

# Abstracta

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## Trabalhos Publicados

### [P291-2013] "A method for thermal diffusivity measurement in fluids"

Marin, E.; Hernandez-Rosales, E.; Mansanares, A. M.\*; Ivanov, R.; Rojas-Trigos, J. B.; Calderon, A.

A technique is proposed for thermal diffusivity measurement in fluids. It is based on the Angstrom method, but with excitation of thermal waves by electromagnetic energy absorption and pyroelectric detection. The good agreement between measured thermal diffusivity of air and some test liquids with literature values shows the validity of the method. It is free of some limitations of conventional photopyroelectric technique with length scanning because it is free of moving parts inside the sample and because it avoids problems associated with the non-parallelism between thermal wave generator surface and sensor. It does not require any data normalization procedure or special sample preparation.

Review Of Scientific Instruments 84[10], 104903, 2013. DOI: 10.1063/1.4824191

### [P292-2013] "Anisotropic magnetocaloric effect in ErGa2 and HoGa2 single-crystals"

dos Reis, R. D.\*; da Silva, L. M.; dos Santos, A. O.; Medina, A. M. N.; Cardoso, L. P.\*; Gandra, F. C. G.\*

In this work we study the anisotropic magnetocaloric properties of ErGa2 and HoGa2 single-crystals. Both compounds present antiferromagnetic ordering below 10 K but with different easy axis as a result of the crystal field anisotropy. The single-crystal conventional MCE values are similar or in certain circumstances even larger than the results for the polycrystalline material. The anisotropic MCE was calculated by taking the difference of the entropy change of the easy and hard magnetization directions. For both compounds, the anisotropic variation of entropy is as large as the conventional entropy change obtained by sweeping the magnetic field up to 5 T. Particularly for ErGa2 an inverse MCE for a 3 T field oriented along the easy axis is obtained with similar magnitude of the 5 T MCE found for polycrystalline samples. The results show that by exploring anisotropic properties of the materials it is possible to obtain a significant MCE. From a technological point of view this can be an interesting alternative because the MCE is produced just by rotating the magnetic material under a constant magnetic field.

Journal Of Alloys And Compounds 582, 461-465, 2013. DOI: 10.1016/j.jallcom.2013.08.023

### [P293-2013] "Anisotropic magnetocaloric effect in gadolinium thin films: Magnetization measurements and acoustic detection"

Mansanares, A. M.\*; Gandra, F. C. G.\*; Soffner, M. E.; Guimaraes, A. O.; da Silva, E. C.; Vargas, H.; Marin, E.

In this letter, it is demonstrated the ability of the magneto-acoustic technique in detecting the magnetocaloric effect in gadolinium thin films (1.0  $\mu\text{m}$  and 3.0  $\mu\text{m}$  thick), which is not accessible through conventional temperature sensors because of the reduced mass of the samples. The method, which detects the direct effect of the sample temperature variation, proved to be sensitive to the anisotropy of the films, making possible for the investigation of the anisotropic magnetocaloric effect. Magnetization measurements were also carried out, and from these measurements both the adiabatic temperature and the isothermal entropy variations were calculated. The acoustically detected magnetocaloric effect shows very good agreement with these calculations.

Journal Of Applied Physics 114[16], 163905, 2013. DOI: 10.1063/1.4826909

### [P294-2013] "Centrality dependence of pi, K, and p production in Pb-Pb collisions at root s(NN)=2.76 TeV"

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

In this paper measurements are presented of  $\pi^{+/-}$ ,  $K^{+/-}$ ,  $p$ , and  $\bar{p}$  over bar production at midrapidity ( $|\eta| < 0.5$ ), in Pb-Pb collisions at  $\sqrt{s(NN)} = 2.76$  TeV as a function of centrality. The measurement covers the transverse-momentum ( $p(T)$ ) range from 100, 200, and 300 MeV/c up to 3, 3, and 4.6 GeV/c for  $\pi$ , K, and p, respectively. The measured  $p(T)$  distributions and yields are compared to expectations based on hydrodynamic, thermal and recombination models. The spectral shapes of central collisions show a stronger radial flow than measured at lower energies, which can be described in hydrodynamic models. In peripheral collisions, the  $p(T)$  distributions are not well reproduced by hydrodynamic models. Ratios of integrated particle yields are found to be nearly independent of centrality. The yield of protons normalized to pions is a factor similar to 1.5 lower than the expectation from thermal models.

Physical Review C 88[4], 044910, 2013. DOI: 10.1103/PhysRevC.88.044910

### [P295-2013] "Centrality determination of Pb-Pb collisions at root s(NN)=2.76 TeV with ALICE"

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

This publication describes the methods used to measure the centrality of inelastic Pb-Pb collisions at a center-of-mass energy of 2.76 TeV per colliding nucleon pair with ALICE. The centrality is a key parameter in the study of the properties of QCD matter at extreme temperature and energy density, because it is directly related to the initial overlap region of the colliding nuclei. Geometrical properties of the collision, such as the number of participating nucleons and the number of binary nucleon-nucleon collisions, are deduced from a Glauber model with a sharp impact parameter selection and shown to be consistent with those extracted from the data. The centrality determination provides a tool to compare ALICE measurements with those of other experiments and with theoretical calculations.

Physical Review C 88[4], 044909, 2013. DOI: 10.1103/PhysRevC.88.044909

### [P296-2013] "Coherent control of quantum collapse in a Bosonic Josephson junction by modulation of the scattering length"

Lozada-Vera, J.\*; Bagnato, V. S.; de Oliveira, M. C.\*

By means of a temporal-periodic modulation of the s-wave scattering length, a procedure to control the evolution of an initial atomic coherent state associated with a bosonic Josephson junction is presented. The scheme developed has a remarkable advantage of avoiding the quantum collapse of the state due to phase and number diffusion. This kind of control could prove useful for atom interferometry using BECs, where the interactions limit the evolution time stage within the interferometer, and where the modulation can be induced via magnetic Feshbach resonances as recently experimentally demonstrated.

New Journal Of Physics 15, 113012, 2013. DOI: 10.1088/1367-2630/15/11/113012

**[P297-2013] “Cone-like graphene nanostructures: electronic and optical properties”**

Ulloa, P.; Latge, A.; Oliveira, L. E.\*; Pacheco, M.

A theoretical study of electronic and optical properties of graphene nanodisks and nanocones is presented within the framework of a tight-binding scheme. The electronic densities of states and absorption coefficients are calculated for such structures with different sizes and topologies. A discrete position approximation is used to describe the electronic states taking into account the effect of the overlap integral to first order. For small finite systems, both total and local densities of states depend sensitively on the number of atoms and characteristic geometry of the structures. Results for the local densities of charge reveal a finite charge distribution around some atoms at the apices and borders of the cone structures. For structures with more than 5,000 atoms, the contribution to the total density of states near the Fermi level essentially comes from states localized at the edges. For other energies, the average density of states exhibits similar features to the case of a graphene lattice. Results for the absorption spectra of nanocones show a peculiar dependence on the photon polarization in the infrared range for all investigated structures.

Nanoscale Research Letters 8[384], 2013. DOI: 10.1186/1556-276X-8-384

**[P298-2013] “Controlling the influence of Auger recombination on the performance of quantum-dot light-emitting diodes”**

Bae, W. K.; Park, Y. S.; Lim, J.; Lee, D.; Padilha, L. A.\*; McDaniel, H.; Robel, I.; Lee, C.; Pietryga, J. M.; Klimov, V. I.

Development of light-emitting diodes (LEDs) based on colloidal quantum dots is driven by attractive properties of these fluorophores such as spectrally narrow, tunable emission and facile processibility via solution-based methods. A current obstacle towards improved LED performance is an incomplete understanding of the roles of extrinsic factors, such as non-radiative recombination at surface defects, versus intrinsic processes, such as multicarrier Auger recombination or electron-hole separation due to applied electric field. Here we address this problem with studies that correlate the excited state dynamics of structurally engineered quantum dots with their emissive performance within LEDs. We find that because of significant charging of quantum dots with extra electrons, Auger recombination greatly impacts both LED efficiency and the onset of efficiency roll-off at high currents. Further, we demonstrate two specific approaches for mitigating this problem using heterostructured quantum dots, either by suppressing Auger decay through the introduction of an intermediate alloyed layer, or by using an additional shell that impedes electron transfer into the quantum dot to help balance electron and hole injection.

Nature Communications 4, 3661, 2013. DOI: 10.1038/ncomms3661

**[P299-2013] “Crystal structure of fluorite-related Ln(3)SbO(7) (Ln=La-Dy) ceramics studied by synchrotron X-ray diffraction and Raman scattering”**

Siqueira, K. P. F.; Borges, R. M.; Granado, E.\*; Malard, L. M.; de Paula, A. M.; Moreira, R. L.; Bittar, E. M.; Dias, A.

Ln(3)SbO(7) (Ln=La, Pr, Nd, Sm, Eu, Gd, Tb and Dy) ceramics were synthesized by solid-state reaction in optimized

conditions of temperature and time to yield single-phase ceramics. The crystal structures of the obtained ceramics were investigated by synchrotron X-ray diffraction, second harmonic generation (SHG) and Raman scattering. All samples exhibited fluorite-type orthorhombic structures with different oxygen arrangements as a function of the ionic radius of the lanthanide metal. For ceramics with the largest ionic radii (La Nd), the ceramics crystallized into the Cmcm space group, while the ceramics with intermediate and smallest ionic radii (Sm Dy) exhibited a different crystal structure belonging to the same space group, described under the Cam setting. The results from SHG and Raman scattering confirmed these settings and ruled out any possibility for the non-centrosymmetric O221 space group describing the structure of the small ionic radii ceramics, solving a recent controversy in the literature. Besides, the Raman modes for all samples are reported for the first time, showing characteristic features for each group of samples.

Journal Of Solid State Chemistry 203, 326-332, 2013. DOI: 10.1016/j.jssc.2013.05.001

**[P300-2013] “Development of a Lipid Particle for beta-Carotene Encapsulation Using a Blend of Tristearin and Sunflower Oil: Choice of Lipid Matrix and Evaluation of Shelf Life of Dispersions”**

Gomes, G. V. L.; Simplicio, I. A. S.; Souto, E. B.; Cardoso, L. P.\*; Pinho, S. C.

Solid lipid particles are colloidal carriers that have been studied for almost 20 years in the pharmaceutical field and recently have been investigated by food researchers due to their capacity to enhance the incorporation of lipophilic bioactives and their bioavailability in aqueous formulations. The aims of this study are to choose a suitable lipid matrix to produce solid lipid particles, which would be used to encapsulate beta-carotene, and to evaluate the capacity of dispersions to protect the incorporated carotenoid. Bulk lipid mixtures of tristearin and sunflower oil were analysed by differential scanning calorimetry and wide angle X-ray diffraction, and the mixture with the highest degree of structural disorganisation was chosen. beta-Carotene was then encapsulated in solid lipid particles produced with this mixture, composed of 70 % tristearin and 30 % sunflower oil (6 % total lipid) and stabilised with hydrogenated soy lecithin and Tween 80 (3 % total surfactant) by hot pressure homogenisation. Two types of particles were produced, using one or two passages in the homogenisation step. Average particle size, zeta potential, thermal behaviour, crystallinity and beta-carotene concentration were monitored over 4 months of storage (under refrigerated conditions). The results showed minor differences between the systems in terms of size distribution, although the particles produced with one passage through the homogeniser were slightly more efficient at protecting the beta-carotene from degradation and also suffered few microstructural alterations after 4 months.

Food Technology And Biotechnology 51[3], 383-391, 2013.

**[P301-2013] “Dielectric Study at Microwave Frequencies of Phase Transitions in Multiferroic Ceramics”**

Fraygola, B.; Coelho, A. A.\*; Eiras, J. A.

Multiferroic ceramic solid solutions between the ferroelectric relaxor Pb(Fe<sub>2</sub>/3W<sub>1</sub>/3)O<sub>3</sub> (PFW) and “normal” ferroelectric PbTiO<sub>3</sub> (PT) - PFW-PT have been synthesized by a modified B-site precursor method and characterized by microwave dielectric measurements. A dielectric dispersion occurring in the frequency range of 100MHz-3GHz and in a broad range of temperatures showed to be a powerful tool to detect electrostrictive and magnetostrictive effects. Anomalies in the temperature dependence of the dielectric parameters (f(R) (characteristic frequency) and the dielectric strength Delta epsilon

(characteristic of the dispersion)) have been observed at T-N and T-C for all samples, indicating that the coupling between the ferroelectric and antiferromagnetic orders occurs "via strain" and confirming the high sensitivity of microwave dielectric measurements to probe weak transitions in bulk ceramics.

**Materials Research-Ibero-American Journal Of Materials** 16[5], 1134-1139, 2013. DOI: 10.1590/S1516-14392013005000113

**[P302-2013] "Direct Synthesis of Ag Nanoparticles Incorporated on a Mesoporous Hybrid Material as a Sensitive Sensor for the Simultaneous Determination of Dihydroxybenzenes Isomers"**

Canevari, T. C.; Raymundo-Pereira, P. A.; Landers, R.\*; Machado, S. A. S.

This paper describes the synthesis, characterization, and applications of a mesoporous silica/ multiwalled carbon nanotube (SiO<sub>2</sub>/MWCNT) hybrid material, which was obtained by a sol-gel process and decorated with silver nanoparticles (AgNPs) ranging in size from 5 to 8 nm. The AgNPs were prepared directly on the surface of the SiO<sub>2</sub>/MWCNTs material by using N,N-dimethylformamide (DMF) as the reducing agent, and the resulting material was designated Ag/SiO<sub>2</sub>/MWCNT. The Ag/SiO<sub>2</sub>/MWCNT material was characterized by scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDS), high-resolution transmission electron microscopy (HR-TEM), and X-ray photoelectron spectroscopy (XPS). A glassy carbon electrode, modified with the Ag/SiO<sub>2</sub>/MWCNT material, was used in the development of a sensitive electrochemical sensor for the determination of hydroquinone and catechol in the presence of resorcinol by squarewave voltammetry. Well-defined and separate oxidation peaks were observed in phosphate buffer solution (PBS) at pH 7. The Ag/SiO<sub>2</sub>/MWCNT-modified electrode exhibited high sensitivity for the simultaneous determination of hydroquinone and catechol in the presence of resorcinol, and the limits of detection for hydroquinone and catechol are 0.0117 and 0.0121 M, respectively. No significant interference was seen for 2,6-dichloroindophenol, phenol, 4-nitrophenol, and nitrite ions in the detection of dihydroxybenzenes. Our study demonstrates that the resultant Ag/SiO<sub>2</sub>/MWCNT-modified electrode can be used for hydroquinone and catechol detection in the presence of resorcinol and other potentially interfering materials in river water samples.

**European Journal Of Inorganic Chemistry** 2013[33], 5746-5754, 2013. DOI: 10.1002/ejic.201300879

**[P303-2013] "Dynamical aspects of the unzipping of multiwalled boron nitride nanotubes"**

Perim, E.\*; Autreto, P. A. S.\*; Paupitz, R.; Galvao, D. S.\*

Boron nitride nanoribbons (BNNRs) exhibit very interesting magnetic properties, which could be very useful in the development of spintronic based devices. One possible route to obtain BNNRs is through the unzipping of boron nitride nanotubes (BNNTs), which have been already experimentally realized. In this work, different aspects of the unzipping process of BNNTs were investigated through fully atomistic molecular dynamics simulations using a classical reactive force field (ReaxFF). We investigated multiwalled BNNTs of different diameters and chiralities. Our results show that chirality plays a very important role in the unzipping process, as well as the interlayer coupling. These combined aspects significantly change the fracturing patterns and several other features of the unzipping processes in comparison to the ones observed for carbon nanotubes. Also, similar to carbon nanotubes, defective BNNTs can create regions of very high curvature which can act as a path to the unzipping process.

**Physical Chemistry Chemical Physics** 15[44], 19147-19150, 2013. DOI: 10.1039/c3cp52701h

**[P304-2013] "Dynamics of a Bose-Einstein condensate of excited magnons"**

Vannucchi, F. S.\*; Vasconcellos, A. R.\*; Luzzi, R.\*

The emergence of a non-equilibrium Bose-Einstein-like condensation of magnons in rf-pumped magnetic thin films has recently been experimentally observed. We present here a complete theoretical description of the non-equilibrium processes involved. It is demonstrated that the phenomenon is another example of the presence of a Bose-Einstein-like condensation in non-equilibrium many-boson systems embedded in a thermal bath, better referred-to as Frohlich-Bose-Einstein condensation. The complex behavior emerges after a threshold of the exciting intensity is attained. It is inhibited at higher intensities when the magnon-magnon interaction drives the magnons to internal thermalization. The observed behavior of the relaxation to equilibrium after the end of the pumping pulse is also accounted for and the different processes fully described.

**European Physical Journal B** 86[11], 463, 2013. DOI: 10.1140/epjb/e2013-40172-6

**[P305-2013] "Elastic Anomalies of Crystalline He-4 at T=0"**

Pessoa, R.; de Koning, M.\*; Vitiello, S. A.\*

Elastic constants for hcp He-4 are investigated at zero temperature, from close to the melting pressure up to 14 MPa approximately. Well known relations of these quantities are used to analyze the results. A reliable model wave function is used in the calculations. We show that the linear compressibility has a non-isotropic character in a range of densities rather than the expected isotropic behavior. A fact that suggests that the relation among elastic constants that depends on a constant value of the structure parameters ratio  $c/a$  for hcp quantum crystals should not be used to extract an elastic constant from experimental data.

**Journal Of Low Temperature Physics** 173[3-4], 143-151, 2013. DOI: 10.1007/s10909-013-0886-6

**[P306-2013] "Evolution of GaN nanowire morphology during catalyst-induced growth process"**

Sahoo, P.\*; Dhara, S.; Amirthapandian, S.; Kamruddin, M.

We report a very generic methodology to control the crystallographic orientation of GaN nanowires (NWs) in a chemical vapor deposition technique employing a standard vapor-liquid-solid mechanism. Incubation time was considered as a critical parameter to control the nanowire morphology. It was found that nanowires of a particular geometry, such as hexagonal, triangular, wurtzite/zinc-blende biphasic, and square shaped forms could be obtained by varying the length of incubation time. The change in the diameter of the nanowires with respect to the size of the catalyst droplet was corroborated by a simple steady state model. Luminescence spectra recorded from the GaN NWs revealed the presence of a dominating wurtzite phase in all the as-grown samples. However, temperature independent behavior of two luminescence peaks, recorded especially from the biphasic homostructure, was believed to originate from the radiative recombination of carriers localized at potential fluctuations in the zinc-blende and wurtzite phases discretely.

**Journal Of Materials Chemistry C** 1[43], 7237-7245, 2013. DOI: 10.1039/c3tc31494d

**[P307-2013] "Excitonic wavefunction engineering based on type II quantum dots"**

Dacal, L. C. O.; Iikawa, F.\*; Brasil, M. J. S. P.\*

We propose a semiconductor heterostructure that allows an effective control of the shape of the carriers wavefunctions by varying just one main structural parameter. The structure is formed by a type II quantum dot and a type I quantum well. We present the results of calculations for a particular system consisting of an InP/GaAs quantum dot and an InGaAs/GaAs quantum well using a simple effective mass model that provides a good insight on our structure. We show that the wavefunction of the carrier that remains outside the dot changes from a spheroidal to a ring-like shape depending mainly on the separation between the well and the dot layers. This change has a significant impact on relevant excitonic properties such as its lifetime and electrical dipole, and it also determines the possibility of observing the optical Aharonov-Bohm effect.

**Physica Status Solidi B-Basic Solid State Physics 250[10], 2174-2179, 2013. DOI: 10.1002/pssb.201349063**

**[P308-2013] “Extraordinary magnetoresistance in graphite: experimental evidence for the time-reversal symmetry breaking”**

Kopelevich, Y.\*; da Silva, R. R.\*; Camargo, B. C.\*; Alexandrov, A. S.\*

We report a highly anisotropic in-plane magnetoresistance (MR) in graphite that possesses in-plane parallel line-like structural defects. In a current direction perpendicular to the line defects (LD), MR is negative and linear in low fields with a crossover to a positive MR at higher fields, while in a current direction parallel to LD, we observed a giant super-linear positive MR. These extraordinary MRs are respectively explained by a hopping magnetoresistance via non-zero angular momentum orbitals, and by the magnetoresistance of inhomogeneous media. The linear negative orbital MR is a unique signature of the broken time-reversal symmetry (TRS). We discuss the origin of the disorder-induced TRS-breaking in graphite.

**Journal Of Physics-Condensed Matter 25[46], 466004, 2013. DOI: 10.1088/0953-8984/25/46/466004**

**[P309-2013] “Freeze-out dynamics via charged kaon femtoscopy in root sNN=200 GeV central Au plus Au collisions”**

Adamczyk, L.; Adkins, J. K.; Agakishiev, G.; Aggarwal, M. M.; Chinellato, J.\*; Tonelli Manganote, E. J.\*; et al.  
STAR Collaboration

We present measurements of three-dimensional correlation functions of like-sign, low-transverse-momentum kaon pairs from root sNN = 200 GeV Au + Au collisions. A Cartesian surface-spherical harmonic decomposition technique was used to extract the kaon source function. The latter was found to have a three-dimensional Gaussian shape and can be adequately reproduced by Terminator event-generator simulations with resonance contributions taken into account. Compared to the pion one, the kaon source function is generally narrower and does not have the long tail along the pair transverse momentum direction. The kaon Gaussian radii display a monotonic decrease with increasing transverse mass  $m(T)$  over the interval of  $0.55 \leq m(T) \leq 1.15$  GeV/c(2). While the kaon radii are adequately described by the  $m(T)$ -scaling in the outward and sideward directions, in the longitudinal direction the lowest  $m(T)$  value exceeds the expectations from a pure hydrodynamical model prediction.

**Physical Review C 88[3], 034906, 2013. DOI: 10.1103/PhysRevC.88.034906**

**[P310-2013] “Giant magnetoresistance in cluster-assembled nanostructures: on the influence of inter-particle interactions”**

Oyarzun, S.; de Sa, A. D. T.\*; Tuillon-Combes, J.; Tamion, A.; Hillion, A.; Boisson, O.; Mosset, A.; Pellarin, M.; Dupuis, V.; Hillenkamp, M.

The giant magnetoresistance response of granular systems has since its discovery been described by a simple model based on the geometric orientation of the magnetic moments of adjacent nanoparticles. This model has been proven quite successful in many cases but its being based on decoupled neighboring grains has never been verified as all available studies rely on samples with too high concentration. Here we report on magnetic and magnetotransport measurements of cluster-assembled nanostructures with cobalt clusters around 2.3 nm diameter embedded in copper matrices at different concentrations. The thorough magnetic characterization based on the recently developed “triple fit” method allows the detection of measurable inter-particle interactions and thus assures true superparamagnetic behavior in the most dilute sample. The spintronic response is compared to theory and we show that only at low concentration (0.5 at.% Co) all experiments are consistent and the common theoretical description is appropriate. Increasing the concentration to 2.5 and 5 at.% implies deviations between magnetometry and magnetotransport.

**Journal Of Nanoparticle Research 15[9], 1968, 2013. DOI: 10.1007/s11051-013-1968-8**

**[P311-2013] “Gluon mass generation in the presence of dynamical quarks”**

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

We study in detail the impact of dynamical quarks on the gluon mass generation mechanism, in the Landau gauge, for the case of a small number of quark families. As in earlier considerations, we assume that the main bulk of the unquenching corrections to the gluon propagator originates from the fully dressed quark-loop diagram. The nonperturbative evaluation of this diagram provides the key relation that expresses the unquenched gluon propagator as a deviation from its quenched counterpart. This relation is subsequently coupled to the integral equation that controls the momentum evolution of the effective gluon mass, which contains a single adjustable parameter; this constitutes a major improvement compared to the analysis presented in Aguilar et al. [Phys. Rev. D 86, 014032 (2012)], where the behavior of the gluon propagator in the deep infrared was estimated through numerical extrapolation. The resulting nonlinear system is then treated numerically, yielding unique solutions for the modified gluon mass and the quenched gluon propagator, which fully confirms the picture put forth recently in several continuum and lattice studies. In particular, an infrared finite gluon propagator emerges, whose saturation point is considerably suppressed, due to a corresponding increase in the value of the gluon mass. This characteristic feature becomes more pronounced as the number of active quark families increases, and can be deduced from the infrared structure of the kernel entering in the gluon mass equation.

**Physical Review D 88[7], 074010, 2013. DOI: 10.1103/PhysRevD.88.074010**

**[P312-2013] “Influence of size-corrected bound-electron contribution on nanometric silver dielectric function. Sizing through optical extinction spectroscopy”**

Santillan, J. M. J.; Videla, F. A.; van Raap, M. B.; Muraca, D.\*; Scaffardi, L. B.; Schinca, D. C.

The study of metal nanoparticles (NPs) is of great interest due to their ability to enhance optical fields on the nanometric scale, which makes them interesting for various applications in several fields of science and technology. In particular, their optical properties depend on the dielectric function of the metal, its size, shape and surrounding environment. This work analyses the contributions of free and bound electrons to the complex dielectric function of spherical silver NPs and their influence on the optical extinction spectra. The contribution of free electrons is usually corrected for particle size under 10 nm, introducing a modification of the damping constant to account for the extra collisions with the particle's boundary. For the contribution of bound electrons, we considered the interband transitions from the d-band to the conduction band including the size dependence of the electronic density states for radii below 2 nm. Bearing in mind these specific modifications, it was possible to determine optical and band energy parameters by fitting the bulk complex dielectric function. The results obtained from the optimum fit are:  $K\text{-bulk} = 2 \times 10^{24}$  (coefficient for bound-electron contribution),  $E_g = 1.91$  eV (gap energy),  $E_F = 4.12$  eV (Fermi energy), and  $\gamma(b) = 1.5 \times 10^{14}$  Hz (damping constant for bound electrons). Based on this size-dependent dielectric function, extinction spectra of silver particles in the nanometric-subnanometric radius range can be calculated using Mie's theory, and its size behaviour analysed. These studies are applied to fit experimental extinction spectrum of very small spherical particles fabricated by fs laser ablation of a solid target in water. From the fitting, the structure and size distribution of core radius and shell thickness of the colloidal suspension could be determined. The spectroscopic results suggest that the colloidal suspension is composed by two types of structures: bare core and core-shell. The former is composed by Ag, while the latter is composed by two species: silver-silver oxide (Ag-Ag<sub>2</sub>O) and hollow silver (air-Ag) particles. High-resolution transmission microscopy and atomic force microscopy analysis performed on the dried suspension agree with the sizing obtained by optical extinction spectroscopy, showing that the latter is a very good complementary technique to standard microscopy methods.

**Journal Of Physics D-Applied Physics 46[43], 435301, 2013.** DOI: 10.1088/0022-3727/46/43/435301

**[P313-2013] "J/psi Elliptic Flow in Pb-Pb Collisions at root s(NN)=2.76 TeV"**

Abbas, E.; Abelev, B.; Adam, J.; Adamova, D.; Dash, A.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

We report on the first measurement of inclusive J/psi elliptic flow  $v_2$  in heavy-ion collisions at the LHC. The measurement is performed with the ALICE detector in Pb-Pb collisions at root  $s(NN) = 2.76$  TeV in the rapidity range  $2.5 < y < 4.0$ . The dependence of the J/psi  $v_2$  on the collision centrality and on the J/psi transverse momentum is studied in the range  $0 \leq p_T < 10$  GeV/c. For semicentral Pb-Pb collisions at root  $s(NN) = 2.76$  TeV, an indication of nonzero  $v_2$  is observed with a largest measured value of  $v_2 = 0.116 \pm 0.046(\text{stat}) \pm 0.029(\text{syst})$  for J/psi in the transverse momentum range  $2 \leq p_T < 4$  GeV/c. The elliptic flow measurement complements the previously reported ALICE results on the inclusive J/psi nuclear modification factor and favors the scenario of a significant fraction of J/psi production from charm quarks in a deconfined partonic phase.

**Physical Review Letters 111[16], 162301, 2013.** DOI: 10.1103/PhysRevLett.111.162301

**[P314-2013] "Limits in late time conversion of cold dark matter into dark radiation"**

Boriero, D.\*; de Holanda, P. C.\*; Motta, M.\*

Structure formation creates high temperature and density regions in the Universe that allow the conversion of matter into more stable states, with a corresponding emission of relativistic matter and radiation. An example of such a mechanism is the supernova event, that releases relativistic neutrinos corresponding to 99% of the binding energy of remnant neutron star. We take this phenomena as a starting point for an assumption that similar processes could occur in the dark sector, where structure formation would generate a late time conversion of cold dark matter into a relativistic form of dark matter. We performed a phenomenological study about the limits of this conversion, where we assumed a transition profile that is a generalized version of the neutrino production in supernovae events. With this assumption, we obtained an interesting modification for the constraint over the cold dark matter density. We show that when comparing with the standard Lambda CDM cosmology, there is no preference for conversion, although the best fit is within 1 sigma from the standard model best fit. The methodology and the results obtained qualify this conversion hypothesis, from the large scale structure point of view, as a viable and interesting model to be tested in the future with small scale data, and mitigate discrepancies between observations at this scale and the pure cold dark matter model.

**Journal Of Cosmology And Astroparticle Physics 6, 006, 2013.** DOI: 10.1088/1475-7516/2013/06/006

**[P315-2013] "Magnetic and structural studies on nanostructured Gd/Cr multilayer films"**

Gadioli, G. Z.\*; Rouxinol, F. P.; Gelamo, R. V.; Cardoso, L. P.\*; Gama, S.; de Moraes, M. A. B.\*

Investigations of magnetic phases, transition temperatures and coercivity were performed in multilayered Gd/Cr films as a function of the crystalline state and morphology of the Gd layers. The films were deposited by dc magnetron sputtering at three substrate temperatures, T-s, (room temperature, 300 and 500 degrees C). The Gd and Cr thicknesses were of 10 and 30 nm, respectively. Two series of three films were prepared. In one of the series, the films had a single Gd/Cr bilayer; in the other, 15 bilayers. The discontinuous or granular nature of the Gd layers was revealed by scanning electron microscopy. Grazing incidence angle x-ray diffraction was used to investigate the crystalline state of the Gd and Cr layers. These techniques revealed that grain average size and crystalline order increase with increasing T-s. From dc magnetic measurements, the co-existence of ferromagnetic and superferromagnetic phases in the Gd layers was observed, and Curie transition temperatures, T-C, were determined. High coercive fields at low temperature (2 K) were measured in hysteresis cycles. Field-cooled and zero field-cooled magnetizations as functions of temperature curves exhibited, for some of the samples, a low temperature peak suggesting a freezing transition to a cluster glass state. This was confirmed by complementary ac-susceptibility measurements carried out as a function of temperature, for various frequencies of the ac field. Some results of this work - the decline in TC for decreasing Gd grain size, the high coercive field and its dependence on particle size, and the behavior of the magnetization at low temperatures for the sample deposited at room temperature - are discussed in terms of finite size and surface effects in nanosized particles.

**Thin Solid Films 545, 496-502, 2013.** DOI: 10.1016/j.tsf.2013.07.066

**[P316-2013] "Magnetic properties and magnetocaloric effect of the HoAgGa compound"**

da Silva, L. M.; dos Santos, A. O.; Coelho, A. A.\*; Cardoso, L. P.\*

Magnetic properties and magnetocaloric effect (MCE) of the HoAgGa compound are investigated by magnetization and heat capacity measurements. A giant reversible MCE was observed around  $T-C = 7.2\text{K}$ . The maximum values of magnetic entropy change and adiabatic temperature are found to be  $16\text{ J kg}^{-1}\text{K}^{-1}$  and  $6\text{ K}$ , respectively, with a refrigerant capacity value of  $262\text{ J kg}^{-1}$  for field change of  $5\text{ T}$ . These magnetocaloric parameters also remain large for a wide range of temperature above  $T_C$ . The large MCE as well as no hysteresis loss make HoAgGa an attractive candidate for low temperature magnetic refrigerant.

**Applied Physics Letters** 103[16], 162413, 2013. DOI: 10.1063/1.4826440

[P317-2013] "Magnetic states and valence fluctuations in charge frustrated polycrystalline lutetium ferrite samples"

Viana, D. S. F.; Garcia, D.; Eiras, J. A.; Olzon-Dionysio, M.; Souza, S. D.; Montanher, D. Z.; Cotica, L. F.; Santos, I. A.; Coelho, A. A.\*; Gotardo, R. A. M.

LuFe<sub>2</sub>O<sub>4</sub> polycrystalline materials were processed by an innovative protocol using high-energy ball milling and thermal treatments in an argon flux. The results of room-temperature Mossbauer spectroscopy showed different concentrations of Fe<sup>2+</sup> and Fe<sup>3+</sup> in samples treated for different time periods. Magnetic studies revealed multiple magnetic transitions and showed that valence fluctuations resulted in samples with distinguishable magnetic behaviors. In fact, an additional anomaly in the  $M \times T$  curve was observed for the LuFe<sub>2</sub>O<sub>4</sub> sample thermally treated for 1 h at  $1473\text{ K}$ .

**Scripta Materialia** 69[9], 670-673, 2013. DOI: 10.1016/j.scriptamat.2013.07.027

[P318-2013] "Magnetically recoverable AuPd nanoparticles prepared by a coordination capture method as a reusable catalyst for green oxidation of benzyl alcohol"

Silva, T. A. G.; Landers, R.\*; Rossi, L. M.

AuPd nanoparticles (AuPd NPs) have received considerable attention because of their importance as catalysts in selective aerobic oxidations; however, improved synthetic methods for making them reusable catalysts are necessary. Here, we present the preparation of magnetically recoverable AuPd NPs by immobilizing pre-synthesized PVA-stabilized AuPd NPs onto magnetic supports. The immobilization method is based on the functionalization of the support with strong coordinating ligands, such as amino and thiol, for the attachment of AuPd NPs containing weak coordinating groups. We were able to increase the metal loading by a coordination capture method with functionalized supports, but the ligands grafted on the support surface affected the catalytic activity of AuPd NPs. Moreover, the amino groups provided stabilization in solution, which made the catalyst separation after reaction difficult. Finally, we obtained highly active and recyclable catalysts by removing the functional groups by a thermal treatment. Negligible metal leaching and catalyst recycling in successive reactions are important features of the new catalytic system.

**Catalysis Science & Technology** 3[11], 2993-2999, 2013. DOI: 10.1039/c3cy00261f

[P319-2013] "Measurement of the production cross section for  $Z \gamma \rightarrow \nu(\nu)\overline{\gamma}$  in pp collisions at  $\sqrt{s}=7\text{ TeV}$  and limits on ZZ  $\gamma\gamma$  and Z  $\gamma\gamma\gamma$  triple gauge boson couplings"

Chatrchyan, S.; Khachatryan, V.; Sirunyan, A. M.; Chinellato, J.\*; Tonelli Manganote, E. J.\*; et al.

CMS Collaboration

A measurement of the  $Z \gamma \rightarrow \nu(\nu)\overline{\gamma}$  cross section in pp collisions at  $\sqrt{s} = 7\text{ TeV}$  is presented, using data corresponding to an integrated luminosity of  $5.0\text{ fb}^{-1}$  collected with the CMS detector. This measurement is based on the observation of events with an imbalance of transverse energy in excess of  $130\text{ GeV}$  and a single photon in the absolute pseudorapidity range  $|\eta| < 1.4$  with transverse energy above  $145\text{ GeV}$ . The  $Z \gamma \rightarrow \nu(\nu)\overline{\gamma}$  production cross section is measured to be  $21.1 \pm 4.2(\text{stat.}) \pm 4.3(\text{syst.}) \pm 0.5(\text{lum.})\text{ fb}$ , which agrees with the standard model prediction of  $21.9 \pm 1.1\text{ fb}$ . The results are combined with the CMS measurement of  $Z \gamma$  production in the  $l^{+}l^{-}\gamma$  final state (where  $l$  is an electron or a muon) to yield the most stringent limits to date on triple gauge boson couplings:  $|\kappa_{ZZ\gamma}| < 2.7 \times 10^{-3}$ ,  $|\kappa_{Z\gamma\gamma}| < 1.3 \times 10^{-5}$  for ZZ  $\gamma\gamma$  and  $|\kappa_{Z\gamma\gamma}| < 2.9 \times 10^{-3}$ ,  $|\kappa_{\gamma\gamma\gamma}| < 1.5 \times 10^{-5}$  for Z  $\gamma\gamma\gamma$  couplings.

**Journal Of High Energy Physics** 10, 164, 2013. DOI: 10.1007/JHEP10(2013)164

[P320-2013] "Measurement of the  $W+W-$  cross section in pp collisions at and limits on anomalous WW  $\gamma$  and WWZ couplings"

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

A measurement of  $W+W-$  production in pp collisions at is presented. The data were collected with the CMS detector at the LHC, and correspond to an integrated luminosity of  $4.92 \pm 0.11\text{ fb}^{-1}$ . The  $W+W-$  candidates consist of two oppositely charged leptons, electrons or muons, accompanied by large missing transverse energy. The  $W+W-$  production cross section is measured to be  $52.4 \pm 2.0(\text{stat.}) \pm 4.5(\text{syst.}) \pm 1.2(\text{lum.})\text{ pb}$ . This measurement is consistent with the standard model prediction of  $47.0 \pm 2.0\text{ pb}$  at next-to-leading order. Stringent limits on the WW  $\gamma$  and WWZ anomalous triple gauge-boson couplings are set.

**European Physical Journal C** 73[10], 2610, 2013. DOI: 10.1140/epjc/s10052

[P321-2013] "Measurement of the W-boson helicity in top-quark decays from  $t(\overline{t})$  production in lepton plus jets events in pp collisions at  $\sqrt{s}=7\text{ TeV}$ "

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

The W-boson helicity fractions in top-quark decays are measured with  $t(\overline{t})$  events in the lepton+jets final state, using proton-proton collisions at a centre-of-mass energy of  $7\text{ TeV}$ , collected in 2011 with the CMS detector at the LHC. The data sample corresponds to an integrated luminosity of  $5.0\text{ fb}^{-1}$ . The measured fractions of longitudinal, left-, and right-handed helicity are  $F_0 = 0.682 \pm 0.030(\text{stat.}) \pm 0.033(\text{syst.})$ ,  $F_L = 0.310 \pm 0.022(\text{stat.}) \pm 0.022(\text{syst.})$ , and  $F_R = 0.008 \pm 0.012(\text{stat.}) \pm 0.014(\text{syst.})$ , consistent with the standard model predictions. The measured fractions are used to probe the existence of anomalous Wtb couplings. Exclusion limits on the real components of the anomalous couplings  $g(L)$ ,  $g(R)$  are also derived.

**Journal Of High Energy Physics** 10, 167, 2013. DOI: 10.1007/JHEP10(2013)167

[P322-2013] “Mesoscopic hydrothermodynamics of complex-structured materials”

Vasconcellos, A. R.\*; Silva, A. A. P.; Luzzi, R.\*; Casas-Vazquez, J.; Jou, D.

Some experimental results in the study of disordered systems, polymeric fluids, solutions of micelles and surfactants, ionic-glass conductors, and others show a hydrodynamic behavior labeled “anomalous” with properties described by some kind of fractional power laws in place of the standard ones. This is a consequence of the fractal-like structure that is present in these systems of which we do not have a detailed description, thus impairing the application of the conventional ensemble formalism of statistical mechanics. In order to obtain a physical picture of the phenomenon for making predictions which may help with technological and industrial decisions, one may resort to different styles (so-called nonconventional) in statistical mechanics. In that way can be introduced a theory for handling such impaired situations, a nonconventional mesoscopic hydrothermodynamics (MHT). We illustrate the question presenting an application in a contracted description of such nonconventional MHT, consisting in the use of the Renyi approach to derive a set of coupled nonstandard evolution equations, one for the density, a nonconventional Maxwell-Cattaneo equation, which in a limiting case goes over a non-Fickian diffusion equation, and other for the velocity in fluids under forced flow. For illustration the theory is applied to the study of the hydrodynamic motion in several soft-matter systems under several conditions such as streaming flow appearing in electrophoretic techniques and flow generated by harmonic forces arising in optical traps. The equivalence with Levy processes is discussed and comparison with experiment is done.

Physical Review E 88[4], 042110, 2013. DOI: 10.1103/PhysRevE.88.042110

[P323-2013] “MHD Equilibrium with Reversed Current Density and Magnetic Islands Revisited: the Vacuum Vector Potential Calculus”

Braga, F. L.\*

The solution of Grad-Shafranov equation determines the stationary behavior of fusion plasma inside a tokamak. To solve the equation it is necessary to know the toroidal current density profile. Recent works show that it is possible to determine a magnetohydrodynamic (MHD) equilibrium with reversed current density (RCD) profiles that presents magnetic islands. In this work we show analytical MHD equilibrium with a RCD profile and analyze the structure of the vacuum vector potential associated with these equilibria using the virtual casing principle.

Plasma Science & Technology 15[10], 985-988, 2013. DOI: 10.1088/1009-0630/15/10/05

[P324-2013] “Multiplicity dependence of two-particle azimuthal correlations in pp collisions at the LHC”

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

We present the measurements of particle pair yields per trigger particle obtained from di-hadron azimuthal correlations in pp collisions at  $\sqrt{s} = 0.9, 2.76, \text{ and } 7\text{ TeV}$  recorded with the ALICE detector. The yields are studied as a function of the charged particle multiplicity. Taken together with the single particle yields the pair yields provide information about parton fragmentation at low transverse momenta, as well as on the contribution of multiple parton interactions to particle production. Data are compared to calculations using the PYTHIA6, PYTHIA8, and PHOJET event generators.

Journal Of High Energy Physics 9, 049, 2013. DOI: 10.1007/JHEP09(2013)049

[P325-2013] “ODTMA(+) and HDTMA(+) organo-montmorillonites characterization: New insight by WAXS, SAXS and surface charge”

Bianchi, A. E.; Fernandez, M.; Pantanetti, M.; Vina, R.; Torriani, I.\*; Sanchez, R. M.; Punte, G.

In this work we investigate the microstructure and properties of organo-montmorillonites (OMts) synthesized by intercalation of a Patagonian Mt with different surfactant/CEC ratios (0.5, 1 and 2) of octadecyl trimethylammonium (ODTMA(+)) and hexadecyl trimethylammonium (HDTMA(+)) cations. X-ray diffraction (XRD) patterns showed that in all OMT samples  $d(001)$  value increases with respect to raw Mt (1.258 nm). Small angle and wide angle X-ray scattering (SAXS and WAXS) curves, particle apparent diameters (determined by laser), zeta potential values and scanning electron microscopy (SEM) images, showed the presence of assorted  $d(001)$  values (which depend on storage conditions), aggregate formation and charge reversal (which varied with loading and cation length) for samples obtained with 1 and 2 CEC. However, for samples intercalated with 0.5 CEC, we found evidence of smaller aggregate formation, no charge reversal, and similar  $d(001)$  and zeta potential values (both higher than those of Mt). Findings reported here will help attain better conditions to functionalize highly charged Mt making them suitable to be used as nanocomposite precursors for different applications.

Applied Clay Science 83-84, 280-285, 2013. DOI: 10.1016/j.clay.2013.08.032

[P326-2013] “Pressure-induced amorphization and collapse of magnetic order in the type-I clathrate  $\text{Eu}_8\text{Ga}_{16}\text{Ge}_{30}$ ”

Mardegan, J. R. L.\*; Fabbris, G.; Veiga, L. S. I.\*; Adriano, C.\*; Avila, M. A.; Haskel, D.; Giles, C.\*

We investigate the low temperature structural and electronic properties of the type-I clathrate  $\text{Eu}_8\text{Ga}_{16}\text{Ge}_{30}$  under pressure using x-ray powder diffraction (XRD), x-ray absorption near-edge structure (XANES), and x-ray magnetic circular dichroism (XMCD) techniques. The XRD measurements reveal a transition to an amorphous phase above 18 GPa. Unlike previous reports on other clathrate compounds, no volume collapse is observed prior to the crystalline-amorphous phase transition which takes place when the unit cell volume is reduced to 81% of its ambient pressure value. Fits of the pressure-dependent relative volume to a Murnaghan equation of state yield a bulk modulus  $B_0 = 65 \pm 3$  GPa and a pressure derivative  $B'_0 = 3.3 \pm 0.5$ . The Eu L2-edge XMCD data shows quenching of the magnetic order at a pressure coincident with the crystalline-amorphous phase transition. This information along with the persistence of an  $\text{Eu}^{2+}$  valence state observed in the XANES spectra up to the highest pressure point (22 GPa) indicates that the suppression of XMCD intensity is due to the loss of long range magnetic order. When compared with other clathrates, the results point to the importance of guest ion-cage interactions in determining the mechanical stability of the framework structure and the critical pressure for amorphization. Finally, the crystalline structure is not found to recover after pressure release, resulting in an amorphous material that is at least metastable at ambient pressure and temperature.

Physical Review B 88[14], 144105, 2013. DOI: 10.1103/PhysRevB.88.144105

[P327-2013] “Probing light sterile neutrinos in medium baseline reactor experiments”



Esmaili, A.\*; Kemp, E.\*; Peres, O. L. G.\*; Tabrizi, Z.\*

Medium- baseline reactor experiments (Double Chooz, Daya Bay and RENO) provide a unique opportunity to test the presence of light sterile neutrinos. We analyze the data of these experiments in the search of sterile neutrinos and also test the robustness of  $\theta(13)$  determination in the presence of sterile neutrinos. We show that existence of a light sterile neutrino state improves the fit to these data moderately. We also show that the measured value of  $\theta(13)$  by these experiments is reliable even in the presence of sterile neutrinos, and the reliability owes significantly to the Daya Bay and RENO data. From the combined analysis of the data of these experiments, we constrain the mixing of a sterile neutrino with  $\Delta m(41)(2)$  similar to  $(10(-3)-10(-1))$  eV(2) to  $\sin(2)\theta(14)$  less than or similar to 0.1 at 95% C.L.

Physical Review D 88[7], 073012, 2013. DOI: 10.1103/PhysRevD.88.073012

[P328-2013] “Robust perpendicular exchange coupling in an ultrathin CoO/PtFe double layer: Strain and spin orientation”

Lamirand, A. D.; Soares, M. M.; Ramos, A. Y.; Tolentino, H. C. N.; De Santis, M.; Cezar, J. C.; de Siervo, A.\*; Jamet, M.

We report on the exchange coupling and magnetic properties of a strained ultrathin CoO/PtFe double layer with perpendicular magnetic anisotropy. The cobalt oxide growth by reactive molecular beam epitaxy on a Pt-terminated PtFe/Pt(001) surface gives rise to a hexagonal surface and a monoclinic distorted CoO 3 nm film at room temperature. This distorted ultrathin CoO layer couples with the PtFe(001) layer establishing a robust perpendicular exchange bias shift. Soft x-ray absorption spectroscopy provides a full description of the spin orientations in the CoO/PtFe double layer. The exchange bias shift is preserved up to the Neel antiferromagnetic ordering temperature of T-N = 293 K. This unique example of selfsame value for blocking and ordering temperatures, yet identical to the bulk ordering temperature, is likely related to the original strain-induced distortion and strengthened interaction between the two well-ordered spin layers.

Physical Review B 88[14], 140401, 2013. DOI: 10.1103/PhysRevB.88.140401

[P329-2013] “Search for flavor-changing non-standard neutrino interactions by MINOS”

Adamson, P.; Barr, G.; Bishai, M.; Blake, A.; Bock, G. J.; Coelho, J. A. B.\*; Escobar, C. O.\*; et al.  
MINOS Collaboration

We report new constraints on flavor-changing non-standard neutrino interactions from the MINOS experiment, in which neutrino versus antineutrino interactions can be distinguished on an event-by-event basis. We analyzed a combined set of beam neutrino and antineutrino data from the well-understood NuMI beam, and found no evidence for deviations from standard neutrino mixing. The observed energy spectra constrain the non-standard neutrino interactions parameter to the range  $-0.20 < \epsilon(\mu\tau) < 0.07$  (90%C.L.).

Physical Review D 88[7], 072011, 2013. DOI: 10.1103/PhysRevD.88.072011

[P330-2013] “Search for supersymmetry in hadronic final states with missing transverse energy using the variables  $\alpha(T)$  and b-quark multiplicity in pp collisions at root s=8 TeV”

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

An inclusive search for supersymmetric processes that produce final states with jets and missing transverse energy is performed in pp collisions at a centre-of-mass energy of 8 TeV. The data sample corresponds to an integrated luminosity of 11.7 fb<sup>-1</sup> collected by the CMS experiment at the LHC. In this search, a dimensionless kinematic variable,  $\alpha(T)$ , is used to discriminate between events with genuine and misreconstructed missing transverse energy. The search is based on an examination of the number of reconstructed jets per event, the scalar sum of transverse energies of these jets, and the number of these jets identified as originating from bottom quarks. No significant excess of events over the standard model expectation is found. Exclusion limits are set in the parameter space of simplified models, with a special emphasis on both compressed-spectrum scenarios and direct or gluino-induced production of third-generation squarks. For the case of gluino-mediated squark production, gluino masses up to 950-1125 GeV are excluded depending on the assumed model. For the direct pair-production of squarks, masses up to 450 GeV are excluded for a single light first-or second-generation squark, increasing to 600 GeV for bottom squarks.

European Physical Journal C 73[9], 2568, 2013. DOI: 10.1140/epjc/s10052-013-2568-6

[P331-2013] “Search for supersymmetry in hadronic final states with missing transverse energy using the variables  $\alpha(T)$  and b-quark multiplicity in pp collisions at root s=8 TeV”

Chatrchyan, S.; Khachatryan, V.; Sirunyan, A. M.; Tumasyan, A.; Chinellato, J.\*; Tonelli Manganote, E. J.\*; et al.  
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An inclusive search for supersymmetric processes that produce final states with jets and missing transverse energy is performed in pp collisions at a centre-of-mass energy of 8 TeV. The data sample corresponds to an integrated luminosity of 11.7 fb<sup>-1</sup> collected by the CMS experiment at the LHC. In this search, a dimensionless kinematic variable,  $\alpha(T)$ , is used to discriminate between events with genuine and misreconstructed missing transverse energy. The search is based on an examination of the number of reconstructed jets per event, the scalar sum of transverse energies of these jets, and the number of these jets identified as originating from bottom quarks. No significant excess of events over the standard model expectation is found. Exclusion limits are set in the parameter space of simplified models, with a special emphasis on both compressed-spectrum scenarios and direct or gluino-induced production of third-generation squarks. For the case of gluino-mediated squark production, gluino masses up to 950-1125 GeV are excluded depending on the assumed model. For the direct pair-production of squarks, masses up to 450 GeV are excluded for a single light first-or second-generation squark, increasing to 600 GeV for bottom squarks.

European Physical Journal C 73[9], 2568, 2013. DOI: 10.1140/epjc/s10052-013-2568-6

[P332-2013] “Solovay-Kitaev Decomposition Strategy for Single-Qubit Channels”

Wang, D. S.; Berry, D. W.; de Oliveira, M. C.\*; Sanders, B. C.

Inspired by the Solovay-Kitaev decomposition for approximating unitary operations as a sequence of operations selected from a universal quantum computing gate set, we introduce a method for approximating any single-qubit channel using single-qubit gates and the controlled-NOT (CNOT).

Our approach uses the decomposition of the single-qubit channel into a convex combination of “quasiextreme” channels. Previous techniques for simulating general single-qubit channels would require as many as 20 CNOT gates, whereas ours only needs one, bringing it within the range of current experiments.

**Physical Review Letters 111[13], 130504, 2013. DOI: 10.1103/PhysRevLett.111.130504**

**[P333-2013] “Structural Analysis of Intermolecular Interactions in the Kinesin Adaptor Complex Fasciculation and Elongation Protein Zeta 1/Short Coiled-Coil Protein (FEZ1/SCOCO)”**

Alborghetti, M. R.; Furlan, A. D.; da Silva, J. C.; Sforca, M. L.; Honorato, R. V.; Granato, D. C.; Migueleti, D. L. D.; Neves, J. L.; de Oliveira, P. S. L.; Paes-Leme, A. F.; Zeri, A. C. D.; de Torriani, I. C. L.\*; Kobarg, J.

Cytoskeleton and protein trafficking processes, including vesicle transport to synapses, are key processes in neuronal differentiation and axon outgrowth. The human protein FEZ1 (fasciculation and elongation protein zeta 1 / UNC-76, in *C. elegans*), SCOCO (short coiled-coil protein / UNC-69) and kinesins (e. g. kinesin heavy chain / UNC116) are involved in these processes. Exploiting the feature of FEZ1 protein as a bivalent adapter of transport mediated by kinesins and FEZ1 protein interaction with SCOCO (proteins involved in the same path of axonal growth), we investigated the structural aspects of intermolecular interactions involved in this complex formation by NMR (Nuclear Magnetic Resonance), cross-linking coupled with mass spectrometry (MS), SAXS (Small Angle X-ray Scattering) and molecular modelling. The topology of homodimerization was accessed through NMR (Nuclear Magnetic Resonance) studies of the region involved in this process, corresponding to FEZ1 (92-194). Through studies involving the protein in its monomeric configuration (reduced) and dimeric state, we propose that homodimerization occurs with FEZ1 chains oriented in an anti-parallel topology. We demonstrate that the interaction interface of FEZ1 and SCOCO defined by MS and computational modelling is in accordance with that previously demonstrated for UNC-76 and UNC-69. SAXS and literature data support a heterotetrameric complex model. These data provide details about the interaction interfaces probably involved in the transport machinery assembly and open perspectives to understand and interfere in this assembly and its involvement in neuronal differentiation and axon outgrowth.

**Plos One 8[10], e76602, 2013. DOI: 10.1371/journal.pone.0076602**

**[P334-2013] “Structural and electronic characterization of Co nanostructures on Au(332)”**

Prieto, M. J.\*; Carbonio, E. A.\*; Landers, R.\*; de Siervo, A.\*

Co nanoislands were grown on (332) vicinal surface of Au in UHV using the e-beam evaporation technique. Scanning tunneling microscopy results reveal that Co deposition occurs following an islanding mode for  $\theta(\text{Co})$  ranging from 0.17 to 0.64 ML. At low coverage nanoislands show a monolayer height, while at higher Co loadings, islands have a maximum bilayer height. XPS measurements rule out the possibility of alloy formation provided that binding energy of Co2p core lines remains unchanged as cobalt loading increases. Also, XPS data reveals that, when subjected to thermal annealing, Co atoms diffuse into Au crystal retaining its chemical nature as before the annealing. Finally, NO adsorption experiments show that Co nanostructures are partially oxidized upon adsorption, as evidenced by changes in core photoemission lineshapes of the Co2p lines. Also, NO adsorption seems to inhibit Co atom diffusion into Au crystal during moderate thermal treatment.

**Surface Science 617, 87-93, 2013. DOI: 10.1016/j.susc.2013.07.025**

**[P335-2013] “Surface Physicochemical Properties at the Micro and Nano Length Scales: Role on Bacterial Adhesion and Xylella fastidiosa Biofilm Development”**

Lorite, G. S.\*; Janissen, R.\*; Clerici, J. H.\*; Rodrigues, C. M.; Tomaz, J. P.; Mizaikoff, B.; Kranz, C.; de Souza, A. A.; Cotta, M. A.\*

The phytopathogen *Xylella fastidiosa* grows as a biofilm causing vascular occlusion and consequently nutrient and water stress in different plant hosts by adhesion on xylem vessel surfaces composed of cellulose, hemicellulose, pectin and proteins. Understanding the factors which influence bacterial adhesion and biofilm development is a key issue in identifying mechanisms for preventing biofilm formation in infected plants. In this study, we show that *X. fastidiosa* biofilm development and architecture correlate well with physicochemical surface properties after interaction with the culture medium. Different biotic and abiotic substrates such as silicon (Si) and derivatized cellulose films were studied. Both biofilms and substrates were characterized at the micro- and nanoscale, which corresponds to the actual bacterial cell and membrane/protein length scales, respectively. Our experimental results clearly indicate that the presence of surfaces with different chemical composition affect *X. fastidiosa* behavior from the point of view of gene expression and adhesion functionality. Bacterial adhesion is facilitated on more hydrophilic surfaces with higher surface potentials; XadA1 adhesin reveals different strengths of interaction on these surfaces. Nonetheless, despite different architectural biofilm geometries and rates of development, the colonization process occurs on all investigated surfaces. Our results univocally support the hypothesis that different adhesion mechanisms are active along the biofilm life cycle representing an adaptation mechanism for variations on the specific xylem vessel composition, which the bacterium encounters within the infected plant.

**Plos One 8[9], e75247, 2013. DOI: 10.1371/journal.pone.0075247**

**[P336-2013] “Trapping of Hydrochloric and Hydrofluoric Acid at Vacancies on and underneath the Ice I-h Basal-Plane Surface”**

Moreirat, P. A. F. P.; de Koning, M.\*

We investigate the uptake of HCl and HF at lattice vacancies in ice I-h as a function of their distance to the basal-plane surface layer using density-functional theory calculations. The results for HCl display large dispersions in the binding-energy results due to the appearance of distinct dissociation states. The layer-averaged results suggest that the uptake of HCl is most favorable in the two layers just below the surface, which is consistent with available experimental indications. The behavior of HF is found to be manifestly different due to the fact that it is a weaker acid. The dispersion in the binding-energy values is significantly less compared to the case of HCl, and the average values are essentially equal to the bulk value, regardless of layer position. This suggests that, in contrast to the case of HCl, there should not be any tendency for accumulation of HF near the surface.

**Journal Of Physical Chemistry A 117[43], 11066-11071, 2013. DOI: 10.1021/jp408098e**

**Proceedings**

[P337-2013] “Sm<sup>3+</sup> effects in the Tm<sup>3+</sup> doped tellurite glass for S-band amplification”

Belancon, M. P.\*; Julio Ferenz\*; Chillce, E.\*; Barbosa, L. C.\*; Hendow S. T. (Ed.)

Thulium doped Samarium codoped tellurite-tungstate glasses were produced. Luminescence properties in the infrared region were investigated looking to observe improved properties for S-band amplification in the codoped samples. Thulium is well-known by the H-3(4)-F-3(4) radiative transition emitting around similar to 1.47  $\mu\text{m}$ , which is a self-terminating transition in tellurite hosts due the longer lifetime of the lower level in relation to the upper level of this transition. Analysis of absorption and emission spectra showed that we could quench the 3F<sub>4</sub> level significantly, what improved the intensity of the emission at 1.49  $\mu\text{m}$ . However, the state H-3(4) were also quenched due the cross relaxation process due the absorption bands of Sm<sup>3+</sup> around 1.5  $\mu\text{m}$ .

Fiber Lasers X: Technology, Systems, And Applications  
Série: Proceedings of SPIE 8601, 86012D, 2013. DOI: 10.1117/12.2002897

Conference on Fiber Lasers X - Technology, Systems, and Applications, San Francisco, CA, 04 Feb 2013.

[P338-2013] “Spectroscopic investigation of the glass system TeO<sub>2</sub>-WO<sub>3</sub>-Na<sub>2</sub>O-Nb<sub>2</sub>O<sub>5</sub> for mid-infrared amplifiers”

Belancon, M. P.\*; Barbosa, L. C.\*; Hendow S. T. (Ed.)

Tellurite glasses following the molar concentration 71.5% TeO<sub>2</sub>, 22.5% WO<sub>3</sub>, 5% Na<sub>2</sub>O and 1.5% Nb<sub>2</sub>O<sub>5</sub> have been investigated. Samples doped with Tm<sub>2</sub>O<sub>3</sub>, Pr<sub>2</sub>O<sub>3</sub>, Yb<sub>2</sub>O<sub>3</sub> or Bi<sub>2</sub>O<sub>3</sub> were fabricated by the conventional melt quenching process. Rare-earth (RE) 3+ ions have well defined emission bands. On the other hand, Bismuth emission in the infrared region have been found in some glasses and even that emission laser have been already obtained, the mechanism behind its luminescence is still misunderstood[1]. The Bismuth emission is sometimes referred as a “superbroadband” emission around 1.3 $\mu\text{m}$ , which is very promising for an optical amplifier, but, to the best of our knowledge a bismuth based optical amplifier have not been produced yet. Our purpose is to investigate the mechanism behind this misunderstood “superbroadband” luminescence, and compare it with the rare-earths properties in the same range. The characterization consists in measurements of optical absorption spectra, optical emission spectra and life-time decay. Differential thermal analysis (DTA) was also performed, to identify changes in T-g and T-x as function of the doping concentration, which is important to the drawing process of a fiber.

Fiber Lasers X: Technology, Systems, And Applications  
Série: Proceedings of SPIE 8601, 86012F, 2013. DOI: 10.1117/12.2003021

Conference on Fiber Lasers X - Technology, Systems, and Applications, San Francisco, CA, 04 Feb 2013.

\*Autores da comunidade IFGW.

## Patentes

[Pa004-2013] “Amplificador local de campos magnéticos variantes no tempo e seu uso”

Kleber Roberto Pirota\*; Jeroen Schoenmaker

Número da Patente ou Registro: (Agência INOVA) BR 10 2013 023107 0

Tipo da Patente: de Invenção

Mês/Ano de Conclusão:09/2013 - INPI/BBRASIL

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

Disponível em: <http://www.uunicamp.br/ssipex/>

## Defesas de Teses - Mestrado

[D021-2013] “Uma análise fenomenológica de espalhamento elástico próton-próton na região de energia do LHC”

Aluno: Paulo Victor Recchia Gomes da Silva

Orientador: Prof. Dr. Márcio José Menon

Data: 01/11/2013

[D022-2013] “Estudo da nanoestruturação de superfícies metálicas pelo bombardeamento iônico com gases nobres”

Aluno: Sílvia Azevedo dos Santos Cucatti

Orientador: Prof. Dr. Fernando Alvarez

Data: 14/11/2013

[D023-2013] “Oscilação em cavidades optomecânicas”

Aluno: Gustavo de Oliveira Luiz

Orientador: Prof. Dr. Gustavo Wiederhecker

Data: 14/11/2013

## Defesas de Teses - Doutorado

[T016-2013] “Comunicação quântica e implementação de portas lógicas no sistema de cavidades acopladas”

Aluno: Bruno Yabu-uti

Orientador: Prof. Dr. José Antonio Roversi

Data: 11/11/2013

[T017-2013] “Propriedades Mecânicas, estruturais e eletrônicas de nanoestruturas de carbono e nitreto de boro”

Aluno: Samir Silva Coutinho

Orientador: Prof. Dr. Douglas Soares Galvão

Data: 11/11/2013

[T018-2013] “Obtenção de temperaturas e densidades de elétrons em plasmas de tokamaks através de espectroscopia no visível de emissões de impurezas”

Aluno: Felype do Nascimento

Orientador: Não informado

Data: 21/11/2013

[T019-2013] “Estruturas fotônicas compatíveis com tecnologia de silício”

Aluno: David da Silva Leocadio Figueira

Orientador: Prof. Dr. Newton Cesário Frateschi

Data: 22/11/2013

[T020-2013] “Osciladores nanoeletromecânicos no regime quântico”

Aluno: Olímpio Pereira de Sá Neto

Orientador: Prof. Dr. Marcos Cesar de Oliveira

Data: 6/12/2013

Fonte: Portal IFGW/PPós-graduação.

Disponível em: <http://portal.ifi.unicamp.br/eventos#date=2013-05-01,mode=month>

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## Abstracta

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