

Abstracta

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Trabalhos Publicados - P295-2015 à P335-2015

Proceedings - P336-2015 à P341-2015

Patentes - Pa005-2015 à Pa006-2015

Defesas de Dissertações do IFGW - D021-2015 à D026-20155

Defesas de Teses do IFGW - T015-2015 à T017-2015

Trabalhos Publicados

[P295-2015] "A simple visible light photo-assisted method for assembling and curing multilayer GO thin films"

da Silva, M. F. P.; de Oliveira, D. R.; Cavallari, M. R.; Dirani, E. A. T.; Triboni, E. R.; Paterno, L. G.; Fonseca, F. J.; Ando, R. A.; Baptista, M. D.; Landers, R.*; Politi, M. J.; Isolani, P. C.; Silva, G. F. B. L. E.

A simple and efficient method for deposition of reduced graphene oxide (RGO) thin films onto arbitrary substrates is described. The present protocol consists in the application of radial compression to a thin layer of graphene oxide (GO) formed at the air liquid interface of an ammoniacal dispersion of graphene oxide by continuous irradiation with visible light, that drives both the formation and curing of the film. Both infrared and near infrared luminescence spectroscopies were used for the proposition of a chemical mechanism in which the in situ singlet oxygen $\Delta O-1(2)$, generated by the photosensitization of molecular oxygen to visible light, initiates the formation and curing of the film. The GO and RGO films display Raman spectral signatures typical of graphene-based materials, with thickness of ca. 20 nm as evaluated by atomic force microscopy. The deposited films exhibited good transparency to visible light (max. 85%; 550 ± 2 nm), electrical resistivity equals to $14 \pm 0.02 \Omega \text{ m}$, sheet resistance equals to 5 k $\Omega \text{ sq}^{-1}$ with associated charge carrier mobility of 200 $\text{cm}^2/\text{V s}$.

MATERIALS CHEMISTRY AND PHYSICS 165, 125-133, 2015.
DOI: 10.1016/j.matchemphys.2015.09.006

[P296-2015] "Absorption effects on the longitudinal bulk plasmon-polariton modes in 1D heterostructures containing anisotropic metamaterials"

Costa, A. E. B.; Oliveira, L. E.*; Cavalcanti, S. B.

The transmission properties of electromagnetic waves through a one-dimensional layered system containing alternate layers of air and a uniaxial anisotropic left-handed material are investigated. The optical axis of such heterostructure is along the stacking direction and the components of the electric permittivity and magnetic permeability tensors that characterize the metamaterial are modeled by a Drude-type response and a split ring resonator metamaterial response, respectively. Different plasmon frequencies are considered for directions parallel and perpendicular to the optical axis. For oblique incidence, longitudinal bulk like plasmon polariton modes are found in the neighborhood of the plasmon frequency along the optical axis and anisotropy leads to the unfolding of nearly dispersionless plasmon-polariton bands either above or below the plasmon frequency. Moreover, it is shown that, even in the presence of loss/absorption, these plasmon polariton modes do survive and, therefore, should be experimentally detected.

PHYSICA E-LOW-DIMENSIONAL SYSTEMS & NANOSTRUCTURES 74, 123-128, 2015. DOI: 10.1016/j.physe.2015.06.029

[P297-2015] "Assessing the pozzolanic activity of cements with added sugar cane straw ash by synchrotron X-ray diffraction and Rietveld analysis"

Calligaris, G. A.*; Franco, M. K. K. D.; Aldrige, L. P.; Rodrigues, M. S.; Beraldo, A. L.; Yokaichiya, F.; Turrillas, X.; Cardoso, LP*

Sugar and alcohol industries generate large amount of wastes that could produce ashes of great reactivity with pozzolan properties. The objective of this paper is to evaluate the pozzolanicity of Sugar Cane Straw Ashes (SCSA), thermal treated, at different curing times.

Employing Synchrotron X-ray radiation for XRD measurements, scans from 10 degrees to 110 degrees (theta - 2 theta setup) allowed the quantification of several phases of the cement pasts through Rietveld analysis. The SCSA substitution of 20% (weight) in Ordinary Portland Cement (OPC) has improved the AFt (Ettringite) formation up to 47% for 90 days curing time. The Portlandite concentration analysis allowed concluding that this addition of SCSA in OPC has caused a delay in the cement setting time. Moreover, the behaviour of the C3S and Calcite contents in both OPC and OPC/SCSA samples were determined by refinement of the XRD pattern using the Rietveld method.

CONSTRUCTION AND BUILDING MATERIALS 98, 44-50, 2015.
DOI: 10.1016/j.conbuildmat.2015.08

[P298-2015] "Binary dynamics on star networks under external perturbations"

Moreira, C. A.*; Schneider, D. M.*; de Aguiar, M. A. M.*

We study a binary dynamical process that is a representation of the voter model with two candidates and opinion makers. The voters are represented by nodes of a network of social contacts with internal states labeled 0 or 1 and nodes that are connected can influence each other. The network is also perturbed by opinion makers, a set of external nodes whose states are frozen in 0 or 1 and that can influence all nodes of the network. The quantity of interest is the probability of finding m nodes in state 1 at time t . Here we study this process on star networks, which are simple representations of hubs found in complex systems, and compare the results with those obtained for networks that are fully connected. In both cases a transition from disordered to ordered equilibrium states is observed as the number of external nodes becomes small. For fully connected networks the probability distribution becomes uniform at the critical point. For star networks, on the other hand, we show that the equilibrium distribution splits in two peaks, reflecting the two possible states of the central node. We obtain approximate analytical solutions for the equilibrium distribution that clarify the role of the central node in the process. We show that the network topology also affects the time scale of oscillations in single realizations of the dynamics, which are much faster for the star network. Finally, extending the analysis to two stars we compare our results with simulations in simple scale-free networks.

PHYSICAL REVIEW E 92[4] 042812, 2015. DOI: 10.1103/PhysRevE.92.042812

[P299-2015] "Characterization of the TolB-Pal trans-envelope complex from *Xylella fastidiosa* reveals a dynamic and coordinated protein expression profile during the biofilm development process"

Santos, C. A.; Janissen, R.*; Toledo, M. A. S.; Beloti, L. L.; Azzoni, A. R.; Cotta, M. A.*; Souza, M. P.

The intriguing roles of the bacterial Tol-Pal trans-envelope protein complex range from maintenance of cell envelope integrity to potential participation in the process of cell division. In this study, we report the characterization of the XfFolB and XfPal proteins of the Tol-Pal complex of *Xylella fastidiosa*. *X. fastidiosa* is a major plant pathogen that forms biofilms inside xylem vessels, triggering the development of diseases in important cultivable plants around the world. Based on functional complementation experiments in *Escherichia coli* tolB and pal mutant strains, we confirmed the role of xftolB and xfpal in outer membrane integrity. In addition, we observed a dynamic and coordinated protein expression profile during the *X. fastidiosa* biofilm development process. Using small-angle X-ray scattering (SAXS), the low-resolution structure of the isolated XfTolB-XfPal complex in solution was solved for the first time.

Finally, the localization of the XfFolB and XfPal polar ends was visualized via immunofluorescence labeling in vivo during bacterial cell growth. Our results highlight the major role of the components of the cell envelope, particularly the TolB-Pal complex, during the different phases of bacterial biofilm development

BIOCHIMICA ET BIOPHYSICA ACTA-PROTEINS AND PROTEOMICS 1854[10] 1372-1381, 2015. DOI: 10.1016/j.bbapap.2015.05.018

[P300-2015] “Coherent $\rho(0)$ photoproduction in ultra-peripheral Pb-Pb collisions at $\sqrt{s(NN)}=2.76$ TeV”

Adam, J.; Adamova, D.; Aggarwal, M. M.; Chinellato, D. D.*; Dash, A.*; Takahashi, J.*; et al. The ALICE Collaboration

We report the first measurement at the LHC of coherent photoproduction of $\rho(0)$ mesons in ultra-peripheral Pb-Pb collisions. The invariant mass and transverse momentum distributions for $\rho(0)$ production are studied in the $\pi(+)\pi(-)$ decay channel at mid-rapidity. The production cross section in the rapidity range $|\eta| < 0.5$ is found to be $d\sigma/dy = 425 \pm 10$ (stat.) $(+42)(-50)$ (sys.) mb. Coherent $\rho(0)$ production is studied with and without requirement of nuclear breakup, and the fractional yields for various breakup scenarios are presented. The results are compared with those from lower energies and with model predictions.

JOURNAL OF HIGH ENERGY PHYSICS 9, 095, 2015. DOI: 10.1007/JHEP09(2015)095

[P301-2015] “Comparison of the Z/γ^* plus jets to gamma plus jets cross sections in pp collisions at $\sqrt{s}=8$ TeV”

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

A comparison of the differential cross sections for the processes $Z/\gamma^* + \text{jets}$ and $\text{photon}(\gamma) + \text{jets}$ is presented. The measurements are based on data collected with the CMS detector at $\sqrt{s} = 8\text{TeV}$ corresponding to an integrated luminosity of 19.7fb^{-1} . The differential cross sections and their ratios are presented as functions of $p(T)$. The measurements are also shown as functions of the jet multiplicity. Differential cross sections are obtained as functions of the ratio of the $Z/\gamma^* p(T)$ to the sum of all jet transverse momenta and of the ratio of the $Z/\gamma^* p(T)$ to the leading jet transverse momentum. The data are corrected for detector effects and are compared to simulations based on several QCD calculations.

JOURNAL OF HIGH ENERGY PHYSICS 10, 128, 2015. DOI: 10.1007/JHEP10(2015)128

[P302-2015] “Constraints on the pMSSM, AMSB model and on other models from the search for long-lived charged particles in proton-proton collisions at $\sqrt{s}=8\text{TeV}$ ”

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

Stringent limits are set on the long-lived lepton-like sector of the phenomenological minimal supersymmetric standard model (pMSSM) and the anomaly-mediated supersymmetry breaking (AMSB) model. The limits are derived from the results presented in a recent search for long-lived charged particles in proton-proton collisions, based on data collected by the CMS detector at a centre-of-mass energy of 8 TeV at the Large Hadron Collider. In the pMSSM parameter sub-space considered, 95.9% of the points predicting charginos with a lifetime of at least 10 ns are excluded.

These constraints on the pMSSM are the first obtained at the LHC. Charginos with a lifetime greater than 100 ns and masses up to about 800 GeV in the AMSB model are also excluded. The method described can also be used to set constraints on other models.

EUROPEAN PHYSICAL JOURNAL C 75[7] 325, 2015. DOI: 10.1140/epjc/s10052-015-3533-3

[P303-2015] “Effects of Pb doping on the magneto-optical properties of EuPbTe epitaxial films”

Heredia, E.; Motisuke, P.; Couto, O. D. D.*; Lang, R.*; Balanta, M. A. G.*; Brasil, M. J. S. P.*; Rappl, P. H. D. O.; Iikawa, F.*

We investigate the magneto-optical properties of magnetic-semiconductor $\text{Eu}_{1-x}\text{Pb}_x\text{Te}$ epitaxial layers with Pb contents up to 5%. We show that the inclusion of a small amount of Pb atoms in EuTe affects the optical and magnetic properties of the resulting alloy. The incorporation of Pb gives rise to a reduction of the Neel temperature and of the slope of the giant magneto-red-shift of the magnetic polaron optical emission. All those effects can be understood in terms of the magnetic dilution effect due to the reduced Eu concentration. The introduction of Pb also reveals a splitting of the high emission energy side-band under applied magnetic field, presenting a more complex feature of the band structure of the alloys. Our results cannot be fully explained on the basis of the current theoretical knowledge of the EuTe band structure and, therefore, we expect that they can stimulate future theoretical investigations and encourage applied investigations of spintronic devices based on these materials.

JOURNAL OF LUMINESCENCE 167, 193-196, 2015. DOI: 10.1016/j.jlumin.2015.06.033

[P304-2015] “Electronic excitation of furfural as probed by high-resolution vacuum ultraviolet spectroscopy, electron energy loss spectroscopy, and ab initio calculations”

da Silva, F. F.; Lange, E.; Limao-Vieira, P.; Jones, N. C.; Hoffmann, S. V.; Hubin-Franskin, M. J.; Delwiche, J.; Brunger, M. J.; Neves, R. F. C.; Lopes, M. C. A.; de Oliveira, E. M.*; da Costa, R. F.*; Varella, M. T. D.; Bettega, M. H. F.; Blanco, F.; Garcia, G.; Lima, M. A. P.*; Jones, D. B.

The electronic spectroscopy of isolated furfural (2-furaldehyde) in the gas phase has been investigated using high-resolution photoabsorption spectroscopy in the 3.5-10.8 eV energy-range, with absolute cross section measurements derived. Electron energy loss spectra are also measured over a range of kinematical conditions. Those energy loss spectra are used to derive differential cross sections and in turn generalised oscillator strengths. These experiments are supported by ab initio calculations in order to assign the excited states of the neutral molecule. The good agreement between the theoretical results and the measurements allows us to provide the first quantitative assignment of the electronic state spectroscopy of furfural over an extended energy range.

JOURNAL OF CHEMICAL PHYSICS 143[14], 144308, 2015. DOI: 10.1063/1.4932603

[P305-2015] “Emergent SU(3) Symmetry in Random Spin-1 Chains”

Quito, V. L.*; Hoyos, J. A.; Miranda, E.*

We show that generic SU(2)-invariant random spin-1 chains have phases with an emergent SU(3) symmetry.

We map out the full zero-temperature phase diagram and identify two different phases: (i) a conventional random-singlet phase (RSP) of strongly bound spin pairs [SU(3) “mesons”] and (ii) an unconventional RSP of bound SU(3) “baryons,” which are formed, in the great majority, by spin trios located at random positions. The emergent SU(3) symmetry dictates that susceptibilities and correlation functions of both dipolar and quadrupolar spin operators have the same asymptotic behavior.

PHYSICAL REVIEW LETTERS 115[16], 167201, 2015. DOI: 10.1103/PhysRevLett.115.167201

[P306-2015] “Experimental evaluation of the image quality and dose in digital mammography: Influence of x-ray spectrum”

Tomal, A.*; Perez, A. M. M. M.; Silva, M. C.; Poletti, M. E.

In this work, we studied experimentally the influence of x-ray spectrum on the contrast-to-noise ratio (CNR) and the average glandular dose (MDG) for two digital mammography systems: Senographe 2000D (GE Medical Systems) and Lorad Selenia (Hologic), with indirect and direct detector imaging technology, respectively. CNR and MGD were determined using PMMA phantoms simulating breasts with thicknesses of 4 cm and 6 cm. All available anode/filter combinations of the systems were evaluated for a wide range of tube voltages values. Results indicated that the Rh/Rh combination provides the highest image quality with the lower mean glandular dose for the Senographe 2000D system. For the Lorad Selenia system, the W/Ag combination at 30 kV showed the best performance, in terms of dose saving and image quality improvement in relation to all tube voltage range. The comparison between the optimal x-ray spectra and those selected by the AEC mode showed that this automatic selection mechanism could be readjusted to optimize the relationship between image quality and dose.

RADIATION PHYSICS AND CHEMISTRY 116, 282-286, 2015. DOI: 10.1016/j.radphyschem.2015.04.019

[P307-2015] “Horava’s quantum gravity illustrated by embedding diagrams of the Kehagias-Sfetsos spacetimes”

Goluchova, K.; Kulczycki, K.; Vieira, R. S. S.*; Stuchlik, Z.; Kluzniak, W.; Abramowicz, M.

Possible astrophysical consequences of the Horava quantum gravity theory have been recently studied by several authors. They usually employ the Kehagias-Sfetsos (KS) spacetime which is a spherically symmetric vacuum solution of a specific version of Horava’s gravity. The KS metric has several unusual geometrical properties that in the present article we examine by means of the often used technique of embedding diagrams. We pay particular attention to the transition between naked singularity and black-hole states, which is possible along some particular sequences of the KS metrics.

GENERAL RELATIVITY AND GRAVITATION 47[11] 132, 2015. DOI: 10.1007/s10714-015-1976-3

[P308-2015] “Limits on the Higgs boson lifetime and width from its decay to four charged leptons”

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

Constraints on the lifetime and width of the Higgs boson are obtained from $H \rightarrow ZZ \rightarrow 4l$ events using data recorded by the CMS experiment during the LHC run 1 with an integrated luminosity of 5.1 and 19.7 fb⁻¹ at a center-of-mass energy of 7 and 8 TeV, respectively.

The measurement of the Higgs boson lifetime is derived from its flight distance in the CMS detector with an upper bound of $\tau(H) < 1.9 \times 10^{-13}$ s at the 95% confidence level (C.L.), corresponding to a lower bound on the width of $\Gamma(H) > 3.5 \times 10^{-9}$ MeV. The measurement of the width is obtained from an off-shell production technique, generalized to include anomalous couplings of the Higgs boson to two electroweak bosons. From this measurement, a joint constraint is set on the Higgs boson width and a parameter $f(\Lambda Q)$ that expresses an anomalous coupling contribution as an on-shell cross-section fraction. The limit on the Higgs boson width is $\Gamma(H) < 46$ MeV with $f(\Lambda Q)$ unconstrained and $\Gamma(H) < 26$ MeV for $f(\Lambda Q) = 0$ at the 95% C.L. The constraint $f(\Lambda Q) < 3.8 \times 10^{-3}$ at the 95% C.L. is obtained for the expected standard model Higgs boson width.

PHYSICAL REVIEW D 92[7], 072010, 2015. DOI: 10.1103/PhysRevD.92.072010

[P309-2015] “Localized Charge Transfer Process and Surface Band Bending in Methane Sensing by GaN Nanowires”

Patsha, A.; Sahoo, P.*; Arnirithapandian, S.; Prasad, A. K.; Das, A.; Tyagi, A. K.; Cotta, M. A.*; Dhara, S.

The physicochemical processes at the surfaces of semiconductor nanostructures involved in electrochemical and sensing devices are strongly influenced by the presence of intrinsic or extrinsic defects. For revelation of the surface controlled sensing mechanism, intentional lattice oxygen defects are created on the surfaces of GaN nanowires for the elucidation of charge transfer process in methane (CH₄) sensing. Experimental and simulation results of electron energy loss spectroscopy (EELS) studies on oxygen rich GaN nanowires confirmed the possible presence of 2(O-N) and V-Ga-3O(N) defect complexes. A global resistive response for sensor devices of ensemble nanowires and a localized charge transfer process in single GaN nanowires are studied by in situ scanning Kelvin probe microscopy (SKPM). A localized charge transfer process, involving the V-Ga-3O(N) defect complex on a nanowire surface, is attributed to controlling the global gas sensing behavior of the oxygen rich ensemble GaN nanowires.

JOURNAL OF PHYSICAL CHEMISTRY C 119[36] 21251-21260, 2015. DOI: 10.1021/acs.jpcc.5b06971

[P310-2015] “Magnification of signatures of a topological phase transition by quantum zero point motion”

Lopes, P. L. E. S.*; Ghaemi, P.

We show that the zero point motion of a vortex in superconducting doped topological insulators leads to significant changes in the electronic spectrum at the topological phase transition in this system. This topological phase transition is tuned by the doping level, and the corresponding effects are manifest in the density of states at energies which are on the order of the vortex fluctuation frequency. Although the electronic energy gap in the spectrum generated by a stationary vortex is but a small fraction of the bulk superconducting gap, the vortex fluctuation frequency may be much larger. As a result, this quantum zero point motion can induce a discontinuous change in the spectral features of the system at the topological vortex phase transition to energies which are well within the resolution of scanning tunneling microscopy. This discontinuous change is exclusive to superconducting systems in which we have a topological phase transition. Moreover, the phenomena studied in this paper present effects of Magnus forces on the vortex spectrum which are not present in the ordinary s-wave superconductors. Finally, we demonstrate explicitly that the vortex in this system is equivalent to a Kitaev chain.

This allows for the mapping of the vortex fluctuating scenario in three dimensions into similar one-dimensional situations in which one may search for other novel signatures of topological phase transitions.

PHYSICAL REVIEW B 92[6] 064518, 2015. DOI: 10.1103/PhysRevB.92.064518

[P311-2015] “Massive minimal subtraction scheme and “partial-p” in anisotropic Lifshitz space(time)s”

Souza, E. V.*; Carvalho, P. R. S.; Leite, M. M.

We introduce the “partial-p” operation in a massive Euclidean $\lambda\phi^4$ scalar field theory describing anisotropic Lifshitz critical behavior. We then develop a minimal subtraction a la Bogoliubov-Parasyuk-Hepp-Zimmermann renormalization scheme. As an application we compute critical exponents diagrammatically using the orthogonal approximation at least up to two-loop order and show their equivalence with other renormalization techniques. We discuss possible applications of the method in other field-theoretic contexts.

ANNALS OF PHYSICS 362 ,568-575, 2015. DOI: 10.1016/j.aop.2015.08.016

[P312-2015] “Measurement of charm and beauty production at central rapidity versus charged-particle multiplicity in proton-proton collisions at root s=7 TeV”

Adam, J.; Adamova, D.; Aggarwal, M. M.; Chinellato, D. D.*; Dash, A.*; Takahashi, J.*; et al. ALICE Collaboration

Prompt D meson and non-prompt J/psi yields are studied as a function of the multiplicity of charged particles produced in inelastic proton-proton collisions at a centre-of-mass energy of root s = 7 TeV. The results are reported as a ratio between yields in a given multiplicity interval normalised to the multiplicity-integrated ones (relative yields). They are shown as a function of the multiplicity of charged particles normalised to the average value for inelastic collisions (relative charged-particle multiplicity). D-0, D+ and D*+ mesons are measured in five p(T) intervals from 1 GeV/c to 20 GeV/c and for $|y| < 0.5$ via their hadronic decays. The D-meson relative yield is found to increase with increasing charged-particle multiplicity. For events with multiplicity six times higher than the average multiplicity of inelastic collisions, a yield enhancement of a factor about 15 relative to the multiplicity-integrated yield in inelastic collisions is observed. The yield enhancement is independent of transverse momentum within the uncertainties of the measurement. The D-0-meson relative yield is also measured as a function of the relative multiplicity at forward pseudo-rapidity. The non-prompt J/psi, i.e. the B hadron, contribution to the inclusive J/psi production is measured in the di-electron decay channel at central rapidity. It is evaluated for $p(T) > 1.3$ GeV/c and $|y| < 0.9$, and extrapolated to $p(T) > 0$. The fraction of non-prompt J/psi the inclusive J/psi yields shows no dependence on the charged-particle multiplicity at central rapidity. Charm and beauty hadron relative yields exhibit a similar increase with increasing charged-particle multiplicity. The measurements are compared to PYTHIA 8, EPOS 3 and percolation calculations.

JOURNAL OF HIGH ENERGY PHYSICS 9, 148, 2015. DOI: 10.1007/JHEP09(2015)148

[P313-2015] “Measurement of jet quenching with semi-inclusive hadron-jet distributions in central Pb-Pb collisions at root s(NN)=2.76 TeV”

Adam, J.; Adamova, D.; Aggarwal, M. M.; Chinellato, D. D.*; Dash, A.*; Takahashi, J.*; et al. ALICE Collaboration

We report the measurement of a new observable of jet quenching in central Pb-Pb collisions at root s(NN) = 2.76 TeV, based on the semi-inclusive rate of charged jets recoiling from a high transverse momentum (high-p T) charged hadron trigger. Jets are measured using collinear-safe jet reconstruction with infrared cutoff for jet constituents of 0.15 GeV, for jet resolution parameters R = 0.2, 0.4 and 0.5. Underlying event background is corrected at the event-ensemble level, without imposing bias on the jet population. Recoil jet spectra are reported in the range $20 < p(T, \text{jet})(ch) < 100$ GeV. Reference distributions for pp collisions at root s = 2.76 TeV are calculated using Monte Carlo and NLO pQCD methods, which are validated by comparing with measurements in pp collisions at root s = 7 TeV. The recoil jet yield in central Pb-Pb collisions is found to be suppressed relative to that in pp collisions. No significant medium-induced broadening of the intra-jet energy profile is observed within 0.5 radians relative to the recoil jet axis. The angular distribution of the recoil jet yield relative to the trigger axis is found to be similar in central Pb-Pb and pp collisions, with no significant medium-induced acoplanarity observed. Large-angle jet deflection, which may provide a direct probe of the nature of the quasi-particles in hot QCD matter, is explored.

JOURNAL OF HIGH ENERGY PHYSICS 9, 1-42, 170, 2015. DOI: 10.1007/JHEP09(2015)170

[P314-2015] “Measurement of the ratio of the production cross sections times branching fractions of B-c(+/-) -> J/psi pi(+/-) and B-+/- -> J/psi K-+/- and B(B-c(+/-) -> J/psi pi(+/-) pi(+/-)pi(-/+))/B(B-c(+/-) -> J/psi pi(+/-)) in pp collisions at root s=7 TeV.”

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

The ratio of the production cross sections times branching fractions ($\sigma(B-c(+/-))B(B-c(+/-) -> J/psi pi(+/-)) / (\sigma(B-+/-)B(B-+/- -> J/psi K-+/-))$) is studied in proton-proton collisions at a center-of-mass energy of 7 TeV with the CMS detector at the LHC. The kinematic region investigated requires B-c(+/-) and B-+/- mesons with transverse momentum $p(T) > 15$ GeV and rapidity $|\eta| < 1.6$. The data sample corresponds to an integrated luminosity of 5.1 fb⁻¹. The ratio is determined to be $[0.48 \pm 0.05 \text{ (stat)} \pm 0.03 \text{ (syst)} \pm 0.05 \text{ (tau(Bc))}] \%$. The B-c(+/-) -> J/psi pi(+/-) pi(+/-)pi(-/+) decay is also observed in the same data sample. Using a model-independent method developed to measure the efficiency given the presence of resonant behaviour in the three-pion system, the ratio of the branching fractions $B-c(+/-) -> J/psi pi(+/-)pi(+/-)pi(-/+)/B(B-c(+/-) -> J/psi pi(+/-))$ is measured to be $2.55 \pm 0.80 \text{ (stat)} \pm 0.33 \text{ (syst)} (-0.01 \pm 0.04) \text{ (tau(Bc))}$, consistent with the previous LHCb result.

JOURNAL OF HIGH ENERGY PHYSICS 1, 063, 2015. DOI: 10.1007/JHEP01(2015)063

[P315-2015] “Measurement of the underlying event activity using charged-particle jets in proton-proton collisions at root s=2.76 TeV”

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

A measurement of the underlying event (UE) activity in proton-proton collisions is performed using events with charged-particle jets produced in the central pseudorapidity region ($|\eta(\text{jet})| < 2$) and with transverse momentum $1 \leq p(T)(\text{jet}) < 100$ GeV. The analysis uses a data sample collected at a centre-of-mass energy of 2.76 TeV with the CMS experiment at the LHC.

The UE activity is measured as a function of $p(T)(jet) T$ in terms of the average multiplicity and scalar sum of transverse momenta ($p(T)$) of charged particles, with vertical bar eta vertical bar < 2 and $p(T) > 0.5$ GeV, in the azimuthal region transverse to the highest $p(T)$ jet direction. By further dividing the transverse region into two regions of smaller and larger activity, various components of the UE activity are separated. The measurements are compared to previous results at 0.9 and 7TeV, and to predictions of several Monte Carlo event generators, providing constraints on the modelling of the UE dynamics.

JOURNAL OF HIGH ENERGY PHYSICS 9, 137, 2015. DOI: 10.1007/JHEP09(2015)137

[P316-2015] “Nuclear quantum fluctuations in ice I-h”

Moreira, P. A. F. P.; de Koning, M.*

We discuss the role of nuclear quantum fluctuations in ice I-h, focusing on the hydrogen-bond (HB) structure and the molecular dipole-moment distribution. For this purpose we carry out DFT-based first-principles molecular dynamics and path-integral molecular dynamics simulations at $T = 100$ K. We analyze the HB structure in terms of a set of parameters previously employed to characterize molecular structures in the liquid phase and compute the molecular dipole moments using the maximally-localized Wannier functions. The results show that the protons experience very large digressions driven by quantum fluctuations, accompanied by major rearrangements in the electronic density. As a result of these protonic quantum fluctuations the molecular dipole-moment distribution is substantially broadened as well as shifted to a larger mean value when compared to the results obtained when such fluctuations are neglected. In terms of dielectric constants, the reconciliation between the greater mean dipole moment and experimental indications that the dielectric constant of H₂O ice is lower than that of D₂O ice would indicate that the topology of the HB network is sensitive to protonic quantum fluctuations.

PHYSICAL CHEMISTRY CHEMICAL PHYSICS 17[38] 24716-24721, 2015. DOI: 10.1039/c5cp03346b

[P317-2015] “Particles with Negative Mass: Production, Properties and Applications for Nuclear Fusion and Self-Acceleration”

Tajmar, M.; Assis, A. K. T.*

Some experiments have indicated the possible existence of particles with a negative inertial mass. It is shown under which conditions Weber's electrodynamics gives rise to this effect. Some specific experiments related to this aspect of Weber's law are described. Two particles equally electrified with charges of the same sign would then move toward one another if they had negative effective inertial masses. A new concept for nuclear fusion is presented based on the possibility of creating a negative effective inertial mass for ions. It is then considered some properties of the inertial dipole, that is, a system composed by a pair of particles in which one particle has a positive effective inertial mass while the other particle has a negative effective inertial mass. The possible utilization of the inertial dipole as a propulsion system is briefly discussed.

JOURNAL OF ADVANCED PHYSICS 4[1] 77-82, 2015. DOI: 10.1166/jap.2015.1159

[P318-2015] “Performance of photon reconstruction and identification with the CMS detector in proton-proton collisions at root s=8TeV”

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

A description is provided of the performance of the CMS detector for photon reconstruction and identification in proton-proton collisions at a centre-of-mass energy of 8 TeV at the CERN LHC. Details are given on the reconstruction of photons from energy deposits in the electromagnetic calorimeter (ECAL) and the extraction of photon energy estimates. The reconstruction of electron tracks from photons that convert to electrons in the CMS tracker is also described, as is the optimization of the photon energy reconstruction and its accurate modelling in simulation, in the analysis of the Higgs boson decay into two photons. In the barrel section of the ECAL, an energy resolution of about 1% is achieved for unconverted or late-converting photons from $H \rightarrow \gamma\gamma$ decays. Different photon identification methods are discussed and their corresponding selection efficiencies in data are compared with those found in simulated events.

JOURNAL OF INSTRUMENTATION 10, P08010, 2015. DOI: 10.1088/1748-0221/10/08/P08010

[P319-2015] “Photoinduced electrical response in quantum dots/graphene hybrid structure”

Gromova, Y.; Alaferdov, A.; Rackauskas, S.; Ermakov, V.*; Orlova, A.; Maslov, V.; Moshkalev, S.; Baranov, A.; Fedorov, A.

We report on the enhancement of the electrical photoresponse in a hybrid structure composed of multi-layer graphene flakes covered by a layer of CdSe/ZnS quantum dots (QDs) and placed between metal electrodes. The rate of the photoexcitation energy transfer from QDs to graphene, $(0.5-2) \times 10(9) s(-1)$ which controls the photoelectrical response of the structure, was found from the analysis of photoluminescence intensities and decay times for QDs in solution, on a bare glass substrate and on the surface of multilayer graphene, and in the presence of ammonia vapors.

JOURNAL OF APPLIED PHYSICS 118[10] 104305, 2015. DOI: 10.1063/1.4929970

[P320-2015] “Photovoltaic effect in Bi₂TeO₅ photorefractive Crystal”

de Oliveira, I.; Capovilla, D. A.; Carvalho, J. F.; Montenegro, R.; Fabris, Z. V.; Frejlich, J.*

We report on the presence of a strong photovoltaic effect on nominally undoped photorefractive Bi₂TeO₅ crystals and estimated their Glass photovoltaic constant and photovoltaic field for $\lambda = 532$ nm illumination. We directly measured the photovoltaic-based photocurrent in this material under $\lambda = 532$ nm wavelength laser light illumination and compared its behavior with that of a well known photovoltaic Fe-doped Lithium Niobate crystal. We also show the photovoltaic current to strongly depend on the polarization direction of light. Holographic diffraction efficiency oscillation during recording and the behavior of fringe-locked running holograms in self-stabilized experiments are also demonstrated here as additional indirect proofs of the photovoltaic nature of this material.

APPLIED PHYSICS LETTERS 107[15] 151905, 2015. DOI: 10.1063/1.4933097

[P321-2015] “Precision measurement of the mass difference between light nuclei and anti-nuclei”

Adam, J.; Adamova, D.; Aggarwal, M. M.; Chinellato, D. D.*; Dash, A.*; Takahashi, J.*; et al. ALICE Collaboration

The measurement of the mass differences for systems bound by the strong force has reached a very high precision with protons and anti-protons(1,2). The extension of such measurement from (anti-)baryons to (anti-) nuclei allows one to probe any difference in the interactions between nucleons and anti-nucleons encoded in the (anti-) nuclei masses. This force is a remnant of the underlying strong interaction among quarks and gluons and can be described by effective theories(3), but cannot yet be directly derived from quantum chromodynamics. Here we report a measurement of the difference between the ratios of the mass and charge of deuterons (d) and anti-deuterons (\bar{d}), and He-3 and $\bar{3}(\text{He})$ nuclei carried out with the ALICE (A Large Ion Collider Experiment)(4) detector in Pb-Pb collisions at a centre-of-mass energy per nucleon pair of 2.76 TeV. Our direct measurement of the mass-over-charge differences confirms CPT invariance to an unprecedented precision in the sector of light nuclei(5,6). This fundamental symmetry of nature, which exchanges particles with anti-particles, implies that all physics laws are the same under the simultaneous reversal of charge(s) (charge conjugation C), reflection of spatial coordinates (parity transformation P) and time inversion (T).

NATURE PHYSICS 11[10] 811-U120, 2015. DOI: 10.1038/NPHYS3432

[P322-2015] “Precision measurement of the speed of propagation of neutrinos using the MINOS detectors”

Adamson, P.; Anghel, I.; Ashby, N.; Coelho, J. A. B.*; Escobar, C. O*.; et al. MINOS Collaboration;

We report a two-detector measurement of the propagation speed of neutrinos over a baseline of 734 km. The measurement was made with the NuMI beam at Fermilab between the near and far MINOS detectors. The fractional difference between the neutrino speed and the speed of light is determined to be $(v/c - 1) = (1.0 \pm 1.1) \times 10^{-6}$, consistent with relativistic neutrinos.

PHYSICAL REVIEW D 92[5] 052005, 2015. DOI: 10.1103/PhysRevD.92.052005

[P323-2015] “Quantum walks on a circle with optomechanical systems”

Moqadam, J. K.; Portugal, R.; de Oliveira, M. C.*

We propose an implementation of a quantum walk on a circle in an optomechanical system by encoding the walker on the phase space of a radiation field and the coin on a two-level state of a mechanical resonator. The dynamics of the system is obtained by applying Suzuki-Trotter decomposition. We numerically show that the system displays typical behaviors of quantum walks, namely the probability distribution evolves ballistically and the standard deviation of the phase distribution is linearly proportional to the number of steps. We also analyze the effects of decoherence by using the phase-damping channel on the coin space, showing the possibility to implement the quantum walk with present-day technology.

QUANTUM INFORMATION PROCESSING 14[10] 3595-3611, 2015. DOI: 10.1007/s11128-015-1079-9

[P324-2015] “Role of dimensionality in the Kondo CeT X-2 family: The case of CeCd_{0.7}Sb₂”

Rosa, P. F. S.*; Bourg, R. J.; Jesus, C. B. R.*; Pagliuso, P. G.*; Fisk, Z.

Motivated by the presence of competing magnetic interactions in the heavy fermion family CeT X-2 (T = transition metal, X = pnictogen), here we study the novel parent compound CeCd_{0.7}Sb₂ by combining magnetization, electrical resistivity, and heat-capacity measurements. Contrary to the antiferromagnetic (AFM) ground state observed in most members of this family, the magnetic properties of our CeCd_{0.7}Sb₂ single crystals revealed a ferromagnetic ordering at $T_c = 3$ K with an unusual soft behavior. By using a mean field model including anisotropic nearest-neighbor interactions and the tetragonal crystalline electric field (CEF) Hamiltonian, a systematic analysis of our macroscopic data was obtained. Our fits allowed us to extract a simple but very distinct CEF scheme, as compared to the AFM counterparts. As in the previously studied ferromagnet CeAgSb₂, a pure vertical $\bar{1}/2$ ground state is realized, hinting at a general trend within the ferromagnetic members. More generally, we propose a scenario for the understanding of the magnetism in this family of compounds based on the subtle changes of dimensionality in the crystal structure.

PHYSICAL REVIEW B 92[13] 134421, 2015. DOI: 10.1103/PhysRevB.92.134421

[P325-2015] “Search for a Higgs boson in the mass range from 145 to 1000 GeV decaying to a pair of W or Z bosons”

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

A search for a heavy Higgs boson in the $H \rightarrow WW$ and $H \rightarrow ZZ$ decay channels is reported. The search is based upon proton-proton collision data samples corresponding to an integrated luminosity of up to 5.1 fb⁻¹ at $\sqrt{s} = 7$ TeV and up to 19.7 fb⁻¹ at $\sqrt{s} = 8$ TeV, recorded by the CMS experiment at the CERN LHC. Several final states of the $H \rightarrow WW$ and $H \rightarrow ZZ$ decays are analyzed. The combined upper limit at the 95% confidence level on the product of the cross section and branching fraction exclude a Higgs boson with standard model-like couplings and decays in the range $145 < m(H) < 1000$ GeV. We also interpret the results in the context of an electroweak singlet extension of the standard model.

JOURNAL OF HIGH ENERGY PHYSICS 10, 144, 2015. DOI: 10.1007/JHEP10(2015)144

[P326-2015] “Search for neutral color-octet weak-triplet scalar particles in proton-proton collisions at $\sqrt{s}=8\text{TeV}$ ”

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

A search for pair production of neutral color-octet weak-triplet scalar particles ($\Theta(0)$) is performed in processes where one $\Theta(0)$ decays to a pair of b quark jets and the other to a Z boson plus a jet, with the Z boson decaying to a pair of electrons or muons. The search is performed with data collected by the CMS experiment at the CERN LHC corresponding to an integrated luminosity of 19.7 fb⁻¹ of proton-proton collisions at $\sqrt{s} = 8\text{TeV}$. The number of observed events is found to be in agreement with the standard model predictions. The 95% confidence level upper limit on the product of the cross section and branching fraction is obtained as a function of the $\Theta(0)$ mass. The 95% confidence level lower bounds on the $\Theta(0)$ mass are found to be 623 and 426 GeV, for two different octo-triplet theoretical scenarios. These are the first direct experimental bounds on particles predicted by the octo-triplet model.

JOURNAL OF HIGH ENERGY PHYSICS 9, 201, 2015. DOI: 10.1007/JHEP09(2015)201

[P327-2015] "Search for supersymmetry with photons in pp collisions at root s=8 TeV"

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

Two searches for physics beyond the standard model in events containing photons are presented. The data sample used corresponds to an integrated luminosity of 19.7 fb⁻¹ of proton-proton collisions at root s = 8 TeV, collected with the CMS experiment at the CERN LHC. The analyses pursue different inclusive search strategies. One analysis requires at least one photon, at least two jets, and a large amount of transverse momentum imbalance, while the other selects events with at least two photons and at least one jet, and uses the razor variables to search for signal events. The background expected from standard model processes is evaluated mainly from data. The results are interpreted in the context of general gauge-mediated supersymmetry, with the next-to-lightest supersymmetric particle either a bino- or wino-like neutralino, and within simplified model scenarios. Upper limits at the 95% confidence level are obtained for cross sections as functions of the masses of the intermediate supersymmetric particles.

PHYSICAL REVIEW D 92[7], 072006, 2015. DOI: 10.1103/PhysRevD.92.072006

[P328-2015] "Search for the standard model Higgs boson produced through vector boson fusion and decaying to b(b) over-bar"

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

A first search is reported for a standard model Higgs boson (H) that is produced through vector boson fusion and decays to a bottom-quark pair. Two data samples, corresponding to integrated luminosities of 19.8 fb⁻¹ and 18.3 fb⁻¹ of proton-proton collisions at root s = 8 TeV were selected for this channel at the CERN LHC. The observed significance in these data samples for a H -> b (b) over bar signal at a mass of 125 GeV is 2.2 standard deviations, while the expected significance is 0.8 standard deviations. The fitted signal strength $\mu = \sigma/\sigma(SM) = 2.8(-1.4)(+1.6)$. The combination of this result with other CMS searches for the Higgs boson decaying to a b-quark pair yields a signal strength of 1.0 +/- 0.4, corresponding to a signal significance of 2.6 standard deviations for a Higgs boson mass of 125 GeV.

PHYSICAL REVIEW D 92[3] 032008, 2015. DOI: 10.1103/PhysRevD.92.032008

[P329-2015] "Shortcuts to adiabaticity from linear response theory"

Acconcia, T. V.*; Bonanca, M. V. S.*; Deffner, S.

A shortcut to adiabaticity is a finite-time process that produces the same final state as would result from infinitely slow driving. We show that such shortcuts can be found for weak perturbations from linear response theory. With the help of phenomenological response functions, a simple expression for the excess work is found-quantifying the nonequilibrium excitations. For two specific examples, i.e., the quantum parametric oscillator and the spin 1/2 in a time-dependent magnetic field, we show that finite-time zeros of the excess work indicate the existence of shortcuts. Finally, we propose a degenerate family of protocols, which facilitates shortcuts to adiabaticity for specific and very short driving times.

PHYSICAL REVIEW E 92[4], 042148, 2015. DOI: 10.1103/PhysRevE.92.042148

[P330-2015] "Spectral reconstruction of dental X-ray tubes using laplace inverse transform of the attenuation curve"

Malezan, A.; Tornal, A.*; Antoniassi, M.; Watanabe, P. C. A.; Albino, L. D.; Poletti, M. E.

In this work, a spectral reconstruction methodology for diagnostic X-ray, using Laplace inverse transform of the attenuation, was successfully applied to dental X-ray equipments. The attenuation curves of 8 commercially available dental X-ray equipment, from 3 different manufactures (Siemens, Gnatus and Dabi Atlante), were obtained by using an ionization chamber and high purity aluminium filters, while the KV(p) was obtained with a specific meter. A computational routine was implemented in order to adjust a model function, whose inverse Laplace transform is analytically known, to the attenuation curve. This methodology was validated by comparing the reconstructed and the measured (using semiconductor detector of cadmium telluride) spectra of a given dental X-ray unit. The spectral reconstruction showed the Dabi Atlante equipments generating similar shape spectra. This is a desirable feature from clinic standpoint because it produces similar levels of image quality and dose. We observed that equipments from Siemens and Gnatus generate significantly different spectra, suggesting that, for a given operating protocol, these units will present different levels of image quality and dose. This fact claims for the necessity of individualized operating protocols that maximize image quality and dose. The proposed methodology is suitable to perform a spectral reconstruction of dental X-ray equipments from the simple measurements of attenuation curve and KV(p). The simplified experimental apparatus and the low level of technical difficulty make this methodology accessible to a broad range of users. The knowledge of the spectral distribution can help in the development of operating protocols that maximize image quality and dose.

RADIATION PHYSICS AND CHEMISTRY 116, 278-281, 2015. DOI: 10.1016/j.radphyschem.2015.05.008

[P331-2015] "Study of multicomponent fluoro-phosphate based glasses: Ho3+ as a luminescence center"

Babu, S.; Seshadri, M.*; Balakrishna, A.; Prasad, V. R.; Ratnakaram, Y. C.

The multicomponent 49.5P(2)O(5)-10AlF(3)-10BaF(2)-10SrF(2)-10PbO-10M (M=Li2O, Na2O, K2O, ZnO and Bi2O3) glasses doped with 0.5 mol% holmium were prepared by melt quenching technique. Their thermal behavior was examined from differential scanning calorimetry (DSC). It is found that bismuth fluorophosphate glass matrix has good thermal stability. Their structures were characterized by the X-ray diffraction with SEM analysis, fourier transform infrared (FTIR), Raman spectroscopy and magic angle spinning (MAS) nuclear magnetic resonance (NMR) techniques. It was found that the phosphate network of these glasses was composed mainly of Q(2) and Q(3) phosphate tetrahedral units. The Judd-Ofelt parameters (J-O) (Omega(2), Omega(4) and Omega(6)) were evaluated from the intensities of the energy levels through optical absorption spectra. The most intense transitions are observed in the visible region of the spectrum. It is observed that the transition I-5(8) -> (5)G(6) is the hypersensitive transition for Ho3+ ion. With these J-O parameters, various radiative properties like the probabilities of radiative transitions, radiative lifetimes and branching ratios have been calculated for different fluoro-phosphate glasses. The luminescence kinetics from excited holmium levels have been studied upon selective excitation through photoluminescence measurements. Holmium produces two visible laser emissions i.e. one is green (F-5(4)(S-5(2)) -> I-5(8)) and another one is red (F-5(5) -> I-5(8)). The lifetimes of these levels have been experimentally determined through decay profile studies. The above results suggest that the prepared bismuth fluorophosphate glass system could be a suitable candidate for using it as a green laser source (F-5(4)(S-5(2)) -> I-5(8)) in the visible region of the spectrum.

[P332-2015] "Synthesis of Ag@Silica Nanoparticles by Assisted Laser Ablation"

Gonzalez-Castillo, J. R.; Rodriguez, E.; Jimenez-Villar, E.; Rodriguez, D.; Salomon-Garcia, I.; de Sa, G. F.; Garcia-Fernandez, T.; Almeida, D. B.*; Cesar, C. L.*; Johnes, R.; Ibarra, J. C.

This paper reports the synthesis of silver nanoparticles coated with porous silica (Ag@Silica NPs) using an assisted laser ablation method. This method is a chemical synthesis where one of the reagents (the reducer agent) is introduced in nanometer form by laser ablation of a solid target submerged in an aqueous solution. In a first step, a silicon wafer immersed in water solution was laser ablated for several minutes. Subsequently, an AgNO₃ aliquot was added to the aqueous solution. The redox reaction between the silver ions and ablation products leads to a colloidal suspension of core-shell Ag@Silica NPs. The influence of the laser pulse energy, laser wavelength, ablation time, and Ag+ concentration on the size and optical properties of the Ag@Silica NPs was investigated. Furthermore, the colloidal suspensions were studied by UV-VIS-NIR spectroscopy, X-Ray diffraction, and high-resolution transmission electron microscopy (HRTEM).

NANOSCALE RESEARCH LETTERS 10, 399, 2015. DOI: 10.1186/s11671-015-1105-y

[P333-2015] "The network organization of protein interactions in the spliceosome is reproduced by the simple rules of food-web models"

Pires, M. M.; Cantor, M.; Guimaraes, P. R.; de Aguiar, M. A. M.*; dos Reis, S. F.; Coltri, P. P.

The network structure of biological systems provides information on the underlying processes shaping their organization and dynamics. Here we examined the structure of the network depicting protein interactions within the spliceosome, the macromolecular complex responsible for splicing in eukaryotic cells. We show the interactions of less connected spliceosome proteins are nested subsets of the connections of the highly connected proteins. At the same time, the network has a modular structure with groups of proteins sharing similar interaction patterns. We then investigated the role of affinity and specificity in shaping the spliceosome network by adapting a probabilistic model originally designed to reproduce food webs. This food-web model was as successful in reproducing the structure of protein interactions as it is in reproducing interactions among species. The good performance of the model suggests affinity and specificity, partially determined by protein size and the timing of association to the complex, may be determining network structure. Moreover, because network models allow building ensembles of realistic networks while encompassing uncertainty they can be useful to examine the dynamics and vulnerability of intracellular processes. Unraveling the mechanisms organizing the spliceosome interactions is important to characterize the role of individual proteins on splicing catalysis and regulation.

SCIENTIFIC REPORTS 5, 14865, 2015. DOI: 10.1038/srep14865

[P334-2015] "The New 30 THz Solar Telescope in So Paulo, Brazil"

Kudaka, A. S.; Cassiano, M. M.; Marcon, R.*; Cabezas, D. P.; Fernandes, L. O. T.; Ramirez, R. F. H.; Kaufmann, P.; de Souza, R. V.

It has been found that solar bursts exhibit one unexpected spectral component with fluxes increasing with frequency in the sub-THz range, which is distinct from the well-known microwave emission that peaks at a few to some tens of GHz. This component has been found to extend into the THz range of frequencies by recent 30 THz solar flare observations of impulsive bursts with flux intensities considerably higher than fluxes at sub-THz and microwave frequencies. High-cadence solar observations at 30 THz (continuum) are therefore an important tool for the study of active regions and flaring events. We report the recent installation of a new 30 THz solar telescope in So Paulo, located at the top of one of the University's buildings. The instrument uses a Hale-type coelostat with two 20 cm diameter flat mirrors sending light to a 15 cm mirror Newtonian telescope. Radiation is directed to a microbolometer array camera that is kept at room temperature. Observations are usually obtained with cadence. One 60 mm refractor has been added to observe images simultaneously. We describe our new telescopes and the new observatory examples of the first results obtained.

SOLAR PHYSICS 290[8] 2373-2379, 2015. DOI: 10.1007/s11207-015-0749-1

[P335-2015] "Theoretical and experimental investigation of electron collisions with acetone"

Homem, M. G. P.; Iga, I.; da Silva, L. A.; Ferraz, J. R.; Machado, L. E.; de Souza, G. L. C.; da Mata, V. A. S.; Brescansin, L. M.*; Lucchese, R. R.; Lee, M. T.

We report a joint theoretical-experimental investigation on elastic electron scattering by acetone in the low-and intermediate-energy regions. More specifically, experimental differential, integral, and momentum-transfer cross sections are given in the 30-800 eV and 10 degrees-120 degrees ranges. Theoretical cross sections are reported in the 1-500 eV interval. The experimental differential cross sections were determined using a crossed electron-beam-molecular-beam geometry, whereas the absolute values of the cross sections were obtained using the relative-flow technique. Theoretically, a complex optical potential derived from a Hartree-Fock molecular wave function was used to represent the collision dynamics, and a single-center expansion method combined with the Pade approximant technique was used to solve the scattering equations. Our experimental cross-section data are in generally good agreement with the present calculated data. Also, our calculated grand-total and total absorption cross sections are in good agreement with the experimental results reported in the literature. Nevertheless, our calculations have revealed a strong shape resonance in the B-2(2) scattering channel not clearly seen in the experimental results. Possible reasons for this fact are also discussed.

PHYSICAL REVIEW A 92[3] 032711, 2015. DOI: 10.1103/PhysRevA.92.032711

Proceedings

[P336-2015] "Asymptotic Scenarios for the Proton's Central Opacity: An Empirical Study"

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

We present a model-independent analysis of the experimental data on the ratio X between the elastic and total cross-sections from pp and p over bar scattering in the c.m. energy interval 5 GeV - 8 TeV. Using a novel empirical parametrization for that ratio as a function of the energy and based on theoretical and empirical arguments, we investigate three distinct asymptotic scenarios: either the black-disk (BD) limit or scenarios above and below that limit. Our analysis favors a scenario below the BD, with asymptotic ratio $X = 0.36 \pm 0.08$.

DIFFRACTION 2014: INTERNATIONAL WORKSHOP ON DIFFRACTION IN HIGH-ENERGY PHYSICS - AIP Conference Proceedings 1654, 050005, 2015. DOI:10.1063/1.4915978

[P337-2015] “Enhanced Terahertz transmission through 3D non-spherical terajets”

Cruz, A. L. S.; Cordeiro, C. M. B.*; Franco, M. A. R.

In this paper we demonstrate the capability of non-spherical dielectric objects to generate terajets. similar to the photonic nanojets. at Terahertz frequencies. We investigated numerically three geometries with non-usual shape and compared them with a common dielectric sphere. The focusing terajet performance was evaluated and one of the proposed geometry shown an enhancement power similar to 32 times with respect to the incident wave power. Using harmonic frequencies to excite the geometries, the power enhancement can achieve an intensity of similar to 64 times.

24TH INTERNATIONAL CONFERENCE ON OPTICAL FIBRE SENSORS - Proceedings of SPIE 9634, UNSP 963412, 2015. DOI: 10.1117/12.2195279

[P338-2015] “Hydrostatic pressure sensing with surface-core fibers”

Osorio, J. H.*; Franco, M. A. R.; Cordeiro, C. M. B.*

In this paper, we report the employment of surface-core fibers for hydrostatic pressure sensing. To our knowledge, this is the first demonstration of the use of these fibers for the referenced purpose. Theoretical simulations of the fiber structure were performed in order to estimate fiber phase and group birefringence values and its pressure sensitivity coefficient. In order to test fiber performance when acting as a pressure sensor, the same was placed in an polarimetric setup and its spectral response was measured. A sensitivity of 4.8 nm/MPa was achieved, showing good resemblance to the expected sensitivity value (4.6 nm/MPa).

24TH INTERNATIONAL CONFERENCE ON OPTICAL FIBRE SENSORS - Proceedings of SPIE 9634, UNSP 96343B, 2015. DOI: 10.1117/12.2194867

[P339-2015] “Pleistocene megafaunal interaction networks became more vulnerable after human arrival”

Pires, M. M.; Koch, P. L.; Farina, R. A.; de Aguiart, M. A. M.*; dos Reis, S. F.; Guimaraes, P. R.

The end of the Pleistocene was marked by the extinction of almost all large land mammals worldwide except in Africa. Although the debate on Pleistocene extinctions has focused on the roles of climate change and humans, the impact of perturbations depends on properties of ecological communities, such as species composition and the organization of ecological interactions. Here, we combined palaeoecological and ecological data, food-web models and community stability analysis to investigate if differences between Pleistocene and modern mammalian assemblages help us understand why the megafauna died out in the Americas while persisting in Africa. We show Pleistocene and modern assemblages share similar network topology, but differences in richness and body size distributions made Pleistocene communities significantly more vulnerable to the effects of human arrival. The structural changes promoted by humans in Pleistocene networks would have increased the likelihood of unstable dynamics, which may favour extinction cascades in communities facing extrinsic perturbations.

Our findings suggest that the basic aspects of the organization of ecological communities may have played an important role in major extinction events in the past. Knowledge of community-level properties and their consequences to dynamics may be critical to understand past and future extinctions.

PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES 282[1814] 64-72, 20151367, 2015. DOI: 10.1098/rspb.2015.1367

[P340-2015] “Surface-core fiber gratings”

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

In this paper, we report, to our knowledge, the first demonstration of the induction of long-period and Bragg gratings on surface-core optical fibers. Surface-core fibers described herein were fabricated from commercial silica tubes and germanium-doped silica rods by employing a very simple procedure. Being the core on the fiber surface, it can be sensitive to refractive index variations in the environment in which the fiber is immersed. Thus, results concerning the sensitivity of these gratings to environmental refractive index variations are presented. Besides, simulation data are presented for comparison to the experimental behavior and for projecting future steps in this research.

24TH INTERNATIONAL CONFERENCE ON OPTICAL FIBRE SENSORS - Proceedings of SPIE 9634, UNSP 96340V, 2015. DOI: 10.1117/12.2194299

[P341-2015] “The utility of fluorescence lifetime imaging in routine bone marrow smears”

Lorand-Metze, I.; Racanelli, A. P.*; Cesar, C. L.*; Falconi, M. A.; Metze, K.

20th Congress of European-Hematology-Association - HAEMATologica E1134, 100, 452-453 [1], 2015.

Patentes

[Pa005-2015] “Processo e equipamento de cura localizada de resina termosensível e esterolitografia com laser na região espectral do infravermelho para construção de protótipos”

Marco Antonio Fiori Scarparo*; Andre Luiz Jardini Munhoz

Número da Patente ou Registro: Agência INOVA: PI0207464-8
Tipo: Patente de Invenção
Mês/Ano de Conclusão: 07/2015 - INPI/BRASIL

[Pa006-2015] “Processo de produção de nanofios monocristalinos intermetálicos; e nanofios monocristalinos intermetálicos”

Kleber Roberto Pirola*; Priscila Ferrari Silveira Rosa*; Cris Adriano*; Ricardo Rodrigues Urbano*; Wellington Akira Iwamoto*; Peterson Grandini De Carvalho*; Luis Carlos Costa Arzuza*; Carlos Rettori*; Camilo Bruno Ramos De Jesus*; Luiz Augusto Sousa De Oliveira*; Fanny Beron*; Karoline Oliveira Moura*; Marcelo Knobel*; Pascoal Jose Giglio Pagliuso*; Thales Macedo Garitezi *

Número da Patente ou Registro: Agência INOVA: PCT/BR2015/000124

Tipo: Patente de Invenção

Mês/Ano de Conclusão: 08/2015 - INPI/BBRASIL

Fonte: SIPEX - Sistema de Informação de Pesquisa e Extensão da Unicamp.

*Autores da comunidade IFGW

Defesas de Dissertações

[D021-2015] “Cálculo da Produção de Neutrinos Atmosféricos”

Aluno: Gabriela Vitti Stenico

Orientador: Prof. Dr. Orlando Luis Goulart Peres

Data: 13/11/2015

[D022-2015] “Propriedades Ópticas de Pontos Quânticos Acoplados com Gás de Portadores”

Aluno: Helder Faria Andriolo

Orientador: Prof. Dr. José Antônio Brum

Data: 17/11/2015

[D023-2015] “Competição entre anisotropias perpendiculares em bicamadas de CoCrPt/Ni resolvida por ressonância ferromagnética”

Aluno: Gabriel Soares

Orientador: Profa. Dra. Fanny Béron

Data: 27/11/2015

[D024-2015] “Criticality in Neural Networks”

Aluno: Elohim Fonseca dos Reis

Orientador: Prof. Dr. José Antônio Brum

Data: 09/12/2015

[D025-2015] “Projeto, Caracterização e Análise de Microrressonadores Óticos Acoplados em Plataforma SOI”

Aluno: Guilherme Fórniás Machado de Rezende

Orientador: Prof. Dr. Newton Cesario Frateschi

Data: 09/12/2015

[D026-2015] “Nanopartículas de Prata produzidas por ablação à laser em água deionizada”

Aluno: Nelson Fabián Villegas Borrero

Orientador: Prof. Dr. Francisco das Chagas Marques

Data: 14/12/2015

Defesas de Teses

[T015-2015] “Produção Exclusiva de Bósons Z em colisões pp no experimento CMS/LHC”

Aluno: Miguel Medina Jaime

Orientador: Prof. Dr. José Augusto Chinellato

Data: 05/11/2015

[T016-2015] “Clonagem de imagens via Absorção Induzida Eletromagneticamente”

Aluno: Ulises Fernandez Apolinario

Orientador: Prof. Dr. Luis Eduardo Evangelista de Araujo

Data: 10/12/2015

[T017-2015] “Quantum Currents in the Coherent States Representation”

Aluno: Matheus Veronez

Orientador: Prof. Dr. Marcus Aloizio Martinez de Aguiar

Data: 16/12/2015

Fonte: Portal IFGW/Pós-graduação - Agenda de Colóquios, Defesas e Seminários.

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