

Abstracta

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Artigos publicados 2016

[P332-2016] "3D Porous Graphene by Low-Temperature Plasma Welding for Bone Implants"

Chakravarty, D.; Tiwary, C.S.; Woellner, C.F.*; Radhakrishnan, S.; Vinod, S.; Ozden, S.; Autreto, P.A.D.*; Bhowmick, S.; Asif S.; Mani, S.A.; Galvao, D.S.*

3D scaffolds of graphene, possessing ultra-low density, macroporous microstructure, and high yield strength and stiffness can be developed by a novel plasma welding process. The bonding between adjacent graphene sheets is investigated by molecular dynamics simulations. The high degree of biocompatibility along with high porosity and good mechanical properties makes graphene an ideal material for use as body implants.

ADVANCED MATERIALS 28[40] 8959-8967, 2016. DOI: 10.1002/adma.201603146

[P333-2016] "Search for direct pair production of supersymmetric top quarks decaying to all-hadronic final states in pp collisions at root s=8 TeV"

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

Results are reported from a search for the pair production of top squarks, the supersymmetric partners of top quarks, in final states with jets and missing transverse momentum. The data sample used in this search was collected by the CMS detector and corresponds to an integrated luminosity of 18.9 of proton-proton collisions at a centre-of-mass energy of 8 produced by the LHC. The search features novel background suppression and prediction methods, including a dedicated top quark pair reconstruction algorithm. The data are found to be in agreement with the predicted backgrounds. Exclusion limits are set in simplified supersymmetry models with the top squark decaying to jets and an undetected neutralino, either through a top quark or through a bottom quark and chargino. Models with the top squark decaying via a top quark are excluded for top squark masses up to 755 in the case of neutralino masses below 200. For decays via a chargino, top squark masses up to 620 are excluded, depending on the masses of the chargino and neutralino.

EUROPEAN PHYSICAL JOURNAL C 76[8] 460, 2016. DOI: 10.1140/epjc/s10052-016-4292-5

[P334-2016] "Al2O3:C optically stimulated luminescence droplets: Characterization and applications in medical beams"

Nascimento, L.D.; Vanhavere, F.; Souza, R.*; Verellen, D.

Optically stimulated luminescence (OSL) detectors, which are widely used in radiation protection, offer a number of potential advantages for radiotherapy dosimetry. In this study we characterized 1- μ l of OSL droplets consisting of a mixture of Al₂O₃:C powder and a photo-curable polymer, in addition to results described in a previous work (Nascimento et al., 2013). The concentration test showed that droplets have a higher spatial resolution than other commonly used Al₂O₃:C-based detectors. Our results from the dose response, reproducibility and dependence with accumulative dose were obtained for droplets with a powder/polymer concentration that showed a high Signal to Noise Ratio (SNR) without compromising the droplet malleability. Additional test results show the response of such droplets in percentage depth dose curves and dose profiles of clinical beams.

RADIATION MEASUREMENTS 94 41-48, 2016. DOI: 10.1016/j.radmeas.2016.09.003

[P335-2016] "Amine-Free Synthesis of Cesium Lead Halide Perovskite Quantum Dots for Efficient Light-Emitting Diodes"

Yassitepe, E.; Yang, Z.; Walters, G.; Castaneda, J. A.*; Padilha, L. A.*; et al.

Cesium lead halide perovskite quantum dots (PQDs) have attracted significant interest for optoelectronic applications in view of their high brightness and narrow emission linewidth at visible wavelengths. A remaining challenge is the degradation of PQDs during purification from the synthesis solution. This is attributed to proton transfer between oleic acid and oleylamine surface capping agents that leads to facile ligand loss. Here, a new synthetic method is reported that enhances the colloidal stability of PQDs by capping them solely using oleic acid (OA). Quaternary alkylammonium halides are used as precursors, eliminating the need for oleylamine. This strategy enhances the colloidal stability of OA capped PQDs during purification, allowing us to remove excess organic content in thin films. Inverted red, green, and blue PQD light-emitting diodes (LED) are fabricated for the first time with solution-processed polymer-based hole transport layers due to higher robustness of OA capped PQDs to solution processing. The blue and green LEDs exhibit threefold and tenfold improved external quantum efficiency (EQE), respectively, compared to prior related reports for amine/ammonium capped cross-linked PQDs. The brightest blue LED based on all inorganic CsPb(Br_{1-x}Cl_x)(3) PQDs is also reported.

ADVANCED FUNCTIONAL MATERIALS 26[47], 8757-8763, 2016. DOI: 10.1002/adfm.201604580

[P336-2016] "Annealing-Based Electrical Tuning of Cobalt-Carbon Deposits Grown by Focused-Electron-Beam-Induced Deposition"

Dos Santos, M.V.P.*; Velo, M. F.*; Domingos, R. D.*; Zhang, Y.C.; Maeder, X.; Guerra-Nunez, C.; Best, J. P.; Beron, F.*; Pirota, K. R.*; Moshkalev, S.*; Diniz, J. A.; et al.

An effective postgrowth electrical tuning, via an oxygen releasing method, to enhance the content of non-noble metals in deposits directly written with gas-assisted focused-electron-beam-induced deposition (FEBID) is presented. It represents a novel and reproducible method for improving the electrical transport properties of Co-C deposits. The metal content and electrical properties of Co-C-O nanodeposits obtained by electron-induced dissociation of volatile Co-2(CO)(8) precursor adsorbate molecules were reproducibly tuned by applying postgrowth annealing processes at 100 degrees C, 200 degrees C, and 300 degrees C under high-vacuum for 10 min. Advanced thin film EDX analysis showed that during the annealing process predominantly oxygen is released from the Co-C-O deposits, yielding an atomic ratio of Co:C:O = 100:16:1 (85:14:1) with respect to the atomic composition of as written Co:C:O = 100:21:28 (67:14:19). In-depth Raman analysis suggests that the amorphous carbon contained in the as-written deposit turns into graphite nanocrystals with size of about 22.4 nm with annealing temperature. Remarkably, these microstructural changes allow for tuning of the electrical resistivity of the deposits over 3 orders of magnitude from 26 m Ohm cm down to 26 mu Ohm cm, achieving a residual resistivity of rho(2K)/rho(300 K) = 0.56, close to the value of 0.53 for pure Co films with similar dimensions, making it especially interesting and advantageous over the numerous works already published for applications such as advanced scanning-probe systems, magnetic memory, storage, and ferroelectric tunnel junction memristors, as the graphitic matrix protects the cobalt from being oxidized under an ambient atmosphere.

ACS APPLIED MATERIALS & INTERFACES 8[47] 32496-32503, 2016. DOI: 10.1021/acsami.6b12192

[P337-2016] “Azimuthal decorrelation of jets widely separated in rapidity in pp collisions at root s=7 TeV”

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

The decorrelation in the azimuthal angle between the most forward and the most backward jets (Mueller-Navelet jets) is measured in data collected in pp collisions with the CMS detector at the LHC at root s = 7 TeV. The measurement is presented in the form of distributions of azimuthal-angle differences, $\Delta\phi$, between the Mueller-Navelet jets, the average cosines of $(\pi - \Delta\phi)$, $2(\pi - \Delta\phi)$, and $3(\pi - \Delta\phi)$, and ratios of these cosines. The jets are required to have transverse momenta, $p(T)$, in excess of 35 GeV and rapidities, $|y|$, of less than 4.7. The results are presented as a function of the rapidity separation, Δy , between the Mueller-Navelet jets, reaching Δy up to 9.4 for the first time. The results are compared to predictions of various Monte Carlo event generators and to analytical predictions based on the DGLAP and BFKL parton evolution schemes.

JOURNAL OF HIGH ENERGY PHYSICS 8 139, 2016. DOI: 10.1007/JHEP08(2016)139

[P338-2016] “Charge-dependent flow and the search for the chiral magnetic wave in Pb-Pb collisions at root s(NN)=2.76 TeV”

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

We report on measurements of a charge-dependent flow using a novel three-particle correlator with ALICE in Pb-Pb collisions at the CERN Large Hadron Collider (LHC), and discuss the implications for observation of local parity violation and the chiral magnetic wave (CMW) in heavy-ion collisions. Charge-dependent flow is reported for different collision centralities as a function of the event charge asymmetry. While our results are in qualitative agreement with expectations based on the CMW, the nonzero signal observed in higher harmonics correlations indicates a possible significant background contribution. We also present results on a differential correlator, where the flow of positive and negative charges is reported as a function of the mean charge of the particles and their pseudorapidity separation. We argue that this differential correlator is better suited to distinguish the differences in positive and negative charges expected due to the CMW and the background effects, such as local charge conservation coupled with strong radial and anisotropic flow.

PHYSICAL REVIEW C 93[4] 044903, 2016. DOI: 10.1103/PhysRevC.93.044903

[P339-2016] “Combined search for anomalous pseudoscalar HW couplings in VH(H -> b(b)over-bar) production and H -> VV decay”

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

A search for anomalous pseudoscalar couplings of the Higgs boson H to electroweak vector bosons V (= W or Z) in a sample of proton-proton collision events corresponding to an integrated luminosity of 18.9 fb⁻¹ at a center-of-mass energy of 8 TeV is presented. Events consistent with the topology of associated VH production, where the Higgs boson decays to a pair of bottom quarks and the vector boson decays leptonicly, are analyzed.

The consistency of data with a potential pseudoscalar contribution to the HVV interaction, expressed by the effective pseudoscalar cross section fractions $f(a3)$, is assessed by means of profile likelihood scans. Results are given for the VH channels alone and for a combined analysis of the VH and previously published H -> VV channels. Under certain assumptions, $f(a3)(ZZ) > 0.0034$ is excluded at 95% confidence level in the combination. Scenarios in which these assumptions are relaxed are also considered.

PHYSICS LETTERS B 759 672-696, 2016. DOI: 10.1016/j.physletb.2016.06.004

[P340-2016] “Competing adiabatic Thouless pumps in enlarged parameter spaces”

Lopes, P. L. S.*; Ghaemi, P.; Ryu, S.; Hughes, T. L.

The transfer of conserved charges through insulating matter via smooth deformations of the Hamiltonian is known as quantum adiabatic, or Thouless, pumping. Central to this phenomenon are Hamiltonians whose insulating gap is controlled by a multidimensional (usually two-dimensional) parameter space in which paths can be defined for adiabatic changes in the Hamiltonian, i.e., without closing the gap. Here, we extend the concept of Thouless pumps of band insulators by considering a larger, three-dimensional parameter space. We show that the connectivity of this parameter space is crucial for defining quantum pumps, demonstrating that, as opposed to the conventional two-dimensional case, pumped quantities depend not only on the initial and final points of Hamiltonian evolution but also on the class of the chosen path and preserved symmetries. As such, we distinguish the scenarios of closed/open paths of Hamiltonian evolution, finding that different closed cycles can lead to the pumping of different quantum numbers, and that different open paths may point to distinct scenarios for surface physics. As explicit examples, we consider models similar to simple models used to describe topological insulators, but with doubled degrees of freedom compared to a minimal topological insulator model. The extra fermionic flavors from doubling allow for extra gapping terms/adiabatic parameters-besides the usual topological mass which preserves the topology-protecting discrete symmetries-generating an enlarged adiabatic parameter space. We consider cases in one and three spatial dimensions, and our results in three dimensions may be realized in the context of crystalline topological insulators, as we briefly discuss.

PHYSICAL REVIEW B 94[23], 235160, 2016. DOI: 10.1103/PhysRevB.94.235160

[P341-2016] “Constraints on large extra dimensions from the MINOS experiment”

Blake, A.; Thomson, M. A.; Escobar, C.O.*; et al.
MINOS Collaboration

We report new constraints on the size of large extra dimensions from data collected by the MINOS experiment between 2005 and 2012. Our analysis employs a model in which sterile neutrinos arise as Kaluza-Klein states in large extra dimensions and thus modify the neutrino oscillation probabilities due to mixing between active and sterile neutrino states. Using Fermilab's Neutrinos at the Main Injector beam exposure of 10.56×10^{20} protons on target, we combine muon neutrino charged current and neutral current data sets from the Near and Far Detectors and observe no evidence for deviations from standard three-flavor neutrino oscillations. The ratios of reconstructed energy spectra in the two detectors constrain the size of large extra dimensions to be smaller than 0.45 μm at 90% C.L. in the limit of a vanishing lightest active neutrino mass. Stronger limits are obtained for nonvanishing masses.

PHYSICAL REVIEW D 94[11], 111101, 2016. DOI: 10.1103/PhysRevD.94.111101

[P342-2016] “Correlated Event-by-Event Fluctuations of Flow Harmonics in Pb-Pb Collisions at root S-NN=2.76 TeV”

Adam, J.; Adamova, D.; Albuquerque, D. S. D.*; Chinellato, D. D.*; De Souza, R. D.*; Takahashi, J.*; et al.
Alice Collaboration

We report the measurements of correlations between event-by-event fluctuations of amplitudes of anisotropic flow harmonics in nucleus-nucleus collisions, obtained for the first time using a new analysis method based on multiparticle cumulants in mixed harmonics. This novel method is robust against systematic biases originating from nonflow effects and by construction any dependence on symmetry planes is eliminated. We demonstrate that correlations of flow harmonics exhibit a better sensitivity to medium properties than the individual flow harmonics. The new measurements are performed in Pb-Pb collisions at the center-of-mass energy per nucleon pair of $\sqrt{s_{NN}} = 2.76$ TeV by the ALICE experiment at the Large Hadron Collider. The centrality dependence of correlation between event-by-event fluctuations of the elliptic v_2 and quadrangular v_4 flow harmonics, as well as of anticorrelation between v_2 and triangular v_3 flow harmonics are presented. The results cover two different regimes of the initial state configurations: geometry dominated (in midcentral collisions) and fluctuation dominated (in the most central collisions). Comparisons are made to predictions from Monte Carlo Glauber, viscous hydrodynamics, AMPT, and HIJING models. Together with the existing measurements of the individual flow harmonics the presented results provide further constraints on the initial conditions and the transport properties of the system produced in heavy-ion collisions.

PHYSICAL REVIEW LETTERS 117[18] 182301, 2016. DOI: 10.1103/PhysRevLett.117.182301

[P343-2016] “D-meson production in p-Pb collisions at root S-NN=5.02 TeV and in pp collisions at root S=7 TeV”

Albuquerque, D. S. D.*; Chinellato, D. D.*; De Souza, R. D.*; Takahashi, J. A.*; Zhou, M. B.; et al.
Alice Collaboration

Background: In the context of the investigation of the quark gluon plasma produced in heavy-ion collisions, hadrons containing heavy (charm or beauty) quarks play a special role for the characterization of the hot and dense medium created in the interaction. The measurement of the production of charm and beauty hadrons in proton-proton collisions, besides providing the necessary reference for the studies in heavy-ion reactions, constitutes an important test of perturbative quantum chromodynamics (pQCD) calculations. Heavy-flavor production in proton-nucleus collisions is sensitive to the various effects related to the presence of nuclei in the colliding system, commonly denoted cold-nuclear-matter effects. Most of these effects are expected to modify open-charm production at low transverse momenta (p_T) and, so far, no measurement of D-meson production down to zero transverse momentum was available at mid-rapidity at the energies attained at the CERN Large Hadron Collider (LHC). Purpose: The measurements of the production cross sections of promptly produced charmed mesons in p-Pb collisions at the LHC down to $p_T = 0$ and the comparison to the results from pp interactions are aimed at the assessment of cold-nuclear-matter effects on open-charm production, which is crucial for the interpretation of the results from Pb-Pb collisions. The prompt charmed mesons D-0, D+, D*+, and D-s(+) were measured at mid-rapidity in p-Pb collisions at a center-of-mass energy per nucleon pair $\sqrt{s_{NN}} = 5.02$ TeV with the ALICE detector at the LHC. D mesons were reconstructed from their decays D-0 \rightarrow K- π^+ , D+ \rightarrow K- π^+ π^+ , D*+ \rightarrow D-0 π^+ , D-s(+) \rightarrow ϕ π^+ \rightarrow K- K+ π^+ , and their charge conjugates, using an analysis method based on the selection of decay topologies displaced from the interaction vertex.

In addition, the prompt D-0 production cross section was measured in pp collisions at $\sqrt{s} = 7$ TeV and p-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV down to $p_T = 0$ using an analysis technique that is based on the estimation and subtraction of the combinatorial background, without reconstruction of the D-0 decay vertex. Results: The production cross section in pp collisions is described within uncertainties by different implementations of pQCD calculations down to $p_T = 0$. This allowed also a determination of the total c (\bar{c}) over \bar{b} production cross section in pp collisions, which is more precise than previous ALICE measurements because it is not affected by uncertainties owing to the extrapolation to $p_T = 0$. The nuclear modification factor $R_{pPb}(p_T)$, defined as the ratio of the p_T -differential D-meson cross section in p-Pb collisions and that in pp collisions scaled by the mass number of the Pb nucleus, was calculated for the four D-meson species and found to be compatible with unity within uncertainties. The results are compared to theoretical calculations that include cold-nuclear-matter effects and to transport model calculations incorporating the interactions of charm quarks with an expanding deconfined medium. Conclusions: These measurements add experimental evidence that the modification of the D-meson transverse momentum distributions observed in Pb-Pb collisions with respect to pp interactions is due to strong final-state effects induced by the interactions of the charm quarks with the hot and dense partonic medium created in ultrarelativistic heavy-ion collisions. The current precision of the measurement does not allow us to draw conclusions on the role of the different cold-nuclear-matter effects and on the possible presence of additional hot-medium effects in p-Pb collisions. However, the analysis technique without decay-vertex reconstruction, applied on future larger data samples, should provide access to the physics-rich range down to $p_T = 0$.

PHYSICAL REVIEW C 94[5] 054908, 2016. DOI: 10.1103/PhysRevC.94.054908

[P344-2016] “Evidence for exclusive $\gamma\gamma \rightarrow W^+ W^-$ production and constraints on anomalous quartic gauge couplings in pp collisions at and 8 TeV”

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

A search for exclusive or quasi-exclusive $\gamma\gamma \rightarrow W^+ W^-$ production, via $pp \rightarrow p^{(*)} W^+ W^- p^{(*)} \rightarrow p^{(*)} \mu^{+/-} e^{(a)} p^{(*)}$ at TeV, is reported using data corresponding to an integrated luminosity of 19.7 fb⁻¹. Events are selected by requiring the presence of an electron-muon pair with large transverse momentum $p_T(\mu^{+/-} e^{(a)}) > 30$ GeV, and no associated charged particles detected from the same vertex. The 8 TeV results are combined with the previous 7 TeV results (obtained for 5.05 fb⁻¹ of data). In the signal region, 13 (2) events are observed over an expected background of 3.9 ± 0.6 (0.84 ± 0.15) events for 8 (7) TeV, resulting in a combined excess of 3.4 σ over the background-only hypothesis. The observed yields and kinematic distributions are compatible with the standard model prediction for exclusive and quasi-exclusive $\gamma\gamma \rightarrow W^+ W^-$ production. Upper limits on the anomalous quartic gauge coupling operators $a(0,C)$ (W) (dimension-6) and $f(M_0,1,2,3)$ (dimension-8), the most stringent to date, are derived from the measured dilepton transverse momentum spectrum.

JOURNAL OF HIGH ENERGY PHYSICS 8 119, 2016. DOI: 10.1007/JHEP08(2016)119

[P345-2016] “Experimental evidence of transition between dynamical and kinematical diffraction regimes in ion-implemented Si observed through X-ray multiple-beam diffraction mappings”

Calligaris, G.A.*; Lang, R.; Bettini, J.; dos Santos, A.O.; Cardoso, L.P.*; et al.

In this paper, the dependence of a Laue diffraction streak on the crystalline perfection of Xe-implanted Si(001) substrates is presented, based on the observation in the X-ray multiple diffraction (XRMD) mappings, as an experimental evidence of the transition between dynamical and kinematical diffraction regimes. A direct observation of the implanted region by transmission electron microscopy revealed an amorphous Si layer, which recrystallizes into a heavily twinned and faulted microstructure after thermal treatment at 800 degrees C. Besides the lattice damages, the annealing induces the formation of Xe bubbles. Both singularly affect the XRMD pattern, primarily the fourfold streaks profile of the (000)(002)(1 1) over bar(1) over bar(1) (1 over bar3) four-beam simultaneous case when compared with the pristine Si pattern, highlighting the intra- and inter-block diffractions and the role played by the primary extinction effect. Such features provide information on the dominant diffraction regime. The findings are also discussed and compared to the conventional reciprocal space mappings via the asymmetric Si(113) reflection. Published by AIP Publishing.

APPLIED PHYSICS LETTERS 109 14 141901, 2016. DOI: 10.1063/1.4963791

[P346-2016] "Impact of photon cross section uncertainties on Monte Carlo-determined depth-dose distributions"

Aguirre, E.*; David, M.; de Almeida, C. E.; Bernal, M. A.*

This work studies the impact of systematic uncertainties associated to interaction cross sections on depth dose curves determined by Monte Carlo simulations. The corresponding sensitivity factors are quantified by changing cross sections by a given amount and determining the variation in the dose. The influence of total and partial photon cross sections is addressed. Partial cross sections for Compton and Rayleigh scattering, photo-electric effect, and pair production have been accounted for. The PENELOPE code was used in all simulations. It was found that photon cross section sensitivity factors depend on depth. In addition, they are positive and negative for depths below and above an equilibrium depth, respectively. At this depth, sensitivity factors are null. The equilibrium depths found in this work agree very well with the mean free path of the corresponding incident photon energy. Using the sensitivity factors reported here, it is possible to estimate the impact of photon cross section uncertainties on the uncertainty of Monte Carlo-determined depth dose curves.

PHYSICA MEDICA-EUROPEAN JOURNAL OF MEDICAL PHYSICS 32[9] 1065-1071, 2016. DOI: 10.1016/j.ejmp.2016.08.002

[P347-2016] "Magnetically controllable silicon microring with ferrofluid cladding"

El Amili, A.; Souza, M. C. M. M.*; Vallini, F.; Frateschi, N. C.*; Fainman, Y.

We experimentally investigate the application of magnetic fluids (MFs) on integrated silicon photonics. Using a ferro-fluid-clad silicon microring resonator, we demonstrate active control of resonances by applying an external magnetic field. Relatively high loaded quality factors on the order of 6000 are achieved, despite the optical losses introduced by the magnetic nanoparticles. We demonstrate resonance shifts of 185 pm in response to a 110 Oe strong magnetic field, corresponding to an overall refractive index change of -3.2×10^{-3} for the cladding MF. The combination of MFs and integrated photonics could potentially lead to the development of magnetically controllable optical devices and ultra-compact cost-effective magnetic field sensors.

OPTICS LETTERS 41[23] 5576-5579, 2016. DOI: 10.1364/OL.41.005576

[P348-2016] "Measurement of dijet azimuthal decorrelation 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 measurement of the decorrelation of azimuthal angles between the two jets with the largest transverse momenta is presented for seven regions of leading jet transverse momentum up to 2.2. The analysis is based on the proton-proton collision data collected with the CMS experiment at a centre-of-mass energy of 8 corresponding to an integrated luminosity of 19.7. The dijet azimuthal decorrelation is caused by the radiation of additional jets and probes the dynamics of multijet production. The results are compared to fixed-order predictions of perturbative quantum chromodynamics (QCD), and to simulations using Monte Carlo event generators that include parton showers, hadronization, and multiparton interactions. Event generators with only two outgoing high transverse momentum partons fail to describe the measurement, even when supplemented with next-to-leading-order QCD corrections and parton showers. Much better agreement is achieved when at least three outgoing partons are complemented through either next-to-leading-order predictions or parton showers. This observation emphasizes the need to improve predictions for multijet production.

EUROPEAN PHYSICAL JOURNAL C 76[10] 536, 2016. DOI: 10.1140/epjc/s10052-016-4346-8

[P349-2016] "Measurement of the differential cross section and charge asymmetry for inclusive pp -> W-+/- + X production at root s=8 TeV"

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

The differential cross section and charge asymmetry for inclusive pp -> W-+/- + X -> mu(+/-)nu + X production at root s = 8 TeV are measured as a function of muon pseudorapidity. The data sample corresponds to an integrated luminosity of 18.8 fb(-1) recorded with the CMS detector at the LHC. These results provide important constraints on the parton distribution functions of the proton in the range of the Bjorken scaling variable x from 10(-3) to 10(-1).

EUROPEAN PHYSICAL JOURNAL C 76[8] 469, 2016. DOI: 10.1140/epjc/s10052-016-4293-4

[P350-2016] "Measurement of the inelastic cross section in proton-lead collisions at root s(NN)=5.02 TeV"

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

The inelastic hadronic cross section in proton-lead collisions at a centre-of-mass energy per nucleon pair of 5.02 TeV is measured with the CMS detector at the LHC. The data sample, corresponding to an integrated luminosity of $L = 12.6 \pm 0.4$ nb(-1), has been collected with an unbiased trigger for inclusive particle production. The cross section is obtained from the measured number of proton-lead collisions with hadronic activity produced in the pseudorapidity ranges $3 < \eta < 5$ and/or $-5 < \eta < -3$, corrected for photon-induced contributions, experimental acceptance, and other instrumental effects.

The inelastic cross section is measured to be $\sigma(\text{inel})$ (pPb) = 2061 \pm 3(stat) \pm 34(syst) \pm 72(lumi) mb. Various Monte Carlo generators, commonly used in heavy ion and cosmic ray physics, are found to reproduce the data within uncertainties. The value of $\sigma(\text{inel})$ (pPb) is compatible with that expected from the proton-proton cross section at 5.02 TeV scaled up within a simple Glauber approach to account for multiple scatterings in the lead nucleus, indicating that further net nuclear corrections are small.

PHYSICS LETTERS B 759 641-662, 2016. DOI: 10.1016/j.physletb.2016.06.027

[P351-2016] “Measurement of the integrated and differential $t(\bar{t})$ production cross sections for high- $p(T)$ top quarks in pp collisions at $\sqrt{s}=8$ TeV”

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

The cross section for pair production of top quarks ($t(\bar{t})$ over bar) with high transverse momenta is measured in pp collisions, collected with the CMS detector at the LHC with $\sqrt{s} = 8$ TeV in data corresponding to an integrated luminosity of 19.7 fb⁻¹. The measurement is performed using lepton + jets events, where one top quark decays semileptonically, while the second top quark decays to a hadronic final state. The hadronic decay is reconstructed as a single, large-radius jet, and identified as a top quark candidate using jet substructure techniques. The integrated cross section and the differential cross sections as a function of top quark p_T and rapidity are measured at particle level within a fiducial region related to the detector-level requirements and at parton level. The particle-level integrated cross section is found to be $\sigma t(\bar{t})$ over bar = 0.499 \pm 0.035 (stat + syst) \pm 0.095 (theo) \pm 0.013 (lumi) pb for top quark $p(T) > 400$ GeV. The parton-level measurement is $\sigma t(\bar{t})$ over bar = 1.44 \pm 0.10 (stat + syst) \pm 0.29 (theo) \pm 0.04 (lumi) pb. The integrated and differential cross section results are compared to predictions from several event generators.

PHYSICAL REVIEW D 94[7] 072002, 2016. DOI: 10.1103/PhysRevD.94.072002

[P352-2016] “New insights about flocculation process in sodium caseinate-stabilized emulsions”

Huck-Iriart C.; Montes-de-Oca-Avalos, J.; Herrera, M.L.; Candal, R.J.; Pinto-de-Oliveira, C.L.; Linares-Torriani, I.*

Flocculation process was studied in emulsions formulated with 10 wt.% sunflower oil, 2, 5 or 7.5 wt.% NaCas, and with or without addition of sucrose (0, 5, 10, 15, 20 or 30 wt.%). Two different processing conditions were used to prepare emulsions: ultraturrax homogenization or further homogenization by ultrasound. Emulsions with droplets with diameters above (coarse) or below (fine) 1 μm were obtained. Emulsions were analyzed for droplet size distribution by static light scattering (SLS), stability by Turbiscan, and structure by confocal laser scanning microscopy (CLSM) and small angle X-ray scattering (SAXS). SAXS data were fitted by a theoretical model that considered a system composed of poly dispersed spheres with repulsive interaction and presence of aggregates. Flocculation behavior was caused by the self-assembly properties of NaCas, but the process was more closely related to interfacial protein content than micelles concentration in the aqueous phase. The results indicated that casein aggregation was strongly affected by disaccharide addition, hydrophobic interaction of the emulsion droplets, and interactions among interfacial protein molecules. The structural changes detected in the protein micelles in different environments allowed understanding the macroscopic physical behavior observed in concentrated NaCas emulsions.

FOOD RESEARCH INTERNATIONAL 89 338-346, Parte: 1. 2016. DOI: 10.1016/j.foodres.2016.08.026

[P353-2016] “Ni 3d - O 2p hybridization dependent magnetic properties of LaNiO3 thin films”

Kumar, Y.; Sharma, S. K.*; Choudhary, R. J.; Thakur, P.; Knobel, M.*; Brookes, N. B.; Kumar, R.

We present here the study on magnetic properties and their relation to the electronic structure for c-axis oriented LaNiO3 films deposited on LaAlO3 single crystals using the rf-magnetron sputtering. Swift heavy ion irradiation induced annealing alters the unusual temperature dependent magnetic behaviour of pristine film to the paramagnetic one. X-ray absorption spectroscopic measurements, performed at O K-edge and Ni L-edge, reveal that Ni-O hybridization is increased after the initial irradiation. Charge-transfer multiplet calculations of the Ni L-edge indicate that variation of magnetic behaviour can be related to the Ni-O hybridization strength inducing a further variation in Ni spin state.

THIN SOLID FILMS 619 144-147, 2016. DOI: 10.1016/j.tsf.2016.11.008

[P354-2016] “Production of $K^*(892)(0)$ and $\phi(1020)$ in p-Pb collisions at $\sqrt{s(NN)}=5.02$ TeV”

Adam, J.; Chinellato, D. D.*; Dash, A.*; de Souza, R. D.*; Takahashi, J.*; et al.
Alice Collaboration

The production of $K^*(892)(0)$ and $\phi(1020)$ mesons has been measured in p-Pb collisions at $\sqrt{s(NN)} = 5.02$ TeV. $K^*(0)$ and ϕ are reconstructed via their decay into charged hadrons with the ALICE detector in the rapidity range $-0.5 < y < 0$. The transverse momentum spectra, measured as a function of the multiplicity, have a $p(T)$ range from 0 to 15 GeV/c for $K^*(0)$ and from 0.3 to 21 GeV/c for ϕ . Integrated yields, mean transverse momenta and particle ratios are reported and compared with results in pp collisions at $\sqrt{s} = 7$ TeV and Pb-Pb collisions at $\sqrt{s(NN)} = 2.76$ TeV. In Pb-Pb and p-Pb collisions, $K^*(0)$ and ϕ probe the hadronic phase of the system and contribute to the study of particle formation mechanisms by comparison with other identified hadrons. For this purpose, the mean transverse momenta and the differential proton-to- ϕ ratio are discussed as a function of the multiplicity of the event. The short-lived $K^*(0)$ is measured to investigate re-scattering effects, believed to be related to the size of the system and to the lifetime of the hadronic phase.

EUROPEAN PHYSICAL JOURNAL C 76[5] 245, 2016. DOI: 10.1140/epjc/s10052-016-4088-7

[P355-2016] “Search for Higgs boson off-shell production in proton-proton collisions at 7 and 8 TeV and derivation of constraints on its total decay width”

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

A search is presented for the Higgs boson off-shell production in gluon fusion and vector boson fusion processes with the Higgs boson decaying into a $W^+ W^-$ pair and the W bosons decaying leptonically. The data observed in this analysis are used to constrain the Higgs boson total decay width. The analysis is based on the data collected by the CMS experiment at the LHC, corresponding to integrated luminosities of 4.9 fb⁻¹ at a centre-of-mass energy of 7 TeV and 19.4 fb⁻¹ at 8 TeV, respectively.

An observed (expected) upper limit on the off-shell Higgs boson event yield normalised to the standard model prediction of 2.4 (6.2) is obtained at the 95% CL for the gluon fusion process and of 19.3 (34.4) for the vector boson fusion process. Observed and expected limits on the total width of 26 and 66 MeV are found, respectively, at the 95% confidence level (CL). These limits are combined with the previous result in the ZZ channel leading to observed and expected 95% CL upper limits on the width of 13 and 26 MeV, respectively.

JOURNAL OF HIGH ENERGY PHYSICS 9 051, 2016. DOI: 10.1007/JHEP09(2016)051

[P356-2016] “Search for long-lived charged particles in proton-proton collisions at root s=13 TeV”

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

Results are presented of a search for heavy stable charged particles produced in proton-proton collisions at root s = 13 TeV using a data sample corresponding to an integrated luminosity of 2.5 fb(-1) collected in 2015 with the CMS detector at the CERN LHC. The search is conducted using signatures of anomalously high energy deposits in the silicon tracker and long time-of-flight measurements by the muon system. The data are consistent with the expected background, and upper limits are set on the cross sections for production of long-lived gluinos, top squarks, tau sleptons, and leptonlike long-lived fermions. These upper limits are equivalently expressed as lower limits on the masses of new states; the limits for gluinos, ranging up to 1610 GeV, are the most stringent to date. Limits on the cross sections for direct pair production of long-lived tau sleptons are also determined.

PHYSICAL REVIEW D 94[11] 112004, 2016. DOI: 10.1103/PhysRevD.94.112004

[P357-2016] “Search for neutral resonances decaying into a Z boson and a pair of b jets or tau leptons”

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

A search is performed for a new resonance decaying into a lighter resonance and a Z boson. Two channels are studied, targeting the decay of the lighter resonance into either a pair of oppositely charged tau leptons or a b (b) over bar pair. The Z boson is identified via its decays to electrons or muons. The search exploits data collected by the CMS experiment at a centre-of-mass energy of 8 TeV, corresponding to an integrated luminosity of 19.8 fb(-1). No significant deviations are observed from the standard model expectation and limits are set on production cross sections and parameters of two-Higgs-doublet models.

PHYSICS LETTERS B 759 369-394, 2016. DOI: 10.1016/j.physletb.2016.05.087

[P358-2016] “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 759 641-662, 2016. DOI: 10.1016/j.physletb.2016.06.027

[P359-2016] “Search for supersymmetry in electroweak production with photons and large missing transverse energy in pp collisions at root s=8TeV”

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

Results are reported from a search for supersymmetry with gauge-mediated supersymmetry breaking in electroweak production. Final states with photons and large missing transverse energy (E-T(miss)) were examined. The data sample was collected in pp collisions at root s = 8TeV with the CMS detector at the LHC and corresponds to 7.4fb(-1). The analysis focuses on scenarios in which the lightest neutralino has bino- or wino-like components, resulting in decays to photons and gravitinos, where the gravitinos escape undetected. The data were obtained using a specially designed trigger with dedicated low thresholds, providing good sensitivity to signatures with photons, E-T(miss), and low hadronic energy. No excess of events over the standard model expectation is observed. The results are interpreted using the model of general gauge mediation. With the wino mass fixed at 10GeV above that of the bino, wino masses below 710GeV are excluded at 95% confidence level. Constraints are also set in the context of two simplified models, for which the analysis sets the lowest cross section limits on the electroweak production of supersymmetric particles.

PHYSICS LETTERS B 759 479-500, 2016. DOI: 10.1016/j.physletb.2016.05.088

[P360-2016] “Search for supersymmetry in events with soft leptons, low jet multiplicity, and missing transverse energy in proton-proton collisions at root s=8 TeV”

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

Results are presented from a search for supersymmetric particles in scenarios with small mass splittings. The data sample corresponds to 19.7 fb(-1) of proton-proton collisions recorded by the CMS experiment at root s = 8 TeV. The search targets top squark ((t) over tilde) pair production in scenarios with mass differences Delta m = m((t) over tilde) - m((chi) over tilde (0)(1)) below the W-boson mass and with top-squark decays in the four-body mode ((t) over tilde -> bl nu(chi) over tilde (0)(1)), where the neutralino ((chi) over tilde (0)(1)) is assumed to be the lightest supersymmetric particle (LSP). The signature includes a high transverse momentum (p(T)) jet associated with initial-state radiation, one or two low-p(T) leptons, and significant missing transverse energy. The event yields observed in data are consistent with the expected background contributions from standard model processes.

Limits are set on the cross section for top squark pair production as a function of the (t) over \tilde{t} and LSP masses. Assuming a 100% branching fraction for the four-body decay mode, top-squark masses below 316 GeV are excluded for $\Delta m = 25$ GeV at 95% CL. The dilepton data are also interpreted under the assumption of chargino-neutralino production, with subsequent decays to sleptons or sneutrinos. Assuming a difference between the common ($\tilde{\chi}_0$) over \tilde{t} ($\tilde{\chi}_1$) over \tilde{t} ($\tilde{\chi}_2$) mass and the LSP mass of 20 GeV and a tau-enriched decay scenario, masses in the range $m(\tilde{\chi}_1) < 307$ GeV are excluded at 95% CL.

PHYSICS LETTERS B 759 9-35, 2016. DOI: 10.1016/j.physletb.2016.05.033

[P361-2016] “Spinal cord diffusion tensor imaging in patients with sensory neuropathy”

Casseb, R.F.*; de Paiva, J.L.R.; Branco, L.M.T.; Martinez, A.R.M.; Reis, F.; de Lima, J.C.; Castellano, G.*; Franca, M.C.

We investigated whether MR diffusion tensor imaging (DTI) analysis of the cervical spinal cord could aid the (differential) diagnosis of sensory neuronopathies, an underdiagnosed group of diseases of the peripheral nervous system. We obtained spinal cord DTI and T2WI at 3 T from 28 patients, 14 diabetic subjects with sensory-motor distal polyneuropathy, and 20 healthy controls. We quantified DTI-based parameters and looked at the hyperintense T2W signal at the spinal cord posterior columns. Fractional anisotropy and mean diffusivity values at C2-C3 and C3-C4 levels were compared between groups. We also compared average fractional anisotropy (mean of values at C2-C3 and C3-C4 levels). A receiver operating characteristic (ROC) curve was used to determine diagnostic accuracy of average fractional anisotropy, and we compared its sensitivity against the hyperintense signal in segregating patients from the other subjects. Mean age and disease duration were 52 ± 10 and 11.4 ± 9.3 years in the patient group. Eighteen subjects had idiopathic disease and 6 dysimmune etiology. Fractional anisotropy at C3-C4 level and average fractional anisotropy were significantly different between patients and healthy controls ($p < 0.001$ and < 0.001) and between patients and diabetic subjects ($p = 0.019$ and 0.027). Average fractional anisotropy presented an area under the curve of 0.838. Moreover, it had higher sensitivity than visual detection of the hyperintense signal (0.86 vs. 0.54), particularly for patients with short disease duration. DTI-based analysis enables in vivo detection of posterior column damage in sensory neuropathy patients and is a useful diagnostic test for this condition. It also helps the differential diagnosis between sensory neuropathy and distal polyneuropathies.

NEURORADIOLOGY 58[11] 1103-1108, 2016. DOI: 10.1007/s00234-016-1738-2

[P362-2016] “Statistical entropy of open quantum systems”

Durao, L. M. M.*; Caldeira, A. O.*

Dissipative quantum systems are frequently described within the framework of the so-called “system-plus-reservoir” approach. In this work we assign their description to the Maximum Entropy Formalism and compare the resulting thermodynamic properties with those of the well-established approaches. Due to the non-negligible coupling to the heat reservoir, these systems are nonextensive by nature, and the former task may require the use of nonextensive parameter dependent informational entropies. In doing so, we address the problem of choosing appropriate forms of those entropies in order to describe a consistent thermodynamics for dissipative quantum systems. Nevertheless, even having chosen the most successful and popular forms of those entropies, we have proven our model to be a counterexample where this sort of approach leads us to wrong results.

PHYSICAL REVIEW E 94[6], 062147, 2016. DOI: 10.1103/PhysRevE.94.062147

[P363-2016] “Studies of inclusive four-jet production with two b-tagged jets in proton-proton collisions at 7 TeV”

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

Measurements are presented of the cross section for the production of at least four jets, of which at least two originate from b quarks, in proton-proton collisions. Data collected with the CMS detector at the LHC at a center-of-mass energy of 7 TeV are used, corresponding to an integrated luminosity of 3 pb⁻¹. The cross section is measured as a function of the jet transverse momentum for $p(T) > 20$ GeV, and of the jet pseudorapidity for $|\eta| < 2.4$ (b jets), 4.7 (untagged jets). The correlations in azimuthal angle and p_T between the jets are also studied. The inclusive cross section is measured to be $\sigma(pp \rightarrow 2b + 2j + X) = 69 \pm 3(\text{stat}) \pm 24(\text{syst})$ nb. The η and $p(T)$ distributions of the four jets and the correlations between them are well reproduced by event generators that combine perturbative QCD calculations at next-to-leading-order accuracy with contributions from parton showers and multiparton interactions.

PHYSICAL REVIEW D 94[11] 112005, 2016. DOI: 10.1103/PhysRevD.94.112005

[P364-2016] “Study of Z boson production in pPb collisions at root S-NN=5.02 TeV”

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

The production of Z bosons in pPb collisions at $\sqrt{s_{NN}} = 5.02$ TeV is studied by the CMS experiment via the electron and muon decay channels. The inclusive cross section is compared to pp collision predictions, and found to scale with the number of elementary nucleon-nucleon collisions. The differential cross sections as a function of the Z boson rapidity and transverse momentum are measured. Though they are found to be consistent within uncertainty with theoretical predictions both with and without nuclear effects, the forward-backward asymmetry suggests the presence of nuclear effects at large rapidities. These results provide new data for constraining nuclear parton distribution functions.

PHYSICS LETTERS B 759 36-57, 2016. DOI: 10.1016/j.physletb.2016.05.044

[P365-2016] “The Antitoxin Protein of a Toxin-Antitoxin System from Xylella fastidiosa Is Secreted via Outer Membrane Vesicles”

Santiago, A.D.; Mendes, J.S., Clelton A.; de Toledo, M.A.S.; Beloti, L.L.; Crucello, A.; Horta, M. A. C.; de Pinho Favaro, M.T.; Munar, D. M. M.*; Cotta, M. A.*; de Souza, A.P.

The *Xylella fastidiosa* subsp *pauca* strain 9a5c is a Gram-negative, xylem-limited bacterium that is able to form a biofilm and affects citrus crops in Brazil. Some genes are considered to be involved in biofilm formation, but the specific mechanisms involved in this process remain unknown. This limited understanding of how some bacteria form biofilms is a major barrier to our comprehension of the progression of diseases caused by biofilm-producing bacteria. Several investigations have shown that the toxin-antitoxin (TA) operon is related to biofilm formation.

This operon is composed of a toxin with RNase activity and its cognate antitoxin. Previous reports have indicated that the antitoxin is able to inhibit toxin activity and modulate the expression of the operon as well as other target genes involved in oxidative stress and mobility. In this study, we characterize a toxin antitoxin system consisting of XfMqsR and XfYgiT, respectively, from *X. fastidiosa* subsp. *pauca* strain 9a5c. These proteins display a high similarity to their homologs in *X. fastidiosa* strain Temecula and a predicted tridimensional structure that is similar to MqsR-YgiT from *Escherichia coli*. The characterization was performed using *in vitro* assays such as analytical ultracentrifugation (AUC), size exclusion chromatography, isothermal titration calorimetry, and Western blotting. Using a fluorometric assay to detect RNases, we demonstrated that XfMqsR is thermostable and can degrade RNA. XfMqsR is inhibited by XfYgiT, which interacts with its own promoter. XfYgiT is known to be localized in the intracellular compartment; however, we provide strong evidence that *X. fastidiosa* secretes wild-type XfYgiT into the extracellular environment via outer membrane vesicles, as confirmed by Western blotting and specific immunofluorescence labeling visualized by fluorescence microscopy. Taken together, our results characterize the TA system from *X. fastidiosa* strain 9a5c, and we also discuss the possible influence of wild-type XfYgiT in the cell.

FRONTIERS IN MICROBIOLOGY 7, 2030, 2016. DOI: 10.3382/fmicb.2016.02030

[P366-2016] “The role of magnetic excitations in magnetoresistance and Hall effect of slightly TM-substituted BaFe₂As₂ compounds (TM = Mn, Cu, Ni)”

Pena, J. P.; Piva, M. M.*; Jesus, C. B. R.*; Lesseux, G. G.*; Garitezi, T. M.*; Tobia, D.*; Rosa, P. F. S.*; Grant, T.; Fisk, Z.; Adriano, C.*; Urbano, R. R.*; Pagliuso, P. G.*; Pureur, P.

We report on electrical resistivity, magnetoresistance (MR) and Hall effect measurements in four non-superconducting BaFe₂-xTMxAs₂ (TM = Mn, Cu and Ni) single crystals with small values of the chemical substitution x. The spin density wave (SDW) ordering that occurs in these systems at temperatures T similar to (120-140) K, in close vicinity to a tetragonal/orthorhombic transition, produces significant modifications in their magneto-transport properties. While in the magnetically ordered phase the MR is positive and its magnitude increases with decreasing temperatures, in the paramagnetic regime the MR becomes vanishingly small. Above the spin density wave transition temperature (T-SDW) the Hall coefficient R-H is negative, small and weakly temperature dependent, but a remarkable change of slope occurs in the R-H versus T curves at T = T-SDW. The Hall coefficient amplitude, while remaining negative, increases steadily and significantly as the temperature is decreased below T-SDW and down to T = 20 K. The qualitative behavior of both MR and Hall coefficient is weakly dependent on the chemical substitution in the studied limit. The experiments provide strong evidence that scattering of charge carriers by magnetic excitations has to be taken into account to explain the behavior of the resistivity, magnetoresistance and Hall effect in the ordered phase of the studied compounds. Effects of multiple band conduction also must be considered for a complete interpretation of the results.

PHYSICA C-SUPERCONDUCTIVITY AND ITS APPLICATIONS 531, 30-38, 2016. DOI: 10.1016/j.physc.2016.10.006

[P367-2016] “The Uhlenbeck-Ford model: Exact virial coefficients and application as a reference system in fluid-phase free-energy calculations”

Leite, R.P.*; Freitas, R.; Azevedo, R.; de Koning, M.*

The Uhlenbeck-Ford (UF) model was originally proposed for the theoretical study of imperfect gases, given that all its virial coefficients can be evaluated exactly, in principle. Here, in addition to computing the previously unknown coefficients B-11 through B-13, we assess its applicability as a reference system in fluid-phase free-energy calculations using molecular simulation techniques. Our results demonstrate that, although the UF model itself is too soft, appropriately scaled Uhlenbeck-Ford (sUF) models provide robust reference systems that allow accurate fluid-phase free-energy calculations without the need for an intermediate reference model. Indeed, in addition to the accuracy with which their free energies are known and their convenient scaling properties, the fluid is the only thermodynamically stable phase for a wide range of sUF models. This set of favorable properties may potentially put the sUF fluid-phase reference systems on par with the standard role that harmonic and Einstein solids play as reference systems for solid-phase free-energy calculations.

JOURNAL OF CHEMICAL PHYSICS 145[19] 194101, 2016. DOI: 10.1063/1.4967775

[P368-2016] “Ultrahigh-energy neutrino follow-up of gravitational wave events GW150914 and GW151226 with the Pierre Auger Observatory”

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.*; Pereira, L. A. S.*; Theodoro, V. M.*; et al.

On September 14, 2015 the Advanced LIGO detectors observed their first gravitational wave (GW) transient GW150914. This was followed by a second GW event observed on December 26, 2015. Both events were inferred to have arisen from the merger of black holes in binary systems. Such a system may emit neutrinos if there are magnetic fields and disk debris remaining from the formation of the two black holes. With the surface detector array of the Pierre Auger Observatory we can search for neutrinos with energy E-nu above 100 PeV from pointlike sources across the sky with equatorial declination from about -65 degrees to +60 degrees, and, in particular, from a fraction of the 90% confidence-level inferred positions in the sky of GW150914 and GW151226. A targeted search for highly inclined extensive air showers, produced either by interactions of downward-going neutrinos of all flavors in the atmosphere or by the decays of tau leptons originating from tau-neutrino interactions in the Earth's crust (Earth-skimming neutrinos), yielded no candidates in the Auger data collected within +/- 500 s around or 1 day after the coordinated universal time (UTC) of GW150914 and GW151226, as well as in the same search periods relative to the UTC time of the GW candidate event LVT151012. From the nonobservation we constrain the amount of energy radiated in ultrahigh-energy neutrinos from such remarkable events.

PHYSICAL REVIEW D 94[12] 122007, 2016. DOI: 10.1103/PhysRevD.94.122007

Eventos publicados 2016

[P369-2016] “Bullseye Optomechanical Resonator”

Santos, F.G.S.*; Espinel, Y.A.V.*; Luiz, G.O.*; Benevides, R.S.*; Wiederhecker, G.S.*; Alegre, T.P.M.*

We demonstrate an optomechanical resonator that can tightly confine phonons through a circular phononic shield. Our design allows for independently trimmable long living optical and mechanical modes with large optomechanical coupling.

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.

Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P370-2016] "Cascade Coherent Anti-Stokes Raman Scattering (CARS) Microscopy"

Pelegati, V. B.*; Kyotoku, B. B. C.*; Padilha, L. A.*; Cesar, C. L.*

We used a six wave mixing process with two beams to acquire chemical specific laser scanned confocal images. The non linear optical process is called "Cascade Coherent Anti-Stokes Raman" (CCARS).

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.

Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P371-2016] "Demonstration of Brillouin Scattering Self-Cancellation"

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

We experimentally demonstrate the cancellation of Brillouin scattering by engineering a sub-wavelength diameter silica wire with exactly opposite photo-elastic and moving-boundary contributions.

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.

Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P372-2016] "Enhancement of Two-Photon Absorption in Highly Emissive BODIPY Dyes"

Barros, L.W.*; Castaneda, J.A.*; Cardoso, T.A.S.*; Kolmel, D.K.*; Horner, A.*; Bihlmeier, A.; Nieger, M.; Brase, S.; Cruz, C.H.D.*; Padilha, L.A.*

Novel perfluorinated BODIPY dyes have been synthesized aiming increased nonlinear optical properties. Two-photon absorption spectroscopy shows about 4-fold enhancement of two-photon absorption cross-section in planar biphenyl-containing BODIPY dye, compared to the unsubstituted initial material.

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.

Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P373-2016] "Hammerstein-based equalizer for nonlinear compensation in coherent OFDM long-reach PONs"

Torres-Zugaide, J.; Aldaya, I.*; Campuzano, G.; Castanon, G.

The exponential traffic growth driven by high bandwidth applications such as video on demand and video gaming, is continuously forcing network operators to implement new schemes to increase the capacity offered to the end user. In particular, passive optical networks with a full-duplex capacity with 10 Gbps over 40-km spans are expected to be developed shortly. However, the range of such systems is severely penalized.

In order to increase the range, coherent optical (CO) communications have regained attention. In particular, orthogonal frequency division multiplexing (OFDM) has been proposed due to its robustness to the chromatic dispersion, its high spectral efficiency, and its flexibility. However, the high peak to average ratio of OFDM signals makes them very vulnerable to fiber nonlinear distortions. In this paper we propose a novel low-complexity equalizer based on the inverse Hammerstein model to partially compensate the nonlinear distortion in CO-OFDM networks. Numerical simulations using the split-step Fourier transform, reveal the potential of the proposed nonlinear equalizer to increase the range up to 115 km.

18th INTERNATIONAL CONFERENCE ON TRANSPARENT OPTICAL NETWORKS (ICTON), 2016.

Série de livros: International Conference on Transparent Optical Networks-ICTON. 2016.

[P374-2016] "Material limited high-Q mechanical paddle-resonator"

Luiz, G.O.*; Santos, F.G.S.*; Benevides, R.*; Espinel, Y.A.V.*; Alegre, T.P.M.*; Wiederhecker, G.S.*

We used destructive interference of elastic waves to obtain material limited high quality factor micro mechanical devices probed with an optical cavity. Mechanical quality factors as high as 28×10^3 were measured.

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.

Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P375-2016] "Modifying Coupled Mode Theory to model quasi-dark states in coupled resonators"

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

We show that Coupled Mode Theory incorrectly predicts a dark state for a coupled resonator design and we propose a correction that effectively reconciles it with results obtained experimentally and through the Transfer Matrix Method.

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.

Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P376-2016] "Optical Frequency Comb based on Single-Pass Four-Wave-Mixing in a HNLF combined with EO-modulation"

Brito, J.L.S.*; Dainese, P.*; Cruz, F.C.*

An optical frequency comb is produced with over 100 nm bandwidth at 1550 nm and 25 GHz line spacing using two continuous-wave narrow-linewidth seed lasers, in single-pass through a HNLF and a resonant EOM.

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.

Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P377-2016] "Optomechanical Oscillators Fabricated in a CMOS-compatible Foundry"

Benevides, R.*; Luiz, G.O.*; Santos, F.G.S.* ; Wiederhecker, G.S.*; Alegre, T.P.M.*

We demonstrate self-sustained mechanical oscillations at room temperature and ambient pressure in a silicon photonic crystal slot-cavity fabricated by a CMOS-Foundry. Optical quality factor as high as $Q(\text{opt}) = 4 \times 10^5$ and an opto-mechanical coupling rate of $g_0/2\pi = 76$ kHz are observed.

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.

Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P378-2016] “Predictions for neutrinoless double-beta decay in the 3+1 sterile neutrino scenario”

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

In this proceeding we present predictions of the effective Majorana mass vertical bar $m(\beta\beta)$ vertical bar in neutrinoless double-beta decay for the standard 3ν mixing case and for the $3+1$ neutrino mixing case indicated by the short-baseline anomalies. We have taken into account the uncertainties of the neutrino mixing parameters determined by oscillation experiments. We obtained that the predictions for vertical bar $m(\beta\beta)$ vertical bar in the cases of 3ν and $3+1$ mixing are quite different, in agreement with previous discussions in the literature, and that future measurements of neutrinoless double-beta decay and the total mass of the three lightest neutrinos in cosmological experiments may distinguish the 3ν and $3+1$ cases if the mass ordering is determined by oscillation experiments.

14th International Conference on Topics in Astroparticle and Underground Physics (TAUP), SEP 07-11, 2015, Torino, ITALY.

Série de livros: Journal of Physics Conference Series, vol. 718, UNSP 062074, 2016. DOI: 10.1088/1742-6596/718/6/062074

[P379-2016] “Study of Neutrino Oscillation and Dissipative Effects in LBNE”

Oliveira, R. L. N.*; de Gouvea, A.; Guzzo, M.M.*

In this work we make a brief phenomenological study for three neutrino oscillation taking into account the matter effect from the open quantum system approach. Open quantum system approach has a rigorous set of the statements and when it is applied on neutrino oscillation, due to dissipative phenomena, the neutrinos may exhibit new and peculiar effects, in special, decoherence and relaxation effects. We use the most effective quantum dissipators and we study how change the neutrino behavior considering the LBNE configuration. In particular, we show how each kind of dissipative effect is linked to each mixing angle and consequently, as the new effects are described in the survival and appearance probabilities. Interesting enough, in the LBNE case we present a new behavior at matter resonance region that can be seen even when the dissipative effect is small compared with energy dependent oscillation parameters.

37th International Conference on High Energy Physics (ICHEP), Jul 02-09, 2014, Valencia, SPAIN.
NUCLEAR AND PARTICLE PHYSICS PROCEEDINGS 273 2699-2701, 2016. DOI: 10.1016/j.nuclphysbps.2015.10.035

[P380-2016] “The DarkSide awakens”

Davini, S.; Agnes, P.; Segreto, E.*; et al.

The DarkSide program at LNGS aims to perform background-free WIMP searches using two phase liquid argon time projection chambers, with the ultimate goal of covering all parameters down to the so-called neutrino floor. One of the distinct features of the program is the use of underground argon with has a reduced content of the radioactive Ar-39 compared to atmospheric argon. The DarkSide Collaboration is currently operating the DarkSide-50 experiment, the first such WIMP detector using underground argon. Operations with underground argon indicate a suppression of Ar-39 by a factor $(1.4 \pm 0.2) \times 10^3$ relative to atmospheric argon. The new results obtained with DarkSide-50 and the plans for the next steps of the DarkSide program, the 20 t fiducial mass DarkSide-20k detector and the 200 t fiducial Argo, are reviewed in this proceedings.

14th International Conference on Topics in Astroparticle and Underground Physics (TAUP), SEP 07-11, 2015, Torino, ITALY.

Série de livros: Journal of Physics Conference Series, vol. 718, UNSP 042016, 2016. DOI: 10.1088/1742-6596/718/4/042016

[P381-2016] “The DarkSide-50 outer detectors”

Westerdale, S.; Agnes, P.; Segreto, E.*; et al.

DarkSide-50 is a dark matter detection experiment searching for Weakly Interacting Massive Particles (WIMPs), in Gran Sasso National Laboratory. For experiments like DarkSide-50, neutrons are one of the primary backgrounds that can mimic WIMP signals. The experiment consists of three nested detectors: a liquid argon time projection chamber surrounded by two outer detectors. The outermost detector is a 10 m by 11 m cylindrical water Cherenkov detector with 80 PMTs, designed to provide shielding and muon vetoing. Inside the water Cherenkov detector is the 4 m diameter spherical boron-loaded liquid scintillator veto, with a cocktail of pseudocumene, trimethyl borate, and PPO wavelength shifter, designed to provide shielding, neutron vetoing, and in situ measurements of the TPC backgrounds. We present design and performance details of the DarkSide-50 outer detectors.

14th International Conference on Topics in Astroparticle and Underground Physics (TAUP), SEP 07-11, 2015, Torino, ITALY.

Série de livros: Journal of Physics Conference Series, vol. 718, UNSP 042062, 2016. DOI: 10.1088/1742-6596/718/4/042062

[P382-2016] “Time-domain Interferometric Characterization of Nonlinear and Thermal-induced Phase-shift in Silicon Waveguides”

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

Time-domain interferometry is used to simultaneously characterize nonlinear and self-heating phase-shifts in silicon waveguides under long-pulse optical pumping. Applied to a strip waveguide, the method enabled measurements of both stationary phase-shifts and thermal time constant.

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.

Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P383-2016] “Tunable third-harmonic generation in silicon oxide wedge microcavities”

Soares, J.H.*; Santos, F.G.*; Fujii, L.*; Wiederhecker, G.S.*; Alegre, T.P.M.*

We demonstrate tunable third-harmonic generation (THG) using a multimode microcavity. The silicon-oxide wedge-resonator is pumped around 1550 nm telecom band and generates tunable THG (512-520 nm) with a collected power efficiency of 10(-5).

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.
Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

[P384-2016] "Ultra-Compact Broadband Dielectric Antenna"

Pita, J.L.; Dainese, P*; Hernandez-Figueroa, HE ; Gabrielli, LH

We demonstrate an ultra-compact silicon on insulator antenna with 3.2 μm(2) footprint and broadside radiation from 1470nm to 1550nm for applications in fiber-to-chip coupling and phased arrays.

Conference on Lasers and Electro-Optics (CLEO), JUN 05-10, 2016, San Jose, CA.
Publicação: CONFERENCE ON LASERS AND ELECTRO-OPTICS (CLEO). 2016.

Artigos publicados 2017

[P001-2017] "Antibacterial and non-cytotoxic ultra-thin polyethylenimine film"

Hernandez-Montelongo, J.*; Lucchesi, E. G.; Nascimento, V. F.; Franca, C. G.; Gonzalez, I.; Macedo, W. A. A.; Machado, D.; Lancellotti, M.; Moraes, A. M.; Beppu, M. M.; Cotta, M. A.*

In recent years, a common strategy, to obtain more uniform and controlled synthesis of polyelectrolytes multi layers (PEMs), relies on a previous polyethylenimine (PEI) coating of the substrate surface. PEI is a synthetic cationic polymer which provides a positive charge distribution on the materials to be covered with PEMs. Despite being an important step, this pre-layer deposition is frequently overlooked and no comprehensive characterizations or deep discussions are reported in literature. In that sense, this work reports on the synthesis of a typical PEI film that works as a precursor for PEMs, and its detailed physicochemical characterization. As many PEMs are produced for antibacterial and biomedical applications, the cytotoxicity of the film was also tested using fibroblasts, and its antibacterial activity was studied using *Staphylococcus aureus* and *Pseudomonas aeruginosa*. Our results present the formation of an ultra-thin film of PEI with a thickness around 3.5 nm, and with a significant percent of NH₃⁺ (35% of the total amount of N) in its chemical structure; NH₃⁺ is a key chemical group because it is considered an important bacterial killer agent. The film was stable and did not present important cytotoxic effect for fibroblasts up to 7 days, contrary to other reports. Finally, the PEI film showed high antibacterial activity against the *S. aureus* strain: reductions in cell density were higher than 95% up to 24 h.

MATERIALS SCIENCE & ENGINEERING C-MATERIALS FOR BIOLOGICAL APPLICATIONS 71 718-724, 2017. DOI: 10.1016/j.msec.2016.10.064

[P002-2017] "Computational investigation on CO₂ adsorption in titanium carbide-derived carbons with residual titanium"

Zhang, D.F.; Dutzer, M.R.; Liang T.; Fonseca, A.F.*; Wu, Y.;

We develop a new approach for modeling titanium carbide derived-carbon (TiC-CDC) systems with residual titanium by the generation of modified atomistic structures based on a silicon carbide derived carbon (SiC-CDC) model and the application of weighted combinations of these structures. In our approach, the original SiC-CDC structure is modified by (i) removing carbon, (ii) adding carbon and (iii) adding titanium. The new atomic scale carbide-derived carbon (CDC) structures are investigated using classical molecular dynamics simulations, and their pure CO₂ adsorption isotherms are calculated using grand canonical Monte Carlo simulations. The system of TiC-CDC with residual titanium is modeled as weighted combinations of pure carbon CDC structures, CDC structures with titanium and a TiC crystalline structure. Our modeling is able to produce both structural properties and adsorption isotherms in accordance with experimental data. The fraction of different models in the systems successfully reflects the structural differences in various experimental TiC-CDC samples. The modeling also suggests that in partially etched TiC-CDC systems, the titanium that may be accessible to CO₂ gas at the transitional interface may provide significant interaction sites for CO₂ and may lead to more efficient overall gas adsorption.

CARBON 111 741-751, 2017. DOI: 10.1016/j.carbon.2016.10.037

[P003-2017] "Formation of a new copper(II) dimer through heterocyclic ligand ring opening reaction: Supramolecular features and magnetic properties"

Goncalves, B.L.; Gervini, V.C.; Flores, A.F.C.; Pimentel, J.L.; Bortoluzzi, A.J.; Burrow, R.A.; Duarte, R.; da Silva, R.R.*; Vicente, J.R.D.

Two new compounds were synthesized and characterized in this work: the heterocycle (Z)-1-(4-(hydroxyimino)-3,5-dimethyl-1-(methylcarbamothioyl)-4,5-dihydro-1H-pyrazol-5-yl)-4-methylthiosemicarbazide and a copper(II) thiosemicarbazonato dimeric complex. Green prismatic single crystals of the dimer were obtained by the reaction of the heterocycle with copper(II) chloride dihydrate. Both compounds were essentially characterized by spectroscopic methods and X-ray diffraction crystallography. The crystal structures revealed molecules connected through supramolecular hydrogen bond interactions and copper(II) centers in a slightly distorted square-pyramidal environment. SQUID magnetometry performed for the dimer revealed both ferromagnetic and antiferromagnetic interactions in the studied complex, presenting a critical temperature of 19 K.

JOURNAL OF MOLECULAR STRUCTURE 1128 410-418, 2017. DOI: 10.1016/j.molstruc.2016.09.014

[P004-2017] "Hybrid layer-by-layer (LbL) films of polyaniline, graphene oxide and zinc oxide to detect ammonia"

Andre, R.S.; Shimizu, F.M.; Miyazaki, C.M.; Riul, A.*; Mattoso, L.H.C; Correa, D.S.

Reliable gas sensors operating at room temperature are in demand for monitoring the environment for hazardous pollutants, such as ammonia (NH₃) gas that may become toxic to humans and animals above a threshold concentration. In this paper we report on the combination of three materials, namely polyaniline (PANI), graphene oxide (GO) and zinc oxide (ZnO), to produce hybrid layer-by-layer (LbL) films used for sensing NH₃ with impedance spectroscopy measurements. The deposition of tetralayered PANI/GO/PANI/ZnO LbL films was confirmed with UV-vis. absorption and Raman spectroscopies, while atomic force microscopy (AFM) served to investigate film morphology. Exposure of these LbL films to NH₃ caused film roughness to vary, in an effect that depended on the number of tetralayers.

Because of synergy in the materials properties, the films with 3 tetralayers were found to be the most adequate for detecting NH₃ in the range from 25 ppm to 500 ppm with a response time of 30 s. These figures of merit are adequate for monitoring working environments regarding gas exposure, and highlight the usefulness of the control of film architecture provided by the LbL technique.

SENSORS AND ACTUATORS B-CHEMICAL 238 795-801, 2017. DOI: 10.1016/j.snb.2016.07.099

[P005-2017] “Hybrid organic/inorganic interfaces as reversible label-free platform for direct monitoring of biochemical interactions”

Vello, T.P.; da Silva, L.M.B.; Silva, G.O.; de Camargo, D.H.S.; Correa, C.C.; Bufon, C.C.B.*

The combination of organic and inorganic materials to create hybrid nanostructures is an effective approach to develop label-free platforms for biosensing as well as to overcome eventual leakage current related problems in capacitive sensors operating in liquid. In this work, we combine an ultra-thin high-k dielectric layer (Al₂O₃) with a nanostructured organic functional tail to create a platform capable of monitoring biospecific interactions directly in liquid at very low analyte concentrations. As a proof of concept, a reversible label-free glutathione-S-transferase (GST) biosensor is demonstrated. The sensor can quantify the GST enzyme concentration through its biospecific interaction with tripeptide reduced glutathione (GSH) bioreceptor directly immobilized on the dielectric surface. The enzymatic reaction is monitored by electrical impedance measurements, evaluating variations on the overall capacitance values according to the GST concentration. The biosensor surface can be easily regenerated, allowing the detection of GST with the very same device. The biosensor shows a linear response in the range of 200 $\mu\text{mol L}^{-1}$ to 2 $\mu\text{mol L}^{-1}$, the largest reported in the literature along with the lowest detectable GST concentration (200 $\mu\text{mol L}^{-1}$) for GST label-free sensors. Such a nanostructured hybrid organic-inorganic system represents a powerful tool for the monitoring of biochemical reactions, such as protein-protein interactions, for biosensing and biotechnological applications.

BIOSENSORS & BIOELECTRONICS 87 209-215, 2017. DOI: 10.1016/j.bios.2016.08.050

[P006-2017] “Properties of heavy rare-gases adlayers on graphene substrates”

Madeira, L.; Vitiello, S. A.*

We investigated several properties of heavy rare-gases, Ne, Ar, Kr, Xe and Rn, adsorbed on graphene substrates in a range of temperature near their melting transition and at some of the representative densities. We have determined radial distribution functions and spacial distributions of the rare-gases adlayers using molecular dynamics simulations. We gathered evidences that Ne and Kr adlayers form commensurate solids. The specific heat and the melting temperature of the adlayers were calculated. At the conditions that our simulations were performed, we find indications supporting a continuous melting of the adlayers. We estimated the nearest neighbor distance of the adatoms, and we determined their average distance to the substrate. We briefly comment on the wetting behavior of the system.

SURFACE SCIENCE 655 39-48, 2017. DOI: 10.1016/j.susc.2016.08.008

[P007-2017] “Two coupled qubits interacting with a thermal bath: A comparative study of different models”

Decordi, G. L.*; Vidiella-Barranco, A.*

We investigate the dynamics of two interacting two-level systems (qubits) having one of them isolated and the other coupled to a large number of modes of the quantized electromagnetic field (thermal reservoir). We consider two different models of system-reservoir interaction: (i) a “microscopic” model, according to which the corresponding master equation is derived taking into account the interaction between the two subsystems (qubits); (ii) a naive “phenomenological” model, in which such interaction is neglected in the derivation of the master equation. We study the dynamics of quantities such as bipartite entanglement, quantum discord and the linear entropy of the isolated qubit in both the strong and weak coupling regimes of the inter-qubit interaction. We also consider different temperatures of the reservoir. We find significant disagreements between the results obtained from the two models even in the weak coupling regime. For instance, we show that according to the phenomenological model, the isolated qubit would approach a maximally mixed state more slowly for higher temperatures (unphysical result), while the microscopic model predicts the opposite behaviour (correct result).

OPTICS COMMUNICATIONS 387 366-376, 2017. DOI: 10.1016/j.optcom.2016.10.017

Correções

[Co003-2016] “Search for third-generation scalar leptoquarks in the t tau channel in proton-proton collisions at root s = 8 TeV (vol 7, 042, 2015)”

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

JOURNAL OF HIGH ENERGY PHYSICS 11, 056, 2016. DOI: 10.1007/JHEP11(2016)056

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

Defesas de Teses

[T001-2017] “Coexistência microscópica de antiferromagnetismo e supercondutividade não convencional”

Aluno: Dalson Eloy Almeida

Orientador: Prof. Dr. Eduardo Miranda

Data: 20/02/2017

[T002-2017] “Nature of the nematic fluctuations in the parent Fe superconductors LaFeAsO and BaFe₂As₂”

Aluno: Ulisses Ferreira Kaneko

Orientador: Prof. Dr. Eduardo Granado Monteiro da Silva

Data: 23/02/2017

[T003-2017] “Tópicos em física de neutrinos”

Aluno: Eduardo Márcio Zavanin

Orientador: Prof. Dr. Marcelo Moraes Guzzo

Data: 17/03/2017

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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