

Abstracta

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Pa001-2015

Trabalhos Publicados

[P056-2015] "A dynamical analysis of allele frequencies in populations evolving under assortative mating and mutations"

Schneider, D. M.*; do Carmo, E.; de Aguiar, M. A.*

We study the evolution of allele frequencies for infinitely large populations subjected to mutations and assortative mating. Haploid individuals are described by two biallelic genes, and assortativity is introduced by preventing mating between individuals whose alleles differ at both loci. In the absence of mutations, evolution leads to the disappearance of one of the alleles. However, a particular combination of the allele frequencies at the two loci is maintained constant. We show that this combination remains constant even when mutations are present, revealing the robustness of the epistatic correlation introduced by the non-random mating mechanism. We obtain the equilibrium solutions for arbitrary values of the mutation rate and provide a description of the dynamics on the basis of a bifurcation analysis.

PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS 421, 54-68, 2015. DOI: 10.1016/j.physa.2014.11.030

[P057-2015] "Analysis of the crystallographic and magnetic structures of the Tb_{0.1}Pr_{0.9}Al₂ and Tb_{0.25}Pr_{0.75}Al₂ magnetocaloric compounds by means of neutron scattering"

Tedesco, J. C. G.; Carvalho, A. M. G.; Christensen, N. B.; Kockelmann, W.; Telling, M. T. F.; Yokaichiya, F.; Toebbens, D. M.; Simeoni, G. G.; Cardoso, L. P.*; Coelho, A. A.*; Bordallo, H. N.

Neutron powder diffraction and inelastic neutron scattering data were used to simulate and understand the magnetization and heat capacity curves of the pseudobinary Tb(x)Pr_{1-x}Al₂, with x = 0.10 and 0.25, as a function of temperature. From the Rietveld analysis, we concluded that no crystallographic transition occurs in these samples, and the high symmetry of the magnetic structure was confirmed. Moreover, the different contributions from the reflection planes could be related to the known exchange bias-like effect characteristic for the x = 0.25 sample, also suggesting the existence of some rearrangement of the magnetic moments or even the presence of spin frustration in this system. Finally, the obtained set of theoretical parameters using the mean field approach for the two systems consisting of two sublattices allowed the experimental data to be described and to explain their physical behaviors. The ensemble of our results leads us to affirm that the quadrupolar interactions as well as an existence of some rearrangement of the magnetic moments or a frustration play an important role in the strong unidirectional anisotropy and the exchange bias-like effect observed in this pseudobinary system.

JOURNAL OF MATERIALS SCIENCE 50[7], 2884-2892, 2015. DOI: 10.1007/s10853-015-8851-1

[P058-2015] "Bioenergy and African transformation"

Lynd, L. R.; Sow, M.; Chimphango, A. F. A.; Cortez, L. A. B.; Brito Cruz, C. H.*; Elmissiry, M.; Laser, M.; Mayaki, I. A.; Moraes, M. A. F. D.; Nogueira, L. A. H.; Wolfaardt, G. M.; Woods, J.; van Zyl, W. H.

Among the world's continents, Africa has the highest incidence of food insecurity and poverty and the highest rates of population growth. Yet Africa also has the most arable land, the lowest crop yields, and by far the most plentiful land resources relative to energy demand. It is thus of interest to examine the potential of expanded modern bioenergy production in Africa. Here we consider bioenergy as an enabler for development, and provide an overview of modern bioenergy

technologies with a comment on application in an Africa context. Experience with bioenergy in Africa offers evidence of social benefits and also some important lessons. In Brazil, social development, agricultural development and food security, and bioenergy development have been synergistic rather than antagonistic. Realizing similar success in African countries will require clear vision, good governance, and adaptation of technologies, knowledge, and business models to myriad local circumstances. Strategies for integrated production of food crops, livestock, and bioenergy are potentially attractive and offer an alternative to an agricultural model featuring specialized land use. If done thoughtfully, there is considerable evidence that food security and economic development in Africa can be addressed more effectively with modern bioenergy than without it. Modern bioenergy can be an agent of African transformation, with potential social benefits accruing to multiple sectors and extending well beyond energy supply per se. Potential negative impacts also cut across sectors. Thus, institutionally inclusive multi-sector legislative structures will be more effective at maximizing the social benefits of bioenergy compared to institutionally exclusive, single-sector structures.

BIOTECHNOLOGY FOR BIOFUELS 8, 18, 2015. DOI: 10.1186/s13068-014-0188-5

[P059-2015] "Constraints on neutrino decay lifetime using long-baseline charged and neutral current data"

Gomes, R. A.; Gomes, A. L. G.; Peres, O. L. G.*

We investigate the status of a scenario involving oscillations and decay for charged and neutral current data from the MINOS and T2K experiments. We first present an analysis of charged current neutrino and anti-neutrino data from MINOS in the framework of oscillation with decay and obtain a best fit for non-zero decay parameter $\alpha(3)$. The MINOS charged and neutral current data analysis results in the best fit for vertical bar $\Delta m(32)(2)$ vertical bar = $2.34 \times 10^{(-3)}$ eV(2), $\sin(2)$ theta(23) = 0.60 and zero decay parameter, which corresponds to the limit for standard oscillations. Our combined MINOS and T2K analysis reports a constraint at the 90% confidence level for the neutrino decay lifetime $\tau(3)/m(3) > 2.8 \times 10^{(-12)}$ s/eV. This is the best limit based only on accelerator produced neutrinos.

PHYSICS LETTERS B 740, 345-352, 2015. DOI: 10.1016/j.physletb.2014.12.014

[P060-2015] "Differential cross section measurements for the production of a W boson in association with jets in proton-proton collisions at root s=7 TeV"

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

Measurements are reported of differential cross sections for the production of a W boson, which decays into a muon and a neutrino, in association with jets, as a function of several variables, including the transverse momenta (p(T)) and pseudorapidities of the four leading jets, the scalar sum of jet transverse momenta (H-T), and the difference in azimuthal angle between the directions of each jet and the muon. The data sample of pp collisions at a centre-of-mass energy of 7 TeV was collected with the CMS detector at the LHC and corresponds to an integrated luminosity of 5.0 fb (1). The measured cross sections are compared to predictions from Monte Carlo generators, MADGRAPH + PYTHIA and SHERPA, and to next-to-leading-order calculations from BLACKHAT + SHERPA. The differential cross sections are found to be in agreement with the predictions, apart from the p(T) distributions of the leading jets at high p(T) values, the distributions of the H-T at high-H-T and low jet multiplicity, and the distribution of the difference in azimuthal angle between the leading jet and the muon at low values.

PHYSICS LETTERS B 741, 12-37, 2015. DOI: 10.1016/j.physletb.2014.12.003

[P061-2015] "Effect of bombarding steel with Xe⁺ ions on the surface nanostructure and on pulsed plasma nitriding process"

Cucatti, S.*; Ochoa, E. A.; Morales, M.*; Droppa, R.; Garcia, J.; Pinto, H. C.; Zagonel, L. F.*; Wisnivesky, D.; Figueroa, C. A.; Alvarez, F.*

The modification of steel (AISI 316L and AISI 4140) surface morphology and underlying inter-crystalline grains strain due to Xe⁺ ion bombardment are reported to affect nitrogen diffusion after a pulsed plasma nitriding process. The ion bombardment induces regular nanometric patterns and increases the roughness of the material surface. The strain induced by the noble gas bombardment is observed in depths which are orders of magnitude larger than the projectiles' stopping distance. The pre-bombarded samples show peculiar microstructures formed in the nitrified layers, modifying the in-depth hardness profile. Unlike the double nitrified layer normally obtained in austenitic stainless steel by pulsed plasma nitriding process, the Xe⁺ pre-bombardment treatment leads to a single thick compact layer. In nitrified pre-bombarded AISI 4140 steel, the diffusion zone shows long iron nitride needle-shaped precipitates, while in non-pre-bombarded samples finer precipitates are distributed in the material.

MATERIALS CHEMISTRY AND PHYSICS 149, 261-269, 2015. DOI: 10.1016/j.matchemphys.2014.10.015

[P062-2015] "Effect of ZnO on spectroscopic properties of Sm³⁺ doped zinc phosphate glasses"

Seshadri, M.*; Radha, M.*; Rajesh, D.; Barbosa, L. C.*; Cordeiro, C. M. B.*; Ratnakaram, Y. C.

Spectroscopic properties of Sm³⁺ containing zinc oxide based phosphate glasses in the chemical composition (50 - x) P₂O₅+20Na₂HPO₄+9AlF₃+xZnO+1Sm₂O₃ (where x=5, 10, 15, 20 and 25) have been studied. Raman, optical absorption, emission spectra and luminescence decay profiles were recorded and systematically analyzed. Using Judd-Ofelt theory, judd-Ofelt intensity parameters Omega(lambda) (lambda=2, 4 and 6), spontaneous radiative transition probabilities (A(rad)), radiative lifetimes (tau(R)), branching ratios (beta) were calculated and discussed. With 400 nm wavelength excitation, the emission spectra and decay lifetime of (4)G_{5/2} level of Sm³⁺ doped zinc-phosphate glasses were studied. The branching ratios and emission cross-sections for the transition, (4)G_{5/2} -> H₆(7/2) are found to be higher for x=25 mol% of zinc-phosphate glass matrix. The observed decay profiles were found to be exhibiting non-exponential behavior for all zinc-phosphate glasses, due to non-radiative energy transfer among the excited Sm³⁺ ions.

PHYSICA B-CONDENSED MATTER 459, 79-87, 2015. DOI: 10.1016/j.physb.2014.11.016

[P063-2015] "Effects of Ga substitution on the structural and magnetic properties of half metallic Fe₂MnSi Heusler compound"

Pedro, S. S.; Caraballo Vivas, R. J.; Andrade, V. M.; Cruz, C.; Paixao, L. S.; Contreras, C.; Costa-Soares, T.; Caldeira, L.; Coelho, A. A.*; Carvalho, A. Magnus G.; Rocco, D. L.; Reis, M. S.

The so-called half-metallic magnets have been proposed as good candidates for spintronic applications due to the feature of exhibiting a hundred percent spin polarization at the Fermi level.

Such materials follow the Slater-Pauling rule, which relates the magnetic moment with the valence electrons in the system. In this paper, we study the bulk polycrystalline half-metallic Fe₂MnSi Heusler compound replacing Si by Ga to determine how the Ga addition changes the magnetic, the structural, and the half-metal properties of this compound. The material does not follow the Slater-Pauling rule, probably due to a minor structural disorder degree in the system, but a linear dependence on the magnetic transition temperature with the valence electron number points to the half-metallic behavior of this compound.

JOURNAL OF APPLIED PHYSICS 117[1], 013902, 2015. DOI: 10.1063/1.4905173

[P064-2015] "Effects of the activation method on the performance of base metal catalysts prepared by wet impregnation for toluene hydrogenation in liquid phase"

Suppino, R. S.; Landers, R.*; Gomez Cobo, A. J.

The present work aims to study the effects of the activation method on the performance of base metal catalysts for toluene hydrogenation in liquid phase. For this, catalysts of Fe, Co and Ni supported on gamma-Al₂O₃ were prepared by wet impregnation from chlorinated precursors and reduced by formaldehyde. The prepared catalysts were activated ex situ at 773 K or in situ at 523 K both under H₂ and characterized by N₂ physisorption, SEM + EDX, TEM, XPS and TPR techniques. Catalytic tests were conducted in a slurry Parr reactor at 373 K under H₂ pressure of 5 MPa. The results indicate the formation of metal hydroxides during the catalysts preparation, which are not reduced by the formaldehyde. The ex situ activation seems able to reduce both hydroxides of Fe and Ni, but there is no evidence of reduction in the case of Co hydroxide. Co and Ni catalysts present higher activities when not activated, whereas the in situ activation increases the activity of the Fe catalyst.

REACTION KINETICS MECHANISMS AND CATALYSIS 114[1], 295-309, 2015. DOI: 10.1007/s11144-014-0790-3

[P065-2015] "Elucidating the real-time Ag nanoparticle growth on alpha-Ag₂WO₄ during electron beam irradiation: experimental evidence and theoretical insights"

Pereira, W. S.; Andres, J.; Gracia, L.; San-Miguel, M. A.; da Silva, E. Z.*; Longo, E.; Longo, V. M.

Why and how Ag is formed when electron beam irradiation takes place on alpha-Ag₂WO₄ in a vacuum transmission electron microscopy chamber? To find an answer, the atomic-scale mechanisms underlying the formation and growth of Ag on alpha-Ag₂WO₄ have been investigated by detailed in situ transmission electron microscopy (TEM) and field emission scanning electron microscopy (FE-SEM) studies, density functional theory based calculations and ab initio molecular dynamics simulations. The growth process at different times, chemical composition, size distribution and element distribution were analyzed in depth at the nanoscale level using FE-SEM, operated at different voltages (5, 10, 15, and 20 kV), and TEM with energy dispersive spectroscopy (EDS) characterization. The size of Ag nanoparticles covers a wide range of values. Most of the Ag particles are in the 20-40 nm range. The nucleation and formation of Ag on alpha-Ag₂WO₄ is a result of structural and electronic changes in the AgO_x (x = 2, 4, 6, and 7) clusters used as constituent building blocks of this material, consistent with metallic Ag formation. First principle calculations point out that Ag-3 and Ag-4-fold coordinated centers, located in the sub-surface of the (100) surface, are the most energetically favorable to undergo the diffusion process to form metallic Ag. Ab initio molecular dynamics simulations and the nudged elastic band (NEB) method were used to investigate the minimum energy

pathways of these Ag atoms from positions in the first slab layer to outward sites on the (100) surface of α -Ag₂WO₄. The results point out that the injection of electrons decreases the activation barrier for this diffusion step and this unusual behavior results from the presence of a lower energy barrier process.

PHYSICAL CHEMISTRY CHEMICAL PHYSICS 17[7], 5352-5359, 2015. DOI: 10.1039/c4cp05849f

[P066-2015] “ Ferrite Loaded DBD Plasma Device”

Machida, M.*

An atmospheric pressure plasma jet device with dielectric barrier discharge was built using low cost 5C22 thyatron valve and ferrite transformer. The ferrite transformer increases the intensity about four times the primary pulse and lengthens the high voltage pulse, keeping the rise time of the thyatron pulse. Spectrometer measurement shows excited nitrogen molecular emissions of second positive system. The most intense nitrogen molecular line, 357.69 nm, was chosen to monitor the time dependence of the discharge. Synthetic temperature, using 380.49 nm line of N₂ emission and SpecAir simulation, shows plasma gas temperature of 300 K. To corroborate this low temperature, the plasma jet is applied to human tongue with no harm or bad physical feeling.

BRAZILIAN JOURNAL OF PHYSICS 45[1], 132-137, 2015. DOI: 10.1007/s13538-014-0293-8

[P067-2015] “Formation energy of graphene oxide structures: A molecular dynamics study on distortion and thermal effects”

Fonseca, A. F.*; Zhang Cho, K.

Ab initio predictions for the stability of different graphene oxide (GO) structures have been shown to conflict with experimental observations. While ab initio studies predict that the most stable GOs are fully oxygen-covered (either with epoxide or hydroxyl), stable as-produced GOs are partially oxygen-covered and predominantly epoxide-covered structures. Although this discrepancy is being examined in terms of calculations of free energies of GOs and large diffusion energy-barriers for oxygen groups on graphene, there is still a lack of understanding on the energetic properties of GOs using classical molecular dynamics, which is able to investigate their structural distortion. Here, using the reactive empirical bond order (REBO) molecular dynamics potential, we compute the free energy and binding energy of GOs at different oxygen concentrations and epoxide to hydroxyl ratios, as well as the distortion energies of graphene lattice. Although epoxide causes more distortion on the carbon hexagonal planar structure, it provides more stability to the GO structure. The difference between free energy and binding energy of GOs is shown to be independent of oxygen coverage. These results allow gaining more insight on the issue of GO stability and show that REBO can capture most of experimental properties of GOs.

CARBON 84, 365-374, 2015. DOI: 10.1016/j.carbon.2014.12.026

[P068-2015] “Heavy quark production in ultra high energy cosmic ray interactions”

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

In this paper we present a comprehensive study of the heavy quark production in ultra high energy cosmic ray interactions in the atmosphere considering that the primary cosmic ray can be either a photon, neutrino or a proton.

The analysis is performed using a unified framework - the dipole formalism - and the saturation effects, associated to the physical process of parton recombination, are taken into account. We demonstrate that the contribution of heavy quarks for cosmic ray interactions is in general non-negligible and can be dominant depending of the process considered. Moreover, our results indicate that new dynamical mechanisms should be included in order to obtain reliable predictions for the heavy quark production in pp collisions at ultra high cosmic ray energies.

ASTROPARTICLE PHYSICS 61, 41-46, 2015. DOI: 10.1016/j.astropartphys.2014.06.009

[P069-2015] “Interplay of weak interactions in the atom-by-atom condensation of xenon within quantum boxes”

Nowakowska, S.; Wackerlin, A.; Kawai, S.; Ivas, T.; Nowakowski, J.; Fatayer, S.*; Wackerlin, C.; Nijs, T.; Meyer, E.; Bjork, J.; Stohr, M.; Gade, L. H.; Jung, T. A.

Condensation processes are of key importance in nature and play a fundamental role in chemistry and physics. Owing to size effects at the nanoscale, it is conceptually desired to experimentally probe the dependence of condensate structure on the number of constituents one by one. Here we present an approach to study a condensation process atom-by-atom with the scanning tunnelling microscope, which provides a direct real-space access with atomic precision to the aggregates formed in atomically defined ‘quantum boxes’. Our analysis reveals the subtle interplay of competing directional and nondirectional interactions in the emergence of structure and provides unprecedented input for the structural comparison with quantum mechanical models. This approach focuses on-but is not limited to-the model case of xenon condensation and goes significantly beyond the well-established statistical size analysis of clusters in atomic or molecular beams by mass spectrometry.

Nature Communications 6, 6071, 2015. DOI: 10.1038/ncomms7071

[P070-2015] “Investigations in MnAs_{1-x}Sb_x: Experimental validation of a new magnetocaloric composite”

de Campos, A.; da Luz, M. S.; de Campos, A.; Coelho, A. A.*; Cardoso, L. P.*; dos Santos, A. O.; Gama, S.

An overview of the magnetocaloric properties of the MnAs_{1-x}Sb_x is presented. The temperature dependence of the isothermal magnetic entropy, ΔS_{mag} and the refrigerant capacity, RC, have been investigated theoretically and experimentally in a composite based on second order MnAs_{1-x}Sb_x phases. This work demonstrates the outstanding agreement between the experimental results and the continuous curves predicted by numerical calculations, indicating that this approach can be used to design magnetic refrigerant materials with enhanced magnetocaloric response in magnetic refrigerator performing an Ericsson cycle near room temperature.

JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS 374, 342-344, 2015. DOI: 10.1016/j.jmmm.2014.08.069

[P071-2015] “Lambda Lambda Correlation Function in Au plus Au Collisions at root s(NN)=200 GeV”

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

We present Lambda Lambda correlation measurements in heavy-ion collisions for Au + Au collisions at root s(NN) = 200

GeV using the STAR experiment at the Relativistic Heavy-Ion Collider. The Lednický-Lyuboshitz analytical model has been used to fit the data to obtain a source size, a scattering length and an effective range. Implications of the measurement of the Lambda-Lambda correlation function and interaction parameters for dihyperon searches are discussed.

PHYSICAL REVIEW LETTERS 114[2], 022301, 2015. DOI: 10.1103/PhysRevLett.114.022301

[P072-2015] “Longitudinal hydrodynamics from event-by-event Landau initial conditions”

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

We investigate three-dimensional ideal hydrodynamic evolution, with Landau initial conditions, incorporating event-by-event variation with many events and transverse density inhomogeneities. We show that the transition to boost-invariant flow occurs too late for realistic setups, with corrections of O (20%-30%) expected at freeze-out 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, hydrodynamics where boost invariance holds at midrapidity is inadequate to extract transport coefficients of the quark-gluon plasma. We conclude by arguing that developing experimental probes of boost invariance is necessary, and suggest some promising directions in this regard.

PHYSICAL REVIEW C 91[2], 024901, 2015. DOI: 10.1103/PhysRevC.91.024901

[P073-2015] “Low-temperature magnetic properties of GdColn5”

Betancourth, D.; Facio, J. I.; Pedrazzini, P.; Jesus, C. B. R.*; Pagliuso, P. G.*; Vildosola, V.; Cornaglia, P. S.; Garcia, D. J.; Correa, V. F.

A comprehensive experimental and theoretical study of the low temperature properties of GdColn5 was performed. Specific heat, thermal expansion, magnetization and electrical resistivity were measured in good quality single crystals down to He-4 temperatures. All the experiments show a second-order-like phase transition at 30 K probably associated with the onset of antiferromagnetic order. The magnetic susceptibility shows a pronounced anisotropy below T-N with an easy magnetic axis perpendicular to the crystallographic (c) over cap axis. Total energy GGA+U calculations indicate a ground state with magnetic moments localized at the Gd ions and allowed a determination of the Gd-Gd magnetic interactions. Band structure calculations of the electron and phonon contributions to the specific heat together with Quantum Monte Carlo calculations of the magnetic contributions show a very good agreement with the experimental data. Comparison between experiment and calculations suggests a significant anharmonic contribution to the specific heat at high temperature (T greater than or similar to 100 K).

JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS 374, 744-747, 2015. DOI: 10.1016/j.jmmm.2014.09.024

[P074-2015] “Measurement of electrons from semileptonic heavy-flavor hadron decays in pp collisions at root s=2.76 TeV”

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

ALICE Collaboration

The p(T)-differential production cross section of electrons from semileptonic decays of heavy-flavor hadrons has been measured at midrapidity in proton-proton collisions at root s = 2.76 TeV in the transverse momentum range 0.5 < p(T) < 12 GeV/c with the ALICE detector at the LHC. The analysis was performed using minimum bias events and events triggered by the electromagnetic calorimeter. Predictions from perturbative QCD calculations agree with the data within the theoretical and experimental uncertainties.

PHYSICAL REVIEW D 91[1], 012001, 2015. DOI: 10.1103/PhysRevD.91.012001

[P075-2015] “Measurement of the pp -> ZZ production cross section and constraints on anomalous triple gauge couplings in four-lepton final states at root s=8 TeV”

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

A measurement of the inclusive ZZ production cross section and constraints on anomalous triple gauge couplings in proton-proton collisions at root s = 8 TeV are presented. The analysis is based on a data sample, corresponding to an integrated luminosity of 19.6 fb(-1), collected with the CMS experiment at the LHC. The measurements are performed in the leptonic decay modes ZZ -> lll'l', where l = e, mu and l' = e, mu, tau. The measured total cross section sigma(pp -> ZZ) = 7.7 +/- 0.5 (stat) (0)(-0.4)(+0.5) (syst) +/- 0.4 (theo) +/- 0.2 (lumi) pb, for both Z bosons produced in the mass range 60 < m(z) < 120 GeV, is consistent with standard model predictions. Differential cross sections are measured and well described by the theoretical predictions. The invariant mass distribution of the four-lepton system is used to set limits on anomalous ZZZ and ZZ gamma couplings at the 95% confidence level: -0.004 < f(4)(Z), < 0.004, -0.004 < f(5)(Z) < 0.004, -0.005 < f(5)(Z) < 0.005, and -0.005 < f(5)(Y) < 0.005.

PHYSICS LETTERS B 740, 250-272, 2015. DOI: 10.1016/j.physletb.2014.11.059

[P076-2015] “Measurement of the W boson helicity in events with a single reconstructed top quark in p p collisions at root s=8 TeV”

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

A measurement of the W boson helicity is presented, where the W boson originates from the decay of a top quark produced in pp collisions. The event selection, optimized for reconstructing a single top quark in the final state, requires exactly one isolated lepton (muon or electron) and exactly two jets, one of which is likely to originate from the hadronization of a bottom quark. The analysis is performed using data recorded at a center-of-mass energy of 8 TeV with the CMS detector at the CERN LHC in 2012. The data sample corresponds to an integrated luminosity of 19.7 fb(-1). The measured helicity fractions are F-L = 0.298 +/- 0.028 (stat) +/- 0.032(syst), F-0 = 0.720 +/- 0.039 (stat) +/- 0.037(syst), and F-R = -0.018 +/- 0.019 (stat) +/- 0.011(syst). These results are used to set limits on the real part of the tWb anomalous couplings, g(L) and g(R).

JOURNAL OF HIGH ENERGY PHYSICS 1, 053, 2015. DOI: 10.1007/JHEP01(2015)053

[P077-2015] “ Microfluidic electronic tongue”

Daikuzono, C. M.; Dantas, C. A. R.; Volpati, D.; Constantino, C. J. L.; Piazzetta, M. H. O.; Gobbi, A. L.; Taylor, D. M.; Oliveira, O. N., Jr.; Riul, A.*

Fast, simple inspection of liquids such as coffee, wine and body fluids is highly desirable for food, beverage and clinical analysis. Electronic tongues are sensors capable of performing quantitative and qualitative measurements in liquid substances using multivariate analysis tools. Earlier attempts to fulfil this task using only a few drops (microliters) of sample did not yield rational results with non-electrolytes e.g. sucrose (sweetness). We report here the fabrication and testing of a microfluidic e-tongue able to distinguish electrolytes from non-electrolytes, covering also the basic tastes relevant to human gustative perception. The sensitivity of our device is mainly attributed to the ultrathin nature of an array formed by non-selective sensing units. The electronic tongue is composed of an array of sensing units designed with a microchannel stamped in a poly(dimethylsiloxane) (PDMS) matrix and sealed onto gold interdigitated electrodes (IDEs). The IDEs are then coated in situ with a 5-bi-layer film deposited by the layer-by-layer (LbL) technique. The cationic layer is derived from polyallylamine chloride (PAH). The anionic layer is either poly(3,4-ethylenedioxythiophene)-poly(styrenesulfonate) PEDOT:PSS, polypyrrole or nickel tetrasulfonated phthalocyanine. When compared to a conventional electronic tongue our system is three times faster and requires only microliters of sample. Applying Principal Component Analysis to the data yields a high correlation for all substances tested. This microfluidic e-tongue has the potential for producing low-cost, easily integrated, multi-functional sensor for food, beverages, in addition to clinical and environmental applications.

SENSORS AND ACTUATORS B-CHEMICAL 207[SI][B], 1129-1135, 2015. DOI: 10.1016/j.snb.2014.09.112

[P078-2015] “Modeling proton and alpha elastic scattering in liquid water in Geant4-DNA”

Tran, H. N.; El Bitar, Z.; Champion, C.; Karamitros, M.; Bernal, M. A.*; Francis, Z.; Ivantchenko, V.; Lee, S. B.; Shin, J. I.; Incerti, S.; Geant4-DNA Collaboration

Elastic scattering of protons and alpha (α) particles by water molecules cannot be neglected at low incident energies. However, this physical process is currently not available in the “Geant4-DNA” extension of the Geant4 Monte Carlo simulation toolkit. In this work, we report on theoretical differential and integral cross sections of the elastic scattering process for 100 eV-1 MeV incident protons and for 100 eV-10 MeV incident α particles in liquid water. The calculations are performed within the classical framework described by Everhart et al., Ziegler et al. and by the ICRU 49 Report. Then, we propose an implementation of the corresponding classes into the Geant4-DNA toolkit for modeling the elastic scattering of protons and α particles. Stopping powers as well as ranges are also reported. Then, it clearly appears that the account of the elastic scattering process in the slowing-down of the charged particle improves the agreement with the existing data in particular with the ICRU recommendations.

NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH SECTION B-BEAM INTERACTIONS WITH MATERIALS AND ATOMS 343, 132-137, 2015. DOI: 10.1016/j.nimb.2014.10.016

[P079-2015] “Mottness-induced healing in strongly correlated superconductors”

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

We study impurity healing effects in models of strongly correlated superconductors. We show that in general both the range and the amplitude of the spatial variations caused by nonmagnetic impurities are significantly suppressed in the superconducting as well as in the normal states. We explicitly quantify the weights of the local and the nonlocal responses to inhomogeneities and show that the former are overwhelmingly dominant over the latter. We find that the local response is characterized by a well-defined healing length scale, which is restricted to only a few lattice spacings over a significant range of dopings in the vicinity of the Mott insulating state. We demonstrate that this healing effect is ultimately due to the suppression of charge fluctuations induced by Mottness. We also define and solve analytically a simplified yet accurate model of healing, within which we obtain simple expressions for quantities of direct experimental relevance.

PHYSICAL REVIEW B 9[2], 020501, 2015. DOI: 10.1103/PhysRevB.91.020501

[P080-2015] “Multiplicity dependence of jet-like two-particle correlation structures in p-Pb collisions at root s(NN)=5.02 TeV”

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

Two-particle angular correlations between unidentified charged trigger and associated particles are measured by the ALICE detector in p-Pb collisions at a nucleon-nucleon centre-of-mass energy of 5.02 TeV. The transverse-momentum range $0.7 < p(T), (\text{assoc}) < p(T), (\text{trig}) < 5.0$ GeV/c is examined, to include correlations induced by jets originating from low momentum-transfer scatterings (minijets). The correlations expressed as associated yield per trigger particle are obtained in the pseudorapidity range vertical bar η vertical bar < 0.9 . The near-side long-range pseudorapidity correlations observed in high-multiplicity p-Pb collisions are subtracted from both near-side short-range and away-side correlations in order to remove the non-jet-like components. The yields in the jet-like peaks are found to be invariant with event multiplicity with the exception of events with low multiplicity. This invariance is consistent with the particles being produced via the incoherent fragmentation of multiple parton-parton scatterings, while the yield related to the previously observed ridge structures is not jet-related. The number of uncorrelated sources of particle production is found to increase linearly with multiplicity, suggesting no saturation of the number of multi-parton interactions even in the highest multiplicity p-Pb collisions. Further, the number scales only in the intermediate multiplicity region with the number of binary nucleon-nucleon collisions estimated with a Glauber Monte-Carlo simulation.

PHYSICS LETTERS B 741, 38-50, 2015. DOI: 10.1016/j.physletb.2014.11.028

[P081-2015] “ Muons in air showers at the Pierre Auger Observatory: Mean number in highly inclined events”

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

We present the first hybrid measurement of the average muon number in air showers at ultrahigh energies, initiated by cosmic rays with zenith angles between 62 degrees and 80 degrees. The measurement is based on 174 hybrid events recorded simultaneously with the surface detector array and the fluorescence detector of the Pierre Auger Observatory.

The muon number for each shower is derived by scaling a simulated reference profile of the lateral muon density distribution at the ground until it fits the data. A $10(19)$ eV shower with a zenith angle of 67 degrees, which arrives at the surface detector array at an altitude of 1450 m above sea level, contains on average $(2.68 \pm 0.04 \pm 0.48(\text{sys})) \times 10(7)$ muons with energies larger than 0.3 GeV. The logarithmic gain $d \ln N / d \ln E$ of muons with increasing energy between $4 \times 10(18)$ eV and $5 \times 10(19)$ eV is measured to be $(1.029 \pm 0.024) 0.030(\text{sys})$.

PHYSICAL REVIEW D 91[3], 032003, 2015. DOI: 10.1103/PhysRevD.91.032003

[P082-2015] “NiAl(110) Surface as a Template for Growing Transition Metal Linear Atomic Chains: A DFT Investigation”

San-Miguel, M. A.; Amorim, E. P. M.; da Silva, E. Z.*

First-principles calculations based on periodic density functional theory (DFT) have been used to investigate structural, energetic, and electronic properties of different transition metal atoms (Pd, Pt, Cu, Ag, and Au) on the NiAl(110) surface for coverages ranging from 0.25 monolayer up to completing full coverage, with special emphasis on the different possible depositions to form linear atomic chains (LAC). The analysis of the energetic contributions and electronic structure reveals that metal atoms are greatly favored to be aligned along the [001] direction to form LACs. The calculated negative work function changes are interpreted taking into account both the electronegativity and the polarizability of the deposited metal adatoms. This work function change decreases particularly for LACs along the [001] direction and, intriguingly, vanishes for Pt, suggesting an electronic behavior similar to the corresponding free-standing LAC.

JOURNAL OF PHYSICAL CHEMISTRY C 119[5], 2456-2461, 2015. DOI: 10.1021/jp5097635

[P083-2015] “Non-Gaussian Spatial Correlations Dramatically Weaken Localization”

Mard, H. J.; Andrade, E. C.; Miranda, E.*; Dobrosavljevic, V.

We perform variational studies of the interaction-localization problem to describe the interaction-induced renormalizations of the effective (screened) random potential seen by quasiparticles. Here we present results of careful finite-size scaling studies for the conductance of disordered Hubbard chains at half-filling and zero temperature. While our results indicate that quasiparticle wave functions remain exponentially localized even in the presence of moderate to strong repulsive interactions, we show that interactions produce a strong decrease of the characteristic conductance scale g^* signaling the crossover to strong localization. This effect, which cannot be captured by a simple renormalization of the disorder strength, instead reflects a peculiar non-Gaussian form of the spatial correlations of the screened disordered potential, a hitherto neglected mechanism to dramatically reduce the impact of Anderson localization (interference) effects.

PHYSICAL REVIEW LETTERS 114[5], 056401, 2015. DOI: 10.1103/PhysRevLett.114.056401

[P084-2015] “Production of inclusive gamma(1S) and gamma(2S) in p-Pb collisions at, root S-NN=5.02 TeV”

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

We report on the production of inclusive gamma(1S) and gamma(2S) in p-Pb collisions at root S-NN = 5.02 TeV at the LHC. The measurement is performed with the ALICE detector at backward ($-4.46 < y_{\text{cms}} < 2.96$) and forward ($2.03 < y_{\text{cms}} < 3.53$) rapidity down to zero transverse momentum. The production cross sections of the gamma(1S) and gamma(2S) are presented, as well as the nuclear modification factor and the ratio of the forward to backward yields of gamma(1S). A suppression of the inclusive gamma(1S) yield in p-Pb collisions with respect to the yield from pp collisions scaled by the number of binary nucleon-nucleon collisions is observed at forward rapidity but not at backward rapidity. The results are compared to theoretical model calculations including nuclear shadowing or partonic energy loss effects.

PHYSICS LETTERS B 740, 105-117, 2015. DOI: 10.1016/j.physletb.2014.11.041

[P085-2015] “Production of Sigma (1385)(+/-) and Xi (1530) (0) in proton-proton collisions at root s=7 TeV”

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

The production of the strange and double-strange baryon resonances (Sigma (1385)(+/-), Xi (1530)(0)) has been measured at mid-rapidity ($|y| < 0.5$) in proton-proton collisions at root s = 7 TeV with the ALICE detector at the LHC. Transverse momentum spectra for inelastic collisions are compared to QCD-inspired models, which in general underpredict the data. A search for the phi (1860) pentaquark, decaying in the Xi pi channel, has been carried out but no evidence is seen.

EUROPEAN PHYSICAL JOURNAL C 75[1], 1, 2015. DOI: 10.1140/epjc/s10052-014-3191-x

[P086-2015] “Raman and thermal desorption spectroscopy analyses of amorphous graphite-like carbon films with incorporated xenon”

Viana, G. A.*; Marques, F. C.*

Structural and thermodynamic properties of xenon incorporated in amorphous carbon films deposited by means of a sputtering system free of vacuum pumping during the deposition were investigated by visible Raman (Vis-Raman) scattering and thermal desorption spectroscopy (TDS), respectively. Vis-Raman measurements, carried out before and after the xenon desorption, revealed a polycrystalline material rich in C-sp(2) sites that form randomly dispersed nanosized graphite clusters (nanocrystals) of approximately 1 nm. After xenon desorption, a compensating mechanism, activated by the thermal heating, promotes a more ordered C-sp(2) network as revealed by the linewidths of both D and G bands, as well as by the I-D/I-G ratio evolution. The TDS thermograms show that the xenon onset effusing temperature is approximately 120 degrees C. Besides, they also revealed two different regimes, at low and at high temperatures, associated with desorption of xenon atoms trapped either in an interconnecting void network or within the graphite nanocrystals. From the latter regime, the xenon diffusion free energy (activation energy) was determined to be 1.2 eV (115.7 kJ/mol) on the basis of the diffusion-limited desorption standard model.

VACUUM 112, 17-24, 2015. DOI: 10.1016/j.vacuum.2014.10.019

[P087-2015] “Response Function Theory for Many-Body Systems Away from Equilibrium: Conditions of Ultrafast-Time and Ultrasmall-Space Experimental Resolution”

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

A response function theory and scattering theory applicable to the study of physical properties of systems driven arbitrarily far removed from equilibrium, specialized for dealing with ultrafast processes, and in conditions of space resolution (including the nanometric scale) are presented. The derivation is done in the framework of a Gibbs-style nonequilibrium statistical ensemble formalism. The observable properties are shown to be connected with time- and space-dependent correlation functions out of equilibrium. A generalized fluctuation-dissipation theorem, which relates these correlation functions with generalized susceptibilities, is derived. The method of nonequilibrium-thermodynamic Green functions, which proves useful for calculations, is also presented. Two illustrative applications of the formalism, which study optical responses in ultrafast laser spectroscopy and Raman scattering of electrons in III-N semiconductors (of "blue diodes") driven away from equilibrium by electric fields of moderate to high intensities, are described.

BRAZILIAN JOURNAL OF PHYSICS 45[1], 166-193, 2015. DOI: 10.1007/s13538-014-0280-0

[P088-2015] "Room temperature nonlinear magnetoelectric effect in lead-free and Nb-doped AlFeO₃ compositions"

Cotica, L. F.; Santos, G. M.; Freitas, V. F.; Coelho, A. A.*; Pal, M.; Santos, I. A.; Garcia, D.; Eiras, J. A.; Guo, R.; Bhalla, A. S.

It is still a challenging problem to obtain technologically useful materials displaying strong magnetoelectric coupling at room temperature. In the search for new effects and materials to achieve this kind of coupling, a nonlinear magnetoelectric effect was proposed in the magnetically disordered relaxor ferroelectric materials. In this context, the aluminum iron oxide (AlFeO₃), a room temperature ferroelectric relaxor and magnetic spin glass compound, emerges as an attractive lead-free magnetoelectric material along with nonlinear magnetoelectric effects. In this work, static, dynamic, and temperature dependent ferroic and magnetoelectric properties in lead-free AlFeO₃ and 2 at.% Nb-doped AlFeO₃ multiferroic magnetoelectric compositions are studied. Pyroelectric and magnetic measurements show changes in ferroelectric and magnetic states close to each other (similar to 200 K). The magnetoelectric coefficient behavior as a function of H_{bias} suggests a room temperature nonlinear magnetoelectric coupling in both single-phase and Nb-doped AlFeO₃-based ceramic compositions.

JOURNAL OF APPLIED PHYSICS 117[6], 064104, 2015. DOI: 10.1063/1.4908016

[P089-2015] "Search for disappearing tracks in 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

A search is presented for long-lived charged particles that decay within the CMS detector and produce the signature of a disappearing track. Disappearing tracks are identified as those with little or no associated calorimeter energy deposits and with missing hits in the outer layers of the tracker. The search uses proton-proton collision data recorded at root s = 8 TeV that corresponds to an integrated luminosity of 19.5 fb⁻¹. The results of the search are interpreted in the context of the anomaly-mediated supersymmetry breaking (AMSB) model. The number of observed events is in agreement with the background expectation, and limits are set on the cross section of direct electroweak chargino production in terms of the chargino mass and mean proper lifetime.

At 95% confidence level, AMSB models with a chargino mass less than 260 GeV, corresponding to a mean proper lifetime of 0.2 ns, are excluded.

JOURNAL OF HIGH ENERGY PHYSICS 1, 096, 2015. DOI: 10.1007/JHEP01(2015)096

[P090-2015] "Search for long-lived neutral particles decaying to quark-antiquark 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

A search is performed for long-lived massive neutral particles decaying to quark-antiquark pairs. The experimental signature is a distinctive topology of a pair of jets, originating at a secondary vertex. Events were collected with the CMS detector at the CERN LHC in proton-proton collisions at a center-of-mass energy of 8 TeV. The data analyzed correspond to an integrated luminosity of 18.5 fb⁻¹. No significant excess is observed above standard model expectations. Upper limits at 95% confidence level are set on the production cross section of a heavy neutral scalar particle, H, in the mass range of 200 to 1000 GeV, decaying promptly into a pair of long-lived neutral X particles in the mass range of 50 to 350 GeV, each in turn decaying into a quark-antiquark pair. For X with mean proper decay lengths of 0.4 to 200 cm, the upper limits are typically 0.5-200 fb. The results are also interpreted in the context of an R-parity-violating supersymmetric model with long-lived neutralinos decaying into a quark-antiquark pair and a muon. For pair production of squarks that promptly decay to neutralinos with mean proper decay lengths of 2-40 cm, the upper limits on the cross section are typically 0.5-3 fb. The above limits are the most stringent on these channels to date.

PHYSICAL REVIEW D 91[1], 2015. DOI: 10.1103/PhysRevD.91.012007

[P091-2015] "Search for new resonances decaying via WZ to leptons in proton-proton collisions at root s=8 TeV"

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

A search is performed in proton-proton collisions at root s = 8 TeV for exotic particles decaying via WZ to fully leptonic final states with electrons, muons, and neutrinos. The data set corresponds to an integrated luminosity of 19.5 fb⁻¹. No significant excess is observed above the expected standard model background. Upper bounds at 95% confidence level are set on the production cross section of a W boson as predicted by an extended gauge model, and on the W'WZ coupling. The expected and observed mass limits for a W' boson, as predicted by this model, are 1.55 and 1.47 TeV, respectively. Stringent limits are also set in the context of low-scale technicolor models under a range of assumptions for the model parameters.

PHYSICS LETTERS B 740, 83-104, 2015. DOI: 10.1016/j.physletb.2014.11.026

[P092-2015] "Spin orientation in an ultrathin CoO/PtFe double-layer with perpendicular exchange coupling"

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

We studied by soft X-ray absorption spectroscopy the magnetization axis in a 4 nm thin CoO (111) layer exchange coupled to an ultra thin Li(0) PtFe layer with perpendicular magnetic anisotropy. The angular dependence of the linear magnetic dichroism at 10 K and the relative variations of the spectral features provide a full description of the spin orientation in this antiferromagnetic layer. The spins are found in the film plane, pointing along the 110 direction. This results is discussed in relation to the film strain and the preferential occupation of $t(2g)$ orbitals. The strong orthogonal coupling between Co and Fe spins should be at the origin of the robustness of the exchange bias effect found in this bilayer system.

JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS 373, 6-9, 2015. DOI: 10.1010/j.jmmm.2014.02.039

[P093-2015] "Structural and magnetic properties of the La_{2-x}CaxCoIrO₆ double perovskite series"

Coutrim, L. T.; Freitas, D. C.; Fontes, M. B.; Baggio-Saitovitch, E.; Bittar, E. M.; Granado, E.*; Pagliuso, P. G.*; Bufaical, L.

Polycrystalline samples of the series La_{2-x}CaxCoIrO₆ ($0 \leq x \leq 1.2$) have been synthesized and its structural and magnetic properties were investigated using experiments of X-ray powder diffraction, temperature dependent magnetic susceptibility and magnetization as a function of applied magnetic field. All grown polycrystalline compounds form in a monoclinic structure (space group P2(1)/n) with a partially ordered distribution of transition metal cations Co/Ir over the six-coordinate sites. Our results indicate variation of the magnetic interactions between Co and Ir magnetic sublattices possibly due to valence changes of the transition metals, induced by doping. The undoped La₂CoIrO₆ presents magnetic ordering at similar to 97 K, while for Ca-doped compounds a decrease of net magnetization and ordering temperatures was observed. For $x=0.2$ and 0.5 the emergence of a second magnetic interaction, due to the presence of high spin Co³⁺, becomes evident. Interestingly, for $x=0.8$ the large effective magnetic moment indicates strong orbital contribution and spin-orbit coupling and/or the presence of Co⁴⁺ in high spin state.

JOURNAL OF SOLID STATE CHEMISTRY 221, 373-377, 2015. DOI: 10.1016/j.jssc.2014.10.019

[P094-2015] "Study of quasielastic scattering using charged-current nu(mu)-iron interactions in the MINOS near detector"

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

Kinematic distributions from an inclusive sample of 1.41×10^6 charged-current $\nu(\mu)$ interactions on iron, obtained using the MINOS near detector exposed to a wide-band beam with peak flux at 3 GeV, are compared to a conventional treatment of neutrino scattering within a Fermi gas nucleus. Results are used to guide the selection of a subsample enriched in quasielastic ν Fe- μ interactions, containing an estimated 123,000 quasielastic events of incident energies $1 < E_{\nu} < 8$ GeV, with $\langle E_{\nu} \rangle = 2.79$ GeV. Four additional subsamples representing topological and kinematic sideband regions to quasielastic scattering are also selected for the purpose of evaluating backgrounds. Comparisons using subsample distributions in four-momentum transfer Q^2 show the Monte Carlo model to be inadequate at low Q^2 . Its shortcomings are remedied via inclusion of a Q^2 -dependent suppression function for baryon resonance production, developed from the data. A chi-square fit of the resulting Monte Carlo simulation to the shape of the Q^2 distribution for the quasielastic-enriched sample is carried out with the axial-vector

mass M_A of the dipole axial-vector form factor of the neutron as a free parameter. The effective M_A which best describes the data is $1.23(-0.09)(+0.13)(\text{fit})(-0.15)(+0.12)(\text{syst})$ GeV.

PHYSICAL REVIEW D 91[1], 012005, 2015. DOI: 10.1103/PhysRevD.91.012005

[P095-2015] "Study of Vector Boson Scattering and Search for New Physics in Events with Two Same-Sign Leptons and Two Jets"

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

A study of vector boson scattering in pp collisions at a center-of-mass energy of 8 TeV is presented. The data sample corresponds to an integrated luminosity of 19.4 fb⁻¹ collected with the CMS detector. Candidate events are selected with exactly two leptons of the same charge, two jets with large rapidity separation and high dijet mass, and moderate missing transverse energy. The signal region is expected to be dominated by electroweak same-sign W-boson pair production. The observation agrees with the standard model prediction. The observed significance is 2.0 standard deviations, where a significance of 3.1 standard deviations is expected based on the standard model. Cross section measurements for (WW +/-)-W+/- and WZ processes in the fiducial region are reported. Bounds on the structure of quartic vector-boson interactions are given in the framework of dimension-eight effective field theory operators, as well as limits on the production of doubly charged Higgs bosons.

PHYSICAL REVIEW LETTERS 114[5], 051801, 2015. DOI: 10.1103/PhysRevLett.114.051801

[P096-2015] "The role of oxygen vacancies and their location in the magnetic properties of Ce_{1-x}Cu_xO_{2-delta} nanorods"

Bernardi, M. I. B.; Mesquita, A.; Beron, F.*; Pirola, K. R.*; de Zevallos, A. O.; Dorignetto, A. C.; de Carvalho, H. B.

Ceria (CeO₂) is a promising dilute magnetic semiconductor. Several studies report that the intrinsic and extrinsic structural defects are responsible for room temperature ferromagnetism in undoped and transition metal doped CeO₂ nanostructures; however, the nature of the kind of defect necessary to promote and stabilize the ferromagnetism in such a system is still a matter of debate. In the work presented here, nanorods from the system Ce_{1-x}Cu_xO_{2-delta} with $x = 0, 0.01, 0.03, 0.05$ and 0.10, with the more stable {111} surface exposed were synthesized by a microwave-assisted hydrothermal method. A very careful structure characterization confirms that the Cu in the samples assumes a majority 2+ oxidation state, occupying the Ce (Ce⁴⁺ and Ce³⁺) sites with no secondary phases up to $x = 0.05$. The inclusion of the Cu²⁺ in the CeO₂ structure leads to the introduction of oxygen vacancies in a density proportional to the Cu²⁺ content. It is supposed that the spatial distribution of the oxygen vacancies follows the Cu²⁺ distribution by means of the formation of a defect complex consisting of Cu²⁺ ion and an oxygen vacancy. Superconducting quantum interference device magnetometry demonstrated a diamagnetic behavior for the undoped sample and a typical paramagnetic Curie-Weiss behavior with antiferromagnetic interactions between the Cu²⁺ ions for the single phase doped samples. We suggest that the presence of oxygen vacancies is not a sufficient condition to mediate ferromagnetism in the CeO₂ system, and only oxygen vacancies in the surface of nanostructures would lead to such a long range magnetic order.

PHYSICAL CHEMISTRY CHEMICAL PHYSICS 17[5], 3072-3080, 2015. DOI: 10.1039/c4cp04879b

[P097-2015] “Two-magnon Raman scattering in LiMnPO4”

Calderon Filho, C. J.*; Gomes, P. F.*; Garcia-Flores, A. F.*; Barberis, G. E.*; Granado, E.*

Two-magnon Raman scattering is observed in the orthophosphate LiMnPO₄, carrying quantitative information on the magnetic interactions between local Mn²⁺ moments. A simulated annealing fitting procedure of the Raman signal to theoretical curves derived from a magnetic Hamiltonian was carried out, taking exchange and anisotropy constants as free fitting parameters. Previously reported inelastic neutron scattering (INS) data [J. Li et al., Phys. Rev. B 79, 144410 (2009)] were also used in the fit. It is shown that the combined application of INS and Raman scattering data in the fit reduces the ambiguity of the determined set of exchange parameters with respect to fitting procedures using INS or Raman data independently. The temperature dependence of the Raman signal does not show a collapse of the two-magnon excitations at the long-range magnetic ordering temperature, T_N = 34K, supporting significant short-range spin correlations above T_N.

JOURNAL OF MAGNETISM AND MAGNETIC MATERIALS 377, 430-435, 2015. DOI: 10.1016/j.jmmm.2014.10.100

[P098-2015] “Unusual magnetic damping effect in a silver-cobalt ferrite hetero nano-system”

Sharma, S. K.*; Vargas, J. M.; Vargas, N. M.; Castillo-Sepulveda, S.; Altbir, D.; Pirota, K. R.*; Zboril, R.; Zoppellaro, G.; Knobel, M.*

The static and dynamic magnetic response of the newly synthesized CoFe₂O₄-Ag hetero nano-systems showed significant enhancement in the effective energy barrier and reduction of the magnetic hardness of CoFe₂O₄ upon interaction with non-magnetic Ag as compared to neat CoFe₂O₄. The observed magnetic properties of CoFe₂O₄-Ag have been dissected in detail using the superparamagnetic Stoner-Wohlfarth and Neel-Arrhenius/Vogel-Fulcher models with the aid of micromagnetic simulations.

RSC ADVANCES 5[22], 17117-17122, 2015. DOI: 10.1039/c4ra14960b

[P099-2015] “Unveiling Nanometer Scale Extinction and Scattering Phenomena through Combined Electron Energy Loss Spectroscopy and Cathodoluminescence Measurements”

Losquin, A.; Zagonel, L. F.*; Myroshnychenko, V.; Rodriguez-Gonzalez, B.; Tence, M.; Scarabelli, L.; Foerstner, J.; Liz-Marzan, L. M.; Javier Garcia de Abajo, F.; Stephan, O.; Kociak, M.

Plasmon modes of the exact same individual gold nanoparticles are investigated through combined nanometer-resolved electron energy-loss spectroscopy (EELS) and cathodoluminescence (CL) measurements. We show that CL only probes the radiative modes, in contrast to EELS, which additionally reveals dark modes. The combination of both techniques on the same particles thus provides complementary information and also demonstrates that although the radiative modes give rise to very similar spatial distributions when probed by EELS or CL, their resonant energies appear to be different. We trace this phenomenon back to plasmon dissipation, which affects in different ways the plasmon signatures probed by these techniques. Our experiments are in agreement with electromagnetic numerical simulations and can be further interpreted within the framework of a quasi-static analytical model. We therefore demonstrate that CL and EELS are closely related to optical scattering and extinction, respectively, with the addition of nanometer spatial resolution.

NANO LETTERS 15[2], 1229-1237, 2015. DOI: 10.1021/nl5043775

[P100-2015] “White matter abnormalities associate with type and localization of focal epileptogenic lesions”

Campos, B. M.; Coan, A. C.; Beltramini, G. C.*; Liu, M.; Yasuda, C. L.; Ghizoni, E.; Beaulieu, C.; Gross, D. W.; Cendes, F.

To evaluate white matter (WM) integrity of distinct groups of patients with antiepileptic drug (AED)-resistant localization-related epilepsies. Methods We used diffusion tensor imaging (DTI) fiber-tractography and voxel-based morphometry (VBM) to investigate differences of WM micro- and macrostructural integrity in patients with different drug-resistant localization-related epilepsies: 17 with temporal lobe epilepsy with magnetic resonance imaging (MRI) signs of hippocampal sclerosis (TLE-HS), 17 with TLE and normal MRI (TLE-NL), 14 with frontal lobe epilepsy and subtle MRI signs of focal cortical dysplasia (FLE-FCD), and 112 healthy controls. We performed fiber-tractography using a semiautomatic deterministic method to yield average fractional anisotropy (FA), axial (AD), and radial (RD) diffusivity ipsilateral and contralateral to the epileptogenic zone of the following tracts based on their functional and anatomic relevance: body of fornix (BoF), body of cingulum (BoC), inferior frontal occipital (IFO), and uncinate fasciculi (UF). In addition, we performed VBM of the WM maps to assess macrostructural integrity differences among groups. Results TLE-HS had ipsilateral and contralateral decreased FA and increased RD for all tracts. VBM showed WM alterations mainly in the ipsilateral parahippocampal region and contralateral superior temporal gyrus. FLE-FCD showed bilateral FA decreases only in the BoC and ipsilateral RD increases also in the BoC. VBM showed WM reduction mainly in the ipsilateral pre-cuneus and posterior and anterior cingulum. No significant WM alterations were found in the TLE-NL in DTI or VBM analysis. Significance WM abnormalities differ in distinct AED-resistant localization-related epilepsies. The diverse distribution of the WM damage in these patients suggests that the localization of the epileptic networks may play a role in the WM burden. However, the distinct degree of this damage, more accentuated in TLE-HS, also suggests that the underlying cause of the epilepsy is probably an additional factor to explain this WM damage.

EPILEPSIA 56[1], 125-132, 2015. DOI: 10.1111/epi.12871

[P101-2015] “Yttrium segregation and oxygen diffusion along high-symmetry grain boundaries in YSZ”

Gonzalez-Romero, R. L.*; Melendez, J. J.

A study by Molecular Dynamics of yttrium segregation to high-symmetry grain boundaries of yttria-stabilized zirconia has been performed for different amounts of dopants. After an initial (and short) transient, segregation reaches a steady regime in which the concentration of the defect species at the grain-boundaries does not change in time. The maximum concentration of yttrium is reached at the grain-boundary planes, while oxygen vacancies screen the electric field created by segregation. Segregation of yttrium does not change appreciably the coefficients for oxygen diffusion along the grain boundaries, but instead modifies those for bulk diffusion. This effect is rationalized in terms of the rearrangement of the oxygen vacancies in the vicinities of the yttrium cations. The activation energies vary smoothly with the concentration of yttria for all the boundaries. Our data for diffusion coefficients and activation energies compare fairly well with experimental values when segregation is explicitly taken into account.

JOURNAL OF ALLOYS AND COMPOUNDS 622, 708-713, 2015. DOI: 10.1016/j.jallcom.2014.10.184

Correções

[C001-2015] "Improved measurements of the neutrino mixing angle θ_{13} with the Double Chooz detector (vol 10, 086, 2014)"

Abe, Y.; dos Anjos, J. C.; Barriere, J. C.; Gonzalez, L. F. G.*; Kemp, E.*

JOURNAL OF HIGH ENERGY PHYSICS 2, 1-4, 074, 2015.
DOI: 10.1007/JHEP02(2015)074

[C002-2015] "Search for new physics in events with same-sign dileptons and jets in pp collisions at $\sqrt{s} = 8$ TeV (vol 01, pg 163, 2014)"

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

JOURNAL OF HIGH ENERGY PHYSICS 1, 2015. DOI:
10.1007/JHEP01(2015)014

*Autores da comunidade IFGW

Defesas de Dissertações

[D003-2015] "Determination of the dynamical properties in turbid media using diffuse correlation spectroscopy: applications to biological tissues"

Aluno: Rodrigo Menezes Forti
Orientador: Prof. Dr. Rickson Coelho Mesquita
Data: 06/04/2015

[D004-2015] "Medidas de intensidade de múons cósmicos com cintiladores plásticos"

Aluno: Mônica Soares Nunes
Orientador: Prof. Dr. Ernesto Kemp
Data: 29/04/2015

Fonte: Portal IFGW/Pós-graduação - Agenda de Colóquios, Defesas e Seminários.
Disponível em: <http://portal.ifi.unicamp.br/pos-graduacao>

Patente

[Pa001-2015] "Processo de modificação de superfície metálicas por plasma de nitrogênio 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.

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