Abstracta

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Trabalhos Publicados

[P229-2015] "3D Reduced Graphene Oxide Coated V2O5 Nanoribbon Scaffolds for High-Capacity Supercapacitor Electrodes"

Ye, G.; Gong, Y.; Keyshar, K.; Husain, E. A. M.; **Brunetto, G.***; Yang, S.; Vajtai, R.; Ajayan, P. M.

3D architecture V2O5 nanoribbon/reduced graphene oxide is successfully fabricated as an electrode material for supercapacitors. In combination with the advantages from the good rate performance of carbon-based materials and the high specific capacitance of metal oxides, as well as its 3D architecture, this material shows high specific capacitance, superior rate performance, and stability.

[P230-2015] "A versatile x-ray microtomography station for biomedical imaging and materials research"

Lussani, F. C.*; Vescovi, R. F. D.*; de Souza, T. D.*; Leite, C. A. P.*; Gilesa, C.*

An x-ray microtomography station implemented at the X-ray Applied Crystallography Laboratory of the State University of Campinas is described. The station is based on a propagation based phase contrast imaging setup with a microfocus source and digital x-ray area detectors. Due to its simplicity, this setup is ideal for fast, high resolution imaging and microtomography of small biological specimens and materials research samples. It can also be coupled to gratings to use and develop new techniques as the harmonic spatial coherent imaging, which allow scattering contrast imaging. Details of the experimental setup, equipment, and software integration are described. Test microtomography for setup commissioning and characterization is shown. We conclude that phase contrast enhanced x-ray imaging and microtomography with resolution below 5 mu m voxel size are possible and data sets as wide as 2000 x 2000 x 2000 voxels are obtained with this instrumentation.

[P231-2015] "Beam-energy-dependent two-pion interferometry and the freeze-out eccentricity of pions measured in heavy ion collisions at the STAR detector"

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

We present results of analyses of two-pion interferometry in Au + Au collisions at root s(NN) = 7.7, 11.5, 19.6, 27, 39, 62.4, and 200 GeV measured in the STAR detector as part of the BNL Relativistic Heavy Ion Collider Beam Energy Scan program. The extracted correlation lengths (Hanbury-Brown-Twiss radii) are studied as a function of beam energy, azimuthal angle relative to the reaction plane, centrality, and transverse mass (m(T)) of the particles. The azimuthal analysis allows extraction of the eccentricity of the entire fireball at kinetic freeze-out. The energy dependence of this observable is expected to be sensitive to changes in the equation of state. A new global fit method is studied as an alternate method to directly measure the parameters in the azimuthal analysis. The eccentricity shows a monotonic decrease with beam energy that is qualitatively consistent with the trend from all model predictions and quantitatively consistent with a hadronic transport model.

[P232-2015] "Bright 30 THz impulsive solar bursts"

Kaufmann, P.; White, S. M.; **Marcon, R.***; Kudaka, A. S.; Cabezas, D. P.; Cassiano, M. M.; Francile, C.; Fernandes, L. O. T.; Hidalgo Ramirez, R. F.; Luoni, M.; Marun, A.; Pereyra, P.; de Souza, R. V.

Impulsive 30THz continuum bursts have been recently observed in solar flares, utilizing small telescopes with a unique and relatively simple optical setup concept. The most intense burst was observed together with a GOES X2 class event on 27 October 2014, also detected at two subterahertz (sub-THz) frequencies, Reuven Ramaty High Energy Solar Spectroscopic Imager X-rays and Solar Dynamics Observatory/Helioseismic and Magnetic Imager and EUV. It exhibits strikingly good correlation in time and in space with white-light flare emission. It is likely that this association may prove to be very common. All three 30THz events recently observed exhibited intense fluxes in the range of 10(4) solar flux units, considerably larger than those measured for the same events at microwave and submillimeter wavelengths. The 30THz burst emission might be part of the same spectral burst component found at sub-THz frequencies. The 30THz solar bursts open a promising new window for the study of flares at their origin.

[P233-2015] "Carbon-Based Nanostructures Derived from Bilayer Graphene with Zero Thermal Expansion Behavior"

Muniz, A. R.; **Fonseca, A. F.***

Low or zero thermal expansion (ZTE) materials aresuitable for applications requiring low dimensional changes tinder large temperatrire variations. Using density functional theoty calculations and classical molecular dynartrits, simulations, we demonstrate that tailoring the density of covalent carbon-carbon interlayer bonds in bilayer,graphene tunes its thermal expansion coefficient from negative to positive values at room temperature and, most exciting, causes it to exhibit ZTE behavior in a wide range of temperatures.

[P234-2015] "Chemical Vapor Deposition of Monolayer Rhenium Disulfide (ReS2)"

Keyshar, K.; Gong, Y.; Ye, G.; **Brunetto, G.***; Zhou, Wu; Cole, D. P.; Hackenberg, K.; He, Y.; **Machado, L.***; Kabbani, M.; Hart, A. H. C.; Li, Bo; **Galvao, D. S.***; George, A.; Vajtai, R.; Tiwary, C. S.; Ajayan, P. M.

The direct synthesis of monolayer and multilayer ReS2 by chemical vapor deposition at a low temperature of 450 °C is reported. Detailed characterization of this material is performed using various spectroscopy and microscopy methods. Furthermore initial field-effect transistor characteristics are evaluated, which highlight the potential in being used as an n-type semiconductor.

[P235-2015] "Comparison of experimental proton-induced fluorescence spectra for a selection of thin high-Z samples with Geant4 Monte Carlo simulations"

Incerti, S.; Barberet, Ph.; Deves, G.; Michelet, C.; Francis, Z.; Ivantchenko, V.; Mantero, A.; El Bitar, Z.; **Bernal, M. A.***; Tran, H. N.; Karamitros, M.; Seznec, H.

The general purpose Geant4 Monte Carlo simulation toolkit is able to simulate radiative and non-radiative atomic de-excitation processes such as fluorescence and Auger electron emission, occurring after interaction of incident ionising radiation with target atomic electrons. In this paper, we evaluate the Geant4 modelling capability for the simulation of fluorescence spectra induced by 1.5 MeV proton irradiation of thin high-Z foils (Fe, GdF3, Pt, Au) with potential interest for nanotechnologies and life sciences. Simulation results are compared to measurements performed at the Centre d'Etudes Nucleaires de Bordeaux-Gradignan AIFIRA nanobeam line irradiation facility in France. Simulation and experimental conditions are described and the influence of Geant4 electromagnetic physics models is discussed.

[P236-2015] "Constraints on parton distribution functions and extraction of the strong coupling constant from the inclusive jet cross section in pp collisions at root s=7TeV"

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

The inclusive jet cross section for proton-proton collisions at a centre-of-mass energy of 7 TeV was measured by the CMS Collaboration at the LHC with data corresponding to an integrated luminosity of 5.0 fb(-1). The measurement covers a phase space up to 2 TeV in jet transverse momentum and 2.5 in absolute jet rapidity. The statistical precision of these data leads to stringent constraints on the parton distribution functions of the proton. The data provide important input for the gluon density at high fractions of the proton momentum and for the strong coupling constant at large energy scales. Using predictions from perturbative quantum chromodynamics at next-to--leading order, complemented with electroweak corrections, the constraining power of these data is investigated and the strong coupling constant at the Z boson mass M-Z is determined to be alpha(S)(M-Z) = 0.1185 +/- 0.0019 (exp)(-0.0037)(+0.0060) (theo), which is in agreement with the world average.

[P237-2015] "Constraints on the spin-parity and anomalous HVV couplings of the Higgs boson in proton collisions at 7 and 8 TeV"

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

The study of the spin-parity and tensor structure of the interactions of the recently discovered Higgs boson is performed using the H -> ZZ, Z gamma*, gamma*gamma* -> 4l, H -> WW -> l(nu)l(nu), and H -> gamma gamma decay modes. The full data set recorded by the CMS experiment during the LHC run 1 is used, corresponding to an integrated luminosity of up to 5.1 fb(-1) at a center-of-mass energy of 7 TeV and up to 19.7 fb(-1) at 8 TeV. A wide range of spin-two models is excluded at a 99% confidence level or higher, or at a 99.87% confidence level for the minimal gravitylike couplings, regardless of whether assumptions are made on the production mechanism. Any mixed-parity spin-one state is excluded in the ZZ and WW modes at a greater than 99.999% confidence level. Under the hypothesis that the resonance is a spin-zero boson, the tensor structure of the interactions of the Higgs boson with two vector bosons ZZ, Z gamma, gamma gamma, and WW is investigated and limits on eleven anomalous contributions are set. Tighter constraints on anomalous HVV interactions are obtained by combining the HZZ and HWW measurements. All observations are consistent with the expectations for the standard model Higgs boson with the quantum numbers J(PC) = 0(++).

[P238-2015] "Distributions of topological observables in inclusive three- and four-jet events in pp collisions at root s=7 TeV"

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

This paper presents distributions of topological observables in inclusive three- and four-jet events produced in pp collisions at a centre-of-mass energy of 7 TeV with a data sample collected by the CMS experiment corresponding to a luminosity of 5.1 fb(-1). The distributions are corrected for detector effects, and compared with several event generators based on two- and multi-parton matrix elements at leading order. Among the considered calculations, MadGraph interfaced with PYTHIA6 displays the overall best agreement with data.

[P239-2015] "Elliptic flow of identified hadrons in Pb-Pb collisions at root(NN)-N-s=2.76 Tev"

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

The elliptic flow coefficient (v(2)) of identified particles in Pb-Pb collisions at root s(NN) = 2.76 TeV was measured with the ALICE detector at the Large Hadron Collider (LHC). The results were obtained with the Scalar Product method, a two-particle correlation technique, using a pseudo-rapidity gap of |Delta eta| > 0.9 between the identified hadron under study and the reference particles. The v (2) is reported for pi(+/-), K-+/-, K-S(0), p+(p) over bar, phi, Lambda+(Lambda) over bar, Xi+(Xi) over bar (+) and Omega(-)+(Omega) over bar (+) in several collision centralities. In the low transverse momentum (p(T)) region, p(T) < 3 GeV/c, v(2)(p(T)) exhibits a particle mass dependence consistent with elliptic flow accompanied by the transverse radial expansion of the system with a common velocity field. The experimental data for pi (+/-) and the combined K-+/- and K-S(0) results, are described fairly well by hydrodynamic calculations coupled to a hadronic cascade model (VISHNU) for central collisions. However, the same calculations fail to reproduce the v(2)(p(T)) for p+(p) over bar, phi, Lambda+(Lambda) over bar, Xi+(Xi) over bar (+). For transverse momentum values larger than about 3 GeV/c, particles tend to group according to their type, i.e. mesons and baryons. The present measurements exhibit deviations from the number of constituent quark (NCQ) scaling at the level of +/- 20% for p(T) > 3 GeV/c.

[P240-2015] "Energy dependence of K pi, p pi, and Kp fluctuations in Au plus Au collisions from root s(NN)=7.7 to 200 GeV"

Adamczyk, L.; Adkins, J. K.; Agakishiev, G.; **Takahashi, J*.**; et al.
STAR Collaboration

A search for the quantum chromodynamics (QCD) critical point was performed by the STAR experiment at the BNL Relativistic Heavy Ion Collider, using dynamical fluctuations of unlike particle pairs. Heavy ion collisions were studied over a large range of collision energies with homogeneous acceptance and excellent particle identification, covering a significant range in the QCD phase diagram where a critical point may be located. Dynamical K pi, p pi, and Kp fluctuations as measured by the STAR experiment in central 0-5% Au + Au collisions from center-of-mass collision energies root s(NN) = 7.7 to 200 GeV are presented. The observable nu(dyn) was used to quantify the magnitude of the dynamical fluctuations in event-by-event measurements of the Kp, pp, and Kp pairs. The energy dependences of these fluctuations from central 0-5% Au + Au collisions all demonstrate a smooth evolution with collision energy.

[P241-2015] "Enhanced photocatalytic properties of core@shell SiO2@TiO2 nanoparticles"

Ullah, S.; Ferreira-Neto, E. P.; Pasa, A. A.; Alcantara, C. C. J.; Acuna, J. J. S.; Bilmes, S. A.; Ricci, M. L. M.; **Landers, R.***; Fermino, T. Z.; Rodrigues-Filho, U. P.

SiO2@TiO2 core@shell nanoparticles (CSNs) have recently attracted great attention due to their unique and tunable optical and photocatalytic properties and higher dispersion of the supported TiO2. Thus, development of facile, reproducible and effective methods for the synthesis of SiO2@TiO2 CSNs and a fundamental understanding of their improved properties, derived from combination of different core and shell materials, is of great importance. Here we report a very facile and reproducible method for the synthesis of CSNs with a control of particle morphology, crystallinity and phase selectivity, and provide important insight into the effect of core@shell configuration on the photocatalytic and optical properties of SiO2@TiO2 CSNs. For this purpose, synthesis of highly dispersed anatase nanocrystals (similar to 5 nm) of high surface area was carried out by supporting these nanocrystals on silica sub-micron spheres in the form of a porous shell of controlled thickness (10-30 nm). The amorphous TiO2 shell was crystallized into anatase using a low temperature (105 degrees C) hydrothermal treatment. The resulting CSNs were characterized by scanning electron microscopy, transmission electron microscopy, energy dispersive spectroscopy, x-ray photoelectron spectroscopy, X-ray diffraction, vibrational spectroscopy, zeta-potential measurements, BET surface area and electron paramagnetic resonance measurements. Both experimental data and theoretical simulations showed that due to the size of the complete particle (SiO2@TiO2), the general optical response of the system is regulated by Rayleigh scattering, exhibiting a red-shift of the extinction spectra as shell-thickness increases. The SiO2@TiO2 configuration leads to efficient light harvesting by increasing the optical path inside the core@shell particles. An enhanced photoactivity and good recyclability of SiO2@TiO2 CSNs was demonstrated compared to unsupported TiO2. Together with BET surface area measurements, direct assessment of the density of photocatalytic sites probed by electron paramagnetic resonance measurements was used to provide insight into the enhanced photocatalytic activity of CSNs, which is also understood as a consequence of Rayleigh scattering, relative enhancement of the adsorption of organic molecules on the core@shell photocatalyst surface and increased optical path inside the SiO2@TiO2 particles. All these aspects are directly influenced by the core@shell configuration of SiO2@TiO2 samples.

[P242-2015] "Environment-induced anisotropy and sensitivity of the radical pair mechanism in the avian compass"

Carrillo, A.*; Cornelio, M. F.; de Oliveira, M. C.*

Several experiments over the years have shown that the earth's magnetic field is essential for orientation in birds' migration. The most promising explanation for this orientation is the photo-stimulated radical pair (RP) mechanism. In order to define a reference frame for the orientation task radicals must have an intrinsic anisotropy. We show that this kind of anisotropy and consequently the entanglement in the model are not necessary for the proper functioning of the compass. Classically correlated initial conditions for the RP, subjected to a fast decoherence process, are able to provide the anisotropy required. Even a dephasing environment can provide the necessary frame for the compass to work and also implies fast decay of any quantum correlation in the system without damaging the orientation ability. This fact significantly expands the range of applicability of the RP mechanism providing more elements for experimental search.

[P243-2015] "Experimental and theoretical study of atmospheric-pressure argon microplasma jets"

Amorim, J.*; Ridenti, M. A.*; Guerra, V.

Surface-wave discharges in argon at atmospheric pressure were experimentally studied by optical emission spectroscopy (OES) and mass spectrometry (MS). OES was employed to determine the rotational temperature using the ultraviolet OH band, Q(1) branch and found to be between 450 and 970 K. The electron density (5 x 10(13) cm(-3) <= n(e) <= 7 x 10(14) cm(-3)) was estimated using the H-beta line profile, and produced by dissociation of the water present as an impurity in the Ar gas. The electron temperature (0.63 eV <= T-e <= 1.3 eV) was estimated using a collisional-radiative (CR) model that takes the input measured intensities of four emission lines originating from 2p states including 2p(2), 2p(4), 2p(6), and 2p(10). The density of the metastable state Ar(1s(5)) (2.0 x 10(11) cm(-3) <= Ar(1s(5)) <= 4.2 x 10(12) cm(-3)) was estimated by means of OES using the self-absorbing method. Positive and negative ions were probed along the plasma column using MS. A theoretical model based on the solution of the homogeneous electron Boltzmann equation, considering inelastic and superelastic collisions with the Ar(1s) states and electron-electron collisions, coupled with a system of rate balance equations describing the creation and destruction of the most important heavy particles, is proposed. The experimental results are compared with theoretical ones obtained from a self-consistent model of these discharges, providing physical insight into the basic mechanisms and phenomena ruling the discharges.

[P244-2015] "Fano effect and Andreev bound states in a hybrid superconductor-ferromagnetic nanostructure"

Siqueira, E. C.; Orellana, P. A.; Cestari, R. C.; Figueira, M. S.; **Cabrera, G. G.***

In this work, it is considered a hybrid nanostructure composed by a quantum dot coupled to two ferromagnetic leads and a superconductor lead. It is shown that the zero-bias transmittance for the co-tunneling between the ferromagnetic leads presents Fano anti-resonances due to the destructive interference between the two spin channels mixing by the relative orientation of the magnetizations in the leads. When the superconductor is coupled to the system, electron hole correlations between different spin states lead to a resonance in the place of the dip appearing in the transmittance. Such an effect is accompanied by two Fano anti-resonances explained by a "leakage" of conduction channels from the co-tunneling to the Andreev transport. In the non-equilibrium regime, correlations within the quantum dot introduce a dependence of the resonance condition on the finite bias applied to the ferromagnetic leads. However, it is still possible to observe signatures of the same interference effect in the electrical current.

[P245-2015] "Generation of entanglement in quantum parametric oscillators using phase control"

Gonzalez-Henao, J. C.*; Pugliese, E.; Euzzor, S.; Abdalah, S. F.; Meucci, R.; **Roversi, J. A.***

The control of quantum entanglement in systems in contact with environment plays an important role in information processing, cryptography and quantum computing. However, interactions with the environment, even when very weak, entail decoherence in the system with consequent loss of entanglement. Here we consider a system of two coupled oscillators in contact with a common heat bath and with a time dependent oscillation frequency. The possibility to control the entanglement of the oscillators by means of an external sinusoidal perturbation applied to the oscillation frequency has been theoretically explored. We demonstrate that the oscillators become entangled exactly in the region where the classical counterpart is unstable, otherwise when the classical system is stable, entanglement is not possible. Therefore, we can control the entanglement swapping from stable to unstable regions by adjusting amplitude and phase of our external controller. We also show that the entanglement rate is approximately proportional to the real part of the Floquet coefficient of the classical counterpart of the oscillators. Our results have the intriguing peculiarity of manipulating quantum information operating on a classical system.

[P246-2015] "Heavy fermion Ce3Co4Sn13 compound under pressure"

Collave, J. R.; Borges, H. A.; Ramos, S. M.; Hering, E. N.; Fontes, M. B.; Baggio-Saitovitch, E.; Mendonca-Ferreira, L.; Bittar, E. M.; **Pagliuso, P. G.***

The non-magnetic heavy fermion compound Ce3Co4Sn13 was studied under pressure. We report single crystalline measurements of electrical resistivity as a function of temperature rho(T) under pressure. Some characteristic features related to a structural transition (T-S), crystalline field effects (T-CEF), and a low temperature maximum (T-max), possibly connected simultaneously to the onset of Kondo lattice coherence and short range magnetic correlations, were identified in the rho(T) data. A pressure-temperature phase diagram with T-S and T-max was constructed by mapping these features. Like for most Ce-based heavy fermion compounds, T-max moves to higher temperatures with pressure, indicating that it is related to the Kondo energy scale, due to the increase of hybridization induced by pressure.

On the other hand, T-S, associated to a superlattice distortion and probably combined with a charge density wave transition, decreases as a function of pressure. However, differently from the Sr3-xCaxIr4Sn13 system, where a superlattice quantum phase transition is observed [L. E. Klintberg et al., Phys. Rev. Lett. 109, 237 008 (2012)], in Ce3Co4Sn13 T-S similar to 154 K, at ambient pressure (P = 0), seems to stabilize at around 143K for P >= 19 kilobars. We also investigated rho(T) in external magnetic fields, at P = 0. Negative magnetoresistance and increase of T-max are observed, suggesting suppression of low temperature short range magnetic correlations.

[P247-2015] "Hierarchically buckled sheath-core fibers for superelastic electronics, sensors, and muscles"

Liu, Z. F.; Fang, S.; **Moura, F. A.***; Ding, J. N.; Jiang, N.; Di, J.; Zhang, M.; Lepro, X.; **Galvao, D. S.***; Haines, C. S.; Yuan, N. Y.; Yin, S. G.; Lee, D. W.; Wang, R.; Wang, H. Y.; Lv, W.; Dong, C.; Zhang, R. C.; Chen, M. J.; Yin, Q.; Chong, Y. T.; Zhang, R.; Wang, X.; Lima, M. D.; Ovalle-Robles, R.; Qian, D.; Lu, H.; Baughman, R. H.

Superelastic conducting fibers with improved properties and functionalities are needed for diverse applications. Here we report the fabrication of highly stretchable (up to 1320%) sheath-core conducting fibers created by wrapping carbon nanotube sheets oriented in the fiber direction on stretched rubber fiber cores. The resulting structure exhibited distinct short-and long-period sheath buckling that occurred reversibly out of phase in the axial and belt directions, enabling a resistance change of less than 5% for a 1000% stretch. By including other rubber and carbon nanotube sheath layers, we demonstrated strain sensors generating an 860% capacitance change and electrically powered torsional muscles operating reversibly by a coupled tension-to-torsion actuation mechanism. Using theory, we quantitatively explain the complementary effects of an increase in muscle length and a large positive Poisson's ratio on torsional actuation and electronic properties.

[P248-2015] "High spin polarization and spin splitting in equiatomic quaternary CoFeCrAl Heusler alloy"

Bainsla, L.; Mallick, A. I.; **Coelho, A. A.***; Nigam, A. K.; Varaprasad, B. S. D. Ch. S.; Takahashi, Y. K.; Alam, A.; Suresh, K. G.; Hono, K.

In this paper, we investigate CoFeCrAl alloy by means of ab-initio electronic structure calculations and various experimental techniques. The alloy is found to exist in the B2-type cubic Heusler structure, which is very similar to Y-type (or Li-MgPdSn prototype) structure with space group F-43m (#216). Saturation magnetization (M-S) of about 2 mu(B)/f.u. is observed at 8 K under ambient pressure, which is in good agreement with the Slater-Pauling rule. M-S values are found to be independent of pressure, which is a prerequisite for half-metals. The ab-initio electronic structure calculations predict half-metallicity for the alloy with a spin slitting energy of 0.31 eV. Importantly, this system shows a high current spin polarization value of 0.67 +/- 0.02, as deduced from the point contact Andreev reflection measurements. Linear dependence of electrical resistivity with temperature indicates the possibility of reasonably high spin polarization at elevated temperatures (similar to 150 K) as well. All these suggest that CoFeCrAl is a promising material for the spintronic devices.

[P249-2015] "Holography in a background-independent effective theory"

Torrieri, G.*

We discuss the meaning of the strong equivalence principle when applied to a quantum field theory. We show that, because of unitary inequivalence of accelerated frames, the only way for the strong equivalence principle to apply exactly is to add a boundary term representing the decoherence of degrees of freedom leaving the observable region of the bulk. We formulate the constraints necessary for the partition function to be covariant with respect to non-inertial transformations and argue that, when the non-unitary part is expressed as a functional integral over the horizon, holography arises naturally as a consequence of the equivalence principle.

[P250-2015] "Identification of the Chemical Bonding Prompting Adhesion of a-C:H Thin Films on Ferrous Alloy Intermediated by a SiCx:H Buffer Layer"

Cemin, F.; Bim, L. T.; Leidens, L. M.; **Morales, M.***; Baumvol, I. J. R.; **Alvarez, F.***; Figueroa, C. A.

Amorphous carbon (a-C) and several related materials (DLCs) may have ultralow friction coefficients that can be used for saving-energy applications. However, poor chemical bonding of a-C/DLC films on metallic alloys is expected, due to the stability of carbon-carbon bond's. Silicon-based intermediate layers are employed to enhance the adherence of a-C:H films on ferrous alloys, although the role of such buffer layers is not yet fully understood in chemical terms. The chemical bonding of a-C:H thin films on ferrous alloy intermediated by a nanometric SiCx:H buffer layer was analyzed by X-ray photoelectron spectroscopy (XPS): The chemical profile was inspected by glow discharge optical emission spectroscopy (GDOES), and the chemical structure was evaluated by Raman and Fourier transform infrared spectroscopy techniques. The nature of adhesion is discussed by analyzing the chemical bonding at the interfaces of the a-C:H/SiCx:H/ferrous alloy sandwich structure. The adhesion phenomenon is ascribed to specifically chemical bonding character at the buffer layer. Whereas carbon carbon (C-C) and carbon silicon (C-Si) bonds are formed at the outermost interface, the innermost interface is constituted mainly by silicon iron (Si-Fe) bonds. The oxygen presence degrades the adhesion up to totally delaminate the a-C:H thin films. The SiCx:H deposition temperature determines the type of chemical bonding and the amount of oxygen contained in the buffer layer.

[P251-2015] "Inclusive, prompt and non-prompt J/psi production at mid-rapidity in Pb-Pb collisions at root S-NN=2.76 TeV"

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

The transverse momentum (p(T)) dependence of the nuclear modification factor R-AA and the centrality dependence of the average transverse momentum <p(T)> for inclusive J/psi have been measured with ALICE for Pb-Pb collisions at root S-NN = 2.76TeV in the e(+)e(-) decay channel at mid-rapidity (vertical bar y vertical bar < 0.8). The <p(T)> is significantly smaller than the one observed for pp collisions at the same centre-of-mass energy.

Consistently, an increase of RAA is observed towards low p(T). These observations might be indicative of a sizable contribution of charm quark coalescence to the J/psi production. Additionally, the fraction of non-prompt J/psi from beauty hadron decays, f(B), has been determined in the region 1.5 < p(T) < 10 GeV/c in three centrality intervals. No significant centrality dependence of fB is observed. Finally, the RAA of non-prompt J/psi is discussed and compared with model predictions. The nuclear modification in the region 4.5 < p(T) < 10 GeV/c is found to be stronger than predicted by most models.

[P252-2015] "Indications of a nontrivial vacuum in the effective theory of perfect fluids"

Burch, T.; **Torrieri, G.***
LSS Collaboration

Using lattice field theory techniques, we investigate the vacuum structure of the field theory corresponding to perfect fluid dynamics in the Lagrangian prescription. We find intriguing, but inconclusive evidence, that the vacuum of such a theory is nontrivial, casting doubts on whether the gradient expansion can provide a good effective field theory for this type of system. The nontrivial vacuum looks like a "turbulent" state where some of the entropy is carried by macroscopic degrees of freedom. We describe further steps to strengthen or falsify this evidence.

[P253-2015] "Interaction between lamellar twinning and catalyst dynamics in spontaneous core-shell InGaP nanowires"

Oliveira, D. S.*; Tizei, L. H. G.; Li, A.; Vasconcelos, T. L.; Senna, C. A.; Archanjo, B. S.; **Ugarte, D.***; **Cotta, M. A.***

Semiconductor nanowires oriented along the [211] direction usually present twins parallel to their axis. For group IV nanowires this kind of twin allows the formation of a catalyst-nanowire interface composed of two equivalent {111} facets. For III-V nanowires, however, the twin will generate two facets with different polarities. In order to keep the < 211 > orientation stable, a balance in growth rates for these different facets must be reached. We report here the observation of stable, micron-long < 211 >-oriented InGaP nanowires with a spontaneous core-shell structure. We show that stacking fault formation in the crystal region corresponding to the {111} A facet termination provides a stable NW/NP interface for growth along the < 211 > direction. During sample cool down, however, the catalyst migrates to a lateral {111} B facet, allowing the growth of branches perpendicular to the initial orientation. In addition to that, we show that the core-shell structure is non-concentric, most likely due to the asymmetry between the facets formed in the NW sidewall; this effect generates stress along the nanowire, which can be relieved through bending.

[P254-2015] "Intrinsic dependence of the magnetic properties of CoFe2O4 nanoparticles prepared via chemical methods with addition of chelating agents"

Mendonca, E. C.; Tenorio, M. A.; Mecena, S. G.; Zucolotto, B.; Silva, L. S.; **Jesus, C. B. R.***; Meneses, C. T.; Duque, J. G. S.

In this work, the effect of addition of different chelating agents on the magnetic properties of cobalt ferrite nanoparticles produced by the combining of both en precipitation and hydrothermal methods is reported. The Rietveld analyses of X-ray diffraction patterns reveal that our samples are single phase (space group: Fd-3m) with small average sizes. The weight losses observed in the thermogravimetric measurements together with the M x H curves show that the organic contamination coming from chelating agent decomposition can give rise to misinterpretation of the magnetization measurements. Besides, analyses of the zero-field-cooled (ZFC) and field cooled (PC) magnetization measurements and the M x H curves measured at room temperature allows us to state that both the average blocking temperature and particles size distribution are sensitive to the kind of chelating agent.

[P255-2015] "Long-range pseudorapidity dihadron correlations in d plus Au collisions at root S-NN=200 GeV"

Adamczyk, L.; Adkins, J. K.; Agakishiev, G.; **Takahashi, J.***; et al.
STAR Collaboration

Dihadron angular correlations in d + Au collisions at root S-NN = 200 GeV are reported as a function of the measured zero-degree calorimeter neutral energy and the forward charged hadron multiplicity in the Au-beam direction. A finite correlated yield is observed at large relative pseudorapidity (Delta eta) on the near side (i.e. relative azimuth Delta phi similar to 0). This correlated yield as a function of Delta eta appears to scale with the dominant, primarily jet-related, away-side (Delta phi similar to pi) yield. The Fourier coefficients of the Delta phi correlation, V-n = < cosn Delta phi >, have a strong Delta eta dependence. In addition, it is found that V-1 is approximately inversely proportional to the mid-rapidity event multiplicity, while V-2 is independent of it with similar magnitude in the forward (d-going) and backward (Au-going) directions.

[P256-2015] "Measurement of diffractive dissociation cross sections in pp collisions at root s=7 TeV"

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

Measurements of diffractive dissociation cross sections in pp collisions at root s = 7 TeV are presented in kinematic regions defined by the masses M-X and M-Y of the two final-state hadronic systems separated by the largest rapidity gap in the event. Differential cross sections are measured as a function of xi= M-X(2)/s in the region -5.5 < log(10)xi 10(X) < -2.5, for logio M-Y < 0.5, dominated by single dissociation (SD), and 0.5 < log(10)M(Y) < 1.1, dominated by double dissociation (DD), where M-x and M-y are given in GeV. The inclusive pp cross section is also measured as a function of the width of the central pseudorapidity gap Delta eta for Delta eta > 3, logio M-X > 1.1, and logioMy > 1.1, a region dominated by DD. The cross sections integrated over these regions are found to be, respectively, 2.99 0.02(staf)12392(sysf) mb, 1.18 +/- 0.02(stat) +/- 0.13(syst) mh, and 0.58 +/- 0.01(stat) (-0.11)(+0.13) (syst) mh, and are used to extract extrapolated total SD and DD cross sections. In addition, the inclusive differential cross section, d sigma/d Delta eta(F), for events with a pseudorapidity gap adjacent to the edge of the detector, is measured over Delta eta F = 8.4 units of pseudorapidity. The results are compared to those of other experiments and to theoretical predictions and found compatible with slowly 'rising diffractive cross sections as a function of center-of-mass energy.

[P257-2015] "Non-Fermi-Liquid Behavior in Metallic Quasicrystals with Local Magnetic Moments"

Andrade, E. C.; Jagannathan, A.; **Miranda, E.***; Vojta, M.; Dobrosavljevic, V.

Motivated by the intrinsic non-Fermi-liquid behavior observed in the heavy-fermion quasicrystal Au51Al34Yb15, we study the low-temperature behavior of dilute magnetic impurities placed in metallic quasicrystals. We find that a large fraction of the magnetic moments are not quenched down to very low temperatures T, leading to a power-law distribution of Kondo temperatures P(T-K) similar to T-K(alpha-1), with a nonuniversal exponent alpha, in a remarkable similarity to the Kondo-disorder scenario found in disordered heavy-fermion metals. For alpha < 1, the resulting singular P(T-K) induces non-Fermi-liquid behavior with diverging thermodynamic responses as T -> 0.

[P258-2015] "Nonzero Classical Discord"

Gheorghiu, V.; **de Oliveira, M. C.***; Sanders, B. C.

Quantum discord is the quantitative difference between two alternative expressions for bipartite mutual information, given respectively in terms of two distinct definitions for the conditional entropy. By constructing a stochastic model of shared states, classical discord can be similarly defined, quantifying the presence of some stochasticity in the measurement process. Therefore, discord can generally be understood as a quantification of the system's state disturbance due to local measurements, be it quantum or classical. We establish an operational meaning of classical discord in the context of state merging with noisy measurement and thereby show the quantum-classical separation in terms of a negative conditional entropy.

[P259-2015] "On the influence of etch pits in the overall dissolution rate of apatite basal sections"

Alencar, I.*; **Guedes, S.***; **Palissari, R.***; **Hadler, J. C.***

Determination of efficiencies for particle detection plays a central role for proper estimation of reaction rates. If chemical etching is employed in the revelation of latent particle tracks in solid-state detectors, dissolution rates and etchable lengths are important factors governing the revelation and observation. In this work, the mask method, where a reference part of the sample is protected during dissolution, was employed to measure step heights in basal sections of apatite etched with a nitric acid, HNO, solution at a concentration of 1.1 M and a temperature of 20 A degrees C. We show a drastic increase in the etching velocity as the number of etch pits in the surface augments, in accordance with the dissolution stepwave model, where the outcrop of each etch pit generates a continuous sequence of stepwaves. The number of etch pits was varied by irradiation with neutrons and perpendicularly incident heavy ions. The size dependence of the etch-pit opening with etching duration for ion (200-300 MeV Sm-152 and U-238) tracks was also investigated.

There is no distinction for the etch pits between the different ions, and the dissolution seems to be governed by the opening velocity when a high number of etch pits are present in the surface. Measurements of the etchable lengths of these ion tracks show an increase in these lengths when samples are not pre-annealed before irradiation. We discuss the implications of these findings for fission-track modelling.

[P260-2015] "On the thermal characterization of solids by photoacoustic calorimetry: thermal diffusivity and linear thermal expansion coefficient"

Bedoya, A.; Marin, E.; **Mansanares, A. M.***; Zambrano-Arjona, M. A.; Riech, I.; Calderon, A.

In this paper, we resume a straightforwardly methodology that can be employed for accurate thermal diffusivity measurement by photoacoustics. The proposed methodology involves measurements in the thermally thick sample regime with normalization using a thermally thin reference sample, as well as consideration of the sample's thermoelastic bending in both the thermally thin and thick regime. The usefulness of the method has been demonstrated with measurements in test samples of different materials. The possibilities of the method to account for linear thermal expansion coefficient have been discussed too. It has been demonstrated that for the determination of this parameter the sample must be in the ideal thermally thick regime, i.e. the range of modulation frequencies used must lie well above the cut-off frequency between the thermally thin and thick regimes. In other words, this cut-off frequency must be very small. Although this condition is very difficult to be achieved in praxis, in order to account for it, a method is proposed here that involves measurements in samples with different thicknesses and uses an extrapolation procedure.

[P261-2015] "One- and two-photon photoluminescence excitation spectra of CdTe quantum dots in a cryogenic confocal microscopy platform"

Almeida, D. B.*; **de Thomaz, A. A.***; Carvalho, H. F.; **Cesar, C. L.***

In this work we describe a method to obtain photoluminescente excitation spectra, through one and two photon absorption, of CdTe quantum dots, based on a confocal microscope platform. This system becomes an analytical multipurpose characterization platform with spatial, and spectral resolution with temperature control. The capabilities of such platform were demonstrated by photoluminescence and second harmonic generation spectra acquisition as a function of temperature from 10 K to room temperature. The differences for one and two photons transition selection rules between the quantum dot confined levels provide access to intra and inter band, forbidden in one photon transitions, information that could be used to validate confinement models. The results agree well with the transition selection rules calculated with a parabolic model.

[P262-2015] "Origin of spin gapless semiconductor behavior in CoFeCrGa: Theory and Experiment"

Bainsla, L.; Mallick, A. I.; Raja, M. M.; **Coelho, A. A.***; Nigam, A. K.; Johnson, D. D.; Alam, A.; Suresh, K. G.

Despite a plethora of materials suggested for spintronic applications, a new class of materials has emerged, namely spin gapless semiconductors (SGS), which offers potentially more advantageous properties than existing ones. These magnetic semiconductors exhibit a finite band gap for one spin channel and a closed gap for the other. Here, supported by electronic-structure calculations, we report evidence of SGS behavior in equiatomic quaternary CoFeCrGa, having a cubic Heusler (prototype LiMgPdSn) structure but exhibiting chemical disorder (DO3 structure). CoFeCrGa is found to transform from SGS to half-metallic phase under pressure, which is attributed to unique electronic-structure features. The saturation magnetization (M-S) obtained at 8K agrees with the Slater-Pauling rule and the Curie temperature (T-C) is found to exceed 400 K. Carrier concentration (up to 250 K) and electrical conductivity are observed to be nearly temperature independent, prerequisites for SGS. The anomalous Hall coefficient is estimated to be 185 S/cm at 5K. Considering the SGS properties and high T-C, this material appears to be promising for spintronic applications.

[P263-2015] "Performance of electron reconstruction and selection with the CMS detector 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

The performance and strategies used in electron reconstruction and selection at CMS are presented based on data corresponding to an integrated luminosity of 19.7 fb(-1), collected in proton-proton collisions at root s = 8TeV at the CERN LHC. The paper focuses on prompt isolated electrons with transverse momenta ranging from about 5 to a few 100 GeV. A detailed description is given of the algorithms used to cluster energy in the electromagnetic calorimeter and to reconstruct electron trajectories in the tracker. The electron momentum is estimated by combining the energy measurement in the calorimeter with the momentum measurement in the tracker. Benchmark selection criteria are presented, and their performances assessed using Z, SIC, and J/psi decays into e(+)+e(-) pairs. The spectra of the observables relevant to electron reconstruction and selection as well as their global efficiencies are well reproduced by Monte Carlo simulations. The momentum scale is calibrated with an uncertainty smaller than 0.3%. The momentum resolution for electrons produced in Z boson decays ranges from 1.7 to 4.5%, depending on electron pseudorapidity and energy loss through bremsstrahlung in the detector material.

[P264-2015] "Plasma Core Electron Density and Temperature Measurements Using CVI Line Emissions in TCABR Tokamak"

do Nascimento, F.; **Machida, M.***; Severo, J. H. F.; Sanada, E.; Ronchi, G.

In this work, we present results of electron temperature (T-e) and density (n(e)) measurements obtained in Tokamak Chauffage Alfven Bresilien (TCABR) tokamak using visible spectroscopy from CVI line emissions which occurs mainly near the center of the plasma column. The presented method is based on a well-known relationship between the particle flux (Gamma(ion)) and the photon flux (phi(ion)) emitted by an ion species combined with ionizations per photon atomic data provided by the atomic data and analysis structure (ADAS) database. In the experiment, we measured the photon fluxes of three different CVI spectral line emissions,

4685.2, 5290.5, and 6200.6 angstrom (one line per shot). Using this method it was possible to find out the temporal evolution of T-e and n(e) in the plasma. The results achieved are in good agreement with T-e and ne measurements made using other diagnostic tools.

[P265-2015] "Polyamorphism in tetrahedral substances: Similarities between silicon and ice"

Garcez, K. M. S.; **Antonelli, A.***

Tetrahedral substances, such as silicon, water, germanium, and silica, share various unusual phase behaviors. Among them, the so-called polyamorphism, i.e., the existence of more than one amorphous form, has been intensively investigated in the last three decades. In this work, we study the metastable relations between amorphous states of silicon in a wide range of pressures, using Monte Carlo simulations. Our results indicate that the two amorphous forms of silicon at high pressures, the high density amorphous (HDA) and the very high density amorphous (VHDA), can be decompressed from high pressure (similar to 20 GPa) down to the tensile regime, where both convert into the same low density amorphous. Such behavior is also observed in ice. While at high pressure (similar to 20 GPa), HDA is less stable than VHDA, at the pressure of 10 GPa both forms exhibit similar stability. On the other hand, at much lower pressure (similar to 5 GPa), HDA and VHDA are no longer the most stable forms, and, upon isobaric annealing, an even less dense form of amorphous silicon emerges, the expanded high density amorphous, again in close similarity to what occurs in ice.

[P266-2015] "Precision Measurement of the Longitudinal Double-Spin Asymmetry for Inclusive Jet Production in Polarized Proton Collisions at root s=200 GeV"

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

We report a new measurement of the midrapidity inclusive jet longitudinal double-spin asymmetry, A(LL), in polarized pp collisions at center-of-mass energy root s = 200 GeV. The STAR data place stringent constraints on polarized parton distribution functions extracted at next-to-leading order from global analyses of inclusive deep-inelastic scattering (DIS), semi-inclusive DIS, and RHIC pp data. The measured asymmetries provide evidence at the 3 sigma level for positive gluon polarization in the Bjorken-x region x > 0.05.

[P267-2015] "Predictions for neutrinoless double-beta decay in the 3+1 sterile neutrino scenario"

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

We present accurate predictions of the effective Majorana mass vertical bar m beta beta vertical bar in neutrinoless double-beta decay in the standard case of 3v mixing and in the case of 3+1 neutrino mixing indicated by the reactor, Gallium and LSND anomalies. We have taken into account the uncertainties of the neutrino mixing parameters determined by oscillation experiments. It is shown that the predictions for vertical bar m beta beta vertical bar in the cases of 3v and 3+1 mixing are quite different, in agreement with previous discussions in the literature, and that future measurements of neutrinoless double-beta decay and of the effective light neutrino mass in beta decay or the total mass of the three lightest neutrinos in cosmological experiments may distinguish the 3v and 3+1 cases if the mass ordering is determined by oscillation experiments. We also present a relatively simple method to determine the minimum value of vertical bar m beta beta vertical bar in the general case of N-neutrino mixing.

[P268-2015] "Programmed assembly of 4,2 ':6 ',4 ''-terpyridine derivatives into porous, on-surface networks"

Nijs, T.; Malzner, F. J.; **Fatayer, S.***; Waeckerlin, A.; Nowakowska, S.; Constable, E. C.; Housecroft, C. E.; Jung, T. A.

The use of divergent, V-shaped, 4,2': 6',4 ''-terpyridine building blocks that self-assemble into hydrogen-bonded domains and upon addition of copper atoms undergo metallation with concomitant transformation into a coordination network is described; multiple energetically similar structural motifs are observed in both hydrogen-bonded and adatom-coordinated networks.

[P269-2015] "Recent advances in the application of the Schwinger multichannel method with pseudopotentials to electron-molecule collisions"

da Costa, R. F.; Varella, M. T. do N.; Bettega, M. H. F.; **Lima, M. A. P.***

The Schwinger multichannel method [K. Takatsuka and V. McKoy, Phys. Rev. A 30, 1734 (1984)], which is based on the Schwinger variational principle for the scattering amplitude [J. Schwinger, Phys. Rev. 72, 742 (1947)], was designed to account for exchange, polarization and electronically multichannel coupling effects in the low-energy region of electron scattering from molecules with arbitrary geometry. The applications of the method became more ambitious with the availability of computer power combined with parallel processing, use of norm-conserving pseudopotentials and improvement of the description of target excited states (minimal orbital basis for single configuration interaction). The most recent applications involving 33 and 45 electronically open channels for phenol and ethylene molecules, represent good examples of the present status of the method. In this colloquium, we review the strategy and point out new directions to apply the method in its full extension.

[P270-2015] "Search for a pseudoscalar boson decaying into a Z boson and the 125 GeV Higgs boson in l(+)l(-)b(b)over-bar final states"

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

Results are reported on a search for decays of a pseudoscalar A boson into a Z boson and a light scalar h boson, where the Z boson decays into a pair of oppositely-charged electrons or muons, and the h boson decays into bb. The search is based on data from proton-proton collisions at a center-of--mass energy root s = 8 TeV collected with the CMS detector, corresponding to an integrated luminosity of 19.7 fb(-1).

The h boson is assumed to be the standard model-like Higgs boson with a mass of 125 GeV. With no evidence for signal, upper limits are obtained on the product of the production cross section and the branching fraction of the A boson in the Zh channel. Results are also interpreted in the context of two Higgs doublet models.

[P271-2015] "Search for heavy Majorana neutrinos in mu(+/-)mu(+/-) + jets events inproton-proton collisions at root s=8TeV"

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

A search is performed for heavy Majorana neutrinos (N) using an event signature defined by two muons of the same charge and two jets (mu(+/-)mu(+/-)jj). The data correspond to an integrated luminosity of 19.7 fb(-1) of proton-proton collisions at a center-of-mass energy of 8TeV, collected with the CMS detector at the CERN LHC. No excess of events is observed beyond the expected standard model background and upper limits are set on vertical bar V-mu N vertical bar(2) as a function of Majorana neutrino mass mN for masses in the range of 40-500GeV, where V-mu N is the mixing element of the heavy neutrino with the standard model muon neutrino. The limits obtained are vertical bar V-mu N vertical bar(2) < 0.00470 for m(N) = 90GeV, vertical bar V-mu N vertical bar(2) < 0.0123 for m(N) = 200GeV, and vertical bar V-mu N vertical bar(2) < 0.583 for m(N) = 500 GeV. These results extend considerably the regions excluded by previous direct searches.

[P272-2015] "Search for narrow high-mass resonances in proton-proton collisions at root s=8 TeV decaying to a Z and a Higgs boson"

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

A search for a narrow, high-mass resonance decaying into Z and Higgs (H) bosons is presented. The final state studied consists of a merged jet pair and a tau pair resulting from the decays of Z and H bosons, respectively. The analysis is based on a data sample of proton-proton collisions at a center-of mass energy of 8 TeV, collected with the CMS experiment in 2012, and corresponding to an integrated luminosity of 19.7 fb(-1). In the resonance mass range of interest, which extends from 0.8 to 2.5 TeV, the Z and H bosons are produced with large momenta, which implies that the final products of the two quarks or the two tau leptons must be detected within a small angular interval. From a combination of all possible decay modes of the tau leptons, production cross sections in a range between 0.9 and 27.8 fb are excluded at 95% confidence level, depending on the resonance mass.

[P273-2015] "Search for pair-produced resonances decaying to jet pairs 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

Results are reported of a general search for pair production of heavy resonances decaying to pairs of hadronic jets in events with at least four jets. The study is based on up to 19.4 fb(-1) of integrated luminosity from proton-proton collisions at a center-of-mass energy of 8 TeV, recorded with the CMS detector at the LHC. Limits are determined on the production of scalar top quarks (top squarks) in the framework of R-parity violating supersymmetry and on the production of color-octet vector bosons (colorons). First limits at the LHC are placed on top squark production for two scenarios. The first assumes decay to a bottom quark and a light-flavor quark and is excluded for masses between 200 and 385 GeV, and the second assumes decay to a pair of light-flavor quarks and is excluded for masses between 200 and 350 GeV at 95% confidence level. Previous limits on colorons decaying to light-flavor quarks are extended to exclude masses from 200 to 835 GeV.

[P274-2015] "Search for the production of dark matter in association with top-quark pairs in the single-lepton final state 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 particle dark matter produced in association with a pair of top quarks in pp collisions at a centre-of-mass energy of root s = 8TeV. The data were collected with the CMS detector at the LHC and correspond to an integrated luminosity of 19.7 fb(-1). This search requires the presence of one lepton, multiple jets, and large missing transverse energy. No excess of events is found above the SM expectation, and upper limits are derived on the production cross section. Interpreting the findings in the context of a scalar contact interaction between fermionic dark matter particles and top quarks, lower limits on the interaction scale are set. These limits are also interpreted in terms of the dark matter-nucleon scattering cross sections for the spin-independent scalar operator and they complement direct searches for dark matter particles in the low mass region.

[P275-2015] "Search for third-generation scalar leptoquarks in the t tau channel 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 pair production of third-generation scalar leptoquarks decaying to top quark and tau lepton pairs is presented using proton-proton collision data at a center-of-mass energy of root s=8TeV collected with the CMS detector at the LHC and corresponding to an integrated luminosity of 19.7 fb(-1). The search is performed using events that contain an electron or a muon, a hadronically decaying tau lepton, and two or more jets. The observations are found to be consistent with the standard model predictions. Assuming that all leptoquarks decay to a top quark and a tau lepton, the existence of pair produced, charge -1/3, third-generation leptoquarks up to a mass of 685 GeV is excluded at 95% confidence level. This result constitutes the first direct limit for leptoquarks decaying into a top quark and a tau lepton, and may also be applied directly to the pair production of bottom squarks decaying predominantly via the R-parity violating coupling lambda'(333).

[P276-2015] "Searches for third-generation squark production in fully hadronic final states in proton-proton collisions at root s=8 TeV"

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

Searches for third-generation squarks in fully hadronic final states are presented using data samples corresponding to integrated luminosities of 19.4 or 19.7 fb(-1), collected at a centre-of--mass energy of 8 TeV with the CMS detector at the LHC. Three mutually exclusive searches are presented, each optimized for a different decay topology. They include a multijet search requiring one fully reconstructed top quark, a dijet search requiring one or two jets originating from b quarks, and a monojet search. No excesses above the standard model expectations are seen, and limits are set on top and bottom squark production in the context of simplified models of supersymmetry.

[P277-2015] "Self-assembly of NiTPP on Cu(111): a transition from disordered 1D wires to 2D chiral domains"

Fatayer, S.*; Veiga, R. G. A.; **Prieto, M. J.***; **Perim, E.***; **Landers, R.***; Miwa, R. H.; **de Siervo, A.***

The growth and self-assembling properties of nickel-tetraphenyl porphyrins (NiTPP) on the Cu(111) surface are analysed via scanning tunnelling microscopy (STM), X-ray photoelectron spectroscopy (XPS) and density functional theory (DFT). For low coverage, STM results show that NiTPP molecules diffuse on the terrace until they reach the step edge of the copper surface forming a 1D system with disordered orientation along the step edges. The nucleation process into a 2D superstructure was observed to occur via the interaction of molecules attached to the already nucleated 1D structure, reorienting molecules. For monolayer range coverage a 2D nearly squared self-assembled array with the emergence of chiral domains was observed. The XPS results of the Ni 2p(3/2) core levels exhibit a 2.6 eV chemical shift between the mono-and multilayer configuration of NiTPP. DFT calculations show that the observed chemical shifts of Ni 2p(3/2) occur due to the interaction of 3d orbitals of Ni with the Cu(111) substrate.

[P278-2015] "Spectral engineering with coupled microcavities: active control of resonant mode-splitting"

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

Optical mode-splitting is an efficient tool to shape and fine--tune the spectral response of resonant nanophotonic devices. The active control of mode-splitting, however, is either small or accompanied by undesired resonance-shifts, often much larger than the resonance splitting. We report a control mechanism that enables reconfigurable and widely tunable mode splitting while efficiently mitigating undesired resonance shifts. This is achieved by actively controlling the excitation of counter-traveling modes in coupled resonators. The transition from a large splitting (80 GHz) to a single-notch resonance is demonstrated using low-power microheaters (35 mW).

We show that the spurious resonance shift in our device is only limited by thermal crosstalk, and resonance-shift-free splitting control may be achieved.

[P279-2015] "Spectroscopic and laser properties of Er3+ doped fluoro-phosphate glasses as promising candidates for broadband optical fiber lasers and amplifiers"

Babu, S.; **Seshadri, M.***; Prasad, V. Reddy; Ratnakaram, Y. C.

Different fluoro-phosphate glasses doped with 0.5 mol% Er3+ doped are prepared by melt quenching method. Both structural and spectroscopic properties have been characterized in order to evaluate their potential as both laser source and amplifier materials. Optical absorption measurements are carried out and analyzed through Judd-Ofelt and Mc-Cumber theories where spectroscopic parameters such as intensity parameters Omega(i) (lambda = 2,4,6), transition probabilities, radiative lifetimes, stimulated absorption cross-sections and emission cross-sections at 1.5 mu m have been evaluated for Er3+ doped different fluorophosphate glasses. The various luminescence and gain properties are explained from photoluminescence studies. The decay curve analysis have been done for obtaining the decay time constants of Er3+ excited level I-4(13/2) in all the fluoro-phosphate glasses. The obtained results of each glass matrix are compared with the equivalent parameters for several other host glasses. These fluoro-phosphate glasses are found to be suitable candidates for laser and amplifier applications.

[P280-2015] "Sr2Ir1-xRhxO4(x < 0.5): An inhomogeneous j(eff)=1/2 Hubbard system"

Chikara, S.; Haskel, D.; Sim, Jae-Hoon; Kim, Heung-Sik; Chen, Cheng-Chien; Fabbris, G.; **Veiga, L. S. I.***; Souza-Neto, N. M.; Terzic, J.; Butrouna, K.; Cao, G.; Han, M. J.; van Veenendaal, M..

In a combined experimental and theoretical study, we investigate the properties of Sr2Ir1-xRhxO4. From the branching ratios of the L-edge isotropic x-ray absorption spectra, we determine that the spin-orbit coupling is remarkably independent of x for both iridium and rhodium sites. DFT + U calculations show that the doping is close to isoelectronic and introduces impurity bands of predominantly rhodium character close to the lower Hubbard band. Overlap of these two bands leads to metallic behavior. Since the low-energy states for x < 0.5 have predominantly j(eff) = 1/2 character, we suggest that the electronic properties of this material can be described by an inhomogeneous Hubbard model, where the on-site energies change due to local variations in the spin-orbit interaction strength combined with additional changes in binding energy.

[P281-2015] "Strong Electronic Selectivity in the Shallow Core Excitation of the CH2Cl2 Molecule"

Alcantara, K. F.; **Gomes, A. H. A.***; Wolff, W.; Sigaud, L.; Santos, A. C. F.

The photoexcitation and multiphotoionization of the dichloromethane molecule have been studied for photons with energies from 100 eV to the Cl 2p edge, using the time-of--flight multicoincidence technique and synchrotron radiation.

The electronic de-excitation gives rise to one to three electrons and an ionic molecule that decays onto smaller moieties through several fragmentation channels. To discern the channels, sets of fragments have been dispersed in time, measured in coincidence, and recorded as a function of incident photon energy. The chlorine ion, Cl+, has the highest intensity around and above the Cl 2p edge, while the CHnCl+ ion, corresponding to the loss of one neutral chlorine atom, dominates the mass spectra in the valence region. In addition, strong electronic selectivity has been observed for the core-excited molecule.

[P282-2015] "Structural study of Ni-substituted YBaCo4-xNi-xO7 frustrated cobaltites"

Torre, L. M.; Aurelio, G.; **Granado, E.***; Sanchez, R. D.

In this work we report a study of the thermal stability and the evolution of the crystal structure of Ni-substituted YBaCo4-xNi-xO7 cobaltites, for x=0, 0.10 and 0.20. Synchrotron X-ray powder diffraction and thermodiffraction experiments show that the structural transition P31c -> Pbn2(1), which occurs around room temperature for the parent compound, is shifted up to 40 by the partial substitution Ni-for-Co. Moreover, the transition is shown to be of first order with a volume collapse of approximate to 0.05% and an abrupt contraction of the cell along the c-direction. The monoclinic distortion below 100 K reported for the parent compound is also observed in the Ni-substituted samples, suggesting that they also get to order antiferromagnetically below that temperature. Magnetization measurements allowed us to detect a small amount of a ferromagnetic impurity in the sample with x=0.20, indicating that the solubility limit of Ni lies below that value. The magnetic susceptibility in the paramagnetic region, as well as the cell parameters in each crystallographic phase, is not significantly modified by these amounts of Ni substitution, in contrast to the marked enhancement of the P31c phase stability upon substitution.

[P283-2015] "Study of optical absorption, visible emission and NIR-vis luminescence spectra of Tm3+/Yb3+, Ho3+/Yb3+ and Tm3+/Ho3+/Yb3+ doped tellurite glasses"

Seshadri, M.*; **Barbosa, L. C.***; **Cordeiro, C. M. B.***; **Radha, M.***; Sigoli, F. A.; Ratnakaram, Y. C.

Tm3+/Yb3+, Ho3+/Yb3+ co-doped and Tm3+/Ho3+/Yb3+ triply doped TeO2-Bi2O3-ZnO-Li2O-Nb2O5 (TBZLN) tellurite glasses were prepared by melt quenching method. Judd-Ofelt intensity parameters (Omega(lambda), lambda=2, 4 and 6), radiative transition probabilities, branching ratios and radiative lifetimes of Tm3+, Ho3+ ions in co-doped TBZLN glasses were calculated from the optical absorption spectra. Excitation, visible luminescence and decay lifetimes in visible region were also investigated. The stimulated emission and gain cross-sections for the Tm3+:F-3(4) -> H-3(6) (1700 nm) and Ho3+:I-5(7) -> I-5(8) (1956 nm) transitions in co-doped TBZLN glasses have been analyzed and compared with those of other reported glasses. Up-conversion luminescence was observed in TBZLN glasses under 980 nm laser excitation and energy transfer mechanisms have been discussed. Finally, CIE color co-ordinates were calculated and it is observed that the color co-ordinates fall in blue and green regions for Tm3+/Yb3+ and Ho3+/Yb3+ co-doped TBZLN glasses, respectively. A subsequent shift in color co-ordinates from green to greenish-yellow region has been observed with an increase in the concentration (0.1, 0.5 and 1.0 mol%) of Tm3+ ions in Tm3+/Ho3+/Yb3+ triply doped TBZLN glasses.

[P284-2015] "Sustainability assessment of water hyacinth fast pyrolysis in the Upper Paraguay River basin, Brazil"

Buller, L. S.; Ortega, E.; Bergier, I.; Mesa-Perez, J. M.; Salis, S. M.; **Luengo, C. A.***

Fast pyrolysis of naturally produced water hyacinth was assessed through Emergy accounting approach. Two analyses were carried out to evaluate the influence of additional services and externalities on Emergy indicators for a pyrolysis plant unit able to process 1000 kg of dry biomass per hour. The initial approach was a traditional Emergy assessment in which financial fluxes and externalities were not considered. The second approach included taxes and fees of the Brazilian government, interests related to financing operations and assumes a reserve financial fund of 5% of the total investment as externalities cost. For the first evaluation, the renewability of 86% indicates that local and renewable resources mainly support the process and the Emergy Yield Ratio of 3.2 shows that the system has a potential contribution to the regional economy due to the local resources use. The inclusion of financial fluxes and externalities in the second evaluation reduces both renewability and Emergy Yield Ratio, whereas it increases the Emergy Investment Ratio which means a higher dependence on external resources. The second analysis allows portraying significant forces of the industrial and financial systems and the evaluation of the externalities' impact on the general system Emergy behavior. A comparison of the renewability of water hyacinth fast pyrolysis with other biofuels like soybean biodiesel and sugarcane ethanol indicates that the former is less dependent on fossil fuel resources, machinery and fertilizers. To complement the sustainability assessment provided by the Emergy method, a regular financial analysis for the second defined system was done. It shows that the system is financially attractive even with the accounting of additional costs. The results obtained in this study could be used as the maximum and minimum thresholds to subsidize regulatory policies for new economic activities in tropical wetlands involving natural resources exploitation and bio-industrial systems.

[P285-2015] "Testing time reversal symmetry in artificial atoms"

Brito, F.; Rouxinol, F.; LaHaye, M. D.; **Caldeira, A. O.***

Over the past several decades, a rich series of experiments has repeatedly verified the quantum nature of superconducting devices, leading some of these systems to be regarded as artificial atoms. In addition to their application in quantum information processing, these 'atoms' provide a test bed for studying quantum mechanics in macroscopic limits. Regarding the last point, we present here a feasible protocol for directly testing time reversal symmetry (TRS) through the verification of the microreversibility principle in a superconducting artificial atom. TRS is a fundamental property of quantum mechanics and is expected to hold if the dynamics of the artificial atom strictly follow the Schrodinger equation. However, this property has yet to be tested in any macroscopic quantum system. In the end, as an application of this work, we outline how the successful implementation of the protocol would provide the first verification of the quantum work fluctuation theorems with superconducting systems.

[P286-2015] "The circular polarization inversion in delta < Mn >/InGaAs/GaAs light-emitting diodes"

Dorokhin, M. V.; Danilov, Yu. A.; Zvonkov, B. N.; **Gonzalez Balanta, M. A.***; **Brasil, M. J. S. P.***; **Iikawa, F.***; **Mendes, U. C.***; **Brum, J. A.***; Demina, P. B.; Malysheva, E. I.; Zdoroveyshchev, A. V.; Kudrin, A. V.

We investigated light-emitting diodes consisting of an InGaAs/GaAs quantum well adjacent to a ferromagnetic delta < Mn >-layer. The magnetic field-dependent circular polarization obtained from both photo- and electroluminescence shows an unusual sign inversion depending on the growth parameters that can be explained by an interplay of the Zeeman splitting and Mn-hole interaction effects. Our results can help to understand the origin and control of the spin polarization on Mn doped GaAs structures, a fundamental step for the development of Mn-based spintronic devices.

[P287-2015] "The Pierre Auger Cosmic Ray Observatory"

Aab, A.; Abreu, P.; Aglietta, M.; **Chinellato, J. A.***; **Daniel, B.***; **Diaz Castro, M. L.***; **Dobrigkeit, C.***; **Escobar, C. O.***; **Fauth, A. C.***; **Kemp, E.***; **Muller, M. A.***; **PakkSelmi-Dei, D.***; **Santos, E.***; **Theodoro, V. M.***; **Silva, M. Zimbres***; et al.

The Pierre Auger Observatory, located on a vast, high plain in western Argentina, is the world's largest cosmic ray observatory. The objectives of the Observatory are to probe the origin and characteristics of cosmic rays above 10(17) eV and to study the interactions of these, the most energetic particles observed in nature. The Auger design features an array of 1660 water Cherenkov particle detector stations spread over 3000 km(2) overlooked by 24 air fluorescence telescopes. In addition, three high elevation fluorescence telescopes overlook a 23.5 km(2), 61-detector infilled array with 750 in spacing. The Observatory has been in successful operation since completion in 2008 and has recorded data from an exposure exceeding 40,000 km(2) sr yr. This paper describes the design and performance of the detectors, related subsystems and infrastructure that make up the Observatory.

[P288-2015] "Topics in Present-day Science Technology and Innovation: Ultrafast Relaxation Processes in Semiconductors"

Rodrigues, C. G.; **Vasconcellos, A. R.***; **Luzzi, R.***

The nowadays notable development of all the modern technology, fundamental for the progress and well being of world society, imposes a great deal of stress in the realm of basic Physics, more precisely on Thermo-Mechanical Statistics. In electronics and optoelectronics we face situations involving physical-chemical systems far-removed-from equilibrium, where ultrafast (in pico-and femto-second scale) and non-linear processes are present. Here we describe in an extended overview the question of ultrafast relaxation processes in the excited plasma in semiconductors.

[P289-2015] "Zirconia-Nanoparticle-Reinforced Morphology-Engineered Graphene-Based Foams"

Chakravarty, D.; Tiwary, C. S.; **Machado, L. D.***; **Brunetto, G.***; Vinod, S.; Yadav, R. M.; **Galvao, D. S.***; Joshi, S. V.; Sundararajan, G.; Ajayan, P. M.

The morphology of graphene-based foams can be engineered by reinforcing them with nanocrystalline zirconia, thus improving their oil-adsorption capacity; This can be observed experimentally and explained theoretically. Low zirconia fractions yield flaky microstructures where zirconia nanoparticles arrest propagating cracks. Higher zirconia concentrations possess a mesh-like interconnected structure where the degree of coiling is dependant on the local zirconia content.

[P290-2015] "Revivendo o estereoscopio de Wheatstone"

Lunazzi, J. J.*; Franca, M. C.; Mori, A. S.

Descrevemos a montagem de um estereoscopio com dois espelhos, muito similar ao primeiro da historia, mas com a grande vantagem de usarmos imagens digitais em telas de cristal lquido. Com ele surpreendemos o publico, que n~ao imagina que pode ver 3D sem precisar de oculos especcos, nem que algo t~ao simples e antigo n~ao seja bem conhecido. Atualmente, quando e comum colocar dois monitores num unico computador, a montagem se mostra bem simples.

Proceedings

[P291-2015] "A new method for computing the quark-gluon vertex"

Aguilar, A. C.*

In this talk we present a new method for determining the nonperturbative quark-gluon vertex, which constitutes a crucial ingredient for a variety of theoretical and phenomenological studies. This new method relies heavily on the exact all-order relation connecting the conventional quark-gluon vertex with the corresponding vertex of the background field method, which is Abelian-like. The longitudinal part of this latter quantity is fixed using the standard gauge technique, whereas the transverse is estimated with the help of the so-called transverse Ward identities. This method allows the approximate determination of the nonperturbative behavior of all twelve form factors comprising the quark-gluon vertex, for arbitrary values of the momenta. Numerical results are presented for the form factors in three special kinematical configurations (soft gluon and quark symmetric limit, zero quark momentum), and compared with the corresponding lattice data.

[P292-2015] "Exploring cosmic rays at the highest-energy frontier with the Pierre Auger Observatory"

Dobrigkeit, C.*;
Pierre Auger Collaboration

The Pierre Auger Observatory studies the most energetic cosmic rays arriving at Earth, those with energies from 10(17) eV up to 10(20) eV and beyond. In continuous operation since 2004, the Observatory employs two complementary detection techniques for measuring air showers induced by those extremely energetic particles. For the past few years new detectors and techniques are being added in order to augment the sensitivity of the measurements. Data accumulated in ten years have led to major advances in our knowledge of the origin and nature of cosmic rays. We present a summary of the latest results for the spectrum of cosmic rays, their arrival directions and composition, as well as the challenges for the future operation of the Observatory.

[P293-2015] "Hydrodynamics from Landau initial conditions"

Sen, A.; Gerhard, J.; **Torrieri, G.***; Read, K.; Wong, C. Y.; Iop

We investigate ideal hydrodynamic evolution, with Landau initial conditions, both in a semi-analytical 1+1D approach and in a numerical code incorporating event-by-event variation with many events and transverse density inhomogeneities. The object of the calculation is to test how fast would a Landau initial condition transition to a commonly used boost-invariant expansion. We show that the transition to boost-invariant flow occurs too late for realistic setups, with corrections of O (20 - 30%) expected at freezeout for most scenarios. Moreover, the deviation from boost-invariance is correlated with both transverse flow and elliptic flow, with the more highly transversely flowing regions also showing the most violation of boost invariance. Therefore, if longitudinal flow is not fully developed at the early stages of heavy ion collisions, 2+1 dimensional hydrodynamics is inadequate to extract transport coefficients of the quark-gluon plasma. Based on [1, 2]

[P294-2015] "Increased metabolic activity detected by FLIM in human breast cancer cells with desmoplastic reaction: a pilot study"

Natal, R. de A.; **Pelegati, V. B.***; Bondarik, C.; Mendonca, G. R.; Derchain, S. F.; Lima, C. P.; **Cesar, C. L.***; Sarian, L. O.; Vassallo, J.

Introduction: In breast cancer (BC), desmoplastic reaction, assembled primarily by fibroblasts, is associated with unfavorable prognosis, but the reason of this fact remains still unclear. In this context, nonlinear optics microscopy, including Fluorescence Lifetime Imaging Microscopy (FLIM), has provided advancement in cellular metabolism research. In this paper, our purpose is to differentiate BC cells metabolism with or without contact to desmoplastic reaction. Formalin fixed, paraffin embedded samples were used at different points of hematoxylin stained sections. Methodology: Sections from 14 patients with invasive ductal breast carcinoma were analyzed with FLIM methodology to NAD(P)H and FAD fluorescence lifetime on a Confocal Upright LSM780 NLO device (Carl Zeiss AG, Germany). Quantification of the fluorescence lifetime and fluorescence intensity was evaluated by SPC Image software (Becker & Hickl) and ImageJ (NIH), respectively. Optical redox ratio was calculated by dividing the FAD fluorescence intensity by NAD(P) H fluorescence intensity. Data value for FLIM measurements and fluorescence intensities were calculated using Wilcoxon test; $p < 0.05$ was considered significant. Results: BC cells in contact with desmoplastic reaction presented a significantly lower NAD(P) H and FAD fluorescence lifetime. Furthermore, optical redox ratio was also lower in these tumor cells. Conclusion: Our results suggest that contact of BC cells with desmoplastic reaction increase their metabolic activity, which might explain the adverse prognosis of cases associated with higher peritumoral desmoplastic reaction.

Trabalhos Aceitos

[A002-2015] "Architectured materials: Straining to expand entanglements"

Baughman, R. H.; **Fonseca, A. F.***

Porous solids comprising a self-entangled coiled polymer fibre or metal wire reversibly increase their volume when either stretched or compressed in an axial direction, possibly providing a new type of mechanical behaviour for tuning functional properties.

*Autores da comunidade IFGW

Patentes

[Pa004-2015] "Processo de modificação de superfície metálicas por plasma de nitrôgênio e deutério"

Fernando Alvarez*; Carlos Alejandro Figueroa

Número da Patente ou Registro: Agência INOVA: PI0304011-9
Tipo: Patente de Invenção
Mês/Ano de Conclusão: 02/2015 - INPI/BBRASIL

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

Capítulos de Livros

[Ca001-2015] "On how Cupisnique and Olmed Mirrors would have been Employed"

LUNAZZI, J. J.*

In: GALLAGA, Emiliano; BLAINEY, Marc G. (Ed.). Manufactured light: mirrors in the Mesoamerican realm. Boulder, CO: University Press Of Colorado, 2015. Cap. 6. ISBN: 978-160732407-2.

Defesas de Dissertações

[D020-2015] "Pentes de frequências ópticas baseados em moduladores eletro-ópticos e fibras altamente não lineares"
Aluno: Jose Luis Saquinaula Brito
Orientador: Prof. Dr. Flavio Caldas da Cruz
Data: 08/10/2015

Defesas de Teses

[T013-2015] "Integrabilidade e Ressonâncias: Aplicações e métodos de Melnikov e de continuação numérica"
Aluno: Gabriela Iunes Depetri
Orientador: Prof. Dr. Alberto Saa
Data: 25/09/2015

[T014-2015] "Líquidos polimórficos e Transições de Fase em Líquidos Confinados através de Simulações Atomísticas"
Aluno: Oscar Samuel C Macollunco
Orientador: Prof. Dr. Alex Antonelli
Data: 16/10/2015

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