

Abstracta

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Trabalhos Publicados

[P273-2014] "Alignment of the CMS tracker with LHC and cosmic ray data"

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

The central component of the CMS detector is the largest silicon tracker ever built. The precise alignment of this complex device is a formidable challenge, and only achievable with a significant extension of the technologies routinely used for tracking detectors in the past. This article describes the full-scale alignment procedure as it is used during LHC operations. Among the specific features of the method are the simultaneous determination of up to 200 000 alignment parameters with tracks, the measurement of individual sensor curvature parameters, the control of systematic misalignment effects, and the implementation of the whole procedure in a multiprocessor environment for high execution speed. Overall, the achieved statistical accuracy on the module alignment is found to be significantly better than 10 μ m.

Journal Of Instrumentation 9, P06009, 2014. DOI: 10.1088/1748-0221/9/06/P06009

[P274-2014] "An experimental and theoretical investigation into the excited electronic states of phenol"

Jones, D. B.; da Silva, G. B.; Neves, R. F. C.; Duque, H. V.; Chiari, L.; de Oliveira, E. M.*; Lopes, M. C. A.; da Costa, R. F.; Varella, M. T. N.; Bettiga, M. H. F.; Lima, M. A. P.*; Brunger, M. J.

We present experimental electron-energy loss spectra (EELS) that were measured at impact energies of 20 and 30 eV and at angles of 90 degrees and 10 degrees, respectively, with energy resolution similar to 70 meV. EELS for 250 eV incident electron energy over a range of angles between 3 degrees and 50 degrees have also been measured at a moderate energy resolution (similar to 0.9 eV). The latter spectra were used to derive differential cross sections and generalised oscillator strengths (GOS) for the dipole-allowed electronic transitions, through normalization to data for elastic electron scattering from benzene. Theoretical calculations were performed using time-dependent density functional theory and single-excitation configuration interaction methods. These calculations were used to assign the experimentally measured spectra. Calculated optical oscillator strengths were also compared to those derived from the GOS data. This provides the first investigation of all singlet and triplet excited electronic states of phenol up to the first ionization potential

Journal Of Chemical Physics 141[7], 074314, 2014. DOI: 10.1063/1.4893116

[P275-2014] "Atomic Structure of Cr2O3/Ag(111) and Pd/Cr2O3/Ag(111) Surfaces: A Photoelectron Diffraction Investigation"

Kilian, A. S.; Bernardi, F.; Pancotti, A.; Landers, R.*; de Siervo, A.*; Morais, J.

A detailed investigation concerning the atomic structure of Cr2O3 and Pd/Cr2O3 ultrathin films deposited on a Ag(111) single crystal is presented. The films were prepared by MBE (molecular beam epitaxy) and characterized in situ by LEED (low energy electron diffraction), XPS (X-ray photoelectron spectroscopy), and XPD (X-ray photoelectron diffraction). Evidences of rotated domains and an oxygen-terminated Cr2O3/Ag(111) surface were observed,

along with significant contractions of the oxide's outermost interlayer distances. The deposition of Pd atoms on the Cr2O3 surface formed a four-monolayer film, fcc packed and oriented in the [111] direction, which presented changes in monolayer spacing and lateral atomic distance compared to the expected values for bulk Pd. The observed surface structure may shed light on new physical properties such as the induced magnetic ordering in Pd atoms.

Journal Of Physical Chemistry C 118[35], 20452-20460, 2014. DOI: 10.1021/jp506507e

[P276-2014] "Beam Energy Dependence of Moments of the Net-Charge Multiplicity Distributions in Au plus Au Collisions at RHIC"

Adamczyk, L.; Adkins, J. K.; Agakishiev, G.; de Souza, R. Der-radi*; Takahashi, J.*; Vasconcelos, G. M. S.*; et al.

We report the first measurements of the moments-mean (M), variance (σ^2), skewness (S), and kurtosis (κ)-of the net-charge multiplicity distributions at midrapidity in Au + Au collisions at seven energies, ranging from $\sqrt{s(NN)} = 7.7$ to 200 GeV, as a part of the Beam Energy Scan program at RHIC. The moments are related to the thermodynamic susceptibilities of net charge, and are sensitive to the location of the QCD critical point. We compare the products of the moments, σ^2/M , S/σ , and κ/σ^2 , with the expectations from Poisson and negative binomial distributions (NBDs). The S/σ values deviate from the Poisson baseline and are close to the NBD baseline, while the κ/σ^2 values tend to lie between the two. Within the present uncertainties, our data do not show nonmonotonic behavior as a function of collision energy. These measurements provide a valuable tool to extract the freeze-out parameters in heavy-ion collisions by comparing with theoretical models.

Physical Review Letters 113[9], 092301, 2014. DOI: 10.1103/PhysRevLett.113.092301

[P277-2014] "Capacitive coupling of two transmission line resonators mediated by the phonon number of a nanoelectromechanical oscillator"

de Sa Neto, O. P.*; de Oliveira, M. C.*; Nicacio, F.*; Milburn, G. J.

Detection of quantum features in mechanical systems at the nanoscale constitutes a challenging task, given the weak interaction with other elements and the available technology. Here we describe the interaction between two monomodal transmission-line resonators (TLRs) mediated by vibrations of a nanoelectromechanical oscillator. This scheme is then employed for quantum nondemolition detection of the number of phonons in the nanoelectromechanical oscillator through a direct current measurement in the output of one of the TLRs. For that to be possible an undepleted field inside one of the TLRs works as an amplifier for the interaction between the mechanical resonator and the remaining TLR. We also show how the nonclassical nature of this system can be used for generation of tripartite entanglement and conditioned mechanical coherent superposition states, which may be further explored for detection processes.

Physical Review A 90[2], 023843, 2014. DOI: 10.1103/PhysRevA.90.023843

[P278-2014] "Communication: Transient anion states of phenol center dot center dot center dot(H2O)(n) (n=1, 2) complexes: Search for microsolvation signatures"

de Oliveira, E. M.*; Freitas, T. C.; Coutinho, K.; Varella, M. T. D.; Canuto, S.; Lima, M. A. P.*; Bettega, M. H. F.

We report on the shape resonance spectra of phenol-water clusters, as obtained from elastic electron scattering calculations. Our results, along with virtual orbital analysis, indicate that the well-known indirect mechanism for hydrogen elimination in the gas phase is significantly impacted on by microsolvation, due to the competition between vibronic couplings on the solute and solvent molecules. This fact suggests how relevant the solvation effects could be for the electron-driven damage of biomolecules and the biomass delignification [E. M. de Oliveira et al., Phys. Rev. A 86, 020701(R) (2012)]. We also discuss microsolvation signatures in the differential cross sections that could help to identify the solvated complexes and access the composition of gaseous admixtures of these species.

Journal Of Chemical Physics 141[5], 051105, 2014. DOI: 10.1063/1.4892066

[P279-2014] "Competing anisotropies on 3d sub-lattice of YNi_{4-x}CoxB compounds"

Vivas, R. J. C.; Rocco, D. L.; Soares, T. C.; Caldeira, L.; Coelho, A. A.*; Reis, M. S.

The magnetic anisotropy of 3d sub-lattices has an important rule on the overall magnetic properties of hard magnets. Intermetallics alloys with boron (R-Co/Ni-B, for instance) belong to those hard magnets family and are useful objects to help to understand the magnetic behavior of 3d sub-lattice, specially when the rare earth ions R do not have magnetic nature, like YCo₄B ferromagnetic material. Interestingly, YNi₄B is a paramagnetic material and Ni ions do not contribute to the magnetic anisotropy. We focused therefore our attention to YNi_{4-x}CoxB series, with x = 0, 1, 2, 3, and 4. The magnetic anisotropy of these compounds is deeper described using statistical and preferential models of Co occupation among the possible Wyckoff positions into the CeCo₄B type hexagonal structure. We found that the preferential model is the most suitable to explain the magnetization experimental data.

Journal Of Applied Physics 116[6], 063907, 2014. DOI: 10.1063/1.4892677

[P280-2014] "Constraints on the Higgs boson width from off-shell production and decay to Z-boson pairs"

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

Constraints are presented on the total width of the recently discovered Higgs boson, $\Gamma(H)$, using its relative on-shell and off-shell production and decay rates to a pair of Z bosons, where one Z boson decays to an electron or muon pair, and the other to an electron, muon, or neutrino pair. The analysis is based on the data collected by the CMS experiment at the LHC in 2011 and 2012, corresponding to integrated luminosities of 5.1 fb⁻¹ at a center-of-mass energy $\sqrt{s} = 7$ TeV and 19.7 fb⁻¹ at $\sqrt{s} = 8$ TeV. A simultaneous maximum likelihood fit to the measured kinematic distributions near the resonance peak and above the Z-boson pair production threshold leads to an upper limit on the Higgs boson width of $\Gamma(H) < 22$ MeV at a 95% confidence level, which is 5.4 times the expected value in the standard model at the measured mass of $m(H) = 125.6$ GeV.

Physics Letters B 736, 64-85, 2014. DOI: 10.1016/j.physletb.2014.06.077

[P281-2014] "Determination of the magnetocaloric entropy change by field sweep using a heat flux setup"

Monteiro, J. C. B.*; dos Reis, R. D.*; Mansanares, A. M.*; Gandra, F. G.*

We report on a simple setup using a heat flux sensor adapted to a Quantum Design Physical Property Measurement System to determine the magnetocaloric entropy change (ΔS). The major differences for the existing setups are the simplicity of this assembly and the ease to obtain the isothermal entropy change either by a field sweep or a temperature sweep process. We discuss the use of these two processes applied to Gd and Gd₅Ge₂Si₂ samples. The results are compared to the temperature sweep measurements and they show the advantages of this setup and of the field sweep procedure. We found a significant reduction of DS and on the refrigerating cooling power (RCP) at low field changes in a field sweep process when the sample is not driven to the same initial state for each temperature. We show that the field sweep process without any measuring protocol is the only correct way to experimentally determine DS and RCP for a practical regenerative refrigerator.

Applied Physics Letters 105[7], 074104, 2014. DOI: 10.1063/1.4894004

[P282-2014] "Diffusion-controlled reactions modeling in Geant4-DNA"

Karamitros, M.; Luan, S.; Bernal, M. A.*; Allison, J.; Baldacchino, G.; Davidkova, M.; Francis, Z.; Friedland, W.; Ivantchenko, V.; Ivantchenko, A.; Mantero, A.; Nieminem, P.; Santin, G.; Tran, H. N.; Stepan, V.; Incerti, S.

Context Under irradiation, a biological system undergoes a cascade of chemical reactions that can lead to an alteration of its normal operation. There are different types of radiation and many competing reactions. As a result the kinetics of chemical species is extremely complex. The simulation becomes then a powerful tool which, by describing the basic principles of chemical reactions, can reveal the dynamics of the macroscopic system. To understand the dynamics of biological systems under radiation, since the 80s there have been on-going efforts carried out by several research groups to establish a mechanistic model that consists in describing all the physical, chemical and biological phenomena following the irradiation of single cells. This approach is generally divided into a succession of stages that follow each other in time: (1) the physical stage, where the ionizing particles interact directly with the biological material; (2) the physico-chemical stage, where the targeted molecules release their energy by dissociating, creating new chemical species; (3) the chemical stage, where the new chemical species interact with each other or with the biomolecules; (4) the biological stage, where the repairing mechanisms of the cell come into play. This article focuses on the modeling of the chemical stage. Method This article presents a general method of speeding-up chemical reaction simulations in fluids based on the Smoluchowski equation and Monte-Carlo methods, where all molecules are explicitly simulated and the solvent is treated as a continuum. The model describes diffusion-controlled reactions. This method has been implemented in Geant4-DNA. The keys to the new algorithm include: (1) the combination of a method to compute time steps dynamically with a Brownian bridge process to account for chemical reactions, which avoids costly fixed time step simulations; (2) a k-d tree data structure for quickly locating, for a given molecule, its closest reactants. The performance advantage is presented in terms of complexity, and the accuracy of the new algorithm is demonstrated by simulating radiation chemistry in the context of the Geant4-DNA project. Application The time-dependent radiolytic yields of the main chemical species formed after irradiation are computed for incident protons at different energies (from 50 MeV to 500 keV). Both the time-evolution and energy dependency of the yields are discussed.

The evolution, at one microsecond, of the yields of hydroxyls and solvated electrons with respect to the linear energy transfer is compared to theoretical and experimental data. According to our results, at high linear energy transfer, modeling radiation chemistry in the trading compartment representation might be adopted.

Journal Of Computational Physics 274, 841-882, 2014. DOI: 10.1016/j.jcp.2014.06.011

[P283-2014] “Effect of the synthesis atmosphere on the magnetic and structural properties of TbMnO₃ multiferroic polycrystals”

Dias, G. S.; Silveira, L. G. D.; Cotica, L. F.; Santos, I. A.; Coelho, A. A.*; Garcia, D.; Eirasc, J. A.; Sampaio, J. A.

Nanostructured orthorhombic TbMnO₃ polycrystals were synthesized by high-energy ball milling and annealing in Ar or O₂ atmospheres. Oxygen annealed samples show shrunken unit cells in comparison with Ar annealed ones, without Mn valence changes in both cases. Magnetic and dielectric investigations show strong evidence of long-range (43 K) and quasi-long-range (9 K) ordering for Mn and Tb ions, respectively, and a noncollinear spin-spiral magnetic ordering of Mn spins, with higher magnetic response and ferroelectric state for argon synthesized samples.

Scripta Materialia 89, 65-68, 2014. DOI: 10.1016/j.scriptamat.2014.06.028

[P284-2014] “Effects of Be acceptors on the spin polarization of carriers in p-i-n resonant tunneling diodes”

Awan, I. T.; Galeti, H. V. A.; Gobato, Y. G.; Brasil, M. J. S. P.*; Taylor, D.; Henini, M.

In this paper, we have investigated the effect of Be acceptors on the electroluminescence and the spin polarization in GaAs/AlAs p-i-n resonant tunneling diodes. The quantum well emission comprise two main lines separated by similar to 20meV attributed to excitonic and Be-related transitions, which intensities show remarkably abrupt variations at critical voltages, particularly at the electron resonant peak where it shows a high-frequency bistability. The circular-polarization degree of the quantum-well electroluminescence also shows strong and abrupt variations at the critical bias voltages and it attains relatively large values (of similar to-75% at 15 T). These effects may be explored to design novel devices for spintronic applications such as a high-frequency spin-oscillators.

Journal Of Applied Physics 116[5], 054506, 2014. DOI: 10.1063/1.4891996

[P285-2014] “Electron-electron interaction mediated indirect coupling of electron and magnetic ion or nuclear spins in self-assembled quantum dots”

Mendes, U. C.*; Korkusinski, M.; Hawrylak, P.

We show here the existence of the indirect coupling of electron and magnetic or nuclear ion spins in self-assembled quantum dots mediated by electron-electron interactions. With a single localized spin placed in the center of the dot, only the spins of electrons occupying the zero angular momentum states couple directly to the localized spin. We show that when the electron-electron interactions are included, the electrons occupying finite angular momentum orbitals interact with the localized spin. This effective interaction is obtained using exact diagonalization of the microscopic Hamiltonian as a function of the number of electronic shells,

shell spacing, and anisotropy of the electron-Mn exchange interaction. The effective interaction can be engineered to be either ferromagnetic or antiferromagnetic by tuning the parameters of the quantum dot.

Physical Review B 89[19], 195308, 2014. DOI: 10.1103/PhysRevB.89.195308

[P286-2014] “Eliminating anchor loss in optomechanical resonators using elastic wave interference”

Zhang, M. A.; Luiz, G.*; Shah, S.; Wiederhecker, G.*; Lipson, M.

Optomechanical resonators suffer from the dissipation of mechanical energy through the necessary anchors enabling the suspension of the structure. Here, we show that such structural loss in an optomechanical oscillator can be almost completely eliminated through the destructive interference of elastic waves using dual-disk structures. We also present both analytical and numerical models that predict the observed interference of elastic waves. Our experimental data reveal unstressed silicon nitride (Si₃N₄) devices with mechanical Q-factors up to 10(4) at mechanical frequencies of $f = 102$ MHz ($f_Q = 10(12)$) at room temperature.

Applied Physics Letters 105[5], 051904, 2014. DOI: 10.1063/1.4892417

[P287-2014] “Estimating nonlinear QCD effects in ultrahigh energy neutrino events at IceCube”

Goncalves, V. P.; Gratieri, D. R.*

The number of ultrahigh energy events at IceCube is estimated, for the first time, taking into account nonlinear QCD effects in the neutrino-hadron cross section. We assume that the extragalactic neutrino flux is given by $\Phi(\nu)(E-\nu) = \Phi E^{-0(\nu)-2}$ and estimate the neutrino-hadron cross section using the dipole approach and a phenomenological model for the dipole-hadron cross section based on nonlinear QCD dynamics. We demonstrate that the nonlinear prediction is able to describe the current IceCube data and that the magnitude of the nonlinear effects is larger than 20% for visible energies of order of 2 PeV and increases with the neutrino energy. Our main conclusion is that the nonlinear QCD effects are non-negligible and should be taken into account in the analysis of the number of ultrahigh energy events.

Physical Review D 90[5], 057502, 2014. DOI: 10.1103/PhysRevD.90.057502

[P288-2014] “Integrated polarizers based on tapered highly birefringent photonic crystal fibers”

Romagnoli, P.; Biazoli, C. R.*; Franco, M. A. R.; Cordeiro, C. M. B.*; de Matos, C. J. S.

This paper proposes and demonstrates the creation of sections with a high polarization dependent loss (PDL) in a commercial highly birefringent (polarization maintaining) photonic crystal fiber (PCF), via tapering with pressure applied to the holes. The tapers had a 1-cm-long uniform section with a 66% scale reduction, in which the original microstructure aspect ratio was kept by the pressure application. The resulting waveguides show polarizing action across the entire tested wavelength range, 1510-1600 nm, with a peak PDL of 35.3 dB/cm (c.f. similar to 1 dB/cm for a typical commercial polarizing fiber). The resulting structure, as well as its production, is extremely simple,

and enable a small section with a high PDL to be obtained in a polarization maintaining PCF, meaning that the polarization axes in the polarizing and polarization maintaining sections are automatically aligned.

Optics Express 22[15], 17769-17775, 2014. DOI: 10.1364/OE.22.017769

[P289-2014] “J/psi production at low p(T) in Au plus Au and Cu plus Cu collisions at root s(NN)=200 GeV with the STAR detector”

Adamczyk, L.; Adkins, J. K.; Agakishiev, G.; de Souza, R. Derradi*; Takahashi, J.*; Vasconcelos, G. M. S.*; et al.
Autor(es) grupo: STAR Collaboration

The J/psi p(T) spectrum and nuclear modification factor (R-AA) are reported for p(T) < 5 GeV/c and vertical bar y vertical bar < 1 from 0% to 60% central Au + Au and Cu + Cu collisions at root s(NN) = 200 GeV at STAR. A significant suppression of p(T) - integrated J/psi production is observed in central Au + Au events. The Cu + Cu data are consistent with no suppression, although the precision is limited by the available statistics. R-AA in Au + Au collisions exhibits a strong suppression at low transverse momentum and gradually increases with p(T). The data are compared to high-p(T) STAR results and previously published BNL Relativistic Heavy Ion Collider results. Comparing with model calculations, it is found that the invariant yields at low p(T) are significantly above hydrodynamic flow predictions but are consistent with models that include color screening and regeneration.

Physical Review C 90[2], 024906, 2014. DOI: 10.1103/PhysRevC.90.024906

[P290-2014] “Low-density three-dimensional foam using self-reinforced hybrid two-dimensional atomic layers”

Vinod, S.; Tiwary, C. S.; Autreto, P. A. D.*; Taha-Tijerina, J.; Ozden, S.; Chipara, A. C.; Vajtai, R.; Galvao, D. S.*; Narayanan, T. N.; Ajayan, P. M.

Low-density nanostructured foams are often limited in applications due to their low mechanical and thermal stabilities. Here we report an approach of building the structural units of three-dimensional (3D) foams using hybrid two-dimensional (2D) atomic layers made of stacked graphene oxide layers reinforced with conformal hexagonal boron nitride (h-BN) platelets. The ultra-low density (1/400 times density of graphite) 3D porous structures are scalably synthesized using solution processing method. A layered 3D foam structure forms due to presence of h-BN and significant improvements in the mechanical properties are observed for the hybrid foam structures, over a range of temperatures, compared with pristine graphene oxide or reduced graphene oxide foams. It is found that domains of h-BN layers on the graphene oxide framework help to reinforce the 2D structural units, providing the observed improvement in mechanical integrity of the 3D foam structure.

Nature Communications 5, 4541, 2014. DOI: 10.1038/ncomms5541

[P291-2014] “Measurement of jet fragmentation in PbPb and pp collisions at root s(NN)=2.76 TeV”

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

The jet fragmentation function of inclusive jets with transverse momentum p(T) above 100 GeV/c in PbPb collisions has been measured using reconstructed charged particles with p(T) above 1 GeV/c in a cone of radius 0.3 around the jet axis. A data sample of PbPb collisions collected in 2011 at a nucleon-nucleon center-of-mass energy of root s(NN) = 2.76 TeV corresponding to an integrated luminosity of 150 mu b(-1) is used. The results for PbPb collisions as a function of collision centrality and jet transverse momentum are compared to reference distributions based on pp data collected at the same center-of-mass energy in 2013, with an integrated luminosity of 5.3 pb(-1). A centrality-dependent modification of the fragmentation function is found. For the most central collisions, a significant enhancement is observed in the PbPb/pp fragmentation function ratio for charged particles with p(T) less than 3 GeV/c. This enhancement is observed for all jet p(T) bins studied.

Physical Review C 90[2], 024908, 2014. DOI: 10.1103/PhysRevC.90.024908

[P292-2014] “Measurement of jet multiplicity distributions in t(t)over-bar production in pp collisions at root s=7TeV”

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

The normalised differential top quark-antiquark production cross section is measured as a function of the jet multiplicity in proton-proton collisions at a centre-of-mass energy of 7 TeV at the LHC with the CMS detector. The measurement is performed in both the dilepton and lepton+jets decay channels using data corresponding to an integrated luminosity of 5.0 fb(-1). Using a procedure to associate jets to decay products of the top quarks, the differential cross section of the t (t) over bar production is determined as a function of the additional jet multiplicity in the lepton+jets channel. Furthermore, the fraction of events with no additional jets is measured in the dilepton channel, as a function of the threshold on the jet transverse momentum. The measurements are compared with predictions from perturbative quantum chromodynamics and no significant deviations are observed.

European Physical Journal C 74[8], 3014, 2014. DOI: 10.1140/epjc/s10052-014-3014-0

[P293-2014] “Measurement of Longitudinal Spin Asymmetries for Weak Boson Production in Polarized Proton-Proton Collisions at RHIC”

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

We report measurements of single- and double-spin asymmetries for W+/- and Z/gamma* boson production in longitudinally polarized p + p collisions at root s = 510 GeV by the STAR experiment at RHIC. The asymmetries for W+/- were measured as a function of the decay lepton pseudorapidity, which provides a theoretically clean probe of the proton's polarized quark distributions at the scale of the W mass. The results are compared to theoretical predictions, constrained by polarized deep inelastic scattering measurements, and show a preference for a sizable, positive up antiquark polarization in the range 0.05 < x < 0.2.

Physical Review Letters 113[7], 072301, 2014. DOI: 10.1103/PhysRevLett.113.072301

[P294-2014] “Measurement of quarkonium production at forward rapidity in collisions at TeV”

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

The inclusive production cross sections at forward rapidity of $\rho(770)$, $\rho(1450)$ and $\rho(2100)$ are measured in collisions at $\sqrt{s} = 2.76$ TeV with the ALICE detector at the LHC. The analysis is based on a data sample corresponding to an integrated luminosity of 1.35 pb. Quarkonia are reconstructed in the dimuon-decay channel and the signal yields are evaluated by fitting the invariant mass distributions. The differential production cross sections are measured as a function of the transverse momentum and rapidity, over the ranges $0.5 < p_T < 1.5$ GeV/c for $\rho(770)$ and for all other resonances and for $0.5 < p_T < 1.5$ GeV/c. The measured cross sections integrated over p_T and y , and assuming unpolarized quarkonia, are: b , b , nb and nb , where the first uncertainty is statistical and the second one is systematic. The results are compared to measurements performed by other LHC experiments and to theoretical models.

European Physical Journal C 74[8], 2974, 2014. DOI: 10.1140/epjc/s10052-014-2974-4

[P295-2014] “Measurement of the muon charge asymmetry in inclusive $pp \rightarrow W$ plus X production at $\sqrt{s} = 7$ TeV and an improved determination of light parton distribution functions”

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

Measurements of the muon charge asymmetry in inclusive $pp \rightarrow W + X$ production at $\sqrt{s} = 7$ TeV are presented. The data sample corresponds to an integrated luminosity of 4.7 fb⁻¹ recorded with the CMS detector at the LHC. With a sample of more than 20 million $W \rightarrow \mu \nu$ events, the statistical precision is greatly improved in comparison to previous measurements. These new results provide additional constraints on the parton distribution functions of the proton in the range of the Bjorken scaling variable x from 10^{-3} to 10^{-1} . These measurements and the recent CMS measurement of associated $W + \text{charm}$ production are used together with the cross sections for inclusive deep inelastic $e(\pm) p$ scattering at HERA in a next-to-leading-order QCD analysis. The determination of the valence quark distributions is improved, and the strange-quark distribution is probed directly through the leading-order process $g + s \rightarrow W + c$ in proton-proton collisions at the LHC.

Physical Review D 90[3], 032004, 2014. DOI: 10.1103/PhysRevD.90.032004

[P296-2014] “Measurement of the ratio $B(t \rightarrow Wb)/B(t \rightarrow Wq)$ in pp collisions at $\sqrt{s} = 8$ TeV”

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

The ratio of the top-quark branching fractions $R = B(t \rightarrow Wb)/B(t \rightarrow Wq)$, where the denominator includes the sum over all down-type quarks ($q = b, s, d$), is measured in the t (\bar{t}) over dilepton final state with proton-proton collision data at $\sqrt{s} = 8$ TeV from an integrated luminosity of 19.7 fb⁻¹, collected with the CMS detector. In order to quantify the purity of the signal sample, the cross section is measured by fitting the observed jet multiplicity, thereby constraining the signal and background contributions. By counting the number of b jets per event, an unconstrained value of $R = 1.014 \pm 0.003$ (stat.) ± 0.032 (syst.) is measured, in a good agreement with current precision measurements in electroweak and flavour sectors. A lower limit $R > 0.955$ at the 95% confidence level is obtained after requiring $R \leq 1$,

and a lower limit on the Cabibbo-Kobayashi-Maskawa matrix element $|V_{tb}| > 0.975$ is set at 95% confidence level. The result is combined with a previous CMS measurement of the t -channel single-top-quark cross section to determine the top-quark total decay width, $\Gamma(t) = 1.36 \pm 0.02$ (stat.) ± 0.14 (syst.) GeV.

Physics Letters B 736, 33-57, 2014. DOI: 10.1016/j.physletb.2014.06.076

[P297-2014] “Measurement of WZ and ZZ production in pp collisions at $\sqrt{s} = 8$ TeV in final states with b -tagged jets”

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

Measurements are reported of the WZ and ZZ production cross sections in proton-proton collisions at $\sqrt{s} = 8$ TeV in final states where one Z boson decays to b -tagged jets. The other gauge boson, either W or Z, is detected through its leptonic decay (either $e\mu$, $e\tau$, or $\mu\tau$). The results are based on data corresponding to an integrated luminosity of 18.9 fb collected with the CMS detector at the Large Hadron Collider. The measured cross sections, and σ_{ZZ} , are consistent with next-to-leading order quantum chromodynamics calculations.

European Physical Journal C 74[8], 2973, 2014. DOI: 10.1140/epjc/s10052-014-2973-5

[P298-2014] “Mechanical properties and fracture dynamics of silicene membranes”

Botari, T.*; Perim, E.*; Autreto, P. A. S.*; van Duin, A. C. T.; Paupitz, R.; Galvao, D. S.*

As graphene has become one of the most important materials, there is renewed interest in other similar structures. One example is silicene, the silicon analogue of graphene. It shares some of the remarkable graphene properties, such as the Dirac cone, but presents some distinct ones, such as a pronounced structural buckling. We have investigated, through density functional based tight-binding (DFTB), as well as reactive molecular dynamics (using ReaxFF), the mechanical properties of suspended single-layer silicene. We calculated the elastic constants, analyzed the fracture patterns and edge reconstructions. We also addressed the stress distributions, unbuckling mechanisms and the fracture dependence on the temperature. We analysed the differences due to distinct edge morphologies, namely zigzag and armchair.

Physical Chemistry Chemical Physics 16[36], 19417-19423, 2014. DOI: 10.1039/c4cp02902j

[P299-2014] “New method for determining the quark-gluon vertex”

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

We present a novel nonperturbative approach for calculating the form factors of the quark-gluon vertex in terms of an unknown three-point function, in the Landau gauge. The key ingredient of this method is the exact all-order relation connecting the conventional quark-gluon vertex with the corresponding vertex of the background field method, which is Abelian-like. When this latter relation is combined with the standard gauge technique, supplemented by a crucial set of transverse Ward identities, it allows the approximate determination of the nonperturbative behavior of all 12 form factors comprising the quark-gluon vertex, for arbitrary values of the momenta.

The actual implementation of this procedure is carried out in the Landau gauge, in order to make contact with the results of lattice simulations performed in this particular gauge. The most demanding technical aspect involves the approximate calculation of the components of the aforementioned (fully dressed) three-point function, using lattice data as input for the gluon propagators appearing in its diagrammatic expansion. The numerical evaluation of the relevant form factors in three special kinematical configurations (soft-gluon and quark symmetric limit, zero quark momentum) is carried out in detail, finding qualitative agreement with the available lattice data. Most notably, a concrete mechanism is proposed for explaining the puzzling divergence of one of these form factors observed in lattice simulations.

Physical Review D 90[6], 065027, 2014. DOI: 10.1103/PhysRevD.90.065027

[P300-2014] "Optical characterization, infrared emission and visible up-conversion in Er³⁺ doped tellurite glasses"

Seshadri, M.*; Chillce, E. F.*; Marconi, J. D.*; Sigoli, F. A.; Ratnakaram, Y. C.; Barbosa, L. C.*

In this work, Er³⁺ doped tellurite glasses have been prepared with the composition (82.5-x) TeO₂ + 4.5Bi₂O₃ + 11.5ZnO + 1.5Nb₂O₅ + x Er₂O₃ (x = 0.1, 0.3, 0.5, 0.7, 1.0 mol%) by melt-quenching method and their physical, spectroscopic properties were investigated. The experimental oscillator strengths (f_{exp}) of individual absorption peaks are used to estimate the Judd-Ofelt intensity parameters (Omega(λ), λ = 2, 4, 6). Judd-Ofelt intensity parameters are used to calculate the spontaneous transition probabilities, radiative lifetimes and branching ratios for certain excited states of Er³⁺ ions. NIR emission and visible up-conversion luminescence were observed at room temperature for all glasses by exciting with 980 nm laser radiation. The emission characteristics such as peak stimulated emission cross section, FWHM, figure of merit optical gain cross sections and measured lifetimes have been obtained for the observed Er³⁺: I-4(13/2) → I-4(15/2) transition in the above glass composition for all the concentrations and are compared with that of the reported. Finally, NIR to visible energy conversion has been analyzed for all glasses excited at 980 nm and suitable mechanism was proposed.

Journal Of Non-Crystalline Solids 402, 141-148, 2014. DOI: 10.1016/j.jnoncrysol.2014.05.024

[P301-2014] "Origin of atmospheric aerosols at the Pierre Auger Observatory using studies of air mass trajectories in South America"

Aab, A.; Abreu, P.; Aglietta, M.; Daniel, B.*; de Mello, W. J. M.*; Dobrigkeit, C.*; Escobar, C. O.*; Fauth, A. C.*; Kemp, E.*; Muller, M. A.*; Selmi-Dei, D. Pakk*; Silva, M. Z.*; et al. Pierre Auger Collaborat

The Pierre Auger Observatory is making significant contributions towards understanding the nature and origin of ultra-high energy cosmic rays. One of its main challenges is the monitoring of the atmosphere, both in terms of its state variables and its optical properties. The aim of this work is to analyse aerosol optical depth tau(a)(z) values measured from 2004 to 2012 at the observatory, which is located in a remote and relatively unstudied area of Pampa Amarilla, Argentina. The aerosol optical depth is in average quite low - annual mean tau(a)(3.5 km) similar to 0.04 - and shows a seasonal trend with a winter minimum - tau(a)(3.5 km) - 0.03 -, and a summer maximum - tau(a)(3.5 km) similar to 0.06 -, and an unexpected increase from August to September tau(a)(35 km) similar to 0.055.

We computed backward trajectories for the years 2005 to 2012 to interpret the air mass origin. Winter nights with low aerosol concentrations show air masses originating from the Pacific Ocean. Average concentrations are affected by continental sources (wind-blown dust and urban pollution), whilst the peak observed in September and October could be linked to biomass burning in the northern part of Argentina or air pollution coming from surrounding urban areas.

Atmospheric Research 149, 120-135, 2014. DOI: 10.1016/j.atmosres.2014.05.021

[P302-2014] "Petroleomics by electrospray ionization FT-ICR mass spectrometry coupled to partial least squares with variable selection methods: prediction of the total acid number of crude oils"

Terra, L. A.; Filgueiras, P. R.; Tose, L. V.; Romao, W.; de Souza, D. D.*; de Castro, E. V. R.; de Oliveira, M. S. L.; Dias, J. C. M.; Poppi, R. J.

Negative-ion mode electrospray ionization, ESI(-), with Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR MS) was coupled to a Partial Least Squares (PLS) regression and variable selection methods to estimate the total acid number (TAN) of Brazilian crude oil samples. Generally, ESI(-)-FT-ICR mass spectra present a power of resolution of ca. 500 000 and a mass accuracy less than 1 ppm, producing a data matrix containing over 5700 variables per sample. These variables correspond to heteroatom-containing species detected as deprotonated molecules, [M - H](-) ions, which are identified primarily as naphthenic acids, phenols and carbazole analog species. The TAN values for all samples ranged from 0.06 to 3.61 mg of KOH g(-1). To facilitate the spectral interpretation, three methods of variable selection were studied: variable importance in the projection (VIP), interval partial least squares (iPLS) and elimination of uninformative variables (UVE). The UVE method seems to be more appropriate for selecting important variables, reducing the dimension of the variables to 183 and producing a root mean square error of prediction of 0.32 mg of KOH g(-1). By reducing the size of the data, it was possible to relate the selected variables with their corresponding molecular formulas, thus identifying the main chemical species responsible for the TAN values.

Analyst 139[19], 4908-4916, 2014. DOI: 10.1039/c4an00538d

[P303-2014] "Physical properties of EuPtIn₄ intermetallic antiferromagnet"

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

We report the physical properties of EuPtIn₄ single crystalline platelets grown by the In flux technique. This compound crystallizes in the orthorhombic Cmcm structure with lattice parameters a = 4.542(1) Å, b = 16.955(2) Å and c = 7.389(1) Å. Measurements of magnetic susceptibility, heat capacity, electrical resistivity, and electron spin resonance (ESR) reveal that EuPtIn₄ is a metallic Curie-Weiss paramagnet at high temperatures with an effective moment of mu(eff) approximate to 7.8(1) mu(B) due to divalent Eu ions. At low temperatures, antiferromagnetic (AFM) ordering is observed at T-N = 13.3 K followed by a successive anomaly at T* = 12.6 K. In addition, within the magnetic state, a spin-flop transition is observed with H-c similar to 2.5 T at T = 1.8 K when the magnetic field is applied along the ac-plane. In the paramagnetic state, a single divalent Eu²⁺ Dysonian ESR line with a Korringa relaxation rate of b = 4.1(2) Oe/K is observed. Interestingly, even at high temperatures, both ESR linewidth and electrical resistivity reveal a similar anisotropy.

We discuss a possible common microscopic origin for the observed anisotropy in these physical quantities likely associated with an anisotropic magnetic interaction between Eu^{2+} 4f electrons mediated by conduction electrons.

Journal Of Magnetism And Magnetic Materials 371, 5-9, 2014. DOI: 10.1016/j.jmmm.2014.07.001

[P304-2014] “Physicochemical, structural, mechanical, and tribological characteristics of Si_3N_4 - MoS_2 thin films deposited by reactive magnetron sputtering”

Trentin, R. E.; Bandeira, A. L.; Cemin, F.; Morales, M.*; Amorim, C. L. G.; Aguzzoli, C.; Alvarez, F.*; Baumvol, I. J. R.; Farias, M. C. M.; Figueroa, C. A.

Si_3N_4 coatings show outstanding performance in wear and corrosion resistance of cutting tools at high temperatures, up to 1000 degrees C and above. In addition, the incorporation of minor concentrations of MoS_2 in Si_3N_4 could reduce the friction coefficient and preserve sufficiently high hardness values. In the present work, Si_3N_4 - MoS_2 thin films were deposited on C and Si (001) substrates by RF and DC reactive deposition magnetron sputtering from Si and MoS_2 targets in a Ar/N-2 plasma, with different low MoS_2 amounts. The thin films were characterized by nanoindentation at different temperatures from 23 degrees C to 400 degrees C and sliding friction and nanoscratch tests at a constant temperature of 23 degrees C. Several different analytical techniques were also employed to characterize the thin films. In the whole layer both Si_3N_4 and MoS_2 compounds are stoichiometric and the structure is amorphous and homogenous. Although the hardness is roughly constant in the here investigated MoS_2 concentration range at constant temperature, the lowest amount of MoS_2 (0.2 at.%) increases substantially the hardness of Si_3N_4 - MoS_2 thin films at 23 degrees C. The hardness of Si_3N_4 - MoS_2 thin films decreases with the increase of temperature. The friction coefficient decreases substantially for MoS_2 concentrations between 0.2 and 0.3 at.% and the annealing process does not modify such behavior. The 24 h annealing performed during hardness measurements, up to 400 degrees C, induced thermally-activated processes in the thin films, which modify the critical load, hardness, and reduced elastic modulus of the thin film when measured at 23 degrees C.

Surface & Coatings Technology 254, 327-332, 2014. DOI: 10.1016/j.surfcoat.2014.06.016

[P305-2014] “Possible unconventional superconductivity in substituted BaFe_2As_2 revealed by magnetic pair-breaking studies”

Rosa, P. F. S.*; Adriano, C.*; Garitezi, T. M.*; Piva, M. M.*; Mydeen, K.; Grant, T.; Fisk, Z.; Nicklas, M.; Urbano, R. R.*; Fernandes, R. M.; Pagliuso, P. G.*

The possible existence of a sign-changing gap symmetry in BaFe_2As_2 -derived superconductors (SC) has been an exciting topic of research in the last few years. To further investigate this subject we combine Electron Spin Resonance (ESR) and pressure-dependent transport measurements to investigate magnetic pair-breaking effects on $\text{BaFe}_{1.9\text{M}0.1\text{As}_2}$ (M = Mn, Co, Cu, and Ni) single crystals. An ESR signal, indicative of the presence of localized magnetic moments, is observed only for M = Cu and Mn compounds, which display very low SC transition temperature (T-c) and no SC, respectively. From the ESR analysis assuming the absence of bottleneck effects, the microscopic parameters are extracted to show that this reduction of T-c cannot be accounted by the Abrikosov-Gorkov pair-breaking expression for a sign-preserving gap function. Our results reveal an unconventional spin-and pressure-dependent pair-breaking effect and impose strong constraints on the pairing symmetry of these materials.

Scientific Reports 4, 6252, 2014. DOI: 10.1038/srep06252

[P306-2014] “Precision muon reconstruction in Double Chooz”

Abe, Y.; dos Anjos, J. C.; Barriere, J. C.; Baussan, E.; Bekman, I.; Gonzalez, L. F. G.*; Kemp, E.*; et al.

We describe a muon track reconstruction algorithm for the reactor anti-neutrino experiment Double Chooz. The Double Chooz detector consists of two optically isolated volumes of the liquid scintillator viewed by PMTs, and an Outer Veto above these made of crossed scintillator strips. Muons are reconstructed by their Outer Veto hit positions along with timing information from the other two detector volumes. All muons are fit under the hypothesis that they are through-going and ultrarelativistic. If the energy depositions suggest that the muon may have stopped, the reconstruction fits also for this hypothesis and chooses between the two via the relative goodness-of-fit. In the ideal case of a through-going muon intersecting the center of the detector, the resolution is similar to 40 mm in each transverse dimension. High quality muon reconstruction is an important tool for reducing the impact of the cosmogenic isotope background in Double Chooz.

Nuclear Instruments & Methods In Physics Research Section A-Accelerators Spectrometers Detectors And Associated Equipment 764, 330-339, 2014. DOI:10.1016/j.nima.2014.07.058

[P307-2014] “Production of charged pions, kaons and protons at large transverse momenta in pp and Pb-Pb collisions at root s(NN)=2.76 TeV”

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

Transverse momentum spectra of $\pi^{+/-}$, $K^{+/-}$ and $p(\bar{p})$ over bar up to $p(T) = 20$ GeV/c at mid-rapidity in pp, peripheral (60-80%) and central (0-5%) Pb-Pb collisions at $\sqrt{s(\text{NN})} = 2.76$ TeV have been measured using the ALICE detector at the Large Hadron Collider. The proton-to-pion and the kaon-to-pion ratios both show a distinct peak at $p(T)$ approximate to 3 GeV/c in central Pb-Pb collisions. Below the peak, $p(T) < 3$ GeV/c, both ratios are in good agreement with hydrodynamical calculations, suggesting that the peak itself is dominantly the result of radial flow rather than anomalous hadronization processes. For $p(T) > 10$ GeV/c particle ratios in pp and Pb-Pb collisions are in agreement and the nuclear modification factors for $\pi^{+/-}$, $K^{+/-}$ and $p(\bar{p})$ indicate that, within the systematic and statistical uncertainties, the suppression is the same. This suggests that the chemical composition of leading particles from jets in the medium is similar to that of vacuum jets.

Physics Letters B 736, 196-207, 2014. DOI: 10.1016/j.physletb.2014.07.011

[P308-2014] “Reconstruction of inclined air showers detected with the pierre Auger 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.*; Selmi-Dei, D. Pakk*; Theodoro, V. M.*; Silva, M. Zimbres*; et al.
Pierre Auger Collaborat

We describe the method devised to reconstruct inclined cosmic-ray air showers with zenith angles greater than 60 degrees detected with the surface array of the Pierre Auger Observatory.

The measured signals at the ground level are fitted to muon density distributions predicted with atmospheric cascade models to obtain the relative shower size as an overall normalization parameter. The method is evaluated using simulated showers to test its performance. The energy of the cosmic rays is calibrated using a sub-sample of events reconstructed with both the fluorescence and surface array techniques. The reconstruction method described here provides the basis of complementary analyses including an independent measurement of the energy spectrum of ultra-high energy cosmic rays using very inclined events collected by the Pierre Auger Observatory.

Journal Of Cosmology And Astroparticle Physics [8], 019, 2014. DOI: 10.1088/1475-7516/2014/08/019

[P309-2014] “Robust ferromagnetism in the compressed permanent magnet Sm2Co17”

Jeffries, J. R.; Veiga, L. S. I.*; Fabbris, G.; Haskel, D.; Huang, P.; Butch, N. P.; McCall, S. K.; Holliday, K.; Jenei, Z.; Xiao, Y.; Chow, P.

The compound Sm2Co17 displays magnetic properties amenable to permanent magnet applications owing to both the 3d electrons of Co and the 4f electrons of Sm. The long-standing description of the magnetic interactions between the Sm and Co ions implies a truly ferromagnetic configuration, but some recent calculations challenge this axiom, suggesting at least a propensity for ferrimagnetic behavior. We have used high-pressure synchrotron x-ray techniques to characterize the magnetic and structural properties of Sm2Co17 to reveal a robust ferromagnetic state. The local Sm moment is at most weakly affected by compression, and the ordered moments show a surprising resilience to volumetric compressions of nearly 20%. Density functional theory calculations echo the magnetic robustness of Sm2Co17.

Physical Review B 90[10], 104408, 2014. DOI: 10.1103/PhysRevB.90.104408

[P310-2014] “Search for jet extinction in the inclusive jet-p(T) spectrum from proton-proton collisions at root s=8 TeV”

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

The first search at the LHC for the extinction of QCD jet production is presented, using data collected with the CMS detector corresponding to an integrated luminosity of 10.7 fb⁻¹ of proton-proton collisions at a center-of-mass energy of 8 TeV. The extinction model studied in this analysis is motivated by the search for signatures of strong gravity at the TeV scale (terascale gravity) and assumes the existence of string couplings in the strong-coupling limit. In this limit, the string model predicts the suppression of all high-transverse-momentum standard model processes, including jet production, beyond a certain energy scale. To test this prediction, the measured transverse-momentum spectrum is compared to the theoretical prediction of the standard model. No significant deficit of events is found at high transverse momentum. A 95% confidence level lower limit of 3.3 TeV is set on the extinction mass scale.

Physical Review D 90[3], 032005, 2014. DOI: 10.1103/PhysRevD.90.032005

[P311-2014] “Search for massive resonances decaying into pairs of boosted bosons in semi-leptonic final states at root s=8 TeV”

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

A search for new resonances decaying to WW, ZZ, or WZ is presented. Final states are considered in which one of the vector bosons decays leptonically and the other hadronically. Results are based on data corresponding to an integrated luminosity of 19.7 fb⁻¹ recorded in proton-proton collisions at root s= 8 TeV with the CMS detector at the CERN LHC. Techniques aiming at identifying jet substructures are used to analyze signal events in which the hadronization products from the decay of highly boosted W or Z bosons are contained within a single reconstructed jet. Upper limits on the production of generic WW, ZZ, or WZ resonances are set as a function of the resonance mass and width. We increase the sensitivity of the analysis by statistically combining the results of this search with a complementary study of the all-hadronic final state. Upper limits at 95% confidence level are set on the bulk graviton production cross section in the range from 700 to 10 fb for resonance masses between 600 and 2500 GeV, respectively. These limits on the bulk graviton model are the most stringent to date in the diboson final state.

Journal Of High Energy Physics 8, UNSP 174, 2014. DOI: 10.1007/JHEP08(2014)174

[P312-2014] “Search for massive resonances in dijet systems containing jets tagged as W or Z boson decays in pp collisions at root s=8 TeV”

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

A search is reported for massive resonances decaying into a quark and a vector boson (W or Z), or two vector bosons (WW, WZ, or ZZ). The analysis is performed on an inclusive sample of multijet events corresponding to an integrated luminosity of 19.7 fb⁻¹, collected in proton-proton collisions at a centre-of-mass energy of 8 TeV with the CMS detector at the LHC. The search uses novel jet-substructure identification techniques that provide sensitivity to the presence of highly boosted vector bosons decaying into a pair of quarks. Exclusion limits are set at a confidence level of 95% on the production of: (i) excited quark resonances q* decaying to qW and qZ for masses less than 3.2 TeV and 2.9 TeV, respectively, (ii) a Randall-Sundrum graviton G(RS) decaying into WW for masses below 1.2 TeV, and (iii) a heavy partner of the W boson W' decaying into WZ for masses less than 1.7 TeV. For the first time mass limits are set on W' -> WZ and G(RS) -> WW in the all-jets final state. The mass limits on q* -> qW, q* -> qZ, W' -> WZ, G(RS) -> WW are the most stringent to date. A model with a “bulk” graviton G(bulk) that decays into WW or ZZ bosons is also studied.

Journal Of High Energy Physics 8, UNSP 173, 2014. DOI: 10.1007/JHEP08(2014)173

[P313-2014] “Search for the associated production of the Higgs boson with a top-quark pair”

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

A search for the standard model Higgs boson produced in association with a top-quark pair (t (t) over barH) is presented, using data samples corresponding to integrated luminosities of up to 5.1 fb⁻¹ and 19.7 fb⁻¹ collected in pp collisions at center-of-mass energies of 7 TeV and 8 TeV respectively. The search is based on the following signatures of the Higgs boson decay: H -> hadrons, H -> photons, and H -> leptons.

The results are characterized by an observed t (\tilde{t}) over $b\bar{t}$ signal strength relative to the standard model cross section, $\mu = \sigma/\sigma(\text{SM})$, under the assumption that the Higgs boson decays as expected in the standard model. The best fit value is $\mu = 2.8 \pm 1.0$ for a Higgs boson mass of 125.6 GeV.

Journal Of High Energy Physics **9**, 087, 2014. DOI: 10.1007/JHEP09(2014)087

[P314-2014] “Search for top-squark pairs decaying into Higgs or Z bosons 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

A search for supersymmetry through the direct pair production of top squarks, with Higgs (H) or Z bosons in the decay chain, is performed using a data sample of proton-proton collisions at root s = 8 TeV collected in 2012 with the CMS detector at the LHC. The sample corresponds to an integrated luminosity of 19.5 fb⁻¹. The search is performed using a selection of events containing leptons and bottom-quark jets. No evidence for a significant excess of events over the standard model background prediction is observed. The results are interpreted in the context of simplified supersymmetric models with pair production of a heavier top-squark mass eigenstate (\tilde{t}_2) decaying to a lighter top-squark mass eigenstate (\tilde{t}_1) via either $\tilde{t}_2 \rightarrow H \tilde{t}_1$ or $\tilde{t}_2 \rightarrow Z \tilde{t}_1$, followed in both cases by $\tilde{t}_1 \rightarrow t \tilde{\chi}_1^0$ or $\tilde{t}_1 \rightarrow t \tilde{\chi}_1^{\pm}$, where $\tilde{\chi}_1^0$ ($\tilde{\chi}_1^{\pm}$) is an undetected, stable, lightest supersymmetric particle. The interpretation is performed in the region where the mass difference between the \tilde{t}_2 and $\tilde{\chi}_1^0$ ($\tilde{\chi}_1^{\pm}$) states is approximately equal to the top-quark mass ($m(\tilde{t}_2) - m(\tilde{\chi}_1^0)$) similar or equal to $m(t)$ which is not probed by searches for direct \tilde{t}_2 production. The analysis excludes top squarks with masses $m(\tilde{t}_2) < 575$ GeV and $m(\tilde{\chi}_1^0) < 400$ GeV at a 95% confidence level.

Physics Letters B **736**, 371-397, 2014. DOI: 10.1016/j.physletb.2014.07.053

[P315-2014] “Search for WW gamma and WZ gamma production and constraints on anomalous quartic gauge couplings in pp collisions at root s=8 TeV”

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

A search for WW gamma triple vector boson production is presented based on events containing a W boson decaying to a muon or an electron and a neutrino, a second V (W or Z) boson, and a photon. The data correspond to an integrated luminosity of 19.3 fb⁻¹ collected in 2012 with the CMS detector at the LHC in pp collisions at root s = 8 TeV. An upper limit of 311 fb on the cross section for the WW gamma production process is obtained at 95% confidence level for photons with a transverse energy above 30 GeV and with an absolute value of pseudorapidity of less than 1.44. This limit is approximately a factor of 3.4 larger than the standard model predictions that are based on next-to-leading order QCD calculations. Since no evidence of anomalous WW gamma gamma or WWZ gamma quartic gauge boson couplings is found, this paper presents the first experimental limits on the dimension-eight parameter $f(T,0)$ and the CP-conserving WWZ gamma parameters $\kappa(W)(0)$ and $\kappa(W)(C)$. Limits are also obtained for the WW gamma gamma parameters $a(0)(W)$ and $a(C)(W)$.

Physical Review D **90**[3], 032008, 2014. DOI: 10.1103/PhysRevD.90.032008

[P316-2014] “Simultaneous determination of epinephrine and dopamine by electrochemical reduction on the hybrid material SiO2/graphene oxide decorated with Ag nanoparticles”

Cincotto, F. H.; Canevari, T. C.; Campos, A. M.; Landers, R.*; Machado, S. A. S.

This paper describes the synthesis, characterization and applications of a new hybrid material composed of mesoporous silica (SiO₂) modified with graphene oxide (GO), SiO₂/GO, obtained by the sol-gel process using HF as the catalyst. The hybrid material, SiO₂/GO, was decorated with silver nanoparticles (Ag-NPs) with a size of less than 20 nanometres, prepared directly on the surface of the material using N,N-dimethylformamide (DMF) as the reducing agent. The resulting material was designated as AgNP/SiO₂/GO. The Ag/SiO₂/GO material was characterized by X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM), energy-dispersive X-ray (EDX) and high-resolution transmission electron microscopy (HR-TEM). A glassy carbon electrode modified with AgNP/SiO₂/GO was used in the development of a sensitive electrochemical sensor for the simultaneous determination of epinephrine and dopamine employing electrocatalytic reduction using squarewave voltammetry. Well-defined and separate reduction peaks were observed in PBS buffer at pH 7. No significant interference was seen for primarily biological interferents such as uric acid and ascorbic acid in the detection of dopamine and epinephrine. Our study demonstrated that the resultant AgNP/SiO₂/GO-modified electrode is highly sensitive for the simultaneous determination of dopamine and epinephrine, with the limits of detection being 0.26 and 0.27 $\mu\text{mol L}^{-1}$, respectively. The AgNP/SiO₂/GO-modified electrode is highly selective and can be used to detect dopamine and epinephrine in a human urine sample.

ANALYST **139**[18], 4634-4640, 2014. DOI: 10.1039/c4an00580e

[P317-2014] “Site-dependent hydrogenation on graphdiyne”

Autreto, P. A. S.*; de Sousa, J. M.*; Galvao, D. S.*

Graphene is one of the most important materials in science today due to its unique and remarkable electronic, thermal and mechanical properties. However in its pristine state, graphene is a gapless semiconductor, what limits its use in transistor electronics. In part due to the revolution created by graphene in materials science, there is a renewed interest in other possible graphene-like two-dimensional structures. Examples of these structures are graphynes and graphdienes, which are two-dimensional structures, composed of carbon atoms in sp² and sp-hybridized states. Graphdienes (benzenoid rings connecting two acetylenic groups) were recently synthesized and some of them are intrinsically nonzero gap systems. These systems can be easily hydrogenated and the relative level of hydrogenation can be used to tune the band gap values. We have investigated, using fully reactive molecular dynamics (ReaxFF), the structural and dynamics aspects of the hydrogenation mechanisms of graphdiyne membranes. Our results showed that the hydrogen bindings have different atom incorporation rates and that the hydrogenation patterns change in time in a very complex way. The formation of correlated domains reported to hydrogenated graphene is no longer observed in graphdiyne cases.

CARBON **77**, 829-834, 2014. DOI: 10.1016/j.carbon.2014.05.088

[P318-2014] “Strong-disorder renormalization-group study of the one-dimensional tight-binding model”

Mard, H. J.; Hoyos, J. A.; Miranda, E.*; Dobrosavljevic, V.

We formulate a strong-disorder renormalization-group (SDRG) approach to study the beta function of the tight-binding

model in one dimension with both diagonal and off-diagonal disorder for states at the band center. We show that the SDRG method, when used to compute transport properties, yields exact results since it is identical to the transfer matrix method. The beta function is shown to be universal when only off-diagonal disorder is present even though single-parameter scaling is known to be violated. A different single-parameter scaling theory is formulated for this particular (particle-hole symmetric) case. Upon breaking particle-hole symmetry (by adding diagonal disorder), the beta function is shown to crossover from the universal behavior of the particle-hole symmetric case to the conventional nonuniversal one in agreement with the two-parameter scaling theory. We finally draw an analogy with the random transverse-field Ising chain in the paramagnetic phase. The particle-hole symmetric case corresponds to the critical point of the quantum Ising model, while the generic case corresponds to the Griffiths paramagnetic phase.

Physical Review B 90[12], 125141, 2014. DOI: 10.1103/PhysRevB.90.125141

[P-3192014] “Study of wet etching thin films of indium tin oxide in oxalic acid by monitoring the resistance”

Mammana, S. S.; Greatti, A.; Luiz, F. H.; da Costa, F. I.; Mammana, A. P.; Calligaris, G. A.*; Cardoso, L. P.*; Mammana, C. I. Z.; den Engelsen, D.

We describe a study on wet etching of thin films of indium tin oxide (ITO) using a simple method by monitoring the resistance of the thin film in aqueous solutions of oxalic acid and hydrochloric acid. Generally three different regimes can be distinguished during etching ITO in acids: (1) initial etching, which is slow, (2) a fast etching phase and (3) slow etching stage at the end. These regimes are explained in terms of a porosity-roughness model. This porosity model has been confirmed largely by X-ray reflection measurements at grazing incidence, roughness measurements and scanning electron microscopy (SEM). A reliable method for monitoring the resistance during etching has been developed. This method is based on a 2-strips measuring jig with a very low series contact resistance. The activation energy of the etch rate of ITO films was found to be 80 +/- 5 kJ/mol for oxalic acid and 56 +/- 5 kJ/mol for HCl. SEM analyses in the final stage of the etching process indicate an enrichment of Sn in the residual film material. These observations are explained in terms of preferential etching of In₂O₃. X-ray analyses showed that the density of the ITO film decreased by etching. By adding ferric chloride to the oxalic acid solution we could accelerate the etch rate substantially.

Thin Solid Films 567, 20-31, 2014. DOI: 10.1016/j.tsf.2014.07.027

[P320-2014] “Visualization of ranking data: Geographical signatures in international collaboration, leadership and research impact”

Manganote, E. J. T.*; Araujo, M. S.; Schulz, P. A.

In this work we address the comprehensive Scimago Institutions Ranking 2012, proposing a data visualization of the listed bibliometric indicators for the 509 Higher Education Institutions among the 600 largest research institutions ranked according to their outputs. We focus on research impact, internationalization and leadership indicators, which became important benchmarks in a worldwide discussion about research quality and impact policies for universities. Our data visualization reveals a qualitative difference between the behavior of Northern American and Western European Higher Education Institutions concerning International collaboration levels.

Chinese universities show still a systematic low international collaboration levels which are positively linked to the low research impact. The data suggests that research impact can be related directly to internationalization only to rather low values for both indicators. Above world average, other determinants may become relevant in fostering further impact. The leadership indicator provides further insights to the collaborative environment of universities in different geographical regions, as well as the optimized collaboration portfolio for enhancing research impact.

Journal Of Informetrics 8[3], 642-649, 2014. DOI: 10.1016/j.joi.2014.05.005

Carta

[Ca001-2014] “Response to Letter Regarding Article, “Optical Bedside Monitoring of Cerebral Blood Flow in Acute Ischemic Stroke Patients During Head-of-Bed Manipulation”

Mesquita, R. C.*; Favilla, C. G.; Yodh, A. G.; Detre, J. A.

STROKE 45[9], E190-E190, 2014. DOI: 10.1161/STROKE-AHA.114.006125

*Autores da comunidade IFGW

Defesas de Dissertações

[D015-2014] “Utilização da fase para estimativa das propriedades ópticas absolutas do tecido biológico com espectroscopia óptica de difusão”

Aluno: Reember Cano Rodriguez

Data: 10/10/2014

Defesas de Teses

[T022] “Estudo teórico de sistema de elétrons altamente correlacionados”

Aluno: Cesar José Calderon Filho

Orientador: Prof. Dr. Gaston Eduardo Barberis

Data: 15/09/2014

[T023] “Análise temporal de correlatos hemodinâmicos associados à atividade epileptiforme através da técnica de EEG-RMf simultâneos”

Aluno: Guilherme Côco Beltramini

Data: 03/10/2014

[T024] “Monocamadas sp² corrugadas e suas aplicações”

Aluno: Luis Henrique de Lima

Orientador: Prof. Dr. Abner de Siervo

Data: 13/10/2014

[T025] “Estudo da hemodinâmica cortical através da técnica NIRS sob três condições distintas: estimulação visual, realização de exercício físico e apneia em portadores de estenose carotídea”

Aluno: Carlos A. S. Anjos

Orientador: Prof. Dr. Roberto José Maria Covolan

Data: 05/11/2014

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

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