

# Abstracta

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**Trabalhos Publicados - P116-12 à P148-12**

**Proceedings - P149-12 à P150-12**

**Correção**

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**Defesas de Dissertações e Teses do IFGW - D005-12 à T006-12**

## Trabalhos Publicados

### [P116-12] "Anomalous magnetoresistance in Fibonacci multilayers"

Machado, L. D.; Bezerra, C. G.; Correa, M. A.; Chesman, C.; Pearson, J. E.; Hoffmann, A.

We theoretically investigated magnetoresistance curves in quasiperiodic magnetic multilayers for two different growth directions, namely, [110] and [100]. We considered identical ferromagnetic layers separated by nonmagnetic layers with two different thicknesses chosen based on the Fibonacci sequence. Using parameters for Fe/Cr multilayers, four terms were included in our description of the magnetic energy: Zeeman, cubic anisotropy, bilinear coupling, and biquadratic coupling. The minimum energy was determined by the gradient method and the equilibrium magnetization directions found were used to calculate magnetoresistance curves. By choosing spacers with a thickness such that biquadratic coupling is stronger than bilinear coupling, unusual behaviors for the magnetoresistance were observed: (i) for the [110] case, there is a different behavior for structures based on even and odd Fibonacci generations, and, more interesting, (ii) for the [100] case, we found magnetic field ranges for which the magnetoresistance increases with magnetic field.

*Physical Review B* **85**[22], 224416, 2012

### [P117-12] "Aspects of a dynamical gluon mass approach to elastic hadron scattering at LHC"

Fagundes, D. A.; Luna, E. G. S.; Menon, M. J.; Natale, A. A.

We discuss how the main features of the recent LHC data on elastic scattering can be described by a QCD-inspired formalism with a dynamical infrared mass scale. For this purpose new developments on a dynamical gluon mass approach are reported, with emphasis on a method to estimate uncertainty bounds in the predictions for the high-energy scattering observables. We investigate the effects due to the correlations among the fixed and free parameters involved and show that the bands of predictions are consistent with the recent data from the TOTEM experiment, including the forward quantities and the differential cross section up to the dip position.

*Nuclear Physics A* **886**, 48-70, 2012

### [P118-12] "Correlation between quantum conductance and atomic arrangement of atomic-size silver nanowires"

Lagos, M. J.; Autreto, P. A. S.; Galvao, D. S.; Ugarte, D.

We have studied the effect of thermal effects on the structural and transport response of Ag atomic-size nanowires (NWs) generated by mechanical elongation. Our study involves both time-resolved atomic resolution transmission electron microscopy imaging and quantum conductance measurement using an ultra-high-vacuum mechanically controllable break junction. We have observed drastic changes in conductance and structural properties of Ag nanowires generated at different temperatures (150 and 300 K). By combining electron microscopy images, electronic transport measurements, and quantum transport calculations, we have been able to obtain a consistent correlation between the conductance and structural properties of Ag NWs. In particular, our study has revealed the formation of metastable rectangular rod-like Ag wire (3/3) along the [001] crystallographic direction, whose formation is enhanced. These results illustrate the high complexity of analyzing structural and quantum conductance behaviour of metal atomic-size wires; also, they reveal that it is extremely difficult to compare NW conductance experiments performed at different temperatures due to the fundamental modifications of the mechanical behavior.

*Journal of Applied Physics* **111**[12], 124316, 2012

### [P119-12] "Development of a recombinant fusion protein based on the dynein light chain LC8 for non-viral gene delivery"

Toledo, M. A. S.; Janissen, R.; Favaro, M. T. P.; Cotta, M. A.; Monteiro, G. A.; Prazeres, D. M. F.; Souza, A. P.; Azzoni, A. R.

The low efficiency of gene transfer is a recurrent problem in DNA vaccine development and gene therapy studies using non-viral vectors such as plasmid DNA (pDNA). This is mainly due to the fact that during their traffic to the target cell's nuclei, plasmid vectors must overcome a series of physical, enzymatic and diffusional barriers. The main objective of this work is the development of recombinant proteins specifically designed for pDNA delivery, which take advantage of molecular motors like dynein, for the transport of cargos from the periphery to the centrosome of mammalian cells. A DNA binding sequence was fused to the N-terminus of the recombinant human dynein light chain LC8. Expression studies indicated that the fusion protein was correctly expressed in soluble form using *E. coli* BL21(DE3) strain. As expected, gel permeation assays found the purified protein mainly present as dimers, the functional oligomeric state of LC8. Gel retardation assays and atomic force microscopy proved the ability of the fusion protein to interact and condense pDNA. Zeta potential measurements indicated that LC8 with DNA binding domain (LD4) has an enhanced capacity to interact and condense pDNA, generating positively charged complexes. Transfection of cultured HeLa cells confirmed the ability of the LD4 to facilitate pDNA uptake and indicate the involvement of the retrograde transport in the intracellular trafficking of pDNA: LD4 complexes. Finally, cytotoxicity studies demonstrated a very low toxicity of the fusion protein vector, indicating the potential for in vivo applications. The study presented here is part of an effort to develop new modular shuttle proteins able to take advantage of strategies used by viruses to infect mammalian cells, aiming to provide new tools for gene therapy and DNA vaccination studies.

*Journal of Controlled Release* **159**[2], 222-231, 2012

### [P120-12] "Direct Access to Oxidation-Resistant Nickel Catalysts through an Organometallic Precursor"

Costa, N. J. S.; Jardim, R. F.; Masunaga, S. H.; Zanchet, D.; Landers, R.; Rossi, L. M.

The synthesis of nickel catalysts for industrial applications is relatively simple; however, nickel oxidation is usually difficult to avoid, which makes it challenging to optimize catalytic activities, metal loadings, and high-temperature activation steps. A robust, oxidation-resistant and very active nickel catalyst was prepared by controlled decomposition of the organometallic precursor [bis(1,5-cyclooctadiene)nickel(0)], Ni(COD)<sub>2</sub>, over silica-coated magnetite (Fe<sub>3</sub>O<sub>4</sub>@SiO<sub>2</sub>). The sample is mostly Ni(0), and surface oxidized species formed after exposure to air are easily reduced in situ during hydrogenation of cyclohexene under mild conditions recovering the initial activity. This unique behavior may benefit several other reactions that are likely to proceed via Ni heterogeneous catalysis.

*ACS Catalysis* **2**[6], 925-929, 2012

### [P121-12] "DNA fragmentation by gamma radiation and electron beams using atomic force microscopy"

Gonzalez, L. N.; Arruda-Neto, J. D. T.; Cotta, M. A.; Carrer, H.; Garcia, F.; Silva, R. A. S.; Moreau, A. L. D.; Righi, H.; Genofre, G. C.

Double-stranded pBS plasmid DNA was irradiated with gamma rays at doses ranging from 1 to 12 kGy and electron beams from 1 to 10 kGy.

Fragment-size distributions were determined by direct visualization, using atomic force microscopy with nanometer-resolution operating in non-tapping mode, combined with an improved methodology. The fragment distributions from irradiation with gamma rays revealed discrete-like patterns at all doses, suggesting that these patterns are modulated by the base pair composition of the plasmid. Irradiation with electron beams, at very high dose rates, generated continuous distributions of highly shattered DNA fragments, similar to results at much lower dose rates found in the literature. Altogether, these results indicate that AFM could supplement traditional methods for high-resolution measurements of radiation damage to DNA, while providing new and relevant information.

*Journal of Biological Physics* 38[3], 531-542, 2012

**[P122-12] "Efficient Technique to Control the Zero-Dispersion Wavelength of a Microstructured Optical Fiber"**

Ramos-Gonzales, R. E.; Fernandez-Chillce, E.; Barbosa, L. C.; Hernandez-Figueroa, H. E.

An efficient technique to control the zero-dispersion wavelength of a microstructured optical fiber is proposed and numerically demonstrated in this article. This technique is based on the variation of the linear refractive index and the thickness of a thin film covering the microstructured optical fiber holes' inner surfaces. A powerful and accurate code based on a full-vector finite-element method formulation in conjunction with perfectly matched layers was used. A maximum of 570-nm zero-dispersion wavelength displacement is demonstrated. This thin film can be included after the microstructured optical fiber has been fabricated, as that means the zero dispersion of such fiber can be tailored as needed.

*Fiber and Integrated Optics* 31[3], 186-195, 2012

**[P123-12] "Electronic excitation of gas-phase furan molecules by electron impact"**

da Costa, R. F.; Bettega, M. H. F.; Lima, M. A. P.; Lopes, M. C. A.; Hargreaves, L. R.; Serna, G.; Khakoo, M. A.

Experiments and ab initio calculations of the differential and integral cross sections for the electronic excitation from the ground state (1)A(1) to the B-3(2) and (3)A(1) states of gas-phase furan molecules by low-energy electron impact were performed. Experimental differential cross sections were measured at incident electron energies between 5 and 15 eV and for scattering angles from 10 degrees to 130 degrees. The calculated cross sections were obtained using the Schwinger multichannel method implemented with pseudopotentials. The influence of channel-coupling and polarization effects is investigated through the comparison between three different models of scattering calculations, each one considering a distinct channel-coupling scheme. The comparison of experimental and calculated cross sections for electronically inelastic electron scattering by C<sub>4</sub>H<sub>4</sub>O molecules is found to be mostly reasonable. The existing discrepancies in this combined theoretical and experimental study help to illustrate difficulties in readily establishing reliable electronic excitation cross sections of polyatomic molecules by low-energy electrons.

*Physical Review A* 85[6], 062706, 2012

**[P124-12] "Energy and system-size dependence of two- and four-particle nu(2) measurements in heavy-ion collisions at root S-NN=62.4 and 200 GeV and their implications on flow fluctuations and nonflow"**

Agakishiev, G.; Aggarwal, M. M.; Ahammed, Z.; Alakhverdyants, A. V.; Alekseev, I.; Alford, J.; Anderson, B. D.; de Souza, R. D.; Takahashi, J.; Vasconcelos, G. M. S.; et al.

STAR Collaboration

We present STAR measurements of azimuthal anisotropy by means

of the two- and four-particle cumulants  $\nu(2)$  ( $\nu(2)\{2}$  and  $\nu(2)\{4}$ ) for Au + Au and Cu + Cu collisions at center-of-mass energies  $\sqrt{s_{NN}} = 62.4$  and 200 GeV. The difference between  $\nu(2)\{2}$  and  $\nu(2)\{4}\{2}$  is related to  $\nu(2)$  fluctuations ( $\sigma(\nu(2))$ ) and nonflow ( $\Delta(2)$ ). We present an upper limit to  $\sigma(\nu(2))/\nu(2)$ . Following the assumption that eccentricity fluctuations  $\sigma(\epsilon)$  dominate  $\nu(2)$  fluctuations  $\nu(2)/\sigma(\nu(2))$  approximate to  $\epsilon/\sigma(\epsilon)$  we deduce the nonflow implied for several models of eccentricity fluctuations that would be required for consistency with  $\nu(2)\{2}$  and  $\nu(2)\{4}$ . We also present results on the ratio of  $\nu(2)$  to eccentricity.

*Physical Review C* 86[1], 014904, 2012

**[P125-12] "Expectation of Forward-Backward Rapidity Correlations in p plus p Collisions at the LHC Energies"**

Dash, A. K.; Mahapatra, D. P.; Mohanty, B.

Forward-backward correlation strength ( $b$ ) as a function of pseudorapidity intervals for experimental data from p + p nonsingly diffractive collisions are compared to PYTHIA and PHOJET model calculations. The correlations are discussed as a function of rapidity window ( $\Delta\eta$ ) symmetric about the central rapidity as well as rapidity window separated by a gap ( $\eta(\text{gap})$ ) between forward and backward regions. While the correlations are observed to be independent of  $\Delta\eta$ , it is found to decrease with increase in  $\eta(\text{gap})$ . This reflects the role of short range correlations and justifies the use of  $\eta(\text{gap})$  to obtain the accurate information about the physics of interest, the long range correlations. The correlation strength from PYTHIA are in agreement with the available experimental data while those from the PHOJET give higher values. For p + p collisions at  $\sqrt{s} = 7, 10$  and 14 TeV, the correlation strength from PHOJET are lower compared to those from PYTHIA, this is in contrast to the observations at lower energies. The experimental  $b$  value shows a linear dependence on  $\ln \sqrt{s}$  with the maximum value of unity being reached at  $\sqrt{s} = 16$  TeV, beyond the top LHC energy. However calculations from the PYTHIA and PHOJET models indicate a deviation from linear dependence on  $\ln \sqrt{s}$  and saturation in the  $b$  values being reached beyond  $\sqrt{s} = 1.8$  TeV. Such a saturation in correlation values could have interesting physical interpretations related to clan structures in particle production. Strong forward-backward correlations are associated with cluster production in the collisions. The average number of charged particles to which the clusters fragments, called the cluster size, are found to also increase linearly with  $\ln \sqrt{s}$  for both data and the models studied. The rate of increase in cluster size versus  $\ln \sqrt{s}$  from models studied are larger compared to those from the data and higher for PHOJET compared to PYTHIA. Our study indicates that the forward-backward measurements will provide a clear distinguishing observable for the models studied at LHC energies.

*International Journal of Modern Physics A* 27[14], 1250079, 2012

**[P126-12] "Exponential depletion of neutral dangling bonds density (D-0) by rare-earth doping in amorphous Si films"**

Iwamoto, W.; Zanatta, A. R.; Rettori, C.; Pagliuso, P. G.

In this work we study the effect reduction in the density of dangling bond species D-0 states in rare-earth (RE) doped a-Si films as a function concentration for different RE-specimens. The films a-Si-1<sub>x</sub>(x) RE<sub>x</sub>, RE=Y<sup>3+</sup>, Gd<sup>3+</sup>, Er<sup>3+</sup>, Lu<sup>3+</sup>) were prepared by co-sputtering and investigated by electron spin resonance (ESR) and Raman scattering experiments. According to our data the RE-doping reduces the ESR signal intensity of the D-0 states with an exponential dependence on the rare-concentration. Furthermore, the reduction produced by the magnetic rare-earths Gd<sup>3+</sup> and Er<sup>3+</sup> is remarkably greater than that caused by Y<sup>3+</sup> and Lu<sup>3+</sup>, which led us to suggest an exchange-like coupling between the spin of the magnetic REs<sup>3+</sup> and the spin of silicon neutral dangling bonds.

*Physica-B-Condensed Matter* 407[16], 3222-3224, 2012



**[P127-12] “Ground-state properties of the disordered spin-1 Bose-Hubbard model: A stochastic mean-field theory study”**

Warnes, J. H.; Miranda, E.

We study the ground state of the disordered Bose-Hubbard model for spin-1 particles by means of the stochastic mean-field theory. This approach enables the determination of the probability distributions of various physical quantities, such as the superfluid order parameter, the average site occupation number, the standard deviation of the occupation per site and the square of the spin operator per site. We show how a stochastic method, previously used in the study of localization, can be flexibly used to solve the relevant equations with great accuracy. We have determined the phase diagram, which exhibits three phases: the polar superfluid, the Mott insulating, and the Bose glass. A complete characterization of the physical properties of these phases has been established.

**Physical Review B 85[21], 214532, 2012**

**[P128-12] “High-pressure tuning of valence and magnetic interactions in Eu<sub>0.5</sub>Yb<sub>0.5</sub>Ga<sub>4</sub>”**

Loula, G. D.; dos Reis, R. D.; Haskel, D.; Garcia, F.; Souza-Neto, N. M.; Gandra, F. C. G.

Pressure-induced changes in valence and magnetic ordering are observed in a Eu<sub>0.5</sub>Yb<sub>0.5</sub>Ga<sub>4</sub> compound by means of element selective x-ray absorption spectroscopy at Eu and Yb L-3 edges. Concomitant Eu and Yb valence transitions towards a 3+ state, together with an antiferromagnetic to ferromagnetic transition, are observed with applied pressures up to 30 GPa. With the support of density functional theory calculations, we argue that hybridization between (Eu/Yb)-5d and Ga orbitals regulates the valence and magnetic exchange interactions in this system.

**Physical Review B 85[24], 245128, 2012**

**[P129-12] “Highly-sensitive and label-free indium phosphide biosensor for early phytopathogen diagnosis”**

Moreau, A. L. D.; Janissen, R.; Santos, C. A.; Peroni, L. A.; Stach-Machado, D. R.; de Souza, A. A.; de Souza, A. P.; Cotta, M. A.

The development of highly-sensitive and label-free operating semiconductor-based, biomaterial detecting sensors has important applications in areas such as environmental science, biomedical research and medical diagnostics. In the present study, we developed an Indium Phosphide (InP) semiconductor-based resistive biosensor using the change of its electronic properties upon biomaterial adsorption as sensing element. To detect biomaterial at low concentrations, the procedure of functionalization and covalent biomolecule immobilization was also optimized to guarantee high molecule density and high reproducibility which are prerequisite for reliable results. The characterization, such as biomolecular conjugation efficiency, detection concentration limits, receptor:ligand specificity and concentration detection range was analyzed by using three different biological systems: i) synthetic dsDNA and two phytopathogenic diseases, ii) the severe CB-form of Citrus Tristeza Virus (CTV) and iii) *Xylella fastidiosa*, both causing great economic loss worldwide. The experimental results show a sensitivity of 1 pM for specific ssDNA detection and about 2 nM for the specific detection of surface proteins of CTV and *X. fastidiosa* phytopathogens. A brief comparison with other semiconductor based biosensors and other methodological approaches is discussed and confirms the high sensitivity and reproducibility of our InP based biosensor which could be suitable for reliable early infection diagnosis in environmental and life sciences.

**Biosensors & Bioelectronics 36[1], 62-68, 2012**

**[P130-12] “Identification of twinned gas phase clusters by single-shot scattering with intense soft x-ray pulses”**

Rupp, D.; Adolph, M.; Gorkhover, T.; Schorb, S.; Wolter, D.; Hartmann, R.; Kimmel, N.; Reich, C.; Feigl, T.; de Castro, A. R. B.; Treusch, R.; Struder, L.; Moller, T.; Bostedt, C.

Scattering experiments on xenon nanoclusters with high-intensity soft x-ray laser pulses from the Free-Electron LASer in Hamburg (FLASH) are performed to investigate different cluster morphologies in the gas phase. Three different types of scattering patterns can be identified. The most frequent pattern of concentric rings reflects the event of a single spherical cluster in focus. Fine interference rings similar to Newton rings appear when two clusters are illuminated at  $\mu\text{m}$  distance, revealing three-dimensional information about the location of the clusters. Between 10 and 30% of all hits show a previously unknown twin cluster configuration with two clusters in direct contact. Simulations of scattering patterns for twin clusters with different sizes of the two particles, degree of fusion and orientation in space allow us to explain all the observed patterns.

**New Journal of Physics 14, 055016, 2012**

**[P131-12] “Indirect dark matter detection in the light of sterile neutrinos”**

Esmaili, A.; Peres, O. L. G.

The recent global fit of short baseline neutrino oscillation data favors the presence of one (or more) sterile neutrino state which leads to new mass splitting  $\Delta m^2$  similar to  $1\text{eV}^2$ . We consider the effect of this new states on the evolution of neutrinos from the dark matter annihilation inside the Sun. We show that neutrinos with energy  $E_\nu$  greater than or similar to 100 GeV undergo resonant active-sterile oscillation which depletes the flux of neutrinos arriving at the Earth. As an example of this effect, we present the oscillation probabilities for the case of monochromatic neutrinos from the direct annihilation of dark matter particles to neutrinos and the depletion due to the presence of sterile neutrinos. We discuss the seasonal variation of oscillation probabilities which is expected for the case of monochromatic neutrinos.

**Journal of Cosmology and Astroparticle Physics 5, 002, 2012**

**[P132-12] “Initial crystallographic studies of a small heat-shock protein from *Xylella fastidiosa*”**

Tada, S. F. S.; Saraiva, A. M.; Lorite, G. S.; Rosselli-Murai, L. K.; Pelloso, A. C.; dos Santos, M. L.; Trivella, D. B. B.; Cotta, M. A.; de Souza, A. P.; Aparicio, R.

The ORF XF2234 in the *Xylella fastidiosa* genome was identified as encoding a small heat-shock protein of 17.9 kDa (HSP17.9). HSP17.9 was found as one of the proteins that are induced during *X. fastidiosa* proliferation and infection in citrus culture. Recombinant HSP17.9 was crystallized and surface atomic force microscopy experiments were conducted with the aim of better characterizing the HSP17.9 crystals. X-ray diffraction data were collected at 2.7 angstrom resolution. The crystal belonged to space group P4(3)2<sub>2</sub>, with unit-cell parameters  $a = 68.90$ ,  $b = 68.90$ ,  $c = 72.51$  angstrom, and is the first small heat-shock protein to crystallize in this space group.

**Acta Crystallographica Section F-Structural Biology and Crystalization Communications 68, 535-539, Part 5, 2012**

**[P133-12] “Interstitial doping induced superconductivity at 15.3 K in Nb<sub>5</sub>Ge<sub>3</sub> compound”**

Bortolozzo, A. D.; dos Santos, C. A. M.; Jardim, R. F.; Ritter, C.; Devishvili, A.; Rotter, M.; Gandra, F. G.; Machado, A. J. S.

It is reported superconductivity in Nb<sub>5</sub>Ge<sub>3</sub>C<sub>0.3</sub>, an interstitial carbide compound. The temperature dependence of the electrical resistivity, ac-susceptibility, and heat capacity (HC) indicate that a bulk type-II superconductivity appears at  $T_C = 15.3$  K.

Magneto-resistance measurements suggest an upper critical field of B-C2 similar to 10.6 T and a coherence length of  $\xi$  similar to 55 angstrom at zero temperature. Neutron diffraction analyzes locate the carbon atoms at the interstitial 2b site of the Mn<sub>5</sub>Si<sub>3</sub> type-structure. Heat capacity data below T-C are well described by BCS theory. The size of the jump at T-C is in good agreement with the superconducting volume fraction observed in susceptibility measurements. A Debye temperature and Sommerfeld constant were also extracted from heat capacity data as 343 K and 34 mJ/mol K<sup>-2</sup>, respectively.

**Journal of Applied Physics 111[12], 123912, 2012**

**[P134-12] “J/psi production as a function of charged particle multiplicity in pp collisions at root s=7 TeV”**

Abelev, B.; Adam, J.; Adamova, D.; Adare, A. M.; Aggarwal, M. M.; Dash, A.; Takahashi, J.; et al.

The ALICE Collaboration reports the measurement of the relative J/psi yield as a function of charged particle pseudorapidity density  $dN(ch)/d\eta$  in pp collisions at root s = 7 TeV at the LHC. J/psi particles are detected for  $p(t) > 0$ , in the rapidity interval  $|y| < 0.9$  via decay into  $e^+e^-$ , and in the interval  $2.5 < y < 4.0$  via decay into  $\mu^+\mu^-$  pairs. An approximately linear increase of the J/psi yields normalized to their event average  $(dN(J/psi)/dy)/(dN(ch)/dy)$  with  $(dN(ch)/c\eta)/(dN(ch)/d\eta)$  is observed in both rapidity ranges, where  $dN(ch)/d\eta$  is measured within  $|y| < 1$  and  $p(t) > 0$ . In the highest multiplicity interval with  $(dN(ch)/d\eta)_{bin} = 24.1$ , corresponding to four times the minimum bias multiplicity density, an enhancement relative to the minimum bias J/psi yield by a factor of about 5 at  $2.5 < y < 4$  ( $8$  at  $|y| < 0.9$ ) is observed.

**Physics Letters B 712[3], 165-175, 2012**

**[P135-12] “KATRIN sensitivity to sterile neutrino mass in the shadow of lightest neutrino mass”**

Esmaili, A.; Peres, O. L. G.

The presence of light sterile neutrinos would strongly modify the energy spectrum of the tritium beta electrons. We perform an analysis of the Karlsruhe Tritium Neutrino (KATRIN) experiment's sensitivity by scanning almost all the allowed region of neutrino mass-squared difference and mixing angles of the 3 + 1 scenario. We consider the effect of the unknown absolute mass scale of active neutrinos on the sensitivity of KATRIN to the sterile neutrino mass. We show that after 3 years of data-taking, the KATRIN experiment can be sensitive to mixing angles as small as  $\sin(2)\theta(s)$  similar to  $10^{-2}$ . Particularly we show that for small mixing angles,  $\sin(2)\theta(s)$  less than or similar to 0.1, the KATRIN experiment can give the strongest limit on active-sterile mass-squared difference.

**Physical Review D 85[11], 117301, 2012**

**[P136-12] “Long-distance correlations in TCABR biasing experiments”**

Kuznetsov, Yu. K.; Nascimento, I. C.; Silva, C.; Figueiredo, H.; Guimaraes, Z. O.; Caldas, I. L.; Galvao, R. M. O.; Severo, J. H. F.; Toufen, D. L.; Machida, M.; Duarte, P.; Ronchi, G.; Schmutzler, L. M. F.; et al.

Long-distance correlations (LDCs) of plasma potential fluctuations in the plasma edge have been investigated in the TCABR tokamak in the regime of edge biasing H-mode using an array of multi-pin Langmuir probes. This activity was carried out as part of the scientific programme of the 4th IAEA Joint Experiment (2009). The experimental data confirm the effect of amplification of LDCs in potential fluctuations during biasing recently observed in stellarators and tokamaks.

For long toroidal distances between probes, the cross-spectrum is concentrated at low frequencies  $f < 60$  kHz with peaks at  $f < 5$  kHz,  $f = 13-15$  kHz and  $f$  similar to 40 kHz and low wave numbers with a maximum at  $k = 0$ . The effects of MHD activity on the LDCs in potential fluctuation are investigated.

**Nuclear Fusion 52[6], 063004, 2012**

**[P137-12] “Magnetoresistance and transistor-like behavior of a double quantum-dot via crossed Andreev reflections”**

Siqueira, E. C.; Cabrera, G. G.

The electric current and the magnetoresistance effect are studied in a double quantum-dot system, where one of the dots QD(a) is coupled to two ferromagnetic electrodes (F-1; F-2), while the second QD(b) is connected to a superconductor S. For energy scales within the superconductor gap, electric conduction is allowed by Andreev reflection processes. Due to the presence of two ferromagnetic leads, non-local crossed Andreev reflections are possible. We found that the magnetoresistance sign can be changed by tuning the external potential applied to the ferromagnets. In addition, it is possible to control the current of the first ferromagnet (F-1) through the potential applied to the second one (F-2). We have also included intradot interaction and gate voltages at each quantum dot and analyzed their influence through a mean field approximation. The interaction reduces the current amplitudes with respect to the non-interacting case, but the switching effect still remains as a manifestation of quantum coherence, in scales of the order of the superconductor coherence length.

**Journal of Applied Physics 111[11], 113905, 2012**

**[P138-12] “Mechanism for Enhanced Disordered Screening in Strongly Correlated Metals: Local vs. Nonlocal Effects”**

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

We study the low temperature transport characteristics of a disordered metal in the presence of electron-electron interactions. We compare Hartree-Fock and dynamical mean field theory (DMFT) calculations to investigate the scattering processes of quasiparticles off the screened disorder potential and show that both the local and non-local (coming from long-ranged Friedel oscillations) contributions to the renormalized disorder potential are suppressed in strongly renormalized Fermi liquids. Our results provide one more example of the power of DMFT to include higher order terms left out by weak-coupling theories.

**Journal of Superconductivity and Novel Magnetism 25[5], 1399-1402, 2012**

**[P139-12] “Multi-strange baryon production in pp collisions at root s=7 TeV with ALICE”**

Abelev, B.; Adam, J.; Adamova, D.; Chinellato, D. D.; Cosentino, M. R.; Dash, A.; Takahashi, J.; et al.

ALICE Collaboration

A measurement of the multi-strange  $\Xi(-)$  and  $\Omega(-)$  baryons and their antiparticles by the ALICE experiment at the CERN Large Hadron Collider (LHC) is presented for inelastic proton-proton collisions at a centre-of-mass energy of 7 TeV. The transverse momentum ( $p(T)$ ) distributions were studied at mid-rapidity ( $|y| < 0.5$ ) in the range of  $0.6 < p(T) < 8.5$  GeV/c  $\Xi(-)$  for and  $\Xi(+)$  baryons, and in the range of  $0.8 < p(T) < 5$  GeV/c for  $\Omega(-)$  and  $\Omega(+)$  baryons. Baryons and antibaryons were measured as separate particles and we find that the baryon to antibaryon ratio of both particle species is consistent with unity over the entire range of the measurement. The statistical precision of the current data has allowed us to measure a difference between the mean  $p(T)$  of  $\Xi(-)$  ( $\langle p(T) \rangle$ ) and  $\Omega(-)$  ( $\langle p(T) \rangle$ ).

Particle yields, mean  $\pi$ , and the spectra in the intermediate  $\pi$  range are not well described by the PYTHIA Perugia 2011 tune Monte Carlo event generator, which has been tuned to reproduce the early LHC data. The discrepancy is largest for  $\Omega(-)$  ( $\Omega$  over bar (+)). This PYTHIA tune approaches the  $\pi$  spectra of  $\Xi(-)$  and  $\Xi(+)$  baryons below  $p(T) < 0.85$  GeV/c and describes the  $\Xi(-)$  and  $\Xi(+)$  spectra above  $p(T) > 6.0$  GeV/c. We also illustrate the difference between the experimental data and model by comparing the corresponding ratios of  $(\Omega(-) + \Omega$  over bar (+))/( $\Xi(-) + \Xi(+)$ ) as a function of transverse mass.

**Physics Letters B 712[4-5], 309-318, 2012**

**[P140-12] "Nonzero Gap Two-Dimensional Carbon Allotrope from Porous Graphene"**

Brunetto, G.; Autreto, P. A. S.; Machado, L. D.; Santos, B. I.; dos Santos, R. P. B.; Galvao, D. S.

Abstract: Graphene is considered one of the most promising materials for future electronics. However, in its pristine form, graphene is a gapless material, which imposes limitations to its use in some electronic applications. To solve this problem, many approaches have been tried, such as physical and chemical functionalizations. These processes compromise some of the desirable graphene properties. In this work, based on ab initio quantum molecular dynamics, we showed that a two-dimensional carbon allotrope, named biphenylene carbon (BPC), can be obtained from selective dehydrogenation of porous graphene. BPC presents a nonzero bandgap and well-delocalized frontier orbitals. Synthetic routes to BPC are also addressed.

**Journal of Physical Chemistry C 116[23], 12810-12813, 2012**

**[P141-12] "Spin reorientation and the magnetocaloric effect in  $\text{HoEr}(1-y)\text{N}$ "**

von Ranke, P. J.; Alvarenga, T. S. T.; Alho, B. P.; Nobrega, E. P.; Ribeiro, P. O.; Carvalho, A. M. G.; de Sousa, V. S. R.; Caldas, A.; de Oliveira, N. A.

We report on the magnetic and magnetocaloric effect calculations in rare earth mononitrides  $\text{HoEr}(1-y)\text{N}$  ( $y = 0, 0.5, 0.75, \text{ and } 1$ ). The magnetic Hamiltonian includes the crystalline electrical field in both magnetic sublattices; disorder in exchange interactions among Ho-Ho, Er-Er, and Ho-Er magnetic ions and the Zeeman effect. The theoretical results for the magnetic entropy change and adiabatic temperature change are in good agreement with the available experimental data. Besides, ferrimagnetic arrangement, inverse magnetocaloric effect, and spin reorientation transition (spin flop process) were predicted and quantitatively described.

**Journal of Applied Physics 111[11], 113916, 2012**

**[P142-12] "Structural, optical and electrical properties of indium nitride polycrystalline films"**

da Silva, M. V. S.; David, D. G. F.; Pepe, I.; da Silva, A. F.; de Almeida, J. S.; Gazoto, A. L.; dos Santos, A. O.; Cardoso, L. P.; Meneses, E. A.; Graybill, D. L.; Mertes, K. M.

The structural, optical and electrical properties of InN polycrystalline films on glass substrate are investigated by means of X-ray photoelectron spectroscopy, Raman scattering measurements, X-ray diffraction analysis, optical spectroscopy, and electrical measurements as a function of the inverse of temperature. The absorption edge for the films is most likely due to an impurity band formed by the presence of defects in the material. Such an impurity band, located at 1.6 eV extends itself to about 1.8 eV above the Fermi level, and it is attributed to nitrogen vacancies present in the material. The Raman scattering data also reveal the incorporation of oxygen

in the InN films, leading to the formation of the In<sub>2</sub>O<sub>3</sub> amorphous phase during the process of sputtering. Additionally, the X-ray photoelectron spectroscopy of the valence band, which is highly desirable to the determination of the Fermi level, confirms the optical gap energy. Furthermore, the X-ray diffraction patterns of the thinner films present broader peaks, indicating high values for the strain between the film lattice and the glass substrate. Finally, first principles calculations are used to investigate the optical properties of InN and also to support the experimental findings.

**Thin Solid Films 520[15], 4848-4852, 2012**

**[P143-12] "The Effect of Boron Doping Level on The Morphology and Structure of Ultra/Nanocrystalline Diamond Films"**

Souza, F. A.; Azevedo, A. F.; Giles, C.; Saito, E.; Baldan, M. R.; Ferreira, N. G.

In this work, boron-doped nanocrystalline diamond (BDND) films are grown on silicon substrates by hot-filament (HF)CVD in Ar/H<sub>2</sub>/CH<sub>4</sub> gas mixtures. In this study, the transition from ultra-nanocrystalline to nanocrystalline diamond films is clearly shown by the addition of boron dopant to the growth of the gas mixture. The doping process consists of an additional H<sub>2</sub> line passing through a bubbler containing B<sub>2</sub>O<sub>3</sub> dissolved in methanol with various B/C ratios. Five sample sets are obtained with doping in the methanol bubbler solution of 2?000, 5?000, 10?000, 20?000, and 30?000?ppm for a 16?h growth time. The morphology, roughness, and structure of these films have markedly different properties. The cross-section of the films is characterized by scanning electron microscopy (SEM) showing the transition from ultra-nanocrystalline growth (renucleation process) to a columnar structure of nanocrystalline films. The acceptor density values, evaluated by Raman spectra and by Mott-Schottky plot analysis, vary from 10<sup>20</sup> to 10<sup>21</sup> B cm<sup>-3</sup> as the doping level increases. The grain size and the relative intensity of the (111)/(220) peaks are obtained from X-ray diffraction (XRD) patterns of the films. The diamond average grain size increases from 10 to 35?nm for films with 2?000 and 30?000?ppm B/C, respectively, in the methanol bubbler solution. The preferential orientation also changes, from (220) to (111), as the boron doping level increases.

**Chemical Vapor Deposition 18[4-6], 159-165, 2012**

**[P144-12] "Theoretical and Experimental Study of Valence Photoelectron Spectrum of D,L-Alanine Amino Acid"**

Farrokhpour, H.; Fathi, F.; De Brito, A. N.

In this work, the He-I (21.218 eV) photoelectron spectrum of D,L-alanine in the gas phase is revisited experimentally and theoretically. To support the experiment, the high level ab initio calculations were used to calculate and assign the photoelectron spectra of the four most stable conformers of gaseous alanine, carefully. The symmetry adapted cluster/configuration interaction (SAC-CI) method based on single and double excitation operators (SD-R) and its more accurate version, termed general-R, was used to separately calculate the energies and intensities of the ionization bands of the L- and n-alanine conformers. The intensities of ionization bands were calculated based on the monopole approximation. Also, natural bonding orbital (NBO) calculations were employed for better spectral band assignment. The relative electronic energy, Gibbs free energy, and Boltzmann population ratio of the conformers were calculated at the experimental temperature (403 K) using several theoretical methods. The theoretical photoelectron spectrum of alanine calculated by summing over the spectra of individual D and L conformers weighted by different population ratios. Finally, the population ratio of the four most stable conformers



of alanine was estimated from the experimental photoelectron spectrum using theoretical calculations for the first time.

**Journal of Physical Chemistry A 116[26], 7004-7015, 2012**

**[P145-12] "Theoretical-Experimental Study of Formic Acid Photofragmentation in the Valence Region"**

Arruda, M. S.; Marinho, R. R. T.; Maniero, A. M.; Mundin, M. S. P.; Mocellin, A.; Pilling, S.; de Brito, A. N.; Prudente, F. V.

Photoionization and photofragmentation studies of formic acid (HCOOH) are performed for the valence shell electron ionization process. The total and partial ion yield of gaseous HCOOH were collected as a function of photon energy in the ultraviolet region, between 11.12 and 19.57 eV. Measurements of the total and partial ion yield of gaseous formic acid molecule are performed with a time-of-flight mass spectrometer at the Synchrotron Light Brazilian Laboratory. Density functional theory and time dependent density functional theory are employed to calculate the ground and excited electronic state energies of neutral and ionic formic acid as well as their fragments and normal vibration modes. The ionization potential energies, the stability of electronic excited states of HCOOH<sup>+</sup>, and the energies of opening fragmentation channels are estimated from theoretical-experimental analysis. Additionally, the main formic acid photofragmentation pathways by exposition of photons within that energy range are determined experimentally. These produced ions primarily have the following mass/charge ratios: 46 (HCOOH<sup>+</sup>), 45 (COOH<sup>+</sup>), 29 (HCO<sup>+</sup>), and 18 (H<sub>2</sub>O<sup>+</sup>).

**Journal of Physical Chemistry A 116[25], SI, 6693-6701, 2012**

**[P146-12] "Thermal expansion coefficient, mechanical and structural properties of hydrogenated carbon nitrides"**

Champi, A.; Marques, F. C.

Amorphous hydrogenated carbon nitride films (a-C:H:N) deposited by plasma enhanced chemical vapor deposition of methane (CH<sub>4</sub>) and nitrogen (N<sub>2</sub>), under low (-200 V) and high (-800 V) bias voltage are investigated. The nitrogen content was obtained from X-ray photoelectron spectroscopy and nuclear reaction analysis. Raman measurements were performed at 514 nm (visible) and 244 nm (UV) wavelengths. Mechanical properties (Young's modulus and hardness) and thermal expansion coefficient (TEC) were studied using the bending beam method. Raman spectroscopy shows that the incorporation of nitrogen in a-C:H reduces the disorder in the film, independent of the initial structure of the a-C:H films (tetrahedral-, diamond-, or graphitic-like). The TEC is related to the Raman parameters associated with the degree of sp<sup>2</sup> ordering (aromatic rings) in the film structure, increasing with the nitrogen incorporation.

**Diamond and Related Materials 25, 124-127, 2012**

**[P147-12] "Tumor Blood Flow Differs between Mouse Strains: Consequences for Vasoresponse to Photodynamic Therapy"**

Mesquita, R. C.; Han, S. W.; Miller, J.; Schenkel, S. S.; Pole, A.; Esipova, T. V.; Vinogradov, S. A.; Putt, M. E.; Yodh, A. G.; Busch, T. M.

Fluctuations in tumor blood flow are common and attributed to factors such as vasomotion or local vascular structure, yet, because vessel structure and physiology are host-derived, animal strain of tumor propagation may further determine blood flow characteristics. In the present report, baseline and stress-altered tumor hemodynamics as a function of murine strain were studied using radiation-induced fibrosarcomas (RIF) grown in C3H or nude mice. Fluctuations in tumor blood flow during one hour of baseline monitoring or during vascular stress induced by photodynamic therapy (PDT) were measured by diffuse correlation spectroscopy. Baseline monitoring revealed fluctuating tumor blood flow highly correlated with heart rate and with similar median periods

(i.e. similar to 9 and 14 min in C3H and nudes, respectively). However, tumor blood flow in C3H animals was more sensitive to physiologic or stress-induced perturbations. Specifically, PDT-induced vascular insults produced greater decreases in blood flow in the tumors of C3H versus nude mice; similarly, during baseline monitoring, fluctuations in blood flow were more regular and more prevalent within the tumors of C3H mice versus nude mice; finally, the vasoconstrictor L-NNA reduced tumor blood flow in C3H mice but did not affect tumor blood flow in nudes. Underlying differences in vascular structure, such as smaller tumor blood vessels in C3H versus nude animals, may contribute to strain-dependent variation in vascular function. These data thus identify clear effects of mouse strain on tumor hemodynamics with consequences to PDT and potentially other vascular-mediated therapies.

**PLOS ONE 7[5], e37322, 2012**

**[P148-12] "Ultrahigh-sensitivity temperature fiber sensor based on multimode interference"**

Silva, S.; Pachon, E. G. P.; Franco, M. A. R.; Hayashi, J. G.; Malcata, F. X.; Frazao, O.; Jorge, P.; Cordeiro, C. M. B.

The proposed sensing device relies on the self-imaging effect that occurs in a pure silica multimode fiber (coreless MMF) section of a single-mode-multimode-single-mode (SMS)-based fiber structure. The influence of the coreless-MMF diameter on the external refractive index (RI) variation permitted the sensing head with the lowest MMF diameter (i.e., 55 μm) to exhibit the maximum sensitivity (2800 nm/RIU). This approach also implied an ultrahigh sensitivity of this fiber device to temperature variations in the liquid RI of 1.43: a maximum sensitivity of -1880 pm/degrees C was indeed attained. Therefore, the results produced were over 100-fold those of the typical value of approximately 13 pm/degrees C achieved in air using a similar device. Numerical analysis of an evanescent wave absorption sensor was performed, in order to extend the range of liquids with a detectable RI to above 1.43. The suggested model is an SMS fiber device where a polymer coating, with an RI as low as 1.3, is deposited over the coreless MMF; numerical results are presented pertaining to several polymer thicknesses in terms of external RI variation.

**Applied Optics 51[16], 3236-3242, 2012**

## Proceedings

**[P149-12] "Bend Loss insensitive All-Solid Optical Fiber"**

Avila, L. F.; Chillcce, E. F.; Barbosa, L. C.; Jiang, S. (editor); Dignonnet, M. J. F. (editor).

Conventional core/clad optical fibers composed of all-solid silica material were fabricated using the "stack and draw" technique. The optical fiber consists of Ge-doped silica glass in the core and un-doped silica glass in the clad. The optical attenuation and the chromatic dispersion spectra of these optical fibers, with their external diameters of 212, 176, 150 and 125 μm, were characterized by using a PK2500 and a PK2800 instrument respectively. The attenuation of these optical fibers, at 1550 nm, was approximately 5 dB/km and the zero-dispersion-wavelength range from 1350 to 1370 nm. On the other hand, bend loss spectra of these fibers were characterized by using small bend diameter rods (bend diameters from 2.5 to 10 mm). The bend loss spectra show that these all-solid optical fibers are almost insensitive to bend effect. In addition we explore the nonlinear properties of these fibers to investigate the potential for supercontinuum generation.

**Optical Components and Materials IX. Proceedings of SPIE. v. 8257, 82571B, 2012 - Conference on Optical Components and Materials IX, JAN 25-26, 2012, San Francisco, CA.**

**[P150-12] “Er<sup>3+</sup>-doped Tellurite Micro-structured Fiber: Laser Generation and Optical Gain”**

Chilicce, E. F.; Narro-Garcia, R.; Menezes, J. W.; Rodriguez, E.; Marconi, D.; Fragnito, H. L.; Barbosa, L. C.; Jiang S. (editor); Digonnet M. J. F. (editor).

Optical results concerning the generation of laser and optical gain by using an Er<sup>3+</sup>-doped tellurite micro-structured fiber are reported for the first time. For this purpose a scheme that consist of two 980 nm diode pump lasers (simultaneously in the co-propagating and the counter-propagating directions) and short Er<sup>3+</sup>-doped tellurite micro-structured fibers (fabricated by using the stack-and-draw technique and a soft glass drawing tower) was used. The laser produced here was obtained within the range 1530 to 1565 nm, and the maximum optical gain obtained was higher than 8 dB.

Optical Components and Materials IX. Proceedings of SPIE. v. 8257, 82570B, 2012 - Conference on Optical Components and Materials IX. JAN 25-26, 2012. San Francisco, CA.

## Correção

“Validation of diffuse correlation spectroscopic measurement of cerebral blood flow using phase-encoded velocity mapping magnetic resonance imaging (vol 17, 037007, 2012)”

Buckley, E. M.; Hance, D.; Pawlowski, T.; Lynch, J.; Wilson, F. B.; Mesquita, R. C.; Durduran, T.; Diaz, L. K.; Putt, M. E.; Licht, D. J.; Fogel, M. A.; Yodh, A. G.

Journal of Biomedical Optics 17[4], 049805, 2012

## Meeting Abstract

“Effect of Helium-Neon (HeNe) laser irradiation on lesions in experimental Paracoccidiodomycosis”

da Costa, T. A.; Di Gangi, R.; Francelin, C.; Costa, R. M. S. N.; Vasconcellos, E.; Burger, E.; Verinaud, L.

Mycoses 55[SI], 39-319, Sup. 4, 2012

## Material Editorial

“Comment on ‘Revealing common artifacts due to ferromagnetic inclusions in highly oriented pyrolytic graphite’ by Sepioni M. et al”

Spemann, D.; Rothermel, M.; Esquinazi, P.; Ramos, M. A.; Kopelevich, Y.; Ohldag, H.

EPL 98[5], 57006, 2012

## Defesas de Dissertações - Mestrado

**[D005-12] “Síntese e caracterização magnética de nanopartículas do tipo dímero de Ag-Fe<sub>3</sub>O<sub>4</sub>.”**

Aluno: Gleyggestone Lopes de Macêdo  
Orientador: Kleber Roberto Pirota  
Julho/2012

**[D006-12] “Correlações Quânticas entre Dois Osciladores Conectados por um Acoplamento Dependente do Tempo.”**

Aluno: Thales Figueiredo Roque  
Orientador: José Antonio Roversi  
Agosto/2012

**[D007-12] “Efeitos de Interface nas Propriedades Ópticas de Pontos Quânticos de InP/GaAs.”**

Aluno: Tiago Illipronti Girardi  
Orientador: Fernando Iikawa  
Agosto/2012

## Defesas de Teses - Doutorado

**[T004-12] “Estudo magnético e calorimétrico sobre a série Tb<sub>x</sub>Pr<sub>1-x</sub>Al<sub>2</sub>.”**

Aluno: Júlio César Guimarães Tedesco  
Orientador: Adelino de Aguiar Coelho  
Julho/2012

**[T005-12] “O Efeito da Pressão sobre Transições entre Fases Desordenadas do Silício Líquido.”**

Aluno: Karl Marx Silva Garcez  
Orientador: Alex Antonelli  
Agosto/2012

**[T006-12] “Simulações Computacionais de Sistemas Nanoestruturados.”**

Aluno: Marcelo Zimmer Sampaio Flores  
Orientador: Douglas Soares Galvão  
Setembro/2012

Fonte: Portal IFGW / Pós-Graduação.

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# Abstracta

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