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Artigos publicados

[P235-2017] "A gravitational-wave standard siren measurement of the Hubble constant"

Abbott, B. P.; Abbott, R.; Abbott, T. D.; **Sobreira, F.***; et al.
LIGO Sci Collaboration; Virgo Collaboration; 1M2H Collaboration; Dark Energy Camera GW-EM; DES Collaboration; DLT40 Collaboration; Las Cumbres Observ Collaboration; VINROUGE Collaboration; MASTER Collaboration

On 17 August 2017, the Advanced LIGO(1) and Virgo(2) detectors observed the gravitational-wave event GW170817-a strong signal from the merger of a binary neutron-star system(3). Less than two seconds after the merger, a gamma-ray burst (GRB 170817A) was detected within a region of the sky consistent with the LIGO-Virgo-derived location of the gravitational-wave source(4-6). This sky region was subsequently observed by optical astronomy facilities(7), resulting in the identification(8-13) of an optical transient signal within about ten arcseconds of the galaxy NGC 4993. This detection of GW170817 in both gravitational waves and electromagnetic waves represents the first 'multi-messenger' astronomical observation. Such observations enable GW170817 to be used as a 'standard siren'(14-18) (meaning that the absolute distance to the source can be determined directly from the gravitational-wave measurements) to measure the Hubble constant. This quantity represents the local expansion rate of the Universe, sets the overall scale of the Universe and is of fundamental importance to cosmology. Here we report a measurement of the Hubble constant that combines the distance to the source inferred purely from the gravitational-wave signal with the recession velocity inferred from measurements of the redshift using the electromagnetic data. In contrast to previous measurements, ours does not require the use of a cosmic 'distance ladder'(19): the gravitational-wave analysis can be used to estimate the luminosity distance out to cosmological scales directly, without the use of intermediate astronomical distance measurements. We determine the Hubble constant to be about 70 kilometres per second per megaparsec. This value is consistent with existing measurements(20,21), while being completely independent of them. Additional standard siren measurements from future gravitational-wave sources will enable the Hubble constant to be constrained to high precision.

[P236-2017] "A suitable (wide-range plus linear) temperature sensor based on Tm3+ ions"

Zanatta, A. R.; **Scoca, D.***; **Alvarez, F.***

Future advances in the broad fields of photonics, (nano-) electronics or even theranostics rely, in part, on the precise determination and control, with high sensitivity and speed, of the temperature of very well-defined spatial regions. Ideally, these temperature-sensors (T-sensors) should produce minimum (or no) disturbance in the probed regions, as well as to exhibit good resolution and significant dynamic range. Most of these features are consistent with the sharp and distinctive optical transitions of trivalent rare-earth (RE3+) ions that, additionally, are susceptible to their local environment and conditions. Altogether, these aspects form the basis of the present work, in which we propose a new T-sensor involving the light emission of trivalent thulium ions (Tm3+) embedded into crystalline TiO2. The optical characterization of the TiO2: Tm3+ system indicated a Tm3+-related emission at similar to 676 nm whose main spectral features are: (1) a temperature-induced wavelength shift of -2.2 pm K-1, (2) a rather small line-width increase over the similar to 85-750 K range, and (3) minimum data deconvolution-processing. The study also included the experimental data of the well-established pressure-and T-sensor ruby (Al2O3:Cr3+)

and a comprehensive discussion concerning the identification and the excitation-recombination mechanisms of the Tm3+--related transitions.

[P237-2017] "Affect during incremental exercise: The role of inhibitory cognition, autonomic cardiac function, and cerebral oxygenation"

da Silva, W. Q. A.; Fontes, E. B.; **Forti, R. M.***; Lima, Z. L.; Machado, D. G. D.; Deslandes, A. C.; Hussey, E.; Ward, N.; **Mesquita, R. C.***; Okano, A. H.; Elsangedy, H. M.

Background Pleasure is a key factor for physical activity behavior in sedentary individuals. Inhibitory cognitive control may play an important role in pleasure perception while exercising, especially at high intensities. In addition, separate work suggests that autonomic regulation and cerebral hemodynamics influence the affective and cognitive responses during exercise. Purpose We investigated the effects of exercise intensity on affect, inhibitory control, cardiac autonomic function, and prefrontal cortex (PFC) oxygenation. Methods Thirty-seven sedentary young adults performed two experimental conditions (exercise and control) in separate sessions in a repeated-measures design. In the exercise condition, participants performed a maximum graded exercise test on a cycle ergometer as we continuously measured oxygen consumption, heart rate variability (HRV), and PFC oxygenation. At each of 8 intensity levels we also measured inhibitory control (Stroop test), associative and dissociative thoughts (ADT), and affective/pleasure ratings. In the control condition, participants sat motionless on a cycle ergometer without active pedaling, and we collected the same measures at the same points in time as the exercise condition. We evaluated the main effects and interactions of exercise condition and intensity level for each measure using two-way repeated measures ANOVAs. Additionally, we evaluated the relationship between affect and inhibitory control, ADT, HRV, and PFC oxygenation using Pearson's correlation coefficients. Results For exercise intensities below and at the ventilatory threshold (VT), participants reported feeling neutral, with preservation of inhibitory control, while intensities above the VT were associated with displeasure (p<0.001), decreased inhibitory control and HRV (p<0.001), and increased PFC oxygenation (p<0.001). At the highest exercise intensity, pleasure was correlated with the low-frequency index of HRV (r =-0.34; p<0.05) and the low-frequency/high--frequency HRV ratio (r =-0.33; p<0.05). PFC deoxyhemoglobin was correlated with pleasure two stages above the VT (r =-0.37; p<0.05). Conclusion Our results support the notion that exercise at high intensities influences inhibitory control and one's perception of pleasure, which are linked to changes in cardiac autonomic control and cerebral hemodynamics. These findings strengthen the existence of an integrated brain--heart-body system and highlight the importance of exercise intensity in exercise related behavior in sedentary individuals.

[P238-2017] "Analysis and control of energy transfer processes and luminescence across the visible spectrum in PFO:P3OT blends"

Renzi, W.; Franchello, F.; Cordeiro, N. J. A.; **Pelegati, V. B.***; **Cesar, C. L.***; Laureto, E.; Duarte, J. L.

A systematic study of luminescence from blends made of poly (9, 9-dioctylfluorene-2, 7-diyl) (PFO) and poly (3-octylthiophene-2, 5-diyl) (P3OT), and its photophysics was carried out. Acceptor concentration influence and sample preparation conditions was analyzed, particularly regarding the solvent,

in order to control emission through the entire visible spectrum, and to understand the physical processes involved. An additional emission band observed in PFO:P3OT films with low concentration of P3OT was studied through confocal luminescence microscopy and was attributed to a decrease of energy transfer between P3OT molecules leading to an emission through chains with smaller conjugation length. The extra emission was also separated from the others by Time Resolved Emission Spectroscopy due to the fact that its lifetime is longer than those of the other emissions. Balance control of the emission through PFO (blue), low conjugation chains of P3OT (green) and P3OT aggregates (red) was possible changing the solvent and the way to prepare samples, that causes a greater or lesser amount of beta phase in PFO. The study of the energy processes involved was also performed.

[P239-2017] "Bounds on the rise of total cross section from LHC7 and LHC8 data"

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

Recent measurements of the proton proton total cross section sigma(tot) at 7 and 8 TeV by the TOTEM and ATLAS Collaborations are characterized by some discrepant values: the TOTEM data suggest a rise of the cross section with the energy faster than the ATLAS data. Attempting to quantify these different behaviors, we develop new analytical fits to sigma(tot) and rho data from (p) over barp and pp scattering in the energy region 5 GeV-8 TeV. The dataset comprises all the accelerator data below 7 TeV and we consider three ensembles by adding: either only the TOTEM data (T), or only the ATLAS data (A), or both sets (T + A). For the purposes, we use our previous RRPL gamma parametrization for sigma(tot) (s), consisting of two Reggeons (RR), one critical Pomeron (P) and a leading log-raised-to-gamma (L gamma) contribution (with gamma as a free fit parameter), analytically connected to rho(s) through singly-subtracted derivative dispersion relations and energy scale fixed at the physical threshold. The data reductions with ensembles T and A present good agreement with the experimental data analyzed and cannot be distinguished on statistical grounds. The quality of the fit is not as good with ensemble T + A. The fit results provide gamma similar to 2.3 +/- 0.1 (T), 2.0 +/- 0.1 (A), 2.2 +/- 0.2 (T + A), with x(2)/DOF similar to 1.07 (T), 1.09 (A), 1.14 (T + A), suggesting extrema bounds for gamma given by 1.9 and 2.4. Fits with gamma = 2 (fixed) are also developed and discussed.

[P240-2017] "Calibration of the logarithmic-periodic dipole antenna (LPDA) radio stations at the Pierre Auger Observatory using an octocopter"

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

An in-situ calibration of a logarithmic periodic dipole antenna with a frequency coverage of 30 MHz to 80 MHz is performed. Such antennas are part of a radio station system used for detection of cosmic ray induced air showers at the Engineering Radio Array of the Pierre Auger Observatory, the so-called Auger Engineering Radio Array (AERA). The directional and frequency characteristics of the broadband antenna are investigated using a remotely piloted aircraft carrying a small transmitting antenna.

The antenna sensitivity is described by the vector effective length relating the measured voltage with the electric-field components perpendicular to the incoming signal direction. The horizontal and meridional components are determined with an overall uncertainty of 7.4(-0.3)(+0.9)%and 10.3(-1.7)(+2.8)% respectively. The measurement is used to correct a simulated response of the frequency and directional response of the antenna. In addition, the influence of the ground conductivity and permittivity on the antenna response is simulated. Both have a negligible influence given the ground conditions measured at the detector site. The overall uncertainties of the vector effective length components result in an uncertainty of 8.8(-1.3)(+2.1)% in the square root of the energy fluence for incoming signal directions with zenith angles smaller than 60 degrees.

[P241-2017] "Centrality dependence of the pseudorapidity density distribution for 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 present the charged-particle pseudorapidity density in Pb--Pb collisions at root s(NN) = 5.02 TeV in centrality classes measured by ALICE. The measurement covers a wide pseudorapidity range from -3.5 to 5, which is sufficient for reliable estimates of the total number of charged particles produced in the collisions. For the most central (0-5%) collisions we find 21 400 +/- 1 300, while for the most peripheral (80-90%) we find 230 +/- 38. This corresponds to an increase of (27 +/- 4)% over the results at root s(NN) = 2.76 TeV previously reported by ALICE. The energy dependence of the total number of charged particles produced in heavy-ion collisions is found to obey a modified power-law like behaviour. The charged-particle pseudorapidity density of the most central collisions is compared to model calculations--none of which fully describes the measured distribution. We also present an estimate of the rapidity density of charged particles. The width of that distribution is found to exhibit a remarkable proportionality to the beam rapidity, independent of the collision energy from the top SPS to LHC energies.

[P242-2017] "Coherent J/psi photoproduction in ultra-peripheral PbPb collisions at root s(NN)=2.76 TeV with the CMS experiment"

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

The cross section for coherent J/psi photoproduction accompanied by at least one neutron on one side of the interaction point and no neutron activity on the other side, Xn0n, is measured with the CMS experiment in ultra-peripheral PbPb collisions at root sNN= 2.76TeV. The analysis is based on a data sample corresponding to an integrated luminosity of 159 mu b(-1), collected during the 2011 PbPb run. The J/psi mesons are reconstructed in the dimuon decay channel, while neutrons are detected using zero degree calorimeters. The measured cross section is d sigma(Xn)o(n)(coh)/dy(J/psi) = 0.36 +/- 0.04 (stat)+/- 0.04 (syst) mbin the rapidity interval 1.8 <vertical bar y vertical bar < 2.3. Using a model for the relative rate of coherent photoproduction processes, this Xn0nmeasurement gives a total coherent photoproduction cross section of d sigma(coh/)dy(J/psi) = 1.82 +/- 0.22 (stat)+/- 0.20 (syst)+/- 0.19 (theo) mb.

The data strongly disfavorthe impulse approximation model prediction, indicating that nuclear effects are needed to describe coherent J/psi photoproduction in.+ Pbinteractions. The data are found to be consistent with the leading twist approximation, which includes nuclear gluon shadowing.

[P243-2017] "Cross section measurement of t-channel single top quark production in pp collisions at root s=13 TeV"

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

The cross section for the production of single top quarks in the t channel is measured in proton- proton collisions at 13TeV with the CMS detector at the LHC. The analyzed data correspond to an integrated luminosity of 2.2fb(-1). The event selection requires one muon and two jets where one of the jets is identified as originating from a bottom quark. Several kinematic variables are then combined into a multivariate discriminator to distinguish signal from background events. A fit to the distribution of the discriminating variable yields a total cross section of 238 +/- 13 (stat)+/- 29(syst) pband a ratio of top quark and top antiquark production of Rt-ch.= 1.81 +/- 0.18 (stat)+/- 0.15(syst). From the total cross section the absolute value of the CKM matrix element Vtbis calculated to be 1.05 +/- 0.07 (exp)+/- 0.02(theo). All results are in agreement with the standard model predictions.

[P244-2017] "Cryogenic Characterization of FBK RGB-HD SiPMs"

Aalseth, C. E.; Acerbi, F.; Agnes, P.; **Machado, A. A.***; **Segreto, E.***; et al.
DarkSide Collaboration

We report on the cryogenic characterization of Red Green Blue - High Density (RGB-HD) SiPMs developed at Fondazione Bruno Kessler (FBK) as part of the DarkSide program of dark matter searches with liquid argon time projection chambers. A cryogenic setup was used to operate the SiPMs at varying temperatures and a custom data acquisition system and analysis software were used to precisely characterize the primary dark noise, the correlated noise, and the gain of the devices. We demonstrate that FBK RGB-HD SiPMs with low quenching resistance (RGB-HD-LRq) can be operated from 40K to 300K with gains in the range 105 to 106 and noise rates at a level of around 1 Hz/mm(2).

[P245-2017] "Crystal-field effects in Er3+- and Yb3+-doped hexagonal NaYF4 nanoparticles"

Garcia-Flores, A. F.; Matias, J. S.; Garcia, D. J.; **Martinez, E. D.***; Cornaglia, P. S.; **Lesseux, G. G.***; Ribeiro, R. A.; **Urbano, R. R.***; **Rettori, C.***

Since the up-conversion phenomenon in rare-earths (REs) doped NaYF4 is strongly affected by the crystal electric field (CF), determining the CF parameters, wave functions, and scheme of the energy levels of the RE J multiplets could be crucial to improve and tune the up-conversion efficiency. In this work, the temperature and magnetic field dependent magnetization of NaY1-x[Er(Yb)](x)F-4 hexagonal nanoparticles (NPs) is reported.

The data were best fit using the appropriated CF Hamiltonian for the J = 15/2 (J = 7/2) ground state multiplet of Er3+ (Yb3+) ions. The B-2(0), B-4(0), B-6(0), and B-6(6) CF parameters were considered in the Hamiltonian for RE ions located at the hexagonal C-3h point symmetry site of the NaYF4 host lattice. These results allowed us to predict an overall CF splitting of similar to 214 (similar to 356 K) for Er3+ (Yb3+) and the wave functions and their energy levels for the J = 15/2 (J = 7/2) ground state multiplet which are in good agreement with the low temperature electron spin resonance experiments. Besides, our measurements allowed us to calculate all the excited CF J multiplets that yield to a good estimation of the up-conversion light emission linewidth. The nonlinear optical light emission of the studied NaY1-x[Er(Yb)](x) F-4 hexagonal NPs was also compared with the most efficient up-conversion codoped NaY1-x-yErxYbyF4 hexagonal NPs.

[P246-2017] "Design of Porous Metal-Organic Frameworks for Adsorption Driven Thermal Batteries"

Borges, D. D.*; Maurin, G.; Galvao, D. S.*

Thermal batteries based on a reversible adsorption/desorption of a working fluid (water, methanol, ammonia) rather than the conventional vapor compression is a promising alternative to exploit waste thermal energy for heat reallocation. In this context, there is an increasing interest to find novel porous solids able to adsorb a high energy density of working fluid under low relative vapor pressure condition combined with an easy ability of regeneration (desorption) at low temperature, which are the major requirements for adsorption driven heat pumps and chillers. The porous crystalline hybrid materials named Metal-Organic Frameworks (MOF) represent a great source of inspiration for sorption based-applications owing to their tunable chemical and topological features associated with a large variability of pore sizes. Recently, we have designed a new MOF named MIL-160 (MIL stands for Materials of Institut Lavoisier), isostructural to CAU-10, built from the assembly of corner sharing aluminum chains octahedra AlO4(OH)(2) with the 2,5-furandicarboxylic linker substituting the pristine organic linker, 1,4-benzenedicarboxylate. This ligand replacement strategy proved to enhance both the hydrophilicity of the MOF and its amount of water adsorbed at low p/p(0). This designed solid was synthesized and its chemical stability/adsorption performances verified. Here, we have extended this study by incorporating other polar heterocyclic linkers and a comparative computational study of the water adsorption performances of these novel structures has been performed. To that purpose, the cell and geometry optimizations of all hypothetical frameworks were first performed at the density functional theory level and their water adsorption isotherms were further predicted by using force-field based Grand-Canonical Monte Carlo simulations. This study reveals the ease tunable water affinity of MOF for the desired application.

[P247-2017] "Drug abusers have impaired cerebral oxygenation and cognition during exercise"

Da Costa, K. G.; Rachetti, V. S.; Da Silva, W. Q. A.; Cabral, D. A. R.; Machado, D. G. D.; Costa, E. C.; **Forti, R. M.***; **Mesquita, R. C.***; Elsangedy, H. M.; Okano, A. H.; Fontes, E. B.

Background: Individuals with Substance Use Disorder (SUD) have lower baseline metabolic activity of the prefrontal cortex (PFC) associated with impairment of cognitive functions in decisionmaking and inhibitory control.

Aerobic exercise has shown to improve PFC function and cognitive performance, however, its effects on SUD individuals remain unclear. Purpose: To verify the cognitive performance and oxygenation of the PFC during an incremental exercise in SUD individuals. Methods: Fourteen individuals under SUD treatment performed a maximum graded exercise test on a cycle ergometer with continuous measurements of oxygen consumption, PFC oxygenation, and inhibitory control (Stroop test) every two minutes of exercise at different intensities. Fifteen non-SUD individuals performed the same protocol and were used as control group. Results: Exercise increased oxyhemoglobin (O(2)Hb) and total hemoglobin (tHb) by 9% and 7%, respectively. However, when compared to a non-SUD group, this increase was lower at high intensities ($p < 0.001$), and the inhibitory cognitive control was lower at rest and during exercise ($p < 0.007$). In addition, PFC hemodynamics during exercise was inversely correlated with inhibitory cognitive performance (reaction time) ($r = -0.62$, $p = 0.001$), and a lower craving perception for the specific abused substance ($p = 0.0189$) was reported immediately after exercise. Conclusion: Despite SUD individuals having their PFC cerebral oxygenation increased during exercise, they presented lower cognition and oxygenation when compared to controls, especially at elevated intensities. These results may reinforce the role of exercise as an adjuvant treatment to improve PFC function and cognitive control in individuals with SUD.

[P248-2017] "EEG sensorimotor rhythms' variation and functional connectivity measures during motor imagery: linear relations and classification approaches"

Stefano, C. A.*; Attux, R.; Castellano, G.*

Hands motor imagery (MI) has been reported to alter synchronization patterns amongst neurons, yielding variations in the mu and beta bands' power spectral density (PSD) of the electroencephalography (EEG) signal. These alterations have been used in the field of brain-computer interfaces (BCI); in an attempt to assign distinct MI tasks to commands of such a system. Recent studies have highlighted that inforniation may be missing if knowledge about brain functional connectivity is not considered. In this work, we modeled the brain as a graph in which each EEG electrode represents a node. Our goal was to understand if there exists any I near correlation between variations in the synchronization patterns that is, variations in the PSD of mu and beta bands induced by MI and alterations in the corresponding functional networks. Moreover, we (I) explored the feasibility of using functional connectivity parameters as features fora classifier in the context of an MI-BCI; (2) investigated three different types of feature selection (FS) techniques; and (3) compared our approach to a more traditional method using the signal PSD as classifier inputs. Ten healthy subjects participated in this study. We observed significant correlations ($p < 0.05$) with values ranging from 0.4 to 0.9 between PSD variations and functional network alterations for some electrodes, prominently in the beta band. The PSD method performed better for data classification, with mean accuracies of $(90 +/- 8)\%$ and $(87 +/- 7)\%$ for the mu and beta band, respectively, versus $(83 +/- 8)\%$ and $(83 +/- 7)\%$ for the same bands for the graph method. Moreover, the number of features for the graph method was considerably larger. However, results for both methods were relatively close, and even overlapped when the uncertainties of the accuracy rates were considered. Further investigation regarding a careful exploration of other graph metrics may provide better alternatives.

[P249-2017] "Electron spin resonance of Gd3+ in the intermetallic Gd1-xYxNi3Ga9 (0 <= x <= 0.90) compounds"

Mendonca, E. C.; Silva, L. S.; Mercena, S. G.; Meneses, C. T.; Jesus, C. B. R.*; Duque, J. G. S.*; Souza, J. C.*; Pagliuso, P. G.*; Lora-Serrano, R.; Teixeira-Neto, A. A.

In this work, experiments of X-ray diffraction, magnetic susceptibility, heat capacitance, and Electron Spin Resonance (ESR) carried out in the Gd1-xYxNi3Ga9 (0 <= x <= 0.90) compounds grown through a Ga self flux method are reported. The X-ray diffraction data indicate that these compounds crystallize in a trigonal crystal structure with a space group R32. This crystal structure is unaffected by Y-substitution, which produces a monotonic decrease of the lattice parameters. For the $x = 0$ compound, an antiferromagnetic phase transition is observed at T-N = 19.2 K, which is continuously suppressed as a function of the Y-doping and extrapolates to zero at x approximate to 0.85. The ESR data, taken in the temperature range 15 <= T <= 300 K, show a single Dysonian Gd3+ line with nearly temperature independent g-values. The linewidth follows a Korringa-like behavior as a function of temperature for all samples. The Korringa rates (b = Delta H/Delta T) are Y-concentration-dependent indicating a "bottleneck" regime. For the most diluted sample ($x = 0.90$), when it is believed that the "bottleneck" effect is minimized, we have calculated the q-dependent effective exchange interactions between Gd3+ local moments and the c-e of $< h(f\text{-}ce)(2)(q)>(1/2) = 18(2)$ meV and $J(f\text{-}ce)(q = 0) = 90(10)$ meV. Published by AIP Publishing.

[P250-2017] "Enhanced energy transfer efficiency in a four--electrodes configuration DBD plasma jet"

do Nascimento, F.; Machida, M.*; Kostov, K.; Moshkalev, S.; Honda, R. Y.; Mota, R. P.; Nishime, T. M. C.; Castro, A. H. R.

In this work a dielectric barrier discharge (DBD) plasma jet that uses a multiple electrodes configuration is investigated. The results show that both plasma power and its rotational and vibrational temperatures tend to increase with the number of powered electrodes in the DBD device. The emission intensities of the excited species in the plasma, and consequently their number density, also grow as a function of the number of powered electrodes. Based on these facts and since the electric power provided by the power supply was kept constant, there is an indication that the use of multiple electrodes improves the energy efficiency of the device.

[P251-2017] "Graphene-Titanium Interfaces from Molecular Dynamics Simulations"

Fonseca, A. F.*; Liang, T.; Zhang, D. F.; Choudhary, K.; Phillpot, S. R.; Sinnott, S. B.

Unraveling the physical and chemical properties of graphene-metal contacts is a key step toward the development of graphitic electronic nanodevices. Although many studies have revealed the way that various metals interact with graphene, few have described the structure and behavior of large pieces of graphene-metal nanostructures under different conditions. Here, we present the first classical molecular dynamics study of graphene titanium (G-Ti) structures, with and without substrates. Physical and chemical properties of equilibrium structures of G-Ti interfaces with different amounts of titanium coverage are investigated.

Adhesion of Ti films on graphene is shown to be enhanced by the vacancies in graphene or the electrostatic influence of substrates. The dynamics of pristine G-Ti structures at different temperatures on planar and nonplanar substrates are investigated, and the results show that G-Ti interfaces are thermally stable, that is, not prone to any reaction toward the formation of titanium carbide.

[P252-2017] "How does methylation suppress the electron--induced decomposition of 1-methyl-nitroimidazoles?"

Kossoski, F.*; Varella, M. T. N.

The efficient decomposition of nitroimidazoles (NIs) by low energy electrons is believed to underlie their radiosensitizing properties. Recent dissociative electron attachment (DEA) measurements showed that methylation at the N1 site unexpectedly suppresses the electron-induced reactions in 4(5)-NI. We report theoretical results that provide a clear interpretation of that astounding finding. Around 1.5 eV, DEA reactions into several fragments are initiated by a pi* resonance, not considered in previous studies. The autoionization lifetime of this anion state, which limits the predissociation dynamics, is considerably shorter in the methylated species, thereby suppressing the DEA signals. On the other hand, the lifetime of the pi* resonance located around 3 eV is less affected by methylation, which explains why DEA is still observed at these energies. Our results demonstrate how even a simple methylation can significantly modify the probabilities for DEA reactions, which may be significant for NI-based cancer therapy.

[P253-2017] "Hydrogenation Dynamics of Biphenylene Carbon (Graphenylene) Membranes"

Splugues, V.*; Autreto, P. A. D.*; Galvao, D. S.*

The advent of graphene created a revolution in materials science. Because of this there is a renewed interest in other carbon-based structures. Graphene is the ultimate (just one atom thick) membrane. It has been proposed that graphene can work as impermeable membrane to standard gases, such argon and helium. Graphene-like porous membranes, but presenting larger porosity and potential selectivity would have many technological applications. Biphenylene carbon (BPC), sometimes called graphenylene, is one of these structures. BPC is a porous twodimensional (planar) allotrope carbon, with its pores resembling typical sieve cavities and/or some kind of zeolites. In this work, we have investigated the hydrogenation dynamics of BPC membranes under different conditions (hydrogenation plasma density, temperature, etc.). We have carried out an extensive study through fully atomistic molecular dynamics (MD) simulations using the reactive force field ReaxFF, as implemented in the well-known Large-scale Atomic/Molecular Massively Parallel Simulator (LAMMPS) code. Our results show that the BPC hydrogenation processes exhibit very complex patterns and the formation of correlated domains (hydrogenated islands) observed in the case of graphene hydrogenation was also observed here. MD results also show that under hydrogenation BPC structure undergoes a change in its topology, the pores undergoing structural transformations and extensive hydrogenation can produce significant structural damages, with the formation of large defective areas and large structural holes, leading to structural collapse.

[P254-2017] "Ideal relativistic fluid limit for a medium with polarization"

Montenegro, D.*; Tinti, L.; Torrieri, G.*

We use Lagrangian effective field theory techniques to construct the equations of motion for an ideal relativistic fluid of which the constituent degrees of freedom have microscopic polarization. We discuss the meaning of such a system and argue that it is the first term in the Effective Field Theory (EFT) appropriate for describing polarization observables in heavy ion collisions, such as final-state particle polarization and chiral magnetic and vortaic effects. We show that this system will generally require nondissipative dynamics at higher order in the gradient than second order, leading to potential stability issues known with such systems. We comment on the significance of this in the light of conjectured lower limits on viscosity.

[P255-2017] "Idiopathic atrophoderma of Pasini and Pierini: A case study of collagen and elastin texture by multiphoton microscopy"

Vieira-Damiani, G.; Lage, D.; Daldon, P. E. C.; Alves, C. R. T.; Cintra, M. L.; Metze, K.; Adur, J.*; Pelegati, V. B.*; Carvalho, H. F.*; Cesar, C. L.*

Background: The diagnosis of idiopathic atrophoderma of Pasini and Pierini (IAPP) relies on typical clinical features, particularly distinctive pigmented ovular/round depressed plaques. Histologic examination often reveals no obvious changes, but patterns of collagen distribution, using multiphoton imaging and second harmonic generation can help track hidden details of tissue organization contributing to atrophy. Objective: To identify histologic features that distinguish IAPP from unaffected skin. Methods: Eleven patients were included for conventional analyses. Masson trichromee and Unna-Tanzer orcein-stained sections were evaluated using automated morphometry. Hematoxylin-eosinestained sections were analyzed by multiphoton imaging using 2-photon excited fluorescence and second harmonic generation. Results: No abnormalities were found under light microscopy or by automated quantification. Multiphoton imaging revealed no difference in optical density of either collagen or elastic fibers in lesioned and unaffected skin; however, horizontal collagen fiber organization in lesion specimens increased toward the lower dermis, whereas elastic fibers featured greater disorganization within the upper dermis. Limitations: The low number of patients evaluated. Conclusion: The atrophic appearance of IAPP lesions reflects changes in organization, but not in collagen and elastic tissue content. Minute organizational differences that are imperceptible to the experienced pathologist and undetectable by automated analyses were revealed by multiphoton analyses, particularly second harmonic generation, in association with texture analyses.

[P256-2017] "Induced spin-triplet pairing in the coexistence state of antiferromagnetism and singlet superconductivity: Collective modes and microscopic properties"

Almeida, D. E.*; Fernandes, R. M.; Miranda, E.*

The close interplay between superconductivity and antiferromagnetism in several quantum materials can lead to the appearance of an unusual thermodynamic state in which both orders coexist microscopically, despite their competing nature. A hallmark of this coexistence state is the emergence of a spin--triplet superconducting gap component, called a pi triplet,

which is spatially modulated by the antiferromagnetic wave vector, reminiscent of a pair density wave. In this paper, we investigate the impact of these p-triplet degrees of freedom on the phase diagram of a system with competing antiferromagnetic and superconducting orders. Although we focus on a microscopic two-band model that has been widely employed in studies of iron pnictides, most of our results follow from a Ginzburg-Landau analysis, and as such should be applicable to other systems of interest, such as cuprates and heavy fermion materials. The Ginzburg-Landau functional reveals not only that the p-triplet gap amplitude couples trilinearly with the singlet gap amplitude and the staggered magnetization magnitude but also that the p-triplet d-vector couples linearly with the magnetization direction. While in the mean-field level this coupling forces the d-vector to align parallel or antiparallel to the magnetization, in the fluctuation regime it promotes two additional collective modes-a Goldstone mode related to the precession of the d-vector around the magnetization and a massive mode, related to the relative angle between the two vectors, which is nearly degenerate with a Leggett-like mode associated with the phase difference between the singlet and triplet gaps. We also investigate the impact of magnetic fluctuations on the superconducting-antiferromagnetic phase diagram, showing that due to their coupling with the pi-triplet order parameter the coexistence region is enhanced. This effect stems from the fact that the pi-triplet degrees of freedom promote an effective attraction between the antiferromagnetic and singlet superconducting degrees of freedom, highlighting the complex interplay between these two orders, which goes beyond mere competition for the same electronic states.

[P257-2017] "Influence of hydrogen etching on the adhesion of coated ferrous alloy by hydrogenated amorphous carbon deposited at low temperature"

Crespi, A. E.; Leidens, L. M.; Aguzzoli, C.; **Alvarez, F.***; Figueroa, C. A.

Carbonaceous thin films show poor adhesion when deposited on steels. Chromium, titanium, and silicon containing interlayers are generally used in order to prompt adhesion. This work shows a systematic study of the hydrogen effect on the physical-chemical properties of a-SiCx:H interlayers deposited by using hexamethyldisiloxane on AISI 4140 at low temperatures (85 degrees C-180 degrees C). In particular, the effect of the treatment on the adhesion of a-C:H thin films is reported. The results show that hydrogen radically modifies the tribological behavior inducing the adhesion of a-C:H thin films at temperatures as low as 85 degrees C. The adhesion's improvement is associated with the hydrogen chemical etching that seems to remove more silicon than carbon atoms from the outermost face of the a-SiCx:H interlayer promoting the formation of stronger carbon-carbon bonds. The results are also discussed showing the efficiency obtained by the use of the electrostatic confinement deposition technique.

[P258-2017] "InP Nanowire Biosensor with Tailored Biofunctionalization: Ultrasensitive and Highly Selective Disease Biomarker Detection"

Janissen, R.*; Sahoo, P. K.*; Santos, C. A.; **da Silva, A. M.***; **von Zuben, A. A. G.***; Souto, D. E. P.; Costa, A. D. T.; Celedon, P.; Zanchin, N. I. T.; **Almeida, D. B.***; **Oliveira, D. S.***; Kubota, L. T.; **Cesar, C. L.***; de Souza, A. P.; **Cotta, M. A.***

Electrically active field-effect transistors (FET) based biosensors are of paramount importance in life science applications, as they offer direct, fast, and highly sensitive label-free detection capabilities of several biomolecules of specific interest. In this work, we report a detailed investigation on surface functionalization and covalent immobilization of biomarkers using biocompatible ethanolamine and poly(ethylene glycol) derivate coatings, as compared to the conventional approaches using silica monoliths, in order to substantially increase both the sensitivity and molecular selectivity of nanowire-based FET biosensor platforms. Quantitative fluorescence, atomic and Kelvin probe force microscopy allowed detailed investigation of the homogeneity and density of immobilized biomarkers on different biofunctionalized surfaces. Significantly enhanced binding specificity, biomarker density, and target biomolecule capture efficiency were thus achieved for DNA as well as for proteins from pathogens. This optimized functionalization methodology was applied to InP nanowires that due to their low surface recombination rates were used as new active transducers for biosensors. The developed devices provide ultrahigh label-free detection sensitivities similar to 1 fM for specific DNA sequences, measured via the net change in device electrical resistance. Similar levels of ultrasensitive detection of similar to 6 fM were achieved for a Chagas Disease protein marker (IBMP8-1). The developed InP nanowire biosensor provides thus a qualified tool for detection of the chronic infection stage of this disease, leading to improved diagnosis and control of spread. These methodological developments are expected to substantially enhance the chemical robustness, diagnostic reliability, detection sensitivity, and biomarker selectivity for current and future biosensing devices.

[P259-2017] "Ionization potential and electron attenuation length of titanium dioxide deposited by atomic layer deposition determined by photoelectron spectroscopy in air"

Marques, F. C.*; Jasieniak, J. J.

Photoelectron emission spectroscopy in air (PESA) has been used to investigate titanium dioxide (TiO2) deposited by atomic layer deposition (ALD). A procedure has been developed to unambiguously determine the photoemission threshold energy (also referred to as the "ionization potential") of TiO2 thin films, avoiding inherent artifacts due to photoelectron emission from the substrate, which supplies misleading results. This has been achieved using PESA measurements performed as a function of TiO2 film thickness on two substrates with different work functions. We find that proper measurements of the photoemission threshold energy (including work function and ionization potential) of thin films by PESA require the use of films much thicker than their electron attenuation length (EAL). A photoemission threshold energy of 5.0 +/- 0.2 eV is obtained for TiO2 and has been attributed to a trap level due to oxygen vacancies, which lie within the band gap of the TiO2. The analysis of the photoemission decay with film thickness also provides a method for determining a "practical" (or effective) EAL at excitation energy slightly above the photoemission threshold energy of the material. We extract an EAL for the deposited TiO2 of 0.65 +/- 0.02 nm (at 0.5 eV). The procedure can also be adopted for determining the thickness of extremely thin films, provided their thickness is smaller than their EAL.

[P260-2017] "Lightweight Hexagonal Boron Nitride Foam for CO2 Absorption"

Owuor, P. S.; Park, O. K.; **Woellner, C. F.***; Jalilov, A. S.; Susarla, S.; Joyner, J.; Ozden, S.; Duy, L.; Salvatierra, R. V.; Vajtai, R.; Tour, J. M.; Lou, J.; **Galvao, D. S.***; Tiwary, C. S.; Ajayan, P. M.

Weak van der Waals forces between inert hexagonal boron nitride (h-BN) nanosheets make it easy for them to slide over each other, resulting in an unstable structure in macroscopic dimensions. Creating interconnections between these inert nanosheets can remarkably enhance their mechanical properties. However, controlled design of such interconnections remains a fundamental problem for many applications of h-BN foams. In this work, a scalable in situ freeze-drying synthesis of low-density, lightweight 3D macroscopic structures made of h-BN nanosheets chemically connected by poly(vinyl alcohol) (PVA) molecules via chemical cross-link is demonstrated. Unlike pristine h-BN foam which disintegrates upon handling after freeze-drying, h-BN/PVA foams exhibit stable mechanical integrity in addition to high porosity and large surface area. Fully atomistic simulations are used to understand the interactions between h-BN nanosheets and PVA molecules. In addition, the h-BN/PVA foam is investigated as a possible CO_2 absorption and as laser irradiation protection material.

[P261-2017] "Linear and non-linear flow mode in Pb-Pb collisions at root sNN=2.76 TeV"

Acharya, S.; Adamova, D.; Adolfsson, J.; **Albuquerque, D. S. D.***; **Chinellato, D. D.***; **De Souza, R. D.***; **Takahashi, J.***; et al. ALICE Collaboration

The second and the third order anisotropic flow, V-2 and V-3, are mostly determined by the corresponding initial spatial anisotropy coefficients, epsilon(2) and epsilon(3), in the initial density distribution. In addition to their dependence on the same order initial anisotropy coefficient, higher order anisotropic flow, Vn(n > 3), can also have a significant contribution from lower order initial anisotropy coefficients, which leads to mode-coupling effects. In this Letter we investigate the linear and non-linear modes in higher order anisotropic flow V-n for n = 4, 5, 6 with the ALICE detector at the Large Hadron Collider. The measurements are done for particles in the pseudorapidity range |eta| < 0.8 and the transverse momentum range 0.2 < p(T)< 5.0 GeV/c as a function of collision centrality. The results are compared with theoretical calculations and provide important constraints on the initial conditions, including initial spatial geometry and its fluctuations, as well as the ratio of the shear viscosity to entropy density of the produced system.

[P262-2017] "Low sat-structured fats enriched in alpha-linolenic acid: physicochemical properties and crystallization characteristics"

Stahl, M. A.; Buscato, M. H. M.; Grimaldi, R.; **Cardoso, L. P.***; Ribeiro, A. P. B.

This work sought to obtain and evaluate zero trans-fat reduced in saturated fatty acids, with higher content of unsaturated fatty acids. Palm oil (PO) was used as the reference of zero trans lipid base. Different amounts of linseed oil (LO) were added to PO, obtaining the following blends: 100:0; 80:20; 60:40; 40:60; 20:80 and 0:100 of PO:LO (w/w%), respectively. These blends were added to fully hydrogenated soybean oil (FHSO) as the crystallization modifying agent, and to sorbitan monostearate (SMS) as the structuring element, both at a proportion of 3% to build the structured fractions. The control and the structured blends were evaluated for fatty acid composition, solid fat content, consistency, crystallization kinetics, thermal behavior, microstructure and polymorphism.

With the addition of LO to the PO, an increase of up to 80% was observed in the content of alpha-linolenic acid and a reduction of saturated fatty acids to 47% in the blends. FHSO and SMS offered thermal resistance to the blends, with relevant changes in the crystallization kinetics and microstructure, affecting macroscopic characteristics with the increase in consistence. It was possible to obtain a lipid formulation with features of plasticity and enhanced nutritional quality, compatible with several food applications.

[P263-2017] "Magnetic composite films based on alginate and nano-iron oxide particles obtained by synthesis "in situ""

Kloster, G. A.; **Muraca, D.***; Mosiewicki, M. A.; Marcovich, N. E.

In this work, sodium alginate was used as the polymeric matrix of magnetic nanocomposite films where iron oxide particles, in percentages varying from 2 to 10 wt.% (respect to alginate content), were synthesized "in situ". The effects of the nanoparticle concentration and the addition of 30 wt% of glycerol as plasticizer on the properties of the composite films were analyzed by X-ray diffraction, scanning electron microscopy, infrared spectroscopy, tensile tests, zero field cooling/field cooling measurements and isothermal magnetization as function of applied fields at different temperatures. The presence of residual salts formed during the synthesis process, the film microstructure and the interactions developed between magnetic particles and between particles and matrix were the most important factors that affected the film properties. All the synthesized composite films showed super paramagnetic behavior, while the recorded blocking and irreversibility temperatures were lower for the plasticized ones, indicating that the size of the magnetic particles/particle agglomerates formed in these samples was smaller and the particle dispersion in the polymeric matrix better than those obtained in films prepared without glycerol.

[P264-2017] "Magnetic phase diagram of the organic antiferromagnet F4BImNN"

Adriano, C.*; Freitas, R. S.; Paduan-Filho, A.; **Pagliuso, P. G.***; Oliveira, N. F.; Lahti, P. M.

We present a combination of heat capacity and ac susceptibility measurements as a function of temperature and field, of a single crystal of the radical 2-(4,5,6,7-tetrafluorobenzimidazol-2-yl)-4,4,5,5-tetramethy1-4,5-dihydro-1H--imidazole-3-oxide-1-oxyl. Our results confirm a zero-field Neel temperature at T-N(0) = 0.73 K and allow the determination of the critical field parameters H-c(ll) = 170 Oe and H-c (perpendicular to) = 306 Oe. Assuming the previously determined 1-D intrachain ferromagnetic exchange interaction of J(intra)/k = +22 K between radicals, the interchain antiferromagnetic interaction is calculated as ZJ(inter)/k similar to -0.03 K. (c) 2017 Elsevier Ltd. All rights reserved.

[P265-2017] "Magnetic properties of Mn3-xFexSn compounds with tuneable Curie temperature by Fe content for thermomagnetic motors"

Felez, M. R.; **Coelho, A. A.***; Gama, S.

Mn3-xFexSn system (0.00 <= x <= 3.00 with Delta x = 0.25) alloys present the Curie temperature (T-C) or transition temperature (T-T) tuneable by the Fe content. A piece-wise linear profile for T-C,T-T as a function of x is observed in a two wide temperature ranges, between 155 K up to 759 K and 259 K up to 155 K. Their equations are T-C,T-T = (59 +/- 15) + (240 +/- 7) . x and T-C,T-T = (257 +/- 1) - (206 +/- 4) . x, respectively. The alloys are low cost and easy manufacturing, rare earth free, with second order magnetic transition (SOMT), and have good magnetic properties. These features suggest an immediate application of the material in cascade thermomagnetic motors that operate with a large temperature range between hot and cold sources. Furthermore, SOMT Mn-Fe-Sn system materials are also reported with advantages that could make alloys of the Mn3-xFexSn system, (0.88 < x < 1.20), promising candidate for magnetic refrigeration. The typical ferromagnetic behaviour is achieved only by samples with x >= 1. The samples with x between 0.00 and 0.75 do not show the saturation magnetization even using fields up to 13 T.

[P266-2017] "Measurement of deuteron spectra and elliptic flow in Pb-Pb collisions at root s(NN)=2.76 TeV at the LHC"

Acharya, S.; Adamova, D.; Adolfsson, J.; **Albuquerque, D. S. D.*; Chinellato, D. D.*; De Souza, R. D.*; Takahashi, J.***
ALICE Collaboration

The transverse momentum ($p(T)$) spectra and elliptic flow coefficient ($v(2)$) of deuterons and anti-deuterons at mid-rapidity ($|y| < 0.5$) are measured with the ALICE detector at the LHC in Pb-Pb collisions at root s(NN) = 2.76 TeV. The measurement of the $p(T)$ spectra of (anti-)deuterons is done up to 8 GeV/c in 0-10% centrality class and up to 6 GeV/c in 10-20% and 20-40% centrality classes. The $v(2)$ is measured in the $0.8 < p(T) < 5$ GeV/c interval and in six different centrality intervals (0-5, 5-10, 10-20, 20-30, 30-40 and 40-50%) using the scalar product technique. Measured pi(+/-), K-+/- and p+(p) over bar transverse-momentum spectra and $v(2)$ are used to predict the deuteron $p(T)$ spectra and $v(2)$ within the Blast-Wave model. The predictions are able to reproduce the $v(2)$ coefficient in the measured $p(T)$ range and the transverse-momentum spectra for $p(T) > 1.8$ GeV/c within the experimental uncertainties. The measurement of the coalescence parameter B-2 is performed, showing a $p(T)$ dependence in contrast with the simplest coalescence model, which fails to reproduce also the measured $v(2)$ coefficient. In addition, the coalescence parameter B-2 and the elliptic flow coefficient in the 20-40% centrality interval are compared with the AMPT model which is able, in its version without string melting, to reproduce the measured $v(2)(p(T))$ and the B-2($p(T)$) trend.

[P267-2017] "Measurement of the differential cross sections for the associated production of a W boson and jets in proton-proton collisions at root s=13 TeV"

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

A measurement of the differential cross sections for a W boson produced in association with jets in the muon decay channel is presented. The measurement is based on 13 TeV proton-proton collision data corresponding to an integrated luminosity of 2.2 fb(-1), recorded by the CMS detector at the LHC. The cross sections are reported as functions of jet multiplicity, jet transverse momentum pT, jet rapidity, the scalar pT sum of the jets, and angular correlations between the muon and each jet for different jet multiplicities. The measured cross sections are in agreement with predictions that include multi-leg leading-order (LO) and next-to-LO matrix element calculations interfaced with parton showers, as well as a next-to-next-to-LO calculation for the W boson and one jet production.

[P268-2017] "Measurement of the semileptonic t(t)over-bar + gamma production cross section in pp collisions at root s=8 TeV"

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

A measurement of the cross section for top quark-antiquark (t (t) over bar) pairs produced in association with a photon in proton-proton collisions at root s = 8TeV is presented. The analysis uses data collected with the CMS detector at the LHC, corresponding to an integrated luminosity of 19.7 fb(1). The signal is de fined as the production of a t (t) over bar pair in association with a photon having a transverse energy larger than 25 GeV and an absolute pseudorapidity smaller than 1.44. The measurement is performed in the fiducial phase space corresponding to the semileptonic decay chain of the t (t) over bar pair, and the cross section is measured relative to the inclusive t (t) over bar pair production cross section. The fiducial cross section for associated t (t) over bar pair and photon production is found to be 127 +/- 27 (stat + syst) fb per semileptonic final state. The measured value is in agreement with the theoretical prediction.

[P269-2017] "Measurement of the t(t)over-bar production cross section using events with one lepton and at least one jet in pp collisions at root s=13 TeV"

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

A measurement of the t (t) over bar production cross section at root s = 13 TeV is presented using proton-proton collisions, corresponding to an integrated luminosity of 2.2 fb(-1), collected with the CMS detector at the LHC. Final states with one isolated charged lepton (electron or muon) and at least one jet are selected and categorized according to the accompanying jet multiplicity. From a likelihood fit to the invariant mass distribution of the isolated lepton and a jet identified as coming from the hadronization of a bottom quark, the cross section is measured to be sigma(tt) = 888 +/- 2; (stat) (+26)(-28) (syst) +/- 20 (lumi) pb, in agreement with the standard model prediction. Using the expected dependence of the cross section on the pole mass of the top quark (m(t)), the value of m(t) is found to be 170:6 +/- 2:7 GeV.

[P270-2017] "Measurement of the triple-differential dijet cross section in proton-proton collisions at root s=8 TeV and constraints on parton distribution functions"

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

A measurement is presented of the triple-differential dijet cross section at a centre-of-mass energy of 8 TeV using 19.7 fb(-1) of data collected with the CMS detector in proton--proton collisions at the LHC. The cross section is measured as a function of the average transverse momentum, half the rapidity separation, and the boost of the two leading jets in the event. The cross section is corrected for detector effects and compared to calculations in perturbative quantum chromodynamics at next-to-leading order accuracy, complemented with electroweak and nonperturbative corrections. New constraints on parton distribution functions are obtained and the inferred value of the strong coupling constant is alpha(S)(M-Z) = 0.1199 +/- 0.0015 (exp)(-0.0020)(+0.0031) (theo), where M-Z is the mass of the Z boson.

[P271-2017] "Measurements of jet charge with dijet events in pp collisions at root s=8 TeV"

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

Jet charge is an estimator of the electric charge of a quark, antiquark, or gluon initiating a jet. It is based on the momentum--weighted sum of the electric charges of the jet constituents. Measurements of three charge observables of the leading jet in transverse momentum pT are performed with dijet events. The analysis is carried out with data collected by the CMS experiment at the CERN LHC in proton-proton collisions at root s = 8 TeV corresponding to an integrated luminosity of 19.7 fb(-1). The results are presented as a function of the pT of the leading jet and compared to predictions from leading and next--to-leading-order event generators combined with parton showers. Measured jet charge distributions, unfolded for detector effects, are reported, which expand on previous measurements of the jet charge average and standard deviation in pp collisions.

[P272-2017] "Measurements of properties of the Higgs boson decaying into the four-lepton final state in pp collisions at root s=13 TeV"

Sirunyan, A. M.; Tumasyan, A.; Adam, W.; **Chinellato, J.***; **Tonelli Manganote, E. J.***; et al.

Properties of the Higgs boson are measured in the H -> ZZ -> 4l (l = e, mu) decay channel. A data sample of proton-proton collisions at root s = 13 TeV, collected with the CMS detector at the LHC and corresponding to an integrated luminosity of 35.9 fb(-1) is used. The signal strength modifier mu, defined as the ratio of the observed Higgs boson rate in the H -> ZZ -> 4l decay channel to the standard model expectation, is measured to be mu = 1.05(-0.17)(+0.19) at m(H) = 125.09 GeV, the combined ATLAS and CMS measurement of the Higgs boson mass. The signal strength modifiers for the individual Higgs boson production modes are also measured. The cross section in the fiducial phase space defined by the requirements on lepton kinematics and event topology is measured to be 2.92(-0.44)(+0.48)(stat) (+0.28)(-0.24)(syst) fb, which is compatible with the standard model prediction of 2.76 +/- 0.14 fb. Differential cross sections are reported as a function of the transverse momentum of the Higgs boson, the number of associated jets, and the transverse momentum of the leading associated jet.

The Higgs boson mass is measured to be m(H) = 125.26 +/- 0.21 GeV and the width is constrained using the on-shell invariant mass distribution to be Gamma(H) < 1.10 GeV, at 95% confidence level.

[P273-2017] "Measurements of the associated production of a Z boson and b jets in pp collisions at root s=8 TeV"

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

Measurements of the associated production of a Z boson with at least one jet originating from a b quark in proton-proton collisions at root s = 8 TeV are presented. Differential cross sections are measured with data collected by the CMS experiment corresponding to an integrated luminosity of 19.8 fb(-1). Z bosons are reconstructed through their decays to electrons and muons. Cross sections are measured as a function of observables characterizing the kinematics of the b jet and the Z boson. Ratios of differential cross sections for the associated production with at least one b jet to the associated production with any jet are also presented. The production of a Z boson with at least two b jets is investigated, and differential cross sections are measured for the dijet system. Results are compared to theoretical predictions, testing two different flavour schemes for the choice of initial-state partons.

[P274-2017] "Measurements of the charm jet cross section and nuclear modification factor in pPb collisions at root sNN=5.02TeV"

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

The CMS Collaboration presents the first measurement of the differential cross section of jets from charm quarks produced in proton-lead (pPb) collisions at a nucleon-nucleon center-of-mass energy of root sNN= 5.02 TeV, as well as results from charm quark jets in proton-proton (pp) collisions at root s=2.76and 5.02TeV. By comparing the yields of the pPb and pp collision systems at the same energy, a nuclear modification factor for charm jets from 55 to 400GeV/cin pPb collisions at root sNN=5.02 TeV of R-pA= 0.92 +/- 0.07 (stat) +/- 0.11(syst) is obtained. This is consistent with an absence of final-state energy loss for charm quarks in pPb collisions. In addition, the fraction of jets coming from charm quarks is found to be consistent with that predicted by PYTHIA 6 for pp collisions at root s=2.76 and 5.02TeV, and is independent of the jet transverse momentum from 55 to 400 GeV/c.

[P275-2017] "Measurements of the pp -> W gamma gamma and pp -> Z gamma gamma cross sections and limits on anomalous quartic gauge couplings at root s=8 TeV"

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

Measurements are presented of W gamma gamma and Z gamma gamma production in proton-proton collisions.

Fiducial cross sections are reported based on a data sample corresponding to an integrated luminosity of 19.4 fb(-1) collected with the CMS detector at a center-of-mass energy of 8 TeV. Signal is identified through the W -> lv and Z -> ll decay modes, where l is a muon or an electron. The production of W gamma gamma and Z gamma gamma, measured with significances of 2.6 and 5.9 standard deviations, respectively, is consistent with standard model predictions. In addition, limits on anomalous quartic gauge couplings in W gamma gamma production are determined in the context of a dimension-8 effective field theory.

[P276-2017] "Mechanical and Thermal Stability of Graphyne and Graphdiyne Nanoscrolls"

Solis, D.*; Woellner, C.*; Borges, D. D.*; Galvao, D. S.*

Graphynes and graphdiynes are carbon 2D allotrope structures presenting both sp(2) and sp hybridized atoms. These materials have been theoretically predicted but due to intrinsic difficulties in their synthesis, only recently some of these structures have been experimentally realized. Graphyne nanoscrolls are structures obtained by rolling up graphyne sheets into papyrus--like structures. In this work, we have investigated, through fully atomistic reactive molecular dynamics simulations, the dynamics of nanoscroll formation for a series of graphyne (alpha, beta, and delta types) structures. We have also investigated their thermal stability for a temperature range of 200-1000K. Our results show that stable nanoscrolls can be formed for all structures considered here. Their stability depends on a critical value of the ratio between length and height of the graphyne sheets. Our findings also show that these structures are structurally less stable then graphene-based nanoscrolls. This can be explained by the graphyne higher structural porosity which results in a decreased pi-pi stacking interactions.

[P277-2017] "Microscopic reversal magnetization mechanisms in CoCrPt thin films with perpendicular magnetic anisotropy: Fractal structure versus labyrinth stripe domains"

Navas, D.; Soriano, N.; Beron, F.*; Sousa, C. T.; Pirota, K. R.*; Torrejon, J.*; Redondo, C.; Morales, R.; Ross, C. A.

The magnetization reversal of CoCrPt thin films has been examined as a function of thickness using magneto-optical Kerr effect (MOKE) microscopy and first-order reversal curves (FORC) techniques. MOKE images show differentiated magnetization reversal regimes for different film thicknesses: while the magnetic domains in 10-nm-thick CoCrPt film resemble a fractal structure, a labyrinth stripe domain configuration is observed for 20-nm-thick films. Although FORC distributions for both cases show two main features related to irreversible processes (propagation and annihilation fields) separated by a mostly flat region, this method can nonetheless distinguish which magnetization reversal process is active according to the horizontal profile of the first FORC peak, or propagation field. A single-peak FORC profile corresponds to the fractal magnetization reversal, whereas a flat-peak FORC profile corresponds to the labyrinth magnetization reversal.

[P278-2017] "Multi-messenger Observations of a Binary Neutron Star Merger"

Abbott, B. P.; Abbott, R.; Abbott, T. D.; Sobreira, F.*; et al.

On 2017 August 17 a binary neutron star coalescence candidate (later designated GW170817) with merger time 12:41:04 UTC was observed through gravitational waves by the Advanced LIGO and Advanced Virgo detectors. The Fermi Gamma--ray Burst Monitor independently detected a gamma-ray burst (GRB 170817A) with a time delay of similar to 1.7 s with respect to the merger time. From the gravitational-wave signal, the source was initially localized to a sky region of 31 deg(2) at a luminosity distance of 40(-8)(+8) Mpc and with component masses consistent with neutron stars. The component masses were later measured to be in the range 0.86 to 2.26 M-circle dot. An extensive observing campaign was launched across the electromagnetic spectrum leading to the discovery of a bright optical transient (SSS17a, now with the IAU identification of AT 2017gfo) in NGC 4993 (at similar to 40 Mpc) less than 11 hours after the merger by the One-Meter, Two Hemisphere (1M2H) team using the 1 m Swope Telescope. The optical transient was independently detected by multiple teams within an hour. Subsequent observations targeted the object and its environment. Early ultraviolet observations revealed a blue transient that faded within 48 hours. Optical and infrared observations showed a redward evolution over similar to 10 days. Following early non-detections, X-ray and radio emission were discovered at the transient's position similar to 9 and similar to 16 days, respectively, after the merger. Both the X-ray and radio emission likely arise from a physical process that is distinct from the one that generates the UV/optical/near-infrared emission. No ultra-high-energy gamma-rays and no neutrino candidates consistent with the source were found in follow-up searches. These observations support the hypothesis that GW170817 was produced by the merger of two neutron stars in NGC4993 followed by a short gamma-ray burst (GRB 170817A) and a kilonova/macronova powered by the radioactive decay of r-process nuclei synthesized in the ejecta.

[P279-2017] "Nanodroplets Behavior on Graphdiyne Membranes"

Jaques, Y. M.*; Galvao, D. S.*

In this work we have investigated, by fully atomistic reactive (force field ReaxFF) molecular dynamics simulations, some aspects of impact dynamics of water nanodroplets on graphdiyne-like membranes. We simulated graphdiyne-supported membranes impacted by nanodroplets at different velocities (from 100 up to 1500 m/s). The results show that due to the graphdiyne porous and elastic structure, the droplets present an impact dynamics very complex in relation to the ones observed for graphene membranes. Under impact the droplets spread over the surface with a maximum contact radius proportional to the impact velocity. Depending on the energy impact value, a number of water molecules were able to percolate the nanopore sheets. However, even in these cases the droplet shape is preserved and the main differences between the different impact velocities cases reside on the splashing pattern at the maximum spreading.

[P280-2017] "Natural Type II Collagen Hydrogel, Fibrin Sealant, and Adipose-Derived Stem Cells as a Promising Combination for Articular Cartilage Repair"

Lazarini, M.; Bordeaux-Rego, P.; Giardini-Rosa, R.; Duarte, A. S. S.; Baratti, M. O.; Zorzi, A. R.; de Miranda, J. B.; Cesar, C. L.*; Luzo, A.; Saad, S. T. O.

Objective. Articular cartilage is an avascular tissue with limited ability of self-regeneration and the current clinical treatments have restricted capacity to restore damages induced by trauma or diseases. Therefore, new techniques are being tested for cartilage repair, using scaffolds and/or stem cells. Although type II collagen hydrogel, fibrin sealant, and adipose-derived stem cells (ASCs) represent suitable alternatives for cartilage formation, their combination has not yet been investigated in vivo for focal articular cartilage defects. We performed a simple experimental procedure using the combination of these 3 compounds on cartilage lesions of rabbit knees. Design. The hydrogel was developed in house and was first tested in vitro for chondrogenic differentiation. Next, implants were performed in chondral defects with or without ASCs and the degree of regeneration was macroscopically and microscopically evaluated. Results. Production of proteoglycans and the increased expression of collagen type II (COL2 alpha 1), aggrecan (ACAN), and sex-determining region Y-box 9 (SOX9) confirmed the chondrogenic character of ASCs in the hydrogel in vitro. Importantly, the addition of ASC induced a higher overall repair of the chondral lesions and a better cellular organization and collagen fiber alignment compared with the same treatment without ASCs. This regenerating tissue also presented the expression of cartilage glycosaminoglycan and type II collagen. Conclusions. Our results indicate that the combination of the 3 compounds is effective for articular cartilage repair and may be of future clinical interest.

[P281-2017] "Nonlinear carrier dynamics in silicon nano--waveguides"

Aldaya, I.*; Gil-Molina, A.*; Pita, J. L.; Gabrielli, L. H.; **Fragnito, H. L.***; Dainese, P.***

The understanding of free-carrier dynamics in silicon photonic nano-waveguides and micro-cavities is fundamental to several nonlinear optical phenomena. Through time-resolved pump and probe experiments, a complex and nonlinear carrier recombination dynamics is revealed. Our results show that the carrier lifetime varies as the recombination evolves, with faster decay rates at the initial stages (with lifetime of similar to 800 ps) and much slower lifetimes at later stages (up to similar to 300 ns). The large surface-to-volume ratio in nano-waveguides enables clear observation of the effect of carrier trapping, manifesting as a decay curve that is highly dependent on the initial carrier density. Further, we demonstrate faster recombination rates by operating at high carrier density. Our results, along with a theoretical framework based on trap-assisted recombination statistics applied to nano-waveguides, can impact the dynamics of several nonlinear nanophotonic devices in which free carriers play a critical role, and open further opportunities to enhance the performance of all-optical silicon-based devices.

[P282-2017] "Observation of a large-scale anisotropy in the arrival directions of cosmic rays above 8 x 10(18) eV"

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

Cosmic rays are atomic nuclei arriving from outer space that reach the highest energies observed in nature. Clues to their origin come from studying the distribution of their arrival directions. Using 3 x 10(4) cosmic rays with energies above 8 x 10(18) electron volts, recorded with the Pierre Auger Observatory from a total exposure of 76,800 km(2) sr year, we determined the existence of anisotropy in arrival directions. The anisotropy, detected at more than a 5.2s level of significance, can be described by a dipole with an amplitude of 6:5(-0.9)(+1.3) percent toward right ascension alpha(d) = 100 +/- 10 degrees and declination delta(d) = -24(-13)(+12) degrees. That direction indicates an extragalactic origin for these ultrahighenergy particles.

[P283-2017] "On the properties of non-Bragg gaps of one--dimensional metamaterial superlattices"

Barros, R. F.; Reyes-Gomez, E.; **Oliveira, L. E.***; Latge, A.

We present a theoretical study of the nature of photonic band gaps of one-dimensional photonic crystals containing dispersive materials. Within the transfer-matrix formalism, we calculate the photonic band structure, transmission spectra and electric field profile for multilayered structures constituted by the periodic repetition of polaritonic and lefthanded layers. It is suggested that the prediction of the existence of the (n) = 0, plasmon-polariton, and chef non--Bragg gaps, according to the frequency dependence of the permittivity and permeability of both layers, may be made simpler through the definition of more convenient quantities such as the generalized impedance and optical path length.

[P284-2017] "OzDES multifibre spectroscopy for the Dark Energy Survey: 3-yr results and first data release"

Childress, M. J.; Lidman, C.; Davis, T. M.; **Sobreira, F.***; et al. DES Collaboration

We present results for the first three years of OzDES, a six year programme to obtain redshifts for objects in the Dark Energy Survey (DES) supernova fields using the 2dF fibre positioner and AAOmega spectrograph on the Anglo-Australian Telescope. OzDES is a multi-object spectroscopic survey targeting multiple types of targets at multiple epochs over a multiyear baseline and is one of the first multi-object spectroscopic surveys to dynamically include transients into the target list soon after their discovery. At the end of three years, OzDES has spectroscopically confirmed almost 100 supernovae, and has measured redshifts for 17 000 objects, including the redshifts of 2566 supernova hosts. We examine how our ability to measure redshifts for targets of various types depends on signal-to-noise ratio (S/N), magnitude and exposure time, finding that our redshift success rate increases significantly at a S/N of 2-3 per 1-angstrom bin. We also find that the change in S/N with exposure time closely matches the Poisson limit for stacked exposures as long as 10 h. We use these results to predict the redshift yield of the full OzDES survey, as well as the potential yields of future surveys on other facilities such as (i.e. the 4-m Multi-Object Spectroscopic Telescope, the Subaru Prime Focus Spectrograph and the Maunakea Spectroscopic Explorer). This work marks the first OzDES data release, comprising 14 693 redshifts. OzDES is on target to obtain over 30 000 redshifts over the 6-yr duration of the survey, including a yield of approximately 5700 supernova host-galaxy redshifts.

[P285-2017] "Parasitic phases at the origin of magnetic moment in BiFeO3 thin films grown by low deposition rate RF sputtering"

Mori, T. J. A.; **Mouls, C. L.***; Morgado, F. F.; Schio, P.; Cezar, J. C.

A series of epitaxial BiFeO3 thin films has been grown under high partial pressure in a pure O-2 atmosphere, which leads to a low deposition rate. The samples grown under these conditions have presented an evolution of the quality of the epitaxy as the deposition temperature increases, however, spurious beta-Bi2O3 and supertetragonal BiFeO3 phases are present in the films grown at higher temperatures. The presence of gamma-Fe2O3 is reported in one growing condition, and has been attributed to the origin of hysteretic ferromagnetic behavior. A second kind of magnetism, with higher magnetic moment and anhysteretic behaviour, is attributed to the presence of mixed phases of BiFeO3. Published by AIP Publishing.

[P286-2017] "Particle-flow reconstruction and global event description with the CMS detector"

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

The CMS apparatus was identified, a few years before the start of the LHC operation at CERN, to feature properties well suited to particle-flow (PF) reconstruction: a highly-segmented tracker, a fine-grained electromagnetic calorimeter, a hermetic hadron calorimeter, a strong magnetic field, and an excellent muon spectrometer. A fully-fledged PF reconstruction algorithm tuned to the CMS detector was therefore developed and has been consistently used in physics analyses for the first time at a hadron collider. For each collision, the comprehensive list of final-state particles identified and reconstructed by the algorithm provides a global event description that leads to unprecedented CMS performance for jet and hadronic tau decay reconstruction, missing transverse momentum determination, and electron and muon identification. This approach also allows particles from pileup interactions to be identified and enables efficient pileup mitigation methods. The data collected by CMS at a centre-of-mass energy of 8 TeV show excellent agreement with the simulation and confirm the superior PF performance at least up to an average of 20 pileup interactions.

[P287-2017] "Permeation of Water Nanodroplets on Carbon Nanotubes Forests"

Jaques, Y. M.*; Galvao, D. S.*

Fully atomistic molecular dynamics simulations were carried out to investigate how a liquid-like water droplet behaves when into contact with a nanopore formed by carbon nanotube arrays. We have considered different tube arrays, varying the spacing between them, as well as, different chemical functionalizations on the uncapped nanotubes. Our results show that simple functionalizations (for instance, hydrogen ones) allow tuning up the wetting surface properties increasing the permeation of liquid inside the nanopore. For functionalizations that increase the surface hydrophilicity, even when the pore size is significantly increased the droplet remains at the surface without tube permeation.

[P288-2017] "Proposal for automated transformations on single-photon multipath qudits"

Baldijao, R. D.*; Borges, G. F.; Marques, B.; Solis-Prosser, M. A.; Neves, L.; Padua, S.

We propose a method for implementing automated state transformations on single-photon multipath qudits encoded in a one-dimensional transverse spatial domain. It relies on transferring the encoding from this domain to the orthogonal one by applying a spatial phase modulation with diffraction gratings, merging all the initial propagation paths by using a stable interferometric network, and filtering out the unwanted diffraction orders. The automation feature is attained by utilizing a programmable phase-only spatial light modulator (SLM) where properly designed diffraction gratings displayed on its screen will implement the desired transformations, including, among others, projections, permutations, and random operations. We discuss the losses in the process which is, in general, inherently nonunitary. Some examples of transformations are presented and, considering a realistic scenario, we analyze how they will be affected by the pixelated structure of the SLM screen. The method proposed here enables one to implement much more general transformations on multipath qudits than is possible with a SLM alone operating in the diagonal basis of which-path states. Therefore, it will extend the range of applicability for this encoding in high-dimensional quantum information and computing protocols as well as fundamental studies in quantum theory.

[P289-2017] "Proximity effects in chromosome aberration induction by low-LET ionizing radiation"

Cajiao, J. J. T.; Carante, M. P.; **Bernal, M. A.***; Ballarini, F.

Although chromosome aberrations are known to derive from distance-dependent mis-rejoining of chromosome fragments, evaluating whether a certain model describes such "proximity effects" better than another one is complicated by the fact that different approaches have often been tested under different conditions. Herein, a biophysical model ("BIANCA", i.e. Biophysical ANalysis of Cell death and chromosome Aberrations) was upgraded, implementing explicit chromosome-arm domains and two new models for the dependence of the rejoining probability on the fragment initial distance, r. Such probability was described either by an exponential function like exp(-r/r(o)), or by a Gaussian function like exp(-r(2)/2o(2)), where r(o) and sigma were adjustable parameters. The second, and last, parameters was the yield of "Cluster Lesions" (CL), where "Cluster Lesion" defines a critical DNA damage producing two independent chromosome fragments. The model was applied to low-LET irradiated lymphocytes (doses: 1-4 Gy) and fibroblasts (1-6.1 Gy). Good agreement with experimental yields of dicentrics and centric rings, and thus their ratio ("F-ratio"), was found by both the exponential model (with r(o) = 0.8 mu m for lymphocytes and 0.7 mu m for fibroblasts) and the Gaussian model (with sigma = 1.1 mu m for lymphocytes and 1.3 mu m for fibroblasts). While the former also allowed reproducing dose-responses for excess acentric fragments, the latter substantially underestimated the experimental curves. Both models provided G-ratios (ratio of acentric to centric rings) higher than those expected from randomness, although the values calculated by the Gaussian model were lower than those calculated by the exponential one. For lymphocytes the calculated G-ratios were in good agreement with the experimental ones, whereas for fibroblasts both models substantially underestimated the experimental results, which deserves further investigation. This work suggested that, although both models performed better than a step model (which previously allowed reproducing the F-ratio but underestimated the G-ratio), an exponential function describes proximity effects better than a Gaussian one.

[P290-2017] "Reactor and atmospheric neutrino mixing angles' correlation as a probe for new physics"

Pasquini, P.*

We perform a simulation on the DUNE experiment to probe the capability of future neutrino longbaseline experiments to constrain the parameter space of high-energy models by using the correlation between the atmospheric and reactor mixing angles. As an example, we analyze the tetrahedral flavor symmetry model, which predicts a strong relation between the nonzero value of theta(13) and a deviation of theta(23) from maximality. We show that in this case, the model can realistically be excluded by more than 3 sigma for most of the parameter space. We also study the octant degeneracy at DUNE and its impact on the sensitivity of such models.

[P291-2017] "Realized trophic niche driven by apparent competition: an example with marsupials"

Kuhnen, V. V.; **de Aguiar, M. A. M.***; Goncalves, A. Z.; Setz, E. Z. F.

According to apparent competition theory, the co-occurrence of two species that share the same predators appears to affect each other's population growth and abundance. However, due to habitat loss and over-hunting, top predators are being made rare worldwide. Considering that apparent competitors share similar resources, we would expect the absence of top predators to reflect in changes on prey realized trophic niches. To test our hypothesis, we developed a model to predict the abundance ratio of apparent competitor species based on changes in their realized trophic niches. We tested our model against field data on the Neotropical marsupials Didelphis aurita and Metachirus nudicaudatus. Our results revealed that D. aurita and M. nudicaudatus are two species under apparent competition and their realized trophic niche and diet overlap change according to the presence of top predators. The model was able to predict the actual relative abundances of D. aurita and M. nudicaudatus in the three empirical studies analyzed. Our study presents quantitative support to the apparent competition theory; however, the model's applications to other groups still need to be verified. Additionally, our study shows that the lack of top predators has consequences on the realized trophic niche of their prey, and therefore, we reinforce that conservation plans need to focus on the effects of top predator loss on ecosystems.

[P292-2017] "Search for a heavy resonance decaying to a top quark and a vector-like top quark at root s=13 TeV"

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

A search is presented for massive spin-1 Z' resonances decaying to a top quark and a heavy vector-like top quark partner T. The search is based on a 2.6 fb(-1) sample of proton-proton collisions at 13TeV collected with the CMS detector at the LHC. The analysis is optimized for final states in which the T quark decays to a W boson and a bottom quark. The focus is on all-jet final states in which both the W boson and the top quark decay into quarks that evolve into jets. The decay products of the top quark and of the W boson are assumed to be highly Lorentz-boosted and cannot be reconstructed as separate jets, but are instead reconstructed as merged, wide jets. Techniques for the identification of jet substructure and jet flavour are used to distinguish signal from background events.

Several models for Z' bosons decaying to T quarks are excluded at 95% confidence level, with upper limits on the cross section ranging from 0.13 to 10 pb, depending on the chosen hypotheses. This is the first search for a neutral spin-1 heavy resonance decaying to a top quark and a vector-like T quark in the all-hadronic final state.

[P293-2017] "Search for a light pseudoscalar Higgs boson produced in association with bottom quarks in pp collisions at root s=8 TeV"

Sirunyan, A. M.; Tumasyan, A.; Adam, W.; **Chinellato, J. A.*; Tonelli Manganote, E. J.***; et al.
CMS collaboration

A search for a light pseudoscalar Higgs boson (A) produced in association with bottom quarks and decaying into a muon pair is reported. The search uses 19.7 fb(-1) of proton-proton collisions at a center-of-mass energy of 8TeV, collected by the CMS experiment. No signal is observed in the dimuon mass range from 25 to 60 GeV. Upper limits on the cross section times branching fraction, sigma(pp -> b $(b) over bar $A) B(A -> mu mu), are set.

[P294-2017] "Search for associated production of dark matter with a Higgs boson decaying to b(b)over-bar or gamma gamma at root s=13 TeV"

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

A search for dark matter is performed looking for events with large missing transverse momentum and a Higgs boson decaying either to a pair of bottom quarks or to a pair of photons. The data from proton-proton collisions at a center-of-mass energy of 13TeV, collected in 2015 with the CMS detector at the LHC, correspond to an integrated luminosity of 2.3 fb(-1). Results are interpreted in the context of a Z'-two-Higgs-doublet model, where the gauge symmetry of the standard model is extended by a U(1) Z' group, with a new massive Z' gauge boson, and the Higgs sector is extended with four additional Higgs bosons. In this model, a high-mass resonance Z' decays into a pseudoscalar boson A and a light SM-like scalar Higgs boson, and the A decays to a pair of dark matter particles. No signi fi cant excesses are observed over the background prediction. Combining results from the two decay channels yields exclusion limits in the signal cross section in the m(Z')-m(A) phase space. For example, the observed data exclude the Z' mass range from 600 to 1860 GeV, for Z' coupling strength gZ' = 0: 8, the coupling of A with dark matter particles g(X) = 1, the ratio of the vacuum expectation values tan beta = 1, and m(A) = 300GeV. The results of this analysis are valid for any dark matter particle mass below 100 GeV.

[P295-2017] "Search for Charged Higgs Bosons Produced via Vector Boson Fusion and Decaying into a Pair of W and Z Bosons Using pp Collisions at root s=13 TeV"

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

A search for charged Higgs bosons produced via vector boson fusion and decaying into W and Z bosons using proton-proton collisions at root s = 13 TeV is presented. The data sample corresponds to an integrated luminosity of 15.2 fb(-1) collected with the CMS detector in 2015 and 2016. The event selection requires three leptons (electrons or muons), two jets with large pseudorapidity separation and high dijet mass, and missing transverse momentum. The observation agrees with the standard model prediction. Limits on the vector boson fusion production cross section times branching fraction for new charged physical states are reported as a function of mass from 200 to 2000 GeV and interpreted in the context of Higgs triplet models.

[P296-2017] "Search for direct production of super symmetric partners of the top quark in the all-jets final state in proton-proton collisions at root s=13 TeV"

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

A search for direct production of top squark pairs in events with jets and large transverse momentum imbalance is presented. The data are based on proton-proton collisions at a center-of--mass energy of 13 TeV, collected with the CMS detector in 2016 at the CERN LHC, and correspond to an integrated luminosity of 35.9 fb(-1). The search considers a variety of R-parity conserving supersymmetric models, including ones for which the top squark and neutralino masses are nearly degenerate. Specialized jet reconstruction tools are developed to exploit the unique characteristics of the signal topologies. With no significant excess of events observed above the standard model expectations, upper limits are set on the direct top squark pair production cross section in the context of simplified supersymmetric models for various decay hypotheses. Models with larger differences in mass between the top squark and neutralino are probed for masses up to 1040 and 500 GeV, respectively, whereas models with a more compressed mass hierarchy are probed up to 660 and 610 GeV, respectively. The smallest mass difference probed is for masses near to 550 and 540 GeV, respectively.

[P297-2017] "Search for heavy resonances that decay into a vector boson and a Higgs boson in hadronic final states at root s=13TeV"

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

A search for heavy resonances with masses above 1 TeV, decaying to final states containing a vector boson and a Higgs boson, is presented. The search considers hadronic decays of the vector boson, and Higgs boson decays to b quarks. The decay products are highly boosted, and each collimated pair of quarks is reconstructed as a single, massive jet. The analysis is performed using a data sample collected in 2016 by the CMS experiment at the LHC in proton-proton collisions at a center-of-mass energy of 13 TeV, corresponding to an integrated luminosity of 35.9 fb(-1). The data are consistent with the background expectation and are used to place limits on the parameters of a theoretical model with a heavy vector triplet. In the benchmark scenario with mass-degenerate W' and Z' bosons decaying predominantly to pairs of standard model bosons, for the first time heavy resonances for masses as high as 3.3 TeV are excluded at 95% confidence level, setting the most stringent constraints to date on such states decaying into a vector boson and a Higgs boson.

[P298-2017] "Search for Higgs boson pair production in the bb tau state in proton-proton collisions at root(s)=8 TeV"

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

Results are presented from a search for production of Higgs boson pairs (HH) where one boson decays to a pair of b quarks and the other to a t lepton pair. This work is based on proton-proton collision data collected by the CMS experiment at root(s) = 8 TeV, corresponding to an integrated luminosity of 18.3 fb (TM) (1). Resonant and nonresonant modes of HH production have been probed and no significant excess relative to the background-only hypotheses has been found in either mode. Upper limits on cross sections of the two HH production modes have been set. The results have been combined with previously published searches at root(s) = 8 TeV, in decay modes to two photons and two b quarks, as well as to four b quarks, which also show no evidence for a signal. Limits from the combination have been set on resonant HH production by an unknown particle X in the mass range m (x)= 300 GeV to m (x)= 1000 GeV. For resonant production of spin 0 (spin 2) particles, the observed 95' CL upper limit is 1.13 pb (1.09 pb) at m (x)= 300 GeV and to 21 fb (18 fb) at m (x)= 1000 GeV. For nonresonant HH production, a limit of 43 times the rate predicted by the standard model has been set.

[P299-2017] "Search for high-mass Z gamma resonances in proton-proton collisions at root s=8 and 13 TeV using jet substructure techniques"

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

A search for massive resonances decaying to a Z boson and a photon is performed in events with a hadronically decaying Z boson candidate, separately in light-quark and b quark decay modes, identified using jet substructure and advanced b tagging techniques. Results are based on samples of proton-proton collisions collected with the CMS detector at the LHC at center--of-mass energies of 8 and 13 TeV, corresponding to integrated luminosities of 19.7 and 2.7 fb(-1), respectively. The results of the search are combined with those of a similar search in the leptonic decay modes of the Z boson, based on the same data sets. Spin-0 resonances with various widths and with masses in a range between 0.2 and 3.0 TeV are considered. No significant excess is observed either in the individual analyses or the combination. The results are presented in terms of upper limits on the production cross section of such resonances and constitute the most stringent limits to date for a wide range of masses.

[P300-2017] "Search for leptophobic Z ' bosons decaying into four-lepton 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 heavy narrow resonances decaying into four-lepton final states has been performed using proton-proton collision data at root s= 8 TeVcollected by the CMS experiment, corresponding to an integrated luminosity of 19.7fb(-1). No excess of events over the standard model background expectation is observed. Upper limits for a benchmark model on the product of cross section and branching fraction for the production of these heavy narrow resonances are presented. The limit excludes leptophobic Z' bosons with masses below 2.5 TeV within the benchmark model. This is the first result to constrain a leptophobic Z' resonance in the four-lepton channel.

[P301-2017] "Search for light bosons in decays of the 125 GeV Higgs 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 is presented for decays beyond the standard model of the 125 GeV Higgs bosons to a pair of light bosons, based on models with extended scalar sectors. Light boson masses between 5 and 62.5 GeV are probed in final states containing four tau leptons, two muons and two b quarks, or two muons and two tau leptons. The results are from data in proton-proton collisions corresponding to an integrated luminosity of 19.7 fb(-1), accumulated by the CMS experiment at the LHC at a center-of-mass energy of 8TeV. No evidence for such exotic decays is found in the data. Upper limits are set on the product of the cross section and branching fraction for several signal processes. The results are also compared to predictions of two-Higgs-doublet models, including those with an additional scalar singlet.

[P302-2017] "Search for Low Mass Vector Resonances Decaying to Quark-Antiquark Pairs in Proton-Proton Collisions at root s=13 TeV"

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

A search is reported for a narrow vector resonance decaying to quark-antiquark pairs in proton-proton collisions at root s = 13 TeV, collected with the CMS detector at the LHC. The data sample corresponds to an integrated luminosity of 2.7 fb(-1). The vector resonance is produced at large transverse momenta, with its decay products merged into a single jet. The resulting signature is a peak over background in the distribution of the invariant mass of the jet. The results are interpreted in the framework of a leptophobic vector resonance and no evidence is found for such particles in the mass range of 100-300 GeV. Upper limits at 95% confidence level on the production cross section are presented in a region of mass-coupling phase space previously unexplored at the LHC. The region below 140 GeV has not been explored by any previous experiments.

[P303-2017] "Search for new phenomena with multiple charged leptons in proton-proton collisions at root s=13TeV"

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

Results are reported from a search for physics beyond the standard model in final states with at least three charged leptons, in any combination of electrons or muons. The data sample corresponds to an integrated luminosity of 2.3 fb(-1) of proton-proton collisions at root s = 13 TeV, recorded by the CMS experiment at the LHC in 2015. Two jets are required in each event, providing good sensitivity to strong production of gluinos and squarks. The search regions, sensitive to a range of different new physics scenarios, are defined using the number of jets tagged as originating from bottom quarks, the sum of the magnitudes of the transverse momenta of the jets, the imbalance in the overall transverse momentum in the event, and the invariant mass of opposite-sign, same-flavor lepton pairs. The event yields observed in data are consistent with the expected background contributions from standard model processes. These results are used to derive limits in terms of R-parity conserving simplified models of supersymmetry that describe strong production of gluinos and squarks. Model-independent limits are presented to facilitate the reinterpretation of the results in a broad range of scenarios for physics beyond the standard model.

[P304-2017] "Search for new phenomena with the M-T2 variable in the all-hadronic final state produced in proton-proton collisions at root s=13TeV"

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

A search for new phenomena is performed using events with jets and significant transverse momentum imbalance, as inferred through the M-T2 variable. The results are based on a sample of proton-proton collisions collected in 2016 at a center-of-mass energy of 13 TeV with the CMS detector and corresponding to an integrated luminosity of 35.9 fb(-1). No excess event yield is observed above the predicted standard model background, and the results are interpreted as exclusion limits at 95% confidence level on the masses of predicted particles in a variety of simplified models of R-parity conserving supersymmetry. Depending on the details of the model, 95% confidence level lower limits on the gluino (light-flavor squark) masses are placed up to 2025 (1550) GeV. Mass limits as high as 1070 (1175) GeV are set on the masses of top (bottom) squarks. Information is provided to enable re-interpretation of these results, including model-independent limits on the number of non-standard model events for a set of simplified, inclusive search regions.

[P305-2017] "Search for new physics in the monophoton final state in proton-proton collisions at root s=13 TeV"

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

A search is conducted for new physics in a final state containing a photon and missing transverse momentum in proton-proton collisions at root s = 13 TeV. The data collected by the CMS experiment at the CERN LHC correspond to an integrated luminosity of 12.9 fb(-1). No deviations are observed relative to the predictions of the standard model. The results are interpreted as exclusion limits on the dark matter production cross sections and parameters in models containing extra spatial dimensions. Improved limits are set with respect to previous searches using the monophoton final state.

In particular, the limits on the extra dimension model parameters are the most stringent to date in this channel.

[P306-2017] "Search for single production of vector-like quarks decaying into a b quark and a W boson in proton--proton collisions at root s=13 TeV"

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

A search is presented for a heavy vector-like quark, decaying into a b quark and a W boson, which is produced singly in association with a light flavor quark and a b quark. The analysis is performed using a data sample of proton-proton collisions at a center-of-mass energy of root s = 13 TeV collected at the LHC in 2015. The data set used in the analysis corresponds to an integrated luminosity of 2.3 fb(-1). The search is carried out using events containing one electron or muon, at least one b--tagged jet with large transverse momentum, at least one jet in the forward region of the detector, and missing transverse momentum. No excess over the standard model prediction is observed. Upper limits are placed on the production cross section of heavy exotic quarks: a T quark with a charge of 2/3, and a Y quark with a charge of -4/3. For Y quarks with coupling of 0.5 and beta(Y -> bW) = 100%, the observed (expected) lower mass limits are 1.40 (1.0) TeV. This is the most stringent limit to date on the single production of the Y vector-like quark.

[P307-2017] "Search for standard model production of four top quarks in proton-proton collisions at root s=13TeV"

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

A search for events containing four top quarks (t (t) over bart (t) over bar) is reported from proton-proton collisions recorded by the CMS experiment at root s = 13 TeV and corresponding to an integrated luminosity of 2.6 fb(-1). The analysis considers the single-lepton (e or mu)+jets and the opposite-sign dilepton (mu(+)mu(-),mu +/- e -/+ , or e(+) e(-))+ jets channels. It uses boosted decision trees to combine information on the global event and jet properties to distinguish between t (t) over bart (t) over bar and t (t) over bar production. The number of events observed after all selection requirements is consistent with expectations from background and standard model signal predictions, and an upper limit is set on the cross section for t (t) over bart (t) over bar production in the standard model of 94 fb at 95% confidence level (10.2 x the prediction), with an expected limit of 118 fb. This is combined with the results from the published CMS search in the same-sign dilepton channel, resulting in an improved limit of 69 fb at 95% confidence level (7.4xthe prediction), with an expected limit of 71 fb. These are the strongest constraints on the rate of t (t) over bart (t) over bar production to date.

[P308-2017] "Search for top squark pair production in pp collisions at root s=13 TeV using single lepton events"

Sirunyan, A. M.; Tumasyan, A.; Adam, W.; **Chinellato, J. A.*; Tonelli Manganote, E. J.***; et al.

CMS Collaboration

A search for top squark pair production in pp collisions at root s = 13 TeV is performed using events with a single isolated electron or muon, jets, and a large transverse momentum imbalance. The results are based on data collected in 2016 with the CMS detector at the LHC, corresponding to an integrated luminosity of 35.9 fb(-1). No significant excess of events is observed above the expectation from standard model processes. Exclusion limits are set in the context of supersymmetric models of pair production of top squarks that decay either to a top quark and a neutralino or to a bottom quark and a chargino. Depending on the details of the model, we exclude top squarks with masses as high as 1120 GeV. Detailed information is also provided to facilitate theoretical interpretations in other scenarios of physics beyond the standard model.

[P309-2017] "Searches for transverse momentum dependent flow vector fluctuations in Pb-Pb and p-Pb collisions at the LHC"

Acharya, S.; Adamova, D.; Adolfsson, J.; **Albuquerque, D. S. D.*; Chinellato, D. D.*; De Souza, R. D.*; Takahashi, J.***; et al.
ALICE Collaboration

The measurement of azimuthal correlations of charged particles is presented for Pb-Pb collisions at root S-NN 2.76 TeV and p-Pb collisions at root S-NN 5.02 TeV with the ALICE detector at the CERN Large Hadron Collider. These correlations are measured for the second, third and fourth order flow vector in the pseudorapidity region vertical bar eta vertical bar 0.8 as a function of centrality and transverse momentum pT using two observables, to search for evidence of PT-dependent flow vector fluctuations. For Ph-Ph collisions at 2.76 TeV, the measurements indicate that PT-dependent fluctuations are only present for the second order flow vector. Similar results have been found for p-Pb collisions at 5.02 TeV. These measurements are compared to hydrodynamic model calculations with event-by-event geometry fluctuations in the initial state to constrain the initial conditions and transport properties of the matter created in Ph-Ph and p-Pb collisions.

[P310-2017] "Self-Organized Lead(II) Sulfide Quantum Dots Superlattice"

da Silva, J. M. C.*; Ermakov, V. A.*; Bonato, L. G.; Nogueira, A. F.; **Marques, F. C.***

We show that superlattice (SL) of PbS quantum dots (QD) can be easily prepared by drop casting of colloidal QD solution onto glass substrate and the ordering level can be controlled by the substrate temperature. A QD solution was dropped on glass and dried at 25, 40, 70 and 100 degrees C resulting in formation of different SL structures. X-ray diffractograms (XRD) of deposited films show a set of sharp and intense peaks that are higher order satellites of a unique peak at 1.8 degrees (two theta), which corresponds, using the Bragg's Law, to an interplanar spacing of 5.3 nm. The mean particles diameter, calculated through the broadening of the (111) peak of PbS using the Scherrer's formula, were in agreement with the interplanar spacing. Transmission electron microscopy (TEM) measurements were also used to study the SL structure, which showed mainly a face centered cubic (FCC) arrangement of the QD. The photoluminescence (PL) spectrum of QD in the SL showed a shift toward lower energy compared to one in solution.

It can be attributed to the fluorescence resonant energy transfer (FRET) between neighbors QD's. Moreover, we observed greater redshift of PL peak for film with lower drying temperature, suggesting that it has a more organized structure.

[P311-2017] "Simulation of argon response and light detection in the DarkSide-50 dual phase TPC"

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

A Geant4-based Monte Carlo package named G4DS has been developed to simulate the response of DarkSide-50, an experiment operating since 2013 at LNGS, designed to detect WIMP interactions in liquid argon. In the process of WIMP searches, DarkSide-50 has achieved two fundamental milestones: the rejection of electron recoil background with a power of similar to 10(7), using the pulse shape discrimination technique, and the measurement of the residual Ar-39 contamination in underground argon, similar to 3 orders of magnitude lower with respect to atmospheric argon. These results rely on the accurate simulation of the detector response to the liquid argon scintillation, its ionization, and electron-ion recombination processes. This work provides a complete overview of the DarkSide Monte Carlo and of its performance, with a particular focus on PARIS, the custommade liquid argon response model.

[P312-2017] "Solid He-4 and the diffusion Monte Carlo method: A study of their properties"

Rugeles, E. J.*; Ujevic, S.; **Vitiello, S. A.***

Properties of helium atoms in the solid phase are investigated using the multiweight diffusion Monte Carlo method. Two different importance function transformations are used in two series of independent calculations. The kinetic energy is estimated for both the solid and liquid phases of He-4. We estimate the melting and freezing densities, among other properties of interest. Our estimates are compared with experimental values. We discuss why walkers biased by two distinctly different guiding functions do not lead to noticeable changes in the reported results. Criticisms concerning the bias introduced into our estimates by population control and system size effects are considered.

[P313-2017] "Sound waves and vortices in a polarized relativistic fluid"

Montenegro, D.*; Tinti, L.; **Torrieri, G.***

We extend the effective theory approach to the ideal fluid limit where the polarization of the fluid is nonzero. After describing and motivating the equations of motion [1], we expand them around the hydrostatic limit, obtaining the sound wave and vortex degrees of freedom. We discuss how the presence of polarization affects the stability and causality of the ideal fluid limit.

[P314-2017] "Spectral calibration of the fluorescence telescopes of the Pierre Auger Observatory"

Aab, A.; Abreu, P.; Aglietta, M.; **Chinellato, J. A.***; **Daniel, B.***; **Diaz Castro, M. L.***; **Dobrigkeit, C.***; **Fauth, A. C.***; **Kemp, E.***; et al.
Pierre Auger Collaboration

We present a novel method to measure precisely the relative spectral response of the fluorescence telescopes of the Pierre Auger Observatory. We used a portable light source based on a xenon flasher and a monochromator to measure the relative spectral efficiencies of eight telescopes in steps of 5 nm from 280 nm to 440nm. Each point in a scan had approximately 2nm FWHM out of the monochromator. Different sets of telescopes in the observatory have different optical components, and the eight telescopes measured represent two each of the four combinations of components represented in the observatory. We made an end-to-end measurement of the response from different combinations of optical components, and the monochromator setup allowed for more precise and complete measurements than our previous multi-wavelength calibrations. We find an overall uncertainty in the calibration of the spectral response of most of the telescopes of 1.5% for all wavelengths; the six oldest telescopes have larger overall uncertainties of about 2.2%. We also report changes in physics measurables due to the change in calibration, which are generally small.

[P315-2017] "Superconducting Properties in Arrays of Nanostructured beta-Gallium"

Moura, K. O.*; **Pirota, K. R.***; **Beron, F.***; **Jesus, C. B. R.***; **Rosa, P. F. S.***; **Tobia, D.***; **Pagliuso, P. G.***; **de Lima, O. F.***

Samples of nanostructured beta-Ga wires were synthesized by a novel method of metallic-flux nanonucleation. Several superconducting properties were observed, revealing the stabilization of a weak-coupling type-II-like superconductor (T-c approximate to 6.2 K) with a Ginzburg-Landau parameter kappa(GL) = 1.18. This contrasts the type-I superconductivity observed for the majority of Ga phases, including small spheres of beta-Ga with diameters near 15 mu m. Remarkably, our magnetization curves reveal a crossover field H-D, where we propose that the Abrikosov vortices are exactly touching their neighbors inside the Ga nanowires. A phenomenological model is proposed to explain this result by assuming that only a single row of vortices is allowed inside a nanowire under perpendicular applied field, with an appreciable depletion of Cooper pair density at the nanowire edges. These results are expected to shed light on the growing area of superconductivity in nanostructured materials.

[P316-2017] "Synthesis, structural and magnetic characterization of a copper(II) complex of 2,6-di(1H-imidazol-2-yl) pyridine and its application in copper-mediated polymerization catalysis"

de Arruda, E. G. R.; de Farias, M. A.; Jannuzzi, S. A. V.; Gonsales, S. D.; Timm, R. A.; **Sharma, S.***; Zoppellaro, G.; Kubota, L. T.; **Knobel, M.***; Formiga, A. L. B.

The 2,6-di(1H-imidazol-2-yl) pyridine (H(2)dimpy) ligand is synthesized and suggested as an alternative ligand for copper mediated catalysis. A Cu(II) complex was obtained with this ligand and characterized via ESI-MS, FT-IR, UV--vis and the structure was confirmed by single crystal XRD.

The crystal showed the [Cu-2(H(2)dimpy)(2)(mu-Cl)(2)] (PF6)(2)] center dot 2H(2)O dimeric complex, in which Cu(II) is in a distorted square-pyramidal geometry (tau = 0.301). Ferromagnetic coupling with J = -11.1 cm(-1) was confirmed by experiment and corroborated by density functional calculations. In order to evaluate the applicability of H(2)dimpy in atom transfer radical polymerization (ATRP), polystyrene was produced in DMF solution at low polydispersity (1.3) while maintaining the livingness of the polymer chain. The good performance of the H(2) dimpy compared to a standard ligand for ATRP (5,5'-dimethyl--2,2'-dipyridyl) indicates that it is suitable for this reaction.

[P317-2017] "The DES Bright Arcs Survey: Hundreds of Candidate Strongly Lensed Galaxy Systems from the Dark Energy Survey Science Verification and Year 1 Observations"

Diehl, H. T.; Buckley-Geer, E. J.; Lindgren, K. A.; **Sobreira, F.***; et al.
Collaboration, D

We report the results of searches for strong gravitational lens systems in the Dark Energy Survey (DES) Science Verification and Year 1 observations. The Science Verification data span approximately 250 sq. deg. with a median i-band limiting magnitude for extended objects (10 sigma) of 23.0. The Year 1 data span approximately 2000 sq. deg. and have an i-band limiting magnitude for extended objects (10 sigma) of 22.9. As these data sets are both wide and deep, they are particularly useful for identifying strong gravitational lens candidates. Potential strong gravitational lens candidate systems were initially identified based on a color and magnitude selection in the DES object catalogs or because the system is at the location of a previously identified galaxy cluster. Cutout images of potential candidates were then visually scanned using an object viewer and numerically ranked according to whether or not we judged them to be likely strong gravitational lens systems. Having scanned nearly 400,000 cutouts, we present 374 candidate strong lens systems, of which 348 are identified for the first time. We provide the R.A. and decl., the magnitudes and photometric properties of the lens and source objects, and the distance (radius) of the source(s) from the lens center for each system.

[P318-2017] "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. I. Discovery of the Optical Counterpart Using the Dark Energy Camera"

Soares-Santos, M.; Holz, D. E.; Annis, J.; **Sobreira, F.***; et al.
Dark Energy Survey Dark Energy

We present the Dark Energy Camera (DECam) discovery of the optical counterpart of the first binary neutron star merger detected through gravitational-wave emission, GW170817. Our observations commenced 10.5 hr post-merger, as soon as the localization region became accessible from Chile. We imaged 70 deg(2) in the i and z bands, covering 93% of the initial integrated localization probability, to a depth necessary to identify likely optical counterparts (e.g., a kilonova). At 11.4 hr post--merger we detected a bright optical transient located 10 ''.6 from the nucleus of NGC 4993 at redshift z = 0.0098, consistent (for H-0 = 70 km s(-1) Mpc(-1)) with the distance of 40 +/- 8 Mpc reported by the LIGO Scientific Collaboration and the Virgo Collaboration (LVC). At detection the transient had magnitudes of i = 17.3 and z = 17.4, and thus an absolute magnitude of M-i = -15.7, in the luminosity range expected for a kilonova.

We identified 1500 potential transient candidates. Applying simple selection criteria aimed at rejecting background events such as supernovae, we find the transient associated with NGC 4993 as the only remaining plausible counterpart, and reject chance coincidence at the 99.5% confidence level. We therefore conclude that the optical counterpart we have identified near NGC 4993 is associated with GW170817. This discovery ushers in the era of multi-messenger astronomy with gravitational waves and demonstrates the power of DECam to identify the optical counterparts of gravitational-wave sources.

[P319-2017] "The Electromagnetic Counterpart of the Binary Neutron Star Merger LIGO/Virgo GW170817. II. UV, Optical, and Near-infrared Light Curves and Comparison to Kilonova Models"

Cowperthwaite, P. S.; Berger, E.; Villar, V. A.; **Sobreira, F.***; et al.

We present UV, optical, and near-infrared (NIR) photometry of the first electromagnetic counterpart to a gravitational wave source from Advanced Laser Interferometer Gravitational-wave Observatory (LIGO)/Virgo, the binary neutron star merger GW170817. Our data set extends from the discovery of the optical counterpart at 0.47-18.5 days post-merger, and includes observations with the Dark Energy Camera (DECam), Gemini--South/ FLAMINGOS-2 (GS/F2), and the Hubble Space Telescope (HST). The spectral energy distribution (SED) inferred from this photometry at 0.6 days is well described by a blackbody model with T approximate to 8300 K, a radius of R approximate to 4.5 x 10(14) cm (corresponding to an expansion velocity of v approximate to 0.3c), and a bolometric luminosity of L-bol approximate to 5 x 10(41) erg s(-1). At 1.5 days we find a multi-component SED across the optical and NIR, and subsequently we observe rapid fading in the UV and blue optical bands and significant reddening of the optical/ NIR colors. Modeling the entire data set, we find that models with heating from radioactive decay of Ni-56, or those with only a single component of opacity from r-process elements, fail to capture the rapid optical decline and red optical/NIR colors. Instead, models with two components consistent with lanthanide-poor and lanthanide-rich ejecta provide a good fit to the data; the resulting "blue" component has M-ej(blue) approximate to 0.01 M-circle dot and v(ej)(blue) approximate to 0.3c, and the "red" component has M-cj(red) approximate to 0.04 M-circle dot and v(cj)(red) approximate to 0.1 c. These ejecta masses are broadly consistent with the estimated r-process production rate required to explain the Milky Way r-process abundances, providing the first evidence that binary neutron star (BNS) mergers can be a dominant site of r-process enrichment.

[P320-2017] "The role of bioenergy in a climate-changing world"

Souza, G. M.; Ballester, M. V. R.; **Cruz, C. H.***; Chum, H.; Dale, B.; Dale, V. H.; Fernandes, E. C. M.; Foust, T.; Karp, A.; Lynd, L.; Maciel, R.; Milanez, A.; Nigro, F.; Osseweijer, P.; Verdade, L. M.; Victoria, R. L.; Van der Wielen, L.

Bioenergy has been under intense scrutiny over the last ten years with significant research efforts in many countries taking place to define and measure sustainable practices. We describe here the main challenges and policy issues and provide policy recommendations for scaling up sustainable bioenergy approaches globally.

The 2016 Intended Nationally Determined Contributions (INDCs defined under the UN Framework Convention on Climate Change) (UNFCCC) Conference of the Parties (COP21) will not reach global Greenhouse Gas (GHG) emission targets of 2 degrees C. Sustainable biomass production can make a significant contribution. Substantive evidence exists that many bioenergy cropping systems can bring multiple benefits and off-set environmental problems associated with fossil fuels usage as well as intensive food production and urbanization. We provide evidence that there are many approaches to land use for bioenergy expansion that do not lead to competition for food or other needs. We should focus on how to manage these approaches on a synergistic basis and how to reduce tradeoffs at landscape scales. Priorities include successful synergies between bioenergy and food security (integrated resource management designed to improve both food security and access to bioenergy), investments in technology, rural extension, and innovations that build capacity and infrastructure, promotion of stable prices to incentivize local production and use of double cropping and flex crops (plants grown for both food and non-food markets) that provide food and energy as well as other services. The sustainable production of biomass requires appropriate policies to secure long-term support to improve crop productivity and also to ensure environmental as well as economic and social benefits of bioenergy cropping systems. Continuous support for cropping, infrastructure, agricultural management and related policies is needed to foster positive synergies between food crops and bioenergy production. In comparison to fossil fuels, biofuels have many positive environmental benefits. Potential negative effects caused by land-use change and agriculture intensification can be mitigated by agroecological zoning, best management practices, the use of eco-hydrology and biodiversity-friendly concepts at field, watershed and landscape scales. Global climate and environmental changes related to the use of fossil fuels and inequitable development make it unethical not to pursue more equitable energy development that includes bioenergy. To achieve sustainable development, competitiveness and costs of bioenergy production need to be addressed in a manner that considers not only economic gains but also development of local knowledge and social and environmental benefits.

[P321-2017] "Unraveling 5f-6d hybridization in uranium compounds via spin-resolved L-edge spectroscopy"

dos Reis, R. D.*; Veiga, L. S. I.*; Escanhoela, C. A.; Lang, J. C.; Joly, Y.; Gandra, F. G.*; Haskel, D.; Souza-Neto, N. M.

The multifaceted character of 5f electrons in actinide materials, from localized to itinerant and in between, together with their complex interactions with 6d and other conduction electron states, has thwarted efforts for fully understanding this class of compounds. While theoretical efforts abound, direct experimental probes of relevant electronic states and their hybridization are limited. Here we exploit the presence of sizable quadrupolar and dipolar contributions in the uranium L-3-edge X-ray absorption cross section to provide unique information on the extent of spin-polarized hybridization between 5f and 6d electronic states by means of X-ray magnetic circular dichroism. As a result, we show how this 5f-6d hybridization regulates the magnetism of each sublattice in UCu2Si2 and UMn2Si2 compounds, demonstrating the potentiality of this methodology to investigate a plethora of magnetic actinide compounds.

[P322-2017] "Visible neutrino decay in the light of appearance and disappearance long-baseline experiments"

Gago, A. M.; Gomes, R. A.; Gomes, A. L. G.; Jones-Perez, J.; Peres, O. L. G.*

We investigate the present constraints from MINOS and T2K experiments for the neutrino decay scenario induced by non-diagonal couplings of Majorons to neutrinos. As novelty, on top of the typical invisible decay prescription, we add the contribution of visible decay, where final products can be observed. This new effect depends on the nature of the neutrino-Majoron coupling, which can be of scalar or pseudoscalar type. Using the combination of disappearance data from MINOS and disappearance and appearance data from T2K, for normal ordering, we constrain the decay para alpha E Gamma for the heaviest neutrino, where E and are the neutrino energy and width, respectively. We find that when considering visible decay within appearance data, alpha < O (10(-5)) eV(2), at 90% C.L., for both kinds of couplings, which is better by one order of magnitude compared to previous bounds.

[P323-2017] "Weyl states and Fermi arcs in parabolic bands"

Doria, M. M.*; Perali, A.

Weyl fermions are shown to exist inside a parabolic band in a single electronic layer, where the kinetic energy of carriers is given by the non-relativistic Schroedinger equation. There are Fermi arcs as a direct consequence of the folding of a ring-shaped Fermi surface inside the first Brillouin zone. Our results stem from the decomposition of the kinetic energy into the sum of the square of the Weyl state, the coupling to the local magnetic field and the Rashba interaction. The Weyl fermions break the space and time reflection symmetries present in the kinetic energy, thus allowing for the onset of a weak three-dimensional magnetic field around the layer. This field brings topological stability to the current-carrying states through a Chern number. In the special limit for which the Weyl state becomes gapless, this magnetic interaction is shown to be purely attractive, thus suggesting the onset of a superconducting condensate of zero helicity states.

Eventos publicados

[P324-2017] "Combustion of Hadrons to Strange Quark Matter Inside a Neutron Star"

Rosero, J. A.*; Kemp, E.*
Editores: Santos, A. L.; Vasconcellos, C. A. Z.; Silva, D. T.; Hadjimichef, D.; Weber, F.; Machado, M. V. T.; Silva, M. L. L.; Xu, R.; Greiner, W.

We have studied the phase transition from hadronic to quark matter inside neutron stars, we calculate the rate and emissivity for all the relevant weak interaction processes and solve the Boltzmann transport equation, considering the effect of strong interactions in the perturbative regime to the order of QCD coupling constant alpha(c). We find that the neutrino and antineutrino emissivity is around of 10(53) erg.

[P325-2017] "Magnetized Neutron Stars"

Souza, G. H.*; Kemp, E.*; Chirenti, C.
Editores: Santos, A. L.; Vasconcellos, C. A. Z.; Silva D. T.; Hadjimichef, D.; Weber, F.; Machado, M. V. T.; Silva, M. L. L.; Xu, R.; Greiner, W.

In this work we show the results for numerical solutions of the relativistic Grad-Shafranov equation for a typical neutron star with 1.4 solar masses. We have studied the internal magnetic field considering both the poloidal and toroidal components, as well as the behavior of the field lines parametrized by the ratio between these components of the field.

7th International Workshop on Astronomy and Relativistic Astrophysics (IWARA), OCT 09-13, 2016. OCT 09-13, 2016.

[P326-2017] "Optical sensing with antiresonant capillary fibers"

Osorio, J. H.*; Marques, T. H. R.*; Figueredo, I. C.*; Serrao, V. A.; Franco, M. A. R.; **Cordeiro, C. M. B.***
IEEE

Herein, we present a study of the use of polymer capillary optical fibers in sensing measurements. In particular, we approach the application of these fibers for temperature sensing. To do this, an analytical model for describing the spectral characteristics of the light transmitted through the capillaries was employed. Thermal expansion and thermo-optic effect influences on the transmitted spectrum were evaluated. Moreover, a 140 +/- 6 pm/degrees C temperature sensitivity was measured, which is in good resemblance to simulated data and is around 14 times higher than the sensitivity attained in conventional Bragg gratings sensors.

25th International Conference on Optical Fibre Sensors (OFS), APR 24-28, 2017. SOUTH KOREA.

Correções

[Co004-2017] "Production of pi(0) and eta mesons up to high transverse momentum in pp collisions at 2.76 TeV (vol 77, 339, 2017)"

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

[Co005-2017] "Search for dark matter and unparticles in events with a Z boson and missing transverse momentum in proton-proton collisions at root s = 13 TeV (vol 3, 061, 2017)"

Sirunyan, A. M.; Tumasyan, A.; Adam, W.; **Chinellato, J. A.*; Tonelli Manganote, E. J.*;** et al.

CMS Collaboration

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

Defesas de Dissertações

[D011-2017] "Fabricação de trilhas condutoras através de tecnologia de impressão 3D"
Aluno: Gabriel Gäal
Orientador: Prof. Dr. Antonio Riul Junior
Data: 07/11/2017

[D012-2017] "Estudo da Distribuição de CO2 e seus Derivados Protonados na Superfície Molecular Aquosa em Função de sua Acidez"
Aluno: Gabriela Moura do Amaral
Orientador: Prof. Dr. Arnaldo Naves de Brito
Data: 28/11/2017

[D013-2017] "Entropia de emaranhamento de antiferromagnetos dimerizados"
Aluno: Leonardo da Silva Garcia Leite
Orientador: Prof. Dr. Ricardo Luís Doretto
Data: 05/12/2017

[D014-2017] "Investigação da Estrutura Eletrônica de Materiais Complexos através da Espectroscopia de Fotoemissão Resolvida em Ângulo"
Aluno: Kevin Raduenz Pakuszewski
Orientador: Profa. Dra. Cris Adriano
Data: 13/12/2017

[D015-2017] "A técnica de análise do discriminante linear (LDA) no estudo da composição química de raios cósmicos primários em uma parametrização fenomenológica do perfil longitudinal de chuveiros atmosféricos extensos"
Aluno: Clewton Luís Ferreira da Fonseca
Orientador: Prof. Dr. José Augusto Chinellato
Data: 19/12/2017

Defesas de Teses

[T019-2017] "Oscilações da crosta em estrelas de nêutrons magnetizadas e a validade das relações universais para o mundo fundamental das ondas gravitacionais"
Aluno: Gibran Henrique de Souza
Orientador: Profa. Dra. Cecília B. M. Hadler Chirenti
Data: 26/10/2017

[T020-2017] "Interação entre domínios ferromagnéticos e ferroelétricos em filmes finos de ferro sobre titanato de bário (BaTiO3)"
Aluno: Caroline Lydie Mouls
Orientador: Prof. Dr. Júlio Criginski Cézar
Data: 27/10/2017

[T021-2017] "Mecanismos de condução em filmes nanoes-truturados de óxidos de grafeno"
Aluno: Mawin Javier Martinez Jimenez
Orientador: Prof. Dr. Antonio Riul Junior
Data: 06/11/2017

[T022-2017] "Propriedades Estruturais e Mecânicas de Materiais Baseados no Grafeno"
Aluno: Rafael Amatte Bizão
Orientador: Prof. Dr. Douglas Soares Galvão
Data: 10/11/2017

[T023-2017] "Síntese e Caracterização da Perovskita de Iodeto de Chumbo e Metil-Amônio a Partir de Filmes Finos de Iodeto de Chumbo Produzidos por Sputtering e Pontos Quânticos de Sulfeto de Chumbo"
Aluno: José Maria Clemente da Silva Filho
Orientador: Prof. Dr. Francisco das Chagas Marques
Data: 24/11/2017

[T024-2017] "Superando Limitações e Possibilitando No-vas Funcionalidades em Fotônica de Silício Integrada"
Aluno: Mário César Mendes Machado de Souza
Orientador: Prof. Dr. Newton Cesario Frateschi
Data: 05/12/2017

[T025-2017] "Teoria de Jogos e Genética de Populações: um estudo de dinâmica de populações guiado por competi-ção e cooperação entre indivíduos polimórficos"
Aluno: Wendell Pereira Barreto
Orientador: Prof. Dr. Marcus Aloizio Martinez de Aguiar
Data: 07/12/2017

[T026-2017] "Métodos de Estatística Bayesiana e Máxi-ma Entropia aplicados na análise de dados em eventos de raios cósmicos"
Aluno: Eder Arnedo Perassa
Orientador: Prof. Dr. José Augusto Chinellato
Data: 13/12/2017

[T027-2017] "Análises Fenomenológicas de Seções de Choque Hadrônicas em Energias Altas e Assintóticas"
Aluno: Paulo Victor Recchia Gomes da Silva
Orientador: Prof. Dr. Márcio José Menon
Data: 15/12/2017

O **Abstracta** é um boletim bimestral destinado à divulgação da produção científica da comunidade do Instituto de Física "Gleb Wataghin" - IFGW da Universidade Estadual de Campinas - Unicamp.

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