

# Abstracta

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Artigos publicados - P022-2019 à P141-2019

Patentes 2018 - Pa001-2018 à Pa010-2018

Defesas de Teses do IFGW - T001-2019 à T005-2019

Defesas de Dissertações do IFGW - D002-2019 à D004-2019

## Artigos publicados

[P022-2019] “A microscopic approach to heating rate of ferrofluid droplets by a magnetic field”

Siqueira, E. C.; Junior, L. R. N.; Jurelo, A. R.; Monteiro, J. F. H. L.; Orellana, P. A.; Cabrera, G. G.\*; Fachini, F. F.

In this work, we study the heating process of colloidal ferrofluids by a magnetic field. The heating of the fluid occurs by the magnetic relaxation of the nanoparticles which provide thermal energy for the host liquid. In the limit of small volumes, the relaxation process occurs through the Neel mechanism since the magnetic nanoparticles present superparamagnetic behavior. Within this limit, we have used a microscopic model for the coupling to phonons and external magnetic field in order to model the relaxation mechanism and to obtain an expression for the heating rate of the fluid as a function of microscopic parameters. The analysis allows determining appropriate conditions for an optimal heating rate for ferrofluids based on superparamagnetic nanoparticles.

JOURNAL OF APPLIED PHYSICS [125], 4, 045104, 2019. DOI: 10.1063/1.5078648

[P023-2019] “Addressing the hypertriton lifetime puzzle with ALICE at the LHC”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

The ALICE Collaboration collected a large data sample of Pb-Pb collisions at root S-NN = 5.02 TeV in 2015 at the Large Hadron Collider (LHC) and the excellent particle identification (PID) capabilities allow for the detection of rarely produced (anti-)hypernuclei. In particular, the (anti-)hypertriton, H-3(Lambda), which is a bound state of a proton, a neutron and a  $\Lambda$ , is the lightest known hypernucleus. The results on the H-3(Lambda) production are compared with the predictions from a model based on coalescence approach and from statistical-thermal models to investigate the production mechanisms in heavy-ion collisions. Emphasis will also be put on the latest and more precise determination of the H-3(Lambda) lifetime.

NUCLEAR PHYSICS A [982], 815-818, 2019. DOI: 10.1016/j.nuclphysa.2018.11.016

[P024-2019] “ALICE measurements of flow coefficients and their correlations in small (pp and p-Pb) and large (Xe-Xe and Pb-Pb) collision systems”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Many observables which are used as a signature of the collective effects in heavy-ion collisions when measured in high multiplicity pp and pA interactions reveal a very similar behaviour. We will present first measurements of different order flow coefficients and their magnitude correlations for data collected by ALICE during the LHC Run 2 operation, which includes pp collisions at root s = 13 TeV, p-Pb at root s(NN) = 5.02 TeV, Xe-Xe at root sNN = 5.44 TeV and Pb-Pb collisions at root s(NN) = 5.02 TeV. Such a broad spectrum of colliding systems with different energies and wide range of multiplicity allow for detailed investigation of their collision dynamics. The measurements are based on a newly developed subevent technique, which was proven to be particularly important for studies in small systems. The results provide an important insight into the nature of collective phenomena in different collision systems.

NUCLEAR PHYSICS A [982], 487-490, 219. DOI: 10.1016/j.nuclphysa.2018.09.006

[P025-2019] “ALICE results on system-size dependence of charged-particle multiplicity density in p-Pb, Pb-Pb and Xe-Xe collisions”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Particle production at LHC energies involves the interplay of hard (perturbative) and soft (non-perturbative) QCD processes. Global observables, such as the charged-particle multiplicity, are related to the initial geometry and the energy density produced in the collision. They are important to characterise relativistic heavy-ion collisions and to constrain model calculations. The LHC produced Xenon-Xenon collisions for the first time in October 2017. New results on the primary charged-particle pseudorapidity density, and its pseudorapidity and centrality dependence are presented for this lighter and deformed nucleus, and compared to measurements obtained for lead ions. New results will also be presented for p-Pb collisions at the highest energy of 8.16 TeV, as part of an overview of all the measurements at LHC Run 1 and 2 energies. These studies allow us to investigate the evolution of particle production with energy and system size and to compare models based on various particle production mechanisms and different initial conditions.

NUCLEAR PHYSICS A [982], 279-282, 2019. DOI: 10.1016/j.nuclphysa.2018.09.060

[P026-2019] “Anisotropic Flow Control and Gate Modulation of Hybrid Phonon-Polaritons”

Maia, F. C. B.; O’Callahan, B. T.; Cadore, A. R.; Barcelos, I. D.; Campos, L. C.; Watanabe, K.; Taniguchi, T.; Deneke, C.\*; Belyanin, A.; Raschke, M. B.; Freitas, R. O.

Light-matter interaction in two-dimensional photonic or phononic materials allows for the confinement and manipulation of free-space radiation at sub-wavelength scales. Most notably, the van der Waals heterostructure composed of graphene (G) and hexagonal boron nitride (hBN) provides for gate-tunable hybrid hyperbolic plasmon phonon-polaritons (HP3). Here, we present the anisotropic flow control and gate-voltage modulation of HP3 modes in G-hBN on an air-Au microstructured substrate. Using broadband infrared synchrotron radiation coupled to a scattering-type near-field optical microscope, we launch HP3 waves in both hBN Reststrahlen bands and observe directional propagation across in-plane heterointerfaces created at the air-Au junction. The HP3 hybridization is modulated by varying the gate voltage between graphene and Au. This modifies the coupling of continuum graphene plasmons with the discrete hBN hyperbolic phonon polaritons, which is described by an extended Fano model. This work represents the first demonstration of the control of polariton propagation, introducing a theoretical approach to describe the breaking of the reflection and transmission symmetry for HP3 modes. Our findings augment the degree of control of polaritons in G-hBN and related hyperbolic metamaterial nanostructures, bringing new opportunities for on-chip nano-optics communication and computing.

NANO LETTERS [19], 2, 708-715, 2019. DOI: 10.1021/acs.nanolett.8b03732

[P027-2019] “Application of thermal lens microscopy (TLM) for measurement of Cr(VI) traces in wastewater”

Hernandez-Carabali, L. A.; Cedeno, E.; Mantilla, A.; Alvarado, S.; Cabrera, H.; Mansanares, A. M.\*; Calderon, A.; Marin, E.

In this work, we demonstrate for the first time that Thermal Lens Microscopy technique (TLM) can be applied to monitor the dynamics of a photocatalytic process in-situ. The photocatalytic reduction of hexavalent chromium -Cr(VI)- in aqueous solution using CdS and irradiated with visible light is monitored by TLM. Since the values of Cr(VI) concentration obtained after the photocatalytic process were close to those imposed by the international regulations for drinking water, the use of TLM allowed its measurement with a better reliability than with UV spectroscopy, usually used in this kind of analysis.

**JOURNAL OF ENVIRONMENTAL MANAGEMENT [232], 305-309, 2019. DOI: 10.1016/j.jenvman.2018.11.044**

**[P028-2019] “Astrometry and Occultation Predictions to Trans-Neptunian and Centaur Objects Observed within the Dark Energy Survey”**

Banda-Huarca, M., V; Camargo, J. I. B.; Desmars, J.; Sobreira, F.\*; et al.  
DES Collaboration

Trans-Neptunian objects (TNOs) are a source of invaluable information to access the history and evolution of the outer solar system. However, observing these faint objects is a difficult task. As a consequence, important properties such as size and albedo are known for only a small fraction of them. Now, with the results from deep sky surveys and the Gaia space mission, a new exciting era is within reach as accurate predictions of stellar occultations by numerous distant small solar system bodies become available. From them, diameters with kilometer accuracies can be determined. Albedos, in turn, can be obtained from diameters and absolute magnitudes. We use observations from the Dark Energy Survey (DES) from 2012 November until 2016 February, amounting to 4,292,847 charge-coupled device (CCD) frames. We searched them for all known small solar system bodies and recovered a total of 202 TNOs and Centaurs, 63 of which have been discovered by the DES collaboration as of the date of submission. Their positions were determined using the Gaia Data Release 2 as reference and their orbits were refined. Stellar occultations were then predicted using these refined orbits plus stellar positions from Gaia. These predictions are maintained, and updated, in a dedicated web service. The techniques developed here are also part of an ambitious preparation to use the data from the Large Synoptic Survey Telescope (LSST), that expects to obtain accurate positions and multifilter photometry for tens of thousands of TNOs.

**ASTRONOMICAL JOURNAL [157], 3, 120, 2019. DOI: 10.3847/1538-3881/aafb37**

**[P029-2019] “Azimuthal Anisotropy of Heavy-Flavor Decay Electrons in p-Pb Collisions at root s(NN)=5.02 TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

Angular correlations between heavy-flavor decay electrons and charged particles at midrapidity (vertical bar eta vertical bar < 0.8) are measured in p-Pb collisions at root s(NN) = 5.02 TeV. The analysis is carried out for the 0%-20% (high) and 60%-100% (low) multiplicity ranges. The jet contribution in the correlation distribution from high-multiplicity events is removed by subtracting the distribution from low-multiplicity events. An azimuthal modulation remains after removing the jet contribution, similar to previous observations in two-particle angular correlation measurements for light-flavor hadrons. A Fourier decomposition of the modulation results in a positive second-order coefficient (nu(2)) for heavy-flavor decay electrons in the transverse momentum interval 1.5 < p(T) < 4 GeV/c in high-multiplicity events, with a significance larger than 5 sigma.

The results are compared with those of charged particles at midrapidity and those of inclusive muons at forward rapidity. The nu(2) measurement of open heavy-flavor particles at midrapidity in small collision systems could provide crucial information to help interpret the anisotropies observed in such systems.

**PHYSICAL REVIEW LETTERS [122], 7, 072301, 2019. DOI: 10.1103/PhysRevLett.122.072301**

**[P030-2019] “Balance functions of (un)identified hadrons in Pb-Pb, p-Pb, and pp collisions at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

In ultrarelativistic heavy-ion collisions, correlations of particles with opposite quantum numbers provide insight into quark production mechanisms and time scales, collective motion, and re-scattering in the hadronic phase. The longitudinal and azimuthal widths of balance functions for charged kaons and charged pions are used to examine the two-wave quark production model proposed to explain quark-antiquark production within the QGP, which predicts a large increase in up and down quark pairs relative to strange quark pairs around the time of hadronization. Balance functions are also analyzed in small collision systems such as p-Pb and pp to study fragmentation effects and possible collective effects in high-multiplicity events. A comprehensive set of balance functions has been measured using the ALICE detector, including results for unidentified hadrons in Pb-Pb and p-Pb collisions at root s(NN) = 5.02 TeV, for charged pions in Pb-Pb collisions at root s(NN) = 2.76 TeV, p-Pb collisions at root s(NN) = 5.02 TeV and pp collisions at root s = 7 TeV, and for charged kaons in Pb-Pb collisions at root s(NN) = 2.76 TeV. The first balance function yield results are also presented.

**NUCLEAR PHYSICS A [982], 315-318, 2019. DOI: 10.1016/j.nuclphysa.2018.09.022**

**[P031-2019] “Beyond nPDFs effects : Prompt J/psi and psi(2S) production in pPb and pp collisions”**

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

A multi-dimensional analysis of prompt charmonia in pp and pPb collisions at root s(NN) = 5.02 TeV with the CMS detector is presented. The pPb differential cross-sections of prompt J/psi are shown in a wide kinematic region, for transverse momentum p(T) spanning from 2 to 30 GeV/c and a rapidity interval between -2.4 to 1.93 in the center of mass of the collision. The final results on prompt psi/(2S) meson production cross section in pp and pPb collisions at 5.02 TeV are also reported as a function of p(T) and rapidity, for p(T) from 4 to 30 GeV/c. The nuclear modification factor is found to be smaller than that of prompt J/psi in all measured bins, especially at low p(T) and at backward rapidity. Such a different behaviour between the ground and excited states cannot be reproduced considering nPDF effects alone.

**NUCLEAR PHYSICS A [982], 743-746, 2019. DOI: 10.1016/j.nuclphysa.2018.10.028**

**[P032-2019] “Catalytic oxidation at pilot-scale: Efficient degradation of volatile organic compounds in gas phase”**

Ribeiro, B. M. B.; Pinto, J. F.; Suppino, R. S.; Marcola, L.; Landers, R.\*; Tomaz, E.

Volatile organic compounds (VOCs) are responsible for environmental problems and may affect human health. Several treatment technologies minimize VOCs emissions; among those, catalytic oxidation appears as a promising alternative. In this study, a pilot-scale catalytic reactor was developed and the influence of process parameters on toluene degradation were investigated. Inlet gases were heated by electrical resistances and the catalyst employed was a honeycomb shape commercial automotive catalyst (Umicore, model AFT). Toluene degradation higher than 99% was achieved for several conditions and temperature showed to be the most important process variable for it. For all concentrations, it was observed that when increasing temperature led to a decrease on the space time. At 800 ppmv, varying from 543 K to 633 K, the space time decreased from 0.121 s to 0.08 s, respectively. At 1600 ppmv for the same temperature range, space time was reduced from 0.098 s to 0.040 s, respectively. At 2400 ppmv, varying from 543 K to 633 K, space time decreased from 0.081 s to 0.048 s. The catalytic reactor developed proved to be efficient for VOCs treatment, showing a high potential of application at industrial emission sources.

**JOURNAL OF HAZARDOUS MATERIALS [365], 581-589, 2019. DOI: 10.1016/j.jhazmat.2018.11.030**

**[P033-2019] “Centrality and pseudorapidity dependence of the charged-particle multiplicity density in Xe-Xe collisions at root s(NN)=5.44 TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

In this Letter, the ALICE Collaboration presents the first measurements of the charged-particle multiplicity density,  $dN(\text{ch})/d\eta$ , and total charged-particle multiplicity,  $N\text{-ch}(\text{tot})$ , in Xe-Xe collisions at a centre-of-mass energy per nucleon-nucleon pair of  $\sqrt{s(\text{NN})} = 5.44$  TeV. The measurements are performed as a function of collision centrality over a wide pseudorapidity range of  $-3.5 < \eta < 5$ . The values of  $dN(\text{ch})/d\eta$  at mid-rapidity and  $N\text{-ch}(\text{tot})$  for central collisions, normalised to the number of nucleons participating in the collision ( $N\text{-part}$ ) as a function of  $\sqrt{s(\text{NN})}$  follow the trends established in previous heavy-ion measurements. The same quantities are also found to increase as a function of  $N\text{-part}$ , and up to the 5% most central collisions the trends are the same as the ones observed in Pb-Pb at a similar energy. For more central collisions, the Xe-Xe scaled multiplicities exceed those in Pb-Pb for a similar  $N\text{-part}$ . The results are compared to phenomenological models and theoretical calculations based on different mechanisms for particle production in nuclear collisions. All considered models describe the data reasonably well within 15%.

**PHYSICS LETTERS B [790], 35-48, 2019. DOI: 10.1016/j.physletb.2018.12.048**

**[P034-2019] “Charged jet cross section and fragmentation in proton-proton collisions at root S=7 TeV”**

Acharya, S.; Adamova, D.; Adler, A.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.; A Large Ion Collider Expt Collabor

We report the differential charged jet cross section and jet fragmentation distributions measured with the ALICE detector in proton-proton collisions at a center-of-mass energy  $\sqrt{S} = 7$  TeV. Jets with pseudorapidity  $|\eta| < 0.5$  are reconstructed from charged particles using the anti- $k(T)$  jet-finding algorithm with a resolution parameter  $R = 0.4$ . The jet cross section is measured in the transverse momentum interval  $5 \leq p(T)(\text{ch jet}) < 100$  GeV/c.

Jet fragmentation is studied measuring the scaled transverse momentum spectra of the charged constituents of jets in four intervals of jet transverse momentum between 5 and 30 GeV/c. The measurements are compared to calculations from the PYTHIA model as well as next-to-leading-order perturbative QCD calculations with POWHEG+PYTHIA8. The charged jet cross section is well described by POWHEG for the entire measured range of  $p(T)(\text{ch jet})$ . For  $p(T)(\text{ch jet}) > 40$  GeV/c, the PYTHIA calculations also agree with the measured charged jet cross section. PYTHIA6 simulations describe the fragmentation distributions to 15%. Larger discrepancies are observed for PYTHIA8.

**PHYSICAL REVIEW D [99], 1, 012016, 2019. DOI: 10.1103/PhysRevD.99.012016**

**[P035-2019] “Color stability of maxillofacial prosthetic silicone functionalized with oxide nanocoating”**

Bishal, A. K.; Wee, A. G.; Barao, V. A. R.; Yuan, J. C. C.; Landers, R.\*; Sukotjo, C.; Takoudis, C. G.

Statement of Problem. Maxillofacial prostheses made of silicone elastomers undergo undesirable color degradation over time. How this color change can be prevented is unclear. Purpose. The purpose of this in vitro study was to evaluate the ability of an oxide nanocoating to prevent color degradation of maxillofacial silicone elastomers after artificial accelerated aging. Material and Method. A silicone elastomer with functional intrinsic pigment was tested. Specimens ( $N=20$ ) were fabricated, and half of them were coated with a nanolayer of titanium dioxide ( $\text{TiO}_2$ ) using atomic layer deposition. Both coated and noncoated specimens (control) were exposed to artificial aging at 450  $\text{kJ/m}^2$  of total energy. Changes in the color of all the specimens with and without  $\text{TiO}_2$  nanocoating were measured before and after the atomic layer deposition coating and before and after aging. The obtained color data were analyzed by using independent  $t$  tests and the 1-sample  $t$  test ( $\alpha=.05$ ). Results. Color change ( $\Delta E_1=3.4 \pm 1.4$ ) was observed for the silicone elastomers after the specimens were surface coated with  $\text{TiO}_2$  nanofilm, although this change was not statistically significant ( $P=.369$ ) compared with the acceptability threshold ( $\Delta E=3.0$ ). Upon exposure to artificial aging, the noncoated control specimens underwent color change ( $\Delta E_2=2.5 \pm 0.7$ ,  $P=.083$ ) compared with the acceptability threshold. The specimens with  $\text{TiO}_2$  nanocoated surface experienced the least color change ( $\Delta E_3=1.4 \pm 0.6$ ) when subjected to artificial aging, and this change was significantly lower ( $P<.001$ ) than the established acceptability threshold of  $\Delta E=3.0$ . In addition, the chemical analyses confirmed that the  $\text{TiO}_2$  nanocoating remained on the surface after exposure to artificial aging. Conclusions.  $\text{TiO}_2$  nanocoating was shown to be effective in reducing color degradation of the silicone elastomer exposed to artificial aging for 120 hours with 450  $\text{kJ/m}^2$  of total energy.

**JOURNAL OF PROSTHETIC DENTISTRY [121], 3, 538-543, 2019. DOI: 10.1016/j.prosdent.2018.06.007**

**[P036-2019] “Complex magnetic behavior along the GdIn(Ni<sub>x</sub>Cu<sub>1-x</sub>)(4) (0.00 ≤ x ≤ 1.00) series of compounds”**

Mercena, S. G.; Mendonca, E. C.; Meneses, C. T.; Silva, L. S.; Duque, J. G. S.\*; Jesus, C. B. R.\*; Souza, J. C.\*; Pagliuso, P. G.\*

In this work, structural, magnetic, and local properties of  $\text{GdIn}(\text{Ni}_x\text{Cu}_{1-x})_4$  ( $0.00 \leq x \leq 1.00$ ) samples synthesized via the flux method are investigated by means of X-ray, magnetization, specific heat, and electron spin resonance measurements. The analysis of X-ray powder diffraction data taken at room temperature reveals that all samples belong to the cubic space group ( $\text{Cl}_{5b}$ -type structure) with lattice parameters,  $a$ , ranging from  $7.08 < a < 7.23$  angstrom.

Interestingly, the analysis of both T-dependence magnetic susceptibility and  $MvsH$  loops indicates a gradual transition from antiferromagnetic to ferromagnetic ground states as a function of the Ni-doping. The transition temperatures are confirmed via specific heat measurements. Finally, electron spin resonance data taken in the temperature range of  $100 \leq T \leq 300$  K show a single Dysonian line shape, which is characteristic of a metallic environment. A nearly T-independent  $g$ -value was observed and the value was concentration independent. Besides, the doped samples show an increase of the residual linewidth, which can be linked with the chemical disorder introduced by the Ni-doping. Our results are discussed considering the bottleneck and multiple band effects on the  $Gd^{3+}$  spin dynamics in this series and their implication in the magnetic frustration observed in these materials.

**JOURNAL OF APPLIED PHYSICS [125], 6, 063903, 2019. DOI: 10.1063/1.5052226**

**[P037-2019] “Constraining production models with light (anti-)nuclei measurements in small systems with ALICE at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

The production of deuterons and anti-deuterons in pp collisions at  $\sqrt{s} = 7$  and 13 TeV has been studied as a function of charged-particle multiplicity using the ALICE detector at the LHC. The preliminary results are shown here, together with those obtained in heavy-ion collisions. They are presented by focusing the discussion on the comparison with expectations from hadron-coalescence models.

**NUCLEAR PHYSICS A [982], 895-898, 2019. DOI: 10.1016/j.nuclphysa.2018.11.029**

**[P038-2019] “Control of Multiferroic properties in BiFeO3 nanoparticles”**

Carranza-Celis, D.; Cardona-Rodriguez, A.; Narvaez, J.; Moscoso-Londonoz, O.\*; Muraca, D.\*; Knobel, M.\*; Ornelas-Soto, N.; Reiber, A.; Gabriel Ramirez, J.

BiFeO<sub>3</sub> (BFO) nanoparticles (NPs) were synthesized using the sol-gel method at different calcination temperatures from 400 degrees C to 600 degrees C. XRD studies have confirmed that all BFO NPs show distorted rhombohedral crystals that match the R3c space group. We found evidence of local structural strain that develops with increasing particle size as suggested by TEM and Raman spectroscopy measurements. Magnetic measurements suggest that NPs have two distinct regimes: a ferromagnetic-like one at low temperatures and a superparamagnetic-like one at room temperature. The crossover temperature increases with NPs size, suggesting a size-dependent blocking magnetic regime. Similarly, local piezoelectric measurements at room temperature in single NP have confirmed a ferroelectric order with a NP size-dependent  $d(33)$  coefficient. An analysis of both the ferroelectric and the magnetic results suggest that ferromagnetism and ferroelectricity coexist at room temperature in NPs. Our results lead to the possibility of tailoring the ferroic order in multifunctional materials by means of NP size.

**SCIENTIFIC REPORTS [9], 3182, 2019. DOI: 10.1038/s41598-019-39517-3**

**[P039-2019] “D-0-Meson R-AA in PbPb Collisions at  $\sqrt{s(NN)}$ =5.02 TeV and Elliptic Flow in pPb Collisions at  $\sqrt{s(NN)}$ =8.16 TeV with CMS”**

Sirunyan, A. M.; Tumasyan, A.; Adam, W.; Chinellato, J. A.\*; Tonelli Manganote, E. J.\*; et al.

CMS Collaboration

The study of charm production in heavy-ion collisions is considered an excellent probe for the properties of the hot and dense medium created in heavy-ion collisions. Measurements of D-0-meson nuclear modification factor can provide strong constraints into the mechanisms of in-medium energy loss and charm flow in the medium. The measurement of D-0-meson elliptic flow in pPb collisions helps us understand the strength of charm quarks coupling to significantly reduced systems which demonstrate hydrodynamic properties. In this paper, the measurements of the D-0-meson nuclear modification factor in PbPb collisions at 5.02 TeV together with the new measurement of D-0-meson elliptic flow in high multiplicity pPb collisions at 5.02 TeV using the two-particle correlation method will be presented.

**NUCLEAR PHYSICS A [982], 647-650, 2019. DOI: 10.1016/j.nuclphysa.2018.08.029**

**[P040-2019] “Designing new quinoline-based organic photosensitizers for dye-sensitized solar cells (DSSC): a theoretical investigation”**

Santos, G. C.; Oliveira, E. F.\*; Lavarda, F. C.; da Silva Filho, L. C.

In this work, 27 new quinoline-derivative dyes were proposed, and their geometries, electronic structures, and absorption spectra were investigated using density functional theory (DFT) calculations. An important feature found in most of the new compounds was that the lowest unoccupied molecular orbital (LUMO) was above the TiO<sub>2</sub> conduction band, facilitating electron transfer from the excited dye to the semiconductor. The energy of the highest occupied molecular orbital (HOMO) was below the reduction potential energy of the electrolyte (I-/I<sup>-3</sup>(-)), improving the charge regeneration process after photooxidation. Here we present compounds with a small band gap, favorable absorption properties, a D-A-type structure that exhibits maximum absorption above 540nm, and a high light harvesting efficiency (LHE>0.78). The results show that the compounds D1C, D2C, D3C, and R3C could be used as dye sensitizers for dye-sensitized solar cells (DSSCs).

**JOURNAL OF MOLECULAR MODELING [25], 3, 75, 2019. DOI: 10.1007/s00894-019-3958-y**

**[P041-2019] “Dielectron measurements in pp and Pb-Pb collisions with ALICE at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

The production of low-mass dielectrons is one of the most promising tools for the investigation of chiral symmetry restoration and thermal radiation from the QGP created in heavy-ion collisions. To single out the signal characteristics of the QGP, it is crucial to understand the primordial  $e^{+}e^{-}$  pair production in vacuum, i.e. in inelastic proton-proton (pp) collisions. Low-mass dielectrons have been measured with ALICE at the LHC in pp collisions at  $\sqrt{s} = 7$  and 13 TeV, and in Pb-Pb collisions at  $\sqrt{s(NN)} = 2.76$  TeV. An overview of the results on dielectron production is presented, together with their implications for the direct-photon and heavy-quark production.

**NUCLEAR PHYSICS A [982], 779-782, 2019. DOI: 10.1016/j.nuclphysa.2018.10.021**

**[P042-2019] “Direct photon elliptic flow in Pb-Pb collisions at root s(NN)=2.76 TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; **Albuquerque, D. S. D.\***; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.; ALICE Collaboration

The elliptic flow of inclusive and direct photons was measured at mid-rapidity in two centrality classes 0-20% and 20-40% in Pb-Pb collisions at root s(NN) = 2.76 TeV by ALICE. Photons were detected with the highly segmented electromagnetic calorimeter PHOS and via conversions in the detector material with the e(broken vertical bar)e pairs reconstructed in the central tracking system. The results of the two methods were combined and the direct-photon elliptic flow was extracted in the transverse momentum range  $0.9 < p(T) < 6.2$  GeV/c. A comparison to RHIC data shows a similar magnitude of the measured direct-photon elliptic flow. Hydrodynamic and transport model calculations are systematically lower than the data, but are found to be compatible.

**PHYSICS LETTERS B [789], 308-322, 2019. DOI: 10.1016/j.physletb.2018.11.039**

**[P043-2019] “Direct photon elliptic flow in Pb-Pb collisions at root S-NN=2.76 TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; **Albuquerque, D. S. D.\***; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.; ALICE Collaboration

The elliptic flow of inclusive and direct photons was measured by ALICE for central and semi-central Pb-Pb collisions at root S-NN = 2.76 TeV. The photons were reconstructed using the electromagnetic calorimeter PHOS and the central tracking system. The inclusive photon flow reconstructed with both methods are combined and used to extract the direct photon flow, using a decay photon simulation and the direct photon excess R-gamma, in the transverse momentum range  $0.9 < p(T) < 6.2$  GeV/c. We find that the theoretical predictions generally under-predict the results.

**NUCLEAR PHYSICS A [982], 195-197, 2019. DOI: 10.1016/j.nuclphysa.2018.10.065**

**[P044-2019] “Direct photon production at low transverse momentum in proton-proton collisions at root s=2.76 and 8 TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; **Albuquerque, D. S. D.\***; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Measurements of inclusive and direct photon production at midrapidity in pp collisions at root s = 2.76 and 8 TeV are presented by the ALICE experiment at the LHC. The results are reported in transverse momentum ranges of  $0.4 < p(T) < 10$  GeV/c and  $0.3 < p(T) < 16$  GeV/c, respectively. Photons are detected with the electromagnetic calorimeter (EMCal) and via reconstruction of e(+) e(-) pairs from conversions in the ALICE detector material using the central tracking system. For the final measurement of the inclusive photon spectra the results are combined in the overlapping p(T), interval of both methods. Direct photon spectra, or their upper limits at 90% C.L. are extracted using the direct photon excess ratio R-gamma, which quantifies the ratio of inclusive photons over decay photons generated with a decay-photon simulation. An additional hybrid method, combining photons reconstructed from conversions with those identified in the EMCAL, is used for the combination of the direct photon excess ratio R-gamma, as well as the extraction of direct photon spectra or their upper limits.

While no significant signal of direct photons is seen over the full p(T), range, R-gamma, for p(T), > 7 GeV/c is at least one sigma above unity and consistent with expectations from next-to-leading order pQCD calculations.

**PHYSICAL REVIEW C [99], 2, 024912, 2019. DOI: 10.1103/PhysRevC.99.024912**

**[P045-2019] “Elastic constants of ice I-h as described by semi-empirical water models”**

Moreira, P. A. F. P.; Veiga, R. G. A.; de Koning, M.\*

Using molecular dynamics simulations, we compute the elastic constants of ice I-h for a set of 8 frequently used semi-empirical potentials for water, namely, the rigid-molecule SPC/E, TIP4P, TIP4P2005, TIP4P/Ice, and TIP5P models, the flexible-molecule qTIP4P/Fw and SPC/Fw models, and the coarse-grained atomic mW potential. In quantitative terms, the mW description gives values for the individual stiffness constants that are closest to the experiment, whereas the explicit-proton models display substantial discrepancies. On the other hand, in contrast to all explicit-proton potentials, the mW model is unable to reproduce central qualitative trends such as the anisotropy in Young's modulus and the shear modulus. This suggests that the elastic behavior of ice I-h is closely related to its molecular nature, which has been coarse-grained out in the mW model. These observations are consistent with other recent manifestations concerning the limitations of the mW model in the description of mechanical properties of ice I-h.

**JOURNAL OF CHEMICAL PHYSICS [150], 4, 044503, 2019. DOI: 10.1063/1.5082743**

**[P046-2019] “Electrochromic Switch Devices Mixing Small- and Large-Sized Upconverting Nanocrystals”**

Martinez, E. D.\*; Brites, C. D. S.; Carlos, L. D.; Garcia-Flores, A. F.\*; Urbano, R. R.\*; Rettori, C.\*

The hasty progress in smart, portable, flexible, and transparent integrated electronics and optoelectronics is currently one of the driving forces in nanoscience and nanotechnology. A promising approach is the combination of transparent conducting electrode materials (e.g., silver nanowires, AgNWs) and upconverting nanoparticles (UCNPs). Here, electrochromic devices based on transparent nanocomposite films of poly(methyl methacrylate) and AgNWs covered by UCNPs of different sizes and compositions are developed. By combining the electrical control of the heat dissipation in AgNW networks with size-dependent thermal properties of UCNPs, tunable electrochromic transparent devices covering a broad range of the chromatic diagrams are fabricated. As illustrative examples, devices mixing large-sized (>70 nm) beta-NaYF4:Yb,Ln and small-sized (<15 nm) NaGdF4:Yb,Ln@NaYF4 core@shell UCNPs (Ln = Tm, Er, Ce/Ho) are presented, permitting to monitor the temperature-dependent emission of the particles by the intensity ratio of the Er3+ 2H11/2 and S-4(3/2) -> I-4(15/2) emission lines, while externally controlling the current flow in the AgNW network. Moreover, by defining a new thermometric parameter involving the intensity ratio of transitions of large- and small-sized UCNPs, a relative thermal sensitivity of 5.88% K-1 (at 339 K) is obtained, a sixfold improvement over the values reported so far.

**ADVANCED FUNCTIONAL MATERIALS [29], 8, 1807758, 2019. DOI: 10.1002/adfm.201807758 (Artigo destaque de capa)**

**[P047-2019] “Electroweak boson measurements in p-Pb and Pb-Pb collisions at root S-NN=5.02 TeV with ALICE at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

The ALICE collaboration has measured the electroweak boson production at forward rapidity in Pb-Pb and p-Pb collisions at root  $s_{NN} = 5.02$  TeV. Final results on the  $Z(0)$  boson production in Pb-Pb collisions are presented as a function of centrality and rapidity. Calculations based on free parton distribution functions overestimate the measurement up to 3 sigma. In addition, final results on  $W^{+/-}$  and  $Z(0)$  bosons production in p-Pb collisions at the same energy will be presented and discussed.

**NUCLEAR PHYSICS A [982], 783-786, 2019. DOI: 10.1016/j.nuclphysa.2018.10.022**

**[P048-2019] “Elliptic flow of identified hadrons in small collisional systems measured with ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Recent observations of long-range multi-particle azimuthal correlations in p-Pb and high multiplicity pp collisions provided new insights into collision dynamics and opened a possibility to study collective effects in these small systems. New measurements of  $p(T)$ -differential elliptic flow ( $v(2)$ ) coefficient for inclusive charged hadrons as well as a variety of identified particle species in p-Pb collisions at root  $s_{NN} = 5.02$  TeV are presented. The data was collected by ALICE during the LHC Run 2 data taking. Besides high precision measurements of  $v(2)(P-T)$  for  $\pi^{+/-}$ ,  $K^{+/-}$  and  $p(\bar{p})$ , the first results for  $K^*(0)$ ,  $\Lambda(\bar{\Lambda})$  and  $\phi$  are shown. In order to eliminate non-flow contamination, a pseudo-rapidity separation between correlated particles is applied as well as subtraction of remaining non-flow estimate based on a measurement of minimum-bias pp collisions at root  $s = 13$  TeV. Moreover, the reported characteristic mass ordering and approximate number of constituent quarks (NCQ) and transverse kinetic energy (KET) scaling of  $v(2)$  allow to test various theoretical models, constrain the initial conditions, and probe the origin of collective behavior in small collision systems.

**NUCLEAR PHYSICS A [982], 451-454, 2019. DOI: 10.1016/j.nuclphysa.2018.09.020**

**[P049-2019] “Energy and system dependence of nuclear modification factors of inclusive charged particles and identified light hadrons measured in p-Pb, Xe-Xe and Pb-Pb collisions with ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

We report recent ALICE results on primary charged particle and neutral meson production in pp, p-Pb, Pb-Pb and Xe-Xe collisions at LHC energies. In this article, measurements of the nuclear modification factors RAA of primary charged particles and of light neutral mesons in Pb-Pb, in Xe-Xe and in p-Pb collisions in a wide  $p(T)$  range and different centrality classes are discussed. We compare the nuclear modification factors obtained for different collision systems as a function of transverse momentum, collision centrality as well as charged particle multiplicity ( $dN(ch)/d\eta$ ). We also present comparison of experimental results to model calculations.

**NUCLEAR PHYSICS A [982], 567-570, 2019. DOI: 10.1016/j.nuclphysa.2018.10.052**

**[P050-2019] “Energy dependence of  $\phi(1020)$  production at mid-rapidity in pp collisions with ALICE at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Hadronic resonances are unique tools to investigate the interplay of re-scattering and regeneration effects during the hadronization phase in heavy-ion collisions. Measurements in small collision systems provide a necessary baseline for heavy-ion data, help to tune pQCD inspired event generators and give insight into the search for the onset of collective effects. As the  $\phi$  meson has a longer lifetime compared to other resonances, it is expected that its production would be much less affected by regeneration and re-scattering processes. We report on measurements of  $\phi$  meson production in minimum bias pp collisions at different beam energies and as a function of charged particle multiplicity with the ALICE detector at the LHC. The results include the transverse momentum ( $p(T)$ ) distributions of  $\phi$  as well as the particle yield ratios. Finally, we have also studied the effective strangeness content by comparing our results to theoretical calculations.

**NUCLEAR PHYSICS A [982], 180-182, 2019. DOI: 10.1016/j.nuclphysa.2018.09.078**

**[P051-2019] “Event-Shape Engineering for the D-meson elliptic flow in mid-central Pb-Pb collisions at  $s_{NN}=5.02$  TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

The production yield of prompt D mesons and their elliptic flow coefficient  $v(2)$  were measured with the Event-Shape Engineering (ESE) technique applied to mid-central (10-30% and 30-50% centrality classes) Pb-Pb collisions at the centre-of-mass energy per nucleon pair  $s_{NN}=5.02$  TeV, with the ALICE detector at the LHC. The ESE technique allows the classification of events, belonging to the same centrality, according to the azimuthal anisotropy of soft particle production in the collision. The reported measurements give the opportunity to investigate the dynamics of charm quarks in the Quark-Gluon Plasma and provide information on their participation in the collective expansion of the medium. D mesons were reconstructed via their hadronic decays at mid-rapidity,  $|\eta| < 0.8$ , in the transverse momentum interval  $1 < p(T) < 24$  GeV/c. The  $v(2)$  coefficient is found to be sensitive to the event-shape selection confirming a correlation between the D-meson azimuthal anisotropy and the collective expansion of the bulk matter, while the per-event D-meson yields do not show any significant modification within the current uncertainties.

**JOURNAL OF HIGH ENERGY PHYSICS [2], 150, 2019. DOI: 10.1007/JHEP02(2019)150**

**[P052-2019] “Event-shape- and multiplicity-dependent identified particle production in pp collisions at 13 TeV with ALICE at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Multiplicity-dependent measurements of identified particle production led to the discovery of collective-like behavior in pp collisions at the LHC. Better understanding of the effects attributed to well-understood physics, like multiple hard scatterings,

is required to establish whether this behaviour is truly collective in origin. Experimentally, those effects can be controlled using event shapes, like transverse sphericity, which allows the classification of pp collisions either as jetty or isotropic events. The transverse momentum ( $p(T)$ ) spectra of light-flavor hadrons in pp collisions measured over a broad range provide important input to study particle production mechanisms in the soft and hard scattering regimes of the QCD. In this work, they are used to perform a comprehensive study as a function of the event multiplicity, collision energy, and event shapes. The proton-to-pion and kaon-to-pion particle ratios as a function of  $p(T)$  are also reported and the results compared to QCD-inspired models.

**NUCLEAR PHYSICS A [982], 507-510, 2019. DOI: 10.1016/j.nuclphysa.2018.08.021**

**[P053-2019] “Evidence for color dichotomy in the primordial Neptunian Trojan population”**

Lin, H. W.; Gerdes, D. W.; Hamilton, S. J.; Sobreira, F.\*; et al.

In the current model of early Solar System evolution, the stable members of the Jovian and Neptunian Trojan populations were captured into resonance from the leftover reservoir of planetesimals during the outward migration of the giant planets. As a result, both Jovian and Neptunian Trojans share a common origin with the primordial disk population, whose other surviving members constitute today's trans-Neptunian object (TNO) populations. The cold (low inclination and small eccentricity) classical TNOs are ultra-red, while the dynamically excited “hot” (high inclination and larger eccentricity) population of TNOs contains a mixture of ultra-red and blue objects. In contrast, Jovian and Neptunian Trojans are observed to be blue. While the absence of ultra-red Jovian Trojans can be readily explained by the sublimation of volatile material from their surfaces due to the high flux of solar radiation at 5 AU, the lack of ultra-red Neptunian Trojans presents both a puzzle and a challenge to formation models. In this work we report the discovery by the Dark Energy Survey (DES) of two new dynamically stable L4 Neptunian Trojans, 2013 VX30 and 2014 UU240, both with inclinations  $i > 30$  degrees, making them the highest-inclination known stable Neptunian Trojans. We have measured the colors of these and three other dynamically stable Neptunian Trojans previously observed by DES, and find that 2013 VX30 is ultra-red, the first such Neptunian Trojan in its class. As such, 2013 VX30 may be a “missing link” between the Trojan and TNO populations. Using a simulation of the DES TNO detection efficiency, we find that there are  $162 \pm 73$  Trojans with  $H-r < 10$  at the L4 Lagrange point of Neptune. Moreover, the blue-to-red Neptunian Trojan population ratio should be higher than 17:1. Based on this result, we discuss the possible origin of the ultra-red Neptunian Trojan population and its implications for the formation history of Neptunian Trojans.

**ICARUS [321], 426-435, 2019. DOI: 10.1016/j.icarus.2018.12.006**

**[P054-2019] “Evidence for light-by-light scattering in ultraperipheral PbPb collisions at root S-NN=5.02 TeV”**

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

Evidence for light-by-light (LbL) scattering,  $\gamma \gamma \rightarrow \gamma \gamma$ , in ultraperipheral PbPb collisions at a nucleon-nucleon center-of-mass energy of 5.02 TeV is reported. LbL scattering processes are selected in events with just two photons produced, with transverse energy  $E_T(\gamma) > 2$  GeV, pseudorapidity  $|\eta(\gamma)| < 2.4$ ; and diphoton invariant mass  $m(\gamma \gamma) > 5$  GeV, transverse momentum  $p_T(\gamma \gamma) < 1$  GeV, and acoplanarity  $(1 - \Delta\phi(\gamma \gamma))/\pi < 0.01$ .

After all selection criteria, 14 events are observed, compared to  $11.1 \pm 1.1$  (theo) and  $3.8 \pm 1.3$  (stat) events expected for signal and background processes respectively. The significance of the signal excess over the background-only hypothesis is 4.10 sigma. The measured fiducial LbL scattering cross section,  $\sigma(\text{fid})(\gamma \gamma \rightarrow \gamma \gamma) = 122 \pm 46$  (stat)  $\pm 29$  (syst)  $\pm 4$  (theo) nb is consistent with the standard model prediction.

**NUCLEAR PHYSICS A [982], 791-794, 2019. DOI: 10.1016/j.nuclphysa.2018.10.018**

**[P055-2019] “Exploring jet profiles in Pb-Pb collisions at 5.02 TeV with the ALICE detector”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

In this contribution, we present measurements of inclusive jet production with the ALICE detector in Pb-Pb collisions at  $\sqrt{s_{NN}} = 5.02$  TeV. Production cross sections of charged particle jets and fully reconstructed jets are measured with jet resolution parameters  $R = 0.2$  and  $0.3$ . To quantify the medium induced parton energy loss, jet nuclear modification factors ( $R_{AA}$ ) are measured by utilizing POWHEG+Pythia8 predictions as reference cross section in pp collisions. We also calculate the ratio of jet production cross sections for jets reconstructed with different cone radii to explore the jet radial profile in Pb-Pb collisions. The ratios of jet cross sections are compared to a pp reference predicted by POWHEG+Pythia8 and in-medium energy loss model prediction by the JEWEL Monte Carlo event generator.

**NUCLEAR PHYSICS A [982], 639-642, 2019. DOI: 10.1016/j.nuclphysa.2018.10.063**

**[P056-2019] “Exploring the Phase Space of Jet Splittings at ALICE using Grooming and Recursive Techniques”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

Hard splittings in the evolution of a hard scattered parton may be modified by the presence of a dense strongly interacting medium. Grooming procedures can be used to isolate such hard components of a jet and allows one to focus on the two subjects resulting from a sufficiently hard partonic splitting. Measurements of the symmetry parameter ( $z(g)$ ), angular separation ( $R_g$ ) and number of splittings ( $n(\text{SD})$ ) of Soft Drop groomed jets are reported as measured with the ALICE Detector in pp and Pb-Pb collisions at  $\sqrt{s} = 7$  TeV and  $\sqrt{s_{NN}} = 2.76$  TeV, respectively. The use of recursive splittings and their mappings to identify interesting regions of phase space in the  $z(g) - R_g$  plane are also discussed.

**NUCLEAR PHYSICS A [982], 587-590, 2019. DOI: 10.1016/j.nuclphysa.2018.09.007**

**[P057-2019] “ $f(0)(980)$  resonance production in pp collisions with the ALICE detector at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

We report on a preliminary study of the production of  $f(0)(980) \rightarrow \pi^+\pi^-$  at mid-rapidity ( $|\eta| < 0.5$ ) performed with the ALICE detector at the LHC in minimum bias pp collisions at the centre-of-mass energy  $\sqrt{s} = 5.02$  TeV. The  $f(0)(980)$  signal extraction is challenging due to the large background from correlated  $\pi^+\pi^-$  pairs from other resonance decays in the invariant mass window under study, as well as due to the combinatorics from uncorrelated pairs. We present the strategy for the signal extraction and first results in terms of  $p(T)$ -dependent production yields. The results are discussed and compared with production yields of other resonances and stable hadrons.

**NUCLEAR PHYSICS A [982], 201-203, 2019. DOI: 10.1016/j.nuclphysa.2018.09.023**

**[P058-2019] “First Cosmology Results using Type Ia Supernovae from the Dark Energy Survey: Constraints on Cosmological Parameters”**

Abbott, T. M. C.; Allam, S.; Andersen, P.; Sobreira, F.\*; et al. DES Collaboration

We present the first cosmological parameter constraints using measurements of type Ia supernovae (SNe Ia) from the Dark Energy Survey Supernova Program (DES-SN). The analysis uses a subsample of 207 spectroscopically confirmed SNe Ia from the first three years of DES-SN, combined with a low-redshift sample of 122 SNe from the literature. Our “DES-SN3YR” result from these 329 SNe Ia is based on a series of companion analyses and improvements covering SN Ia discovery, spectroscopic selection, photometry, calibration, distance bias corrections, and evaluation of systematic uncertainties. For a flat  $\Lambda$ CDM model we find a matter density  $\Omega_m = 0.331 \pm 0.038$ . For a flat  $w$ CDM model, and combining our SN Ia constraints with those from the cosmic microwave background (CMB), we find a dark energy equation of state  $w = -0.978 \pm 0.059$ , and  $\Omega_m = 0.321 \pm 0.018$ . For a flat  $w(0)w(a)$ CDM model, and combining probes from SN Ia, CMB and baryon acoustic oscillations, we find  $w(0) = -0.885 \pm 0.114$  and  $w(a) = -0.387 \pm 0.430$ . These results are in agreement with a cosmological constant and with previous constraints using SNe Ia (Pantheon, JLA).

**ASTROPHYSICAL JOURNAL LETTERS [872], 2, L30, 2019. DOI: 10.3847/2041-8213/ab04fa**

**[P059-2019] “Fragmentation of  $J/\psi$  in jets in pp collisions at  $\sqrt{s}=5.02$  TeV Batoul Diab for the CMS collaboration”**

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

The fragmentation of jets containing a  $J/\psi$  meson is studied in  $\sqrt{s} = 5.02$  TeV pp data using an integrated luminosity of  $L = 27.39$  pb<sup>-1</sup>. The fraction of the jet transverse momentum  $p(T_{jet})$  carried by the  $J/\psi$  is measured for prompt  $J/\psi$  and  $J/\psi$  coming from b hadron decays, named nonprompt. Whereas the fragmentation function of nonprompt  $J/\psi$  is well-modeled by simulations using a Monte Carlo generator, the prompt  $J/\psi$  are found to be accompanied by a larger level of jet activity. The fraction of  $J/\psi$  mesons that are produced inside a jet is also reported, and found to be larger in data than in simulation, for both prompt and nonprompt  $J/\psi$ .

**NUCLEAR PHYSICS A [982], 186-188, 2019. DOI: 10.1016/j.nuclphysa.2018.09.049**

**[P060-2019] “gamma suppression at forward rapidity in Pb-Pb collisions at  $\sqrt{s(NN)}=5.02$  TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Inclusive  $\gamma(1S)$  and  $\gamma(2S)$  production have been measured in Pb-Pb collisions at the centre-of-mass energy per nucleon-nucleon pair  $\sqrt{s(NN)} = 5.02$  TeV, using the ALICE detector at the CERN LHC. The gamma mesons are reconstructed in the centre-of-mass rapidity interval  $2.5 < y < 4$  and in the transverse momentum range  $p(T) < 15$  GeV/c, via their decays to muon pairs. In this Letter, we present results on the inclusive  $\gamma(1S)$  nuclear modification factor  $R_{AA}$  as a function of collision centrality, transverse momentum and rapidity. The  $\gamma(1S)$  and  $\gamma(2S)$   $R_{AA}$ , integrated over the centrality range 0-90%, are  $0.37 \pm 0.02(\text{stat}) \pm 0.03(\text{syst})$  and  $0.10 \pm 0.04(\text{stat}) \pm 0.02(\text{syst})$ , respectively, leading to a ratio  $R_{AA}(\gamma(2S))/R_{AA}(\gamma(1S))$  of  $0.28 \pm 0.12(\text{stat}) \pm 0.06(\text{syst})$ . The observed  $\gamma(1S)$  suppression increases with the centrality of the collision and no significant variation is observed as a function of transverse momentum and rapidity.

**PHYSICS LETTERS B [790], 89-101, 2019. DOI: 10.1016/physletb.2018.11.067**

**[P061-2019] “Hadronic resonances, strange and multi-strange particle production in Xe-Xe and Pb-Pb collisions with ALICE at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

We present measurements of hadronic resonance, strange and multi-strange particle production in collisions of Xe-Xe and Pb-Pb at the center-of-mass energies of  $\sqrt{s(NN)} = 5.44$  and 5.02 TeV, respectively, by the ALICE collaboration at the LHC. Particle ratios are presented as a function of multiplicity for  $K^*(892)^0$ ,  $\Lambda(1520)$ ,  $\Xi(1320)^0$ ,  $\Xi(1320)^-$ ,  $\Omega(1370)^-$ ,  $\rho(770)^0$ ,  $K^*(892)^0$ ,  $\phi(1020)$  and  $\Lambda(1520)$ . Our results are discussed and compared with predictions of QCD-inspired event generators. Additionally, comparisons with lower energy measurements and smaller systems are also presented.

**NUCLEAR PHYSICS A [982], 823-826, 2019. DOI: 10.1016/j.nuclphysa.2018.08.033**

**[P062-2019] “Heavy-flavour hadron decay leptons in Pb-Pb and Xe-Xe collisions at the LHC with ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Heavy quarks, i.e. charm and beauty, are sensitive probes of the medium produced in high-energy heavy-ion collisions. They are produced in the early stage of the collision, mainly in hard partonic scattering processes, and are expected to experience the whole collision evolution interacting with the medium constituents via both elastic and inelastic processes. The nuclear modification factor ( $R_{AA}$ ) is one of the main experimental observables that allow us to investigate the interaction strength of heavy quarks with the medium. The ALICE collaboration measured the production of open heavy-flavour hadrons via their semi-leptonic decays to electrons at mid-rapidity and to muons at forward rapidity in elementary proton-proton (pp) collisions as well as p-Pb, Ph-Ph and in Xe-Xe collisions.

**NUCLEAR PHYSICS A [982], 651-654, 2019. DOI: 10.1016/j.nuclphysa.2018.09.038**

**[P063-2019] “Higher moment fluctuations of identified particle distributions from ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.

ALICE Collaboration

Cumulants of conserved charges fluctuations are regarded as a potential tool to study the criticality in the QCD phase diagram and to determine the freeze-out parameters in a model-independent way. At LHC energies, the measurements of the ratio of the net-baryon (net-proton) cumulants can be used to test the lattice QCD predictions. In this work, we present the first measurements of cumulants of the net-proton number distributions up to 4th order in Pb-Pb collisions at  $\sqrt{s}(\text{NN}) = 2.76$  and  $5.02$  TeV as a function of collision centrality. We compare our cumulant ratios results with the STAR experiment net-proton results measured in the first phase of the Beam Energy Scan program at RHIC. The results can be used to obtain the chemical freeze-out parameters at LHC.

NUCLEAR PHYSICS A [982], 851-854, 2019. DOI: 10.1016/j.nuclphysa.2018.11.030

**[P064-2019] “Hydrophilic Quantum Dots Functionalized with Gd(III)-DO3A Monoamide Chelates as Bright and Effective T-1-weighted Bimodal Nanoprobes”**

Pereira, M. I. A.; Pereira, G.; Monteiro, C. A. P.; Geraldés, C. F. G. C.; Cabral Filho, P. E.; Cesar, C. L.\*; Thomaz, A. A.\*; Santos, B. S.; Pereira, G. A. L.; Fontes, A.

Magnetic resonance imaging (MRI) is a powerful non-invasive diagnostic tool that enables distinguishing healthy from pathological tissues, with high anatomical detail. Nevertheless, MRI is quite limited in the investigation of molecular/cellular biochemical events, which can be reached by fluorescence-based techniques. Thus, we developed bimodal nanosystems consisting in hydrophilic quantum dots (QDs) directly conjugated to Gd(III)-DO3A monoamide chelates, a Gd(III)-DOTA derivative, allowing for the combination of the advantages of both MRI and fluorescence-based tools. These nanoparticulate systems can also improve MRI contrast, by increasing the local concentration of paramagnetic chelates. Transmetallation assays, optical characterization, and relaxometric analyses, showed that the developed bimodal nanoprobes have great chemical stability, bright fluorescence, and high relaxivities. Moreover, fluorescence correlation spectroscopy (FCS) analysis allowed us to distinguish nanosystems containing different amounts of chelates/QD. Also, inductively coupled plasma optical emission spectrometry (ICP - OES) indicated a conjugation yield higher than 75%. Our nanosystems showed effective longitudinal relaxivities per QD and per paramagnetic ion, at least 5 times [per Gd(III)] and 100 times (per QD) higher than the  $r(1)$  for Gd(III)-DOTA chelates, suitable for T-1-weighted imaging. Additionally, the bimodal nanoparticles presented negligible cytotoxicity, and efficiently labeled HeLa cells as shown by fluorescence. Thus, the developed nanosystems show potential as strategic probes for fluorescence analyses and MRI, being useful for investigating a variety of biological processes.

SCIENTIFIC REPORTS [9], 2341, 2019. DOI: 10.1038/s41598-019-38772-8

**[P065-2019] “Idealized Carbon-Based Materials Exhibiting Record Deliverable Capacities for Vehicular Methane Storage”**

Collins, S. P.; Perim, E.\*; Daff, T. D.; Skaf, M. S.; Galvao, D. S.\*; Woo, T. K.

Materials for vehicular methane storage have been extensively studied, although no suitable material has been found. In this work, we use molecular simulation to investigate three types of carbon-based materials, Schwarzites, layered graphenes, and carbon nanoscrolls, for use in vehicular methane storage under adsorption conditions of 65 bar and 298 K and desorption conditions of 5.8 bar and 358 K. Ten different Schwarzites were tested and found to have high adsorption with maximums at 273 V-STP/V, but middling deliverable capacities of no more than 131 V-STP/V. Layered graphene and graphene nanoscrolls were found to have extremely high CH<sub>4</sub> adsorption capacities of 355 and 339 V-STP/V, respectively, when the interlayer distance was optimized to 11 angstrom. The deliverable capacities of perfectly layered graphene and graphene nanoscrolls were also found to be exceptional with values of 266 and 252 V-STP/V, respectively, with optimized interlayer distances. These values make idealized graphene and nanoscrolls the record holders for adsorption and deliverable capacities under vehicular methane storage conditions.

JOURNAL OF PHYSICAL CHEMISTRY C [123], 2, 1050-1058, 2019. DOI: 10.1021/acs.jpcc.8b09447

**[P066-2019] “In-place bonded semiconductor membranes as compliant substrates for III-V compound devices”**

Garcia, A. J.; Rodrigues, L. N.; Covre da Silva, S. F.; Morelhaio, S. L.; Couto, O. D. D., Odilon D. D.\*; Iikawa, F.\*; Deneke, C.\*

Overcoming the critical thickness limit in pseudomorphic growth of lattice mismatched heterostructures is a fundamental challenge in heteroepitaxy. On-demand transfer of light-emitting structures to arbitrary host substrates is an important technological method for optoelectronic and photonic device implementation. The use of freestanding membranes as compliant substrates is a promising approach to address both issues. In this work, the feasibility of using released GaAs/InGaAs/GaAs membranes as virtual substrates to thin films of InGaAs alloys is investigated as a function of the indium content in the films. Growth of flat epitaxial films is demonstrated with critical thickness beyond typical values observed for growth on bulk substrates. Optically active structures are also grown on these membranes with a strong photoluminescence signal and a clear red shift for an InAlGaAs/InGaAs/InAlGaAs quantum well. The red shift is ascribed to strain reduction in the quantum well due to the use of a completely relaxed membrane as the substrate. Our results demonstrate that such membranes constitute a virtual substrate that allows further heterostructure strain engineering, which is not possible when using other post-growth methods.

NANOSCALE [11], 8, 3748-3756, 2019. DOI: 10.1039/c8nr08727j

**[P067-2019] “Inclusive search for supersymmetry in pp collisions at  $\sqrt{s}=13$  TeV using razor variables and boosted object identification in zero and one lepton final states”**

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

An inclusive search for supersymmetry (SUSY) using the razor variables is performed using a data sample of proton-proton collisions corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>, collected with the CMS experiment in 2016 at a center-of-mass energy of  $\sqrt{s}=13$  TeV. The search looks for an excess of events with large transverse energy, large jet multiplicity, and large missing transverse momentum. The razor kinematic variables are sensitive to large mass differences between the parent particle and the invisible particles of a decay chain and help to identify the presence of SUSY particles.

The search covers final states with zero or one charged lepton and features event categories divided according to the presence of a high transverse momentum hadronically decaying W boson or top quark, the number of jets, the number of b-tagged jets, and the values of the razor kinematic variables, in order to separate signal from background for a broad range of SUSY signatures. The addition of the boosted W boson and top quark categories within the analysis further increases the sensitivity of the search, particularly to signal models with large mass splitting between the produced gluino or squark and the lightest SUSY particle. The analysis is interpreted using simplified models of R-parity conserving SUSY, focusing on gluino pair production and top squark pair production. Limits on the gluino mass extend to 2.0 TeV, while limits on top squark mass reach 1.14 TeV.

**JOURNAL OF HIGH ENERGY PHYSICS [3], 031, 2019. DOI: 10.1007/JHEP03(2019)031**

**[P068-2019] “Influence of the Anatase and Rutile phases on the luminescent properties of rare-earth-doped TiO<sub>2</sub> films”**

Zanatta, A. R.; Scoca, D.\*; Alvarez, F.\*

For a long time, the development of new and more efficient light-emitting materials has been the driving force to investigate the presence of trivalent rare-earth (RE<sup>3+</sup>) ions into solid hosts. It happens because RE<sup>3+</sup> ions provide efficient and well-defined optical transitions whose intensities are determined by phenomena regarding excitation-recombination mechanisms or, ultimately, by the RE<sup>3+</sup> atomic surroundings. Motivated by these aspects, this paper presents a comprehensive study of the influence exerted by TiO<sub>2</sub> (under the amorphous and crystalline forms) onto the light emission due to Sm<sup>3+</sup> and Tm<sup>3+</sup> ions. To this end, Sm-, Tm-, and SmTm-doped TiO<sub>2</sub> films were prepared and their structural-electronic properties were investigated by optical spectroscopic techniques - following appropriate thermal annealing treatments. As a result of the deposition method and conditions, the asdeposited (stoichiometric) TiO<sub>2</sub> films present an amorphous structure and single RE concentrations around 0.5 at.%. Also, whereas thermal annealing the films at increasing temperatures resulted in almost no changes in their elemental composition, extensive variations were observed in their atomic structure and RE<sup>3+</sup>-related light emission characteristics. Based on the experimental results, it became clear the role played by the amorphous or crystalline (Anatase or Rutile) structures of the TiO<sub>2</sub> films onto the RE<sup>3+</sup>-related luminescence features, and the likely mechanisms behind the phenomenon are presented and discussed in detail.

**JOURNAL OF ALLOYS AND COMPOUNDS [780], 491-497, 2019. DOI: 10.1016/j.jallcom.2018.11.401**

**[P069-2019] “Investigating correlated fluctuations of conserved charges with net-A fluctuations in Pb-Pb collisions at ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.

ALICE Collaboration

Event-by-event fluctuations of conserved charges such as electric charge, strangeness, and baryon number - in ultrarelativistic heavy-ion collisions provide insight into the properties of the quark-gluon plasma and the QCD phase diagram. They can be related to the higher moments of the multiplicity distributions of identified particles, such as the  $\Lambda$  baryon which carries both strangeness and baryon number and is thus of particular interest. We present the first measurement of net-A fluctuations in Pb-Pb collisions at  $\sqrt{s(NN)}=5.02$  TeV as a function of centrality and the pseudorapidity acceptance of the measurement.

The results are compared to expectations of the effects of global baryon number conservation as well as to predictions from the HIJING Monte Carlo event generator. In this analysis the Identity Method is applied in a novel way to account for the combinatoric background in the invariant mass distribution.

**NUCLEAR PHYSICS A [982], 299-302, 2019. DOI: 10.1016/j.nuclphysa.2018.11.020**

**[P070-2019] “Kinetic energy of fermionic systems”**

Zampronio, V.\*; Vitiello, S. A.\*

The kinetic energy of a system made from normal He-3 liquid is estimated and shows that progress has been made in resolving a long-standing disagreement with most experimental values of this quantity. In general, in the investigation of systems formed from strongly correlated fermions, the disagreement between experimental and “exact” theoretical values of the kinetic energy is a matter of concern. For these systems, difficulties are not only due to the Fermi-Dirac statistics they must obey, but also are due to the configurations that are used in estimations of quantities that do not commute with the Hamiltonian. We are able to improve the sampling of configurations and to avoid most of the bias from variational theories. Bias analysis and unbiased estimates of quantities that do not commute with the system Hamiltonian are also easily made.

**PHYSICAL REVIEW B [99], 4, 045145, 2019. DOI: 10.1103/PhysRevB.99.045145**

**[P071-2019] “Light (anti-)nuclei production and elliptic flow at the LHC with ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.

ALICE Collaboration

Results on the production of stable light nuclei, including deuterons, He-3, He-4 and the corresponding anti-nuclei, in Pb-Pb collisions at  $\sqrt{s(NN)} = 2.76$  TeV and  $\sqrt{s(NN)} = 5.02$  TeV are presented and compared with theoretical predictions and with the results in small systems to provide insight into the production mechanisms of (anti-)nuclei at colliders. The experimental results are presented giving a critical view of their comparison to the expectations from coalescence and hydrodynamic models that aim at describing both the p(T)-spectra and the elliptic flow.

**NUCLEAR PHYSICS A [982], 447-450, 2019. DOI: 10.1016/j.nuclphysa.2018.10.043**

**[P072-2019] “Magnetic and magnetocaloric properties in ferromagnetic PrCu<sub>9</sub>Sn<sub>4</sub> single crystals”**

Silva, N. C.; Campoy, J. C. P.; Honda, R. H.; Plaza, E. J. R.; Xavier, M. O. S.; Jesus, C. B. R.\*; Pagliuso, P. G.\*

The tetragonal ferromagnetic single crystal PrCu<sub>9</sub>Sn<sub>4</sub> is considered to be a material with a strong uniaxial magnetic anisotropy. The paramagnetic Curie temperatures suggest axial ferromagnetic and basal antiferromagnetic interactions. In order to further understand their magnetic behavior, we prepared single crystals of this compound and after characterizing the samples magnetically, we performed a study of the anisotropic features. The magnetic properties were investigated in terms of the Oguchi pair-approximation model considering crystalline electric field anisotropy with tetragonal symmetry.

A set of crystal-field and exchange parameters were calculated, which suggest the presence of small antiferromagnetic interactions on the basal plane. Then, from the magnetic equation of state, the conventional Magnetocaloric Effect in the main directions of symmetry was also calculated.

**JOURNAL OF ALLOYS AND COMPOUNDS [785], 1215-1221, 2019. DOI: 10.1016/j.jallcom.2019.01.173**

**[P073-2019] “Mass Calibration of Optically Selected DES Clusters Using a Measurement of CMB-cluster Lensing with SPTpol Data”**

Raghunathan, S.; Patil, S.; Baxter, E.; Sobreira, F.\*; et al.

We use cosmic microwave background (CMB) temperature maps from the 500 deg(2) SPTpol survey to measure the stacked lensing convergence of galaxy clusters from the Dark Energy Survey (DES) Year-3 redMaPPer (RM) cluster catalog. The lensing signal is extracted through a modified quadratic estimator designed to be unbiased by the thermal Sunyaev-Zel'dovich (tSZ) effect. The modified estimator uses a tSZ-free map, constructed from the SPTpol 95 and 150 GHz data sets, to estimate the background CMB gradient. For lensing reconstruction, we employ two versions of the RM catalog: a flux-limited sample containing 4003 clusters and a volume-limited sample with 1741 clusters. We detect lensing at a significance of  $8.7 \sigma$  ( $6.7 \sigma$ ) with the flux (volume)-limited sample. By modeling the reconstructed convergence using the Navarro-Frenk-White profile, we find the average lensing masses to be  $M_{200} = (1.62(-0.25)(+0.35) [\text{stat.}] \pm 0.04 [\text{sys.}] \text{ and } (1.28(-0.18)(+0.14) [\text{stat.}] \pm 0.03 [\text{sys.}] \times 10^{14}) M_{\odot}$  for the volume- and flux-limited samples, respectively. The systematic error budget is much smaller than the statistical uncertainty and is dominated by the uncertainties in the RM cluster centroids. We use the volume-limited sample to calibrate the normalization of the mass-richness scaling relation, and find a result consistent with the galaxy weak-lensing measurements from DES.

**ASTROPHYSICAL JOURNAL [872], 2, 170, 2019. DOI: 10.3847/1538-4357/ab01ca**

**[P074-2019] “Measurement of anisotropic flow in XeXe collisions at 5.44 TeV with the CMS experiment”**

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

New measurements of anisotropic flow in XeXe collisions at a center-of-mass energy of 5.44 TeV per nucleon pair, collected by the CMS experiment at the LHC, are presented. The  $v(2)$ ,  $v(3)$  and  $v(4)$  Fourier coefficients of the anisotropic azimuthal distribution are obtained employing three different analysis techniques: two-particle correlations, the scalar product method, and multiparticle cumulants, which have different sensitivities to non-flow and flow fluctuation effects. The results are shown as a function of transverse momentum (P-T) for various centrality selections, and compared with corresponding results from PbPb collisions. These new measurements in a smaller nucleus-nucleus system than PbPb provide additional insights into the system-size dependence of the collective flow induced by the dominant collision geometry and its fluctuations. In particular, these results, compared to theoretical predictions and Monte Carlo generators, will provide important details on the system size dependence of the medium response in heavy ion collisions. They also offer a unique opportunity to study the onset of flow from small to large systems.

**NUCLEAR PHYSICS A [982], 395-398, 2019. DOI: 10.1016/j.nuclphysa.2018.09.085**

**[P075-2019] “Measurement of dielectron production in central Pb-Pb collisions at root S-NN=2.76 TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.; ALICE Collaboration

The first measurement of dielectron ( $e^{+}e^{-}$ ) production in central (0-10%) Pb-Pb collisions at root S-NN = 2.76 TeV at the LHC is presented. The dielectron invariant-mass spectrum is compared to the expected contributions from hadron decays in the invariant-mass range  $0 < m(ee) < 3.5 \text{ GeV}/c^2$ . The ratio of data and the cocktail of hadronic contributions without vacuum  $\rho(0)$  is measured in the invariant-mass range  $0.15 < m(ee) < 0.7 \text{ GeV}/c^2$ , where an excess of dielectrons is observed in other experiments, and its value is  $1.40 \pm 0.28$  (stat.)  $\pm 0.08$  (syst.)  $\pm 0.27$  (cocktail). The dielectron spectrum measured in the invariant mass range  $0 < m(ee) < 1 \text{ GeV}/c^2$  is consistent with the predictions from two theoretical model calculations that include thermal dielectron production from both partonic and hadronic phases with in-medium broadened  $\rho(0)$  meson. The fraction of direct virtual photons over inclusive virtual photons is extracted for dielectron pairs with invariant mass  $0.1 < m(ee) < 0.3 \text{ GeV}/c^2$  and in the transverse-momentum intervals  $1 < p_{T}(ee) < 2 \text{ GeV}/c$  and  $2 < p_{T}(ee) < 4 \text{ GeV}/c$ . The measured fraction of virtual direct photons is consistent with the measurement of real direct photons by ALICE and with the expectations from previous dielectron measurements at RHIC within the experimental uncertainties.

**PHYSICAL REVIEW C [99], 2, 024002, 2019. DOI: 10.1103/PhysRevC.99.024002**

**[P076-2019] “Measurement of differential cross sections for Z boson pair production in association with jets at root s=8 and 13 TeV”**

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

This Letter reports measurements of differential cross sections for the production of two Z bosons in association with jets in proton-proton collisions at root s = 8 and 13 TeV. The analysis is based on data samples collected at the LHC with the CMS detector, corresponding to integrated luminosities of 19.7 and 35.9 fb<sup>-1</sup> at 8 and 13 TeV, respectively. The measurements are performed in the leptonic decay modes  $ZZ \rightarrow l^{+}l^{-}l'^{+}l'^{-}$ , where,  $l, l' = e, \mu$ . The differential cross sections as a function of the jet multiplicity, the transverse momentum  $p(T)$ , and pseudorapidity of the P-T-leading and subleading jets are presented. In addition, the differential cross sections as a function of variables sensitive to the vector boson scattering, such as the invariant mass of the two P-T-leading jets and their pseudorapidity separation, are reported. The results are compared to theoretical predictions and found in good agreement within the theoretical and experimental uncertainties.

**PHYSICS LETTERS B [789], 19-44, 2019. DOI: 10.1016/j.physletb.2018.11.007**

**[P077-2019] “Measurement of inclusive and differential Higgs boson production cross sections in the diphoton decay channel in proton-proton collisions at root s=13 TeV”**

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

Measurements of the inclusive and differential production cross sections for the Higgs boson in the diphoton decay channel are performed using the data set of proton-proton collisions at 13

TeV collected by the CMS experiment at the LHC in 2016 and corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>. The cross sections are measured in a fiducial phase space defined by a set of requirements on the isolation and kinematic variables of the photons. Differential cross sections are measured as functions of the kinematic properties of the diphoton system and the event. A subset of the measurements is performed in regions of the fiducial phase space, where relative contributions of specific Higgs boson production mechanisms are enhanced. The total cross section in the chosen fiducial phase space is measured to be 84 +/- 11 (stat) +/- 7 (syst) fb = 84 +/- 13 fb, to be compared with a theoretical prediction of 73 +/- 4 fb. All measurements are found to be in agreement with the theoretical predictions for the standard model Higgs boson with a mass of 125.09 GeV within the experimental and theoretical uncertainties.

**JOURNAL OF HIGH ENERGY PHYSICS [1], 183, 2019.** DOI: 10.1007/JHEP01(2019)183

**[P078-2019] “Measurement of nuclear modification factors of gamma(1S), gamma(2S), and gamma(3S) mesons in PbPb collisions at root s(NN)=5.02 TeV”**

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

The cross sections for gamma(1S), gamma(2S), and gamma(3S) production in lead-lead (PbPb) and proton-proton (pp) collisions at root s(NN) = 5.02 TeV have been measured using the CMS detector at the LHC. The nuclear modification factors, R-AA, derived from the PbPb-to-pp ratio of yields for each state, are studied as functions of meson rapidity and transverse momentum, as well as PbPb collision centrality. The yields of all three states are found to be significantly suppressed, and compatible with a sequential ordering of the suppression, R-AA(T(1S)) > R-AA(gamma(2S)) > R-AA(gamma(3S)). The suppression of gamma(1S) is larger than that seen at root s(NN) = 2.76 TeV, although the two are compatible within uncertainties. The upper limit on the R-AA of gamma(3S) integrated over p(T), rapidity and centrality is 0.096 at 95% confidence level, which is the strongest suppression observed for a quarkonium state in heavy ion collisions to date.

**PHYSICS LETTERS B [790], 270-293, 2019.** DOI: 10.1016/j.physletb.2019.01.006

**[P079-2019] “Measurement of prompt psi(2S) production cross sections in proton-lead and proton-proton collisions at root s(NN)=5.02 TeV”**

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

Measurements of prompt psi(2S) meson production cross sections in proton-lead (pPb) and proton-proton (pp) collisions at a nucleon-nucleon center-of-mass energy of root s(NN) = 5.02 TeV are reported. The results are based on pPb and pp data collected by the CMS experiment at the LHC, corresponding to integrated luminosities of 34.6 nb<sup>-1</sup> and 28.0 pb<sup>-1</sup>, respectively. The nuclear modification factor R-pPb is measured for prompt psi(2S) in the transverse momentum range 4 < p(T) < 30 GeV/c and the center-of-mass rapidity range -2.4 < y(CM) < 1.93. The results on psi(2S) R-pPb are compared to the corresponding modification factor for prompt J/psi mesons. The results point to different nuclear effects at play in the production of the excited charmonium state compared to the ground state, in the region of backward rapidity and for PT < 10 GeV/c.

**PHYSICS LETTERS B [790], 509-532, 2019.** DOI: 10.1016/j.physletb.2019.01.058

**[P080-2019] “Measurement of the average shape of longitudinal profiles of cosmic-ray air showers at the Pierre Auger Observatory”**

Aab, A.; Abreu, P.; Aglietta, M.; Chinellato, J. A.\*; Daniel, B.\*; Diaz Castro, M. L.\*; Dobrigkeit, C.\*; Fauth, A. C.\*; Muller, M. A.\*; Pereira, L. A. S.\*; et al.  
Pierre Auger Collaboration

The profile of the longitudinal development of showers produced by ultra-high energy cosmic rays carries information related to the interaction properties of the primary particles with atmospheric nuclei. In this work, we present the first measurement of the average shower profile in traversed atmospheric depth at the Pierre Auger Observatory. The shapes of profiles are well reproduced by the Gaisser-Hillas parametrization within the range studied, for E > 10(17.8) eV. A detailed analysis of the systematic uncertainties is performed using ten years of data and a full detector simulation. The average shape is quantified using two variables related to the width and asymmetry of the profile, and the results are compared with predictions of hadronic interaction models for different primary particles.

**JOURNAL OF COSMOLOGY AND ASTROPARTICLE PHYSICS [3], 018, 2019.** DOI: 10.1088/1475-7516/2019/03/018

**[P081-2019] “Measurements of anisotropic flow and flow fluctuations in Xe-Xe and Pb-Pb collisions with ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

Anisotropic flow is a key observable to characterise the system created in heavy-ion collisions, as it is sensitive to the system's initial state, transport properties, the equation of state and freeze-out conditions. In these proceedings we present the anisotropic flow coefficients of inclusive charged particles in Pb-Pb collisions at root s(NN) = 2.76 and 5.02 TeV, and in Xe-Xe collisions at root s(NN) = 5.44 TeV. The results are reported for a wide range of particle transverse momentum within the pseudo-rapidity range vertical bar eta vertical bar < 0.8 at different collision centralities. The energy and system dependence are found to place strong constraints on the temperature dependence of eta/s and the modeling of the initial state, respectively. We also present detailed studies of flow fluctuations in heavy-ion collisions, in order to precisely characterise the underlying flow probability density function. We find evidence of non-Bessel-Gaussian fluctuations and discuss the origin of this observation.

**NUCLEAR PHYSICS A [982], 367-370, 2019.** DOI: 10.1016/j.nuclphysa.2018.11.026

**[P082-2019] “Measurements of heavy-flavour correlations and jets with ALICE at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

In this work, the latest heavy-flavour correlation and jet measurements at mid-rapidity with the ALICE detector in pp, p-Pb and Pb-Pb collisions from the LHC Run 2 are reported. In particular, the results of azimuthal correlation measurements of D mesons with charged particles in pp collisions at root s = 13 TeV and in p-Pb collisions at root S-NN = 5.02 TeV are presented. Studies on the centrality-dependent azimuthal correlations of heavy-flavour hadron decay electrons with charged particles in Pb Pb collisions at root S-NN = 5.02 TeV are shown.

In addition, measurements of D-meson tagged jet production in pp collisions at  $\sqrt{s} = 7$  TeV and in p Pb collisions at  $\sqrt{s} = 5.02$  TeV are presented, including studies in pp collisions of the jet momentum fraction carried by the D meson. A first result on the D-meson tagged jet nuclear modification factor in central Pb Pb collisions at  $\sqrt{s} = 5.02$  TeV is also reported.

**NUCLEAR PHYSICS A [982], 579-582, 2019. DOI: 10.1016/j.nuclphysa.2018.10.085**

**[P083-2019] “Measurements of  $t(t)$  over bar differential cross sections in proton-proton collisions at  $\sqrt{s} = 13$  TeV using events containing two leptons”**

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

Measurements of differential top quark pair  $t(t)$  over bar cross sections using events produced in proton-proton collisions at a centre-of-mass energy of 13 TeV containing two oppositely charged leptons are presented. The data were recorded by the CMS experiment at the CERN LHC in 2016 and correspond to an integrated luminosity of 35.9 fb<sup>-1</sup>. The differential cross sections are presented as functions of kinematic observables of the top quarks and their decay products, the  $t(t)$  over bar system, and the total number of jets in the event. The differential cross sections are defined both with particle-level objects in a fiducial phase space close to that of the detector acceptance and with parton-level top quarks in the full phase space. All results are compared with standard model predictions from Monte Carlo simulations with next-to-leading-order (NLO) accuracy in quantum chromodynamics (QCD) at matrix-element level interfaced to parton-shower simulations. Where possible, parton-level results are compared to calculations with beyond-NLO precision in QCD. Significant disagreement is observed between data and all predictions for several observables. The measurements are used to constrain the top quark chromomagnetic dipole moment in an effective field theory framework at NLO in QCD and to extract  $t(t)$  over bar and leptonic charge asymmetries.

**JOURNAL OF HIGH ENERGY PHYSICS [2], 149, 2019. DOI: 10.1007/JHEP02(2019)149**

**[P084-2019] “Measurements of the chiral magnetic effect in Pb-Pb collisions with ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

We present the measurement of the charge-dependent 3-particle azimuthal correlation for unidentified charged particles in Pb-Pb collisions at  $\sqrt{s} = 5.02$  TeV in ALICE. The results are compared with corresponding results from Pb-Pb collisions at  $\sqrt{s} = 2.76$  TeV. We observe no significant difference in the charge-sensitive 3-particle correlator ( $\gamma(112)$ ) between the two collision energies. Charged-dependent mixed-harmonic correlator ( $\gamma(132)$ ) is also presented and compared with the predictions from a blast-wave model incorporating local charge conservation.

**NUCLEAR PHYSICS A [982], 543-546, 2019. DOI: 10.1016/j.nuclphysa.2018.11.008**

**[P085-2019] “Measuring (KSK +/-)-K-0 interactions using pp collisions at  $\sqrt{s} = 7$  TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

We present the first measurements of femtoscopic correlations between the K-S(0) and K+/- particles in pp collisions at  $\sqrt{s} = 7$  TeV measured by the ALICE experiment. The observed femtoscopic correlations are consistent with final-state interactions proceeding solely via the a(0)(980) resonance. The extracted kaon source radius and correlation strength parameters for (KSK-)-K-0 are found to be equal within the experimental uncertainties to those for (KSK+)-K-0. Results of the present study are compared with those from identical-kaon femtoscopic studies also performed with pp collisions at  $\sqrt{s} = 7$  TeV by ALICE and with a (KSK +/-)-K-0 measurement in Pb-Pb collisions at  $\sqrt{s} = 2.76$  TeV. Combined with the Pb-Pb results, our pp analysis is found to be compatible with the interpretation of the a(980) having a tetraquark structure instead of that of a diquark.

**PHYSICS LETTERS B [790], 22-34, 2019. DOI: 10.1016/j.physletb.2018.12.033**

**[P086-2019] “Microscopic Electrochemical Control of Ag Nanoparticles into Mesoporous TiO2 Thin Films”**

Moreau, M. M. L.; Martinez, E. D.\*; Fuertes, M. C.; Zelcer, A.; Golmar, F.; Granell, P. N.; Levy, P. E.; Soler Illia, G. J. A. A.; Granja, L. P.

Conductive-tip atomic force microscopy (CAFM) was used to explore the effects of high electric fields on silver nanoparticle (NP) arrays embedded inside the pores of mesoporous TiO2 thin films (MTF). A controlled local modification of the distribution of Ag nanoparticles inside the MTF and their electronic transport properties was carried out. The process is driven by strong electrochemically induced Ag+ migration and reduction inside the pores localized around the CAFM tip. Depending on the experimental parameters, we were able to induce drastic and violent changes, both at the surface and at the MTF/Si interface, that is, through the whole scanned region. Therefore, the results reported in this work contribute to the design and development of novel metal NP-based devices at the micro- and nanoscale.

**JOURNAL OF PHYSICAL CHEMISTRY C [123], 6, 3579-3587, 2019. DOI: 10.1021/acs.jpcc.8b11217**

**[P087-2019] “Molecular Electronics Including Temperature Effects Based on Dyes Pigments”**

Amador, A. T.; Neto, A. F. G.; Cruz, J. N.; Magno, F. N. B.; Marques, F. C.\*; da Silva Junior, C. A. B.; Del Nero, J.; Neto, A. M. J. C.

In this work we used the Density Functional Theory to study the thermodynamic properties from Brazilein (BZE) and Brazilin (BZI) molecules, main pigments responsible for the red color from Brazil wood. We did a comparison between the two dyes to then know which dye has better resistance to temperature (T) and external electric field (E) values, aiming their potential to possible applications in solar cells, as exciton trainers. We have found that the BZE molecule becomes less stable after a temperature known as degradation temperature, and therefore enters oxidation state. However, BZE is more stable and more resistant to high temperatures. With respect to the applied external electric field, we find that BZE is more reactive to almost all the applied electric fields, thus more easily converted into energy in the form of electrical work.

**JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY [19], 6, 3631-3636, 2019. DOI: 10.1166/jnn.2019.16142**

**[P088-2019] “Multiparticle correlations and higher order harmonics in pPb collisions at  $\sqrt{s} = 8.16$  TeV”**

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

The elliptic and higher-order azimuthal anisotropy Fourier harmonics  $v(n)$  are obtained for pPb collisions at  $\sqrt{s}(\text{NN}) = 8.16$  TeV over a wide range of event multiplicities based on multiparticle correlations. The data were collected by the CMS experiment during the 2016 LHC run. A sample of peripheral PbPb collisions at  $\sqrt{s}(\text{NN}) = 5.02$  TeV covering a similar range of event multiplicities to the pPb results is also analyzed for comparison. The ratios of different harmonic moments are obtained for both  $v(2)$  and  $v(3)$  with high precision, which allows a direct comparison to theoretical predictions assuming a hydrodynamic evolution of the created medium with initial-state density fluctuations, particularly probing the non-Gaussian nature of initial-state fluctuations in small collision systems. The presented results provide crucial insights into the origin of collective long-range correlations observed in small collision systems.

NUCLEAR PHYSICS A [982], 375-378, 2019. DOI: 10.1016/j.nuclphysa.2018.09.064

[P089-2019] “Multiplicity dependence of light-flavor hadron production in pp collisions at  $\sqrt{s}=7$  TeV”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

Comprehensive results on the production of unidentified charged particles,  $\pi(+/-)$ ,  $K+/-$ ,  $K^*(892)(0)$ ,  $p$ ,  $(p)$  over  $\bar{p}$ ,  $\phi(1020)$ ,  $\Lambda$ ,  $(\Lambda)$  over  $\bar{\Lambda}$ ,  $\Xi(-)$ ,  $(\Xi)$  over  $\bar{\Xi}(+)$ ,  $\Omega(-)$ , and  $(\Omega)$  over  $\bar{\Omega}(+)$  hadrons in proton-proton (pp) collisions at  $\sqrt{s} = 7$  TeV at midrapidity (vertical bar  $y$  vertical bar  $< 0.5$ ) as a function of charged-particle multiplicity density are presented. In order to avoid autocorrelation biases, the actual transverse momentum  $p(T)$  spectra of the particles under study and the event activity are measured in different rapidity windows. In the highest multiplicity class, the charged-particle density reaches about 3.5 times the value measured in inelastic collisions. While the yield of protons normalized to pions remains approximately constant as a function of multiplicity, the corresponding ratios of strange hadrons to pions show a significant enhancement that increases with increasing strangeness content. Furthermore, all identified particle-to-pion ratios are shown to depend solely on charged-particle multiplicity density, regardless of system type and collision energy. The evolution of the spectral shapes with multiplicity and hadron mass shows patterns that are similar to those observed in p-Pb and Pb-Pb collisions at Large Hadron Collider energies. The obtained  $p(T)$ , distributions and yields are compared to expectations from QCD-based pp event generators as well as to predictions from thermal and hydrodynamic models. These comparisons indicate that traces of a collective, equilibrated system are already present in high-multiplicity pp collisions.

PHYSICAL REVIEW C [99], 2, 024906, 2019. DOI: 10.1103/PhysRevC.99.024906

[P090-2019] “Multiplicity dependence of strangeness and hadronic resonance production in pp and p-Pb collisions with ALICE at the LHC”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

One of the key results of the LHC Run 1 was the observation of an enhanced production of strange particles in high multiplicity pp and p-Pb collisions at  $\sqrt{s}(\text{NN})$  7 and 5.02 TeV, respectively.

The strangeness enhancement is investigated by measuring the evolution with multiplicity of single-strange and multi-strange baryon production relative to non-strange particles. A smooth increase of strange particle yields relative to the non-strange ones with event multiplicity has been observed in such systems. We report the latest results on multiplicity dependence of strange and multi-strange hadron production in pp collisions at  $\sqrt{s} = 13$  TeV with ALICE. We also presented recent measurements of mesonic and baryonic resonances in small collision systems like pp and p-Pb at  $\sqrt{s}(\text{NN}) = 13$  and 8.16 TeV, respectively. The multiplicity dependent studies in pp and p-Pb collisions have been used to investigate how the hadronic scattering processes affect measured resonance yields and to better understand the interplay between canonical suppression and strangeness enhancement. The measurement of the  $\phi(1020)$  meson as a function of multiplicity provides crucial constraints in this context.

NUCLEAR PHYSICS A [982], 467-470, 2019. DOI: 10.1016/j.nuclphysa.2018.11.011

[P091-2019] “Muon physics at forward rapidity with the ALICE detector upgrade”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

ALICE is the experiment specifically designed to study the Quark-Gluon Plasma (QGP) in heavy-ion collisions at the CERN LHC. The ALICE detector will be upgraded during the Long Shutdown 2, planned for 2019-2020, in order to cope with the maximum interaction rate of 50 kHz of Pb-Pb collisions foreseen for Runs 3 and 4. The ambitious programme of high-precision measurements, expected for muon physics after 2020, requires an upgrade of the front-end and readout electronics of the existing Muon Spectrometer. This concerns the Cathode Pad Chambers (CPC) used for tracking and the Resistive Plate Chambers (RPC) used for triggering and for muon identification. The Muon Forward Tracker (MFT), an internal tracker added in front of the front absorber of the existing Muon Spectrometer, is also part of the ALICE detector upgrade programme. It is based on an assembly of circular planes made of Monolithic Active Pixel Sensors (MAPS), covering the pseudorapidity range  $2.5 < \eta < 3.6$ . The MFT will improve present measurements and enable new ones. A selection of results from physics performance studies will be presented, together with an overview of the technical aspects of the upgrade project.

NUCLEAR PHYSICS A [982], 947-950, 2019. DOI: 10.1016/j.nuclphysa.2018.10.034

[P092-2019] “Non-Gaussian elliptic-flow fluctuations in PbPb collisions at  $\sqrt{s}\text{-NN}=5.02$  TeV”

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

Event-by-event fluctuations in the elliptic-flow coefficient  $v(2)$  are studied in PbPb collisions at  $\sqrt{s}\text{-NN} = 5.02$  TeV using the CMS detector at the CERN LHC. Elliptic-flow probability distributions  $p(v(2))$  for charged particles with transverse momentum  $0.3 < p(T) < 3.0$  GeV/c and pseudorapidity vertical bar  $\eta$  vertical bar  $< 1.0$  are determined for different collision centrality classes. The moments of the  $p(v(2))$  distributions are used to calculate the  $v(2)$  coefficients based on cumulant orders 2, 4, 6, and 8. A rank ordering of the higher-order cumulant results and nonzero standardized skewness values obtained for the  $p(v(2))$  distributions indicate non-Gaussian initial-state fluctuations. Bessel-Gaussian and elliptic power fits to the flow distributions are studied to characterize the initial-state spatial anisotropy.

PHYSICS LETTERS B [789], 643-665, 2019. DOI: 10.1016/j.physletb.2018.11.063

[P093-2019] “Non-linear flow modes of identified particles in Pb-Pb collisions at root  $s(NN)=5.02$  TeV with the ALICE detector”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

The non-linear flow modes,  $v(4,22)$ ,  $v(5,32)$  and  $v(6,33)$  as a function of transverse momentum ( $p(T)$ ) have been measured for the first time in Pb-Pb collisions at root  $s(NN) = 5.02$  TeV for identified particles, i.e. charged pions, kaons and (anti-)protons. These observables probe the contribution of the second and third initial anisotropy coefficients to the higher order flow harmonics. Interestingly, all the characteristic features observed in previous  $p(T)$ -differential as well as  $p(T)$ -integrated measurements (e.g.  $v(2)$  and  $v(3)$ ) for various particle species are present in these measurements, i.e. increase of magnitude with increasing centrality percentile, a mass ordering in the low  $p(T)$  region and a particle type grouping in the intermediate  $p(T)$  region. The results cover 0-1% (ultra-central collisions), 10-20% (mid-central collisions) and 40-50% (mid-peripheral collisions) centrality intervals and allow to test models that attempt to describe initial conditions and the mode-coupling of different harmonics.

NUCLEAR PHYSICS A [982], 383-386, 2019. DOI: 10.1016/j.nuclphysa.2018.09.059

[P094-2019] “Non-strange and strange D-meson and charm-baryon production in heavy-ion collisions measured with ALICE at the LHC”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

We present recent results on strange and non-strange D-meson production measured with ALICE in Pb-Pb collisions at the LHC. In addition, the measurements of the  $\Lambda^+(c)$ -baryon production and of the  $\Lambda^+(c)/D-0$  ratio in pp, p-Pb, and, for the first time ever, Pb-Pb collisions are reported.

NUCLEAR PHYSICS A [982], 667-670, 2019. DOI: 10.1016/j.nuclphysa.2018.09.017

[P095-2019] “Nonequilibrium free-energy calculations of fluids using LAMMPS”

Leite, R. P.\*; de Koning, M.\*

We present a guide to compute the absolute free energies of classical fluids using nonequilibrium free-energy techniques within the LAMMPS (Large-scale Atomic/Molecular Massively Parallel Simulator) code. The main approach is based on the construction of a thermodynamic path connecting the fluid of interest to either atomic or molecular variants of the Uhlenbeck-Ford (UF) model as reference systems. We describe these reference systems in detail, discuss their implementation in the LAMMPS package and make available source code, scripts as well as auxiliary files. As an illustration we detail a number of distinct applications, involving systems characterized by fundamentally different interactions. In addition to two different atomic models (mW water and the MEAM-2NN CuZr liquid binary alloy), we consider three molecular models for water, two of them rigid (TIP4P and SPC/E) and one flexible (q-SPC/Fw).

For the molecular models we develop UF-based reference systems for which the free energies are given by a sum of two contributions: an intermolecular part described by the known UF free energy and an intramolecular contribution that can be determined analytically. The tools described in this paper provide a platform on which fluid-phase free energies can be easily and efficiently computed using the LAMMPS code. In addition to being useful for the development of new models for liquid phases, the tools may also find applications in the construction of community databases containing thermodynamic properties of existing models.

COMPUTATIONAL MATERIALS SCIENCE [159], 316-326, 2019. DOI: 10.1016/j.commatsci.2018.12.029

[P096-2019] “Nonperturbative structure of the ghost-gluon kernel”

Aguilar, A. C.\*; Ferreira, M. N.\*; Figueiredo, C. T.\*; Papavasiliou, J.

The ghost-gluon scattering kernel is a special correlation function that is intimately connected with two fundamental vertices of the gauge sector of QCD: the ghost-gluon vertex, which may be obtained from it through suitable contraction, and the three-gluon vertex, whose Slavnov-Taylor identity contains that kernel as one of its main ingredients. In this work we present a detailed nonperturbative study of the five form factors comprising it, using as the starting point the “one-loop dressed” approximation of the dynamical equations governing their evolution. The analysis is carried out for arbitrary Euclidean momenta and makes extensive use of the gluon propagator and the ghost dressing function, whose infrared behavior has been firmly established from a multitude of continuum studies and large-volume lattice simulations. In addition, special Ansatz are employed for the vertices entering in the relevant equations, and their impact on the results is scrutinized in detail. Quite interestingly, the veracity of the approximations employed may be quantitatively tested by appealing to an exact relation, which fixes the value of a special combination of the form factors under construction. The results obtained furnish the two form factors of the ghostgluon vertex for arbitrary momenta and, more importantly, pave the way toward the nonperturbative generalization of the Ball-Chiu construction for the longitudinal part of the three-gluon vertex.

PHYSICAL REVIEW D [99], 3, 034026, 2019. DOI: 10.1103/PhysRevD.99.034026

[P097-2019] “Open heavy-flavour production and elliptic flow in p-Pb collisions at the LHC with ALICE”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Measurements of open heavy flavour production in p-A collisions allow the investigation of Cold Nuclear Matter effects. In addition, they are an important tool for a complementary investigation of the long-range correlations found in small systems in the light flavour sector. In this work, production measurements of D mesons at mid-rapidity in p-Pb collisions at root  $S-NN = 5.02$  TeV are reported. Production yields are also reported for the heavy-flavour hadron decay electrons at central rapidity at root  $(SNN) = 5.02$  and 8.16 TeV. The elliptic flow ( $\nu(2)$ ) of heavy-flavour hadron decay electrons in high multiplicity p-Pb collisions at root  $(SNN) = 5.02$  TeV is found to be positive with a significance larger than 5 sigma.

NUCLEAR PHYSICS A [982], 691-694, 2019. DOI: 10.1016/j.nuclphysa.2018.11.012

[P098-2019] "Oscillatory trajectory of an optical beam propagating in free space"

Santana, O. J. S.\*; de Araujo, L. E. E.\*

We describe the experimental observation of nonrectilinear trajectories of a nearly Gaussian light beam propagating in free space, after reflecting from a glass-air interface near critical incidence. The angular-dependent reflection coefficients modulate the incident beam's angular spectrum, shifting the reflected beam from the rectilinear path predicted by geometrical optics. The beam trajectory shows strong dependence on the angle of incidence, changing from rectilinear to oscillatory within 0.07 degrees. Our experimental results are in good agreement with theoretical predictions for the trajectories followed by the intensity peak of the reflected beam.

OPTICS LETTERS Volume: [44], 3, 646-649, 2019. DOI: 10.1364/OL.44.000646

[P099-2019] "p-p, p-Lambda, and Lambda-Lambda correlations studied via femtoscopy in pp reactions at root s=7 TeV"

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.

ALICE Collaboration

We report on the first femtoscopic measurement of baryon pairs, such as p-p, p-Lambda, and Lambda-Lambda, measured by ALICE at the Large Hadron Collider (LHC) in proton-proton collisions at root s = 7 TeV. This study demonstrates the feasibility of such measurements in pp collisions at ultrarelativistic energies. The femtoscopy method is employed to constrain the hyperon-nucleon and hyperon-hyperon interactions, which are still rather poorly understood. A new method to evaluate the influence of residual correlations induced by the decays of resonances and experimental impurities is hereby presented. The p-p, p-Lambda, and Lambda-Lambda correlation functions were fitted simultaneously with the help of a new tool developed specifically for the femtoscopy analysis in small colliding systems: Correlation Analysis Tool using the Schrodinger equation (CATS). Within the assumption that in pp collisions the three particle pairs originate from a common source, its radius is found to be equal to  $r(0) = 1.125 \pm 0.018$  (stat)(-0.035)(+0.058) (syst) fm. The sensitivity of the measured p-Lambda correlation is tested against different scattering parameters, which are defined by the interaction among the two particles, but the statistics is not sufficient yet to discriminate among different models. The measurement of the Lambda-Lambda correlation function constrains the phase space spanned by the effective range and scattering length of the strong interaction. Discrepancies between the measured scattering parameters and the resulting correlation functions at LHC and RHIC energies are discussed in the context of various models.

PHYSICAL REVIEW C [99], 2, 024001, 2019. DOI: 10.1103/PhysRevC.99.024001

[P100-2019] "Peri/epicellular protein disulfide isomerase-A1 acts as an upstream organizer of cytoskeletal mechanoadaptation in vascular smooth muscle cells"

Tanaka, L. Y.; Araujo, T. L. S.; Rodriguez, A. I.; Ferraz, M. S.; Pelegati, V. B.\*; Morais, M. C. C.; dos Santos, A. M.; Cesar, C. L.\*; Ramos, A. F.; Alencar, A. M.; Laurindo, F. R. M.

Although redox processes closely interplay with mechanoresponses to control vascular remodeling, redox pathways coupling mechanostimulation to cellular cytoskeletal organization remain unclear. The peri/epicellular pool of protein disulfide isomerase-A1 (pecPDIA1) supports postinjury vessel remodeling.

Using distinct models, we investigated whether pecPDIA1 could work as a redox-dependent organizer of cytoskeletal mechanoresponses. In vascular smooth muscle cells (VSMCs), pecPDIA1 immunoneutralization impaired stress fiber assembly in response to equibiaxial stretch and, under uniaxial stretch, significantly perturbed cell repositioning perpendicularly to stretch orientation. During cyclic stretch, pecPDIA1 supported thiol oxidation of the known mechanosensor beta(1)-integrin and promoted polarized compartmentalization of sulfenylated proteins. Using traction force microscopy, we showed that pecPDIA1 organizes intracellular force distribution. The net contractile moment ratio of platelet-derived growth factor-exposed to basal VSMCs decreased from  $0.90 \pm 0.09$  (IgG-exposed controls) to  $0.70 \pm 0.08$  after pecPDIA1 neutralization ( $P < 0.05$ ), together with an enhanced coefficient of variation for distribution of force modules, suggesting increased noise. Moreover, in a single cell model, pecPDIA1 neutralization impaired migration persistence without affecting total distance or velocity, whereas siRNA-mediated total PDIA1 silencing disabled all such variables of VSMC migration. Neither expression nor total activity of the master mechanotransmitter/regulator RhoA was affected by pecPDIA1 neutralization. However, cyclic stretch-induced focal distribution of membrane-bound RhoA was disrupted by pecPDIA1 inhibition, which promoted a nonpolarized pattern of RhoA/caveolin-3 cluster colocalization. Accordingly, FRET biosensors showed that pecPDIA1 supports localized RhoA activity at cell protrusions versus perinuclear regions. Thus, pecPDIA1 acts as a thiol redox-dependent organizer and noise reducer mechanism of cytoskeletal repositioning, oxidant generation, and localized RhoA activation during a variety of VSMC mechanoresponses. **NEW & NOTEWORTHY** Effects of a peri/epicellular pool of protein disulfide isomerase-A1 (pecPDIA1) during mechanoregulation in vascular smooth muscle cells (VSMCs) were highlighted using approaches such as equibiaxial and uniaxial stretch, random single cell migration, and traction force microscopy. pecPDIA1 regulates organization of the cytoskeleton and minimizes the noise of cell alignment, migration directionality, and persistence. pecPDIA1 mechanisms involve redox control of beta(1)-integrin and localized RhoA activation. pecPDIA1 acts as a novel organizer of mechanoadaptation responses in VSMCs.

AMERICAN JOURNAL OF PHYSIOLOGY-HEART AND CIRCULATORY PHYSIOLOGY [316], 3, H566-H579, 2019. DOI: 10.1152/ajpheart.00379.2018

[P101-2019] "Phase transitions in phospholipid monolayers: Statistical model at the pair approximation"

de Oliveira, F. O.\*; Tamashiro, M. N.\*

A Langmuir film, consisting of a phospholipid monolayer at the air-water interface, was modeled as a two-dimensional lattice gas corresponding to a ternary mixture of water molecules (w), ordered-chain lipids (o), and disordered-chain lipids (d). The statistical problem is formulated in terms of a spin-1 model, in which the disordered-chain lipid states possess a high degeneracy  $\omega \gg 1$ , and was termed Doniach lattice gas (DLG). Motivated by some open questions in the analysis of the DLG model at the mean-field approximation (MFA) [Phys. Rev. E 90, 052705 (2014)], we have reconsidered it at the pair-approximation level by solving the model on a Cayley tree of coordination  $z$ . The attractors of the corresponding discrete-map problem are associated with the thermodynamic solutions on the Bethe lattice (the central region of an asymptotically infinite Cayley tree). To check the thermodynamic stability of the possible phases, the grand-potential density was obtained by the method proposed by Gujrati [Phys. Rev. Lett. 74, 809 (1995)]. In general, the previous MFA results are confirmed at the pair-approximation level, but a novel staggered phase, overlooked in the MFA analysis, was found when the condition  $\epsilon(wd) > 1/2(\epsilon(ww) + \epsilon(dd))$  is satisfied, where  $\epsilon(xy)$  represents the nearest-neighbor intermolecular interactions between single-site states  $x$  and  $y$ .

Model parameters obtained by fitting to experimental data for the two most commonly studied zwitterionic phospholipids, 1,2-dimyristoyl-sn-glycero-3-phosphocholine (DMPC) and 1,2-dipalmitoyl-sn-glycero-3-phosphocholine (DPPC), yield phase diagrams consistent with the phase transitions observed on Langmuir films of the same lipids under isothermal compression, which present a liquid-condensed to a liquid-expanded first-order transition line ending at a critical point.

**PHYSICAL REVIEW E [99], 1, 012147, 2019. DOI: 10.1103/PhysRevE.99.012147**

**[P102-2019] “Pion-kaon femtoscopy in Pb-Pb collisions at root s(NN)=2.76 TeV measured with ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Femtoscopic correlations between charged pions and kaons for different charge combinations are measured in Pb-Pb collisions at root s(NN) = 2.76 TeV with ALICE at the LHC. The three-dimensional pion-kaon ( $\pi$  - K) correlation functions and double ratios in the out-side-long pair rest frame are studied in different centrality bins. The  $\pi$  - K femtoscopic source size parameter (R-out) and emission asymmetry ( $\mu$ (out)) are extracted. It is observed that the average source size of the system and the emission asymmetry between pions and kaons increase from peripheral to central events.

**NUCLEAR PHYSICS A [982], 351-354, 2019. DOI: 10.1016/j.nuclphysa.2018.10.048**

**[P103-2019] “Plasmonic quantum size effects in silver nanoparticles are dominated by interfaces and local environments”**

Campos, A.; Troc, N.; Cottancin, E.; Pellarin, M.; Weissker, H. C.; Lerme, J.; Kociak, M.; Hillenkamp, M.\*

The physical properties of metals change when their dimensions are reduced to the nano-scale and new phenomena such as the localized surface-plasmon resonance (LSPR) appear. This collective electronic excitation can be tuned over a large spectral range by adapting the material, size and shape. The existing literature is as rich as it is controversial-for example, size-dependent spectral shifts of the LSPR in small metal nanoparticles, induced by quantum effects, are reported to the red, to the blue or entirely absent. Here we report how complementary experiments on size-selected small silver nanoparticles embedded in silica can yield inconsistent results on the same system: whereas optical absorption shows no size effect in the range between only a few atoms and similar to 10 nm, a clear spectral shift is observed in single-particle electron spectroscopy. Our quantitative interpretation, based on a mixed classical/quantum model, resolves the apparent contradictions, not only within our experimental data, but also in the literature. Our comprehensive model describes how the local environment is the crucial parameter controlling the manifestation or absence of quantum size effects.

**NATURE PHYSICS [15], 3, 275-+, 2019. DOI: 10.1038/s41567-018-0345-z**

**[P104-2019] “Quarkonium measurements in nucleus-nucleus collisions with ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Quarkonia, i.e. bound states of b (b) over bar and c (c) over bar quarks, are powerful observables to study the properties of nuclear matter under extreme conditions. The formation of a Quark-Gluon Plasma (QGP), which is predicted by lattice QCD calculations at high temperatures as reached at the LHC energies, has a strong influence on the production and behavior of quarkonia. The latest ALICE results on bottomonium and charmonium production in nucleus-nucleus collisions are presented. This includes measurements of the  $\gamma(1S)$  and  $\gamma(2S)$  nuclear modification factor (R-AA) at forward rapidity and the  $J/\psi$  R-AA and  $v(2)$  as a function of centrality, P-T and rapidity in Pb-Pb collisions at root S-NN = 5.02 TeV. Also, first results from  $J/\psi$  measurements in Xe-Xe collisions at root S-NN = 5.44 TeV are presented. Further on, the experimental results are compared to various calculations from theoretical models.

**NUCLEAR PHYSICS A [982], 703-706, 2019. DOI: 10.1016/j.nuclphysa.2018.09.024**

**[P105-2019] “Quarkonium production in p-Pb collisions with ALICE”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.; ALICE Collaboration

ALICE has measured quarkonium production in p-Pb collisions at backward ( $-4.46 < y(\text{cms}) < 2.96$ ), mid ( $-1.37 < y(\text{cms}) < 0.43$ ) and forward ( $2.03 < y(\text{cms}) < 3.53$ ) rapidity ( $y$ ) regions down to zero transverse momentum ( $p(T)$ ). The inclusive  $J/\psi$  production has been studied at mid- $y$  in p-Pb interactions at root S-NN = 5.02 TeV and at forward and backward  $y$  in p-Pb collisions at root S-NN = 5.02 TeV and 8.16 TeV. The comparison of the  $J/\psi$  production to the one of the loosely bound  $\psi(2S)$  state is discussed, together with new results on the nuclear modification factors of the  $\gamma(1S)$  and  $\gamma(2S)$  states measured at forward and backward  $y$ . All the results will be compared to those obtained at lower energies and with available theoretical calculations.

**NUCLEAR PHYSICS A [982], 739-742, 2019. DOI: 10.1016/j.nuclphysa.2018.11.024**

**[P106-2019] “Real-time vibrations of a carbon nanotube”**

Barnard, A. W.; Zhang, M.; Wiederhecker, G. S.\*; Lipson, M.; McEuen, P. L.

The field of miniature mechanical oscillators is rapidly evolving, with emerging applications including signal processing, biological detection(1) and fundamental tests of quantum mechanics(2). As the dimensions of a mechanical oscillator shrink to the molecular scale, such as in a carbon nanotube resonator(3-7), their vibrations become increasingly coupled and strongly interacting(8,9) until even weak thermal fluctuations could make the oscillator nonlinear(10-13). The mechanics at this scale possesses rich dynamics, unexplored because an efficient way of detecting the motion in real time is lacking. Here we directly measure the thermal vibrations of a carbon nanotube in real time using a high-finesse micrometre-scale silicon nitride optical cavity as a sensitive photonic microscope. With the high displacement sensitivity of 700 fm Hz<sup>(-1/2)</sup> and the fine time resolution of this technique, we were able to discover a realm of dynamics undetected by previous time-averaged measurements and a room-temperature coherence that is nearly three orders of magnitude longer than previously reported. We find that the discrepancy in the coherence stems from long-time non-equilibrium dynamics, analogous to the Fermi-Pasta-Ulam-Tsingou recurrence seen in nonlinear systems(14). Our data unveil the emergence of a weakly chaotic mechanical breather(15),

in which vibrational energy is recurrently shared among several resonance modes-dynamics that we are able to reproduce using a simple numerical model. These experiments open up the study of nonlinear mechanical systems in the Brownian limit (that is, when a system is driven solely by thermal fluctuations) and present an integrated, sensitive, high-bandwidth nanophotonic interface for carbon nanotube resonators.

**NATURE [566], 7742, 89-+, 2019. DOI: 10.1038/s41586-018-0861-0**

**[P107-2019] “Relative particle yield fluctuations in Pb-Pb collisions at  $\sqrt{s(NN)}=2.76$  TeV”**

Acharya, S.; Acosta, F. T.; Adamova, D.; **Albuquerque, D. S. D.\***; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

First results on  $K/\pi$ ,  $\pi/\pi$  and  $K/p$  fluctuations are obtained with the ALICE detector at the CERN LHC as a function of centrality in Pb-Pb collisions at  $\sqrt{s(NN)} = 2.76$  TeV. The observable  $\nu(\text{dyn})$ , which is defined in terms of the moments of particle multiplicity distributions, is used to quantify the magnitude of dynamical fluctuations of relative particle yields and also provides insight into the correlation between particle pairs. This study is based on a novel experimental technique, called the Identity Method, which allows one to measure the moments of multiplicity distributions in case of incomplete particle identification. The results for  $p/\pi$  show a change of sign in  $\text{dyn}$  from positive to negative towards more peripheral collisions. For central collisions, the results follow the smooth trend of the data at lower energies and  $\text{dyn}$  exhibits a change in sign for  $p/\pi$  and  $K/p$ .  $\nu(\text{dyn})$

**EUROPEAN PHYSICAL JOURNAL C [79], 3, 236, 2019. DOI: 10.1140/epjc/s10052-019-6711-x**

**[P108-2019] “Search for a heavy resonance decaying to a top quark and a vector-like top quark in the lepton plus jets final state in pp collisions at  $\sqrt{s}=13$  TeV”**

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

A search is presented for a heavy spin-1 resonance  $Z$  decaying to a top quark and a vector-like top quark partner  $T$  in the lepton + jets final state. The search is performed using a data set of pp collisions at a centre-of-mass energy of 13 TeV corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup> as recorded by the CMS experiment at the CERN LHC in the year 2016. The analysis is optimised for final states arising from the  $T$  decay modes to a top quark and a Higgs or  $Z$  boson ( $T \rightarrow Ht, Zt$ ). The event selection makes use of resolved and merged top quark decay products, as well as decays of boosted Higgs bosons and  $Z$  and  $W$  bosons using jet substructure techniques. No significant deviation from the standard model background expectation is observed. Exclusion limits on the product of the cross section and branching fraction for  $Z \rightarrow t\bar{T}, T \rightarrow Ht, Zt, Wb$  are presented for various combinations of the  $Z$  resonance mass and the vector-like  $T$  quark mass. These results represent the most stringent limits to date for the decay mode  $Z \rightarrow t\bar{T}, t\bar{H}t$ . In a benchmark model with extra dimensions, invoking a heavy spin-1 resonance  $G^*$ , masses of the  $G^*$  between 1.5 and 2.3 TeV and between 2.0 and 2.4 TeV are excluded for  $T$  masses of 1.2 and 1.5 TeV, respectively.

**EUROPEAN PHYSICAL JOURNAL C [79], 3, 208, 2019. DOI: 10.1140/epjc/s10052-019-6688-5**

**[P109-2019] “Search for Dark Matter Particles Produced in Association with a Top Quark Pair at  $\sqrt{s}=13$  TeV”**

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

A search is performed for dark matter particles produced in association with a top quark pair in proton-proton collisions at  $\sqrt{s} = 13$  TeV. The data correspond to an integrated luminosity of 35.9 fb<sup>-1</sup> recorded by the CMS detector at the LHC. No significant excess over the standard model expectation is observed. The results are interpreted using simplified models of dark matter production via spin-0 mediators that couple to dark matter particles and to standard model quarks, providing constraints on the coupling strength between the mediator and the quarks. These are the most stringent collider limits to date for scalar mediators, and the most stringent for pseudoscalar mediators at low masses.

**PHYSICAL REVIEW LETTERS [122], 1, 011803, 2019. DOI: 10.1103/PhysRevLett.122.011803**

**[P110-2019] “Search for heavy Majorana neutrinos in same-sign dilepton channels in proton-proton collisions at  $\sqrt{s} = 13$  TeV”**

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

A search is performed for a heavy Majorana neutrino ( $N$ ), produced in leptonic decay of a  $W$  boson propagator and decaying into a  $W$  boson and a lepton, with the CMS detector at the LHC. The signature used in this search consists of two same-sign leptons, in any flavor combination of electrons and muons, and at least one jet. The data were collected during 2016 in proton-proton collisions at a center-of-mass energy of 13 TeV, corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>. The results are found to be consistent with the expected standard model background. Upper limits are set in the mass range between 20 and 1600 GeV in the context of a Type-I seesaw mechanism, on  $|V_{eN}|(2)$ ,  $|V_{\mu N}|(2)$ , and  $|V_{\nu N}|(2)/(|V_{eN}|(2)+|V_{\mu N}|(2))$ , where  $V_{\nu N}$  is the matrix element describing the mixing of  $N$  with the standard model neutrino of flavor  $\nu = e, \mu$ . For  $N$  masses between 20 and 1600 GeV, the upper limits on  $|V_{\nu N}|(2)$  range between  $2.3 \times 10^{-5}$  and unity. These are the most restrictive direct limits for heavy Majorana neutrino masses above 430 GeV.

**JOURNAL OF HIGH ENERGY PHYSICS [1], 122, 2019. DOI: 10.1007/JHEP01(2019)122**

**[P111-2019] “Search for heavy resonances decaying into two Higgs bosons or into a Higgs boson and a  $W$  or  $Z$  boson in proton-proton collisions at 13 TeV”**

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

A search is presented for massive narrow resonances decaying either into two Higgs bosons, or into a Higgs boson and a  $W$  or  $Z$  boson. The decay channels considered are  $HHbb^-$  and  $VHqq^-$ , where  $H$  denotes the Higgs boson, and  $V$  denotes the  $W$  or  $Z$  boson. This analysis is based on a data sample of proton-proton collisions collected at a center-of-mass energy of 13 TeV by the CMS Collaboration, corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>. For the TeV-scale mass resonances considered, substructure techniques provide ways to differentiate among the hadronization products from vector boson decays to quarks, Higgs boson decays to bottom quarks, and quark- or gluon-induced jets.

Reconstruction techniques are used that have been specifically optimized to select events in which the tau lepton pair is highly boosted. The observed data are consistent with standard model expectations and upper limits are set at 95% confidence level on the product of cross section and branching fraction for resonance masses between 0.9 and 4.0 TeV. Exclusion limits are set in the context of bulk radion and graviton models: spin-0 radion resonances are excluded below a mass of 2.7 TeV at 95% confidence level. In the spin-1 heavy vector triplet framework, mass-degenerate W and Z resonances with dominant couplings to the standard model gauge bosons are excluded below a mass of 2.8 TeV at 95% confidence level. These are the first limits for massive resonances at the TeV scale with these decay channels at 13 TeV.

**JOURNAL OF HIGH ENERGY PHYSICS [1], 051, 2019. DOI: 10.1007/JHEP01(2019)051**

**[P112-2019] “Search for long-lived particles decaying into displaced jets in proton-proton collisions at  $\sqrt{s}=13$  TeV”**

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

A search for long-lived particles decaying into jets is presented. Data were collected with the CMS detector at the LHC from proton-proton collisions at a center-of-mass energy of 13 TeV in 2016, corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>. The search examines the distinctive topology of displaced tracks and secondary vertices. The selected events are found to be consistent with standard model predictions. For a simplified model in which long-lived neutral particles are pair produced and decay to two jets, pair production cross sections larger than 0.2 fb are excluded at 95% confidence level for a long-lived particle mass larger than 1000 GeV and proper decay lengths between 3 and 130 mm. Several supersymmetry models with gauge-mediated supersymmetry breaking or R-parity violation, where pair-produced long-lived gluinos or top squarks decay to several final-state topologies containing displaced jets, are also tested. For these models, in the mass ranges above 200 GeV, gluino masses up to 2300-2400 GeV and top squark masses up to 1350-1600 GeV are excluded for proper decay lengths approximately between 10 and 100 mm. These are the most restrictive limits to date on these models.

**PHYSICAL REVIEW D [99], 3, 032011, 2019. DOI: 10.1103/PhysRevD.99.032011**

**[P113-2019] “Search for Narrow H gamma Resonances in Proton-Proton Collisions at  $\sqrt{s}=13$  TeV”**

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

A search for heavy, narrow resonances decaying to a Higgs boson and a photon (H $\gamma$ ) has been performed in proton-proton collision data at a center-of-mass energy of 13 TeV, corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup> collected with the CMS detector at the LHC in 2016. Events containing a photon and a Lorentz-boosted hadronically decaying Higgs boson reconstructed as a single, large-radius jet are considered, and the  $\gamma$  jet invariant mass spectrum is analyzed for the presence of narrow resonances. To increase the sensitivity of the search, events are categorized depending on whether or not the large-radius jet can be identified as a result of the merging of two jets originating from b quarks. Results in both categories are found to agree with the predictions of the standard model. Upper limits on the production rate of H $\gamma$  resonances are set as a function of their mass in the range of 720-3250 GeV, representing the most stringent constraints to date.

**PHYSICAL REVIEW LETTERS [122], 8, 081804, 2019. DOI: 10.1103/PhysRevLett.122.081804**

**[P114-2019] “Search for new particles decaying to a jet and an emerging jet”**

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

A search is performed for events consistent with the pair production of a new heavy particle that acts as a mediator between a dark sector and normal matter, and that decays to a light quark and a new fermion called a dark quark. The search is based on data corresponding to an integrated luminosity of 16.1 fb<sup>-1</sup> from proton-proton collisions at  $\sqrt{s}=13$  TeV collected by the CMS experiment at the LHC in 2016. The dark quark is charged only under a new quantum-chromodynamics-like force, and forms an emerging jet via a parton shower, containing long-lived dark hadrons that give rise to displaced vertices when decaying to standard model hadrons. The data are consistent with the expectation from standard model processes. Limits are set at 95% confidence level excluding dark pion decay lengths between 5 and 225 mm for dark mediators with masses between 400 and 1250 GeV. Decay lengths smaller than 5 and greater than 225 mm are also excluded in the lower part of this mass range. The dependence of the limit on the dark pion mass is weak for masses between 1 and 10 GeV. This analysis is the first dedicated search for the pair production of a new particle that decays to a jet and an emerging jet.

**JOURNAL OF HIGH ENERGY PHYSICS [2], 179, 2019. DOI: 10.1007/JHEP02(2019)179**

**[P115-2019] “Search for new physics in final states with a single photon and missing transverse momentum in proton-proton collisions at  $\sqrt{s}=13$  TeV”**

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

A search is conducted for new physics in final states containing a photon and missing transverse momentum in proton-proton collisions at  $\sqrt{s}=13$  TeV, using the data collected in 2016 by the CMS experiment at the LHC, corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>. No deviations from the predictions of the standard model are observed. The results are interpreted in the context of dark matter production and models containing extra spatial dimensions, and limits on new physics parameters are calculated at 95% confidence level. For the two simplified dark matter production models considered, the observed (expected) lower limits on the mediator masses are both 950 (1150) GeV for 1 GeV dark matter mass. For an effective electroweak-dark matter contact interaction, the observed (expected) lower limit on the suppression parameter is 850 (950) GeV. Values of the effective Planck scale up to 2.85-2.90 TeV are excluded for between 3 and 6 extra spatial dimensions.

**JOURNAL OF HIGH ENERGY PHYSICS [2], 074, 2019. DOI: 10.1007/JHEP02(2019)074**

**[P116-2019] “Search for pair production of second-generation leptoquarks at  $\sqrt{s}=13$  TeV”**

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

A search for pair production of second-generation leptoquarks is performed using proton-proton collision data collected at root  $s = 13$  TeV in 2016 with the CMS detector at the CERN LHC, corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>. Final states with two muons and two jets, or with one muon, two jets, and missing transverse momentum are considered. Second-generation scalar leptoquarks with masses less than 1530(1285) GeV are excluded for  $ss = 1.0(0.5)$ , where  $ss$  is the branching fraction for the decay of a leptoquark to a charged lepton and a quark. The results of the search are also interpreted as limits on the pair production of long-lived top squarks in an R-parity violating supersymmetry model that has a final state with two muons and two jets. These limits represent the most stringent limits to date on these models.

PHYSICAL REVIEW D [99], 3, 032014, 2019. DOI: 10.1103/PhysRevD.99.032014

[P117-2019] “Search for pair-produced three-jet resonances in proton-proton collisions at root  $s=13$  TeV”

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

A search has been performed for pair-produced resonances decaying into three jets. The proton-proton collision data used for this analysis were collected with the CMS detector in 2016 at a center-of-mass energy of 13 TeV and correspond to an integrated luminosity of 35.9 fb<sup>-1</sup>. The mass range from 200 to 2000 GeV is explored in four separate mass regions. The observations show agreement with standard model expectations. The results are interpreted within the framework of R-parity violating SUSY, where pair-produced gluinos decay to a six quark final state. Gluino masses below 1500 GeV are excluded at 95% confidence level. An analysis based on data with multijet events reconstructed at the trigger level extends the reach to masses as low as 200 GeV. Improved analysis techniques have led to enhanced sensitivity, allowing the most stringent limits to date to be set on gluino pair production.

PHYSICAL REVIEW D [99], 1, 012010, 2019. DOI: 10.1103/PhysRevD.99.012010

[P118-2019] “Search for production of Higgs boson pairs in the four b quark final state using large-area jets in proton-proton collisions at root  $s = 13$  TeV”

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

A search is presented for pair production of the standard model Higgs boson using data from proton-proton collisions at a centre-of-mass energy of 13 TeV, collected by the CMS experiment at the CERN LHC in 2016, and corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>. The final state consists of two b quark-antiquark pairs. The search is conducted in the region of phase space where one pair is highly Lorentz-boosted and is reconstructed as a single large-area jet, and the other pair is resolved and is reconstructed using two b-tagged jets. The results are obtained by combining this analysis with another from CMS looking for events with two large jets. Limits are set on the product of the cross sections and branching fractions for narrow bulk gravitons and radions in warped extradimensional models having a mass in the range 750-3000 GeV. The resulting observed and expected upper limits on the non-resonant Higgs boson pair production cross section correspond to 179 and 114 times the standard model value, respectively, at 95% confidence level. The existence of anomalous Higgs boson couplings is also investigated and limits are set on the non-resonant Higgs boson pair production cross sections for representative coupling values.

JOURNAL OF HIGH ENERGY PHYSICS [1], 040, 2019. DOI: 10.1007/JHEP01(2019)040

[P119-2019] “Search for rare decays of Z and Higgs bosons to  $J/\psi$  and a photon in proton-proton collisions at 13 TeV”

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

A search is presented for decays of Z and Higgs bosons to a  $J/\psi$  meson and a photon, with the subsequent decay of the  $J/\psi$  to  $+\ell-\ell$ . The analysis uses data from proton-proton collisions with an integrated luminosity of 35.9fb<sup>-1</sup> at  $\sqrt{s}=13$  collected with the CMS detector at the LHC. The observed limit on the  $ZJ/\psi$  decay branching fraction, assuming that the  $J/\psi$  meson is produced unpolarized, is  $1.4 \times 10^{-6}$  at 95% confidence level, which corresponds to a rate higher than expected in the standard model by a factor of 15. For extreme-polarization scenarios, the observed limit changes from -13.6 to +8.6% with respect to the unpolarized scenario. The observed upper limit on the branching fraction for  $HJ/\psi$  where the  $J/\psi$  meson is assumed to be transversely polarized is  $7.6 \times 10^{-4}$ , a factor of 260 larger than the standard model prediction. The results for the Higgs boson are combined with previous data from proton-proton collisions at  $\sqrt{s}=8$ TeV to produce an observed upper limit on the branching fraction for  $HJ/\psi$  that is a factor of 220 larger than the standard model value.

EUROPEAN PHYSICAL JOURNAL C [79], 2, 94, 2019. DOI: 10.1140/epjc/s10052-019-6562-5

[P120-2019] “Search for single production of vector-like quarks decaying to a top quark and a W boson in proton-proton collisions at TeV”

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

A search is presented for the single production of vector-like quarks in proton-proton collisions at TeV. The data, corresponding to an integrated luminosity of 35.9fb<sup>-1</sup>, were recorded with the CMS experiment at the LHC. The analysis focuses on the vector-like quark decay into a top quark and a W boson, with one muon or electron in the final state. The mass of the vector-like quark candidate is reconstructed from hadronic jets, the lepton, and the missing transverse momentum. Methods for the identification of b quarks and of highly Lorentz boosted hadronically decaying top quarks and W bosons are exploited in this search. No significant deviation from the standard model background expectation is observed. Exclusion limits at 95% confidence level are set on the product of the production cross section and branching fraction as a function of the vector-like quark mass, which range from 0.3 to 0.03pb for vector-like quark masses of 700 to 2000GeV. Mass exclusion limits up to 1660GeV are obtained, depending on the vector-like quark type, coupling, and decay width. These represent the most stringent exclusion limits for the single production of vector-like quarks in this channel.

EUROPEAN PHYSICAL JOURNAL C [79], 2, 90, 2019. DOI: 10.1140/epjc/s10052-019-6556-3

[P121-2019] “Search for Sterile Neutrinos in MINOS and MINOS plus Using a Two-Detector Fit”

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

A search for mixing between active neutrinos and light sterile neutrinos has been performed by looking for muon neutrino disappearance in two detectors at baselines of 1.04 and 735 km, using a combined MINOS and MINOS+ exposure of  $16.36 \times 10^{20}$  protons on target. A simultaneous fit to the charged-current muon neutrino and neutral-current neutrino energy spectra in the two detectors yields no evidence for sterile neutrino mixing using a  $3 + 1$  model. The most stringent limit to date is set on the mixing parameter  $\sin^2(2\theta_{24})$  for most values of the sterile neutrino mass splitting  $\Delta m_{41}(2) > 10^{-4} \text{ eV}(2)$ .

PHYSICAL REVIEW LETTERS [122], 9, 091803, 2019. DOI: 10.1103/PhysRevLett.122.091803

[P122-2019] “Search for supersymmetric partners of electrons and muons in proton-proton collisions at root s=13 TeV”

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

A search for direct production of the supersymmetric (SUSY) partners of electrons or muons is presented in final states with two opposite-charge, same-flavour leptons (electrons and muons), no jets, and large missing transverse momentum. The data sample corresponds to an integrated luminosity of  $35.9 \text{ fb}^{-1}$  of proton-proton collisions at root s = 13 TeV, collected with the CMS detector at the LHC in 2016. The search uses the  $M_{T2}$  variable, which generalises the transverse mass for systems with two invisible objects and provides a discrimination against standard model backgrounds containing W bosons. The observed yields are consistent with the expectations from the standard model. The search is interpreted in the context of simplified SUSY models and probes slepton masses up to approximately 290, 400, and 450 GeV, assuming right-handed only, left-handed only, and both right- and left-handed sleptons (mass degenerate selectrons and smuons), and a massless lightest supersymmetric particle. Limits are also set on selectrons and smuons separately. These limits show an improvement on the existing limits of approximately 150 GeV.

PHYSICS LETTERS B [790], 140-166, 2019. DOI: 10.1016/j.physletb.2019.01.005

[P123-2019] “Search for supersymmetry in events with a photon, a lepton, and missing transverse momentum in proton-proton collisions at root s=13 TeV”

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

Results of a search for supersymmetry are presented using events with a photon, an electron or muon, and large missing transverse momentum. The analysis is based on a data sample corresponding to an integrated luminosity of  $35.9 \text{ fb}^{-1}$  of proton-proton collisions at 13 TeV, produced by the LHC and collected with the CMS detector in 2016. Theoretical models with gauge-mediated supersymmetry breaking predict events with photons in the final state, as well as electroweak gauge bosons decaying to leptons. Searches for events with a photon, a lepton, and missing transverse momentum are sensitive probes of these models. No excess of events is observed beyond expectations from standard model processes. The results of the search are interpreted in the context of simplified models inspired by gauge-mediated supersymmetry breaking. These models are used to derive upper limits on the production cross sections and set lower bounds on masses of supersymmetric particles. Gaugino masses below 930 GeV are excluded at the 95% confidence level in a simplified model with electroweak production of a neutralino and chargino.

For simplified models of gluino and squark pair production, gluino masses up to 1.75 TeV and squark masses up to 1.43 TeV are excluded at the 95% confidence level.

JOURNAL OF HIGH ENERGY PHYSICS [1], 154, 2019. DOI: 10.1007/JHEP01(2019)154

[P124-2019] “Search for  $t(\bar{t})$  production in the  $H \rightarrow b(\bar{b})$  decay channel with leptonic  $t(\bar{t})$  decays in proton-proton collisions at root s=13 TeV”

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

A search is presented for the associated production of a standard model Higgs boson with a top quark-antiquark pair ( $t\bar{t}H$ ), in which the Higgs boson decays into a b quark-antiquark pair, in proton-proton collisions at a centre-of-mass energy =13 TeV. The data correspond to an integrated luminosity of  $35.9 \text{ fb}^{-1}$  recorded with the CMS detector at the CERN LHC. Candidate  $t\bar{t}H$  events are selected that contain either one or two electrons or muons from the t decays and are categorised according to the number of jets. Multivariate techniques are employed to further classify the events and eventually discriminate between signal and background. The results are characterised by an observed  $t\bar{t}H$  signal strength relative to the standard model cross section,  $\mu = \sigma/\sigma(\text{SM})$ , under the assumption of a Higgs boson mass of 125 GeV. A combined fit of multivariate discriminant distributions in all categories results in an observed (expected) upper limit on  $\mu$  of 1.5 (0.9) at 95% confidence level, and a best fit value of  $0.72 \pm 0.24(\text{stat}) \pm 0.38(\text{syst})$ , corresponding to an observed (expected) signal significance of 1.6 (2.2) standard deviations above the background-only hypothesis.

JOURNAL OF HIGH ENERGY PHYSICS [3], 026, 2019. DOI: 10.1007/JHEP03(2019)026

[P125-2019] “Search for the chiral magnetic effect at the LHC with the CMS experiment”

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

Searches for the chiral magnetic effect (CME) using charge-dependent azimuthal correlations with respect to event planes are presented in PbPb collisions at 5.02 TeV and pPb collisions at 5.02 and 8.16 TeV, with the CMS experiment at the LHC. The azimuthal correlations with respect to the second- and third-order event planes are explored as a function of pseudorapidity, transverse momentum, and event multiplicity, which provides new insights into the underlying background correlations. By employing an event-shape engineering technique, a linear dependence of charge-dependent correlations on the second-order anisotropy flow ( $\nu_2$ ) is observed, and the upper limits on the  $\nu_2$ -independent fraction, which is directly related to the CME signal, are obtained at 95% confidence level for both pPb and PbPb collisions. These results provide strong constraints on the search for the chiral magnetic effect at LHC energies, and establish new guidelines for searches in future experiments.

NUCLEAR PHYSICS A [982], 527-530, 2019. DOI: 10.1016/j.nuclphysa.2018.08.032

[P126-2019] “Selective sensory deafferentation induces structural and functional brain plasticity”

Casseb, R. F.\*; de Campos, B. M.; Martinez, A. R. M.; Castellano, G.\*; Franca, M. C.

Sensory-motor integration models have been proposed aiming to explain how the brain uses sensory information to guide and check the planning and execution of movements. Sensory neuronopathy (SN) is a peculiar disease characterized by exclusive, severe and widespread sensory loss. It is a valuable condition to investigate how sensory deafferentation impacts brain organization. We thus recruited patients with clinical and electro-physiological criteria for SN to perform structural and functional MRI analyses. We investigated volumetric changes in gray matter (GM) using anatomical images; the microstructure of WM within segmented regions of interest (ROI), via diffusion images; and brain activation related to a finger tapping task. All significant results were related to the long disease duration subgroup of patients. Structural analysis showed hypertrophy of the caudate nucleus, whereas the diffusion study identified reduction of fractional anisotropy values in ROIs located around the thalamus and the striatum. We also found differences regarding finger-tapping activation in the posterior parietal regions and in the medial areas of the cerebellum. Our results stress the role of the caudate nucleus over the other basal ganglia in the sensory-motor integration models, and suggest an inhibitory function of a recently discovered tract between the thalamus and the striatum. Overall, our findings confirm plasticity in the adult brain and open new avenues to design neurorehabilitation strategies.

**NEUROIMAGE-CLINICAL 21, UNSP 101633, 2019. DOI: 10.1016/j.nicl.2018.101633**

**[P127-2019] “Self-tearing and self-peeling of folded graphene nanoribbons”**

Fonseca, A. F.\*; Galvao, D. S.\*

A recent experimental study showed that an induced folded flap of graphene can spontaneously drive itself its tearing and peeling off a substrate, thus producing long, micrometer sized, regular trapezoidal-shaped folded graphene nanoribbons. As long as the size of the graphene flaps is above a threshold value, the “tug of war” between the forces of adhesion of graphene-graphene and graphene-substrate, flexural strain of folded region and carbon-carbon (C-C) covalent bonds favor the self-tearing and self-peeling off process. As the detailed information regarding the atomic scale mechanism involved in the process remains not fully understood, we carried out atomistic reactive molecular dynamics simulations to address some features of the process. We show that large thermal fluctuations can prevent the process by increasing the probability of chemical reactions between carbon dangling bonds of adjacent graphene layers. The effects of the strength of attraction between graphene and the substrate on the ribbon growth velocities at the early stages of the phenomenon were also investigated. Structures with initial armchair crack-edges were observed to form more uniform cuts than those having initial zigzag ones. Our results are of importance to help set up new experiments on this phenomenon, especially with samples with nanoscale sized cuts.

**CARBON [143], 230-239, 2019. DOI: 10.1016/j.carbon.2018.11.020**

**[P128-2019] “Solar Cells Fabricated in Upgraded Metallurgical Silicon, Obtained Through Vacuum Degassing and Czochralski Growth”**

Marques, F. C.\*; Cortes, A. D. S.; Mei, P. R.

Upgraded metallurgical grade silicon (UMG-Si) was obtained through metallurgical methods using two steps. First, metallurgical grade silicon was purified by the vacuum degassing technique using an electron-beam system. An ingot was then produced through Czochralski (CZ) growth.

This later process was also used to reduce impurities through the segregation phenomenon in the CZ technique, producing a material of 99.9993% purity, one order of magnitude less pure than the minimum required for solar grade silicon. Solar cells fabricated with polycrystalline silicon with that amount of impurities are of low efficiency. Thus, the CZ technique was also adopted to supply monocrystalline silicon in order to avoid additional defects due to the grain boundary of polycrystalline wafers. Adopting this procedure, we produced solar cells with an efficiency of 13%, using a very simple fabrication process.

**SILICON [11], 1, 77-83, 2019. DOI: 10.1007/s12633-018-9860-x**

**[P129-2019] “Spin alignment measurements using vector mesons with ALICE detector at the LHC”**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al.  
ALICE Collaboration

We present new measurements related to spin alignment of  $K^*(0)$  vector mesons at mid-rapidity for Pb-Pb collisions at root  $s(\text{NN}) = 2.76$  and  $5.02$  TeV. The spin alignment measurements are carried out with respect to production plane and 2nd order event plane. At low  $p(\text{T})$  the spin density matrix element  $\rho(00)$  for  $K^*(0)$  is found to have values slightly below  $1/3$ , while it is consistent with  $1/3$ , i.e. no spin alignment, at high  $p(\text{T})$ . Similar values of  $\rho(00)$  are observed with respect to both production plane and event plane. Within statistical and systematic uncertainties,  $\rho(00)$  values are also found to be independent of root  $s(\text{NN})$ .  $\rho(00)$  also shows centrality dependence with maximum deviation from  $1/3$  for mid-central collisions with respect to both the kinematic planes. The measurements for  $K^*(0)$  in pp collisions at root  $s = 13$  TeV and for  $K_s(0)$  (a spin 0 hadron) in 20-40% central Pb-Pb collisions at root  $s(\text{NN}) = 2.76$  TeV are consistent with no spin alignment.

**NUCLEAR PHYSICS A [982], 515-518, 2019. DOI: 10.1016/j.nuclphysa.2018.12.004**

**[P130-2019] “Strain-Induced Structural Deformation Study of 2D MoxW(1-x) S-2”**

Susarla, S.; Manimunda, P.; Jaques, Y. M.\*; Hachtel, J. A.; Idrobo, J. C.; Asif, S. A. S.; Galvao, D. S.\*; Tiwary, C. S.; Ajayan, P. M.

The possibility of tuning properties and its potential applications in the fields of optoelectronics and/or flexible electronics, has increased the demand for 2D alloys in recent times. Understanding the mechanical performance of 2D materials under extreme conditions, such as strain, stress, and fracture is essential for the reliable electronic devices based on these structures. In this study, combined molecular dynamics (MD) simulations and in situ Raman spectroscopic techniques are used to study the mechanical performance of a 2D alloy system,  $\text{MoxW(1-x) S-2}$ . It is observed that W substitution in  $\text{MoS}_2$  causes solid-solution strengthening and increase in the Young's modulus values. Higher W content decreases failure strain for  $\text{MoS}_2$ . Based on spatially resolved Raman spectroscopy and MD simulations results, a detailed model to explain failure mechanisms in  $\text{MoxW(1-x) S-2}$  alloys is proposed.

**ADVANCED MATERIALS INTERFACES [6], 5, 1801262, 2019. DOI: 10.1002/admi.201801262**

**[P131-2019] “Structural analysis of PdRh/C and PdSn/C and its use as electrocatalysts for ethanol oxidation in alkaline medium”**

Fontes, E. H.; Ramos, C. E. D.; Nandenha, J.; Piasentin, R. M.; Neto, A. O.; Landers, R.\*

The Pd/C, PdRh(50:50)/C and PdSn(50:50)/C nanomaterials were used as electrocatalysts for ethanol (EtOH) oxidation in Direct Ethanol Fuel Cell (DEFC) in an alkaline medium. This work aims to provide a complete physical characterization of the nanomaterials, elucidate the bifunctional mechanism concerning ethanol oxidation reaction and understand the influence of carbon - metal bonding in the electrochemical activity. These nanomaterials were investigated by X-ray photoelectron spectroscopy (XPS) and revealed that the atomic percentage of the surface is different of those obtained by Energy Dispersive X-ray spectroscopy (EDS). Raman spectroscopy showed a bonding between palladium and carbon atoms which can play a decisive role in the performance of the materials. Attenuated Total Reflectance technique coupled to the Fourier Transform Infrared spectroscopy (ATR-FTIR) made possible to investigate the oxidation products originated by the ethanol oxidation, and all the electrocatalysts showed the presence of acetaldehyde, carbonate ions, acetate and carbon dioxide, suggesting that the mechanism of oxidation is incomplete. Among all the nanomaterials studied, PdSn(50:50)/C showed the best electrochemical and Fuel Cell's results. It is about 33% better than Pd/C. The micrographs obtained by Transmission Electron Microscopy (TEM) revealed some agglomerate regions, but they are consistent with the literature data.

**INTERNATIONAL JOURNAL OF HYDROGEN ENERGY [44], 2, 937-951, 2019. DOI: 10.1016/j.ijhydene.2018.11.049**

**[P132-2019] "Structural and Thermal Stability of Graphyne and Graphdiyne Nanoscroll Structures"**

Solis, D. A.\*; Borges, D. D.\*; Woellner, C. F.\*; Galvao, D. S.\*

Graphynes and graphdienes are generic names for families of two-dimensional carbon allotropes, where acetylenic groups connect benzenoid-like hexagonal rings, with the coexistence of sp and sp(2) hybridized carbon atoms. The main differences between graphynes and graphdienes are the number of acetylenic groups (one and two for graphynes and graphdienes, respectively). Similarly to graphene nanoscrolls, graphyne and graphdienes nanoscrolls are nanosized membranes rolled into papyrus-like structures. In this work we studied through molecular dynamics simulations, using reactive potentials, the structural and thermal (up to 1000 K) stability of alpha,beta,gamma-graphyne and alpha,beta,gamma-graphdiyne scrolls. Our results demonstrate that stable nanoscrolls can be created for all the structures studied here, although they are less stable than corresponding graphene scrolls. This can be elucidated as a result of the higher graphyne/graphdiyne structural porosity in relation to graphene, and as a consequence, the pi-pi stacking interactions decrease.

**ACS APPLIED MATERIALS & INTERFACES [11], 3, 2670-2676, 2019. DOI: 10.1021/acsami.8b03481**

**[P133-2019] "Study of J/psi azimuthal anisotropy at forward rapidity in Pb-Pb collisions at root s(NN)=5.02 TeV"**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

The second (v(2)) and third (v(3)) flow harmonic coefficients of J/ mesons are measured at forward rapidity (2.5 < y < 4.0) in Pb-Pb collisions at sNN=5.02 TeV with the ALICE detector at the LHC. Results are obtained with the scalar product method and reported as a function of transverse momentum, p(T), for various collision centralities. A positive value of J/ v(3) is observed with 3.7 sigma significance.

The measurements, compared to those of prompt D-0 mesons and charged particles at mid-rapidity, indicate an ordering with v(n)(J/) < v(n)(D-0) < v(n)(h(+/-)) (n = 2, 3) at low and intermediate p(T) up to 6 GeV/c and a convergence with v(2)(J/) approximate to v(2)(D-0) approximate to v(2)(h(+/-)) at high p(T) above 6-8 GeV/c. In semi-central collisions (5-40% and 10-50% centrality intervals) at intermediate p(T) between 2 and 6 GeV/c, the ratio v(3)/v(2) of J/ mesons is found to be significantly lower (4.6 sigma) with respect to that of charged particles. In addition, the comparison to the prompt D-0-meson ratio in the same p(T) interval suggests an ordering similar to that of the v(2) and v(3) coefficients. The J/ v(2) coefficient is further studied using the Event Shape Engineering technique. The obtained results are found to be compatible with the expected variations of the eccentricity of the initial-state geometry.

**JOURNAL OF HIGH ENERGY PHYSICS [2], 012, 2019. DOI: 10.1007/JHEP02(2019)012**

**[P134-2019] "Study of the underlying event in top quark pair production in pp collisions at 13 TeV"**

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

Measurements of normalized differential cross sections as functions of the multiplicity and kinematic variables of charged-particle tracks from the underlying event in top quark and antiquark pair production are presented. The measurements are performed in proton-proton collisions at a center-of-mass energy of 13 TeV, and are based on data collected by the CMS experiment at the LHC in 2016 corresponding to an integrated luminosity of 35.9 fb<sup>-1</sup>. Events containing one electron, one muon, and two jets from the hadronization and fragmentation of b quarks are used. These measurements characterize, for the first time, properties of the underlying event in top quark pair production and show no deviation from the universality hypothesis at energy scales typically above twice the top quark mass.

**EUROPEAN PHYSICAL JOURNAL C [79], 2, 123, 2019. DOI: 10.1140/epjc/s10052-019-6620-z**

**[P135-2019] "Suppression of Lambda(1520) resonance production in central Pb-Pb collisions at root S-NN=2.76 TeV"**

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

The production yield of the Lambda(1520) baryon resonance is measured at midrapidity in Pb-Pb collisions at root S-NN = 2.76 TeV with the ALICE detector at the Large Hadron Collider (LHC). The measurement is performed in the Lambda(1520) -> pK(-) (and charge conjugate) hadronic decay channel as a function of the transverse momentum (p(T)) and collision centrality. The ratio of the P-T-integrated production of Lambda(1520) baryons relative to A baryons in central collisions is suppressed by about a factor of 2 with respect to peripheral collisions. This is the first observation of the suppression of a baryonic resonance at the LHC and the first 3 sigma evidence of Lambda(1520) suppression within a single collision system. The measured Lambda(1520)/Lambda ratio in central collisions is smaller than the value predicted by the statistical hadronization model calculations. The shape of the measured p(T) distribution and the centrality dependence of the suppression are reproduced by the EPOS3 Monte Carlo event generator. The measurement adds further support to the formation of a dense hadronic phase in the final stages of the evolution of the fireball created in heavy-ion collisions, lasting long enough to cause a significant reduction in the observable yield of short-lived resonances.

PHYSICAL REVIEW C [99], 2, 024905, 2019. DOI: 10.1103/PhysRevC.99.024905

[P136-2019] “Surface treatment response of AISI 2205 and AISI 304L steels: SMAT and plasma-nitriding”

Singh, D.; Gatey, A. M.; Devan, R. S.; Antunes, V.\*; Alvarez, F.\*; Figueroa, C. A.; Joshi, A. A.; Hosmani, S. S.

The surface behaviour of surface mechanical attrition treated (SMATed) and plasma-nitrided AISI 2205 and AISI 304L steels was investigated in the present study. The intersection of the mechanical twins formed the submicron-size rhombic blocks in the surface region of the SMATed AISI 304L steel. However, such microstructural feature was absent in the SMATed AISI 2205 steel. The improvement in the surface-hardness due to the SMAT was about 70-80% for AISI 2205, and more than 100% for AISI 304L steel. The nature of passive film formed on the AISI 2205 steel was different from the AISI 304L steel. Passive film formed on the SMATed AISI 304L steel was relatively more unstable than that of the AISI 2205 steel at an elevated electric-potential and in a plasma environment. The plasma-nitriding response was affected due to the different passivation behaviour of the SMATed, and non-SMATed steels.

SURFACE ENGINEERING [35], 3, 205-215, 2019. DOI: 10.1080/02670844.2018.1516372

[P137-2019] “Testing the system size dependence of hydrodynamical expansion and thermal particle production with  $\pi$ , K, p, and  $\phi$  in Xe-Xe and Pb-Pb collisions with ALICE”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

We present new results on transverse momentum spectra, integrated yields, and mean transverse momenta of pions, kaons, and protons, as well as of  $\phi$ -mesons for various centrality classes measured in Pb-Pb and Xe-Xe collisions at the LHC. This unique set of data allows us to investigate bulk particle production for very different systems at similar multiplicities. The chemical and kinetic freeze-out parameters are extracted via statistical-thermal and combined blast-wave fits to the data in heavy-ion collisions and are compared to results obtained in pp and p-Pb collisions at similar multiplicities. The evolution of collective-like effects from pp and p-Pb collisions to Xe-Xe and Pb-Pb collisions is further investigated by detailed comparisons to predictions from models.

NUCLEAR PHYSICS A [982], 427-430, 2019. DOI: 10.1016/j.nuclphysa.2018.09.082

[P138-2019] “The evolution of the near-side peak in two-particle number and transverse momentum correlations in Pb-Pb collisions from ALICE”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

Two-particle number and transverse momentum correlations are powerful tools for studying the medium produced in heavy-ion collisions. Correlations in the angular separation of pairs of hadrons can provide information on the medium transport characteristics. In particular, the transverse momentum correlations are sensitive to momentum currents, and provide information about the system life time, the shear viscosity over entropy density ratio ( $\eta/s$ ) and the system relaxation time ( $\tau(\pi)$ ).

Furthermore, the interaction of the jets produced in the initial stages of a collision can be studied using number correlations, by observing the medium-induced modification of the near-side jet peak. Measurements of both sets of correlations from Pb-Pb collisions are reported as a function of centrality. Theoretical interpretations and results from Monte Carlo generators are then confronted with the experimental data.

NUCLEAR PHYSICS A [982], 363-366, 2019. DOI: 10.1016/j.nuclphysa.2018.09.055

[P139-2019] “Upconversion Nanocomposite Materials With Designed Thermal Response for Optoelectronic Devices”

Martinez, E. D.\*; Brites, C. D. S.; Carlos, L. D.; Urbano, R. R.\*; Rettori, C.\*

Upconversion is a non-linear optical phenomenon by which low energy photons stimulate the emission of higher energy ones. Applications of upconversion materials are wide and cover diverse areas such as bio-imaging, solar cells, optical thermometry, displays, and anti-counterfeiting technologies, among others. When these materials are synthesized in the form of nanoparticles, the effect of temperature on the optical emissions depends critically on their size, creating new opportunities for innovation. However, it remains a challenge to achieve upconversion materials that can be easily processed for their direct application or for the manufacture of optoelectronic devices. In this work, we developed nanocomposite materials based on upconversion nanoparticles (UCNPs) dispersed in a polymer matrix of either polylactic acid or poly(methyl methacrylate). These materials can be processed from solution to form thin film multilayers, which can be patterned by applying soft-lithography techniques to produce the desired features in the micro-scale, and luminescent tracks when used as nanocomposite inks. The high homogeneity of the films, the uniform distribution of the UCNPs and the easygoing deposition process are the distinctive features of such an approach. Furthermore, the size-dependent thermal properties of UCNPs can be exploited by a proper formulation of the nanocomposites in order to develop materials with high thermal sensitivity and a thermochromic response. Here, we thus present different strategies for designing optical devices through patterning techniques, ink dispensing and multilayer stacking. By applying upconverting nanocomposites with unique thermal responses, local heating effects in designed nanostructures were observed.

FRONTIERS IN CHEMISTRY [7], 83, 2019. DOI: 10.3389/fchem.2019.00083

[P140-2019] “Upgrade of the ALICE central barrel tracking detectors: ITS and TPC”

Acharya, S.; Acosta, F. T.; Adamova, D.; Albuquerque, D. S. D.\*; Chinellato, D. D.\*; De Souza, R. D.\*; Takahashi, J.\*; et al. ALICE Collaboration

The ALICE Collaboration will undertake a major upgrade of the detector apparatus during the second LHC Long Shutdown LS2 (2019-2020) in view of the Runs 3 and 4 (2021-2029). The objective of the upgrade is two-fold: i) an improvement of the tracking precision and efficiency, in particular in the low-momentum range; ii) an improvement of the readout capabilities of the experiment, in order to fully exploit the luminosity for heavy ions envisaged after LS2. The first goal will be achieved by replacing the Inner Tracking System with a new tracker, composed of seven layers of silicon pixel detector. The new tracker will be made up of about 25000 Monolithic Active Pixel Sensors with fast readout, resulting in a material thickness reduced to 0.3% (inner layers) -1% (outer layers) of the radiation length and a granularity of  $28 \times 28 \mu\text{m}^2$ .

The second goal will be achieved, among other measures, by replacing the readout chambers of the 90 m(3) Time Projection Chamber with Micro Pattern Gaseous Detectors. In particular, the new readout chambers will consist of stacks of 4 Gas Electron Multiplier foils combining different hole pitches. The upgraded detector will operate continuously without the use of a triggered gating grid. It will thus be able to record all Pb-Pb collisions at the LHC interaction rate of 50 kHz.

**NUCLEAR PHYSICS A [982], 943-946, 2019. DOI: 10.1016/j.nuclphysa.2018.08.022**

**[P141-2019] “Weak measurement of the Goos-Hanchen shift of partially coherent light beams”**

**Santana, O. J. S.\*; de Araujo, L. E. E.\***

Optical beam shifts are very small and challenging phenomena to measure. Weak measurement techniques have been developed to amplify and more easily measure the shifts of spatially coherent beams. We here investigate theoretically a weak measurement technique for measuring the Goos-Hanchen shift of partially spatially coherent beams. We show that the amplification factor of the technique depends on the global coherence degree of the field and on the size of the Goos-Hanchen shift experienced by the beam. Large amplification factors can be obtained for low shifts, even for very incoherent beams. But, for higher beam shifts, such as those occurring near critical incidence, the amplification factors are modest to low for beams of low coherence.

**JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS [36], 2, 533-540, 2019. DOI: 10.1364/JO-SAB.36.000533**

**\*Autores da comunidade IFGW**

**Fonte: Web of Science on-line (WOS)**

## Patentes 2018

**[Pa001-2018] “Técnica de recepção de sinais ópticos através de um pré-amplificador óptico híbrido, formado por um amplificador de fibra dopada e um amplificador paramétrico”**

**Hugo Luis Fragnito\*, André Guimarães dos Santos, Fábio Donati Simões, Felix Emilio Prado Cornejo, Jorge Diego Marconi, José Manuel Chávez Boggio**

**Número da Patente ou Registro: Agência INOVA: PI0405497-0**

**Tipo: Patente de Invenção**

**Mês/Ano de Conclusão: 02/2018 - INPI/BBRASIL**

**[Pa002-2018] “Processo de modulação das propriedades de amido usando plasma frio e amido modificado”**

**Maria Teresa Pedrosa Silva Clerici, Carlos Salles Lambert\*, Yoon Kil Chang**

**Número da Patente ou Registro: Agência INOVA: PI0903002-6**

**Tipo: Patente de Invenção**

**Mês/Ano de Conclusão: 11/2018 - INPI/BBRASIL**

**[Pa003-2018] “Prisma, e laser compacto unidirecional, de frequência-única, com cavidade de geometria plana em anel sem elementos intracavidade”**

**Flávio Caldas da Cruz\***

**Número da Patente ou Registro: Agência INOVA: PI0705854-3**

**Tipo: Patente de Invenção**

**Mês/Ano de Conclusão: 10/2018 - INPI/BBRASIL**

**[Pa004-2018] “Método para suprimir o espalhamento Brillouin estimulado e dispositivos paramétricos com supressão do espalhamento Brillouin estimulado”**

**Hugo Luis Fragnito\*, André Guimarães dos Santos, Felix Emilio Prado Cornejo, Jorge Diego Marconi, José Manuel Chávez Boggio**

**Número da Patente ou Registro: Agência INOVA: PI0402966-6**

**Tipo: Patente de Invenção**

**Mês/Ano de Conclusão: 02/2018 - INPI/BBRASIL**

**[Pa005-2018] “Método de medição do coeficiente de dispersão cromática de quarta ordem em fibra óptica e dispositivo de medição do coeficiente de dispersão cromática de quarta ordem em fibra óptica”**

**Hugo Luis Fragnito\*, Jorge Diego Marconi, José Manuel Chávez Boggio**

**Número da Patente ou Registro: Agência INOVA: PI0605704-7**

**Tipo: Patente de Invenção**

**Mês/Ano de Conclusão: 02/2018 - INPI/BBRASIL**

**[Pa006-2018] “Método de descontaminação de produtos embalados à vácuo”**

**Carlos Salles Lambert\*, Claudia Nakamura Horita, Anderson de Souza Sant’Ana**

**Número da Patente ou Registro: Agência INOVA: BR 10 2018 075245 6**

**Tipo: Patente de Invenção**

**Mês/Ano de Conclusão: 12/2018 - INPI/BBRASIL**

**[Pa007-2018] “Laser semiconductor heterogêneo III-V em silício”**

**Newton Cesario Frateschi\*, Guilherme Fórniás Machado de Rezende**

**Número da Patente ou Registro: Agência INOVA: BR 10 2018 077535-9**

**Tipo: Patente de Invenção**

**Mês/Ano de Conclusão: 12/2018 - INPI/BBRASIL**

**[Pa008-2018] “Forno de nitretação iônica com catodos múltiplos”**

**Daniel Wisnivesky\***

**Número da Patente ou Registro: Agência INOVA: PI0700308-0**

**Tipo: Patente de Invenção**

**Mês/Ano de Conclusão: 02/2018 - INPI/BBRASIL**

[Pa009-2018] “Fibra óptica com casca e núcleo líquidos, método para preenchimento simultâneo e método de redução do número de modos guiados”

Cristiano Monteiro de Barros Cordeiro\*, Christiano José Santiago de Matos, Eliane Moura dos Santos, Daniel dos Santos Ferreira, Carlos Henrique de Brito Cruz\*, Aniel Wisniwesky

Número da Patente ou Registro: Agência INOVA: PI0705636-2

Tipo: Patente de Invenção

Mês/Ano de Conclusão: 07/2018 - INPI/BBRASIL

[Pa010-2018] “Fibra óptica capilar com núcleo embutido”

Cristiano Monteiro de Barros Cordeiro\*, Marcos Antonio Ruggieri Franco, Jonas Henrique Osório

Número da Patente ou Registro: Agência INOVA: BR 20 2018 011551 6

Tipo: Patente de Invenção

Mês/Ano de Conclusão: 06/2018 - INPI/BBRASIL

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

## Defesas de Teses do IFGW

[T001-2019] “Método Variational Path-Integral Aplicado a Sistemas”

Aluno: Vinícius Zamprônio Pedrosa

Orientador: Prof. Dr. Sílvio A. S. Vitiello

Data: 15/03/2019

[T002-2019] “Dissipação Quântica em Sistemas de Muitos Corpos: Uma Versão Quântica do Modelo de Drude”

Aluno: Lisan Marcos Marques Durão

Orientador: Prof. Dr. Amir Ordacgi Caldeira

Data: 22/03/2019

[T003-2019] “Simetrias de Lie e Leis de Conservação para Sistemas de Equações Diferenciais Parciais sem Lagrangiana Modelando Fenômenos Hidrodinâmicos”

Aluno: Valter Aparecido Silva Junior

Orientador: Prof. Dr. Yuri Dimitrov Bozhkov

Data: 29/03/2019

[T004-2019] “Desvio de feixes ópticos: o efeito Goos-Hänchen”

Aluno: Octavio José Santos de Santana

Orientador: Prof. Dr. Luis Eduardo Evangelista de Araujo

Data: 24/04/2019

[T005-2019] “Física de Sabor de Neutrinos”

Aluno: Pedro Simoni Pasquini

Orientador: Prof. Dr. Orlando Luis Goulart Peres

Data: 08/05/2019

## Defesas de Dissertações do IFGW

[D002-2019] “Estruturas e Transições magnéticas dos compostos  $GdNiSi_3$  e  $TbNiSi_3$ ”

Aluno: Rodolfo Tartaglia Souza

Orientador: Prof. Dr. Eduardo Granado Monteiro da Silva

Data: 29/03/2019

[D003-2019] “Estrutura cristalina e valência de Yb no composto de Férmions Pesados  $YbFe_2Zn_{20}$  com substituição de Cd”

Aluno: André Luiz Fahl

Orientador: Prof. Dr. Eduardo Granado Monteiro da Silva

Data: 29/03/2019

[D004-2019] “Síntese e caracterização dos compostos intermetálicos  $CeTM_2$  (T = Cu e Cd; M = Bi e Sb)”

Aluno: Gabriel Silva Freitas

Orientador: Prof. Dr. Pascoal José Giglio Pagliuso

Data: 24/05/2019

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

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

\*Nestes meses não há Defesas de Dissertações e Teses do PECIM com Orientadores do IFGW.

## Abstracta

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