

# Abstracta

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## Trabalhos Publicados

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P 124-09 à P 168-09

## Trabalhos Publicados

### **P124-09 “A study of pressure and chemical substitution effects on the magnetocaloric properties of the ferromagnetic compound UGa<sub>2</sub>”**

da Silva, L. M., dos Santos, A. O., Medina, A. N., Coelho, A. A., Cardoso, L. P., and Gandra, F. G.

We report on pressure effects on the magnetic and magnetocaloric properties of the compound UGa<sub>2</sub>. Using a mean field approximation, we were able to calculate the isothermal entropy change and the adiabatic temperature change. Neither the applied pressure nor the chemical substitution experiments within the ranges studied revealed a remarkable improvement on the magnetocaloric effect (MCE) except for the Al substitutions. Nevertheless, we found that mechanical pressure and chemical pressure are equivalent in terms of the Curie temperature shift when Al, Ge and Si are substituted for Ga, but a different behavior is found when Ni, Fe and Co are used. Our results also show that a composite to operate between 80 and 120 K can be obtained using different concentrations of U(Ga, Ni)<sub>2</sub>

**Journal of Physics-Condensed Matter 21[27], 276001. 2009.**

### **P125-09 “Anisotropic ideal magnetohydrodynamic cylindrical equilibria with incompressible adiabatic flow”**

Clemente, R. A. and Sterzo, D.

The problem of ideal anisotropic magnetohydrodynamic cylindrical equilibria with incompressible adiabatic flow is treated. Two examples of exact analytical solutions with different cross shapes of the plasma column are shown. As a bypass result, the model is consistent with the difference between parallel and perpendicular plasma pressures sustained by the flow itself

**Plasma Physics and Controlled Fusion 51[8], 085011. 2009.**

### **P126-09 “Can quantum mechanics fool the cosmic censor?”**

Matsas, G. E. A., Richartz, M., Saa, A., da Silva, A. R. R., and Vanzella, D. A. T.

We revisit the mechanism for violating the weak cosmic-censorship conjecture (WCCC) by overspinning a nearly-extreme charged black hole. The mechanism consists of an incoming massless neutral scalar particle, with low energy and large angular momentum, tunneling into the hole. We investigate the effect of the large angular momentum of the incoming particle on the background geometry and address recent claims that such a backreaction would invalidate the mechanism. We show that the large angular momentum of the incident particle does not constitute an obvious impediment to the success of the overspinning quantum mechanism, although the induced backreaction turns out to be essential to restoring the validity of the WCCC in the classical regime. These results seem to endorse the view that the “cosmic censor” may be oblivious to processes involving quantum effects

**Physical Review D 79[10], 101502. 2009.**

### **P127-09 “Diamond like carbon used as antireflective coating on crystalline silicon solar cells”**

Oliveira, M. H., Silva, D. S., Cortes, A. D. S., Namani, M. A. B., and Marques, F. C.

Amorphous carbon with different structures was used as antireflective coating on crystalline silicon solar cells. Polymeric-like carbon (PLC) and diamond-like carbon (DLC) were deposited by the PECVD technique on the anode and cathode electrode, respectively. Tetrahedral-like carbon (ta-C) was deposited by the filtered cathodic vacuum arc (FCVA). An increase in the short circuit current comparable to that obtained by conventional antireflective coating (SnO<sub>2</sub>) was obtained using PLC antireflective coating. The effect on the short circuit current of the other structures (DLC and ta-C) is reduced mainly due to the band gap and/or a mismatch on the index of refraction of the film and the crystalline silicon substrate. (C) 2009 Elsevier B.V. All rights reserved

**Diamond and Related Materials 18[5-8], 1028-1034. 2009.**

### **P128-09 “Effect of 200 MeV Ag<sup>15+</sup> ion irradiation on structural and magnetic properties of Mg<sub>0.95</sub>Mn<sub>0.05</sub>Fe<sub>2</sub>O<sub>4</sub> ferrite thin film”**

Sharma, S. K., Kumar, S., Alimuddin, Knobel, M., Choudhary, R. J., Phase, D. M., Lee, C. G., and Kumar, R.

Nanocrystalline Mg<sub>0.95</sub>Mn<sub>0.05</sub>Fe<sub>2</sub>O<sub>4</sub> ferrite thin films, prepared by pulsed laser deposition technique on a glass substrate coated with indium tin oxide, are irradiated with 200 MeV Ag<sup>15+</sup> ions at different fluence values in the range from 1 × 10<sup>11</sup> to 1 × 10<sup>12</sup> ions/cm<sup>2</sup>. The as-deposited and irradiated thin films are investigated using X-ray diffraction, dc magnetization and atomic force microscopy techniques. X-ray diffraction analysis of the as-deposited as well as irradiated thin film indicates the single phase cubic structure as the main composition. The crystallite size evaluated from Scherrer's equation is found to be decreased from 26 nm for as-deposited thin films to 17 nm for irradiated at a fluence of 1 × 10<sup>12</sup> ions/cm<sup>2</sup>. The decrease in crystallite size in all the thin film samples after irradiation indicates a distortion in the lattice structure caused by stress-induced defects. The zero-field-cooled (ZFC) and field-cooled (FC) magnetizations have been recorded in a low field of 100 Oe and they show a typical behavior of superparamagnetic particles. This is further supported by the magnetization hysteresis (M-H) curve taken at 300 K, for the as-deposited thin film, which shows zero coercivity and remanence. The blocking temperatures calculated from the maxima of ZFC are found to decrease with the increase in irradiation fluence, which is consistent with XRD results. (C) 2009 Elsevier B.V. All rights reserved

**Surface & Coatings Technology 203[17-18], 2707-2711. 2009.**

### **P129-09 “Electrochemical and surface characterisation of carbon-film-coated piezoelectric quartz crystals”**

Pinto, E. M., Gouveia-Caridade, C., Soares, D. M., and Brett, C. M. A.

The electrochemical properties of carbon films, of thickness between 200 and 500 nm, sputter-coated on gold- and platinum-coated 6 MHz piezoelectric quartz crystal oscillators, as new electrode materials have been investigated. Comparative studies under the same experimental conditions were performed on bulk electrodes. Cyclic voltammetry was carried out in 0.1 M KCl electrolyte solution, and kinetic parameters of the model redox systems Fe(CN)<sub>6</sub><sup>3+/4+</sup> and [Ru(NH<sub>3</sub>)<sub>6</sub>]<sup>3+/2+</sup> as well as the electroactive area of the electrodes were obtained. Atomic force microscopy was used in order to examine the surface morphology of the films, and the properties of the carbon films and the electrode-solution

interface were studied by electrochemical impedance spectroscopy. The results obtained demonstrate the feasibility of the preparation and development of nanometer thick carbon film modified quartz crystals. Such modified crystals should open up new opportunities for the investigation of electrode processes at carbon electrodes and for the application of electrochemical sensing associated with the EQCM. (C) 2009 Elsevier B.V. All rights reserved

**Applied Surface Science 255[18], 8084-8090. 2009.**

**P130-09 “Electron dynamics in films made of transition metal nanograins embedded in SiO<sub>2</sub>: Infrared reflectivity and nanoplasma infrared resonance”**

Massa, N. E., Denardin, J. C., Socolovsky, L. M., Knobel, M., and Zhang, X. X.

We report on near normal infrared reflectivity spectra of similar to 550 nm thick films made of cosputtered transition metal nanograins and SiO<sub>2</sub> in a wide range of metal fractions. Co<sub>0.85</sub>(SiO<sub>2</sub>)<sub>(0.15)</sub>, with conductivity well above the percolation threshold has a frequency and temperature behavior according to what it is found in conducting metal oxides. The electron scattering rate displays a unique relaxation time characteristic of single type of carriers experiencing strong electron-phonon interactions. Using small polaron fits we identify those phonons as glass vibrational modes. Ni<sub>0.61</sub>(SiO<sub>2</sub>)<sub>(0.39)</sub>, with a metal fraction closer to the percolation threshold, undergoes a metal-nonmetal transition at similar to 77 K. Here, as it is suggested by the scattering rate nearly quadratic dependence, we broadly identify two relaxation times (two carrier contributions) associated to a Drude mode and a midinfrared overdamped band, respectively. Disorder induced, the midinfrared contribution drives the phase transition by thermal electron localization. Co<sub>0.51</sub>(SiO<sub>2</sub>)<sub>(0.49)</sub> has the reflectivity of an insulator with a distinctive band at similar to 1450 cm<sup>-1</sup> originating in electron promotion, localization, and defect induced polaron formation. Angle dependent oblique reflectivity of globally insulating Co<sub>0.38</sub>(SiO<sub>2</sub>)<sub>(0.62)</sub>, Fe<sub>0.34</sub>(SiO<sub>2</sub>)<sub>(0.66)</sub>, and Ni<sub>0.28</sub>(SiO<sub>2</sub>)<sub>(0.72)</sub>, reveals a remarkable resonance at that band threshold. We understand this as due to the excitation by normal to the film electric fields of defect localized electrons in the metallic nanoparticles. At higher oblique angles, this localized nanoplasma couples to SiO<sub>2</sub> longitudinal optical Berreman phonons resulting in band peak softening reminiscent to the phonon behavior undergoing strong electron-phonon interactions. Singular to a globally insulating phase, we believe that this resonance might be a useful tool for tracking metal-insulator phase transitions in inhomogeneous materials. (C) 2009 American Institute of Physics. [DOI: 10.1063/1.3126485]

**Journal of Applied Physics 105[11], 114306. 2009.**

**P131-09 “Electronic Griffiths Phase of the d=2 Mott Transition”**

Andrade, E. C., Miranda, E., and Dobrosavljevic, V.

We investigate the effects of disorder within the T=0 Brinkman-Rice scenario for the Mott metal-insulator transition in two dimensions. For sufficiently weak disorder the transition retains the Mott character, as signaled by the vanishing of the local quasiparticle weights Z(i) and strong screening of the renormalized site energies at criticality. In contrast to the behavior in high dimensions, here the local spatial fluctuations of quasiparticle parameters are strongly enhanced in the critical regime, with a distribution function P(Z) similar to Z<sup>(alpha-1)</sup> and alpha -> 0 at the transition. This behavior

indicates a robust emergence of an electronic Griffiths phase preceding the metal-insulator transition, in a fashion surprisingly reminiscent of the “infinite randomness fixed point” scenario for disordered quantum magnets

**Physical Review Letters 102[20], 206403. 2009.**

**P132-09 “Evolution of the microstructure and magnetic properties of Sm(Co<sub>0.6</sub>Cu<sub>0.4</sub>)<sub>5</sub> alloys prepared with different Sm excess content”**

Penton-Madrigal, A., Estevez-Rams, E., Espina-Hernandez, J. H., Lora-Serrano, R., Knobel, M., Sinnecker, E. H. C. P., de Oliveira, L. A. S., Sinnecker, J. P., Grossinger, R., and Turtelli, R. S.

The structure of annealed Sm(Co<sub>0.6</sub>Cu<sub>0.4</sub>)<sub>5</sub> compounds, prepared with different Sm excess content, has been investigated by means of high resolution x-ray diffraction and scanning electron microscopy. The samples were also magnetically characterized by thermomagnetic analysis and M versus H curves at room temperature. Increasing Sm excess improves the compositional order of the 1 : 5 phase. The coercivity (H-C) and the Curie temperature (T-C) are both changed as a function of Sm excess content. The decrease in the structural defects density, resulting from the compositional order, is responsible for the observed magnetic behaviour

**Journal of Physics D-Applied Physics 42[12], 125005. 2009.**

**P133-09 “Field-Trial Evaluation of Cross-Layer Effect Caused by All-Optical Wavelength Converters on IP Network Applications”**

Abbade, M. L. F., Marconi, J. D., Cassiolato, R. L., Ishizuca, V., Fonseca, I. E., and Fragnito, H. L.

Future Internet infrastructure will require the utilization of new all-optical devices able to enhance the use of fiber capacity. Nevertheless, before deploying such devices, it is necessary to test them under conditions similar to the ones of commercial networks and to evaluate their impact on real-world applications. In this work we investigate the performance of a tunable fiber four-wave mixing all-optical wavelength converter (AOWC) on a video-streaming carried through a field-trial network. This analysis is performed by measuring the packet-error rate (PER) degradation caused by the AOWC for different wavelength separations between the input and output optical carriers. To the best of our knowledge, this is the first time that such a cross-layer effect is systematically evaluated for an AOWC. A dynamic polarization controller was successfully used to prevent the FWM efficiency variations that were caused by the changes in the state-of-polarization of the video signal. Our results show that the AOWC introduced a maximum power penalty of 2.5 dB for wavelength separations of up to 12 nm. We also find that such a penalty is related to the optical signal-to-noise ratio degradation induced by the converter

**Journal of Lightwave Technology 27[12], 1816-1826. 2009.**

**P134-09 “Graphene in the Quantum Hall Regime: Effects of Vacancies, Sublattice Polarization and Disorder”**

Pereira, A. L. C. and Schulz, P. A.

We investigate the effects of vacancies, disorder and sublattice polarization on the electronic properties of a monolayer graphene in the quantum Hall regime. Energy spectra as a function of magnetic field and the localization properties of the states within the graphene Landau levels (LLs) are calculated



through a tight-binding model. We first discuss our results considering vacancies in the lattice, where we show that vacancies introduce extra levels (or well-defined bands) between consecutive LLs. An striking consequence here is that extra Hall resistance plateaus are expected to emerge when an organized vacancy superlattice is considered. Secondly, we discuss the anomalous localization properties we have found for the lowest LL, where an increasing disorder is shown to enhance the wave functions delocalization (instead of inducing localization). This unexpected effect is shown to be directly related to the way disorder increasingly destroys the sublattice (valley) polarization of the states in the lowest LL. The reason why this anomalous disorder effect occurs only for the zero-energy LL is that, in absence of disorder, only for this level all the states are sublattice polarized, i.e., their wave functions have amplitudes in only one of the sublattices

**International Journal of Modern Physics B 23[12-13], 2618-2627. 2009.**

**P135-09 “Hydrostatic pressure effects on electron states in GaAs-(Ga,Al)As double quantum rings”**

Culchac, F. J., Porrás-Montenegro, N., and Latge, A.

Here we address a theoretical analysis of the effects of applied hydrostatic pressure on electron states in concentric GaAs-(Ga,Al)As double quantum rings, under axial magnetic fields. Emphasis is put on the dependence of such effects on the system geometry confinement described within a hard potential model and following an effective-mass approximation. The energy of the ground and excited electronic states were found to decrease with the applied hydrostatic pressure, due mainly to an effective reduction in the barrier potential confinement. Also, while the increase in the magnetic field opens the electron states degeneracy with different angular momenta, the increase in the applied hydrostatic pressure does not alter significantly the energy of these states. For both symmetric and asymmetric double quantum rings, one found that the electron-heavy hole transition energies augment with the applied hydrostatic pressure, mainly due to the increase in the GaAs gap. (C) 2009 American Institute of Physics. [DOI: 10.1063/1.3124643]

**Journal of Applied Physics 105[9], 094324. 2009.**

**P136-09 “III-V semiconductor nanowire growth: does arsenic diffuse through the metal nanoparticle catalyst?”**

Tizei, L. H. G., Chiaramonte, T., Ugarte, D., and Cotta, M. A.

The synthesis of III-V semiconductor nanowires (NWs) is based on the delivery of atoms from a vapor phase to a catalytic metal nanoparticle (NP). Although there has been extensive work on such systems, the incorporation pathways of group V atoms remain an open issue. Here, we have performed a detailed structural and chemical analysis of the catalyst NP in NWs where we switch the V atomic element during growth (heterostructured InP/InAs/InP NWs). Our experimental results indicate a group V pathway where these atoms actually diffuse through the catalytic NP by formation of a stable phase containing As under growth conditions. We have observed distinct NW growth behavior within a narrow temperature range (30 degrees C) suggesting a transition between vapor-liquid-solid and vapor- solid-solid growth modes

**Nanotechnology 20[27], 275604. 2009.**

**P137-09 “Influence of modal loss on quantum state generation via cross-Kerr nonlinearity”**

Mogilevtsev, D., Tyc, T., and Korolkova, N.

In this paper we investigate the influence of decoherence effects on quantum states generated as a result of the cross-Kerr nonlinear interaction between two modes. For Markovian losses (both photon loss and dephasing), a region of parameters when losses still do not lead to destruction of nonclassicality is identified. We emphasize the difference in impact of losses in the process of state generation as opposed to those occurring in propagation channel. We show, moreover, that correlated losses in modern realizations of schemes of large cross-Kerr nonlinearity might lead to enhancement of nonclassicality

**Physical Review A 79[5], 053832. 2009.**

**P138-09 “Kerr nonlinearities and nonclassical states with superconducting qubits and nanomechanical resonators”**

Semiao, F. L., Furuya, K., and Milburn, G. J.

We propose the use of a superconducting charge qubit capacitively coupled to two resonant nanomechanical resonators to generate Yurke-Stoler states, i.e., quantum superpositions of pairs of distinguishable coherent states 180 degrees out of phase with each other. This is achieved by effectively implementing Kerr nonlinearities induced through the application of a strong external driving field in one of the resonators. A simple study of the effect of dissipation on our scheme is also presented and lower bounds of fidelity and purity of the generated state are calculated. Our procedure to implement a Kerr nonlinearity in this system may be used for high-precision measurements in nanomechanical resonators

**Physical Review A 79[6], 063811. 2009.**

**P139-09 “Limit on the diffuse flux of ultrahigh energy tau neutrinos with the surface detector of the Pierre Auger Observatory”**

Abraham, J., Abreu, P., Aglietta, M., Aguirre, C., Ahn, E. J., Allard, D., Allekotte, I., Allen, J., Allison, P., varez-Muniz, J., Ambrosio, M., Anchordoqui, L., Andringa, S., Anzalone, A., et al

Data collected at the Pierre Auger Observatory are used to establish an upper limit on the diffuse flux of tau neutrinos in the cosmic radiation. Earth-skimming  $\nu(\tau)$  may interact in the Earth's crust and produce a tau lepton by means of charged-current interactions. The tau lepton may emerge from the Earth and decay in the atmosphere to produce a nearly horizontal shower with a typical signature, a persistent electromagnetic component even at very large atmospheric depths. The search procedure to select events induced by tau decays against the background of normal showers induced by cosmic rays is described. The method used to compute the exposure for a detector continuously growing with time is detailed. Systematic uncertainties in the exposure from the detector, the analysis, and the involved physics are discussed. No tau neutrino candidates have been found. For neutrinos in the energy range  $2 \times 10^{17} \text{ eV} < E_{\nu} < 2 \times 10^{19} \text{ eV}$ , assuming a diffuse spectrum of the form  $E_{\nu}^{-2}$ , data collected between 1 January 2004 and 30 April 2008 yield a 90% confidence-level upper limit of  $E(\nu) dN(\nu \tau) / dE(\nu) < 9 \times 10^{-8} \text{ GeV cm}^{-2} \text{ s}^{-1} \text{ sr}^{-1}$

**Physical Review D 79[10], 102001. 2009.**

**P140-09 “Magnetic coupling between Gd and Pr ions and magnetocaloric effect in Gd<sub>0.5</sub>Pr<sub>0.5</sub>Al<sub>2</sub> compound”**

Carvalho, A. M. G., Garcia, F., de Sousa, V. S. R., von Ranke, P. J., Rocco, D. L., Loula, G. D., de Carvalho, E. J., Coelho, A. A., da Silva, L. M., and Gandra, F. C. G.

In this work, we report the theoretical and experimental investigations on the magnetic and magnetocaloric properties for Gd<sub>0.5</sub>Pr<sub>0.5</sub>Al<sub>2</sub> compound in different magnetic fields. The magnetization features Gd<sub>0.5</sub>Pr<sub>0.5</sub>Al<sub>2</sub> is ferrimagnetic at low temperatures. We also present data from X-ray magnetic circular dichroism (XMCD) experiments for this compound, with which we have confirmed that the magnetic moments of the Pr ions are antiparallel to the magnetic moments of the Gd ions. The magnetocaloric parameters,  $\Delta T-S$  and  $\Delta S-T$ , were obtained from calorimetric data and both curves present normal and inverse magnetocaloric effect. A theoretical model for ferrimagnetic coupling, including the crystalline electrical field anisotropy, was used to describe the  $\Delta T-S$  and  $\Delta S-T$  experimental results. (C) 2009 Elsevier B.V. All rights reserved

**Journal of Magnetism and Magnetic Materials 321[19], 3014-3018. 2009.**

**P141-09 “Magnetic Resonant X-Ray Diffraction Applied to the Study of Eute Films and Multilayers”**

Diaz, B., Abramof, E., Rappl, P. H. O., Granado, E., Chitta, V. A., Henriques, A. B., and Oliveira, N. F.

In this work we use magnetic resonant x-ray diffraction to study the magnetic properties of a 1.5  $\mu\text{m}$  EuTe film and an EuTe/PbTe superlattice (SL). The samples were grown by molecular beam epitaxy on (111) oriented BaF<sub>2</sub> substrates. The measurements were made at the Eu L-2 absorption edge, taking profit of the resonant enhancement of more than two orders in the magnetically diffracted intensity. At resonance, high counting rates above 11000 cps were obtained for the 1.5  $\mu\text{m}$  EuTe film, allowing to check for the type II antiferromagnetic order of EuTe. An equal population of the three possible in-plane magnetic domains was found. The EuTe/PbTe SL magnetic peak showed a satellite structure, indicating the presence of magnetic correlations among the 5 ML (monolayers) EuTe layers across the 15 ML PbTe non-magnetic spacers. The temperature dependence of the integrated intensities of the film and the SL yielded different Neel temperatures  $T_N$ . The lower  $T_N$  for the SL is explained considering the higher influence of the surface atoms, with partial bonds lost

**International Journal of Modern Physics B 23[12-13], 2979-2983. 2009.**

**P142-09 “Magnetization measurement of a possible high-temperature superconducting state in amorphous carbon doped with sulfur”**

Felner, I. and Kopelevich, Y.

Magnetization  $M(T,H)$  measurements performed on thoroughly characterized commercial amorphous carbon powder doped with sulfur (AC-S), revealed the occurrence of an inhomogeneous superconductivity (SC) below  $T_c = 38$  K. The constructed magnetic field-temperature (H-T) phase diagram resembles that of type-II superconductors. However, AC-S demonstrates a number of anomalies, such as: (1) a nonmonotonic behavior of the lower critical-field  $H_{c1}(T)$ ; (2) a pronounced positive curvature of the apparent upper critical-field boundary  $H_{c2}(T)$ ; and (3) a spontaneous ferromagneticlike magnetization  $M_0$  coexisting with SC. Based on the analysis of experimental results we propose a nonstandard SC state in AC-S

**Physical Review B 79[23], 233409. 2009.**

**P143-09 “Measurement of  $D^*$  mesons in jets from p plus p collisions at root s=200 GeV”**

Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Balewski, J., Barannikova, O., et al

We report the measurement of charged  $D^*$  mesons in inclusive jets produced in proton-proton collisions at a center-of-mass energy  $\sqrt{s} = 200$  GeV with the STAR experiment at the Relativistic Heavy Ion Collider. For  $D^*$  mesons with fractional momenta  $0.2 < z < 0.5$  in inclusive jets with 11.5 GeV mean transverse energy, the production rate is found to be  $N(D^*(+) + D^*(-))/N(\text{jet}) = 0.015 \pm 0.008(\text{stat}) \pm 0.007(\text{sys})$ . This rate is consistent with perturbative QCD evaluation of gluon splitting into a pair of charm quarks and subsequent hadronization

**Physical Review D 79[11], 112006. 2009.**

**P144-09 “Measurements of phi meson production in relativistic heavy-ion collisions at the BNL Relativistic Heavy Ion Collider (RHIC)”**

Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Bai, Y., Balewski, J., et al

We present results for the measurement of phi meson production via its charged kaon decay channel  $\phi \rightarrow K^+ K^-$  Au + Au collisions at  $\sqrt{s_{NN}} = 62.4, 130, \text{ and } 200$  GeV, and in p + p and d + Au collisions at  $\sqrt{s_{NN}} = 200$  GeV from the STAR experiment at the BNL Relativistic Heavy Ion Collider (RHIC). The midrapidity ( $|\eta| < 0.5$ ) phi meson transverse momentum ( $p(T)$ ) spectra in central Au + Au collisions are found to be well described by a single exponential distribution. On the other hand, the  $p(T)$  spectra from p + p, d + Au, and peripheral Au + Au collisions show power-law tails at intermediate and high  $p(T)$  and are described better by Levy distributions. The constant  $\phi/K^-$  yield ratio vs beam species, collision centrality, and colliding energy is in contradiction with expectations from models having kaon coalescence as the dominant mechanism for phi production at RHIC. The  $\Omega/\phi$  yield ratio as a function of  $p(T)$  is consistent with a model based on the recombination of thermal s quarks up to  $p(T)$  similar to 4 GeV/c, but disagrees at higher transverse momenta. The measured nuclear modification factor,  $R_{dAu}$ , for the phi meson increases above unity at intermediate  $p(T)$ , similar to that for pions and protons, while  $R_{AA}$  is suppressed due to the energy loss effect in central Au + Au collisions. Number of constituent quark scaling of both  $R_{cp}$  and  $\nu(2)$  for the phi meson with respect to other hadrons in Au + Au collisions at  $\sqrt{s_{NN}} = 200$  GeV at intermediate  $p(T)$  is observed. These observations support quark coalescence as being the dominant mechanism of hadronization in the intermediate  $p(T)$  region at RHIC

**Physical Review C 79[6], 064903. 2009.**

**P145-09 “Microstructure and magneto-dielectric properties of ferrimagnetic composite GdIG(X):YIG(1-X) at radio and microwave frequencies”**

Fechine, P. B. A., Pereira, F. M. M., Santos, M. R. P., Filho, F. P., de Menezes, A. S., de Oliveira, R. S., Goes, J. C., Cardoso, L. P., and Sombra, A. S. B.

The gadolinium iron garnet (GdIG, Gd<sub>3</sub>Fe<sub>5</sub>O<sub>12</sub>) and yttrium iron garnet (YIG, Y<sub>3</sub>Fe<sub>5</sub>O<sub>12</sub>), and their GdIG(X):YIG(1-X) composites, were obtained by a new solid-state procedure. The microstructure of the samples was studied by X-ray powder diffraction and Rietveld refinement, Vickers microhardness and scanning electron microscopy. The density and microhardness behavior were studied as a function of the lattice parameters for the composite samples. In the present work, the magnetic and dielectric properties of the GdIG(X):YIG(1-X) composite at radio and microwave frequencies were also studied. The magnetic permeability and dielectric permittivity and loss properties for the composite GdIG(X):YIG(1-X) showed good potential for use in components, when one is looking for moderate  $\epsilon''$  and  $\mu''$  materials with low loss in the radio-frequency and microwave range. (C) 2009 Elsevier Ltd. All rights reserved

**Journal of Physics and Chemistry of Solids 70[5], 804-810. 2009.**

**P146-09 “Microstructure of tool steel after low temperature ion nitriding”**

Zagonel, L. F., Mittemeijer, E. J., and Alvarez, F.

The microstructural development in H13 tool steel upon nitriding by an ion beam process was investigated. The nitriding experiments were performed at a relatively low temperature of similar to 400 degrees C and at constant ion beam energy (400 eV) of different doses in a high vacuum preparation chamber; the ion source was fed with high purity nitrogen gas. The specimens were characterised by X-ray photoelectron spectroscopy, electron probe microanalysis, scanning and transmission electron microscopy, and grazing incidence and Bragg-Brentano X-ray diffractometry. In particular, the influence of the nitrogen surface concentration on the development of the nitrogen concentration depth profile and the possible precipitation of alloying element nitrides were discussed

**Materials Science and Technology 25[6], 726-732. 2009.**

**P147-09 “New Insights on the Growth of Anisotropic Nanoparticles from Total Energy Calculations”**

Rocha, T. C. R., Sato, F., Dantas, S. O., Galvao, D. S., and Zanchet, D.

The growth mechanism of anisotropic metallic nanoparticles is still an open and polemical question. The common observation of the existence of nonspherical (not the most stable) shapes in varied experimental conditions is not fully understood. In this work, based on results from total energy calculations for different shapes and sizes of Ag nanoparticles, we provide new insights of why anisotropic structures are commonly found in different preparation conditions. We show that, assuming the presence of a particle shape distribution in the beginning of the growth process, anisotropic nanoparticles can preferentially grow over spherical ones due to the fact that the energy required to build larger anisotropic structures could be less than the one required to build isotropic structures. These results suggest that many previous works in literature shall be revisited accordingly to these new finds

**Journal of Physical Chemistry C 113[28], 11976-11979. 2009.**

**P148-09 “On the catalytic hydrogenation of polycyclic aromatic hydrocarbons into less toxic compounds by a facile recoverable catalyst”**

Jacinto, M. J., Santos, O. H. C. F., Landers, R., Kiyohara, P. K., and Rossi, L. M.

Here we present the catalytic hydrogenation of polycyclic aromatic hydrocarbons (PAHs) to less toxic mixtures of saturated and partial unsaturated polycyclic hydrocarbons under mild reaction conditions using a magnetically recoverable rhodium catalyst and molecular hydrogen as the exclusive H source. The catalyst is easily recovered after each reaction by placing a permanent magnet on the reactor wall and it can be reused in successive runs without any significant loss of catalytic activity. As an example, anthracene was totally converted into the saturated polycyclic hydrocarbon form (ca. 60%) and the partially hydrogenated form, 1,2,3,4,5,6,7,8-octahydroanthracene (ca. 40%). The catalyst operates in a broad range of temperature and H<sub>2</sub> pressure in both organic and aqueous/organic solutions of anthracene and it also exhibits significant activity at low substrate concentrations (20 ppm). This can be an efficient recycling process for hydrogenation of PAHs present in contaminated fluid waste streams. (C) 2009 Elsevier B.V. All rights reserved

**Applied Catalysis B-Environmental 90[3-4], 688-692. 2009.**

**P149-09 “Oscillations of very low energy atmospheric neutrinos”**

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

There are several new features in the production, oscillations, and detection of the atmospheric neutrinos of low energies  $E$  less than or similar to 100 MeV. The flavor ratio  $r$  of muon to electron neutrino fluxes is substantially smaller than 2 and decreases with energy, a significant part of events is due to the decay of invisible muons at rest, etc. Oscillations in a two-layer medium (atmosphere-Earth) should be taken into account. We derive analytical and semianalytical expressions for the oscillation probabilities of these “sub-sub-GeV” neutrinos. The energy spectra of the e-like events in water Cherenkov detectors are computed, and the dependence of the spectra on the 2-3 mixing angle  $\theta_{23}$ , the 1-3 mixing, and the CP-violation phase are studied. We find that variations of  $\theta_{23}$  in the presently allowed region change the number of e-like events by about 15%-20% as well as lead to distortion of the energy spectrum. The 1-3 mixing and CP violation can lead to similar to 10% effects. Detailed study of the sub-sub-GeV neutrinos will be possible in future megaton-scale detectors

**Physical Review D 79[11], 113002. 2009.**

**P150-09 “Performance Analysis of A Radio Over Fiber System Based on IEEE 802.15.4 Standard in A Real Optical Network”**

Sodre, A. C., Silva, D. C. V. E., Fortes, M. A. Q. R., da Silva, L. F., Branquinho, O. C., and Abbade, M. L. F.

We report on an implementation of a Radio over Fiber system based on IEEE 802.15.4 standard in a geographically distributed optical network. The system performance was analyzed under real conditions of temperature, pressure, humidity, and wind. Experimental results show no signal degradation and indicate frame error rates two orders of magnitude below the typical levels of wireless sensor networks. for distances tip to 160 kin. (C) 2009 Wiley Periodicals, Inc. Microwave Opt Technol Lett 51: 1876-1879, 2009; Published online in Wiley InterScience (www.interscience.wiley.com). DOI 10.1002/mop.24497

**Microwave and Optical Technology Letters 51[8], 1876-1879. 2009.**



**P151-09 "Preparation of recoverable Ru catalysts for liquid-phase oxidation and hydrogenation reactions"**

Jacinto, M. J., Santos, O. H. C. F., Jardim, R. F., Landers, R., and Rossi, L. M.

We here report the synthesis, characterization and catalytic performance of new supported Ru(III) and Ru(0) catalysts. In contrast to most supported catalysts, these new developed catalysts for oxidation and hydrogenation reactions were prepared using nearly the same synthetic strategy, and are easily recovered by magnetic separation from liquid phase reactions. The catalysts were found to be active in both forms, Ru(III) and Ru(0), for selective oxidation of alcohols and hydrogenation of olefins, respectively. The catalysts operate under mild conditions to activate molecular oxygen or molecular hydrogen to perform clean conversion of selected substrates. Aryl and alkyl alcohols were converted to aldehydes under mild conditions, with negligible metal leaching. If the metal is properly reduced, Ru(0) nanoparticles immobilized on the magnetic support surface are obtained, and the catalyst becomes active for hydrogenation reactions. (c) 2009 Elsevier B.V. All rights reserved

**Applied Catalysis A-General 360[2], 177-182. 2009.**

**P152-09 "Pressure Sensing Based on Nonconventional Air-Guiding Transmission Windows in Hollow-Core Photonic Crystal Fibers"**

de Oliveira, R. E. P., de Matos, C. J. S., Hayashi, J. G., and Cordeiro, C. M. B.

Non-conventional core-guided transmission windows within the visible spectral range are identified in commercial hollow-core photonic crystal fibers designed to operate at 1550 nm. These windows are likely to be related to higher-order cladding photonic bandgaps and are found to be highly dependent on the cladding microstructure, thus being affected by pressure-induced stress/deformation. 20-cm-long fiber samples are then used to demonstrate simple and temperature-independent hydrostatic pressure sensing with two different setups. While in the first setup pressure is externally applied to the fiber and results in operation in the hundreds of kgf/cm<sup>2</sup> (or tens of MPa) range, the second setup applies pressure directly to fiber internal microstructure and is sensitive to pressures down to a fraction of kgf/cm<sup>2</sup> (hundredths of MPa). The fact that pressure is directly transduced into transmitted power greatly simplifies the required sensor interrogation setup

**Journal of Lightwave Technology 27[11], 1605-1609. 2009.**

**P153-09 "Quasienergy spectra of graphene dots in intense ac fields: Field anisotropy and photon-dressed quantum rings"**

Rivera, P. H., Pereira, A. L. C., and Schulz, P. A.

A graphene quantum dot under intense ac field and static low magnetic field is investigated. From a tight-binding perspective, applying a Fourier-Floquet transformation and renormalization process, we observe that graphene-intrinsically anisotropic-reveals field polarization signatures in the quasidensity of states. For the ac field polarized along the armchair direction, the dressed electronic structure shows an emergent property: an ac-field-induced quantum ring. This is inferred by the orientation-dependent formation of a miniband of energy states periodically modulated with increasing magnetic field, exactly analogous to the behavior of a quantum-ring spectrum

**Physical Review B 79[20], 205406. 2009.**

**P154-09 "Refractive index effect in the lattice geometry of photonic crystals generated by multi-exposure interference patterns"**

Menezes, J. W., de Carvalho, E. J., Braga, E. S., and Cescato, L.

Different types of 2D and 3D photonic crystal lattices may be recorded using the multi-exposure of dual beam interference patterns by varying the number of exposures and the rotation angles of the sample between the exposures. The lattice geometry of the photonic crystal is a crucial parameter for the appearance of photonic band gaps. In this paper we show both theoretically and experimentally that for certain types of structure the lattice geometry of the superimposed interference pattern, inside the photosensitive material, changes drastically due to light refraction

**Journal of Optics A-Pure and Applied Optics 11[7], 075103. 2009.**

**P155-09 "Sensitivity on earth core and mantle densities using atmospheric neutrinos"**

Borriello, E., Mangano, G., Marotta, A., Miele, G., Migliozi, P., Moura, C. A., Pastor, S., Pisanti, O., and Strolin, P.

Neutrino radiography may provide an alternative tool to study the very deep structures of the Earth. Though these measurements are unable to resolve the fine density layer features, nevertheless the information which can be obtained are independent and complementary to the more conventional seismic studies. The aim of this paper is to assess how well the core and mantle averaged densities can be reconstructed through atmospheric neutrino radiography. We find that about a 2% sensitivity for the mantle and 5% for the core could be achieved for a ten year data taking at an underwater km<sup>3</sup> Neutrino Telescope. This result does not take into account systematics related to the details of the experimental apparatus

**Journal of Cosmology and Astroparticle Physics [6], 030. 2009.**

**P156-09 "Shell explosion and core expansion of xenon clusters irradiated with intense femtosecond soft x-ray pulses"**

Thomas, H., Bostedt, C., Hoener, M., Eremina, E., Wabnitz, H., Laarmann, T., Plonjes, E., Treusch, R., de Castro, A. R. B., and Moller, T.

The disintegration mechanisms for xenon clusters in intense femtosecond soft x-ray pulses from the FLASH free electron laser are investigated. The clusters are irradiated at a wavelength of  $\lambda = 13.7$  nm ( $h\nu = 90.5$  eV) and power densities of  $5 \times 10^{14}$  W cm<sup>-2</sup>. During the 10 fs pulse the Xe clusters are transformed into a highly excited, multiply charged nanoplasma. Simulating the ion kinetic energies in an electrostatic model suggests that highly charged ions explode off the surface due to Coulomb repulsion while the inner core expands in a hydrodynamic expansion. The current results yield evidence for efficient ionization of the clusters in addition to direct multistep photoemission

**Journal of Physics B-Atomic Molecular and Optical Physics 42[13], 134018. 2009.**

**P157-09 “Signatures of Inhomogeneous Electronic State in Quantum Limit in Graphite”**

Kopelevich, Y. and Da Silva, R. R.

In-plane magnetoresistance (MR) measurements performed on highly oriented pyrolytic graphite (HOPG) in Corbino-disk geometry revealed signatures of the electronic inhomogeneous state. In particular, the obtained results showed that besides of the Shubnikov-de-Haas (SdH) effect, the magnetic field  $B > 4$  T triggers MR oscillations of a different origin that are spatially asymmetric. The possible coexistence of different electronic states in quantized magnetic field is discussed

*International Journal of Modern Physics B* 23[12-13], 2723-2726. 2009.

**P158-09 “Structural and magnetic properties of chemically synthesized Fe doped ZnO”**

Kumar, S., Kim, Y. J., Koo, B. H., Sharma, S. K., Vargas, J. M., Knobel, M., Gautam, S., Chae, K. H., Kim, D. K., Kim, Y. K., and Lee, C. G.

We report on the synthesis of Fe-doped ZnO with nominal composition of Zn<sub>0.99</sub>Fe<sub>0.01</sub>O by using a coprecipitation method. X-ray diffraction and selective area electron diffraction studies reveal a single phase wurtzite crystal structure without any secondary phase. Field emission transmission electron microscopy measurements infer that Zn<sub>0.99</sub>Fe<sub>0.01</sub>O have nanorod-type microstructures. Magnetic hysteresis measurement performed at different temperatures show that Zn<sub>0.99</sub>Fe<sub>0.01</sub>O exhibits a weak ferromagnetic behavior at room temperature. A detailed investigation of the electronic and local structure using O K-, Fe L-3, L-2 near edge x-ray absorption fine structure suggests that Fe is substituting Zn in ZnO matrix and is in Fe<sup>3+</sup> state. (C) 2009 American Institute of Physics. [DOI: 10.1063/1.3073933]

*Journal of Applied Physics* 105[7], 07C520. 2009.

**P159-09 “Structural and magnetic properties of bulk and thin films of Mg<sub>0.95</sub>Mn<sub>0.05</sub>Fe<sub>2</sub>O<sub>4</sub>”**

Kumar, S., Sharma, S. K., Alimuddin, Knobel, M., Choudhary, R. J., Lee, C. G., Koo, B. H., and Kumar, R.

We present here a comparative study on Structural and magnetic properties of bulk and thin films of Mg<sub>0.95</sub>Mn<sub>0.05</sub>Fe<sub>2</sub>O<sub>4</sub> ferrite deposited on two different substrates using X-ray diffraction (XRD) and dc magnetization measurements. XRD pattern indicates that the bulk sample and their thin films exhibit a polycrystalline single phase Cubic spinel structure. It is found that the film deposited on indium till oxide coated glass (ITO) substrate has smaller grain size than the film deposited on platinum coated silicon (Pt-Si) Substrate. Study of magnetization hysteresis loop measurements infer that the bulk sample of Mg<sub>0.95</sub>Mn<sub>0.05</sub>Fe<sub>2</sub>O<sub>4</sub> and its thin film deposited on Pt-Si substrate shows a well-defined hysteresis loop at room temperature, which reflects its ferrimagnetic behavior. However, the film deposited on ITO does not show any hysteresis, which reflects its superparamagnetic behavior at room temperature. (C) 2008 Elsevier B.V. All rights reserved

*Current Applied Physics* 9[5], 1009-1013. 2009.

**P160-09 “Studying taxis in real time using optical tweezers: Applications for Leishmania amazonensis parasites”**

Pozzo, L. Y., Fontes, A., de Thomaz, A. A., Santos, B. S., Farias, P. M. A., Ayres, D. C., Giorgio, S., and Cesar, C. L.

Beads trapped by an optical tweezers can be used as a force transducer for measuring forces of the same order of magnitude as typical forces induced by flagellar motion. We used an optical tweezers to study chemotaxis by observing the force response of a flagellated microorganism when placed in a gradient of attractive chemical substances. This report shows such observations for *Leishmania amazonensis*, responsible for leishmaniasis, a serious disease. We quantified the movement of this protozoan for different gradients of glucose. We were able to observe both the strength and the directionality of the force. The characterization of the chemotaxis of these parasites can help to understand the mechanics of infection and improve the treatments employed for this disease. This methodology can be used to quantitatively study the taxis of any kind of flagellated microorganisms under concentration gradients of different chemical substances, or even other types of variable gradients such as temperature and pressure. (C) 2009 Elsevier Ltd. All rights reserved

*Micron* 40[5-6], 617-620. 2009.

**P161-09 “Synthesis of Carbon Nanotubes and Nanofibers by Thermal CVD on SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> Support Layers”**

Aguiar, M. R., Verissimo, C., Ramos, A. C. S., Moshkalev, S. A., and Swart, J. W.

In this work, catalytic thermal chemical vapor deposition method, using a mixture of methane and hydrogen at atmospheric pressure in a horizontal tubular quartz furnace, was used to grow carbon nanostructured materials. Silicon wafers with SiO<sub>2</sub> or Al<sub>2</sub>O<sub>3</sub> layers were used as support for thin nickel film deposition used as catalyst. It has been shown that the interaction between catalysts and substrates is of critical importance for carbon nanotube growth. However, this mechanism is not completely understood. Here, the interaction between catalyst nickel film and two different oxide layers supported on silicon wafers was studied as well as the influence of both support systems (SiO<sub>2</sub>/Si and Al<sub>2</sub>O<sub>3</sub>/Si) on the carbon nanostructures growth at different temperatures and process running times. The substrates were characterized by atomic force microscopy and the carbon nanostructured materials were studied by Raman spectroscopy, high resolution scanning and transmission electron microscopy. At higher temperatures it was observed a high density of carbon nanotubes grown over Al<sub>2</sub>O<sub>3</sub> support layer when compared to SiO<sub>2</sub> Support layer showing a different behavior for Ni catalyst on each of the substrates. A quite different Ni catalyst behavior was observed at lower temperatures due to the formation of carbon nanofibers instead of carbon nanotubes on both substrates

*Journal of Nanoscience and Nanotechnology* 9[7], 4143-4150. 2009.

**P162-09 “The hologram and its utilization as a physics teaching tool for physics teaching in engineering courses”**

Toledo, R. S., Cruz, G. V., Zaldo, A. F., Lunazzi, J. J., and Magalhaes, D. S. F.

With the emergence and development of the white-light holograms, new possibilities were created for its utilization as a teaching tool due to the characteristic of producing a three-dimensional image which constitutes an optical duplicate of the object. In this work the distinctive aspects of the hologram are described and its utilization is analyzed in engineering courses, through the design and construction of a Didactic Exhibition of Holography

*Revista Brasileira de Ensino de Física* 31[1], 1401. 2009.



**P163-09 “The shape of the competition and carrying capacity kernels affects the likelihood of disruptive selection”**

Baptestini, E. M., de Aguiar, M. A. M., Bolnick, D. I., and Araujo, M. S.

Many quantitative genetic and adaptive dynamic models suggest that disruptive selection can maintain genetic polymorphism and be the driving force causing evolutionary divergence. These models also suggest that disruptive selection arises from frequency-dependent intraspecific competition. For convenience or historical precedence, these models assume that carrying capacity and competition functions follow a Gaussian distribution. Here, we propose a new analytical framework that relaxes the assumption of Gaussian competition and carrying capacity functions, and investigate how alternative shapes affect the likelihood of disruptive selection. We found that the shape of both carrying capacity and competition kernels interact to determine the likelihood of disruptive selection. For certain regions of the parametric space disruptive selection is facilitated, whereas for others it becomes more difficult. Our results suggest that the relationship between the degree of frequency dependence and the likelihood of disruptive selection is more complex than previously thought, depending on how resources are distributed and competition interference takes place. It is now important to describe the empirical patterns of resource distribution and competition in nature as a way to determine the likelihood of disruptive selection in natural populations. (C) 2009 Elsevier Ltd. All rights reserved

*Journal of Theoretical Biology* 259[1], 5-11. 2009.

**P164-09 “Theoretical evidence for a first-order liquid-liquid phase transition in gallium”**

Jara, D. A. C., Michelon, M. F., Antonelli, A., and de Koning, M.

We report on theoretical results that lend support to recent experimental observations suggesting the existence of a first-order liquid-liquid phase transformation (LLPT) in gallium. Using molecular dynamics simulation based on a modified embedded-atom model, we observe a transition from a high-density to a low-density liquid in the supercooled regime. The first-order character of the transition is established through the detection of the release of latent heat and our findings suggest that the LLPT terminates in a critical point that is located in the tensile-strained domain of the metastable phase diagram. (C) 2009 American Institute of Physics. [DOI: 10.1063/1.3154424]

*Journal of Chemical Physics* 130[22], 221101. 2009.

**P165-09 “Thin film growth of multiferroic BiMn2O5 using pulsed laser ablation and its characterization”**

Shukla, D. K., Kumar, R., Sharma, S. K., Thakur, P., Choudhary, R. J., Mollah, S., Brookes, N. B., Knobel, M., Chae, K. H., and Choi, W. K.

Single phase polycrystalline thin films of multiferroic BiMn2O5 have been prepared on an LaAlO3 (LAO) substrate using the pulsed laser deposition technique. X-ray diffraction and Raman scattering data show that the films are highly strained and have a single phase orthorhombic structure. Near edge x-ray absorption fine structure data of the O K-edge and the Mn L-3,L-2-edge show no change in the electronic structure and the valence state of the BiMn2O5 thin films from that of the bulk. However, magnetic measurements performed over a wide range of temperature (2-300 K) and field (0-2 T) demonstrate

a spectacular change in the magnetic behaviour of the BiMn2O5 thin films compared with the bulk. The zero field cooled magnetization confirms the antiferromagnetic transition, similar to the bulk sample, whereas field cooled magnetization data, surprisingly, show spin glass (SG) behaviour. The antiferromagnetic ordering at low temperature (5 K) is confirmed from M-H hysteresis measurements. Atomic force microscopy (AFM) measurement used to study the surface morphology shows unevenly spaced patterns of size similar to 1-2  $\mu\text{m}$ , separated by ridges of peak-to-valley height similar to 40 nm. The observed magnetic behaviour is explained in the context of the highly strained structure of the films as observed by XRD, Raman scattering and AFM data

*Journal of Physics D-Applied Physics* 42[12], 125304. 2009.

**P166-09 “Unparticle physics and neutrino phenomenology”**

Barranco, J., Bolanos, A., Miranda, O. G., Moura, C. A., and Rashba, T. I.

We have constrained unparticle interactions with neutrinos and electrons using available data on neutrino-electron elastic scattering and the four CERN LEP experiments data on mono photon production. We have found that, for neutrino-electron elastic scattering, the MUNU experiment gives better constraints than previous reported limits in the region  $d > 1.5$ . The results are compared with the current astrophysical limits, pointing out the cases where these limits may or may not apply. We also discuss the sensitivity of future experiments to unparticle physics. In particular, we show that the measurement of coherent reactor neutrino scattering off nuclei could provide a good sensitivity to the couplings of unparticle interaction with neutrinos and quarks. We also discuss the case of future neutrino-electron experiments as well as the International Linear Collider

*Physical Review D* 79[7], 073011. 2009.

**P167-09 “VUV Spectral Line Emission Measurements in the TCABR Tokamak”**

Machida, M., Daltrini, A. M., Severo, J. H. F., Nascimento, I. C., Sanada, E. K., Elizondo, J. I., and Kuznetsov, Y. K.

The study of tokamak plasma light emissions in the vacuum ultraviolet (VUV) region is an important subject since many impurity spectral emissions are present in this region. These spectral emissions can be used to determine the plasma ion temperature and density from different species and spatial positions inside plasma according to their temperatures. We have analyzed VUV spectra from 500 angstrom to 3200 angstrom wavelength in the TCABR tokamak plasma including higher diffraction order emissions. There have been identified 37 first diffraction order emissions, resulting in 28 second diffraction order, 24 third diffraction order, and 7 fourth diffraction order lines. The emissions are from impurity species such as OII, OIII, OIV, OV, OVI, OVII, CII, CIII, CIV, NIII, NIV, and NV. All the spectra beyond 1900 angstrom are from higher diffraction order emissions, and possess much better spectral resolution. Each strong and isolated spectral line, as well as its higher diffraction order emissions suitable for plasma diagnostic is identified and discussed. Finally, an example of ion temperature determination using different diffraction order is presented

*Brazilian Journal of Physics* 39[2], 270-274. 2009.

**P168-09 “Weighted oscillator strengths and lifetimes for the S XIV spectrum”**

Luna, F. R. T., Mania, A. J., and Hernandes, J. A.

The weighted oscillator strengths  $gf$  and the lifetimes for S XIV presented in this work have been calculated in a multiconfigurational Hartree-Fock relativistic approach. In this calculation, the electrostatic parameters were optimized by a least-squares procedure in order to improve the adjustment to experimental energy levels. This method produces  $gf$  values that are in better agreement with observed line intensities and lifetime values closer to the experimentally determined ones. In this work we presented all the experimentally known electric dipole S XIV spectral lines

**Journal of Applied Spectroscopy 76[3], 447-451. 2009**

## Abstracta

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