

Abstracta

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Trabalhos Publicados

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P091-10 à P133 -10

Trabalhos Publicados

[P091-10] “Ab initio study of linear atomic chains in copper nanowires”

Amorim, E. P. M. and da Silva, E. Z.

Recently experimental and theoretical results established that copper nanowires (NWs) evolve to form linear atomic chains when pulled along the [100], [110], and [111] crystallographic directions. Since that, copper NWs became an exciting alternative to produce nanocontacts. In the present study, we used ab initio calculations based on density-functional theory within the local density and generalized gradient approximations to investigate the electronic structure of copper NWs obtained from previous tight-binding molecular dynamics (TBMD) simulations. The TBMD structures obtained just before rupture were used for the ab initio calculations. By pulling the NWs quasistatically in these cases, we also observed their breaking at similar distances as in the TBMD, regardless of the exchange-correlation potential used. The pulling forces before rupture were also presented for TBMD and ab initio calculations and they are in good agreement. Finally, we present a detailed analysis of the electronic structure of selected atoms from the NWs linear atomic chains and tips before rupture. Our results show that the electronic properties are bulklike for atoms with coordination six or more. However, lower coordinated atoms from tips and linear atomic chains have their electronic properties characterized by sharper d and s states shifted toward the Fermi energy

Physical Review B 81[11]. 115463. 2010.

[P092-10] “An initial value representation for the coherent state propagator with complex trajectories”

de Aguiar, M. A. M., Vitiello, S. A., and Grigolo, A.

We present an initial value representation for the semiclassical coherent state propagator based on complex trajectories. We map the complex phase space into a real one with twice as many dimensions and introduce initial valued trajectories in this double phase space. We use a procedure to eliminate non-contributing trajectories that allows for the automation of the entire calculation, rendering it simple. The resulting semiclassical formulas do not show divergences due to caustics and provide accurate results in short computational times. (C) 2010 Elsevier B.V. All rights reserved

Chemical Physics 370[1-3], 42-50. 2010.

[P093-10] “Andreev tunneling through a double quantum-dot system coupled to a ferromagnet and a superconductor: Effects of mean-field electronic correlations”

Siqueira, E. C. and Cabrera, G. G.

We study the transport properties of a hybrid nanostructure composed of a ferromagnet, two quantum dots, and a superconductor connected in series. By using the nonequilibrium Green's function approach, we have calculated the electric current, the differential conductance, and the transmittance for energies within the superconductor gap. In this regime, the mechanism of charge transmission is the Andreev reflection, which allows for a control of the current through the ferromagnet polarization. We have also included interdot and intradot interactions, and have analyzed their influence through a mean-field approximation. In the presence of interactions, Coulomb blockade tend to localize the

electrons at the double-dot system, leading to an asymmetric pattern for the density of states at the dots, and thus reducing the transmission probability through the device. In particular, for nonzero polarization, the intradot interaction splits the spin degeneracy, reducing the maximum value of the current due to different spin-up and spin-down densities of states. Negative differential conductance appears for some regions of the voltage bias, as a result of the interplay of the Andreev scattering with electronic correlations. By applying a gate voltage at the dots, one can tune the effect, changing the voltage region where this novel phenomenon appears. This mechanism to control the current may be of importance in technological applications

Physical Review B 81[9]. 094526. 2010.

[P094-10] “Autler-Townes doublet and electromagnetically induced transparency resonance probed by an ultrashort pulse train”

Soares, A. A. and de Araujo, L. E. E.

We study theoretically the interaction between an ultrashort pulse train and a three-level atom driven by a cw laser. We show that the pulse train can be employed to observe spectra of Autler-Townes doublet and electromagnetically induced transparency resonance that are time and frequency resolved. The observation of subnatural linewidth features associated with the electromagnetically induced transparency resonance is described. The temporal evolution of electromagnetically induced transparency of the pulse train is shown to exhibit new and different features compared to that of the related phenomenon of coherent population trapping. By matching the tooth separation of the frequency comb associated with the pulse train to that of the Autler-Townes doublet, quantum beats between the doublet components can be induced. We show that coherent accumulation of excitation plays a major role in the two studied phenomena

Journal of Physics B-Atomic Molecular and Optical Physics 43[8]. 085003. 2010.

[P095-10] “Bipartite quantum channels using multipartite cluster-type entangled coherent states”

Munhoz, P. P., Roversi, J. A., Vidiella-Barranco, A., and Semiao, F. L.

We propose a particular encoding for bipartite entangled states derived from multipartite cluster-type entangled coherent states (CTECs). We investigate the effects of amplitude damping on the entanglement content of this bipartite state, as well as its usefulness as a quantum channel for teleportation. We find interesting relationships among the amplitude of the coherent states constituting the CTCESs, the number of subsystems forming the logical qubits (redundancy), and the extent to which amplitude damping affects the entanglement of the channel. For instance, in the sense of sudden death of entanglement, given a fixed value of the initial coherent state amplitude, the entanglement life span is shortened if redundancy is increased

Physical Review A 81[4]. 042305. 2010.

[P096-10] “Charged and strange hadron elliptic flow in Cu plus Cu collisions at root s(NN)=62.4 and 200 GeV”

Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Alekseev, I., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Balewski, J., et al

We present the results of an elliptic flow, v_2 , analysis of Cu + Cu collisions recorded with the solenoidal tracker detector (STAR) at the BNL Relativistic Heavy Ion Collider at root $s(NN) = 62.4$ and 200 GeV. Elliptic flow as a function of transverse momentum, $v_2(p(T))$, is reported for different collision centralities for charged hadrons $h(+/-)$ and strangeness-containing hadrons $K-S(0)$, Λ , Ξ , and ϕ in the midrapidity region $|\eta| < 1.0$. Significant reduction in systematic uncertainty of the measurement due to nonflow effects has been achieved by correlating particles at midrapidity, $|\eta| < 1.0$, with those at forward rapidity, $2.5 < |\eta| < 4.0$. We also present azimuthal correlations in $p + p$ collisions at roots = 200 GeV to help in estimating nonflow effects. To study the system-size dependence of elliptic flow, we present a detailed comparison with previously published results from Au + Au collisions at root $s(NN) = 200$ GeV. We observe that $v_2(p(T))$ of strange hadrons has similar scaling properties as were first observed in Au + Au collisions, that is, (i) at low transverse momenta, $p(T) < 2$ GeV/c, v_2 scales with transverse kinetic energy, $m(T) - m$, and (ii) at intermediate $p(T)$, $2 < p(T) < 4$ GeV/c, it scales with the number of constituent quarks, $n(q)$. We have found that ideal hydrodynamic calculations fail to reproduce the centrality dependence of $v_2(p(T))$ for $K-S(0)$ and Λ . Eccentricity scaled v_2 values, v_2/ϵ , are larger in more central collisions, suggesting stronger collective flow develops in more central collisions. The comparison with Au + Au collisions, which go further in density, shows that v_2/ϵ depends on the system size, that is, the number of participants N_{part} . This indicates that the ideal hydrodynamic limit is not reached in Cu + Cu collisions, presumably because the assumption of thermalization is not attained.

Physical Review C 81[4]. 044902. 2010.

[P097-10] "Computational study of configurational and vibrational contributions to the thermodynamics of substitutional alloys: The case of Ni3Al"

Michelon, M. F. and Antonelli, A.

We have developed a methodology to study the thermodynamics of order-disorder transformations in n -component substitutional alloys that combines nonequilibrium methods, which can efficiently compute free energies, with Monte Carlo simulations, in which configurational and vibrational degrees of freedom are simultaneously considered on an equal footing basis. Furthermore, with this methodology one can easily perform simulations in the canonical and in the isobaric-isothermal ensembles, which allow the investigation of the bulk volume effect. We have applied this methodology to calculate configurational and vibrational contributions to the entropy of the Ni₃Al alloy as functions of temperature. The simulations show that when the volume of the system is kept constant, the vibrational entropy does not change upon transition while constant-pressure calculations indicate that the volume increase at the order-disorder transition causes a vibrational entropy increase of 0.08k(B)/atom. This is significant when compared to the configurational entropy increase of 0.27k(B)/atom. Our calculations also indicate that the inclusion of vibrations reduces in about 30% the order-disorder transition temperature determined solely considering the configurational degrees of freedom

Physical Review B 81[9]. 094204. 2010.

[P098-10] "Construction of white-light holographic screens"

Lunazzi, J. J. ; Magalhães, D. S. F. ; Serra, R.L.

In this paper we describe one setup employed for the recording of two types of holographic screens that can be used in white-light applications. We show how to obtain holographic screens with areas up to 1370 cm² and diffraction efficiency of 17%. We analyze the holographic screens in their relevant aspects as to focal lengths, theoretical approach, sizes and diffraction efficiencies specifying when each type is appropriate for particular applications.

Opt. Eng. (Bellingham), v. 48[9]. 095802. 2009.

[P099-10] "Construction of restricted field of view holographic screens"

José J. Lunazzi, Daniel S. F. Magalhães, Rolando L. Serra,

In this paper we describe two different setups employed for recording holographic screens that can be used in whitelight applications. We show how to obtain holographic screens with areas up to 1370 cm² and diffraction efficiency of 20%. We analyze the holographic screens in their relevant aspects as to focal lengths, sizes and diffraction efficiencies specifying when each type is appropriate for particular applications.

Optics & Laser Technology, 43[1]. 119-123. 2011.

[P100-10] "Effects of Ru doping on the transport and magnetic properties of a La_{1.32}Sr_{1.68}Mn_{2-y}Ru_yO₇ layered manganite system"

Kumaresavanji, M., Sousa, L. L. L., Machado, F. L. A., Adriano, C., Pagliuso, P. G., Saitovitch, E. M. B., and Fontes, M. B.

The low temperature magnetization, specific heat, electrical resistance and magnetoresistance have been studied for the Ru-doped La_{1.32}Sr_{1.68}Mn_{2-y}Ru_yO₇ ($y = 0.0, 0.04, 0.08$ and 0.15) layered manganite system. The undoped compound ($y = 0.0$) shows a sharp ferromagnetic transition (T-C) accompanied by a metal-insulator transition (T-MI) at 118 K. The Ru substitution decreases the T-C and T-MI temperatures significantly. The temperature dependence of specific heat measurement confirms the decrease in T-C by observing the anomaly corresponding to T-C. The decreased effective moments from 3.48 $\mu(B)$ for the undoped compound to 1.82 $\mu(B)$ for the highly doped compound at 5 K indicates the Ru substitution weakens the ferromagnetic order in the low temperature regime and reduces the number of Mn pairs in the highly doped sample. The field dependence of magnetization measurements exhibits an enhancement of the coercive field with increased Ru concentration and gives evidence for the mixed magnetic phase for the highly doped compound. For the undoped sample, a large negative magnetoresistance of 300% at T-C and 128% at 4.2 K in a 5 T field were observed. The magnetoresistance ratio decreases gradually with increasing Ru substitution. We find that the doped Ru in the Mn site drives the layered manganite system towards a magnetically mixed state. The effects of Ru doping in the transport and magnetic properties will be explained by the antiferromagnetically coupled Ru and Mn sublattices

Journal of Physics-Condensed Matter 22[23]. 236003. 2010.

[P101-10] "Electromagnetically induced phase grating"

de Araujo, L. E. E.

I propose an electromagnetically induced phase grating based on the giant Kerr nonlinearity of an atomic medium under electromagnetically induced transparency. The atomic phase grating behaves similarly to an ideal sinusoidal phase grating, and it is capable of producing a pi phase excursion across a weak probe beam along with high transmissivity. The grating is created with arbitrarily weak fields, and diffraction efficiencies as high as 30% are predicted. (C) 2010 Optical Society of America

Optics Letters 35[7], 977-979. 2010.

[P102-10] "Electron collisions with alpha-D-glucose and beta-D-glucose monomers"

da Costa, R. F., Bettega, M. H. F., Varella, M. T. D., and Lima, M. A. P.

The development of new alternative routes for production of second generation ethanol from sugarcane biomass poses a challenge to the scientific community. Current research in this field addresses the use of a plasma-based pretreatment of the lignocellulosic raw material. With the aim to provide a theoretical background for this experimental technique we investigate the role of low-energy electrons from the plasma in the rupture of the matrix of cellulosic chains. In this paper, we report calculated cross sections for elastic scattering of low-energy electrons by the alpha- and beta-D-glucose monomers. The calculations employed the Schwinger multichannel method with pseudopotentials and were carried out at the static-exchange and static-exchange plus polarization levels of approximation. Through the comparison of the results obtained with inclusion of polarization effects we discuss the influence of the different conformations of the hydroxyl group linked to the anomeric carbon on the resonance spectra of these molecules. Resonant structures appearing at different energies for alpha- and beta-glucose at the low-energy regime of impact energies can be understood as a fingerprint of an "isomeric effect" and suggest that distinct fragmentation mechanisms proceeding via sigma(*) shape resonances may become operative depending on the glucose anomer under consideration. For energies above 15 eV the integral elastic cross sections are very similar for both monomers. Differential cross sections for the glucopyranose anomers considered in this work are typically dominated by a strong forward scattering due to the molecules' large electric dipole moments and, for energies close to the resonances' positions, they display particular features at the intermediate angular region, notably a pronounced f-wave scattering pattern, that are probably associated with the presence of those structures

Journal of Chemical Physics 132[12]. 124309. 2010.

[P103-10] "Fission track chemical etching kinetic model"

Moreira, P. A. F. P., Guedes, S., Iunes, P. J., and Hadler, J. C.

In fission track thermochronology (FIT) latent fission tracks can be observed under the optical microscope only after chemical etching. The understanding of the etching process in the origin of this track is important for fission track annealing models. This may allow the determination of parameters related to etching kinetics independently of the models fit to the annealing data. In this work, a chemical etching kinetic model based on chemical principles and geometric track features is presented. The relation between track mean length, L (μm), and etching time, t (s), is given by $L = L_0[1 - (Kt+1)^{-M}]^n$ where L_0 (μm), K (s^{-1}), M and n are parameters. M and n are dimensionless. The L_0 can be associated with the initial mean length of the tracks. The model fits well experimental data for apatite and muscovite mica. In addition, it corroborates

the assumption of one of the fission-track annealing models proposed for FFT that strength and efficiency of etching depend on the amount of defects (or displaced atoms) compounding the track. (C) 2009 Elsevier Ltd. All rights reserved

Radiation Measurements 45[2], 157-162. 2010.

[P104-10] "Gd³⁺ rattling triggered by a "weak" M-I transition at 140-160K in the Ce_{1-x}GdxFe₄P₁₂ (x approximate to 0.001) skutterudite compounds: An ESR study"

Garcia, F. A., Duque, J. G. S., Pagliuso, P. G., Rettori, C., Fisk, Z., and Oseroff, S. B.

In this work we report electron spin resonance (ESR) measurements in the semiconducting Ce_{1-x}GdxFe₄P₁₂ (x approximate to 0.001) filled skutterudite compounds. Investigation of the temperature (T) dependence of the ESR spectra and relaxation process suggests, that in the T-interval of 140-160K, the onset of a "weak" metal-insulator (M-I) transition takes place due to the increasing density of thermally activated carriers across the semiconducting gap of approximate to 1500K. In addition, the observed low-T fine and hyperfine structures start to collapse at T approximate to 140K and is completely absent for T greater than or similar to 160 K. We claim that the increasing carrier density is able to trigger the rattling of the Gd³⁺ ions which in turn is responsible, via a motional narrowing mechanism, for the collapse of the ESR spectra. (C) 2010 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

Physica Status Solidi B-Basic Solid State Physics 247[3], 647-649. 2010.

[P105-10] "H₃PO₄- and H₂SO₄- treated niobic acid as heterogeneous catalyst for methyl ester production"

de Pietre, M. K., Almeida, L. C. P., Landers, R., Vinhas, R. C. G., and Luna, F. J.

The activity of solid niobic acid treated with sulfuric acid and with phosphoric acid was tested in the catalytic esterification of oleic acid and in transesterification of soybean oil with methanol. X-ray diffraction studies revealed niobic acid treated with sulfuric acid to be an amorphous solid, while niobic acid treated with phosphoric acid presented a crystalline phase, probably due to the formation of hydrogen niobium phosphate. Among the characterization methods employed here, XPS was particularly instrumental in showing that niobium dihydrogen phosphate and niobium hydrogen sulfate moieties are the acidic active sites responsible for the catalytic effect. The latter is more active according to ammonia TPD studies. Yields as high as 78% in the esterification of oleic acid with methanol and 40% in the transesterification of soybean oil catalyzed by NbSO₄ were recorded

Reaction Kinetics Mechanisms and Catalysis 99[2], 269-280. 2010.

[P106-10] "Iron Oxide Nanosized Clusters Embedded in Porous Nanorods: A New Colloidal Design to Enhance Capabilities of MRI Contrast Agents"

Rebolledo, A. F., Laurent, S., Calero, M., Villanueva, A., Knobel, M., Marco, J. F., and Tartaj, P.

Development of nanosized materials to enhance the image contrast between the normal and diseased tissue and/or to indicate the status of organ functions or blood flow is essential in nuclear magnetic resonance imaging (MRI). Here we describe a contrast agent based on a new ben oxide design (superparamagnetic iron oxide clusters embedded in antiferromagnetic iron oxide porous nanorods). We show as a proof-of-concept that aqueous colloidal suspensions containing these particles show enhanced-proton relaxivities (i.e., enhanced MRI contrast capabilities). A remarkable feature of this new design is that large scale production is possible since aqueous-based routes are used, and porosity and iron oxide superparamagnetic clusters are directly developed from a single phase. We have also proved with the help of a simple model that the physical basis behind the increase in relaxivities lies on both the increase of dipolar field (interactions within iron oxide clusters) and the decrease of proton-cluster distance (porosity favors the close contact between protons and clusters). Finally, a list of possible steps to follow to enhance capabilities of this contrast agent is also included (partial coating with noble metals to add extra sensing capacity and chemical functionality, to increase the amount of doping while simultaneously carrying out cytotoxicity studies, or to find conditions to further decrease the size of the nanorods and to enhance their stability)

Acs Nano 4[4], 2095-2103. 2010.

[P107-10] “La óptica de imágenes en la extensión universitaria de Unicamp”

José Joaquín Lunazzi, Daniel S. F. Magalhães, Maria Clara Igrejas Amon, Rolando Serra Toledo

La enseñanza de la física y en particular de la óptica siempre ha enfrentado problemas de aspecto motivacional principalmente por la pérdida del vínculo con la práctica social y con la vida cotidiana del estudiante. Además, las prácticas de laboratorio han perdido mucho espacio en la enseñanza media por carencias de las escuelas o debido a que tiene apenas como objeto el examen de ingreso a la universidad. El objetivo de este trabajo es mostrar como una actividad de extensión universitaria llamada “Exposición de Holografía” intenta motivar a estudiantes de enseñanza media a través de la experimentación, observación y aplicación de conceptos físicos en la vida cotidiana, despertando sus intereses por la física general.

Latin-American Journal of Physics Education, 4 [2], May 2010
ISSN 1870-9095

[P108-10] “Magnetic and transport properties in ordered arrays of permalloy antidots and thin films”

Confalonieri, G. A. B., Pirota, K. R., Vazquez, M., Nemes, N. M., Garcia-Hernandez, M., Knobel, M., and Batallan, F.

The magnetotransport behaviors of two types of permalloy nanostructures, thin films and antidots, are presented and discussed. Antidots samples were prepared by sputtering a Ni₈₀Fe₂₀ layer on top of a nanoporous alumina membrane. A counterpart continuous thin film grown on a continuous Si substrate was also prepared. The magnetoresistance (MR) was measured both as a function of the external applied magnetic field and of the angular orientation, and thus compared with the magnetization curves. The introduction of antidots is found to reduce the anisotropic MR and the angular dependence of the MR, simultaneously increasing the coercive field of the samples. The influence of the sample geometry on the perpendicular MR behavior is reported and discussed. (C) 2010 American Institute of Physics. [doi:10.1063/1.3383039]

Journal of Applied Physics 107[8]. 083918. 2010.

[P109-10] “Magnetic phase separation and cluster-spin-glass behavior in LaMn_{1-x}Fe_xO_{3+y}”

de Lima, O. F., Coaquira, J. A. H., de Almeida, R. L., and Malik, S. K.

The crystal structure and some magnetic properties were investigated for polycrystalline samples of LaMn_{1-x}Fe_xO_{3+y}, prepared by solid-state reaction in air. All samples show the ORT-2 orthorhombic structure that suppresses the Jahn-Teller distortion and favors a ferromagnetic (FM) superexchange interaction between Mn³⁺-O-Mn³⁺. An evolution from a fairly strong FM phase, for x=0.0, to an antiferromagnetic (AFM) phase, for x=1.0, was observed. For intermediate Fe contents, a magnetic mixed-phase state occurs, with a gradual decrease (increase) in the FM (AFM) phase as x increases. A clear cluster-spin-glass (CG) behavior is observed in our samples for x ≤ 0.1, where FM coupling dominates. In this case, the Vogel-Fulcher law describes very well the CG dynamics, giving reasonable values for the fitted parameters. (C) 2010 American Institute of Physics. [doi: 10.1063/1.3364056]

Journal of Applied Physics 107[9]. 09E107. 2010.

[P110-10] “Magnetic, thermal, and transport properties of Cd-doped CeIn₃”

Berry, N., Bittar, E. M., Capan, C., Pagliuso, P. G., and Fisk, Z.

We have investigated the effect of Cd substitution on the archetypal heavy fermion antiferromagnet CeIn₃ via magnetic susceptibility, specific-heat, and resistivity measurements. The suppression of the Neel temperature, T_N, with Cd doping is more pronounced than with Sn. Nevertheless, a doping-induced quantum critical point does not appear to be achievable in this system. The magnetic entropy at T_N and the temperature of the maximum in resistivity are also systematically suppressed with Cd, while the effective moment and the Curie-Weiss temperature in the paramagnetic state are not affected. These results suggest that Cd locally disrupts the antiferromagnetic order on its neighboring Ce moments, without affecting the valence of Ce. Moreover, the temperature dependence of the specific heat below T_N is not consistent with three-dimensional magnons in pure as well as in Cd-doped CeIn₃, a point that has been missed in previous investigations of CeIn₃ and that has bearing on the type of quantum criticality in this system

Physical Review B 81[17]. 174413. 2010.

[P111-10] “Magnetocaloric effect in GdGeSi compounds measured by the acoustic detection technique: Influence of composition and sample treatment”

Guimaraes, A. O., Soffner, M. E., Mansanares, A. M., Coelho, A. A., Carvalho, A. M. G., Pires, M. J. M., Gama, S., and da Silva, E. C.

In this paper we explore the acoustic detection method applied to the investigation of the magnetocaloric effect in Gd and Gd₅(Ge_{1-x}Si_x)₄ compounds, in the temperature range from 230 to 360 K and for magnetic fields up to 20 kOe. Measurements were performed in as-cast materials, both for powder and pellet samples, and in tree samples with compositions around Gd₅Ge₂Si₂ that underwent different thermal treatments. Small differences were observed when comparing powder and pellet samples of Gd and Gd₅(Ge_{1-x}Si_x)₄ compounds with 0.500 < x ≤ 1.00. For the alloys with composition around Gd₅Ge₂Si₂, which exhibit

giant magnetostriction and coexistence of distinct phases, expressive changes were observed when comparing powder and pellet samples. Based on these cases, it is easy to see that the acoustic method can distinguish a second-order phase transition from a first-order magnetic-crystallographic one, and that it presents good sensitivity to detect spurious material phase in small quantities. (C) 2010 American Institute of Physics. [doi: 10.1063/1.3357375]

Journal of Applied Physics 107[7]. 073524. 2010.

[P112-10] “Mode pattern dependence on the eccentricity of microstadium resonators”

da Silva, A., Barea, L. A. M., Vallini, F., von Zuben, A. A. G., and Frateschi, N. C.

Microdisk and microstadium resonators based on InGaAsP multi-quantum-well laser structures were fabricated by focused ion beam employing Ga⁺ ion milling and polishing followed by selective chemical etching. Stadia with very good morphology and with different eccentricities were fabricated for the study of optical mode selection. Light emission was investigated by infrared microscopy and spectroscopy. The measured emission pattern and the spectra agree well with a simple model based on the summation over periodic orbits or scar modes. The dependence of the scar mode emission with the resonator eccentricity was modeled based on the difference between photon lifetime and orbital round-trip time. The mode selection dependence with the surrounding index of refraction is suggested for chemical sensing applications. (C) 2010 American Institute of Physics. [doi:10.1063/1.3393296]

Journal of Applied Physics 107[8]. 083107. 2010.

[P113-10] “Modifications in magnetic properties of BiMn2O5 multiferroic using swift heavy ion irradiation”

Shukla, D. K., Kumar, R., Mollah, S., Choudhary, R. J., Thakur, P., Sharma, S. K., Brookes, N. B., and Knobel, M.

We report the near edge x-ray absorption fine structure (NEXAFS) and x-ray magnetic circular dichroism (XMCD) studies at the Mn L-3, L-2 edge of pulsed laser deposited pristine thin films of multiferroic BiMn2O5. These investigations are furthermore testified for BiMn2O5 thin films irradiated through 200 MeV Ag¹⁵⁺ ions with fluence value 5 x 10¹¹ ions/cm². Though the pristine film is primarily antiferromagnetic in nature, irradiation induces ferrimagnetism in it. Element specific characterizations, NEXAFS and XMCD demonstrate the evolution of Mn²⁺ state piloting to magnetic signal associated with it. (C) 2010 American Institute of Physics. [doi:10.1063/1.3360356]

Journal of Applied Physics 107[9]. 09D903. 2010.

[P114-10] “Near-threshold vibrational excitation of acetylene by positron impact”

de Oliveira, E. M., Lima, M. A. P., Sanchez, S. D., and Varela, M. T. D.

We report vibrational excitation cross sections for C-C and C-H symmetric stretch modes of acetylene by positron impact. The contribution of these infrared inactive modes to the annihilation parameter is also addressed. The Feshbach projection operator approach was employed to vibrationally resolve e(+)-acetylene scattering phase shifts obtained with the Schwinger multichannel method. The present results point out a virtual state pole at the equilibrium geometry of acetylene

that becomes a bound state as either bond is stretched, in qualitative agreement with previous calculations for small hydrocarbons. The vibrational couplings are stronger for the C-C mode, giving rise to a bound state pole within the Franck-Condon region of the vibrational ground state. These bound and virtual states give rise to sharp threshold structures (vibrational resonances) in both the vibrational excitation cross sections and the annihilation parameter (Z(eff)). We found fair agreement between the present calculations and previously reported e(+)-acetylene vibrational excitation cross sections

Physical Review A 81[1]. 012712. 2010.

[P115-10] “Neutrino and antineutrino inclusive charged-current cross section measurements with the MINOS near detector”

Adamson, P., Andreopoulos, C., Arms, K. E., Armstrong, R., Auty, D. J., Ayres, D. S., Backhouse, C., Barnes, P. D., Barr, G., Barrett, W. L., Bhattacharya, D., et al

The energy dependence of the neutrino-iron and antineutrino-iron inclusive charged-current cross sections and their ratio have been measured using a high-statistics sample with the MINOS near detector exposed to the NuMI beam from the main injector at Fermilab. Neutrino and antineutrino fluxes were determined using a low hadronic energy subsample of charged-current events. We report measurements of nu-Fe ((nu) over bar - Fe) cross section in the energy range 3-50 GeV (5-50 GeV) with precision of 2%-8% (3%-9%) and their ratio which is measured with precision 2%-8%. The data set spans the region from low energy, where accurate measurements are sparse, up to the high-energy scaling region where the cross section is well understood

Physical Review D 81[7]. 072002. 2010.

[P116-10] “Non-Markovian dynamics of quantum discord”

Fanchini, F. F., Werlang, T., Brasil, C. A., Arruda, L. G. E., and Caldeira, A. O.

We evaluate the quantum discord dynamics of two qubits in independent and common non-Markovian environments. We compare the dynamics of entanglement with that of quantum discord. For independent reservoirs the quantum discord vanishes only at discrete instants whereas the entanglement can disappear during a finite time interval. For a common reservoir, quantum discord and entanglement can behave very differently with sudden birth of the former but not of the latter. Furthermore, in this case the quantum discord dynamics presents sudden changes in the derivative of its time evolution which is evidenced by the presence of kinks in its behavior at discrete instants of time

Physical Review A 81[5]. 052107. 2010.

[P117-10] “Observation of charge-dependent azimuthal correlations and possible local strong parity violation in heavy-ion collisions”

Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Balewski, J., Barannikova, O., Barnby, L. S., Baumgart, S., Beavis, D. R., et al

Parity (P)-odd domains, corresponding to nontrivial topological solutions of the QCD vacuum, might be created during

relativistic heavy-ion collisions. These domains are predicted to lead to charge separation of quarks along the orbital momentum of the system created in noncentral collisions. To study this effect, we investigate a three-particle mixed-harmonics azimuthal correlator which is a P-even observable, but directly sensitive to the charge-separation effect. We report measurements of this observable using the STAR detector in Au + Au and Cu + Cu collisions at root s(NN) = 200 and 62 GeV. The results are presented as a function of collision centrality, particle separation in rapidity, and particle transverse momentum. A signal consistent with several of the theoretical expectations is detected in all four data sets. We compare our results to the predictions of existing event generators and discuss in detail possible contributions from other effects that are not related to P violation

Physical Review C 81[5]. 054908. 2010.

[P118-10] “Observation of $\pi^+\pi^-\pi^+\pi^-$ photoproduction in ultraperipheral heavy-ion collisions at root s(NN)=200 GeV at the STAR detector”

Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Balewski, J., Barnby, L. S., Baumgart, S., et al

We present a measurement of $\pi^+\pi^-\pi^+\pi^-$ photonuclear production in ultraperipheral Au-Au collisions at root s(NN) = 200 GeV from the STAR experiment. The $\pi^+\pi^-\pi^+\pi^-$ final states are observed at low transverse momentum and are accompanied by mutual nuclear excitation of the beam particles. The strong enhancement of the production cross section at low transverse momentum is consistent with coherent photoproduction. The $\pi^+\pi^-\pi^+\pi^-$ invariant mass spectrum of the coherent events exhibits a broad peak around 1540 +/- 40 MeV/c(2) with a width of 570 +/- 60 MeV/c(2), in agreement with the photoproduction data for the $\rho(0)(1700)$. We do not observe a corresponding peak in the $\pi^+\pi^-$ final state and measure an upper limit for the ratio of the branching fractions of the $\rho(0)(1700)$ to $\pi^+\pi^-$ and $\pi^+\pi^-\pi^+\pi^-$ of 2.5% at 90% confidence level. The ratio of $\rho(0)(1700)$ and $\rho(0)(770)$ coherent production cross sections is measured to be 13.4 +/- 0.8(stat.) +/- 4.4(syst.)%

Physical Review C 81[4]. 044901. 2010.

[P119-10] “Plasmon polaritons in photonic metamaterial superlattices: Absorption effects”

Mogilevtsev, D., Reyes-Gomez, E., Cavalcanti, S. B., de Carvalho, C. A. A., and Oliveira, L. E.

We discuss the propagation of electromagnetic waves in layered structures made up of alternate layers of air and metamaterials. The role played by absorption on the existence of electric and magnetic plasmon polaritons is investigated. Results show that plasmon-polariton modes are robust even in the presence of rather large absorption

Physical Review e 81[4]. 047601. 2010.

[P120-10] “Plasmon polaritons in photonic metamaterial Fibonacci superlattices”

Reyes-Gomez, E., Raigoza, N., Cavalcanti, S. B., de Carvalho, C. A. A., and Oliveira, L. E.

We study the properties of plasmon polaritons in one-dimensional photonic metamaterial superlattices resulting from the periodic repetition of a Fibonacci structure. We assume the system

made up of positive refraction and metamaterial layers. A Drude-type dispersive response for both the dielectric permittivity and magnetic permeability of the left-handed material is considered. Maxwell's equations are solved for oblique incidence by using the transfer-matrix formalism. Our results show that the plasmon-polariton modes are considerably affected by the increasing of the Fibonacci-sequence order of the elementary cell. The loss of the long-range spatial coherence of the electromagnetic field along the growth direction, which is due to the quasiperiodicity of the elementary cell, leads to the splitting of the plasmon-polariton frequencies, resulting in a Cantor-type frequency spectra. Moreover, the calculated photonic dispersion indicates that if the plasma frequency is chosen within the photonic $\kappa(\omega) = 0$ gap then the plasmon-polariton modes behave essentially as pure plasmon modes

Physical Review B 81[15]. 153101. 2010.

[P121-10] “Proton MRS may predict AED response in patients with TLE”

Campos, B. A. G., Yasuda, C. L., Castellano, G., Bilevicius, E., Li, L. M., and Cendes, F.

P>Purpose: To compare relative N-acetylaspartate (NAA) measurements in temporal lobe epilepsy (TLE) patients with good response to the first trial of antiepileptic drugs (AEDs) (an important prognostic factor) to TLE patients who failed the first AED monotherapy and required further AED trials with monotherapy or polytherapy. **Methods:** We studied 25 consecutive TLE patients who responded to first AED (responders) and 21 who did not (failure-group), as well as 27 controls. Patients were seen regularly in our Epilepsy Service and underwent electroencephalography (EEG) investigation, high-resolution magnetic resonance imaging (MRI), and single-voxel proton MR spectroscopy. Voxels were tailored to the medial temporal region on each side and involved the anterior hippocampus. **Results:** Analysis of variance (ANOVA) demonstrated significant variation of NAA/creatinine (NAA/Cr) values in both hippocampi, ipsilateral and contralateral to the EEG focus ($p < 0.001$ and $p = 0.021$) across the groups. Pairwise post hoc comparisons showed reduced NAA/Cr in both hippocampi of failure-group compared to controls ($p < 0.001$) and compared to responders ($p < 0.05$), but not between the controls and responders. Individual analyses showed NAA/Cr ratios lower than 2 SDs (standard deviations) below the mean of controls in 9 of 21 patients (42.8%) in the failure-group (6 with unilateral and 3 with bilateral reduction) but in none of the responders. **Discussion:** These results indicate that patients with TLE who respond well to the first AED have significantly less evidence of neuronal and axonal damage/dysfunction compared to those who are refractory to the first AED trial

Epilepsia 51[5], 783-788. 2010.

[P122-10] “Search for sterile neutrino mixing in the MINOS long-baseline experiment”

Adamson, P., Andreopoulos, C., Auty, D. J., Ayres, D. S., Backhouse, C., Barnes, P. D., Barr, G., Barrett, W. L., Bishai, M., Blake, A., Bock, G. J., Boehnlein, D. J., Bogert, D., et al

A search for depletion of the combined flux of active neutrino species over a 735 km baseline is reported using neutral-current interaction data recorded by the MINOS detectors in the NuMI neutrino beam. Such a depletion is not expected according to conventional interpretations of neutrino oscillation data involving the three known neutrino flavors.

A depletion would be a signature of oscillations or decay to postulated noninteracting sterile neutrinos, scenarios not ruled out by existing data. From an exposure of 3.18×10^{20} protons on target in which neutrinos of energies between similar to 500 MeV and 120 GeV are produced predominantly as $\nu(\mu)$, the visible energy spectrum of candidate neutral-current reactions in the MINOS far detector is reconstructed. Comparison of this spectrum to that inferred from a similarly selected near-detector sample shows that of the portion of the $\nu(\mu)$ flux observed to disappear in charged-current interaction data, the fraction that could be converting to a sterile state is less than 52% at 90% confidence level (C. L.). The hypothesis that active neutrinos mix with a single sterile neutrino via oscillations is tested by fitting the data to various models. In the particular four-neutrino models considered, the mixing angles θ_{24} and θ_{34} are constrained to be less than 11 degrees and 56 degrees at 90% C. L., respectively. The possibility that active neutrinos may decay to sterile neutrinos is also investigated. Pure neutrino decay without oscillations is ruled out at 5.4 standard deviations. For the scenario in which active neutrinos decay into sterile states concurrently with neutrino oscillations, a lower limit is established for the neutrino decay lifetime $\tau(3)/m(3) > 2.1 \times 10^{-12}$ s/eV at 90% C.L

Physical Review D 81[5]. 052004. 2010.

[P123-10] "Solving the thermal stability problem at the HfO2/Si interface with previous N implantation"

Carazzolle, M. F., Fluchter, C. R., de Siervo, A., Pancotti, A., Weier, D., Schurmann, M., Westphal, C., Landers, R., and Kleiman, G. G.

We report on the use of N implantation to produce thin, pure, uniform, and thermally stable Si3N4 buffer layers and HfO2 overlayers on Si(100) and Si(111) without silicide formation. (C) 2010 American Institute of Physics. [doi: 10.1063/1.3298438]

Journal of Applied Physics 107[5]. 056101. 2010.

[P124-10] "Spectra of identified high-p(T) $\pi^{+/-}$ and $p(\bar{p})$ in Cu + Cu collisions at $\sqrt{s(NN)}=200$ GeV"

Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Anderson, B. D., Arkhipkin, D., Averichev, G. S., Balewski, J., Barnby, L. S., Baumgart, S., Beavis, D. R., Bellwied, R., Benedetto, F., et al

We report new results on identified (anti) proton and charged pion spectra at large transverse momenta ($3 < p(T) < 10$ GeV/c) from Cu + Cu collisions at $\sqrt{s(NN)} = 200$ GeV using the STAR detector at the Relativistic Heavy Ion Collider (RHIC). This study explores the system size dependence of two novel features observed at RHIC with heavy ions: the hadron suppression at high-p(T) and the anomalous baryon to meson enhancement at intermediate transverse momenta. Both phenomena could be attributed to the creation of a new form of QCD matter. The results presented here bridge the system size gap between the available pp and Au + Au data, and allow for a detailed exploration of the onset of the novel features. Comparative analysis of all available 200 GeV data indicates that the system size is a major factor determining both the magnitude of the hadron spectra suppression at large transverse momenta and the relative baryon to meson enhancement

Physical Review C 81[5]. 054907. 2010.

[P125-10] "Spontaneous emission and qubit transfer in spin-1/2 chains" Mogilevtsev, D., Maloshtan, A., Kilin, S., Oliveira, L. E., and Cavalcanti, S. B.

The complex emitter dynamics expected to appear in structured reservoirs, such as bandgap photonic crystals, is shown to be observed via an implementation based on spin chains. We have demonstrated that such association yields new ways of engineering spin chains for efficient state transfers

Journal of Physics B-Atomic Molecular and Optical Physics 43[9]. 095506. 2010.

[P126-10] "Strong superadditivity and monogamy of the Renyi measure of entanglement"

Cornelio, M. F. and de Oliveira, M. C.

Employing the quantum Renyi alpha entropies as a measure of entanglement, we numerically find the violation of the strong superadditivity inequality for a system composed of four qubits and $\alpha > 1$. This violation gets smaller as $\alpha \rightarrow 1$ and vanishes for $\alpha = 1$ when the measure corresponds to the entanglement of formation. We show that the Renyi measure always satisfies the standard monogamy of entanglement for $\alpha = 2$, and only violates a high-order monogamy inequality, in the rare cases in which the strong superadditivity is also violated. The states numerically found where the violation occurs have special symmetries where both inequalities are equivalent. We also show that every measure satisfying monogamy for high-dimensional systems also satisfies the strong superadditivity inequality. For the case of Renyi measure, we provide strong numerical evidences that these two properties are equivalent

Physical Review A 81[3]. 032332. 2010.

[P127-10] "Structure of PbTe(SiO2)/SiO2 multilayers deposited on Si(111)"

Kellermann, G., Rodriguez, E., Jimenez, E., Cesar, C. L., Barbosa, L. C., and Craievich, A. F.

The structure of thin films composed of a multilayer of PbTe nanocrystals embedded in SiO2, named as PbTe(SiO2), between homogeneous layers of amorphous SiO2 deposited on a single-crystal Si(111) substrate was studied by grazing-incidence small-angle X-ray scattering (GISAXS) as a function of PbTe content. PbTe(SiO2)/SiO2 multilayers were produced by alternately applying plasma-enhanced chemical vapour deposition and pulsed laser deposition techniques. From the analysis of the experimental GISAXS patterns, the average radius and radius dispersion of PbTe nanocrystals were determined. With increasing deposition dose the size of the PbTe nanocrystals progressively increases while their number density decreases. Analysis of the GISAXS intensity profiles along the normal to the sample surface allowed the determination of the period parameter of the layers and a structure parameter that characterizes the disorder in the distances between PbTe layers. (C) 2010 International Union of Crystallography Printed in Singapore - all rights reserved

Journal of Applied Crystallography 43, 385-393. 2010.

[P128-10] "Synthesis and magnetic properties of the double layer perovskite CeBaFe2O5+w"

de Almeida, R. L., de Lima, O. F., Coaquira, J. A. H., Altoe, M. L., Quezado, S., and Malik, S. K.

The synthesis, crystallographic structure, and magnetic properties of polycrystalline single-phase samples of CeBaFe2O5+w are reported. An orthorhombic structure belonging to the Pmmm space group was identified through Rietveld analysis of x-ray diffraction data. The room temperature

lattice parameters were found to be $a=3.9666(1)$ angstrom, $b=3.9314(1)$ angstrom, and $c=7.8291(1)$ angstrom. A sudden change in magnetization at the temperature of 130 K was attributed to a Verwey-type transition, and a broader change at 220 K was attributed to a Verwey premonitory transition, as expected in the $R\text{BaFe}_2\text{O}_{5+w}$ compounds (R =rare earth). At a much higher temperature, a paramagnetic to ferromagnetic-like transition was observed around 600 K. (C) 2010 American Institute of Physics. [doi: 10.1063/1.3359436]

Journal of Applied Physics 107[9]. 09E306. 2010.

[P129-10] “Synthesis and spectroscopic characterization of polymer and oligomers of ortho-phenylenediamine”

Sestrem, R. H., Ferreira, D. C., Landers, R., Temperini, M. L. A., and do Nascimento, G. M.

Poly(ortho-phenylenediamine) and oligomers of ortho-phenylenediamine were chemically synthesized and characterized by UV-vis, H-1 and C-13 NMR, FTIR and resonance Raman spectroscopies. Polymerization of ortho-phenylenediamine in HCl medium with ammonium persulfate only leads the trimer compound, in disagreement with some previous reports. Nevertheless, in acetic acid medium it was possible to prepare a polymer constituted by ladder phenazine segments with different protonation levels and quinonediimine rings (polyaniline-like). X-ray absorption at N K-edge (N K XANES), X-ray photoelectron (XPS) and Electron paramagnetic resonance (EPR) spectroscopies were used to determine the different kinds of nitrogen presents in this class of polymer. N K XANES spectrum of poly(ortho-phenylenediamine) shows the band of -N=nitrogen of non-protonated phenazinic rings at 398.2 eV. In addition, XPS and N K XANES data confirm the presence of different types of protonated nitrogens in the polymeric poly(ortho-phenylenediamine) chain and the EPR spectrum shows that the polymer has a very weak polaronic signal. (C) 2009 Elsevier Ltd. All rights reserved

European Polymer Journal 46[3], 484-493. 2010.

[P130-10] “Synthesis and tuning the exchange bias in Ni-NiO nanoparticulate systems”

Sharma, S. K., Vargas, J. M., Knobel, M., Pirota, K. R., Meneses, C. T., Kumar, S., Lee, C. G., Pagliuso, P. G., and Rettori, C.

We report studies on exchange bias effects in Ni-NiO nanoparticles with different particle diameters/distributions and concentration of metallic nickel, which vary from 0% to 32%. The exchange bias field, H_{ex} , depends strongly upon both particle size and the concentration of metallic Ni, being maximum (similar to 2.2 kOe) at 5 K for the sample with almost negligible concentration of metallic Ni, whereas the corresponding value for the sample with highest concentration of metallic Ni (similar to 32 +/- 5.0%) is about 0.07 kOe. The structural features of the samples have been investigated thoroughly by using the Reitveld refinement of x-ray diffraction data and high resolution transmission electron microscopy, where as the magnetic properties using superconducting quantum interference device magnetometer. c 2010 American Institute of Physics. [doi:10.1063/1.3340453]

Journal of Applied Physics 107[9]. 09D725. 2010.

[P131-10] “Temperature and hydrostatic pressure effects on the photonic band structure of a 2D honeycomb lattice”

Porrás-Montenegro, N. and Duque, C. A.

A standard plane-wave expansion method is used to investigate temperature and applied hydrostatic pressure dependence of the photonic band structure of a two-dimensional honeycomb lattice composed by cylindrical rods of GaAs, embedded in air. Present results suggest that for H-polarization an increment of hydrostatic pressure and temperature not only shifts the photonic band gaps, but diminish the energy width of the second and upper band gaps, while for E-polarization the first band gap is shifted to higher energies, without modifying the width of the other band-gaps, consequently modifying the tunability of this system. (C) 2010 Elsevier B.V. All rights reserved

Physica E-Low-Dimensional Systems & Nanostructures 42[6], 1865-1869. 2010.

[P132-10] “The pairing symmetry in the ferromagnetic superconductor UGe2”

Garcia, F. A. and Cabrera, G. G.

We give an extensive treatment of the pairing symmetry in the ferromagnetic (FM) superconductor UGe₂. We show that one can draw important conclusions concerning the superconducting state, considering only the transformation properties of the pairing function, without assumptions about the form of the pairing amplitudes. (C) 2010 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim

Physica Status Solidi B-Basic Solid State Physics 247[3], 589-591. 2010.

[P133-10] “Topologically Closed Macromolecules Made of Single Walled Carbon Nanotubes-’Super’-Fullerenes”

Coluci, V. R., dos Santos, R. P. B., and Galvao, D. S.

We propose and theoretically investigated a new class of topologically closed macromolecules built using single walled carbon nanotubes. These macromolecules are based on the fullerene architecture. Classical molecular dynamics simulations were used to predict their stability, thermal, vibrational, and mechanical properties. These macromolecules, named ‘super’-fullerenes, present high porosity, low density (similar to 1 g/cm³), and high surface area (congruent to 2500 m²/g). Our results predict gas phase specific heat of about 0.4 Jg⁻¹K⁻¹ at room temperature and high flexibility under compressive strains. These properties make these hypothetical macromolecules good candidates for gas storage material and biomolecular sieves

Journal of Nanoscience and Nanotechnology 10[7], 4378-4383. 2010.

Correção da edição anterior dos artigos

[P066-10] “Ions at the Water-Vapor Interface”

Tamashiro, M. N. and Constantino, M. A.

We obtain the electrostatic free energy of finite-sized ions near a dielectric interface within the framework of the classical continuum dielectric theory. The ion is modeled as a dielectric sphere with a fixed uniform surface charge density. In order to avoid the generation of additional induced charges on the ionic surface, it is assumed there is no dielectric contrast between the ion core and the external dielectric medium where it is embedded, which allows an exact solution of the electrostatic problem by the image-charge method. It is shown that earlier results reported in

the literature, especially when there is partial ionic penetration into the interface, always underestimate the electrostatic free energy associated with nonpolarizable ions. For an ion modeled as a vacuum cavity at the water-vapor interface, it is estimated that the free energy is an order of magnitude larger than prior predictions

Journal of Physical Chemistry B 114[10], 3583-3591. 2010.

[P073-10] "Observation of an Antimatter Hypernucleus"

Abelev, B. I., Aggarwal, M. M., Ahammed, Z., Alakhverdyants, A. V., Alekseev, I., et al

Nuclear collisions recreate conditions in the universe microseconds after the Big Bang. Only a very small fraction of the emitted fragments are light nuclei, but these states are of fundamental interest. We report the observation of antihypertritons-comprising an antiproton, an antineutron, and an antilambda hyperon-produced by colliding gold nuclei at high energy. Our analysis yields 70 ± 17 antihypertritons ($\bar{3}/\Lambda(H)$) and 157 ± 30 hypertritons ($H-3(\Lambda)$). The measured yields of $H-3(\Lambda)$ ($\bar{3}/\Lambda(H)$) and $He-3$ ($\bar{3}(He)$) are similar, suggesting an equilibrium in coordinate and momentum space populations of up, down, and strange quarks and antiquarks, unlike the pattern observed at lower collision energies. The production and properties of antinuclei, and of nuclei containing strange quarks, have implications spanning nuclear and particle physics, astrophysics, and cosmology

Science 328[5974], 58-62. 2010.

Abstracta

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