 099 - 01 "Berreman effect applied to phase characterization of thin films supported on metallic substrates: The case of TiO2 - art. no. 125404".

Trasferetti, B. C., Davanzo, C. U., Zoppi, R. A., da Cruz, N. C., and de Moraes, M. A. B.

Infrared reflection-absorption spectra of TiO2 thin films deposited by plasma-enhanced chemical vapor deposition onto aluminum and by a sol-gel process onto platinum were obtained using s- and p-polarized light and oblique incidence angles. Prominent bands with variable reflection minima position and line shapes, which were shown to be phase dependent, were observed for all samples in the 800-900 cm(-1) wave number range when p-polarized light and oblique incidence were used. Such bands were attributed to an LO mode of TiO2 and their enhancement with the incidence angle is a good example of Berreman effect. Such spectra were analyzed by means of spectral simulation based on the Fresnel equation for a threelayered system. The films' optical constants used in the simulations were obtained through the Kramers-Kronig analysis (KKA) of the reflectance spectra of pellets of powdered amorphous TiO2, anatase and rutile. Optical constants for hypothetical polycrystalline TiO2 systems were also calculated from the dielectric functions of single crystals by means of effective medium theories (EMTs), such as those of Bruggeman, Maxwell-Gannett, and Hunderi. These optical constants were used both for spectral simulation and for understanding the bands observed. However, the optical constants for the powdered standards determined through KKA reproduced experimental results more accurately than those determined through the EMTs. In both experimental and simulated spectra, Berreman effect was very clear-cut and a reliable phase characterization could be carried out.

Physical Review B 64[12], 125404, 2001.

P 100 - 01 "Comparison of two multipass configurations for scattered light amplification".

Monteiro, M. J. R., Machida, M., Daltrini, A. M., and Berni, L. A.

Scattered light amplification by using multipass method is a very useful technique to increase Thomson and Rayleigh scattering signals for local plasma electron temperature and density measurements. Using Rayleigh scattering in nitrogen neutral gas chamber, the well-known technique of multipass system with two concentrical spherical mirrors is compared with new configuration by using two sets of lens and flat mirrors. The focusing capability of both configurations makes the difference to stray light and scattered signal related to spectrometer slit aperture and number of multipass. For the same number of laser beam pass and best slit aperture, the lens and plan mirrors new configuration presented lower stray light and higher scattered signal, although the gain of the usual two spherical mirrors still remains higher.

Brazilian Journal of Physics 31[3], 502-506. 2001.

P 101 - 01 "Electronic structure and optical spectroscopy of conducting electrochromic devices".

Del Nero, J. and Laks, B.

Interest in conductive organic polymers has considerably increased since the discovery in 1977 of the doped molecule polyacetylene. Recently, polymers of dithienopyrrole (DP), dithienothiophene (DT) and thionaphtheneindole (TNI) have been synthesized electrochemically showing for several monomer ratios good electrochromic and conducting characteristics. The aim of this paper is to investigate theoretically the electrical and optical properties of the above mentioned polymers. Therefore, we have performed a conformational structure study followed by electronic structure calculations. Also we present a spectroscopic study for oligomers built with the monomers of these materials. In our calculations we utilized the semiempirical method AM1 for the electronic and geometric simulation of the polymers. Optical absorption spectra for neutral and charged systems were calculated using the INDO/S-CI method. All three systems showed similar electronic behavior but significant differences can be seen on the TNI monomer optical spectra. Our results are in good agreement with the experimental ones.

Journal of Molecular Modeling 7[9], 354-359. 2001.

P 102 - 01 "Fe and Mo valences in Sr2FeMoO6".

Moreno, M. S., Gayone, J. E., Abbate, M., Caneiro, A., Niebieskikwiat, D., Sanchez, R. D., de Siervo, A., Landers, R., and Zampieri, G.

The valences of Fe and Mo in Sr2FeMoO6 are investigated by means of X-ray absorption and photoemission spectroscopies.

We find that the d occupations are similar to those of Fe in Fe2O3 and Mo in MoO3. Considering the covalency, however, we argue that the ground state is closer to a Fe+3(3d(5))-Mo+5(4d(1)) configuration than to a Fe+2(3d(6))-Mo+6(4d(0)) configuration.

Solid State Communications 120[4], 161-164. 2001.

P 103 - 01 "The finite temperature random phase approximation as a coupled- channel problem and the implementation of the single-channel random phase approximation (SCRPA) for the He atom in a finite temperature dense plasma".

Csanak, G. and Meneses, G. D.

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

Journal of Quantitative Spectroscopy & Radiative Transfer 71[2-6], 281-294. 2001.

P 104 - 01 "The fractal dimension of boron-doped diamond films".

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

Boron-doped diamond films were grown by hot-filament-assisted chemical vapor deposition (CVD). The fractal dimension (FD) of these films was investigated by atomic force microscope and cyclic voltammetry. 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 FD values lower than two suggesting noncontiguous chemically active sites.

Applied Surface Science 181[3-4], 327-330. 2001.

P 105 - 01 "Granular Cu-Co alloys as interacting superparamagnets"

Allia, P., Coisson, M., Tiberto, P., Vinai, F., Knobel, M., Novak, M. A., and Nunes, W. C.

The anhysteretic magnetization of the granular metallic alloy Cu90Co10 is experimentally studied over a wide temperature range (2-700 K). The measurements definitely exclude that this alloy is a simple superparamagnet, even in the high-temperature limit, although some features of granular systems [such as the typical Langevin-like form of the anhysteretic magnetization curves M(H)] are often taken as evidence of superparamagnetism. A phenomenological theory is proposed, explicitly considering that particle moments interact through long-ranged dipolar random forces, whose effect is pictured in terms of a temperature T*, adding to the actual temperature T in the denominator of the Langevin function argument. This simple formula explains all features of the experimental M(H) curves. The theory indicates that the actual magnetic moments on interacting Co particles are systematically larger than those obtained fitting the magnetic data to a conventional Langevin function. The Cu90Co10 granular alloy is therefore identified as an "interacting superparamagnet" ISR The ISP regime appears as separating the high-temperature, conventional superparamagnetic phase from the low-temperature, blocked- particle regime. In this way, a magnetic-regime diagram can be drawn for each granular system. The competition between single- particle and collective blocking mechanisms is briefly analyzed. The proposed interpretation is thought to be applicable to other fine particle systems; its main features and intrinsic limits are discussed.

Physical Review B 64[14], 144420, 2001.

P 106 - 01 "How do Gold Nanowires break?"

E.Z. da Silva, Antônio J. R. da Silva and A. Fazzio

Suspended gold nanowires have recently been made in na ultrahigh vacuum and were imaged by electron microscopy. Using realistic molecular dynamics simulation, we study the mechanisms of formation, evolution, and breaking of these atomically thin Au nanowires under stress. We show how defects induce the formation of constrictions that eventually will form the one-atom chains. We find that these chains, before breaking, are five atoms long, which is in excellent agreement with experimental results. After the nanowire's rupture, we analyze the structure of the Au tip, which we believe will be universally present due to its highly symmetric nature.

Physical Review Letters, 87[25], 256102, 2001.

P 107 - 01 "Indication of superconductivity at 35 K in graphitesulfur composites".

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

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

Physical Review Letters 87[14], 47001, 2001.

P 108 - 01 "Irreversible magnetization under rotating fields and lock-in effect on a ErBa2Cu3O7-delta single crystal with columnar defects."

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

We have measured the irreversible magnetization (M-i) of an ErBa2Cu3O7-delta 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 M-L(H) loops at fixed angles. The resulting Mi(Theta) 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 phi (L) follows the H-1 theoretical prediction, while the temperature dependence is in agreement with entropic smearing effects corresponding to long range vortex-defects interactions.

Physical Review B 64[14], 144502, 2001.

P 109 - 01 "Magnetic and magnetotransport properties of Co thin films on Si".

Knobel, M., Denardin, J. C., De Carvalho, H. B., Brasil, M. J. S. P., Pakhomov, A. B., and Missell, F. P

A systematic study of magnetic and magnetotransport properties of thin Co films on Si is reported in this work. The Co films of thicknesses 30, 160 and 440 Angstrom were prepared by magnetron sputtering from a Co target onto a Si(100) substrate held at room temperature. Resistance, magnetoresistance and Hall effect were measured in the temperature range 5-350 K. Magnetization was measured in the same temperature range using a SQUID magnetometer. Complete surface hysteresis loops were measured from 4 to 300 K by means of the magneto-optical Kerr effect, in order to follow the behavior of the coercivity and magnetic easy axes of the samples. The transport and magnetotransport properties display a peculiar effect as functions of temperature. The films behave as pure metallic Co below 250 K. However, the resistance drops with heating from 250 to 280 K, regaining its typical metallic behavior at temperatures higher than 280 K. The thinner the film, the larger is the resistance drop in the temperature interval 250- 280 K, reaching a factor of 4.5 for the 30 A thick film. The Hall effect contains both ordinary and extraordinary contributions. From ordinary Hall effect measurements, one finds that the conduction is electronic at low temperatures and turns to holelike above the transition point. Magnetoresistance. changes from negative at low T to positive at high temperatures. These facts indicate that the observed effect is related to the metallic layer, which undergoes a conducting channel switching when the temperature is increased.

Physica Status Solidi A-Applied Research 187[1], 177-188. 2001.

P 110 - 01 "Magnetic carbon".

Makarova, T. L., Sundqvist, B., Hohne, R., Esquinazi, P., Kopelevich, Y., Scharff, P., Davydov, V. A., Kashevarova, L. S., and Rakhmanina, A. V.

The discovery of nanostructured forms of molecular carbon has led to renewed interest in the varied properties of this element. Both graphite and C-60 can be electron-doped by alkali metals(1) to become superconducting; transition temperatures of up to 52 K have been attained by field-induced hole-doping of C-60 (ref.2). Recent experiments(3,4) and theoretical studies(5,6) have suggested that electronic instabilities in pure graphite may give rise to superconducting and ferromagnetic properties, even at room temperature. Here we report the serendipitous discovery of strong magnetic signals in rhombohedral C-60. Our intention was to search for superconductivity in polymerized C-60; however, it appears that our high-pressure, high-temperature polymerization process results in a magnetically ordered state The material exhibits features typical of ferromagnets: saturation magnetization, large hysteresis and attachment to a magnet at room temperature. The temperature dependences of the saturation and remanent magnetization indicate a Curie temperature near 500 K.

Nature 413[6857], 716-718. 2001

P 111 - 01 "Massless "just-so" solution to the solar neutrino problem."

Guzzo, M. M., Nunokawa, H., de Holanda, P. C., and Peres, O. L. G.

We study the effect of the nonresonant, vacuum oscillation-like neutrino flavor conversion induced by nonstandard flavor changing and nonuniversal flavor diagonal neutrino interactions with electrons in the Sun. We have found an acceptable fit for the combined analysis for the solar experiments total rates, the Super-Kamiokande energy spectrum and zenith angle dependence. Phenomenological constraints on nonstandard flavor changing and nonuniversal flavor diagonal neutrino interactions are considered.

Physical Review D 64[9], 097301, 2001.

P 112 - 01 "Measuring CP violation by low-energy mediumbaseline neutrino oscillation experiments".

Minakata, H. and Nunokawa, H.

In this talk, we discuss the possibility of measuring CP violation in neutrino oscillation experiments using the neutrino beam with energy which is lower E-nu greater than or similar to 100 MeV than the one usually considered (typically > 1 GeV) in accelerator experiments. The advantage of using such lower energy neutrino beam is that despite the smaller detection cross-sections, the effect of CP violation is larger and the optimal length of the baseline can be rather short, 30- 50 km, being free from matter effect contamination.

Nuclear Instruments & Methods in Physics Research Section Accelerators Spectrometers Detectors and Associated Equipment 472[3], 421-426. 2001.

P 113 - 01 "Micromagnetic structure images taken using platinum coated tips".

Teschke, O.

We report on magnetic force microscopy images of data tracks written in recording media taken using Pt-coated tips. The force acting on the tip when immersed in the magnetic field of the substrate was modeled assuming diamagnetic and paramagnetic interactions. The sample scanning using Pt-coated tips shows an improvement in the image delineation of the magnetic field distribution compared to the images taken using Co-coated hard magnetic tips and the display of at least a twice higher data track density.

Applied Physics Letters 79[17], 2773-2775. 2001

P 114 - 01 "Neutrino mass spectrum and future beta decay experiments".

Farzan, Y., Peres, O. L. G., and Smirnov, A. Y.

We study the discovery potential of future beta decay experiments on searches for the neutrino mass in the sub-eV range. and, in particular, KATRIN experiment with sensitivity m > 0.3 eV. Effects of neutrino mass and mixing on the beta decayspectrum in the neutrino schemes which explain the solar and atmospheric neutrino data are discussed. The schemes which lead to observable effects contain one or two sets of quasidegenerate states. Future beta decay measurements will allow to check the three-neutrino scheme with mass degeneracy, moreover, the possibility appears to measure the CP-violating Majorana phase. Effects in the four-neutrino schemes which can also explain the LSND data are strongly restricted by the results of Bugey and CHOOZ oscillation experiments: apart from bending of the spectrum and the shift of the end point one expects appearance of small kink of (< 2%) size or suppressed tail after bending of the spectrum with rate below 2% of the expected rate for zero neutrino mass. We consider possible implications of future beta decay experiments for the neutrino mass spectrum,the determination of the absolute scale of neutrino mass and for establishing the nature of neutrinos. We show that beta decay measurements in combination with data from the oscillation and double beta decay experiments will allow to establish the structure of the scheme (hierarchical or non- hierarchical), the type of the hierarchy or ordering of states (normal or inverted) and to measure the relative CP-violating phase in the solar pair of states.

Nuclear Physics B 612[1-2], 59-97. 2001.

P 115 - 01 "New schemes for quantum state generation".

Vidiella-Barranco, A.

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 for the generation of pure quantum states. These schemes rely upon the appropriate choice of atom-field interaction times, and nonclassical states are built up either from the vacuum state or from mixed states.

Optics and Spectroscopy 91[3], 338-342. 2001.

P 116 - 01 "Nucleation and growth of CdTe1-xSx nanocrystals embedded in a borosilicate glass. Effects of sulfur content and two-step thermal annealing".

Kellermann, G., Craievich, A. F., Barbosa, L. C., and Alves, O. L.

Nucleation and growth of CdTe1-xSx nanocrystals embedded in a borosilicate glass matrix and submitted to isothermal annealing were studied by small-angle X-ray scattering (SAXS). Two different sulfur contents (x = 0.3 and x = 0.7) were investigated. The formation and growth of the nanocrystals was studied in situ, maintaining the samples at a constant temperature (560 degreesC) inside a high-temperature cell. The effect of a nucleation pretreatment at 460 degreesC on the characteristics of nanocrystal formation and growth was also studied. The experimental results demonstrate that, in composites with high sulfur content (x = 0.7), nanocrystals grow during the isothermal annealing by coarsening of preformed small crystals. In glasses with low sulfur content (x = 0.3), nanocrystals grow by progressive diffusion of Cd, Te and S atoms initially dispersed in the glass matrix.

Journal of Non-Crystalline Solids 293, 517-526. 2001.

P 118 - 01 "Probing flavor changing neutrino interactions using neutrino beams from a muon storage ring".

Gago, A. M., Guzzo, M. M., Nunokawa, H., Teves, W. J. C., and Funchal, R. Z.

We discuss the capabilities of a future neutrino factory based on intense neutrino beams from a muon storage ring to explore the nonstandard neutrino matter interactions, which are assumed to be subleading effects in the standard mass induced neutrino oscillations, The conjunction of these two mechanisms will magnify the fake CP violating effect in the presence of matter which is not coming from the CP phase in the neutrino mixing matrix. We show that such a fake CP violation can be observed in neutrino factory experiments by measuring the difference between the neutrino and antineutrino probabilities. In order to perform such a test, we consider three neutrino flavors, admitting the mixing parameters in the range consistent with the oscillation solution to the atmospheric and the solar neutrino problems, as well as with the constraints imposed by the reactor neutrino data. We show that with a 10 kt detector with 5 years of operation, a stored muon energy E-mu greater than or equal to 20 GeV, 2 x 10(20) muon decays per year, and a base line L similar to 732 kin, such a neutrino facility can probe the nonstandard flavor changing neutrino interactions down to the level of(10(-3)-10(- 2))G(F) in both v(mu) --> v(tau)/(v) over bar (mu)-->(v) over bar (tau) and v(e) -- >v(tau)/(v) over bar (e)-->(v) over bar (tau) modes.

Physical Review D 64[7], 073003, 2001.

P 119 - 01 "Recoherence in the entanglement dynamics and classical orbits in the N-atom Jaynes-Cummings model."

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

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 J(z). Since the expectation value of this operator can be viewed as related to the orbit radius in the classical phase-space projection associated with 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 centered at periodic orbits in regular regions is a clear periodic recoherence. For chaotic situations the same phenomenon (proximity of the atomic phase- space borderline) is, in general, responsible for oscillations in the entanglement properties.

Physical Review A 64[4], 043801, 2001.

P 120 - 01 "Relaxation dynamics of hot carriers and phonons insemiconductors: Influence of the excitation conditions".

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

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 longitudinal optical 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 carrier-phonon interactions. Comparison of the relaxation dynamics in the case of several semiconductors with different polar strengths is done.

Journal of Applied Physics 90[8], 3973-3978. 2001.

P 121 - 01 "Semiclassical approximations in phase space with coherent states".

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

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

Journal of Physics A-Mathematical and General 34[36], 7227-7286. 2001.

P 122 - 01 "Status of the solutions to neutrino anomalies based on non- standard neutrino interactions".

Nunokawa, H.

We review the status of the solutions to neutrino anomalies by flavor-changing as well as flavor-diagonal neutrino interactions.

While it is difficult to explain the atmospheric neutrino data the solar neutrino data can be well accounted for by the massless neutrino oscillation induced by such non- standard neutrino interactions. We also discuss the possibility to test such kinds of interactions by the future neutrino oscillation experiments at neutrino factories.

Nuclear Instruments & Methods in Physics Research Section A Accelerators Spectrometers Detectors and Associated Equipment 472[3], 443-450. 2001.

P 123 - 01 "Strain-dependent optical emission in In1-xGaxAs/ InP quantum wells".

Tudury, H. A. P., Nakaema, M. K. K., Iikawa, R., Brum, J. A., Ribeiro, E., Carvalho, W., Bernussi, A. A., and Gobbi, A. L.

InGaAs/InP strained-layer modulation-doped quantum wells were studied by photoluminescence. The combination of the built-in strain and the quantum confinement in this system leads to a strong valence band mixing yielding direct and indirect band gap structures. We demonstrate that the optical emission line shape is strongly dependent on the valence band dispersion and it is a good method to distinguish between direct and indirect structures. The application of an external biaxial tensile strain to the samples provides an additional evidence of direct-to-indirect band gap transition in strained heterostructures.

Physical Review B 64[15], 153301, 2001.

P 124 - 01 "Structural and electronic properties of gold nanowires".

Rodrigues, V. and Ugarte, D.

We have used high resolution transmission electron microscopy to determine the structure of gold nanowires generated by mechanical stretching. Just before rupture, the contacts adopt only three possible atomic configurations, whose occurrence probabilities and quantized conductance were subsequently estimated. These predictions have shown a remarkable agreement with conductance measurements from a break junction operating in ultra-high-vacuum, corroborating the derived correlation between nanowire atomic structure and conductance behavior.

European Physical Journal D 16[1-3], 395-398. 2001.

P 125 - 01 "Temperature dependence of the Cr3+ site axial distortion in LiSrAlF6 and LiSrGaF6 single crystals".

Medina, A. N., Bento, A. C., Baesso, M. L., Gandra, F. G., Catunda, T., and Cassanho, A.

The electron spin resonance (ESR) of Cr3+ in LiSrAlF6 (LiSAF:Cr) and LiSrGaF6 (LiSGaF:Cr) single crystals has been measured in the temperature range between 270 and 470 K. The external magnetic field orientation dependence of the spectra is described by a spin Hamiltonian of axial symmetry for both compounds. The value of the zero-field splitting axial parameter (D) for LiSGaF:Cr decreases from 6.60 x 10(-2) cm(-1) to 5.60 x 10(-2) cm(-1), while for LiSAF:Cr it increases from 1.30 x 10(-2) cm(-1) to 1.60 x 10(-2) cm(-1) for increasing temperature. The larger values of D obtained for LiSGaF:Cr show that the distortion of the octahedral Cr site is greater in this compound, in agreement with x-ray diffraction results reported in the literature.

Journal of Physics-Condensed Matter 13[36], 8435-8443. 2001.

P 126 - 01 "Vacuum ultraviolet and visible spectroscopy diagnostics on the NOVA-UNICAMP tokamak".

Daltrini, A. M., Machida, M., and Monteiro, M. J. R.

Three visible and one VUV spectrometers covering four toroidal positions have been set to study He and H plasma created by NOVA-UNICAMP tokamak. Ion temperatures have been measured at the beginning of the tokamak discharge by Doppler broadening of C, O and He lines. The time evolution of carbon line emissions, with different degrees of ionization, showed to have opposite behavior between high and low plasma ionization condition. The high density operation and 2 kHz oscillation present throughout discharge, caused by periodical touching of the plasma with NOVA-UNICAMP tokamak limiter, restrained the increase of ion temperature.

Brazilian Journal of Physics 31[3], 496-501. 2001.

P 127 - 01 "Weak ferromagnetism above T-N in Gd2CuO4".

Martinho, H., Martin, A. A., Moreno, N. O., Sanjurjo, J. A., Rettori, C., Oseroff, S. B., Fisk, Z., Pagliuso, P. G., and Sarrao, J. L.

In this work we report magnetization and Raman measurements performed in single crystals of Gd2CuO4. The data show the presence of two forbidden Raman modes (fRm), B-1g(*) and B- 2g(*), and weak ferromagnetism (WF) in the CuO2 planes up to temperatures well above T(N)(Cu)similar to 280 K. We have studied the T-dependence of the intensity of these fRm and the WF component between 2 and 800 K. The WF component and the relative intensity of the two fRm decrease with increasing T and they vanish at T similar to 650 and 520 K, respectively. Recent neutron diffraction experiments observed a tetragonal to orthorhombic phase transition at T congruent to 650 K. These results are interpreted in terms of structural distortions within the CuO2 planes that lead to the existence of a distribution of coexisting tetragonal and orthorhombic crystallographic domains in this system.

Physica B 305[1], 48-55. 2001.

Abstracta

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