

Abstracta

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Artigos publicados - P161-2016 à P215-2016

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Defesas de Dissertações do IFGW - D013-2016 à D021-2016

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Artigos publicados

[P161-2016] “A generic approach for mechano-chemical reactions between carbonnanotubes of different functionalities”

Kabbani, M. A.; Tiwary, C. S.; Som, A.; Krishnadas, K. R.; Autreto, P. A. S.*; Ozden, S.; Keyshar, K.; Hackenberg, K.; Chi para, A. C.; Galvao, D. S.*; Vajtai, R.; Kabbani, A. T.; Pradeep, T.; Ajayan, P. M.

Here, we report similar reactions between nanotubes carrying functionalities, namely carbon nanotubes (CNTs) with the acyl chloride/hydroxyl and amine/carboxylic functionalities directly attached to their surfaces, resulting in the formation ofchemically modified graphene products. The reaction is spontaneous and is facilitated by simple grinding of the reactants. The new solid-state reactions have been confirmed using different spectroscopic and electron microscopy techniques.

CARBON 104, 196-202, 2016. DOI: 10.1016/j.carbon.2016.02.094

[P162-2016] “Brillouin scattering self-cancellation”

Florez, O.*; Jarschel, P. F.*; Espinel, Y. A. V.*; Cordeiro, C. M. B.*; Mayer Alegre, T. P.*; Wiederhecker, G. S.*; Dainese, P.*

The interaction between light and acoustic phonons is strongly modified in sub-wavelength confinement, and has led to the demonstration and control of Brillouin scattering in photonic structures such as nano-scale optical waveguides and cavities. Besides the small optical mode volume, two physical mechanisms come into play simultaneously: a volume effect caused by the strain-induced refractive index perturbation (known as photo-elasticity), and a surface effect caused by the shift of the optical boundaries due to mechanical vibrations. As a result, proper material and structure engineering allows one to control each contribution individually. Here, we experimentally demonstrate the perfect cancellation of Brillouin scattering arising from Rayleigh acoustic waves by engineering a silica nanowire with exactly opposing photo-elastic and moving-boundary effects. This demonstration provides clear experimental evidence that the interplay between the two mechanisms is a promising tool to precisely control the photon-phonon interaction, enhancing or suppressing it.

NATURE COMMUNICATIONS 7, 11759, 2016. DOI: 10.1038/ncomms11759

[P163-2016] “Centrality Dependence of the Charged-Particle Multiplicity Density at Midrapidity in Pb-Pb Collisions at $\sqrt{s_{NN}}=5.02$ TeV”

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

The pseudorapidity density of charged particles, $dN_{ch}/d\eta$, at midrapidity in Pb-Pb collisions has been measured at a center-of-mass energy per nucleon pair of $\sqrt{s_{NN}}=5.02$ TeV. For the 5% most central collisions, we measure a value of 1943 ± 54 . The rise in $dN_{ch}/d\eta$ as a function of $\sqrt{s_{NN}}$ is steeper than that observed in proton-proton collisions and follows the trend established by measurements at lower energy. The increase of $dN_{ch}/d\eta$ as a function of the average number of participant nucleons, $\langle N_{part} \rangle$, calculated in a Glauber model, is compared with the previous measurement at $\sqrt{s_{NN}}=2.76$ TeV. A constant factor of about 1.2 describes the increase in $dN_{ch}/d\eta$.

from $\sqrt{s_{NN}}=2.76$ to 5.02 TeV for all centrality classes, within the measured range of 0%-80% centrality. The results are also compared to models based on different mechanisms for particle production in nuclear collisions.

PHYSICAL REVIEW LETTERS 116[22] 222302, 2016. DOI: 10.1103/PhysRevLett.116.222302

[P164-2016] “Charge and spin current oscillations in a tunnel junction induced by magnetic field pulses”

Dartora, C. A.; Nobrega, K. Z.; Cabrera, G. G.*

Usually, charge and spin transport properties in tunnel junctions are studied in the DC bias regime and/or in the adiabatic regime of time-varying magnetic fields. In this letter, the temporal dynamics of charge and spin currents in a tunnel junction induced by pulsed magnetic fields is considered. At low bias voltages, energy and momentum of the conduction electrons are nearly conserved in the tunneling process, leading to the description of the junction as a spin-1/2 fermionic system coupled to time-varying magnetic fields. Under the influence of pulsed magnetic fields, charge and spin current can flow across the tunnel junction, displaying oscillatory behavior, even in the absence of DC bias voltage. A type of spin capacitance function, in close analogy to electric capacitance, is predicted.

PHYSICA B-CONDENSED MATTER 495, 89-93, 2016. DOI: 10.1016/j.physb.2016.05.017

[P165-2016] “Chiral Spin-Orbital Liquids with Nodal Lines”

Natori, W. M. H.; Andrade, E. C.; Miranda, E.*; Pereira, R. G.

Strongly correlated materials with strong spin-orbit coupling hold promise for realizing topological phases with fractionalized excitations. Here, we propose a chiral spin-orbital liquid as a stable phase of a realistic model for heavy-element double perovskites. This spin liquid state has Majorana fermion excitations with a gapless spectrum characterized by nodal lines along the edges of the Brillouin zone. We show that the nodal lines are topological defects of a non-Abelian Berry connection and that the system exhibits dispersing surface states. We discuss some experimental signatures of this state and compare them with properties of the spin liquid candidate Ba_2YMoO_6 .

PHYSICAL REVIEW LETTERS 117[1], 017204, 2016. DOI: 10.1103/PhysRevLett.117.017204

[P166-2016] “Comparing two tetraalkylammonium ionic liquids. I. Liquid phase structure”

Lima, T. A.; Paschoal, V. H.; Faria, L. F. O.; Ribeiro, M. C. C.; Giles, C.*

X-ray scattering experiments at room temperature were performed for the ionic liquids n-butyl-trimethylammonium bis(trifluoromethanesulfonyl) imide, $[N-1114][NTf_2]$, and methyl-tributylammonium bis(trifluoromethanesulfonyl) imide, $[N-1444][NTf_2]$. The peak in the diffraction data characteristic of charge ordering in $[N-1444][NTf_2]$ is shifted to longer distances in comparison to $[N-1114][NTf_2]$, but the peak characteristic of short-range correlations is shifted in $[N-1444][NTf_2]$ to shorter distances. Molecular dynamics (MD) simulations were performed for these ionic liquids using force fields available from the literature, although with new sets of partial charges for $[N-1114](+)$ and $[N-1114](+)$ proposed in this work. The shifting of charge and adjacency peaks to opposite directions in these ionic liquids was found in the static structure factor, $S(k)$, calculated by MD simulations.

Despite differences in cation sizes, the MD simulations unravel that anions are allowed as close to [N-1114](+) as to [N-1114](+) because anions are located in between the angle formed by the butyl chains. The more asymmetric molecular structure of the [N-1114](+) cation implies differences in partial structure factors calculated for atoms belonging to polar or non-polar parts of [N-1444][NTf2], whereas polar and non-polar structure factors are essentially the same in [N-1444][NTf2]. Results of this work shed light on controversies in the literature on the liquid structure of tetraalkylammonium based ionic liquids. Published by AIP Publishing.

JOURNAL OF CHEMICAL PHYSICS 144[22], 224504, 2016.
DOI: 10.1063/1.4953414

[P167-2016] “Comparing two tetraalkylammonium ionic liquids. II. Phase transitions”

Lima, T. A.; Paschoal, V. H.; Faria, L. F. O.; Ribeiro, M. C. C.; Ferreira, F. F.; Costa, F. N.; Giles, C.*

Phase transitions of the ionic liquids n-butyl-trimethylammonium bis(trifluoromethanesulfonyl) imide, [N-1114][NTf2], and methyl-tributylammonium bis(trifluoromethanesulfonyl) imide, [N-1114][NTf2], were investigated by differential scanning calorimetry (DSC), X-ray diffraction (XRD) measurements, and Raman spectroscopy. XRD and Raman spectra were obtained as a function of temperature at atmospheric pressure, and also under high pressure at room temperature using a diamond anvil cell (DAC). [N-1114][NTf2] experiences glass transition at low temperature, whereas [N-1114][NTf2] crystallizes or not depending on the cooling rate. Both the ionic liquids exhibit glass transition under high pressure. XRD and low-frequency Raman spectra provide a consistent physical picture of structural ordering-disordering accompanying the thermal events of crystallization, glass transition, cold crystallization, pre-melting, and melting. Raman spectra in the high-frequency range of some specific cation and anion normal modes reveal conformational changes of the molecular structures along phase transitions.

JOURNAL OF CHEMICAL PHYSICS 144[22] 224505, 2016.
DOI: 10.1063/1.4953415

[P168-2016] “Comparison of DSP-based nonlinear equalizers for intra-channel nonlinearity compensation in coherent optical OFDM”

Giacoumidis, E.; Mhatli, S.; Nguyen, T.; Le, S. T.; Aldaya, I.*; McCarthy, M. E.; Ellis, A. D.; Eggleton, B. J.

A novel versatile digital signal processing (DSP)-based equalizer using support vector machine regression (SVR) is proposed for 16-quadrature amplitude modulated (16-QAM) coherent optical orthogonal frequency-division multiplexing (CO-OFDM) and experimentally compared to traditional DSP-based deterministic fiber-induced non-linearity equalizers (NLEs), namely the full-field digital back-propagation (DBP) and the inverse Volterra series transfer function-based NLE (V-NLE). For a 40 Gb/s 16-QAM CO-OFDM at 2000 km, SVR-NLE extends the optimum launched optical power (LOP) by 4 dB compared to V-NLE by means of reduction of fiber non-linearity. In comparison to full-field DBP at a LOP of 6 dBm, SVR-NLE outperforms by similar to 1 dB in Q-factor. In addition, SVR-NLE is the most computational efficient DSP-NLE.

OPTICS LETTERS 41[11] 2509-2512, 2016. DOI: 10.1364/OL.41.002509

[P169-2016] “Compensation temperatures and exchange bias in La_{1.5}Ca_{0.5}Co₂O₆”

Coutrim, L. T.; Bittar, E. M.; Stavale, F.; Garcia, F.; Baggio-Saitovitch, E.; Abbate, M.; Mossaneck, R. J. O.; Martins, H. P.; Tobia, D.*; Pagliuso, P. G.*; Bufaical, L.

We report on the study of magnetic properties of the La_{1.5}Ca_{0.5}Co₂O₆ double perovskite. Via ac magnetic susceptibility we have observed evidence of weak ferromagnetism and reentrant spin glass behavior on an antiferromagnetic matrix. Regarding the magnetic behavior as a function of temperature, we have found that the material displays up to three inversions of its magnetization, depending on the appropriate choice of the applied magnetic field. At low temperature, the material exhibits exchange bias effect when it is cooled in the presence of a magnetic field. Also, our results indicate that this effect may be observed even when the system is cooled at zero field. Supported by other measurements and also by electronic structure calculations, we discuss the magnetic reversals and spontaneous exchange bias effect in terms of magnetic phase separation and magnetic frustration of Ir⁴⁺ ions located between the antiferromagnetically coupled Co ions.

PHYSICAL REVIEW B 93[17] 174406, 2016. DOI: 10.1103/PhysRevB.93.174406

[P170-2016] “Controlling multipolar surface plasmon excitation through the azimuthal phase structure of electron vortex beams”

Ugarte, D.*; Ducati, C.

We have theoretically studied how the azimuthal phase structure of an electron vortex beam excites surface plasmons on metal particles of different geometries as observed in electron energy loss spectroscopy (EELS). We have developed a semiclassical approximation combining a ring-shaped beam and the dielectric formalism. Our results indicate that for the case of total orbital angular momentum transfer, we can manipulate surface plasmon multipole excitation and even attain an enhancement factor of several orders of magnitude. Since electron vortex beams interact with particles mostly through effects due to azimuthal symmetry, i.e., in the plane perpendicular to the electron beam, anisotropy information (longitudinal and transversal) of the sample may be derived in EELS studies by comparing nonvortex and vortex beam measurements.

PHYSICAL REVIEW B 93,[20] 205418, 2016. DOI: 10.1103/PhysRevB.93.205418

[P171-2016] “Differential studies of inclusive J/ψ and ψ(2S) production at forward rapidity in Pb-Pb collisions at root s(NN)=2.76 TeV”

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

The production of J/ψ and ψ(2S) was studied with the ALICE detector in Pb-Pb collisions at the LHC. The measurement was performed at forward rapidity (2.5 < y < 4) down to zero transverse momentum (p(T)) in the dimuon decay channel. Inclusive J/ψ yields were extracted in different centrality classes and the centrality dependence of the average p(T) is presented. The J/ψ suppression, quantified with the nuclear modification factor (R-AA), was measured as a function of centrality, transverse momentum and rapidity. Comparisons with similar measurements at lower collision energy and theoretical models indicate that the J/ψ production is the result of an interplay between color screening and recombination mechanisms in a deconfined partonic medium, or at its hadronization. Results on the ψ(2S) suppression are provided via the ratio of ψ(2S) over J/ψ measured in pp and Pb-Pb collisions.

[P172-2016] "Dimensionality tuning of the electronic structure in Fe₃Ga₄ magnetic materials"

Moura, K. O.*; de Oliveira, L. A. S.; Rosa, P. F. S.*; Jesus, C. B. R.*; Saleta, M. E.*; Granado, E.*; Beron, F.*; Pagliuso, P. G.*; Pirota, K. R.*

This work reports on the dimensionality effects on the magnetic behavior of Fe₃Ga₄ compounds by means of magnetic susceptibility, electrical resistivity, and specific heat measurements. Our results show that reducing the Fe₃Ga₄ dimensionality, via nanowire shape, intriguingly modifies its electronic structure. In particular, the bulk system exhibits two transitions, a ferromagnetic (FM) transition temperature at T-1 = 50 K and an antiferromagnetic (AFM) one at T-2 = 390 K. On the other hand, nanowires shift these transition temperatures, towards higher and lower temperature for T-1 and T-2, respectively. Moreover, the dimensionality reduction seems to also modify the microscopic nature of the T-1 transition. Instead of a FM to AFM transition, as observed in the 3D system, a transition from FM to ferrimagnetic (FERRI) or to coexistence of FM and AFM phases is found for the nanowires. Our results allowed us to propose the magnetic field-temperature phase diagram for Fe₃Ga₄ in both bulk and nanostructured forms. The interesting microscopic tuning of the magnetic interactions induced by dimensionality in Fe₃Ga₄ opens a new route to optimize the use of such materials in nanostructured devices.

SCIENTIFIC REPORTS 6, 28364, 2016. DOI: 10.1038/srep28364

[P173-2016] "Dislocation Structure and Mobility in hcp He-4"

Borda, E. J. L.; Wei Cai; Koning, M.*

Using path-integral Monte Carlo simulations, we assess the core structure and mobility of the screw and edge basal-plane dislocations in hcp He-4. Our findings provide key insights into recent interpretations of giant plasticity and mass flow junction experiments. First, both dislocations are dissociated into non-superfluid Shockley partial dislocations separated by ribbons of stacking fault, suggesting that they are unlikely to act as one-dimensional channels that may display Luttinger-liquid-like behavior. Second, the centroid positions of the partial cores are found to fluctuate substantially, even in the absence of applied shear stresses. This implies that the lattice resistance to motion of the partial dislocations is negligible, consistent with the recent experimental observations of giant plasticity. Further results indicate that both the structure of the partial cores and the zero-point fluctuations play a role in this extreme mobility.

PHYSICAL REVIEW LETTERS 117[4], 045301, 2016. DOI: 10.1103/PhysRevLett.117.045301

[P174-2016] "EEG-fMRI in the presurgical evaluation of temporal lobe epilepsy"

Coan, A. C.; Chaudhary, U. J.; Grouiller, F.; Campos, B. M.; Perani, S.; De Ciantis, A.; Vulliemoz, S.; Diehl, B.; Beltramini, G. C.*; Carmichael, D. W.; Thornton, R. C.; Covolan, R. J.*; Cendes, F.; Lemieux, L.

Objective Drug-resistant temporal lobe epilepsy (TLE) often requires thorough investigation to define the epileptogenic zone for surgical treatment. We used simultaneous interictal scalp EEG-fMRI to evaluate its value for predicting long-term postsurgical outcome. Methods 30 patients undergoing presurgical evaluation and proceeding to temporal lobe (TL) resection were studied.

Interictal epileptiform discharges (IEDs) were identified on intra-MRI EEG and used to build a model of haemodynamic changes. In addition, topographic electroencephalographic correlation maps were calculated between the average IED during videoEEG and intra-MRI EEG, and used as a condition. This allowed the analysis of all data irrespective of the presence of IED on intra-MRI EEG. Mean follow-up after surgery was 46 months. International League Against Epilepsy (ILAE) outcomes 1 and 2 were considered good, and 3-6 poor, surgical outcome. Haemodynamic maps were classified according to the presence (Concordant) or absence (Discordant) of Blood Oxygen Level-Dependent (BOLD) change in the TL overlapping with the surgical resection. Results The proportion of patients with good surgical outcome was significantly higher (13/16; 81%) in the Concordant than in the Discordant group (3/14; 21%) (chi(2) test, Yates correction, p=0.003) and multivariate analysis showed that Concordant BOLD maps were independently related to good surgical outcome (p=0.007). Sensitivity and specificity of EEG-fMRI results to identify patients with good surgical outcome were 81% and 79%, respectively, and positive and negative predictive values were 81% and 79%, respectively. Interpretation The presence of significant BOLD changes in the area of resection on interictal EEG-fMRI in patients with TLE retrospectively confirmed the epileptogenic zone. Surgical resection including regions of haemodynamic changes in the TL may lead to better postoperative outcome.

JOURNAL OF NEUROLOGY NEUROSURGERY AND PSYCHIATRY 87[6] 642-649, 2016. DOI: 10.1136/jnnp-2015-310401

[P175-2016] "Effects of Nanostructure and Dipolar Interactions on Magnetohyperthermia in Iron Oxide Nanoparticles"

Orozco-Henao, J. M.*; Coral, D. F.; Muraca, D.*; Moscoso-Londono, O.*; Zelis, P. M.; van Raap, M. B. F.; Sharma, S. K.; Pirota, K. R.*; Knobel, M.*

Magnetohyperthermia properties of magnetic nanoparticle colloids are strongly affected by their intrinsic magnetic properties and dipolar interactions among themselves. The intrinsic magnetic properties are related to the nanoparticle (NP) size, geometry, phase composition, magnetic anisotropy, and saturation magnetization. The dipole-dipole interactions are determined by colloid nanoparticle concentrations and the possible existence of clustering on the colloidal suspension. Here we have observed that oxygen atmosphere and pressure changes during the final stage of thermal decomposition are critical to modify the size of the iron oxide NPs from 8 to near 20 nm, and consequently their overall magnetic properties. Size-dependent magnetic parameters such as anisotropy, magnetic moment per particle, blocking temperature, and dipolar interaction energy were inferred using different phenomenological approaches. A detailed magnetohyperthermia analysis was performed by applying the linear response theory. A good correlation between experimental and theoretical specific absorption rate values was obtained for a frequency of 260 kHz and applied field of 52 kA/m. These results were observed for the different sizes of nanoparticles, and disagreement between the experimental results and the model increases at lower frequencies.

JOURNAL OF PHYSICAL CHEMISTRY C 120[23], 12796-12809, 2016. DOI: 10.1021/acs.jpcc.6b00900

[P176-2016] "Energy estimation of cosmic rays with the Engineering Radio Array of 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.*; Pakk Selmi-Dei, D.*; Santos, E.*; Theodoro, V. M.*; et al.
Pierre Auger Collaboration

The Auger Engineering Radio Array (AERA) is part of the Pierre Auger Observatory and is used to detect the radio emission of cosmic-ray air showers. These observations are compared to the data of the surface detector stations of the Observatory, which provide well-calibrated information on the cosmic-ray energies and arrival directions. The response of the radio stations in the 30-80 MHz regime has been thoroughly calibrated to enable the reconstruction of the incoming electric field. For the latter, the energy deposit per area is determined from the radio pulses at each observer position and is interpolated using a two-dimensional function that takes into account signal asymmetries due to interference between the geomagnetic and charge-excess emission components. The spatial integral over the signal distribution gives a direct measurement of the energy transferred from the primary cosmic ray into radio emission in the AERA frequency range. We measure 15.8 MeV of radiation energy for a 1 EeV air shower arriving perpendicularly to the geomagnetic field. This radiation energy-corrected for geometrical effects-is used as a cosmic-ray energy estimator. Performing an absolute energy calibration against the surface-detector information, we observe that this radio-energy estimator scales quadratically with the cosmic-ray energy as expected for coherent emission. We find an energy resolution of the radio reconstruction of 22% for the data set and 17% for a high-quality subset containing only events with at least five radio stations with signal.

PHYSICAL REVIEW D 93 [12] 122005, 2016. DOI: 10.1103/PhysRevD.93.122005

[P177-2016] “Evolution of a quantum harmonic oscillator coupled to a minimal thermal environment”

Vidiella-Barranco, A.*

In this paper it is studied the influence of a minimal thermal environment on the dynamics of a quantum harmonic oscillator (labelled A), prepared in a coherent state. The environment itself consists of a second oscillator (labelled B), initially in a thermal state. Two types of interaction Hamiltonians are considered, and the time-evolution of the reduced density operator of oscillator A is compared to the one obtained from the usual master equation approach, i.e., assuming that oscillator A is coupled to a large reservoir. An analysis of the linear entropy evolution of oscillator A shows that simplified models may be able to describe important features related to the phenomenon of decoherence, such as the rapid growth of the linear entropy, as well as its dependence on the effective temperature of the environment.

PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS 459, 78-85, 2016. DOI: 10.1016/j.physa.2016.04.033

[P178-2016] “Floating liquid bridge charge dynamics”

Teschke, O.*; Soares, D. M.*; Gomes, W. E.*; Valente Filho, J. F.*

The interaction of liquid with electric fields is investigated in a configuration where up to 13 kV are applied between electrodes resulting in a 10(6) V/m electric field in the capillaries and where there is the formation of a free-standing fluid bridge in the interelectrode gap. The Mott-Gurney equation was fitted to the measured ionization current vs applied voltage curve which indicates that the ionization rate at the high-voltage anode electrode dimethylsulfoxide (DMSO) interface and space charging in the interelectrode gap determine the floating liquid bridge current for a given cathode-to-anode voltage. Space charge effects were measured in the cathode becker and also at the liquid bridge since the ionized charges at the anode migrate to the bridge outer surface and decrease the interfacial tension from 43 mJ/m(2) to 29 mJ/m(2).

Two distinct structural regions then form the bridge, a charged plastic (bulk modulus similar to 100 MPa) conducting outer layer with a surface conductivity of similar to 10(-9) Omega(-1), which shapes and supports the floating fluid structure, and an inner liquid cylinder, where DMSO molecules flow.

PHYSICS OF FLUIDS 28[1]012105, 2016. DOI: 10.1063/1.4938402

[P179-2016] “Highly ordered carbon-based nanospheres with high stiffness”

Ozden, S.; Tiwary, C. S.; Yao, J. Y.; Brunetto, G.*; Bhowmick, S.; Asif, S.; Vajtai, R.; Ajayan, P. M.

Understanding properties of individual nanostructures, such as mechanical properties and deformation mechanism, aid to control their properties for specific applications. Here we report, the mechanical properties of individual boron and nitrogen doped carbon-based nanospheres (CNS) using in-situ nanocompression testing in a scanning electron microscopy (SEM). The in-situ SEM characterizations showed classical sphere deformation during initial loading and it can be deformed till 40-50 percent. Elastic modulus of spheres is 33.3 GPa which has been determined using unloading curves. The mechanical properties of CNS structures are quite outstanding when it is compared to some other conventional nanomaterials such as polymer-based spheres and nanotube structures.

CARBON 105, 144-150, 2016. DOI: 10.1016/j.carbon.2016.04.023

[P180-2016] “Hosting of La3+ guest ions in type-I Ge clathrates: A first-principles characterization for thermoelectric applications”

Gonzalez-Romero, R. L.*; Miranda, C. R.; Avila, M. A.; Antonelli, A.*

The conversion of heat to electricity by thermoelectric devices may play a key role in the future for energy harvesting. In order to meet that purpose, a variety of more efficient thermoelectric materials are needed. Intense research has been conducted over the past decade on type-I thermoelectric clathrates, and further developments may arise with successful introduction of trivalent rare-earth elements into the cages of this class of materials. This paper is dedicated to study the hypothetical charge-balanced compound La2Ga6Ge40, using first-principles calculations, in order to evaluate the direct effects of introducing La3+ into Ge-46 without occupying all the other cages with other chemical species. Here we present first-principles calculations on the structural, electronic, vibrational and thermoelectric properties of type-I Ge clathrates hosting La3+ guest ions. Our results indicate that the structures with the lowest formation energies are those in which the La3+ guests are inside the Ge-46 dodecahedral cages (2a Wyckoff positions), with Ga substitution for Zintl charge balance. Furthermore, our calculations show that several features of the system, such as, the equilibrium position of the La3+ guests inside the cages, the electronic structure near the band edges, the vibrational properties and anharmonic effects are significantly affected by the way the Ga atoms are distributed in the lattice. The influence of these features on the thermoelectric properties of these systems is discussed.

COMPUTATIONAL MATERIALS SCIENCE 122, 46-56, 2016. DOI: 10.1016/j.commatsci.2016.05.013

[P181-2016] “Inclusive and differential measurements of the t(t)over-bar charge asymmetry in pp collisions at root s=8 TeV”

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

The t (\bar{t}) over bar charge asymmetry is measured in proton-proton collisions at a centre-of-mass energy of 8 TeV. The data, collected with the CMS experiment at the LHC, correspond to an integrated luminosity of 19.7 fb⁻¹. Selected events contain an electron or a muon and four or more jets, where at least one jet is identified as originating from b-quark hadronization. The inclusive charge asymmetry is found to be 0.0010 \pm 0.0068 (stat) \pm 0.0037 (syst). In addition, differential charge asymmetries as a function of rapidity, transverse momentum, and invariant mass of the lf system are studied. For the first time at the LHC, the measurements are also performed in a reduced fiducial phase space of top quark pair production, with an integrated result of -0.0035 \pm 0.0072 (stat) \pm 0.0031 (syst). All measurements are consistent within two standard deviations with zero asymmetry as well as with the predictions of the standard model.

PHYSICS LETTERS B 757, 154-179, 2016. DOI: 10.1016/j.physletb.2016.03.060

[P182-2016] "Magnetoelectric intrinsic coupling in PFW based perovskites"

Fragola, B.; Coelho, A. A.*; Eiras, J. A.

Magnetic, electric and mechanical properties can be strongly coupled in multiferroic materials. However, only few models were developed to describe electro-magneto-mechanical coupling effects on them. We report the influence of the strain induced phase transitions on the enhancement of the magnetoelectric intrinsic properties in multiferroic Pb[(Fe₂/3W₁/3)(1-x)Ti-x]O₃ (x = 0.17, 0.20) ceramics. We argue that when both ferroelectric and antiferromagnetic transition temperatures are closer together, the magnetoelectric intrinsic and extrinsic responses increase. Colossal magnetoelectric intrinsic response was found for Pb(Fe₂/3W₁/3)(0.83)Ti_{0.17}O₃.

JOURNAL OF ELECTROCERAMICS 36 [1-4] 21-29, 2016. DOI: 10.1007/s10832-015-9998-5

[P183-2016] "Mapping of heterogeneous wetting inside superhydrophobic coatings"

Teschke, O.*; Gomes, W. E.*; Soares, D. M.*; de Souza, E. F.*

The condition for the occurrence of induced drying inside structured coating was calculated and corresponds to a new format of the Kelvin equation. Water spatial distribution inside immersed interconnected fibers forming superhydrophobic coatings was then imaged by confocal Raman microscopy characterizing the heterogeneous wetting profile. Coatings were structurally characterized by scanning electron microscopy (resolution similar to 0.1 μ m) and interconnected fiber structure lateral area and empty volume (V_{emp}) measured. The combination of these micrograph images yield a new measurement technique readily applied for structurally characterizing immersed coating hydrophobicity. When this technique was applied for coatings showing induced drying, the measured coating layer lateral area per unit volume was similar to 10(4)/m, which differs by two orders of magnitude with the value calculated by the Kelvin equation.

COLLOID AND INTERFACE SCIENCE COMMUNICATIONS 10, 6-10, 2016. DOI: 10.1016/j.colcom.2016.03.003

[P184-2016] "Measurement of an Excess in the Yield of J/psi at Very Low p(T) in Pb-Pb Collisions at root s(NN)=2.76 TeV"

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

We report on the first measurement of an excess in the yield of J/psi at very low transverse momentum ($p_T < 0.3$ GeV/c) in peripheral hadronic Pb-Pb collisions at $\sqrt{s(NN)} = 2.76$ TeV, performed by ALICE at the CERN LHC. Remarkably, the measured nuclear modification factor of J/psi in the rapidity range $2.5 < y < 4$ reaches about 7 (2) in the $p(T)$ range 0-0.3 GeV/c in the 70%-90% (50%-70%) centrality class. The J/psi production cross section associated with the observed excess is obtained under the hypothesis that coherent photoproduction of J/psi is the underlying physics mechanism. If confirmed, the observation of J/psi coherent photoproduction in Pb-Pb collisions at impact parameters smaller than twice the nuclear radius opens new theoretical and experimental challenges and opportunities. In particular, coherent photoproduction accompanying hadronic collisions may provide insight into the dynamics of photoproduction and nuclear reactions, as well as become a novel probe of the quark-gluon plasma.

PHYSICAL REVIEW LETTERS 116 [22] 222301, 2016. DOI: 10.1103/PhysRevLett.116.222301

[P185-2016] "Measurement of Long-Range Near-Side Two-Particle Angular Correlations in pp Collisions at root s=13 TeV"

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

Results on two-particle angular correlations for charged particles produced in pp collisions at a center-of-mass energy of 13 TeV are presented. The data were taken with the CMS detector at the LHC and correspond to an integrated luminosity of about 270 nb⁻¹. The correlations are studied over a broad range of pseudorapidity ($|\eta_1 - \eta_2| < 2.4$) and over the full azimuth (ϕ) as a function of charged particle multiplicity and transverse momentum (p_T). In high-multiplicity events, a long-range ($|\Delta\eta| > 2.0$), near-side ($|\Delta\phi| \approx 0$) structure emerges in the two-particle $\Delta\eta$ - $\Delta\phi$ correlation functions. The magnitude of the correlation exhibits a pronounced maximum in the range $1.0 < p_T < 2.0$ GeV/c and an approximately linear increase with the charged particle multiplicity, with an overall correlation strength similar to that found in earlier pp data at $\sqrt{s} = 7$ TeV. The present measurement extends the study of near-side long-range correlations up to charged particle multiplicities N_{ch} similar to 180, a region so far unexplored in pp collisions. The observed longrange correlations are compared to those seen in pp, pPb, and PbPb collisions at lower collision energies.

PHYSICAL REVIEW LETTERS 116[17] 172302, 2016. DOI: 10.1103/PhysRevLett.116.172302

[P186-2016] "Measurement of spin correlations in $t\bar{t}$ production using the matrix element method in the muon plus jets final state in pp collisions at root S=8 TeV"

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

The consistency of the spin correlation strength in top quark pair production with the standard model (SM) prediction is tested in the muon+jets final state. The events are selected from pp collisions, collected by the CMS detector, at a centre-of-mass energy of 8 TeV, corresponding to an integrated luminosity of 19.7 fb⁻¹. The data are compared with the expectation for the spin correlation predicted by the SM and with the expectation of no correlation.

Using a template fit method, the fraction of events that show SM spin correlations is measured to be 0.72 ± 0.08 (stat) $(-0.13)(+0.15)$ (syst), representing the most precise measurement of this quantity in the muon+jets final state to date.

PHYSICS LETTERS B 758, 321-346, 2016. DOI: 10.1016/j.physletb.2016.05.005

[P187-2016] “Measurement of the CP-violating weak phase $\phi(s)$ and the decay width difference $\Delta\Gamma(s)$ using the $B_s(0) \rightarrow J/\psi \phi$ (1020) decay channel 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 CP-violating weak phase $\phi(s)$ of the $B_s(0)$ meson and the decay width difference $\Delta\Gamma(s)$ of the $B_s(0)$ light and heavy mass eigenstates are measured with the CMS detector at the LHC using a data sample of $B_s(0) \rightarrow J/\psi \phi(1020) \rightarrow \mu^+\mu^-K^+K^-$ decays. The analysed data set corresponds to an integrated luminosity of 19.7 fb^{-1} collected in pp collisions at a centre-of-mass energy of 8 TeV. A total of 49200 reconstructed $B_s(0)$ decays are used to extract the values of $\phi(s)$ and $\Delta\Gamma(s)$ by performing a time dependent and flavour-tagged angular analysis of the $\mu^+\mu^-K^+K^-$ final state. The weak phase is measured to be $\phi(s) = -0.075 \pm 0.097$ (stat) ± 0.031 (syst) rad, and the decay width difference is $\Delta\Gamma(s) = 0.095 \pm 0.013$ (stat) ± 0.007 (syst) ps^{-1} .

PHYSICS LETTERS B 757, 97-120, 2016. DOI: 10.1016/j.physletb.2016.03.046

[P188-2016] “Measurement of the Radiation Energy in the Radio Signal of Extensive Air Showers as a Universal Estimator of Cosmic-Ray Energy”

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.*; Pakk Selmi-Dei, D.*; Santos, E.*; Theodoro, V. M.*; et al.
Pierre Auger Collaboration

We measure the energy emitted by extensive air showers in the form of radio emission in the frequency range from 30 to 80 MHz. Exploiting the accurate energy scale of the Pierre Auger Observatory, we obtain a radiation energy of 15.8 ± 0.7 (stat) ± 6.7 (syst) MeV for cosmic rays with an energy of 1 EeV arriving perpendicularly to a geomagnetic field of 0.24 G, scaling quadratically with the cosmic-ray energy. A comparison with predictions from state-of-the-art first-principles calculations shows agreement with our measurement. The radiation energy provides direct access to the calorimetric energy in the electromagnetic cascade of extensive air showers. Comparison with our result thus allows the direct calibration of any cosmic-ray radio detector against the well-established energy scale of the Pierre Auger Observatory.

PHYSICAL REVIEW LETTERS 116[24] 241101, 2016. DOI: 10.1103/PhysRevLett.116.241101

[P189-2016] “Measurement of the top quark mass using charged particles 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

A novel technique for measuring the mass of the top quark that uses only the kinematic properties of its charged decay products is presented. Top quark pair events with final states with one or two charged leptons and hadronic jets are selected from the data set of 8 TeV proton-proton collisions, corresponding to an integrated luminosity of 19.7 fb^{-1} . By reconstructing secondary vertices inside the selected jets and computing the invariant mass of the system formed by the secondary vertex and an isolated lepton, an observable is constructed that is sensitive to the top quark mass that is expected to be robust against the energy scale of hadronic jets. The main theoretical systematic uncertainties, concerning the modeling of the fragmentation and hadronization of b quarks and the reconstruction of secondary vertices from the decays of b hadrons, are studied. A top quark mass of 173.68 ± 0.20 (stat) $(-0.97)(+1.58)$ (syst) GeV is measured. The overall systematic uncertainty is dominated by the uncertainty in the b quark fragmentation and the modeling of kinematic properties of the top quark.

PHYSICAL REVIEW D 93[9] 092006, 2016. DOI: 10.1103/PhysRevD.93.092006

[P190-2016] “Multi-strange baryon production in p-Pb collisions at $\sqrt{\text{NN}}-N-S=5.02$ TeV”

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

The multi-strange baryon yields in Pb-Pb collisions have been shown to exhibit an enhancement relative to pp reactions. In this work, Xi and Omega production rates have been measured with the ALICE experiment as a function of transverse momentum, $p(T)$, in p-Pb collisions at a centre-of-mass energy of $\sqrt{s_{\text{NN}}} = 5.02$ TeV. The results cover the kinematic ranges $0.6 \text{ GeV}/c < p(T) < 7.2 \text{ GeV}/c$ and $0.8 \text{ GeV}/c < p(T) < 5 \text{ GeV}/c$, for E and S-2 respectively, in the common rapidity interval $0.5 < y_{\text{cms}} < 0$. Multi-strange baryons have been identified by reconstructing their weak decays into charged particles. The $p(T)$ spectra are analysed as a function of event charged-particle multiplicity, which in p-Pb collisions ranges over one order of magnitude and lies between those observed in pp and Pb-Pb collisions. The measured p - r distributions are compared to the expectations from a Blast-Wave model. The parameters which describe the production of lighter hadron species also describe the hyperon spectra in high multiplicity p-Pb collisions. The yield of hyperons relative to charged pions is studied and compared with results from pp and Pb-Pb collisions. A continuous increase in the yield ratios as a function of multiplicity is observed in p-Pb data, the values of which range from those measured in minimum bias pp to the ones in Pb-Pb collisions. A statistical model qualitatively describes this multiplicity dependence using a canonical suppression mechanism, in which the small volume causes a relative reduction of hadron production dependent on the strangeness content of the hyperon.

PHYSICS LETTERS B 758, 389-401, 2016. DOI: 10.1016/j.physletb.2016.05.027

[P191-2016] “Multimodal and Non-Linear Optical Microscopy Applications in Reproductive Biology”

Adur, J.*; Barbosa, G. O.; Pelegati, V. B.*; Baratti, M. O.; Cesar, C. L.*; Casco, V. H.; Carvalho, H. F.

A plethora of optical techniques is currently available to obtain non-destructive, contactless, real time information with subcellular spatial resolution to observe cell processes. Each technique has its own unique features for imaging and for obtaining certain biological information. However none of the available techniques can be of universal use.

For a comprehensive investigation of biological specimens and events, one needs to use a combination of bioimaging methods, often at the same time. Some modern confocal/multiphoton microscopes provide simultaneous fluorescence, fluorescence lifetime imaging, and four-dimensional imaging. Some of them can also easily be adapted for harmonic generation imaging, and to permit cell manipulation technique. In this work we present a multimodal optical workstation that extends a commercially available confocal microscope to include nonlinear/multiphoton microscopy and optical manipulation/stimulation tools. The nonlinear microscopy capabilities were added to the commercial confocal microscope by exploiting all the flexibility offered by the manufacturer. The various capabilities of this workstation as applied directly to reproductive biology are discussed.

MICROSCOPY RESEARCH AND TECHNIQUE 79[7], 567-582, 2016. DOI: 10.1002/jemt.22684

[P192-2016] “Multipion Bose-Einstein correlations in pp, p-Pb, and Pb-Pb collisions at energies available at the CERN Large Hadron Collider”

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

Three- and four-pion Bose-Einstein correlations are presented in pp, p-Pb, and Pb-Pb collisions at the LHC. We compare our measured four-pion correlations to the expectation derived from two- and three-pion measurements. Such a comparison provides a method to search for coherent pion emission. We also present mixed-charge correlations in order to demonstrate the effectiveness of several analysis procedures such as Coulomb corrections. Same-charge four-pion correlations in pp and p-Pb appear consistent with the expectations from three-pion measurements. However, the presence of non-negligible background correlations in both systems prevent a conclusive statement. In Pb-Pb collisions, we observe a significant suppression of three- and four-pion Bose-Einstein correlations compared to expectations from two-pion measurements. There appears to be no centrality dependence of the suppression within the 0%-50% centrality interval. The origin of the suppression is not clear. However, by postulating either coherent pion emission or large multiplicity Coulomb effects, the suppression may be explained.

PHYSICAL REVIEW C 93[5] 054908, 2016. DOI: 10.1103/PhysRevC.93.054908

[P193-2016] “Muon capture on light isotopes measured with the Double Chooz detector”

Abe, Y.; Abrahao, T.; Almazan, H.; Gonzalez, L. F. G.*; Kemp, E.*; et al. Double Chooz Collaboration

Using the Double Chooz detector, designed to measure the neutrino mixing angle θ_{13} , the products of μ^- capture on C-12, C-13, N-14, and O-16 have been measured. Over a period of 489.5 days, 2.3×10^6 stopping cosmic μ^- have been collected, of which 1.8×10^5 captured on carbon, nitrogen, or oxygen nuclei in the inner detector scintillator or acrylic vessels. The resulting isotopes were tagged using prompt neutron emission (when applicable), the subsequent beta decays, and, in some cases, beta-delayed neutrons. The most precise measurement of the rate of C-12(μ^-), ν)B-12 to date is reported: $6.57(-0.21)(+0.11) \times 10^3 \text{ s}^{-1}$, or $(17.35(-0.59)(+0.35))\%$ of nuclear captures. By tagging excited states emitting gamma s, the ground state transition rate to B-12 has been determined to be $5.68(-0.23)(+0.14) \times 10^3 \text{ s}^{-1}$. The heretofore unobserved reactions C-12(μ^-), ν alpha) Li-8, C-13(μ^-), ν n alpha) Li-8, and C-13(μ^-), ν n)B-12 are measured. Further, a population of beta n decays following stopping muons is identified with 5.5 sigma significance.

Statistics limit our ability to identify these decays definitively. Assuming negligible production of He-8, the reaction C-13(μ^-), ν alpha) Li-9 is found to be present at the 2.7 sigma level. Limits are set on a variety of other processes.

PHYSICAL REVIEW C 93[5] 054608, 2016. DOI: 10.1103/PhysRevC.93.054608

[P194-2016] “Nanometer Scale Hard/Soft Bilayer Magnetic Antidots”

Beron, F.*; Kaidatzis, A.; Velo, M. F.*; Arzuza, L. C. C.*; Palmero, E. M.; del Real, R. P.; Niarchos, D.; Pirola, K. R.*; Garcia-Martin, J. M.

The effect of arrays of nanometer scale pores on the magnetic properties of thin films has been analyzed. Particularly, we investigated the influence of the out-of-plane magnetization component created by the nanopores on the in-plane magnetic behavior of patterned hard/soft magnetic thin films in antidot morphology. Its influence on the coupling in Co/Py bilayers of few tens of nanometer thick is compared for disordered and ordered antidots of 35-nm diameter. The combination of magneto-optical Kerr effect (MOKE) and first-order reversal curve (FORC) technique allows probing the effects of the induced perpendicular magnetization component on the bilayer magnetic behavior, while magnetic force microscopy (MFM) is used to image it. We found that ordered antidots yield a stronger out-of-plane component than disordered ones, influencing in a similar manner the hard layer global in-plane magnetic behavior if with a thin or without soft layer. However, its influence changes with a thicker soft layer, which may be an indication of a weaker coupling.

NANOSCALE RESEARCH LETTERS 11, 86, 2016. DOI: 10.1186/s11671-016-1302-3

[P195-2016] “Optical phonon modulation in semiconductors by surface acoustic waves”

Iikawa, F.*; Hernandez-Minguez, A.; Ramsteiner, M.; Santos, P. V.

We investigate the modulation of optical phonons in semiconductor crystals by a surface acoustic wave (SAW) propagating on the crystal surface. The SAW fields induce changes on the order of 10^{-3} in the time-averaged Raman peak intensity by optical phonons in Si and GaN crystals. The SAW-induced modifications in the intensity of the Raman lines are dominated by the modulation of the longitudinal optical (LO) phonon energy by the SAW strain field. We show that while the strain field of the excited Rayleigh SAWs changes the LO phonon energy, it does not mix it with the transversal optical modes. In addition to the previous contribution, which is of a local character, the experiments give evidence for a weaker and nonlocal contribution attributed to the spatial variation of the SAW strain field. The latter activates optical modes with large wave vectors and, therefore, lower energies. The experimental results, which are well described by theoretical models for the two contributions, prove that optical phonons can be manipulated by SAWs with μm wavelengths.

PHYSICAL REVIEW B 93[19]. 195212, 2016. DOI: 10.1103/PhysRevB.93.195212

[P196-2016] “Particle identification in ALICE: a Bayesian approach”

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

We present a Bayesian approach to particle identification (PID) within the ALICE experiment. The aim is to more effectively combine the particle identification capabilities of its various detectors. After a brief explanation of the adopted methodology and formalism, the performance of the Bayesian PID approach for charged pions, kaons and protons in the central barrel of ALICE is studied. PID is performed via measurements of specific energy loss (dE/dx) and time of flight. PID efficiencies and misidentification probabilities are extracted and compared with Monte Carlo simulations using high-purity samples of identified particles in the decay channels $K^0 \rightarrow \pi^+ \pi^-$, $\phi \rightarrow K^+ K^-$, and $\Lambda \rightarrow p \pi^-$ in p-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV. In order to thoroughly assess the validity of the Bayesian approach, this methodology was used to obtain corrected p(T) spectra of pions, kaons, protons, and D-0 mesons in pp collisions at $\sqrt{s} = 7$ TeV. In all cases, the results using Bayesian PID were found to be consistent with previous measurements performed by ALICE using a standard PID approach. For the measurement of $D^0 \rightarrow K^+ \pi^-$, it was found that a Bayesian PID approach gave a higher signal-to-background ratio and a similar or larger statistical significance when compared with standard PID selections, despite a reduced identification efficiency. Finally, we present an exploratory study of the measurement of $A(c^+) \rightarrow p K^+ \pi^+$ in pp collisions at $\sqrt{s} = 7$ TeV, using the Bayesian approach for the identification of its decay products.

EUROPEAN PHYSICAL JOURNAL PLUS 131[5] 168, 02016, 2016. DOI: 10.1140/epjp/i2016-16168-5

[P197-2016] “Physical properties of antiferromagnetic single crystal GdIn3”

Silva, L. S.; Peixoto, E. B.; Mercena, S. G.; Coelho, A. A.*; Meneses, C. T.; Duque, J. G. S.

A sample of GdIn3 was obtained via the metallic flux technique and its structural, magnetic, and thermodynamic properties were studied. X-ray diffraction (XRD) measurements realized at room temperature were performed in order to verify whether the desired crystalline phase had been obtained. The experimental results show that single crystals were grown successfully by the employed growth technique. The magnetic characterization was carried out through magnetic susceptibility data as a function of temperature ($2 \leq x \leq 300$ K) and magnetic field ($-7 \leq H \leq 7$ T). The specific heat was measured using a commercial small mass calorimeter that employed the thermal relaxation technique in the temperature range of 2-200 K.

MATERIALS LETTERS 175, 9-12, 2016. DOI: 10.1016/j.matlet.2016.03.128

[P198-2016] “Promotion Effect of Platinum on Gold’s Reactivity: A High-Resolution Photoelectron Spectroscopy Study”

Prieto, M. J.*; Carbonio, E. A.*; Landers, R.*; de Siervo, A.*

The reactivity of the Pt/Au(332) surface was studied using high-resolution photoelectron spectroscopy and carbon monoxide adsorption at 3.5×10^{-3} mbar. The characterization of Pt/Au(332) indicates the formation of a Au-Pt surface alloy at the topmost atomic layer of the (332) crystal due to an atomic exchange mechanism at both terrace and step edge. The amount of alloyed Au atoms has proven to be dependent on the amount of Pt deposited in the coverage range investigated. The activation of Au atoms by alloying is detected by comparing the ability of the surface to adsorb CO at high pressures. By analyzing the C 1s and O 1s photoemission lines it is possible to conclude that CO adsorption is both dissociative and molecular on the PtAu/Au(332) surface, differently from the behavior observed for Au and Pt single crystals. Also, by rising the temperature of the COads-PtAu/Au(332) surface, a dissociative reaction path is followed by the accumulation of graphitic carbon on the surface and the oxygen/carbon dioxide desorption.

Thus, our results show not only the differential catalytic behavior of Pt@Au/Au(hkl) model surfaces but also that Au atoms have an active role on the reaction mechanism.

JOURNAL OF PHYSICAL CHEMISTRY C 120[19] 10227-10236, 2016. DOI: 10.1021/acs.jpcc.5b08983

[P199-2016] “Properties of Ti/TiC Interfaces from Molecular Dynamics Simulations”

Liang, T.; Ashton, M.; Choudhary, K.; Zhang, D. F.; Fonseca, A. F.*; Revard, B. C.; Hennig, R. G.; Phillpot, S. R.; Sinnott, S. B.

Titanium carbide is used as a primary component in coating materials, thin films for electronic devices, and composites. Here, the structure of coherent and semicoherent interfaces formed between close-packed TiC (111) and Ti (0001) is investigated in classical molecular dynamics simulations. The forces on the atoms in the simulations are determined using a newly developed TiC potential under the framework of the third-generation charge optimized many-body (COMB3) suite of potentials. The work of adhesion energies for the coherent interfaces is calculated and compared with the predictions of density functional theory calculations. In the case of relaxed semicoherent interfaces, a two-dimensional (2D) misfit dislocation network is predicted to form that separates the interface into different regions in which the positions of the atoms are similar to the positions at the corresponding coherent interfaces. After the interface is annealed at an elevated temperature, the climb of edge dislocations is activated which modifies the 2D misfit dislocation network and increases the work of adhesion. These findings can be used as inputs for sequential larger simulation models to understand and predict the macroscopic properties of TiC/Ti interfaces.

JOURNAL OF PHYSICAL CHEMISTRY C 120[23], 12530-12538, 2016. DOI: 10.1021/acs.jpcc.6b02763

[P200-2016] “Quantum correlations and coherence in spin-1 Heisenberg chains”

Malvezzi, A. L.; Karpat, G.; Cakmak, B.*; Fanchini, F. F.; Debarba, T.; Vianna, R. O.

We explore quantum and classical correlations along with coherence in the ground states of spin-1 Heisenberg chains, namely the one-dimensional XXZ model and the one-dimensional bilinear biquadratic model, with the techniques of density matrix renormalization group theory. Exploiting the tools of quantum information theory, that is, by studying quantum discord, quantum mutual information, and three recently introduced coherence measures in the reduced density matrix of two nearest neighbor spins in the bulk, we investigate the quantum phase transitions and special symmetry points in these models. We point out the relative strengths and weaknesses of correlation and coherence measures as figures of merit to witness the quantum phase transitions and symmetry points in the considered spin-1 Heisenberg chains. In particular, we demonstrate that, as none of the studied measures can detect the infinite-order Kosterlitz-Thouless transition in the XXZ model, they appear to be able to signal the existence of the same type of transition in the bilinear biquadratic model. However, we argue that what is actually detected by the measures here is the SU(3) symmetry point of the model rather than the infinite-order quantum phase transition. Moreover, we show in the XXZ model that examining even single site coherence can be sufficient to spotlight the second-order phase transition and the SU(2) symmetry point.

PHYSICAL REVIEW B 93[18] 184428, 2016. DOI: 10.1103/PhysRevB.93.184428

[P201-2016] “Quantum dissipation in a neutrino system propagating in vacuum and in matter”

Guzzo, M. M.*; de Holanda, P. C.*; Oliveira, R. L. N.*

Considering the neutrino state like an open quantum system, we analyze its propagation in vacuum or in matter. After defining what can be called decoherence and relaxation effects, we show that in general the probabilities in vacuum and in constant matter can be written in a similar way, which is not an obvious result for such system. From this result, we analyze the situation where neutrino evolution satisfies the adiabatic limit and use this formalism to study solar neutrinos. We show that the decoherence effect may not be bounded by the solar neutrino data and review some results in the literature, in particular the current results where solar neutrinos were used to put bounds on decoherence effects through a model-dependent approach. We conclude explaining how and why these models are not general and we reinterpret these constraints.

NUCLEAR PHYSICS B 908, 408-422, 2016. DOI: 10.1016/j.nuclphysb.2016.04.030

[P202-2016] “Search for a low-mass pseudoscalar Higgs boson produced in association with a $b(b)$ over bar pair in pp collisions at root $s=8$ TeV”

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

A search is reported for a light pseudoscalar Higgs boson decaying to a pair of tau leptons, produced in association with a $b(b)$ over bar pair, in the context of two-Higgs-doublet models. The results are based on pp collision data at a centre-of-mass energy of 8 TeV collected by the CMS experiment at the LHC and corresponding to an integrated luminosity of 19.7 fb⁻¹. Pseudoscalar boson masses between 25 and 80 GeV are probed. No evidence for a pseudoscalar boson is found and upper limits are set on the product of cross section and branching fraction to tau pairs between 7 and 39 pb at the 95% confidence level. This excludes pseudoscalar A bosons with masses between 25 and 80 GeV, with SM-like Higgs boson negative couplings to down-type fermions, produced in association with bb pairs, in Type II, two-Higgs-doublet models.

PHYSICS LETTERS B 758, 296-320, 2016. DOI: 10.1016/j.physletb.2016.05.003

[P203-2016] “Search for massive WH resonances decaying into the l nu $b(b)$ over bar final state at root $s=8$ TeV”

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

A search for a massive resonance W' decaying into a W and a Higgs boson in the l nu $b(b)$ over bar ($l = e, \mu$) final state is presented. Results are based on data corresponding to an integrated luminosity of 19.7 fb⁻¹ of proton-proton collisions at root $s = 8$ TeV, collected using the CMS detector at the LHC. For a high-mass (greater than or similar to 1 TeV) resonance, the two bottom quarks coming from the Higgs boson decay are reconstructed as a single jet, which can be tagged by placing requirements on its substructure and flavour. Exclusion limits at 95 % confidence level are set on the production cross section of a narrow resonance decaying into WH , as a function of its mass. In the context of a little Higgs model, a lower limit on the W' mass of 1.4 TeV is set. In a heavy vector triplet model that mimics the properties of composite Higgs models, a lower limit on the W' mass of 1.5 TeV is set.

In the context of this model, the results are combined with related searches to obtain a lower limit on the W' mass of 1.8 TeV, the most restrictive to date for decays to a pair of standard model bosons.

EUROPEAN PHYSICAL JOURNAL C 76[5] 237, 2016. DOI: 10.1140/epjc/s10052-016-4067-z

[P204-2016] “Search for new phenomena in monophoton final states in proton-proton collisions at root $s=8$ TeV”

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

Results are presented from a search for new physics in final states containing a photon and missing transverse momentum. The data correspond to an integrated luminosity of 19.6 fb⁻¹ collected in proton-proton collisions at root $s = 8$ TeV with the CMS experiment at the LHC. No deviation from the standard model predictions is observed for these final states. New, improved limits are set on dark matter production and on parameters of models with large extra dimensions. In particular, the first limits from the LHC on branon production are found and significantly extend previous limits from LEP and the Tevatron. An upper limit of 14.0 fb on the cross section is set at the 95% confidence level for events with a monophoton final state with photon transverse momentum greater than 145 GeV and missing transverse momentum greater than 140 GeV.

PHYSICS LETTERS B 755, 102-124, 2016. DOI: 10.1016/j.physletb.2016.01.057

[P205-2016] “Search for pair-produced vectorlike B quarks in proton-proton collisions at root $s=8$ TeV”

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

A search for the production of a heavy B quark, having electric charge $-1/3$ and vector couplings to $W, Z,$ and H bosons, is carried out using proton-proton collision data recorded at the CERN LHC by the CMS experiment, corresponding to an integrated luminosity of 19.7 fb⁻¹. The B quark is assumed to be pair produced and to decay in one of three ways: to $tW, bZ,$ or bH . The search is carried out in final states with one, two, and more than two charged leptons, as well as in fully hadronic final states. Each of the channels in the exclusive final-state topologies is designed to be sensitive to specific combinations of the B quark-antiquark pair decays. The observed event yields are found to be consistent with the standard model expectations in all the final states studied. A statistical combination of these results is performed, and upper limits are set on the cross section of the strongly produced B quark-antiquark pairs as a function of the B quark mass. Lower limits on the B quark mass between 740 and 900 GeV are set at a 95% confidence level, depending on the values of the branching fractions of the B quark to $tW, bZ,$ and bH . Overall, these limits are the most stringent to date.

PHYSICAL REVIEW D 93[11], 112009, 2016. DOI: 10.1103/PhysRevD.93.112009

[P206-2016] “Search for supersymmetry in events with a photon, a lepton, and missing transverse momentum in pp collisions at root $s=8$ TeV”

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

A search for supersymmetry involving events with at least one photon, one electron or muon, and large missing transverse momentum has been performed by the CMS experiment. The data sample corresponds to an integrated luminosity of 19.7 fb⁻¹ of pp collisions at $\sqrt{s} = 8$ TeV, produced at the CERN LHC. No excess of events is observed beyond expectations from standard model processes. The result of the search is interpreted in the context of a general model of gauge-mediated supersymmetry breaking, where the charged and neutral winos are the next-to-lightest supersymmetric particles. Within this model, winos with a mass up to 360 GeV are excluded at the 95% confidence level. Two simplified models inspired by gauge-mediated supersymmetry breaking are also examined, and used to derive upper limits on the production cross sections of specific supersymmetric processes.

PHYSICS LETTERS B 757, 6-31, 2016. DOI: 10.1016/j.physletb.2016.03.039

[P207-2016] “Search for supersymmetry in pp collisions at $\sqrt{s}=8$ TeV in final states with boosted W bosons and b jets using razor variables”

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

A search for supersymmetry in hadronic final states with highly boosted W bosons and b jets is presented, focusing on compressed scenarios. The search is performed using proton-proton collision data at a center-of-mass energy of 8 TeV, collected by the CMS experiment at the LHC, corresponding to an integrated luminosity of 19.7 fb⁻¹. Events containing candidates for hadronic decays of boosted W bosons are identified using jet substructure techniques, and are analyzed using the razor variables M-R and R-2, which characterize a possible signal as a peak on a smoothly falling background. The observed event yields in the signal regions are found to be consistent with the expected contributions from standard model processes, which are predicted using control samples in the data. The results are interpreted in terms of gluino-pair production followed by their exclusive decay into top squarks and top quarks. The analysis excludes gluino masses up to 1.1 TeV for light top squarks decaying solely to a charm quark and a neutralino, and up to 700 GeV for heavier top squarks decaying solely to a top quark and a neutralino.

PHYSICAL REVIEW D 93[9] 092009, 2016. DOI: 10.1103/PhysRevD.93.092009

[P208-2016] “Search for supersymmetry in the multijet and missing transverse momentum final state in pp collisions at 13 TeV”

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

A search for new physics is performed based on all-hadronic events with large missing transverse momentum produced in proton-proton collisions at $\sqrt{s} = 13$ TeV. The data sample, corresponding to an integrated luminosity of 2.3 fb⁻¹, was collected with the CMS detector at the CERN LHC in 2015. The data are examined in search regions of jet multiplicity, tagged bottom quark jet multiplicity, missing transverse momentum, and the scalar sum of jet transverse momenta. The observed numbers of events in all search regions are found to be consistent with the expectations from standard model processes. Exclusion limits are presented for simplified supersymmetric models of gluino pair production. Depending on the assumed gluino decay mechanism, and for a massless, weakly interacting, lightest neutralino, lower limits on the gluino mass from 1440 to 1600 GeV are obtained, significantly extending previous limits.

PHYSICS LETTERS B 758, 152-180, 2016. DOI: 10.1016/j.physletb.2016.05.002

[P209-2016] “Search for W ‘ decaying to tau lepton and neutrino in proton-proton collisions at $\sqrt{s}=8$ TeV”

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

The first search for a heavy charged vector boson in the final state with a tau lepton and a neutrino is reported, using 19.7 fb⁻¹ of LHC data at $\sqrt{s} = 8$ TeV. A signal would appear as an excess of events with high transverse mass, where the standard model background is low. No excess is observed. Limits are set on a model in which the W' decays preferentially to fermions of the third generation. These results substantially extend previous constraints on this model. Masses below 2.0 to 2.7 TeV are excluded, depending on the model parameters. In addition, the existence of a W' boson with universal fermion couplings is excluded at 95% confidence level, for W' masses below 2.7 TeV. For further reinterpretation a model-independent limit on potential signals for various transverse mass thresholds is also presented.

PHYSICS LETTERS B 755, 196-216, 2016. DOI: 10.1016/j.physletb.2016.02.002

[P210-2016] “Searches for a heavy scalar boson H decaying to a pair of 125 GeV Higgs bosons hh or for a heavy pseudoscalar boson A decaying to Zh, in the final states with h -> tau tau”

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

A search for a heavy scalar boson H decaying into a pair of lighter standard-model-like 125 GeV Higgs bosons hh and a search for a heavy pseudoscalar boson A decaying into a Z and an h boson are presented. The searches are performed on a data set corresponding to an integrated luminosity of 19.7 fb⁻¹ of pp collision data at a centre-of-mass energy of 8 TeV, collected by CMS in 2012. A final state consisting of two tau leptons and two b jets is used to search for the H -> hh decay. A final state consisting of two tau leptons from the h boson decay, and two additional leptons from the Z boson decay, is used to search for the decay A -> Zh. The results are interpreted in the context of two-Higgs-doublet models. No excess is found above the standard model expectation and upper limits are set on the heavy boson production cross sections in the mass ranges 260 < m(H) < 350 GeV and 220 < m(A) < 350 GeV.

PHYSICS LETTERS B 755, 217-244, 2016. DOI: 10.1016/j.physletb.2016.01.056

[P211-2016] “Signals at ground level of relativistic solar particles associated with a radiation storm on 2014 April 18”

Augusto, C.; Navia, C.; de Oliveira, M. N.; Fauth, A.*; Nepomuceno, A.

Active region NOAA AR2036, located at S20W34 at the Sun disk, produced a moderately strong (GOES class M7.3) flare on 2014 April 18. The flare itself was long in duration, and a halo coronal mass ejection (CME) was emitted. In addition, a radiation storm, that is, solar energetic particles (SEP), began to reach the Earth at 13: 30 UT in the aftermath of the solar blast, meeting the condition of an S1 (minor) radiation storm level.

In temporal coincidence with the onset of the S1 radiation storm, the Tupi telescopes located within the South Atlantic Anomaly (SAA) detected a fast rise in the muon counting rate, caused by relativistic protons from this solar blast, with a confidence of up to 3.5% at peak. At the time of the solar blast, of all ground-based detectors, the Tupi telescopes had the best geoeffective location. Indeed, in association with the radiation storm, a gradual increase in the particle intensity was found in some neutron monitors (NMs), all of them in the west region relative to the Sun-Earth line, yet within the geoeffective region. However, their confidence levels are smaller: up to 3%. The fast rising observed at Tupi suggests possible detection of solar particles emitted during the impulsive phase, following by a gradual phase observed also at NMs. Details of these observations, including the expected energy spectrum, are reported.

PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF JAPAN 68[1] 8, 2016. DOI: 10.1093/pasj/psv111

[P212-2016] “Simultaneous measurement of strain, temperature and refractive index based on multimode interference, fiber tapering and fiber Bragg gratings”

Oliveira, R.*; Osorio, J. H.*; Aristilde, S.*; Bilro, L.; Nogueira, R. N.; Cordeiro, C. M. B.*

We report the development of an optical fiber sensor capable of simultaneously measuring strain, temperature and refractive index. The sensor is based on the combination of two fiber Bragg gratings written in a standard single-mode fiber, one in an untapered region and another in a tapered region, spliced to a no-core fiber. The possibility of simultaneously measuring three parameters relies on the different sensitivity responses of each part of the sensor. The results have shown the possibility of measuring three parameters simultaneously with a resolution of $3.77 \mu\epsilon$, 1.36 degrees C and 5×10^{-4} , respectively for strain, temperature and refractive index. On top of the multiparameter ability, the simple production and combination of all the parts involved on this optical-fiber-based sensor is an attractive feature for several sensing applications.

MEASUREMENT SCIENCE AND TECHNOLOGY 27[7], 075107, 2016. DOI: 10.1088/0957-0233/27/7/075107

[P213-2016] “The electromagnetic response of a relativistic Fermi gas at finite temperatures: Applications to condensed-matter systems”

Reyes-Gomez, E.; Oliveira, L. E.*; de Carvalho, C. A. A.

We investigate the electromagnetic response of a relativistic Fermi gas at finite temperatures. Our theoretical results are first-order in the fine-structure constant. The electromagnetic permittivity and permeability are introduced via general constitutive relations in reciprocal space, and computed for different values of the gas density and temperature. As expected, the electric permittivity of the relativistic Fermi gas is found in good agreement with the Lindhard dielectric function in the low-temperature limit. Applications to condensed-matter physics are briefly discussed. In particular, theoretical results are in good agreement with experimental measurements of the plasmon energy in graphite and tin oxide, as functions of both the temperature and wave vector. We stress that the present electromagnetic response of a relativistic Fermi gas at finite temperatures could be of potential interest in future plasmonic and photonic investigations.

EPL, 114[1] 17009, 2016. DOI: 10.1209/0295-5075/114/17009

[P214-2016] “The mutation-drift balance in spatially structured populations”

Schneider, D. M.*; Martins, A. B.*; de Aguiar, M. A. M.*

In finite populations the action of neutral mutations is balanced by genetic drift, leading to a stationary distribution of alleles that displays a transition between two different behaviors. For small mutation rates most individuals will carry the same allele at equilibrium, whereas for high mutation rates of the alleles will be randomly distributed with frequencies close to one half for a biallelic gene. For well-mixed haploid populations the mutation threshold is $\mu(C) = 1/2N$, where N is the population size. In this paper we study how spatial structure affects this mutation threshold. Specifically, we study the stationary allele distribution for populations placed on regular networks where connected nodes represent potential mating partners. We show that the mutation threshold is sensitive to spatial structure only if the number of potential mates is very small. In this limit, the mutation threshold decreases substantially, increasing the diversity of the population at considerably low mutation rates. Defining $k(c)$ as the degree of the network for which the mutation threshold drops to half of its value in well-mixed populations we show that $k(c)$ grows slowly as a function of the population size, following a power law. Our calculations and simulations are based on the Moran model and on a mapping between the Moran model with mutations and the voter model with opinion makers.

JOURNAL OF THEORETICAL BIOLOGY 402, 9-17, 2016. DOI: 10.1016/j.jtbi.2016.04.024

[P215-2016] “The structural and dynamical aspects of boron nitride nanotubes under high velocity impacts”

Machado, L; D.; Ozden, S.; Tiwary, C.; Autreto, Pedro A. S.; Vajtai, R.; Barrera, E. V.; Galvao, D. S.*; Ajayan, P. M.

This communication report is a study on the structural and dynamical aspects of boron nitride nanotubes (BNNTs) shot at high velocities (similar to 5 km s^{-1}) against solid targets. The experimental results show unzipping of BNNTs and the formation of hBN nanoribbons. Fully atomistic reactive molecular dynamics simulations were also carried out to gain insights into the BNNT fracture patterns and deformation mechanisms. Our results show that longitudinal and axial tube fractures occur, but the formation of BN nanoribbons from fractured tubes was only observed for some impact angles. Although some structural and dynamical features of the impacts are similar to the ones reported for CNTs, because BNNTs are more brittle than CNTs this results in a larger number of fractured tubes but with fewer formed nanoribbons.

PHYSICAL CHEMISTRY CHEMICAL PHYSICS 18[22] 14776-14781, 2016. DOI: 10.1039/c6cp01949h

Eventos publicados

[P216-2016] “LPG-based sensor for curvature and vibration”

Nascimento, I. M.; Chesini, G.*; Baptista, J. M.; Cordeiro, C. M. B.*; Jorge, P. A. S.

A long-period grating (LPG) written on a standard single mode fiber is investigated as a curvature and vibration sensor. It is demonstrated a high sensitivity to applied curvature and the possibility to monitor vibration in a wide range of frequencies from 30 Hz to 2000 Hz. The system was tested using an intensity based interrogation scheme with the LPG sensor operating in the curvature regime. Results have shown a reproducible frequency discrimination in the 30 Hz to 2000 Hz, with resolutions between 11 mHz and 913 mHz. Frequency retrieval could be performed independent of temperature up to 86 degrees C.

SIXTH EUROPEAN WORKSHOP ON OPTICAL FIBRE SENSORS
Série de livros: Proceedings of SPIE [9916] 99162D,02016.
DOI: 10.1117/12.2237041

Livro Publicado

[L002-2016] “Stellarium : aprendendo astronomia com software”

Edson Pedro Cecílio Jr.*

1ª ed. Curitiba : Appris, 2016. 273 páginas. ISBN: 978-85-473-0101-9

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

Defesas de Dissertações

[D013-2016] “Espectroscopia óptica de difusão multiespectral para aplicações biomédicas”

Aluno: Andrés Fabián Quiroga Soto
Orientador: Prof. Dr. Rickson Coelho Mesquita
Data: 08/07/2016

[D014-2016] “Estudo das características elétricas do biossensor do tipo FET baseado em InP”

Aluno: Aldeliane Maria da Silva
Orientador: Profa. Dra. Mônica Alonso Cotta
Data: 12/07/2016

[D015-2016] “Comportamento multicrítico do modelo de Blume-Emery-Griffiths com acoplamentos biquadráticos repulsivos”

Aluno: Adinei Ercule
Orientador: Prof. Dr. Mário Noboru Tamashiro
Data: 15/07/2016

[D016-2016] “Diagrama de Fase do Modelo de Uhlenbeck-Ford”

Aluno: Pedro Antonio Santos Florez
Orientador: Prof. Dr. Maurice de Koning
Data: 15/07/2016

[D017-2016] “Espalhamento Raman por dois mágnons em LiMPO4 (M=Co,Ni)”

Aluno: Danilo Rigitano Gomes Silva
Orientador: Prof. Dr. Eduardo Granado Monteiro da Silva
Data: 15/07/2016

[D018-2016] “Potencial de Análise do Dune em interações não Padrão”

Aluno: David Girardelli Batista
Orientador: Prof. Dr. Marcelo Moraes Guzzo
Data: 29/07/2016

[D019-2016] “Mecanismos e consequências da geração de massa dinâmica para o gluon”

Aluno: Clara Teixeira Figueiredo
Orientador: Profa. Dra. Arlene Cristina Aguiar
Data: 02/09/2016

[D020-2016] “Investigando a influência do setor leptônico em mecanismos de bariogênese”

Aluno: Eduardo Akio Sato
Orientador: Prof. Dr. Pedro Cunha de Holanda
Data: 09/09/2016

[D021-2016] “Tópicos em Dinâmica de Fluidos como uma Teoria de Campo”

Aluno: David Montenegro Coelho
Orientador: Prof. Dr. Donato Giorgio Torrieri
Data: 15/09/2016

Defesas de Teses

[T011-2016] “Análises teóricas e simulações aplicadas a estratégias racionais de design de materiais nano-estruturados”

Aluno: Francisco Alírio A. G. de Moura
Orientador: Prof. Dr. Douglas Soares Galvão
Data: 01/08/2016

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

Disponível em: <http://portal.ifi.unicamp.br/pos-graduacao>

Abstracta

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