Trabalhos publicados

[P102-2016] "Acceleration of polymorphic transition of cocoa butter and cocoa butter equivalent by addition of D--limonene"

Miyasaki, E. K.; dos Santos, C. A.; Vieira, L. R.; Ming, C. C.; **Calligaris, G. A.*; Cardoso, L. P.***; Goncalves, L. A. G.

The essential oils obtained from citric fruits have been used as aromatizing agents in various foods. However, the addition of orange essential oil, D-limonene, to cocoa butter (CB) has been shown to have an influence on its crystallization behavior. The objective of this study was to evaluate the influence of adding D-limonene at concentrations of 1.5 and 5% w/w on the polymorphic transitions in Brazilian CB and in a commercial cocoa butter equivalent (CBE). X-ray diffraction (XRD) was used to identify the polymorphic forms in the samples over 27 days of storage at 25 degrees C. The results showed that D-limonene addition was able to accelerate the polymorphic transition in CB and CBE. The addition of 5% w/w D-limonene to Brazilian CB accelerated the complete transition from beta V to the more stable beta VI polymorphic form in only 11 days. Under the same conditions, pure CB remained in beta V form and the transition was not completed in CBE samples. The polymorphic transition of CBE samples appeared to be governed by the characteristics of the triacylglycerol (TAG) profile and only intensified with D-limonene incorporation. Practical applications : D-Limonene is an essential oil that has been used industrially to give orange flavor in chocolate products. Our results showed that D-limonene addition to CB and CBE accelerates the polymorphic transition from polymorphic form V to VI in a short period. As the polymorphic form VI is more stable than form V, the addition of D-limonene to chocolates and the like allows them to keep their melting properties and sensorial quality for long storage periods.

[P103-2016] "Anisotropic Flow of Charged Particles in Pb-Pb Collisions at root S-NN=5.02 TeV"

Adam, J.; Adamova, D.; Aggarwal, M. M.; **Albuquerque, D. S. D.*; Chinellato, D. D.*; de Souza, R. D.*; Takahashi, J.***; et al.
ALICE Collaboration

We report the first results of elliptic (v2), triangular (v3), and quadrangular (v4) flow of charged particles in Pb-Pb collisions at a center-of-mass energy per nucleon pair of root s(NN) = 5.02 TeV with the ALICE detector at the CERN Large Hadron Collider. The measurements are performed in the central pseudorapidity region vertical bar n vertical bar < 0.8 and for the transverse momentum range 0.2 < p(T) < 5 GeV/c. The anisotropic flow is measured using two-particle correlations with a pseudorapidity gap greater than one unit and with the multiparticle cumulant method. Compared to results from Pb--Pb collisions at root s(NN) = 2.76 TeV, the anisotropic flow coefficients v2, v3, and v4 are found to increase by (3.0 +/- 0.6)%, (4.3 +/- 1.4)%, and (10.2 +/- 3.8)%, respectively, in the centrality range 0%-50%. This increase can be attributed mostly to an increase of the average transverse momentum between the two energies. The measurements are found to be compatible with hydrodynamic model calculations. This comparison provides a unique opportunity to test the validity of the hydrodynamic picture and the power to further discriminate between various possibilities for the temperature dependence of shear viscosity to entropy density ratio of the produced matter in heavy-ion collisions at the highest energies.

[P104-2016] "Appearance-disappearance relation in 3+N-s short-baseline neutrino oscillations"

Giunti, C.; **Zavanin, E. M.***

We derive the relation between the amplitudes of short-baseline appearance and disappearance oscillations in 3 + N-s neutrino mixing schemes which is the origin of the appearance-disappearance tension that is found from the analysis of the existing data in any 3 + N-s neutrino mixing scheme. We illustrate the power of the relation to reveal the appearance-disappearance tension in the cases of 3 + 1 and 3 + 2 mixing using the results of global fits of short-baseline neutrino oscillation data.

[P105-2016] "Azimuthal asymmetry in the risetime of the surface detector signals of the Pierre Auger Observatory"

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

The azimuthal asymmetry in the risetime of signals in Auger surface detector stations is a source of information on shower development. The azimuthal asymmetry is due to a combination of the longitudinal evolution of the shower and geometrical effects related to the angles of incidence of the particles into the detectors. The magnitude of the effect depends upon the zenith angle and state of development of the shower and thus provides a novel observable, (sec theta)(max), sensitive to the mass composition of cosmic rays above 3 x 10(18) eV. By comparing measurements with predictions from shower simulations, we find for both of our adopted models of hadronic physics (QGSJETII-04 and EPOS-LHC) an indication that the mean cosmic-ray mass increases slowly with energy, as has been inferred from other studies. However, the mass estimates are dependent on the shower model and on the range of distance from the shower core selected. Thus the method has uncovered further deficiencies in our understanding of shower modeling that must be resolved before the mass composition can be inferred from (sec theta)(max).

[P106-2016] "Centrality dependence of the nuclear modification factor of charged pions, kaons, and protons in 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

Transverse momentum (p(T)) spectra of pions, kaons, and protons up to p(T) = 20 GeV/c have been measured in Pb-Pb collisions at root s(NN) = 2.76 TeV using the ALICE detector for six different centrality classes covering 0%-80%. The proton-to-pion and the kaon-to-pion ratios both show a distinct peak at p(T) approximate to 3 GeV/c in central Pb-Pb collisions that decreases for more peripheral collisions. For p(T) > 10 GeV/c, the nuclear modification factor is found to be the same for all three particle species in each centrality interval within systematic uncertainties of 10%-20%. This suggests there is no direct interplay between the energy loss in the medium and the particle species composition in the hard core of the quenched jet. For p(T) < 10 GeV/c, the data provide important constraints for models aimed at describing the transition from soft to hard physics.

[P107-2016] "Chiral Asymmetric Structures in Aspartic Acid and Valine Crystals Assessed by Atomic Force Microscopy"

Teschke, O.*; Soares, D. M.*

Structures of crystallized deposits formed by the molecular self--assembly of aspartic acid and valine on silicon substrates were imaged by atomic force microscopy. Images of D- and L-aspartic acid crystal surfaces showing extended molecularly flat sheets or regions separated by single molecule thick steps are presented. Distinct orientation surfaces were imaged, which, combined with the single molecule step size, defines the geometry of the crystal. However, single molecule step growth also reveals the crystal chirality, i.e., growth orientations. The imaged ordered lattice of aspartic acid (asp) and valine (val) mostly revealed periodicities corresponding to bulk terminations, but a previously unreported molecular hexagonal lattice configuration was observed for both L-asp and L-val but not for D-asp Or D-val. Atomic force microscopy can then be used to identify the different chiral forms of aspartic acid and valine crystals.

[P108-2016] "Correlations between jets and charged particles in PbPb and pp collisions at root s(NN)=2.76 TeV"

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

The quark-gluon plasma is studied via medium-induced changes to correlations between jets and charged particles in PbPb collisions compared to pp reference data. This analysis uses data sets from PbPb and pp collisions with integrated luminosities of 166 mu b(-1) and 5.3 pb(-1), respectively, collected at root s(NN) = 2.76 TeV. The angular distributions of charged particles are studied as a function of relative pseudorapidity (Delta eta) and relative azimuthal angle (Delta phi) with respect to reconstructed jet directions. Charged particles are correlated with all jets with transverse momentum (p(T)) above 120 GeV, and with the leading and subleading jets (the highest and second-highest in p(T), respectively) in a selection of back-to-back dijet events. Modifications in PbPb data relative to pp reference data are characterized as a function of PbPb collision centrality and charged particle p(T). A centrality--dependent excess of low-p(T) particles is present for all jets studied, and is most pronounced in the most central events. This excess of low-p(T) particles follows a Gaussian-like distribution around the jet axis, and extends to large relative angles of Delta eta approximate to 1 and Delta phi approximate to 1.

[P109-2016] "Defect-Free Carbon Nanotube Coils"

Shadmi, N.; Kremen, A.; Frenkel, Y.; Lapin, Z. J.; **Machado, L. D.***; Legoas, S. B.; Bitton, O.; Rechav, K.; Popovitz-Biro, R.; **Galvao, D. S.***; Jorio, A.; Novotny, L.; Kalisky, B.; Joselevich, E.

Carbon nanotubes are promising building blocks for various nanoelectronic components. A highly desirable geometry for such applications is a coil. However, coiled nanotube structures reported so far were inherently defective or had no free ends accessible for contacting. Here we demonstrate the spontaneous self-coiling of single--wall carbon nanotubes into defect-free coils of up to more than 70 turns with identical diameter and chirality, and free ends. We characterize the structure, formation mechanism, and electrical properties of these coils by different microscopies, molecular dynamics simulations, Raman spectroscopy, and electrical and magnetic measurements. The coils are highly conductive, as expected for defect-free carbon nanotubes, but adjacent nanotube segments in the coil are more highly coupled than in regular bundles of single-wall carbon nanotubes, owing to their perfect crystal momentum matching, which enables tunneling between the turns. Although this behavior does not yet enable the performance of these nanotube coils as inductive devices, it does point a clear path for their realization. Hence, this study represents a major step toward the production of many different nanotube coil devices, including inductors, electromagnets, transformers, and dynamos.

[P110-2016] "Effect of structural disorder on quantum oscillations in graphite"

Camargo, B. C.*; Kopelevich, Y.*; Usher, A.; Hubbard, S. B.

We have studied the effect of structural disorder on the de Haas van Alphen and Shubnikov de Haas quantum oscillations measured in natural, Kish, and highly oriented pyrolytic graphite samples at temperatures down to 30 mK and at magnetic fields up to 14 T. The measurements were performed on different samples characterized by means of x-ray diffractometry, transmission electron microscopy, and atomic-force microscopy techniques. Our results reveal a correlation between the amplitude of quantum oscillations and the sample surface roughness.

[P111-2016] "Effective action and electromagnetic response of topological superconductors and Majorana-mass Weyl férmions"

Stone, M.; Lopes, P. L. e S.*

Motivated by an apparent paradox in [X.-L. Qi, E. Witten, and S.-C. Zhang, Phys. Rev. B 87, 134519 (2013)], we use the method of gaugedWess-Zumino-Witten functionals to construct an effective action for a Weyl fermion with a Majorana mass that arises from coupling to a charged condensate. We obtain expressions for the current induced by an external gauge field and observe that the topological part of the current is only one-third of that that might have been expected from the gauge anomaly. The anomaly is not changed by the induced mass gap, however. The topological current is supplemented by a conventional supercurrent that provides the remaining two-thirds of the anomaly once the equation of motion for the Goldstone mode is satisfied. We apply our formula for the current to resolve the apparent paradox and also to the chiral magnetic effect (CME), where it predicts a reduction of the CME current to one-third of its value for a free Weyl gas in thermal equilibrium. We attribute this reduction to a partial cancellation of the CME by a chiral vortical effect current arising from the persistent rotation of the fluid induced by the external magnetic field.

[P112-2016] "Efficient telecom to visible wavelength conversion in doubly resonant gallium phosphide microdisks"

Lake, D. P.; Mitchell, M.; Jayakumar, H.; **dos Santos, L. F.***; Curic, D.; Barclay, P. E.

Resonant second harmonic generation between 1550 nm and 775 nm with normalized outside efficiency > 3: 8 x 10(-4) mW(-1) is demonstrated in a gallium phosphide microdisk supporting high-Q modes at visible (Q similar to 10(4)) and infrared (Q similar to 10(5)) wavelengths. The double resonance condition is satisfied for a specific pump power through intracavity photothermal temperature tuning using similar to 360 mu W of 1550 nm light input to a fiber taper and coupled to a microdisk resonance. Power dependent efficiency consistent with a simple model for thermal tuning of the double resonance condition is observed.

[P113-2016] "Electron collisions with small esters: A joint experimental-theoretical investigation"

de Souza, G. L. C.; da Silva, L. A.; de Sousa, W. J. C.; Sugohara, R. T.; Iga, I.; dos Santos, A. S.; Machado, L. E.; Homem, M. G. P.; **Brescansin, L. M.***; Lucchese, R. R.; Lee, M. -T.

A theoretical and experimental investigation on elastic electron scattering by two small esters, namely, methyl formate and ethyl acetate, is reported. Experimental differential, integral, and momentum-transfer cross sections are given in the 30-1000 eV and 10 degrees-120. ranges. The relative-flow technique was used to determine such quantities. Particularly for methyl formate, a theoretical study was also carried out in the 1-500 eV range. A complex optical potential derived from a Hartree-Fock molecular wave function was used to represent the collision dynamics, whereas the Pade approximation was used to solve the scattering equations. In addition, calculations based on the framework of the independent-atom model (IAM) were also performed for both targets. In general, there is good agreement between our experimental data and the present theoretical results calculated using the Pade approximation. The theoretical results using the IAM also agree well with the experimental data at 200 eV and above. Moreover, for methyl formate, our calculations reveal a (2)A '' (pi*) resonance at about 3.0 eV and a sigma*-type resonance centered at about 8.0 eV in the (2)A' scattering channel. The pi* resonance is also seen in other targets containing a carbonyl group.

[P114-2016] "Event-shape engineering for inclusive spectra and elliptic flow in Pb-Pb collisions at root(NN)-N-S=2.76 TeV"

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

We report on results obtained with the event-shape engineering technique applied to Pb-Pb collisions at root s(NN) = 2.76 TeV. By selecting events in the same centrality interval, but with very different average flow, different initial-state conditions can be studied. We find the effect of the event-shape selection on the elliptic flow coefficient v(2) to be almost independent of transverse momentum p(T), which is as expected if this effect is attributable to fluctuations in the initial geometry of the system. Charged-hadron, -pion, -kaon, and -proton transverse momentum distributions are found to be harder in events with higher-than-average elliptic flow, indicating an interplay between radial and elliptic flow.

[P115-2016] "Experimental evidences of enhanced magnetocaloric properties at room temperature and half-metallicity on Fe2MnSi-based Heusler alloys"

Vivas, R. J. C.; Pedro, S. S.; Cruz, C.; Tedesco, J. C. G.; **Coelho, A. A.***; Carvalho, A. M. G.; Rocco, D. L.; Reis, M. S.

Heusler alloys are widely studied due to their interesting structural and magnetic properties, like magnetic shape memory ability, coupled magneto-structural phase transitions and half-metallicity; ruled, for many cases, by the valence electrons number (N-v). The present work focuses on the magnetocaloric potentials of half-metals, exploring the effect of N-v on the magnetic entropy change, preserving half-metallicity. The test bench is the Si-rich side of the half-metallic series Fe2MnSi1-xGax. From the obtained experimental results it was possible to propose vertical bar Delta S vertical bar(max) = Delta H-0.8 (alpha + beta N-v), i.e., the maximum magnetic entropy change depends in a linear fashion on N-v, weighted by a power law on the magnetic field change Delta H (alpha and beta are constants experimentally determined). This phenomenological model opens doors for further theoretical investigations. In addition, it was also possible to predict a new multifunctional Heusler alloy, with enhanced magnetocaloric effect, Curie temperature close to 300 K and half-metallicity.

[P116-2016] "Geant4 Monte Carlo simulation of absorbed dose and radiolysis yields enhancement from a gold nanoparticle under MeV proton irradiation"

Tran, H. N.; Karamitros, M.; Ivanchenko, V. N.; Guatelli, S.; McKinnon, S.; Murakami, K.; Sasaki, T.; Okada, S.; Bordage, M. C.; Francis, Z.; El Bitar, Z.; **Bernal, M. A.***; Shin, J. I.; Lee, S. B.; Barberet, P.; Tran, T. T.; Brown, J. M. C.; Hao, T. V. N.; Incerti, S.

Gold nanoparticles have been reported as a possible radio-sensitizer agent in radiation therapy due to their ability to increase energy deposition and subsequent direct damage to cells and DNA within their local vicinity. Moreover, this increase in energy deposition also results in an increase of the radiochemical yields. In this work we present, for the first time, an in silico investigation, based on the general purpose Monte Carlo simulation toolkit Geant4, into energy deposition and radical species production around a spherical gold nanoparticle 50 nm in diameter via proton irradiation. Simulations were preformed for incident proton energies ranging from 2 to 170 MeV, which are of interest for clinical proton therapy.

[P117-2016] "Hole spin injection from a GaMnAs layer into GaAs-AlAs-InGaAs resonant tunneling diodes"

Rodrigues, D. H.; **Brasil, M. J. S. P.***; Orlita, M.; Kunc, J.; Galeti, H. V. A.; Henini, M.; Taylor, D.; Gobato, Y. G.

We have investigated the polarization-resolved electroluminescence (EL) of a p-i-n GaAs/AlAs/InGaAs resonant tunneling diode (RTD) containing a GaMnAs (x = 5%) spin injector under high magnetic fields. We demonstrate that under hole resonant tunneling condition, the GaMnAs contact acts as an efficient spin-polarized source for holes tunneling through the device. Polarization degrees up to 80% were observed in the device around the hole resonance at 2 K under 15 T. Our results could be valuable for improving the hole-spin injection in GaMnAs-based spintronic devices.

[P118-2016] "Hyaluronan/chitosan nanofilms assembled layer-by-layer and their antibacterial effect: A study using Staphylococcus aureus and Pseudomonas aeruginosa"

Hernandez-Montelongo, J.*; Lucchesi, E. G.; Gonzalez, I.; Macedo, W. A. A.; Nascimento, V. F.; Moraes, A. M.; Beppu, M. M.; Cotta, M. A.*

In the last few years, chitosan-based coatings have been proposed as antibacterial surfaces for biomedical devices in order to prevent nosocomial infections. In that sense, this work reports the optimized synthesis of hyaluronan/chitosan (HA/CHI) nanofilms assembled layer-by-layer in order to maximize the antibacterial effect for two important human pathogenic bacteria, Staphylococcus aureus and Pseudomonas aeruginosa. In this assembly, HA forms a soft, highly hydrated, and nontoxic film, whereas CHI shows the antimicrobial characteristics. Our HA/CHI nanofilm synthesis optimization was based on changing pH values of the biopolymer stem-solutions and the consequent variation of their ionization degree. Furthermore, the surface density of primary amino groups, which are related to the antibacterial effect, was also enhanced by increasing the number of HA/CHI bilayers. The antibacterial effect of HA/CHI nanofilms was evaluated by the spread plate counting method for both bacteria. These results were correlated with the morphology of nanofilms (characterized using SEM and AFM), as well as with their chemical properties studied by UV-vis, Kelvin Probe Force microscopy and XPS spectroscopy.

[P119-2016] "In situ growth of Ag nanoparticles on alpha-Ag2WO4 under electron irradiation: probing the physical principles"

San-Miguel, M. A.; da Silva, E. Z.*; Zannetti, S. M.; Cilense, M.; Fabbro, M. T.; Gracia, L.; Andres, J.; Longo, E.

Exploiting the plasmonic behavior of Ag nanoparticles grown on alpha-Ag2WO4 is a widely employed strategy to produce efficient photocatalysts, ozone sensors, and bactericides. However, a description of the atomic and electronic structure of the semiconductor sites irradiated by electrons is still not available. Such a description is of great importance to understand the mechanisms underlying these physical processes and to improve the design of silver nanoparticles to enhance their activities. Motivated by this, we studied the growth of silver nanoparticles to investigate this novel class of phenomena using both transmission electron microscopy and field emission scanning electron microscopy. A theoretical framework based on density functional theory calculations (DFT), together with experimental analysis and measurements, were developed to examine the changes in the local geometrical and electronic structure of the materials. The physical principles for the formation of Ag nanoparticles on alpha-Ag2WO4 by electron beam irradiation are described. Quantum mechanical calculations based on DFT show that the (001) of alpha-Ag2WO4 displays Ag atoms with different coordination numbers. Some of them are able to diffuse out of the surface with a very low energy barrier (less than 0.1 eV), thus, initiating the growth of metallic Ag nanostructures and leaving Ag vacancies in the bulk material. These processes increase the structural disorder of alpha-Ag2WO4 as well as its electrical resistance as observed in the experimental measurements.

[P120-2016] "Inclusive quarkonium production at forward rapidity in pp collisions at root s=8 TeV"

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

We report on the inclusive production cross sections of J/psi, psi(2S), gamma(1S), gamma(2S) and gamma(3S), measured at forward rapidity with the ALICE detector in pp collisions at a center-of-mass energy root s = 8 TeV. The analysis is based on data collected at the LHC and corresponds to an integrated luminosity of 1.23 pb(-1). Quarkonia are reconstructed in the dimuon-decay channel. The differential production cross sections are measured as a function of the transverse momentum p(T) and rapidity y, over the p(T) ranges 0 < p(T) < 20 GeV/c for J/psi, 0 < p(T) < 12 GeV/c for all other resonances, and for 2.5 < y < 4. The cross sections, integrated over p(T) and y, and assuming unpolarized quarkonia, are sigma(J/psi) = 8.98 +/- 0.04 +/- 0.82 mu b, sigma(psi(2S)) = 1.23 +/- 0.08 +/- 0.22 mu b, sigma(gamma(1S)) = 71 +/- 6 +/- 7 nb, sigma(gamma(2S)) = 26 +/- 5 +/- 4 nb and sigma(gamma(3S)) = 9 +/- 4 +/- 1 nb, where the first uncertainty is statistical and the second one is systematic. These values agree, within at most 1.4 sigma, with measurements performed by the LHCb collaboration in the same rapidity range.

[P121-2016] "Influence of Rotation on the Weight of Gyroscopes as an Explanation for Flyby Anomalies"

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

We consider two models which lead to the prediction of a weight change of gyroscopes depending on the rate of rotation: mass-energy equivalence and Weber's force for gravitation. We calculate the order of magnitude of this effect in both models and show that Weber's model predicts a weight change depending on the spin axis orientation resembling close similarities to observed Earth flyby anomalies. However, our predicted effect is much smaller than the observed effect, which could explain why flyby anomalies were not detected anymore in recent spacecraft trajectories.

[P122-2016] "Integral elastic, electronic-state, ionization, and total cross sections for electron scattering with furfural"

Jones, D. B.; **da Costa, R. F.***; Varella, M. T. D. do N.; Bettega, M. H. F.; **Lima, M. A. P.***; Blanco, F.; Garcia, G.; Brunger, M. J.

We report absolute experimental integral cross sections (ICSs) for electron impact excitation of bands of electronic-states in furfural, for incident electron energies in the range 20-250 eV. Wherever possible, those results are compared to corresponding excitation cross sections in the structurally similar species furan, as previously reported by da Costa et al. [Phys. Rev. A 85, 062706 (2012)] and Regeta and Allan [Phys. Rev. A 91, 012707 (2015)]. Generally, very good agreement is found. In addition, ICSs calculated with our independent atom model (IAM) with screening corrected additivity rule (SCAR) formalism, extended to account for interference (I) terms that arise due to the multi-centre nature of the scattering problem, are also reported. The sum of those ICSs gives the IAM-SCAR+I total cross section for electron-furfural scattering. Where possible, those calculated IAM-SCAR+I ICS results are compared against corresponding results from the present measurements with an acceptable level of accord being obtained.

Similarly, but only for the band I and band II excited electronic states, we also present results from our Schwinger multichannel method with pseudopotentials calculations. Those results are found to be in good qualitative accord with the present experimental ICSs. Finally, with a view to assembling a complete cross section data base for furfural, some binary-encounter-Bethe-level total ionization cross sections for this collision system are presented.

[P123-2016] "Low-temperature photoluminescence in self-assembled diphenylalanine microtubes"

Nikitin, T.; Kopyl, S.; Shur, V. Ya.; **Kopelevich, Y. V.***; Kholkin, A. L.

Bioinspired self-assembled structures are increasingly important for a variety of applications ranging from drug delivery to electronic and energy harvesting devices. An important class of these structures is diphenylalanine microtubes which are potentially important for optical applications including light emitting diodes and optical biomarkers. In this work we present the data on their photoluminescent properties at low temperatures (down to 12 K) and discuss the origin of the emission in the near ultraviolet (UV) range seen earlier in a number of reports. UV luminescence increases with decreasing temperature and exhibits several equidistant lines that are assigned to zero-phonon exciton emission line and its phonon replicas. We infer that the exciton is localized on the defect sites and significant luminescence decay is due to thermal quenching arising from the carrier excitation from these defects and non-radiative recombination.

[P124-2016] "Magnetism and structure of nanocomposites made from magnetite and vegetable oil based polymeric matrices"

Meiorin, C.*; **Londono, O. M.***; **Muraca, D.***; **Socolovsky, L. M.***; **Pirota, K. R.***; Aranguren, M. I.; **Knobel, M.***; Mosiewicki, M. A.

The aim of this work is to study the influence of the polymeric matrix composition on particle aggregation, magnetic interparticle interactions and nanoparticle surface effects, which affect the magnetic and structural properties of different ultra-diluted magnetite nanocomposites (MNCPs). Bio-based matrices were selected as a possible response to the increasing demand for renewable materials. To investigate the influence of different bio-based polymeric matrices on the magnetic behavior, three different bio-based polymers were used to prepare MNCPs with 1 wt.% of magnetite nanoparticles (MNPs). One of them was prepared using a tung oil (TO)/styrene (St) weight ratio of 70/30, a second one was prepared by replacing the styrene with methylester (green comonomer obtained from tung oil, ME, 70TO/30ME) and a third one that incorporated a green modifier, acrylated epoxidized soybean oil (AESO), using a tung oil/AESO weight ratio of 90/10. Structural features as nanoparticle aggregation state, nanoparticle and cluster sizes, and fractal dimension were studied and determined from small-angle Xray Scattering (SAXS). The experimental SAXS data were analyzed by means of fractal aggregate model. Results indicate differences in nanoparticle arrangement depending of the containing matrix. The magnetic characterization of these materials indicates that the matrix strongly affects the physical and chemical properties of the MNCPs. All samples display superparamagnetic behavior at room temperature, but the blocking temperature varies from 75 K (tung oil/styrene with 1 wt.% MNPs) to 126 K (tung oil/AESO 1 wt.% MNPs).

Furthermore, the temperature dependence of the coercive field changes for all samples, suggesting a strong influence of the polymer properties on the magnetic properties of the MNCPs.

[P125-2016] "Measurement of D-s(+) product ion and nuclear modification factor in 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

The production of prompt D-s(+) mesons was measured for the first time in collisions of heavy nuclei with the ALICE detector at the LHC. The analysis was performed on a data sample of Pb-Pb collisions at a centre-of-mass energy per nucleon pair, root s(NN), of 2.76 TeV in two different centrality classes, namely 0-10% and 20-50%. D-s(+) mesons and their antiparticles were reconstructed at mid-rapidity from their hadronic decay channel D-s(+) -> phi pi(+), with phi -> K-K+, in the transverse momentum intervals 4 < p(T) < 12 GeV/c and 6 < p(T) < 12 GeV/c for the 0-10% and 20-50% centrality classes, respectively. The nuclear modi fication factor R-AA was computed by comparing the p(T)-differential production yields in Pb-Pb collisions to those in proton-proton (pp) collisions at the same energy. This pp reference was obtained using the cross section measured at root s = 7 TeV and scaled to root s = 2.76TeV. The R-AA of D-s(+) mesons was compared to that of non-strange D mesons in the 10% most central Pb-Pb collisions. At high p(T) (8 < p(T) < 12 GeV/c) a suppression of the D-s(+)-meson yield by a factor of about three, compatible within uncertainties with that of non-strange D mesons, is observed. At lower p(T) (4 < p(T) < 8 GeV/c) the values of the D-s(+)-meson R-AA are larger than those of non-strange D mesons, although compatible within uncertainties. The production ratios D-s(+)/D-0 and D-s(+)/D+ were also measured in Pb-Pb collisions and compared to their values in proton-proton collisions.

[P126-2016] "Measurement of differential and integrated fiducial cross sections for Higgs boson production in the four-lepton decay channel in pp collisions at root s=7 and 8 TeV"

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

Integrated fiducial cross sections for the production of four leptons via the H -> 4l decays (l = e, mu) are measured in pp collisions at root s = 7 and 8TeV. Measurements are performed with data corresponding to integrated luminosities of 5.1 fb(-1) at 7TeV, and 19.7 fb(-1) at 8 TeV, collected with the CMS experiment at the LHC. Differential cross sections are measured using the 8 TeV data, and are determined as functions of the transverse momentum and rapidity of the four-lepton system, accompanying jet multiplicity, transverse momentum of the leading jet, and difference in rapidity between the Higgs boson candidate and the leading jet. A measurement of the Z -> 4l cross section, and its ratio to the H -> 4l cross section is also performed. All cross sections are measured within a fiducial phase space defined by the requirements on lepton kinematics and event topology. The integrated H -> 4l fiducial cross section is measured to be 0.56-(+0.67)(0.44) (stat) (+0.21)(-0.06) (syst) fb at 7 TeV, and 1.11(-0.35)(+ 0.41) (stat) (+ 0.14)(-0.10) (syst) fb at 8 TeV. The measurements are found to be compatible with theoretical calculations based on the standard model.

[P127-2016] "Measurement of the multiple-muon charge ratio in the MINOS Far Detector"

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

The charge ratio, R-mu = N mu+/N mu-, for cosmogenic multiple-muon events observed at an underground depth of 2070 mwe has been measured using the magnetized MINOS Far Detector. The multiple-muon events, recorded nearly continuously from August 2003 until April 2012, comprise two independent data sets imaged with opposite magnetic field polarities, the comparison of which allows the systematic uncertainties of the measurement to be minimized. The multiple-muon charge ratio is determined to be R mu = 1.104 +/- 0.006(stat)(-0.010)(+0.009) (syst). This measurement complements previous determinations of single-muon and multiple-muon charge ratios at underground sites and serves to constrain models of cosmic-ray interactions at TeV energies.

[P128-2016] "Measurement of the ratio B(B-s(0) -> J/psi f(0) (980))/B(B-s(0) -> J/psi phi(1020)) in pp collisions at root s=7 TeV"

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

A measurement of the ratio of the branching fractions of the B-s(0) meson to J/psi f(0)(980) and to J/psi phi(1020) is presented. The J/psi, f(0)(980), and phi(1020) are observed through their decays to mu(+)mu(-), pi(+)pi(-), and K+K-, respectively. The f(0) and the phi are identified by requiring |M-pi+(pi)- - 974 MeV| < 50 MeV and |M-K+(K)- - 1020 MeV| < 10 MeV. The analysis is based on a data sample of pp collisions at a centre-of-mass energy of 7 TeV, collected by the CMS experiment at the LHC, corresponding to an integrated luminosity of 5.3fb(-1). The measured ratio is B(B-s(0) -> J/psi f(0)) B(f(0) ->pi(+)pi(-))/B(B-s(0) -> J/psi phi) B(phi -> K+K-)= 0.140 +/- 0.008 (stat) +/- 0.023 (syst), where the first uncertainty is statistical and the second is systematic.

[P129-2016] "Measurement of the t(t)over-bar production cross section in the all-jets final state in pp collisions at root s=8TeV"

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

The cross section for tt production in the all-jets final state is measured in pp collisions at a centre-of-mass energy of 8 TeV at the LHC with the CMS detector, in data corresponding to an integrated luminosity of 18.4 fb(-1). The inclusive cross section is found to be 275.6 +/- 6.1 (stat) +/- 37.8 (syst) +/- 7.2 (lumi) pb. The normalized differential cross sections are measured as a function of the top quark transverse momenta, pT, and compared to predictions from quantum chromodynamics. The results are reported at detector, parton, and particle levels. In all cases, the measured top quark pT spectra are significantly softer than theoretical predictions.

[P130-2016] "Measurement of the top quark mass using proton-proton data at root(s)=7"

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

A new set of measurements of the top quark mass are presented, based on the proton-proton data recorded by the CMS experiment at the LHC at root s = 8 TeV corresponding to a luminosity of 19.7 fb(-1). The top quark mass is measured using the lepton + jets, all-jets and dilepton decay channels, giving values of 172.35 +/- 0.16(stat) +/- 0.48(syst) GeV, 172.32 +/- 0.25(stat) +/- 0.59(syst) GeV, and 172.82 +/- 0.19(stat) +/- 1.22(syst) GeV, respectively. When combined with the published CMS results at s = 7 TeV, they provide a top quark mass measurement of 172.44 +/- 0.13(stat) +/- 0.47(syst) GeV. The top quark mass is also studied as a function of the event kinematical properties in the lepton + jets decay channel. No indications of a kinematic bias are observed and the collision data are consistent with a range of predictions from current theoretical models of t (t) over bar production.

[P131-2016] "Measurement of top quark polarisation in t--channel single top quark production"

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

A first measurement of the top quark spin asymmetry, sensitive to the top quark polarisation, in t-channel single top quark production is presented. It is based on a sample of pp collisions at a centre-of-mass energy of 8TeV corresponding to an integrated luminosity of 19.7 fb(-1). A high-purity sample of t-channel single top quark events with an isolated muon is selected. Signal and background components are estimated using a fit to data. A differential cross section measurement, corrected for detector effects, of an angular observable sensitive to the top quark polarisation is performed. The differential distribution is used to extract a top quark spin asymmetry of 0.26 +/- 0.03(stat) +/- 0.10(syst), which is compatible with a p-value of 4.6% with the standard model prediction of 0.44.

[P132-2016] "Millisecond direct measurement of the magnetocaloric effect of a Fe2P-based compound by the mirage effect"

Cugini, F.; Porcari, G.; Viappiani, C.; Caron, L.; dos Santos, A. O.; **Cardoso, L. P.***; Passamani, E. C.; Proveti, J. R. C.; **Gama, S.***; Bruck, E.; Solzi, M.

We present direct measurements of the magnetocaloric effect on a Fe2P-based compound induced by a milliseconds pulsed magnetic field of 1 T to test their possible use in high frequency (up to 100 Hz) thermomagnetic cycles. The reported measurements were performed with an innovative and versatile non-contact set up based on the mirage effect. The adiabatic temperature change of a MnFeP0.45As0.55 sample is presented and compared with measurements performed varying the same magnetic field in a time interval of 1 s and 100 ms.

These results demonstrate the absence of kinetic constraints in the first-order phase transition of this sample induced on the milliseconds time scale. The study of the materials' response to millisecond magnetic field pulses represents a fundamental test for the development of more powerful and efficient magnetic refrigerators.

[P133-2016] "Nanometer-scale monitoring of quantum-confined Stark effect and emission efficiency droop in multiple GaN/AlN quantum disks in nanowires"

Zagonel, L. F.*; Tizei, L. H. G.; Vitiello, G. Z.*; Jacopin, G.; Rigutti, L.; Tchernycheva, M.; Julien, F. H.; Songmuang, R.) Ostasevicius, T.; de la Pena, F.; Ducati, C.; Midgley, P. A.; Kociak, M.

We report on a detailed study of the intensity dependent optical properties of individual GaN/AlN quantum disks (QDisks) embedded into GaN nanowires (NW). The structural and optical properties of the QDisks were probed by high spatial resolution cathodoluminescence (CL) in a scanning transmission electron microscope (STEM). By exciting the QDisks with a nanometric electron beam at currents spanning over three orders of magnitude, strong nonlinearities (energy shifts) in the light emission are observed. In particular, we find that the amount of energy shift depends on the emission rate and on the QDisk morphology (size, position along the NW and shell thickness). For thick QDisks (> 4 nm), the QDisk emission energy is observed to blueshift with the increase of the emission intensity. This is interpreted as a consequence of the increase of carriers density excited by the incident electron beam inside the QDisks, which screens the internal electric field and thus reduces the quantum confined Stark effect (QCSE) present in these QDisks. For thinner QDisks (< 3 nm), the blueshift is almost absent in agreement with the negligible QCSE at such sizes. For QDisks of intermediate sizes there exists a current threshold above which the energy shifts, marking the transition from unscreened to partially screened QCSE. From the threshold value we estimate the lifetime in the unscreened regime. These observations suggest that, counterintuitively, electrons of high energy can behave ultimately as single electron-hole pair generators. In addition, when we increase the current from 1 to 10 pA the light emission efficiency drops by more than one order of magnitude. This reduction of the emission efficiency is a manifestation of the "efficiency droop" as observed in nitride-based 2D light emitting diodes, a phenomenon tentatively attributed to the Auger effect.

[P134-2016] "Network analyses support the role of prey preferences in shaping resource use patterns within five animal populations"

Lemos-Costa, P.*; Pires, M. M.; Araujo, M. S.; de Aguiar, M. A. M.*; Guimaraes, P. R.

Individual variation is an inherent aspect of animal populations and understanding the mechanisms shaping resource use patterns within populations is crucial to comprehend how individuals partition resources. Theory predicts that differences in prey preferences among consumers and/or differences in the likelihood of adding new resources to their diets are key mechanisms underlying intrapopulation variation in resource use. We developed network models based on optimal diet theory that simulate how individuals consume resources under varying scenarios of individual variation in prey preferences and in the willingness of consuming alternate resources.

We then investigated how the structure of individual-resource networks generated under each model compared to the structure of observed networks representing five classical examples of individual diet variation. Our results support the notion that, for the studied populations, individual variation in prey preferences is the major factor explaining patterns in individual-resource networks. In contrast, variation in the willingness of adding prey does not seem to play an important role in shaping patterns of resource use. Individual differences in prey preferences in the studied populations may be generated by complex behavioral rules related to cognitive constraints and experience. Our approach provides a pathway for mapping foraging models into network patterns, which may allow determining the possible mechanisms leading to variation in resource use within populations.

[P135-2016] "Non-Monotonic Behavior of the Thermodynamic Work as a Function of Switching Time"

Bonanca, M. V. S.*

It is usually believed that the second law necessarily implies the following statement: the faster we drive a system, the larger is the energetic cost for such manipulation. In the present paper, we show that this is not always the case. The energy necessary to drive a system is quantified by the thermodynamic work performed by the external observer. We have shown that there exists a regime in which this quantity reveals a non-monotonic decay as a function of the switching time. Although this effect can be more pronounced in thermally isolated systems, we claim that it can also be present under isothermal conditions. We illustrate our findings with a spin-1/2 in the presence of a time-dependent magnetic field.

[P136-2016] "Optically controlled spin-polarization memory effect on Mn delta-doped heterostructures"

Balanta, M. A. G.*; Brasil, M. J. S. P.*; Iikawa, F.*; Mendes, U. C.*; Brum, J. A.*; Danilov, Y. A.; Dorokhin, M. V.; Vikhrova, O. V.; Zvonkov, B. N.

We investigated the dynamics of the interaction between spin-polarized photo-created carriers and Mn ions on InGaAs/GaAs: Mn structures. The carriers are confined in an InGaAs quantum well and the Mn ions come from a Mn delta-layer grown at the GaAs barrier close to the well. Even though the carriers and the Mn ions are spatially separated, the interaction between them is demonstrated by time-resolved spin-polarized photoluminescence measurements. Using a pre-pulse laser excitation with an opposite circular-polarization clearly reduces the polarization degree of the quantum-well emission for samples where a strong magnetic interaction is observed. The results demonstrate that the Mn ions act as a spin-memory that can be optically controlled by the polarization of the photocreated carriers. On the other hand, the spin-polarized Mn ions also affect the spin-polarization of the subsequently created carriers as observed by their spin relaxation time. These effects fade away with increasing time delays between the pulses as well as with increasing temperatures.

[P137-2016] "Photoconductivity and photoconversion at a photorefractive thin crystal plate"

Frejlich, J.*; de Oliveira, I.; de Araujo, W. R.; Carvalho, J. F.; Montenegro, R.; Georges, M.; Fleury-Frenette, K.

We report on the photoconductivity and the photoelectric conversion measured on a thin photorefractive sillenite crystal plate, between transparent electrodes, in the longitudinal configuration where the current is measured along the same direction of the light beam through the sample. Its behavior is based on the already reported light-induced Schottky effect. The wavelength for optimal photoconductivity is determined. A specific parameter is formulated here for quantitatively determining the photoelectric conversion efficiency of the sandwiched material.

[P138-2016] "Production of a biofunctional titanium surface using plasma electrolytic oxidation and glow-discharge plasma for biomedical applications"

Beline, T.; Marques, I. D. V.; Matos, A. O.; Ogawa, E. S.; Ricomini, A. P.; Rangel, E. C.; da Cruz, N. C.; Sukotjo, C.; Mathew, M. T.; **Landers, R.***; Consani, R. L. X.; Mesquita, M. F.; Barao, V. A. R.

In this study, the authors tested the hypotheses that plasma electrolytic oxidation (PEO) and glow-discharge plasma (GDP) would improve the electrochemical, physical, chemical, and mechanical properties of commercially pure titanium (cpTi), and that blood protein adsorption on plasma-treated surfaces would increase. Machined and sandblasted surfaces were used as controls. Standard electrochemical tests were conducted in artificial saliva (pHs of 3.0, 6.5, and 9.0) and simulated body fluid. Surfaces were characterized by scanning electron microscopy, energy-dispersive spectroscopy, x-ray photoelectron spectroscopy, atomic force microscopy, x-ray diffraction, profilometry, Vickers microhardness, and surface energy. For biological assay, the adsorption of blood serum proteins (i.e., albumin, fibrinogen, and fibronectin) was tested. Higher values of polarization resistance and lower values of capacitance were noted for the PEO and GDP groups ($p < 0.05$). Acidic artificial saliva reduced the corrosion resistance of cpTi ($p < 0.05$). PEO and GDP treatments improved the surface properties by enrichment of the surface chemistry with bioactive elements and increased surface energy. PEO produced a porous oxide layer (5-mu m thickness), while GDP created a very thin oxide layer (0.76-mu m thickness). For the PEO group, the authors noted rutile and anatase crystalline structures that may be responsible for the corrosion barrier improvement and increased microhardness values. Plasma treatments were able to enhance the surface properties and electrochemical stability of titanium, while increasing protein adsorption levels.

[P139-2016] "Quantum key distribution using continuous-variable non-Gaussian states"

Borelli, L. F. M.*; **Aguiar, L. S.***; **Roversi, J. A.***; **Vidiella-Barranco, A.***

In this work, we present a quantum key distribution protocol using continuous-variable non-Gaussian states, homodyne detection and post-selection. The employed signal states are the photon added then subtracted coherent states (PASCS) in which one photon is added and subsequently one photon is subtracted from the field. We analyze the performance of our protocol, compared with a coherent state-based protocol, for two different attacks that could be carried out by the eavesdropper (Eve). We calculate the secret key rate transmission in a lossy line for a superior channel (beam-splitter) attack, and we show that we may increase the secret key generation rate by using the non-Gaussian PASCS rather than coherent states. We also consider the simultaneous quadrature measurement (intercept-resend) attack, and we show that the efficiency of Eve's attack is substantially reduced if PASCS are used as signal states.

[P140-2016] "Rapid, broadband spectroscopic temperature measurement of CO2 using VIPA spectroscopy"

Klose, A.; Ycas, G.; **Cruz, F. C.***; Maser, D. L.; Diddams, S. A.

Time-resolved spectroscopic temperature measurements of a sealed carbon dioxide sample cell were realized with an optical frequency comb combined with a two-dimensional dispersive spectrometer. A supercontinuum laser source based on an erbium fiber mode-locked laser was employed to generate coherent light around 2000 nm (5000 cm(-1)). The laser was passed through a 12-cm-long cell containing CO_2, and the transmitted light was analyzed in a virtually imaged phased array-based spectrometer. Broadband spectra spanning more than 100 cm(-1) with a spectral resolution of roughly 0.075 cm(-1) (2.2 GHz) were acquired with an integration period of 2 ms. The temperature of the CO_2 sample was deduced from fitting a modeled spectrum to the line intensities of the experimentally acquired spectrum. Temperature dynamics on the timescale of milliseconds were observed with a temperature resolution of 2.6 K. The spectroscopically deduced temperatures agreed with temperatures of the sample cell measured with a thermistor. Potential applications of this technique include quantitative measurement of carbon dioxide concentration and temperature dynamics in gas-phase chemical reactions(e.g., combustion) and plasma diagnostics.

[P141-2016] "Results from the first use of low radioactivity argon in a dark matter search"

Agnes, P.; Agostino, L.; Albuquerque, I. F. M.; **Segreto, E.***; et al.
DarkSide Collaboration

Liquid argon is a bright scintillator with potent particle identification properties, making it an attractive target for direct-detection dark matter searches. The DarkSide-50 dark matter search here reports the first WIMP search results obtained using a target of low-radioactivity argon. DarkSide-50 is a dark matter detector, using a two-phase liquid argon time projection chamber, located at the Laboratori Nazionali del Gran Sasso. The underground argon is shown to contain Ar-39 at a level reduced by a factor $(1.4 +/- 0.2) \times 10(3)$ relative to atmospheric argon. We report a background-free null result from (2616 +/- 43) kg d of data, accumulated over 70.9 live days. When combined with our previous search using an atmospheric argon, the 90% C.L. upper limit on the WIMP-nucleon spin-independent cross section, based on zero events found in the WIMP search regions, is $2.0 \times 10(-4)4$ cm(2) ($8.6 \times 10(-44)$ cm(2), $8.0 \times 10(-43)$ cm(2)) for a WIMP mass of 100 GeV/c(2) (1 TeV/c(2), 10 TeV/c(2)).

[P142-2016] "Search for a massive resonance decaying into a Higgs boson and a W or Z boson in hadronic final states in proton-proton collisions at root s=8 TeV"

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

A search for a massive resonance decaying into a standard-model-like Higgs boson (H) and a W or Z boson is reported. The analysis is performed on a data sample corresponding to an integrated luminosity of 19.7 fb(-1), collected in proton-proton collisions at a centre-of-mass energy of 8 TeV with the CMS detector at the LHC. Signal events, in which the decay products of Higgs, W, or Z bosons at high Lorentz boost are contained within single reconstructed jets, are identified using jet substructure techniques, including the tagging of b hadrons. This is the first search for heavy resonances decaying into HW or HZ resulting in an all-jet final state, as well as the first application of jet substructure techniques to identify H -> WW* -> 4q decays at high Lorentz boost. No significant signal is observed and limits are set at 95% confidence level on the production cross sections of W' and Z' in a model with mass-degenerate charged and neutral spin-1 resonances. Resonance masses are excluded for W' in the interval [1.0, 1.6] TeV, for Z' in the intervals [1.0, 1.1] and [1.3, 1.5] TeV, and for mass-degenerate W' and Z' in the interval [1.0, 1.7] TeV.

[P143-2016] "Search for anomalous single top quark production in association with a photon 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

The result of a search for flavor changing neutral currents (FCNC) through single top quark production in association with a photon is presented. The study is based on proton-proton collisions at a center-of-mass energy of 8 TeV using data collected with the CMS detector at the LHC, corresponding to an integrated luminosity of 19.8 fb(-1). The search for t gamma events where t -> Wb and W -> mu nu is conducted in final states with a muon, a photon, at least one hadronic jet with at most one being consistent with originating from a bottom quark, and missing transverse momentum. No evidence of single top quark production in association with a photon through a FCNC is observed. Upper limits at the 95% confidence level are set on the tu gamma and tc gamma anomalous couplings and translated into upper limits on the branching fraction of the FCNC top quark decays: B (t -> u gamma) < 1.3 x 10(-4) and B(t -> c gamma) < 1.7 x 10(-3). Upper limits are also set on the cross section of associated t gamma production in a restricted phase-space region. These are the most stringent limits currently available.

[P144-2016] "Search for dark matter and unparticles produced in association with a Z boson in proton-proton collisions at root s=8 TeV"

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

A search for evidence of particle dark matter (DM) and unparticle production at the LHC has been performed using events containing two charged leptons, consistent with the decay of a Z boson, and large missing transverse momentum. This study is based on data collected with the CMS detector corresponding to an integrated luminosity of 19.7 fb(-1) of pp collisions at the LHC at a center-of-mass energy of 8 TeV. No significant excess of events is observed above the number expected from the standard model contributions. The results are interpreted in terms of 90% confidence level limits on the DM-nucleon scattering cross section, as a function of the DM particle mass, for both spin-dependent and spin-independent scenarios. Limits are set on the effective cutoff scale., and on the annihilation rate for DM particles, assuming that their branching fraction to quarks is 100%. Additionally, the most stringent 95% confidence level limits to date on the unparticle model parameters are obtained.

[P145-2016] "Search for excited leptons in proton-proton collisions at root s=8 TeV"

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

A search for compositeness of electrons and muons is presented using a data sample of proton-proton collisions at a center-of-mass energy of root s = 8TeV collected with the CMS detector at the LHC and corresponding to an integrated luminosity of 19.7 fb(-1). Excited leptons (l*) produced via contact interactions in conjunction with a standard model lepton are considered, and a search is made for their gauge decay modes. The decays considered are l* -> l gamma and l* -> lZ , which give final states of two leptons and a photon or, depending on the Z-boson decay mode, four leptons or two leptons and two jets. The number of events observed in data is consistent with the standard model prediction. Exclusion limits are set on the excited lepton mass, and the compositeness scale Lambda. For the case M-l* = Lambda the existence of excited electrons (muons) is excluded up to masses of 2.45 (2.47) TeV at 95% confidence level. Neutral current decays of excited leptons are considered for the first time, and limits are extended to include the possibility that the weight factors f and f', which determine the couplings between standard model leptons and excited leptons via gauge mediated interactions, have opposite sign.

[P146-2016] "Search for W ' -> tb in proton-proton collisions at root s=8 TeV"

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

A search is performed for the production of a massive W' boson decaying to a top and a bottom quark. The data analysed correspond to an integrated luminosity of 19.71 fb(-1) collected with the CMS detector at the LHC in proton-proton collisions at root s = 8 TeV. The hadronic decay products of the top quark with high Lorentz boost from the W' boson decay are detected as a single top flavoured jet. The use of jet substructure algorithms allows the top quark jet to be distinguished from standard model QCD background. Limits on the production cross section of a right-handed W' boson are obtained, together with constraints on the left-handed and right-handed couplings of the W' boson to quarks. The production of a right-handed W' boson with a mass below 2.02 TeV decaying to a hadronic final state is excluded at 95% confidence level. This mass limit increases to 2.15 TeV when both hadronic and leptonic decays are considered, and is the most stringent lower mass limit to date in the tb decay mode.

[P147-2016] "Simulation of Auger electron emission from nanometer-size gold targets using the Geant4 Monte Carlo simulation toolkit"

Incerti, S.; Suerfu, B.; Xu, J.; Ivantchenko, V.; Mantero, A.; Brown, J. M. C.; **Bernal, M. A.***; Francis, Z.; Karamitros, M.; Tran, H. N.

A revised atomic deexcitation framework for the Geant4 general purpose Monte Carlo toolkit capable of simulating full Auger deexcitation cascades was implemented in June 2015 release (version 10.2 Beta). An overview of this refined framework and testing of its capabilities is presented for the irradiation of gold nanoparticles (NP) with keV photon and MeV proton beams. The resultant energy spectra of secondary particles created within and that escape the NP are analyzed and discussed. It is anticipated that this new functionality will improve and increase the use of Geant4 in the medical physics, radiobiology, nanomedicine research and other low energy physics fields.

[P148-2016] "Spin dynamics and two-dimensional correlations in the fcc antiferromagnetic Sr2YRuO6"

Disseler, S. M.; Lynn, J. W.; Jardim, R. F.; Torikachvili, M. S.; **Granado, E.***

The face-centered-cubic (fcc) lattice of Ru5+ spins in the double perovskite Sr2YRuO6 shows a delicate, three-dimensional antiferromagnetic (AFM) ground state composed of stacked square AFM layers. Inelastic neutron scattering data taken on this state reveal a gapped low-energy excitation band emerging from [001] with spin excitations extending to 8meV. These magnetic excitations are modeled by a simple J(1)-J(2) interaction scheme allowing quantitative comparisons with similar materials. At higher temperatures, the low-energy excitation spectrum is dominated by a quasielastic component associated with size fluctuations of two-dimensional AFM clusters that exhibit asymmetric correlations even at low temperatures. Thus, the fcc lattice in general and the double-perovskite structure in particular emerge as hosts of both two-dimensional and three-dimensional dynamics resulting from frustration.

[P149-2016] "Stress-Induced Gene Expression Sensing Intracellular Heating Triggered by Magnetic Hyperthermia"

de Sousa, M. E.; Carrea, A.; Zelis, P. M.; **Muraca, D.***; Mykhaylyk, O.; Sosa, Y. E.; Goya, R. G.; Sanchez, F. H.; Dewey, R. A.; van Raap, M. B. F.

It is known that alternating magnetic field applications on eukaryotic cells loaded with single domain iron oxide nanoparticles result in high hyperthermic cytotoxicity leading to cell death. Although magnetic hyperthermia therapy for cancer tumors is being developed using this idea, some in vitro assays have shown controversial results indicating that an alternating magnetic field triggers a large apoptotic effect without significant culture temperature increase. In agreement with these observations, a huge lowering in nanoparticle specific heating rates, when going from the colloidal suspension to cell endosomes, together with cell death, has been reported. Here, we propose a new methodology to determine the occurrence of local heating in cells when alternating magnetic fields in the radiofrequency field range are applied to cell cultures holding very low iron oxide concentrations, these concentrations being insufficient to produce a global cell culture temperature increase up to therapeutic values.

To this end, human lung adenocarcinoma cells (A549 cell line) were transduced with a lentiviral vector encoding the expression of the enhanced green fluorescence protein (EGFP) under the action of the inducible human heat shock protein 70B promoter. This modified A549 cell line was incubated with aqueous suspensions of magnetite core nanoparticles (uncoated or covered with coating agents like citric acid or silicon oxide) and exposed to radiofrequency fields. The application of an alternating magnetic field to cell cultures loaded with nanoparticles resulted in no global temperature increase but EGFP expression. Stress-inducible gene expression scales with uptake and nanoparticle properties like saturation magnetization and heat dissipation efficiency. Our analysis demonstrates that EGFP expression is linked to a localized intracellular temperature increase.

[P150-2016] "Strong correlations generically protect d-wave superconductivity against disorder"

Tang, S.; Dobrosavljevic, V.; **Miranda, E.***

We address the question of why strongly correlated d-wave superconductors, such as the cuprates, prove to be surprisingly robust against the introduction of nonmagnetic impurities. We show that, very generally, both the pair-breaking and the normal state transport scattering rates are significantly suppressed by strong correlations effects arising in the proximity to a Mott insulating state. We also show that the correlation-renormalized scattering amplitude is generically enhanced in the forward direction, an effect which was previously often ascribed to the specific scattering by charged impurities outside the copper-oxide planes.

[P151-2016] "Surface functionalization of two-dimensional metal chalcogenides by Lewis acid-base chemistry"

Lei, S. D.; Wang, X. F.; Li, B.; Kang, J. H.; He, Y. M.; George, A.; Ge, L. H.; Gong, Y. J.; Dong, P.; Jin, Z. H.; **Brunetto, G.***; Chen, W. B.; Lin, Z. T.; Baines, R.; **Galvao, D. S.***; Lou, J.; Barrera, E.; Banerjee, K.; Vajtai, R.; Ajayan, P.

Precise control of the electronic surface states of two-dimensional (2D) materials could improve their versatility and widen their applicability in electronics and sensing. To this end, chemical surface functionalization has been used to adjust the electronic properties of 2D materials. So far, however, chemical functionalization has relied on lattice defects and physisorption methods that inevitably modify the topological characteristics of the atomic layers. Here we make use of the lone pair electrons found in most of 2D metal chalcogenides and report a functionalization method via a Lewis acid-base reaction that does not alter the host structure. Atomic layers of n-type InSe react with Ti4+ to form planar p-type [Ti4+ (n) (InSe)] coordination complexes. Using this strategy, we fabricate planar p-n junctions on 2D InSe with improved rectification and photovoltaic properties, without requiring heterostructure growth procedures or device fabrication processes. We also show that this functionalization approach works with other Lewis acids (such as B3+, Al3+ and Sn4+) and can be applied to other 2D materials (for example MoS2, MoSe2). Finally, we show that it is possible to use Lewis acid-base chemistry as a bridge to connect molecules to 2D atomic layers and fabricate a proof-of-principle dye-sensitized photosensing device.

[P152-2016] "Surface structure characterization of ultra-thin films of Au deposited on Pd(111)"

Pancotti, A.; **de Siervo, A.***; Nascente, P. A. P.; **Landers, R.***

Ultra-thin films of Au were deposited on the Pd(111) surface and then characterized by X-ray photoelectron spectroscopy (XPS), low-energy electron diffraction (LEED), and X-ray photoelectron diffraction (XPD) generated by synchrotron radiation. The Au films were deposited at room temperature (300 K) and subsequently annealed at 400 degrees C (673 K) and 610 degrees C (883 K). XPD analyses indicated that the gold films were 7 and 6 ML thick, for the annealing temperatures of 400 degrees C and 610 degrees C, respectively. The film interlayer distances exhibited an oscillatory behavior, with a 5% contraction between the top and the second layers, a 3% expansion between the second and the third layers, for the film annealed at 400 degrees C, and a 2% expansion in the interlayer distance between the top and the second layers and a 4% contraction between the second and the third layers, for the film annealed at 610 degrees C For both annealing temperatures, the interlayer distances between the third and the fourth layers and between the fourth and the fifth layers exhibited a 1% expansion and a 2% contraction. For the film annealed at 610 degrees C, XPD results revealed that the Pd(111) surface was covered by Au islands, with some bare patches exposed.

[P153-2016] "The electron-furfural scattering dynamics for 63 energetically open electronic states"

da Costa, R. F.*; Varella, M. T. D.; Bettega, M. H. F.; Neves, R. F. C.; Lopes, M. C. A.; Blanco, F. Garcia, G.; Jones, D. B.; Brunger, M. J.; **Lima, M. A. P.***

We report on integral-, momentum transfer-and differential cross sections for elastic and electronically inelastic electron collisions with furfural (C5H4O2). The calculations were performed with two different theoretical methodologies, the Schwinger multichannel method with pseudopotentials (SMCPP) and the independent atom method with screening corrected additivity rule (IAM-SCAR) that now incorporates a further interference (I) term. The SMCPP with N energetically open electronic states (N-open) at either the static-exchange (N-open ch-SE) or the static-exchange-plus-polarisation (N-open ch-SEP) approximation was employed to calculate the scattering amplitudes at impact energies lying between 5 eV and 50 eV, using a channel coupling scheme that ranges from the 1ch-SEP up to the 63ch-SE level of approximation depending on the energy considered. For elastic scattering, we found very good overall agreement at higher energies among our SMCPP cross sections, our IAM-SCAR+I cross sections and the experimental data for furan (a molecule that differs from furfural only by the substitution of a hydrogen atom in furan with an aldehyde functional group). This is a good indication that our elastic cross sections are converged with respect to the multichannel coupling effect for most of the investigated intermediate energies. However, although the present application represents the most sophisticated calculation performed with the SMCPP method thus far, the inelastic cross sections, even for the low lying energy states, are still not completely converged for intermediate and higher energies. We discuss possible reasons leading to this discrepancy and point out what further steps need to be undertaken in order to improve the agreement between the calculated and measured cross sections.

[P154-2016] "The use of an e-tongue for discriminating ethanol/water mixtures and determination of their water contente"

de Queiroz, D. P.; Florentino, A. D.; Bruno, J. C.; da Silva, J. H. D.; **Riul Jr., A.***; Giacometti, J. A.

This paper discusses the applicability of an electronic tongue (e-tongue) based on capacitance measurements to determine the water content in ethanol. The e-tongue consisted of an array of interdigitated electrodes coated with ultrathin films of gallium nitrate and titanium dioxide, which were robust against attack by ethanol. Principal Component Analysis (PCA) was used to treat the capacitance data for discriminating ethanol/water mixtures even in cases with very small water contents. Discrimination is easier if the water added to ethanol contains ions, as is the case of tap water or if NaCl is added to the mixtures. With this e-tongue we were able to quantify the water content through a linear relationship between the first principal component (PCl) and the added water to the biofuel. Therefore, we have proven to be possible to measure the water content precisely, which is one of the major problems in ethanol biofuel adulteration nowadays.

[P155-2016] "The veto system of the DarkSide-50 experiment"

Agnes, P.; Agostino, L.; Albuquerque, I. F. M.; **Segreto, E.***; et al.

Nuclear recoil events produced by neutron scatters form one of the most important classes of background in WIMP direct detection experiments, as they may produce nuclear recoils that look exactly like WIMP interactions. In DarkSide-50, we both actively suppress and measure the rate of neutron-induced background events using our neutron veto, composed of a boron-loaded liquid scintillator detector within a water Cherenkov detector. This paper is devoted to the description of the neutron veto system of DarkSide-50, including the detector structure, the fundamentals of event reconstruction and data analysis, and basic performance parameters.

[P156-2016] "Theoretical and experimental differential cross sections for electron impact excitation of the electronic bands of furfural"

Jones, D. B.; Neves, R. F. C.; Lopes, M. C. A.; **da Costa, R. F.***; Varella, M. T. do N.; Bettega, M. H. F.; **Lima, M. A. P.***; Garcia, G.; Limao-Vieira, P.; Brunger, M. J.

We report results from a joint experimental and theoretical investigation into electron scattering from the important industrial species furfural (C5H4O2). Specifically, differential cross sections (DCSs) have been measured and calculated for the electron-impact excitation of the electronic states of C5H4O2. The measurements were carried out at energies in the range 20-40 eV, and for scattered-electron angles between 10 degrees and 90 degrees. The energy resolution of those experiments was typically similar to 80 meV. Corresponding Schwinger multichannel method with pseudo-potential calculations, for energies between 6-50 eV and with and without Born-closure, were also performed for a sub-set of the excited electronic-states that were accessed in the measurements. Those calculations were undertaken at the static exchange plus polarisation-level using a minimum orbital basis for single configuration interaction (MOB-SCI) approach.

Agreement between the measured and calculated DCSs was qualitatively quite good, although to obtain quantitative accord, the theory would need to incorporate even more channels into the MOB-SCI. The role of multichannel coupling on the computed electronic-state DCSs is also explored in some detail.

[P157-2016] "Three-Dimensional Organic Conductive Networks Embedded in Paper for Flexible and Foldable Devices"

Santhiago, M.; Bettini, J.; Araujo, S. R.; Bufon, C. C. B.*

The fabrication of three-dimensional (3D) polypyrrole conductive tracks through the porous structure of paper is demonstrated by the first time. We combined paper microfluidics and gas-phase pyrrole monomers to chemically synthesize polypyrrole-conducting channels embedded in-between the cellulose fibers. By using this method, foldable conductive structures can be created across the whole paper structure, allowing the electrical connection between both sides of the substrate. As a proof of concept, top-channel-top (TCT) and top-channel bottom (TCB) conductive interconnections as well as all-organic paper-based touch buttons are, demonstrated.

[P158-2016] "Transverse momentum dependence of D-meson production in 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

The production of prompt charmed mesons D-0, D+ and D*(+), and their antiparticles, was measured with the ALICE detector in Pb-Pb collisions at the centre-of-mass energy per nucleon pair, root s(NN), of 2.76 TeV. The production yields for rapidity vertical bar y vertical bar < 0.5 are presented as a function of transverse momentum, p(T), in the interval 1-36 GeV/c for the centrality class 0-10% and in the interval 1-16 GeV/c for the centrality class 30-50%. The nuclear modification factor R-AA was computed using a proton-proton reference at root s = 2.76 TeV, based on measurements at root s = 7 TeV and on theoretical calculations. A maximum suppression by a factor of 5-6 with respect to binary-scaled pp yields is observed for the most central collisions at p(T) of about 10 GeV/c. A suppression by a factor of about 2-3 persists at the highest p(T) covered by the measurements. At low p(T) (1-3 GeV/c), the R-AA has large uncertainties that span the range 0.35 (factor of about 3 suppression) to 1 (no suppression). In all p(T) intervals, the R-AA is larger in the 30-50% centrality class compared to central collisions. The D-meson R-AA is also compared with that of charged pions and, at large p(T), charged hadrons, and with model calculations.

[P159-2016] "Vortex line in the unitary Fermi gas"

Madeira, L.*; Vitiello, S. A.*; Gandolfi, S.; Schmidt, K. E.

We report diffusion Monte Carlo results for the ground state of unpolarized spin-1/2 fermions in a cylindrical container and properties of the system with a vortex-line excitation. The density profile of the system with a vortex line presents a nonzero density at the core. We calculate the ground-state energy per particle, the superfluid pairing gap, and the excitation energy per particle.

These simulations can be extended to calculate the properties of vortex excitations in other strongly interacting systems such as superfluid neutron matter using realistic nuclear Hamiltonians.

Eventos publicados

[P160-2016] "Near-infrared scintillation of liquid argon"

Alexander, T.; Escobar, C. O.*; Lippincott, W. H.; Rubinov, P.

Since the 1970s it has been known that noble gases scintillate in the near infrared (NIR) region of the spectrum (0.7 mu m < lambda < 1.5 mu m). More controversial has been the question of the NIR light yield for condensed noble gases. We first present the motivation for using the NIR scintillation in liquid argon detectors, then briefly review early as well as more recent efforts and finally show encouraging preliminary results of a test performed at Fermilab.

Conference on Light Detection in Noble Elements (LIDINE). AUG 28-30, 2015. Albany, NY.

Carta

[Car001-2016] "Correspondence: Reply to 'On the nature of strong piezoelectricity in graphene on SiO2'"

Rodrigues, G. D. C.; Zelenovskiy, P.; Romanyuk, K.; Luchkin, S.; Kopelevich, Y.*; Kholkin, A.

Correção

[Co001-2016] "Comparison of the Z/gamma* + jets to gamma + jets cross sections in pp collisions at root s = 8 (vol 10, 128, 2015)"

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

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

Defesas de Dissertações

[D008-2016] "Espectroscopia de Alta Sensibilidade através do uso de Cavidades Ópticas"
Aluno: Marvyn William Inga Caqui
Orientador: Prof. Dr. Flávio Caldas da Cruz
Data: 19/05/2016

[D009-2016] "Propriedades Mecânicas e Térmicas de Grafinos e Grafidinos"
Aluno: Sergio Andrés Hernández Sandoval
Orientador: Prof. Dr. Alexandre Fontes da Fonseca
Data: 10/06/2016

[D010-2016] "Difração Bragg-Superfície (BSD) de raios-X no estudo do efeito do tratamento térmico em Si(111) implantado com íons Cr+"
Aluno: Hugo Eugênio de Freitas
Orientador: Prof. Dr. Lisandro Pavie Cardoso
Data: 16/06/2016

[D011-2016] "The influence of the DNA conformation on the radiation-induced DNA damage probabilities"
Aluno: John James Tello Cajiao
Orientador: Prof. Dr. Mario Antonio Bernal Rodriguez
Data: 30/06/2016

[D012-2016] "Investigation of graph parameters for characterization of functional brain networks originated by motor imagery tasks"
Aluno: Carlos A. Stefano Filho
Orientador: Profa. Dra. Gabriela Castellano
Data: 07/07/2016

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