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Artigos publicados

[P275-2016] "Apatite fission-track analysis of Cretaceous alkaline rocks of Ponta Grossa and Alto Paranaiba Arches, Brazil"

Soares, C. J.; **Guedes, S.***; Jonckheere, R.; **Hadler, J. C.***; Passarella, S. M.; Dias, A. N. C.

This work presents fission-track ages and thermal history modelling of apatite samples from two Brazilian alkaline formations: Alto Paranaiba and Ponta Grossa Arches. The apatite fission-track ages obtained for Alto Paranaiba Arch agree with those determined by other radiometric dating methods presenting higher closure temperatures. The ages given by the fission-track thermochronometer suggest that no strong tectonic event has occurred after Alto Paranaiba Formation during Upper Cretaceous. This event is also supported by thermal history modelling of this arch, which is characterized by fast cooling followed by residence at lower temperatures. On the other hand, apatite fission-track ages from Ponta Grossa Arch are systematically lower than other radiometric ages, suggesting that at least one tectonic event occurred after Ponta Grossa Formation, around 130Ma.

[P276-2016] "Ballistic Fracturing of Carbon Nanotubes"

Ozden, S.; **Machado, L. D.***; Tiwary, C.; **Autreto, P. A. S.***; Vajtai, R.; Barrera, E. V.; **Galvão, D. S.***; Pulickel M. A.

Advanced materials with multifunctional capabilities and high resistance to hypervelocity, impact are of great interest to the designers of aerospace structures. Carbon nanotubes (CNTs) with their lightweight and high strength properties are alternative-to metals and/or metallic alloys conventionally used in aerospace-applications. Here we report, a detailed study on the ballistic fracturing of CNTs for different velocity ranges. Our-results show that the highly energetic impacts cause bond breakage and carbon atom rehybridizations, and sometimes extensive structural reconstructions were also observed Experimental;, observations Show the formation of nanoribbons,, nanodiamonds, and covalently interconnected nanostructures, depending On impact conditions. Fully atotnistic reactive molecular dynamics simulations were also carried out in order to gain further insights into the mechanism behind the transformation of CNTs. The simulations show that the velocity and relative-orientation of the multiple colliding :nanotubes are critical to determine the impact outcome.

[P277-2016] "Beam-energy dependence of charge balance functions from Au plus Au collisions at energies available at the BNL Relativistic Heavy Ion Collider"

Adamczyk, L.; Adkins, J. K.; Agakishiev, G.; **Derradi de Souza, R.***; **Takahashi, J.***; **Vasconcelos, G. M. S.***; et al.
STAR Collaboration

Balance functions have been measured in terms of relative pseudorapidity (Delta(eta)) for charged particle pairs at the BNL Relativistic Heavy Ion Collider from Au + Au collisions at root s(NN) = 7.7 GeV to 200 GeV using the STAR detector. These results are compared with balance functions measured at the CERN Large Hadron Collider from Pb + Pb collisions at root s(NN) = 2.76 TeV by the ALICE Collaboration. The width of the balance function decreases as the collisions

In contrast, the widths of the balance functions calculated using shuffled events show little dependence on centrality or beam energy and are larger than the observed widths. Balance function widths calculated using events generated by UrQMD are wider than the measured widths in central collisions and show little centrality dependence. The measured widths of the balance functions in central collisions are consistent with the delayed hadronization of a deconfined quark gluon plasma (QGP). The narrowing of the balance function in central collisions at root s(NN) = 7.7 GeV implies that a QGP is still being created at this relatively low energy.

[P278-2016] "Biomimetic coatings enhance tribocorrosion behavior and cell responses of commercially pure titanium surfaces"

Vieira Marques, I. S.; Alfaro, M. F.; Saito, M. T.; da Cruz, N. C.; Takoudis, C.; **Landers, R.***; Mesquita, M. F.; Nociti Junior, F. H.; Mathew, M. T.; Sukotjo, C.; Ricardo B., V. A.

Biofunctionalized surfaces for implants are currently receiving much attention in the health care sector. Our aims were (1) to create bioactive Ti-coatings doped with Ca, P, Si, and Ag produced by microarc oxidation (MAO) to improve the surface properties of biomedical implants, (2) to investigate the TiO_2 layer stability under wear and corrosion, and (3) to evaluate human mesenchymal stem cells (hMSCs) responses cultured on the modified surfaces. Tribocorrosion and cell experiments were performed following the MAO treatment. Samples were divided as a function of different Ca/P concentrations and treatment duration. Higher Ca concentration produced larger porous and harder coatings compared to the untreated group ($p<0.001$), due to the presence of rutile structure. Free potentials experiments showed lower drops (0.6 V) and higher coating lifetime during sliding for higher Ca concentration, whereas lower concentrations presented similar drops (0.8 V) compared to an untreated group wherein the drop occurred immediately after the sliding started. MAO-treated surfaces improved the matrix formation and osteogenic gene expression levels of hMSCs. Higher Ca/P ratios and the addition of Ag nanoparticles into the oxide layer presented better surface properties, tribocorrosive behavior, and cell responses. MAO is a promising technique to enhance the biological, chemical, and mechanical properties of dental implant surfaces.

[P279-2016] "Cerebral vasomotor reactivity assessment using Transcranial Doppler and MRI with apnea test"

Herrera, C. R. C.; **Beltramini, G. C.***; Avelar, W. M.; Lima, F. O.; Li, L. M.

Differently from previous studies that used Transcranial Doppler (TCD) and functional MRI (fMRI) for cerebral vasomotor reactivity (CVR) assessment in patients with carotid stenosis (CS), we assessed CVR using an identical stimulus, the Breath-Holding Test (BHT). We included 15 patients with CS and 7 age-matched controls to verify whether fMRI responded differently to BHT between groups and to calculate the agreement rate between tests. For TCD, impaired CVR was defined when the mean percentage increase on middle cerebral artery velocities was p31% on 3 consecutive 30-s apnea intercalated by 4-min normal breathing intervals. For fMRI, the percent variation on blood oxygen level-dependent (BOLD) signal intensity in the lentiform nucleus (LN) ipsilateral to the CS (or both LNs for controls) from baseline breathing to apnea was measured. The Euclidian differences between the series of each subject and the series of controls and patients classified it into normal or impaired CVR.

We found different percent variations on BOLD-signal intensities between groups (P=0.032). The agreement was good in Controls (85.7%; kappa=0.69) and overall (77.3%; kappa=0.54). We conclude that BHT was feasible for CVR assessment on fMRI and elicited different BOLD responses in patients and controls, with a good overall agreement between the tests.

[P280-2016] "Characterization of the spontaneous light emission of the PMTs used in the Double Chooz experiment"

Abe, Y.; Abrahao, T.; Almazan, H.; **Gonzalez, L. F. G.***; **Kemp, E.***; et al.
Double Chooz Collaboration

During the commissioning of the first of the two detectors of the Double Chooz experiment, an unexpected and dominant background caused by the emission of light inside the optical volume has been observed. A specific study of the ensemble of phenomena called Light Noise has been carried out in-situ, and in an external laboratory, in order to characterize the signals and to identify the possible processes underlying the effect. Some mechanisms of instrumental noise originating from the PMTs were identified and it has been found that the leading one arises from the light emission localized on the photomultiplier base and produced by the combined effect of heat and high voltage across the transparent epoxy resin covering the electric components. The correlation of the rate and the amplitude of the signal with the temperature has been observed. For the first detector in operation the induced background has been mitigated using online and offline analysis selections based on timing and light pattern of the signals, while a modification of the photomultiplier assembly has been implemented for the second detector in order to blacken the PMT bases.

[P281-2016] "Deciphering M-T diagram of shape memory Heusler alloys: reentrance, plateau and beyond"

Sergeenkov, S.; Cordova, C.; Ari-Gur, P.; Koledov, V. V.; Kamantsev, A. P.; Shavrov, V. G.; Mashirov, A. V.; Gomes, A. M.; Takeuchi, A. Y.; **de Lima, O. F.***; Araujo-Moreira, F. M.

We present our recent results on temperature behaviour of magnetization observed in Ni47Mn39In14 Heusler alloys. Three regions can be distinguished in the M-T diagram: (I) low temperature martensitic phase (with the Curie temperature TCM = 140 K), (II) intermediate mixed phase (with the critical temperature TMS = 230 K) exhibiting a reentrant like behavior (between TCM and TMS) and (III) high temperature austenitic phase (with the Curie temperature TCA = 320 K) exhibiting a rather wide plateau region (between TMS and TCA). By arguing that powerful structural transformations, causing drastic modifications of the domain structure in alloys, would also trigger strong fluctuations of the order parameters throughout the entire M-T diagram, we were able to successfully fit all the data by incorporating Gaussian fluctuations (both above and below the above three critical temperatures) into the Ginzburg-Landau scenario.

[P282-2016] "Decomposing transverse momentum balance contributions for quenched jets in PbPb collisions at root s(NN)=2.76 TeV"

Ruiz Vargas, J. C.; Khachatryan, V.; **Chinellato, J. A.***; et al.
CMS Collaboration

Interactions between jets and the quark-gluon plasma produced in heavy ion collisions are studied via the angular distributions of summed charged-particle transverse momenta (p(T)) with respect to both the leading and subleading jet axes in high-p(T) dijet events. The contributions of charged particles in different momentum ranges to the overall event p(T) balance are decomposed into short-range jet peaks and a long-range azimuthal asymmetry in charged-particle p(T). The results for PbPb collisions are compared to those in pp collisions using data collected in 2011 and 2013, at collision energy root s(NN) = 2.76 TeV with integrated luminosities of 166 mu b(-1) and 5.3 pb(-1), respectively, by the CMS experiment at the LHC. Measurements are presented as functions of PbPb collision centrality, charged-particle p(T), relative azimuth, and radial distance from the jet axis for balanced and unbalanced dijets.

[P283-2016] "Dissipative effect in long baseline neutrino experiments"

Oliveira, R. L. N.*

The propagation of neutrinos in long baselines experiments may be influenced by dissipation effects. Using the Lindblad master equation we evolve neutrinos taking into account these dissipative effects. The MSW and the dissipative effects may change the behavior of the probabilities. In this work, we show and explain how the behavior of the probabilities can change due to the decoherence and relaxation effects acting individually with the MSW effect. A new exotic peak appears in this case and we show the difference between the decoherence and relaxation effects in the appearance of this peak. We also adapt the usual approximate expression for survival and appearance probabilities with all possible decoherence effects. We suppose the baseline of DUNE and show how each of the decoherence parameters changes the probabilities analyzing the possible modification using a numeric and an analytic approach.

[P284-2016] "Dose rate effects in the radiation damage of the plastic scintillators of the CMS hadron endcap calorimeter"

Khachatryan, V.; Sirunyan, A. M.; **Chinellato, J. A.***; et al.
CMS-HCAL Collaboration

We present measurements of the reduction of light output by plastic scintillators irradiated in the CMS detector during the 8 TeV run of the Large Hadron Collider and show that they indicate a strong dose rate effect. The damage for a given dose is larger for lower dose rate exposures. The results agree with previous measurements of dose rate effects, but are stronger due to the very low dose rates probed. We show that the scaling with dose rate is consistent with that expected from diffusion effects.

[P285-2016] "Effect of high energy physics large collaborations on higher education institutions citations and rankings"

Manganote, E. J. T.*; Schulz, P. A.; de Brito Cruz, C. H.*

We analyze the effect of High Energy Physics Large Collaboration articles, an important example of Big Science and well traceable in Web of Science, on the output and citation records at the country and institutional levels. Furthermore, the effect of these specific bibliometric data on two different university rankings, the SCIMAGO and the THE, is addressed. The results suggest that these rankings may be significantly affected by this class of output, suggesting the necessity of a discussion about methodologies differentiating them from other outputs, as well as the time range considered by the rankings.

[P286-2016] "Efficient Biexciton Interaction in Perovskite Quantum Dots Under Weak and Strong Confinement"

Castaneda, J. A.*; Nagamine, G.*; Yassitepe, E.; Bonato, L. G.; Voznyy, O.; Hoogland, S.; Nogueira, A. F.; Sargent, E. H.; **Brito Cruz, C. H.***; **Padilha, L. A.***

Cesium lead halide perovskite quantum dots (PQDs) have emerged as a promising new platform for lighting applications. However, to date, light emitting diodes (LED) based on these materials exhibit limited efficiencies. One hypothesized limiting factor is fast nonradiative multiexciton Auger recombination. Using ultrafast spectroscopic techniques, we investigate multicarrier interaction and recombination mechanisms in cesium lead halide PQDs. By mapping the dependence of the biexciton Auger lifetime and the biexciton binding energy on nanomaterial size and composition, we find unusually strong Coulomb interactions among multiexcitons in PQDs. This results in weakly emissive biexcitons and trions, and accounts for low light emission efficiencies. We observe that, for strong confinement, the biexciton lifetime depends linearly on the PQD volume. This dependence becomes sublinear in the weak confinement regime as the PQD size increases beyond the Bohr radius. We demonstrate that Auger recombination is faster in PQDs compared to CdSe nanoparticles having the same volume, suggesting a stronger Coulombic interaction in the PQDs. We confirm this by demonstrating an increased biexciton binding energy, which reaches a maximum of about 100 meV, fully three times larger than in CdSe quantum dots. The biexciton shift can lead to low-threshold optical gain in these materials. These findings also suggest that materials engineering to reduce Coulombic interaction in cesium lead halide PQDs could improve prospects for high efficiency optoelectronic devices. Core-shell structures, in particular type-II nanostructures, which are known to reduce the bandedge Coulomb interaction in CdSe/CdS, could beneficially be applied to PQDs with the goal of increasing their potential in lighting applications.

[P287-2016] "Enhanced supercapacitor performance of a 3D architecture tailored using atomically thin rGO-MoS2 2D sheets"

Jose, S. P.; Tiwary, C. S.; Kosolwattana, S.; Raghavan, P.; **Machado, L. D.***; Gautam, C.; Prasankumar, T.; Joyner, J.; Ozden, S.; **Galvao, D. S.***; Ajayan, P. M.

A 3D architecture is fabricated using 2D nano-sheets of GO and MoS2 as the building blocks by a facile, one-pot chronoamperometry method to achieve a conductive additive free, binder free and scalable supercapacitor electrode. The superior electrochemical properties of the 3D PPy-rGO-MoS2 (PGMo) are due to its porous structure, thin wall, high surface area and high electrical conductivity that endow rapid transportation of electrolyte ions and electrons throughout the electrode matrix. The synergistic effect between the components in a proper ratio improves the supercapacitor performance and material stability of PGMo.

The possible correlation of the structure and electrochemical performance of the 3D ternary composite is backed by a fully atomistic molecular dynamics (MD) simulation study. The high specific capacitance (387 F g(-1)) and impressive cycling stability (>1000 cycles) estimated for PGMo open up an opportunity to consider the 3D ternary nanostructures as cutting edge materials for energy storage solutions.

[P288-2016] "Enhancement of carrier lifetimes in type-II quantum dot/quantum well hybrid structures"

Couto, O. D. D.*, Jr.; de Almeida, P. T.*; dos Santos, G. E.*; Balanta, M. A. G.*; Andriolo, H. F.*; Brum, J. A.*; Brasil, M. J. S. P.*; Iikawa, F.*; Liang, B. L.; Huffaker, D. L.

We investigate optical transitions and carrier dynamics in hybrid structures containing type-I GaAs/AlGaAs quantum wells (QWs) and type-II GaSb/AlGaAs quantum dots (QDs). We show that the optical recombination of photocreated electrons confined in the QWs with holes in the QDs and wetting layer can be modified according to the QW/QD spatial separation. In particular, for low spacer thicknesses, the QW optical emission can be suppressed due to the transference of holes from the QW to the GaSb layer, favoring the optical recombination of spatially separated carriers, which can be useful for optical memory and solar cell applications. Time-resolved photoluminescence (PL) measurements reveal non-exponential recombination dynamics. We demonstrate that the PL transients can only be quantitatively described by considering both linear and quadratic terms of the carrier density in the bimolecular recombination approximation for type-II semiconductor nanostructures. We extract long exciton lifetimes from 700 ns to 5 mu s for QDs depending on the spacer layer thickness.

[P289-2016] "Evaluation of mean conversion coefficients from air-kerma to H*(10) using secondary and transmitted x-ray spectra in the diagnostic radiology energy range"

Gonzales, A. H. Lopez; Santos, J. C.; Mariano, L.; **Tomal, A.***; Costa, P. R.

Ambient dose equivalent H*(10) is an operational quantity recommended by the IAEA to establish dose constraints in area monitoring for external radiation. The direct measurement of H*(10) is not common due to the complexity in the calibration procedures of radiation monitors involving the use of expanded and aligned radiation fields. Therefore, conversion coefficients are used to assess H*(10) from the physical quantity air-kerma. Conversion coefficients published by international commissions, ICRU and ICRP, present a correlation with the radiation beam quality. However, Brazilian regulation establishes 1.14 Sv Gy(-1) as unique conversion coefficient to convert air-kerma into H*(10), disregarding its beam quality dependence. The present study computed mean conversion coefficients from secondary and transmitted x-ray beams in order to improve the current assessment of H*(10). The weighting of conversion coefficients corresponding to monoenergetic beams with the spectrum energy distribution in terms of air-kerma was used to compute the mean conversion coefficients. In order to represent dedicated chest radiographic facilities, an anthropomorphic phantom was used as scatter object of the primary beam. Secondary x-ray spectra were measured in the diagnostic energy range at scattering angles of 30 degrees, 60 degrees, 90 degrees 120 degrees and 150 degrees degrees. Barite mortar plates were used as attenuator of the secondary beam to produce the corresponding transmitted x-ray spectra.

Results show that the mean conversion coefficients are about 43% higher than the recommended value accepted by Brazilian regulation. For secondary radiation measured at 100 kV the mean coefficient should be 1.46 Sv Gy(-1), which represent the higher value in the mean coefficient set corresponding to secondary beams. Moreover, for transmitted x-ray beams at 100 kV, the recommended mean conversion coefficient is 1.65 Sv Gy(-1) for all barite mortar plate thickness and all scattering angles. An example of application shows the discrepancy in the evaluation of secondary shielding barriers in a controlled area when the shielding goals is evaluated. The conclusion based on these results is that a unique coefficient may not be adequate for deriving the H*(10).

[P290-2016] "Fine structure of the diffraction cone: From the ISR to the LHC"

Fagundes, D. A.; Jenkovszky, L.; Miranda, E. Q.; Pancheri, G.; **Silva, P. V. R. G.***

Following earlier findings, we argue that the low-vertical bar t vertical bar structure in the elastic diffractive cone, recently reported by the TOTEM Collaboration at 8 TeV, is a consequence of the threshold singularity required by t-channel unitarity, such as revealed earlier at the ISR. By using simple Regge-pole models, we analyze the available data on the pp elastic differential cross section in a wide range of c.m. energies, namely those from ISR to LHC8, obtaining good fits of all datasets. This study hints at the fact that the non-exponential behavior observed at LHC8 is a recurrence of the low-vertical bar t vertical bar "break" phenomenon, observed in the seventies at ISR, being induced by the presence of a two-pion loop singularity in the Pomeron trajectory.

[P291-2016] "Forward-backward asymmetry of Drell-Yan lepton pairs in pp collisions at root s=8 TeV"

Khachatryan, V.; Sirunyan, A. M.; Tumasyan, A.; **Chinellato, J.***; **Tonelli Manganote, E. J.***; et al.
CMS Collaboration

A measurement of the forward-backward asymmetry A(FB) of oppositely charged lepton pairs (mu mu and ee) produced via Z/gamma* boson exchange in pp collisions at root s = 8 TeV is presented. The data sample corresponds to an integrated luminosity of 19.7 fb(-1) collected with the CMS detector at the LHC. The measurement of AFB is performed for dilepton masses between 40 GeV and 2 TeV and for dilepton rapidity up to 5. The AFB measurements as a function of dilepton mass and rapidity are compared with the standard model predictions.

[P292-2016] "Heat flux measurements of Tb3M series (M = Co, Rh and Ru): Specific heat and magnetocaloric properties"

Monteiro, J. C. B.*; **Lombardi, G. A.***; dos Reis, R. D.; **Freitas, H. E.***; **Cardoso, L. P.***; **Mansanares, A. M.***; **Gandra, F. G.***

We report on the magnetic properties and magnetocaloric effect (MCE) for the Tb3M series, with M = Co, Rh and Ru, obtained using a heat flux technique.

The specific heat of Tb3Co and Tb3Rh are very similar, with a first order type transition occurring around 6 K below the magnetic ordering temperature without any corresponding feature on the magnetization. The slightly enhanced electronic specific heat, the Debye temperature around 150 K and the presence of the magnetic specific heat well above the ordering temperature are also characteristic of many other compounds of the R3M family (R = Rare Earth). The specific heat for Tb3Ru, however, presents two peaks at 37 K and 74 K. The magnetization shows that below the first peak the system presents an antiferromagnetic behavior and is paramagnetic above 74 K. We obtained a magnetocaloric effect for M= Co and Rh, -Delta S=12 J/kg K, but for Tb3Ru it is less than 3 J/kg K (mu(0)Delta H = 5 T). We believe that the experimental results show that the MCE is directly related with the process of hybridization of the (R)5d-(M)d electrons that occurs in the R3M materials.

[P293-2016] "Insight into In Situ Amphiphilic Functionalization of Few-Layered Transition Metal Dichalcogenide Nanosheets"

Shen, J.; Wu, J.; Wang, M.; Ge, Y.; Dong, P.; Baines, R.; **Brunetto, G.***; **Machado, L. D.***; Ajayan, P. M.; Ye, M.

A facile route toward functionalized amphiphilic layered transition-metal dichalcogenide nanosheets through in situ polymerization of polystyrene-polyacrylamide copolymers is established. The attachment of copolymers greatly affects their dispersibility in different kinds of solvents. Surface-tension components, polarity, and coordination effects of the copolymer are found to be the main factors affecting the dispersibility.

[P294-2016] "Intensity liquid level sensor based on multimode interference and fiber Bragg grating"

Oliveira, R.*; **Aristilde, S.***; **Osorio, J. H.***; Franco, M. A. R.; Bilro, L.; Nogueira, R. N.; **Cordeiro, C. M. B.***

In this paper an intensity liquid level sensor based on a single-mode-no-core-single-mode (SMS) fiber structure together with a Bragg grating inscribed in the later single mode fiber is proposed. As the no-core fiber is sensitive to the external refractive index, the SMS spectral response will be shifted related to the length of no-core fiber that is immersed in a liquid. By positioning the FBG central wavelength at the spectral region of the SMS edge filter, it is possible to measure the liquid level using the reflected FBG peak power through an intensity-based approach. The sensor is also self--referenced using the peak power of another FBG that is placed before and far from the sensing part. The temperature error analysis was also studied revealing that the sensor can operate in environments where the temperature changes are minimal. The possibility to use a second setup that makes the whole device temperature insensitive is also discussed.

[P295-2016] "Laser altimeter for the deep space mission aster modeling and simulation of the instrument operation above a surface with crater"

de Brum, Antonio G. V.; **da Cruz, F. C.***; Hetem, A., Jr.

The 1st Brazilian deep space mission, ASTER, will carry onboard a laser altimeter to assist in the investigation of the triple asteroid system 2001-SN263. The instrument was named ALR and its development is now in progress. A series of studies was conducted with a view to the creation of the instrument control software. These studies involved the modeling of the instrument and its operation and resulted in the creation of a package of computer programs to simulate the operation of a pulsed laser altimeter with operating principle based on the measurement of the time of flight of the travelling pulse. The software Simulator was called , and the results obtained with its use represent what should be expected as return signal when laser pulses are fired toward a target, reflect on it and return to be detected by the instrument. The program was successfully tested with regard to some of the most common situations expected. It constitutes now the main workbench dedicated to the creation and testing of control software to embark in the ALR. In addition, the Simulator constitutes also an important tool to assist the creation of software to be used on Earth, in the processing and analysis of the data received from the instrument. The main focus of this work is the special case which involves the modeling of a surface with crater, along with the simulation of the instrument operation above this type of terrain. The approach used here was the comparison of the return signal obtained from the crater with the expected return signal in case of a flat and homogeneous surface. This method proved to be useful in the extraction of details of the terrain with crater and is recommended for the analysis of the return signal of any surface.

[P296-2016] "LHC forward physics"

Akiba, K.; Akbiyik, M.; Albrow, M.; **Chinellato, D.***; et al.

[P297-2016] "Ligand and Metal Effects on the Stability and Adsorption Properties of an Isoreticular Series of MOFs Based on T-Shaped Ligands and Paddle-Wheel Secondary Building Units"

Xiong, Y.; Fan, Yan-Zhong; **Borges, D. D.***; Chen, Cheng-Xia; Wei, Zhang-Wen; Wang, Hai-Ping; Pan, M.; Jiang, Ji-Jun; Maurin, G.; Su, Cheng-Yong

The synthesis of stable porous materials with appropriate pore size and shape for desired applications remains challenging. In this work a combined experimental/computational approach has been undertaken to tune the stability under various conditions and the adsorption behavior of a series of MOFs by subtle control of both the nature of the metal center ($Co2+$, $Cu2+$, and $Zn2+$) and the pore surface by the functionalization of the organic linkers with amido and N-oxide groups. In this context, six isoreticular MOFs based on T-shaped ligands and paddle-wheel units with ScD0.33 topology have been synthesized. Their stabilities have been systematically investigated along with their ability to adsorb a wide range of gases (N-2, $CO2$, $CH4$, CO, H-2, light hydrocarbons (C-1-C-4)) and vapors (alcohols and water). This study has revealed that the MOF frameworks based on $Cu2+$ are more stable than their $Co2+$ and $Zn2+$ analogues, and that the N-oxide ligand endows the MOFs with a higher affinity for $CO2$ leading to excellent selectivity for this gas over other species.

[P298-2016] "Limits on Active to Sterile Neutrino Oscillations from Disappearance Searches in the MINOS, Daya Bay, and Bugey-3 Experiments"

Adamson, P.; An, F. P.; Anghel, I.; **Escobar, C. O.***; et al. Daya Bay Collaboration; MINOS Collaboration

Searches for a light sterile neutrino have been performed independently by the MINOS and the Daya Bay experiments using the muon (anti) neutrino and electron antineutrino disappearance channels, respectively. In this Letter, results from both experiments are combined with those from the Bugey-3 reactor neutrino experiment to constrain oscillations into light sterile neutrinos. The three experiments are sensitive to complementary regions of parameter space, enabling the combined analysis to probe regions allowed by the Liquid Scintillator Neutrino Detector (LSND) and MiniBooNE experiments in a minimally extended four-neutrino flavor framework. Stringent limits on sin(2) 2 theta(mu e) are set over 6 orders of magnitude in the sterile mass-squared splitting Delta m(41)(2). The sterile-neutrino mixing phase space allowed by the LSND and MiniBooNE experiments is excluded for Delta m(41)(2) < 0.8 eV(2) at 95% CLs.

[P299-2016] "Magnetic interactions in compositionally modulated nanowire arrays"

Palmero, E. M.; **Beron, F.***; Bran, C.; del Real, R. P.; Vazquez, M.

Series of high hexagonally ordered compositionally modulated nanowire arrays, with different Cu layer and FeCoCu segment thicknesses and a constant diameter of 35 nm, were fabricated by electroplating from a single electrolytic bath into anodic aluminum oxide membranes. The objective of the study was to determine the influence of ferromagnetic (FM) segment and non-ferromagnetic (NFM) layer thickness on the magnetic properties, particularly coercivity and magnetic interactions. First-order reversal curve (FORC) measurements and simulations were performed to quantify the effect of the inter-/intra-nanowire magnetostatic interactions on the coercivity and interaction field distributions. The FORC coercivity increases for a thick NFM layer and long FM segments due to decoupling of the the FM segments and the increased shape anisotropy, respectively. On the other hand, the interaction field presents a parallel strong reduction for a thick NFM layer and thin FM segments, which is ascribed to a similar NFM/FM thickness ratio and degree of FM segment decoupling along the nanowire.

[P300-2016] "Magneto-transport properties of As-implanted highly oriented pyrolytic graphite"

de Jesus, R. F.; **Camargo, B. C.***; **da Silva, R. R.***; **Kopelevich, Y.***; Behar, M.; Gusmao, M. A.; Pureur, P.

We report on magneto-transport experiments in a high-quality sample of highly-oriented pyrolytic graphite (HOPG). Magneto-resistance and Hall resistivity measurements were carried out in magnetic inductions up to B = 9 T applied parallel to the c-axis at fixed temperatures between T=2 K and T=12 K. The sample was submitted to three subsequent irradiations with As ions. The implanted As contents were 2.5, 5 and 10 at% at the maximum of the distribution profile. Experiments were performed after each implantation stage. Shubnikov-de Haas (SdH) oscillations were observed in both the magneto-resistance and Hall-effect measurements.

Analyses of these results with fast Fourier transform (FFT) lead to fundamental frequencies and effective masses for electrons and holes that are independent of the implantation fluences. The Hall resistivity at low temperatures shows a sign reversal as a function of the field in all implanted states. We interpret the obtained results with basis on a qualitative model that supposes the existence of an extrinsic hole density associated to the defect structure of our sample. We conclude that the As implantation does not produce a semiconductor-type doping in our HOPG sample. Instead, an increase in the extrinsic hole density is likely to occur as a consequence of disorder induced by implantation.

[P301-2016] "Measurements of nanoresonator-qubit interactions in a hybrid quantum electromechanical system"

Rouxinol, F.*; Hao, Y.; Brito, F.; Caldeira, A. O.*; Irish, E. K.; LaHaye, M. D.

Experiments to probe the basic quantum properties of motional degrees of freedom of mechanical systems have developed rapidly over the last decade. One promising approach is to use hybrid electromechanical systems incorporating superconducting qubits and microwave circuitry. However, a critical challenge facing the development of these systems is to achieve strong coupling between mechanics and qubits while simultaneously reducing coupling of both the qubit and mechanical mode to the environment. Here we report measurements of a qubit-coupled mechanical resonator system consisting of an ultra-high-frequency nanoresonator and a long coherence-time superconducting transmon qubit, embedded in a superconducting coplanar waveguide cavity. It is demonstrated that the nanoresonator and transmon have commensurate energies and transmon coherence times are one order of magnitude larger than for all previously reported qubit-coupled nanoresonators. Moreover, we show that numerical simulations of this new hybrid quantum system are in good agreement with spectroscopic measurements and suggest that the nanoresonator in our device resides at low thermal occupation number, near its ground state, acting as a dissipative bath seen by the qubit. We also outline how this system could soon be developed as a platform for implementing more advanced experiments with direct relevance to quantum information processing and quantum thermodynamics, including the study of nanoresonator quantum noise properties, reservoir engineering, and nanomechanical quantum state generation and detection.

[P302-2016] "Mechanical and structural properties of graphene-like carbon nitride sheets"

de Sousa, J. M.*; Botari, T.*; Perim, E.; Bizao, R. A*.; Galvao, D. S.*

Carbon nitride-based nanostructures have attracted special attention (from theory and experiments) due to their remarkable electromechanical properties. In this work we have investigated the mechanical properties of some graphene-like carbon nitride membranes through fully atomistic reactive molecular dynamics simulations. We have analyzed three different structures of these CN families, the so-called graphene-based g-CN, triazine-based g-C3N4 and heptazine-based g-C3N4. The stretching dynamics of these membranes was studied for deformations along their two main axes and at three different temperatures: 10 K, 300 K and 600 K. We show that g-CN membranes have the lowest ultimate fracture strain value, followed by heptazine-based and triazine-based ones, respectively.

This behavior can be explained in terms of their differences in density values, topologies and types of chemical bonds. The dependency of the fracture patterns on the stretching directions is also discussed.

[P303-2016] "Mechano-chemical stabilization of three-dimensional carbon nanotube aggregates"

Koizumi, R.; Hart, A. H. C.; Brunetto, G.*; Bhowmick, S.; Owuor, P. S.; Hamel, J. T.; Gentles, A. X.; Ozden, S.; Lou, J.; Vajtai, R.; Asif, S. A. S.; Galvao, D. S.*; Tiwary, C. S.; Ajayan, P. M.

Here we report a combined study of experiments and simulations to understand how chemical functional groups can mechanically stabilize aggregates of carbon nanotubes (CNTs). Ultralow density aggregates of chemically functionalized CNTs, in the form of macro-scale spheres made by freeze-drying method, show mechanical stabilization and near complete elastic recovery during deformation. Simulations of interacting functionalized carbon nanotube aggregates show better structural retention compared to non-functionalized CNTs under compression, suggesting that the atomic-level interactions between functional groups on adjoining CNTs help maintain structural rigidity and elastic response during loading. Aggregates of non-functionalized CNTs collapses under similar loading conditions. The dynamic mechanical responses of CNT macrostructures and mechano-chemical stabilization are directly observed using in-situ deformation inside a scanning electron microscope.

[P304-2016] "Modeling quasi-dark states with temporal coupled-mode theory"

Souza, M. C. M. M.*; Rezende, G. F. M.*; Barea, L. A. M.; Wiederhecker, G. S.*; Frateschi, N. C.*

Coupled resonators are commonly used to achieve tailored spectral responses and allow novel functionalities in a broad range of applications. The Temporal Coupled-Mode Theory (TCMT) provides a simple and general tool that is widely used to model these devices. Relying on TCMT to model coupled resonators might however be misleading in some circumstances due to the lumped-element nature of the model. In this article, we report an important limitation of TCMT related to the prediction of dark states. Studying a coupled system composed of three microring resonators, we demonstrate that TCMT predicts the existence of a dark state that is in disagreement with experimental observations and with the more general results obtained with the Transfer Matrix Method (TMM) and the Finite-Difference Time-Domain (FDTD) simulations. We identify the limitation in the TCMT model to be related to the mechanism of excitation/decay of the supermodes and we propose a correction that effectively reconciles the model with expected results. Our discussion based on coupled microring resonators can be useful for other electromagnetic resonant systems due to the generality and far-reach of the TCMT formalism.

[P305-2016] "Multifractality in fidelity sequences of optimized Toffoli gates"

Moqadam, J. K.*; Welter, G. S.; Esquef, P. A. A.

We analyze the multifractality in the fidelity sequences of several engineered Toffoli gates. Using quantum control methods, we consider several optimization problems whose global solutions realize the gate in a chain of three qubits with XY Heisenberg interaction. Applying a minimum number of control pulses assuring a fidelity above 99 % in the ideal case, we design stable gates that are less sensitive to variations in the interqubits couplings. The most stable gate has the fidelity above 91 % with variations about 0.1 %, for up to 10 % variation in the nominal couplings. We perturb the system by introducing a single source of 1/f noise that affects all the couplings. In order to quantify the performance of the proposed optimized gates, we calculate the fidelity of a large set of optimized gates under prescribed levels of coupling perturbation. Then, we run multifractal analysis on the sequence of attained fidelities. This way, gate performance can be assessed beyond mere average results, since the chosen multifractality measure (the width of the multifractal spectrum) encapsulates into a single performance indicator the spread of fidelity values around the mean and the presence of outliers. The higher the value of the performance indicator the more concentrated around the mean the fidelity values are and rarer is the occurrence of outliers. The results of the multifractal analysis on the fidelity sequences demonstrate the effectiveness of the proposed optimized gate implementations, in the sense they are rendered less sensitive to variations in the interqubits coupling strengths.

[P306-2016] "Non-Euclidean Ideal Spectrometry"

Sa Earp, H. N.; Sicca, V.; **Kyotoku, B. B. C.***

We describe the mathematical scheme for an anomaly-free ideal spectrometer, based on a 2-dimensional plane medium with conical regions of bounded slope. Moreover, the construction may be realised in many different configurations.

[P307-2016] "Performance improvement of cascaded dispersion compensation based fiber Bragg gratings by smart selection"

Giacoumidis, E.; Perentos, A.; **Aldaya, I.***

A Monte-Carlo (MC)-based heuristic algorithm is applied, for the first time, in cascaded chromatic dispersion compensation based fiber Bragg gratings (FBGs) for performance improvement by means of group delay ripple mitigation. It is shown that the MC method outperforms random FBG selection by 37.5% and 35% for 10 and 15 cascaded FBGs, respectively.

[P308-2016] "Phenomenological MSSM interpretation of CMS searches in pp collisions at root s=7 and 8 TeV"

Khachatryan, V.; Sirunyan, A. M.; Tumasyan, A.; **Chinellato, J. A.***; et al.
CMS Collaboration

Searches for new physics by the CMS collaboration are interpreted in the framework of the phenomenological minimal supersymmetric standard model (pMSSM). The data samples used in this study were collected at root s = 7 and 8 TeV and have integrated luminosities of 5.0 fb(-1) and 19.5 fb(-1), respectively.

A global Bayesian analysis is performed, incorporating results from a broad range of CMS supersymmetry searches, as well as constraints from other experiments. Because the pMSSM incorporates several well-motivated assumptions that reduce the 120 parameters of the MSSM to just 19 parameters defined at the electroweak scale, it is possible to assess the results of the study in a relatively straightforward way. Approximately half of the model points in a potentially accessible subspace of the pMSSM are excluded, including all pMSSM model points with a gluino mass below 500 GeV, as well as models with a squark mass less than 300 GeV. Models with chargino and neutralino masses below 200 GeV are disfavored, but no mass range of model points can be ruled out based on the analyses considered. The nonexcluded regions in the pMSSM parameter space are characterized in terms of physical processes and key observables, and implications for future searches are discussed.

[P309-2016] "Residual stress in nano-structured stainless steel (AISI 316L) prompted by Xe+ ion bombardment at different impinging angles"

Cucatti, S.*; Droppa, R., Jr.; Figueroa, C. A.; Klaus, M.; Genzel, Ch.; **Alvarez, F.***

The effect of low energy (<1 keV) xenon (Xe+) ion bombardment on the residual stress of polycrystalline iron alloy (AISI 316L steel) is reported. The results take into account the influence of the ion incident angle maintaining constant all other bombarding parameters (i. e., ion energy and current density, temperature, and doses). The bombarded surface topography shows that ions prompt the formation of nanometric regular patterns on the surface crystalline grains and stressing the structure. The paper focalizes on the study of the surface residual stress state stemming from the ion bombardment studied by means of the "sin(2) psi" and "Universal Plot" methods. The analysis shows the absence of shear stress in the affected material region and the presence of compressive in--plane residual biaxial stress (similar to 200 MPa) expanding up to similar to 1 mu m depth for all the studied samples. Samples under oblique bombardment present higher compressive stress values in the direction of the projected ion beam on the bombarded surface. The absolute value of the biaxial surface stress difference (sigma(11)-sigma(22)) increases on ion impinging angles, a phenomenon associated with the momentum transfer by the ions. The highest stress level was measured for ion impinging angles of 45 degrees (sigma(11) = -380 +/- 610 MPa and sigma(22) = -320 +/- 10 MPa). The different stresses obtained in the studied samples do not affect significantly the formation of characteristic surface patterns.

[P310-2016] "Search for lepton flavour violating decays of heavy resonances and quantum black holes to an e mu pair in proton-proton collisions at root s=8 TeV"

Khachatryan, V.; Sirunyan, A. M.; Tumasyan, A.; Chinellato, J. A.*; **Tonelli Manganote, E. J.***; et al.
CMS Collaboration

A search for narrow resonances decaying to an electron and a muon is presented. The e mu mass spectrum is also investigated for non-resonant contributions from the production of quantum black holes (QBHs). The analysis is performed using data corresponding to an integrated luminosity of 19.7 fb(-1) collected in proton-proton collisions at a centre-of--mass energy of 8 TeV with the CMS detector at the LHC.

With no evidence for physics beyond the standard model in the invariant mass spectrum of selected e mu pairs, upper limits are set at 95 % confidence level on the product of cross section and branching fraction for signals arising in theories with charged lepton flavour violation. In the search for narrow resonances, the resonant production of a tau sneutrino in R-parity violating supersymmetry is considered. The t sneutrino is excluded for masses below 1.28 TeV for couplings lambda(132) = lambda(231) = lambda(‘)(311) = 0.01, and below 2.30 TeV for lambda(132) = lambda(231) = 0.07 and lambda(‘)(311) = 0.11. These are the most stringent limits to date from direct searches at high-energy colliders. In addition, the resonance searches are interpreted in terms of a model with heavy partners of the Z boson and the photon. In a framework of TeV-scale quantum gravity based on a renormalization of Newton's constant, the search for non-resonant contributions to the e mu mass spectrum excludes QBH production below a threshold mass M-th of 1.99 TeV. In models that invoke extra dimensions, the bounds range from 2.36 TeV for one extra dimension to 3.63 TeV for six extra dimensions. This is the first search for QBHs decaying into the e mu final state.

[P311-2016] "Search for new physics in same-sign dilepton events in proton-proton collisions at"

Khachatryan, V.; Sirunyan, A. M.; Tumasyan, A.; Chinellato, J. A.*; Tonelli Manganote, E. J.*; et al.
CMS Collaboration

A search for new physics is performed using events with two isolated same-sign leptons, two or more jets, and missing transverse momentum. The results are based on a sample of proton-proton collisions at a center-of-mass energy of 13 recorded with the CMS detector at the LHC, corresponding to an integrated luminosity of 2.3 . Multiple search regions are defined by classifying events in terms of missing transverse momentum, the scalar sum of jet transverse momenta, the transverse mass associated with a boson candidate, the number of jets, the number of quark jets, and the transverse momenta of the leptons in the event. The analysis is sensitive to a wide variety of possible signals beyond the standard model. No excess above the standard model background expectation is observed. Constraints are set on various supersymmetric models, with gluinos and bottom squarks excluded for masses up to 1300 and 680, respectively, at the 95 % confidence level. Upper limits on the cross sections for the production of two top quark-antiquark pairs (119) and two same-sign top quarks (1.7) are also obtained. Selection efficiencies and model independent limits are provided to allow further interpretations of the results.

[P312-2016] "Search for new physics with the M-T2 variable in all-jets final states produced in pp collisions at root s=13 Tev"

Khachatryan, V.; Sirunyan, A. M.; Tumasyan, A.; **Chinellato, J. A.*;** et al.
CMS Collaboration

A search for new physics is performed using events that contain one or more jets, no isolated leptons, and a large transverse momentum imbalance, as measured through the M-T2 variable, which is an extension of the transverse mass in events with two invisible particles. The results are based on a sample of proton-proton collisions collected at a center-of--mass energy of 13 TeV with the CMS detector at the LHC, and that corresponds to an integrated luminosity of 2.3 fb(-1).

The observed event yields in the data are consistent with predictions for the standard model backgrounds. The results are interpreted using simplified models of supersymmetry and are expressed in terms of limits on the masses of potential new colored particles. Assuming that the lightest neutralino is stable and has a mass less than about 500 GeV, gluino masses up to 1550-1750 GeV are excluded at 95% confidence level, depending on the gluino decay mechanism. For the scenario of direct production of squark-antisquark pairs, top squarks with masses up to 800 GeV are excluded, assuming a 100% branching fraction for the decay to a top quark and neutralino. Similarly, bottom squark masses are excluded up to 880 GeV, and masses of light-flavor squarks are excluded up to 600-1260 GeV, depending on the degree of degeneracy of the squark masses.

[P313-2016] "Search for Sterile Neutrinos Mixing with Muon Neutrinos in MINOS"

Adamson, P.; Anghel, I.; Aurisano, A.; **Escobar, C. O.*;** et al.
MINOS Collaboration

We report results of a search for oscillations involving a light sterile neutrino over distances of 1.04 and 735 km in a nu(mu)--dominated beam with a peak energy of 3 GeV. The data, from an exposure of 10.56 x 10(20) protons on target, are analyzed using a phenomenological model with one sterile neutrino. We constrain the mixing parameters theta(24) and Delta m(41)(2) and set limits on parameters of the four-dimensional Pontecorvo-Maki-Nakagawa-Sakata matrix, vertical bar U-mu 4 vertical bar(2) and vertical bar U-tau 4 vertical bar(2), under the assumption that mixing between nu(e) and nu(s) is negligible (vertical bar U-e4 vertical bar(2) = 0). No evidence for nu(mu) -> nu(s) transitions is found and we set a world-leading limit on theta(24) for values of Delta m(41)(2) less than or similar to 1 eV(2).

[P314-2016] "Search for two Higgs bosons in final states containing two photons and two bottom quarks in proton--proton collisions at 8 TeV"

Khachatryan, V.; Sirunyan, A. M.; Tumasyan, A.; **Chinellato, J. A.*; Manganote, E. J. Tonelli.*;** et al.
CMS Collaboration

A search is presented for the production of two Higgs bosons in final states containing two photons and two bottom quarks. Both resonant and nonresonant hypotheses are investigated. The analyzed data correspond to an integrated luminosity of 19.7 fb(-1) of proton-proton collisions at root s = 8 TeV collected with the CMS detector. Good agreement is observed between data and predictions of the standard model (SM). Upper limits are set at 95% confidence level on the production cross section of new particles and compared to the prediction for the existence of a warped extra dimension. When the decay to two Higgs bosons is kinematically allowed, assuming a mass scale Lambda(R) = 1 TeV for the model, the data exclude a radion scalar at masses below 980 GeV. The first Kaluza-Klein excitation mode of the graviton in the RS1 Randall-Sundrum model is excluded for masses between 325 and 450 GeV. An upper limit of 0.71 pb is set on the nonresonant two-Higgs-boson cross section in the SM-like hypothesis. Limits are also derived on nonresonant production assuming anomalous Higgs-boson couplings.

[P315-2016] "Search for ultrarelativistic magnetic monopoles with the Pierre Auger observatory"

Aab, A.; Abreu, P.; Aglietta, M.; **Chinellato, J. A.***; Daniel, B.*; Diaz Castro, M. L.*; Dobrigkeit, C.*; Escobar, C. O.*; Fauth, A. C.*; Kemp, E.*; Muller, M. A.*; Pakk Selmi-Dei, D.*; Pereira, L. A. S.*; Theodoro, V. M.*; et al.
Pierre Auger Collaboration

We present a search for ultrarelativistic magnetic monopoles with the Pierre Auger observatory. Such particles, possibly a relic of phase transitions in the early Universe, would deposit a large amount of energy along their path through the atmosphere, comparable to that of ultrahigh-energy cosmic rays (UHECRs). The air-shower profile of a magnetic monopole can be effectively distinguished by the fluorescence detector from that of standard UHECRs. No candidate was found in the data collected between 2004 and 2012, with an expected background of less than 0.1 event from UHECRs. The corresponding 90% confidence level (C.L.) upper limits on the flux of ultrarelativistic magnetic monopoles range from 10^{-19} $(cm^2\ sr\ s)^{-1}$ for a Lorentz factor gamma = 10^9 to 2.5×10^{-21} $(cm^2\ sr\ s)^{-1}$ for gamma = 10^{12}. These results-the first obtained with a UHECR detector-improve previously published limits by up to an order of magnitude.

[P316-2016] "Synthesis and porous h-BN 3D architectures for effective humidity and gas sensors"

Gautam, C.; Tiwary, C. S.; **Machado, L. D.***; Jose, S.; Ozden, S.; Biradar, S.; **Galvao, D. S.***; Sonker, R. K.; Yadav, B. C.; Vajtai, R.; Ajayan, P. M.

3D (three dimensional) architectures synthesised using an easily scalable solid state method which results in an interconnected network of porous h-BN sheets with boron trioxide are reported in this study. The boron trioxide acts as a nucleating agent for the formation of laterally large nanosheets of h-BN with a low density and increases the specific surface area. The stable form shows improved mechanical properties (experimentally and using MD simulation) and serves as a suitable material for humidity and liquefied petroleum gas (LPG) sensor applications. The sensor shows stability for up to several months without losing its sensitivity.

[P317-2016] "The Effect of Co and Zn Addition on Densification and Electrical Properties of Ceria-Based Nanopowders"

Villas-Boas, L. A.; de Paula Nascente, P. A.; **Landers, R.***; Campos, M.; Pinatti Ferreira de Souza, D. M.

In this work, cobalt and zinc-doped $Ce_{0.8}Gd_{0.2}O_{1.9}$ samples were prepared starting from a commercial nanopowder and compared to the undoped material. The powder samples were pressed and afterwards sintered by a two-step procedure, before characterization by X-Ray Diffraction (XRD), X-ray photoelectron spectroscopy (XPS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM) and Impedance Spectroscopy (IS) in air. Cobalt or zinc additions are effective as sintering aid, allowing peak sintering temperatures around 1000 degrees C to reach densifications above of 93% of theoretical density, showing no evidence for the presence of secondary phases. The total conductivity at 800 degrees C of pressed Zn-doped samples (6.7×10^{-2} S/cm) and Co-doped samples (7.5×10^{-2} S/cm) is similar for undoped samples (7.2×10^{-2} S/cm) showing that Zn and Co has a positive effect on densification without compromising the electrical conductivity.

[P318-2016] "The gluon mass generation mechanism: A concise primer"

Aguilar, A. C.*; Binosi, D.; Papavassiliou, J.

We present a pedagogical overview of the nonperturbative mechanism that endows gluons with a dynamical mass. This analysis is performed based on pure Yang-Mills theories in the Landau gauge, within the theoretical framework that emerges from the combination of the pinch technique with the background field method. In particular, we concentrate on the Schwinger-Dyson equation satisfied by the gluon propagator and examine the necessary conditions for obtaining finite solutions within the infrared region. The role of seagull diagrams receives particular attention, as do the identities that enforce the cancellation of all potential quadratic divergences. We stress the necessity of introducing nonperturbative massless poles in the fully dressed vertices of the theory in order to trigger the Schwinger mechanism, and explain in detail the instrumental role of these poles in maintaining the Becchi-Rouet-Stora-Tyutin symmetry at every step of the mass-generating procedure. The dynamical equation governing the evolution of the gluon mass is derived, and its solutions are determined numerically following implementation of a set of simplifying assumptions. The obtained mass function is positive definite, and exhibits a power law running that is consistent with general arguments based on the operator product expansion in the ultraviolet region. A possible connection between confinement and the presence of an inflection point in the gluon propagator is briefly discussed.

[P319-2016] "The Influence of Chelating Agent on the Structural and Magnetic Properties of CoFe2O4 Nanoparticles"

Pedra, P. P.; Silva Filho, J. L.; Lima, R. J. S.; Sharma, S. K.; **Moura, K. O.***; Duque, J. G. S.; Meneses, C. T.

We have studied the influence of chelating agents (glycerin and sucrose) on the structural and magnetic properties of cobalt ferrite ($CoFe_2O_4$) nanoparticles synthesized via co-precipitation method. The Rietveld refinements from X-ray diffraction patterns confirm that all samples are single phase identified in a cubic crystalline system belonging to the space group Fd-3m. Besides, we have verified that the addition of chelating agents produces a decreasing in the particles average size from 14(2) to 5(1) nm. Magnetization measurements as a function of temperature show a decrease in the blocking temperature (T_B) to sample obtained with addition of sucrose. A superparamagnetic behavior at room temperature was observed by magnetic measurements as function of field in the sample with 0.020 mol/L of sucrose. The results show that character chelating of sucrose reduces the coalescence effect and magnetic interaction in the $CoFe_2O_4$ nanoparticles. These results suggest that sucrose could be an alternative to control the structural and magnetic properties of other oxides nanoparticles.

[P320-2016] "The role of stress in CdTe quantum dot doped glasses"

de Thomaz, A. A.*; **Almeida, D. B.***; **Pelegati, V. B.***; Carvalho, H. F.; Moreira, S. G. C.; **Barbosa, L. C.***; **Cesar, C. L.***

In this work, we unequivocally demonstrate the influence of matrix-related stresses on quantum dots by measuring, side by side, a CdTe quantum dot doped glass and a colloidal sample with similar sizes. We measured the fluorescence spectra and fluorescence lifetime for both samples as a function of the temperature. We show that the expansion coefficient mismatch between CdTe quantum dots and the glass host causes stresses and drastically changes its behavior compared to its colloidal counterpart, even leading to phase transitions. This finding indicates that most experimental data on glass-doped quantum dots used to validate confinement models should be revised, taking stress into account.

[P321-2016] "XDS: a flexible beamline for X-ray diffraction and spectroscopy at the Brazilian synchrotron"

Lima, F. A.; Saleta, M. E.; Pagliuca, R. J. S.; Eleoterio, M. A.; Reis, R. D.; Fonseca Junior, J.; Meyer, B.; Bittar, E. M.; Souza-Neto, N. M.; **Granado, E.***

The majority of the beamlines at the Brazilian Synchrotron Light Source Laboratory (LNLS) use radiation produced in the storage-ring bending magnets and are therefore currently limited in the flux that can be used in the harder part of the X-ray spectrum (above approximate to 10keV). A 4T superconducting multipolar wiggler (SCW) was recently installed at LNLS in order to improve the photon flux above 10keV and fulfill the demands set by the materials science community. A new multi-purpose beamline was then installed at the LNLS using the SCW as a photon source. The XDS is a flexible beamline operating in the energy range between 5 and 30keV, designed to perform experiments using absorption, diffraction and scattering techniques. Most of the work performed at the XDS beamline concentrates on X-ray absorption spectroscopy at energies above 18keV and high-resolution diffraction experiments. More recently, new setups and photon-hungry experiments such as total X-ray scattering, X-ray diffraction under high pressures, resonant X-ray emission spectroscopy, among others, have started to become routine at XDS. Here, the XDS beamline characteristics, performance and a few new experimental possibilities are described.

Eventos publicados

[P322-2016] "Dynamical chiral symmetry with an infrared finite gluon propagator"

Cardona, J. C.*; Aguilar, A. C.*

In this work we study dynamical quark mass generation using an infrared finite gluon propagator obtained from quenched lattice simulations. The quark gap equation is solved using a purely non-Abelian Ansatz for the quark-gluon vertex, which displays a dependence on the ghost dressing function and the scalar component of quark-ghost scattering kernel. For the former quantity we use quenched lattice results, while for the latter we derive its own integral equation at the one-loop-dressed approximation. This latter quantity is then coupled to the system of equations governing the two Dirac structures of the quark propagator. It turns out that when a current quark mass of 5 MeV is introduced, the constituent quark mass generated from the gap equation is of the order of 310 MeV. In addition, the pion decay constant computed from the resulting quark propagator is in good agreement with the physical value.

[P323-2016] "Experimental Comparison of Artificial Neural Network and Volterra based Nonlinear Equalization for CO-OFDM"

Giacoumidis, E.; Le, S. T.; **Aldaya, I.***; Wei, J. L.; McCarthy, M.; Doran, N. J.; Eggleton, B. J.

A novel artificial neural network (ANN)-based nonlinear equalizer (NLE) of low complexity is demonstrated for 40-Gb/s CO-OFDM at 2000 km, revealing similar to 1.5 dB enhancement in Q-factor compared to inverse Volterra-series transfer function based NLE.

[P324-2016] "Gluon Schwinger-Dyson equation in the PT-BFM scheme"

Ferreira, A. M. S. N.*; Aguilar, A. C.*

Schwinger-Dyson equations provide an appropriate framework for tackling nonperturbative QCD phenomena requiring a continuum treatment. However, an inadequate truncation of this tower of integral equations can compromise the symmetries underlying the theory in question. The synthesis of the Pinch Technique and the Background Field method provides a framework where it is possible to devise a self-consistent truncation scheme, exploiting the Ward identities satisfied by the effective Green's functions that emerge. In this work we review how this truncation scheme is implemented, and show that the new series of dressed diagrams for the background gluon propagator organizes itself in characteristic subsets that are individually transverse. In addition, we discuss how the Background Quantum identity connects the background gluon propagator with the conventional one, computed in the lattice simulations.

[P325-2016] "Improvement in Cranioplasty: Advanced Prosthesis Biomanufacturing"

Jardini, A. L.; Larosa, M. A.; Macedo, M. F.; Bernardes, L. F.; **Lambert, C. S.***; Zavaglia, C. A. C.; Maciel, R.; Calderoni, D. R.; Ghizoni, E.; Kharmandayan, P.; Bartolo P. (Ed.)

Additive manufacturing (AM) is a technology that enables the production of models and prosthesis directly from the 3D CAD model facilitating surgical procedures, implant quality and reducing risks. Furthermore, the additive manufacturing has been used to produce implants especially designed for a particular patient, with sizes, shapes and mechanical properties optimized, in many areas of medicine such as cranioplasty surgery. This work presents AM technologies applied to design and manufacture of a biomodel, in fact, an implant for the surgical reconstruction of a large cranial defect.

A series of computed tomography data was obtained and software was used to extract the cranial geometry. The protocol presented was used for creation of anatomic biomodel of the bone defect for the surgical planning as well as to design and manufacture of the patient-specific implant, reducing duration of surgery besides improving the surgical accuracy due to preoperative planning of the anatomical details.

[P326-2016] "Kerr-Induced Nonlinearity Reduction in Coherent Optical OFDM by Low Complexity Support Vector Machine Regression-based Equalization"

Giacoumidis, E.; Mhatli, S.; Nguyen, T.; Le, S. T.; **Aldaya, I.***; McCarthy, M. A.; Eggleton, B. J.

We experimentally demonstrate 7-dB reduction of nonlinearity penalty in 40-Gb/s CO-OFDM at 2000-km using support vector machine regression-based equalization. Simulation in WDM-CO-OFDM shows up to 12-dB enhancement in Q-factor compared to linear equalization.

[P327-2016] "Mass generation and the problem of seagull divergences"

Figueiredo, C. T.*; Aguihar, A. C.*

The gluon mass generation is a purely non-perturbative effect, and the natural framework to study it in the continuum are the Schwinger-Dyson equations (SDEs) of the theory. At the level of the SDEs the generation of such a mass is associated with the existence of infrared finite solutions for the gluon propagator. From the theoretical point of view, the dynamical gluon mass generation has been traditionally plagued with seagull divergences. In this work, we will review how such divergences can be eliminated completely by virtue of a characteristic identity, valid in dimensional regularization. As a pedagogical example, we will first discuss in the context of scalar QED how it is possible to eliminate all seagull divergences, by triggering the aforementioned special identity, which enforces the masslessness of the photon. Then, we will discuss what happens in QCD and present an Ansatz for the three gluon vertex, which completely eliminates all seagull divergences and at same time allows for the possibility of a dynamical gluon mass generation.

[P328-2016] "Mass Spectrometry of Atmospheric Pressure Surface Wave Discharges"

Ridenti, M. A.*; Souza-Correa, J. A.; **Amorim, J.***

By applying mass spectrometry techniques, we carried out measurements of ionic mass spectrum and their energy distribution in order to investigate an atmospheric argon discharge by using a surfatron surface-wave device. The mass and energy distribution measurements were performed with fixed flow rate (2.5 SLM) of pure argon gas (99,999%) and different Ar-O-2 gas mixture compositions (99-1, 98-2 and 97-3). The mass spectra and energy distributions were recorded for Ar+, O+, O-2(+), N+ and N-2(+). The axial distribution profiles of ionic mass and their energy were obtained for different experimental conditions as a function of the plasma length. The results showed that the peak of the positive ion energy distributions shifted to higher energies and also that the distribution width increased as the distance between the sampling orifice and the launcher gap was increased. It was also found that under certain experimental conditions the ion flux of atomic species were higher than the ion flux of their diatomic counterpart. The motivation of this study was to obtain a better understanding of a surface wave discharge in atmospheric pressure that may play a key role on new second generation biofuel technologies.

[P329-2016] "PLLA Synthesis and Nanofibers production: Viability by Human Mesenchymal Stem Cell from Adipose Tissue"

Xavier, M. V.; Macedo, M. F.; Benatti, A. C. B.; Jardini, A. L.; Rodrigues, A. A.; Lopes, M. S.; **Lambert, C. S.***; Filho, R. M.; Kharmandayan, P.; Bartolo, P. (Ed.)

The absorbable polyacid is one of the most used and studied materials in tissue engineering. This work synthesized a poly (L-lactic acid) (PLLA) through ring-opening polymerization and produced with it nanofibers by the electrospinning process. The PLLA was analyzed by FTIR and its cytotoxicity was evaluated by the MTT assay and Live/Dead (R) (Molecular Probes). The tests were performed in contact with human mesenchymal cells at varying times. The high rates of viability and proliferation of cells in contact with the PLLA shown by MTT and Live/Dead (R) tests demonstrate that this PLLA is a biocompatible material. There was also the successful production of electrospinning nanofibers, which can be converted for specific biomedical applications in the future.

[P330-2016] "The Unruh effect and oscillating neutrinos"

Ahluwalia, D. V.; Labun, L.; **Torrieri, G.***

We give an overview of the issues and ambiguities associated with the Unruh effect, and argue that, as well as a very interesting phenomenon, it can also be used as a probe of fundamental physics. In particular, We point out that, because the detectable neutrino is not a mass Eigenstate, the Unruh effect works in a qualitatively different way than for any inertial process. For inertial processes, neutrinoes are produced as charged eigenstates, rather than as mass Eigenstates as in the comoving frame. This makes the Unruh effect detectable in microscopic processes, via, for example, p -> nl vi decays.

Such an experiment would be invaluable both as a tool to measure neutrino masses and mixing angles, and to investigate the fundamental quantization of fields.

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[P331-2016] "Updating an empirical analysis on the proton's central opacity and asymptotia"

Fagundes, D. A.; **Menon, M. J.***; Silva, P. V. R. G.*

We present an updated empirical analysis on the ratio of the elastic (integrated) to the total cross section in the c.m. energy interval from 5 GeV to 8 TeV. As in a previous work, we use a suitable analytical parametrization for that ratio (depending on only four free fit parameters) and investigate three asymptotic scenarios: either the black disk limit or scenarios above or below that limit. The dataset includes now the datum at 7 TeV, recently reported by the ATLAS Collaboration. Our analysis favors, once more, a scenario below the black disk, providing an asymptotic ratio consistent with the rational value 1/3, namely a gray disk limit. Upper bounds for the ratio of the diffractive (dissociative) to the inelastic cross section are also presented.

13th International Workshop on Hadron Physics, MAR 22-27, 2015, Angra dos Reis, BRAZIL. IOP.

XIII INTERNATIONAL WORKSHOP ON HADRON PHYSICS, SECTIONS 1-5, Journal of Physics Conference Series, 706, UNSP 052027, 2016. DOI: 10.1088/1742-6596/706/5/052027

Correção

[Co002-2016] "Search for direct pair production of scalar top quarks in the single- and dilepton channels in proton--proton collisions at root S = 8 TeV (vol 07, 027, 2016)"

Khachatryan, V.; Sirunyan, A. M.; Tumasyan, A.; **Chinellato, J. A.***; **Tonelli Manganote, E. J.***; et al.
CMS Collaboration

JOURNAL OF HIGH ENERGY PHYSICS 9, 2016. DOI: 10.1007/JHEP09(2016)056

*Autores da comunidade IFGW
Fonte: Web of Science on-line.

Defesas de Dissertações

[D024-2016] "Estudo do crescimento de filmes nanoestruturados automontados por adsorção física utilizando medidas de capacitância"
Aluno: Rafael Cintra Hensel Ferreira
Orientador: Prof. Dr. Varlei Rodrigues
Data: 23/11/2016

[D025-2016] "Intercalação de ferro em grafeno CVD crescido sobre Ir(111)"
Aluno: Rodrigo Cézar de Campos Ferreira
Orientador: Prof. Dr. Abner de Siervo
Data: 25/11/2016

[D026-2016] "Sensor de carga tipo FET para medidas em meios líquidos"
Aluno: Paula Simões Casagrande
Orientador: Prof. Dr. David Mendez Soares
Data: 02/12/2016

[D027-2016] "Estudo de Processos Difrativos em Interações Hadrônicas"
Aluno: André Vieira da Silva
Orientador: Prof. Dr. Edmilson José Tonelli Manganote
Data: 02/12/2016

[D028-2016] "Crystal lattice vibrations and their coupling with magnetic correlations and orbital ordering in MSb2O6 (M = Cu, Co)"
Aluno: Damaris Tartarotti Maimone
Orientador: Prof. Dr. Eduardo Granado Monteiro da Silva
Data: 05/12/2016

Defesas de Teses

[T014-2016] "Guiamento óptico de átomos através de feixes não difrativos do tipo "Frozen Waves""
Aluno: Edwin German Pinilla Pachon
Orientador: Prof. Dr. Michel Zamboni Rached
Data: 06/12/2016

[T015-2016] "Threshold theorem for a quantum memory in a correlated environment"
Aluno: Daniel Antonio López Delgado
Orientador: Prof. Dr. Amir Ordacgi Caldeira
Data: 15/12/2016

[T016-2016] "Microscopias Ópticas de Processos Coerentes"
Aluno: Vitor Bianchin Pelegati
Orientador: Prof. Dr. Carlos Lenz Cesar
Data: 20/12/2016

Fonte: Portal IFGW/Pós-graduação - Agenda de Colóquios, Defesas e Seminários.
Disponível em: http://portal.ifi.unicamp.br/pos-graduacao

"Que as realizações alcançadas neste ano sejam apenas sementes plantadas que serão colhidas com maior sucesso no ano vindouro."

Boas festas !!!