

Abstracta

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Trabalhos Aceitos para Publicação

A012-99 à A024-99

Capítulo de Livro

L001-99

[A012-99] "The Electric Field Outside a Stationary Resistive Wire Carrying a Constant Current."

A. K. T. Assis, W. A. Rodrigues Jr., A. J. Mania

We present the opinion of some authors who believed there was no force between a stationary charge and a stationary resistive wire carrying a constant current. We show that this force is different from zero and present its main components: The force due to the charges induced in the wire by the test charge and a force proportional to the current in the resistive wire. We also discuss briefly a component of the force proportional to the square of the current which should exist according to some models and another component due to the acceleration of the conduction electrons in a curved wire carrying a dc current (centripetal acceleration). Finally we analyse experiments showing the existence of the electric field proportional to the current in resistive wires.

Foundations of Physics 29 (5), 729-753, 1999**[A013-99] "Neutrinos: partículas onipresentes e misteriosas."**

A.A. Natale, M.M. Guzzo

Num intervalo de uma hora, cada um de nós emite cerca de 20 milhões de neutrinos. Isto é consequência da existência de aproximadamente 20 mg de potássio 40 em nosso organismo, que é um elemento radioativo. Na direção oposta, somos atravessados, $\{it a cada segundo\}$, por cerca de 50 bilhões dessas partículas produzidas em fontes naturalmente radioativas da Terra, e por mais de 100 bilhões vindas dos reatores nucleares espalhados pelo mundo. Além disso, algo como 100 a 400 trilhões de neutrinos provenientes do Sol nos atingem, seja de dia, seja de noite, quando atravessam a Terra e nos atingem na direção do chão para o céu. São os neutrinos, juntamente com os fótons, as partículas mais abundantes que existem, atingindo a cifra de cerca de 300 a cada centímetro cúbico do universo! Tal realidade sequer era imaginada quando a existência do neutrino foi proposta em 1930. Menos ainda que hoje se estaria discutindo o quanto o futuro do universo depende dessa partícula ter massa ou não. história do neutrino, que se mistura com a história da física das partículas elementares, com a evolução estelar e do próprio universo, é o que pretendemos contar a seguir.

Ciência Hoje 25 (147), Mar 1999**[A014-99] "Atmospheric Neutrino Observations and Flavor Changing Interactions"**

M. C. Gonzalez-Garcia, M. M. Guzzo, P.I. Krastev, H. Nunokawa

Flavor changing (FC) neutrino-matter interactions can account for the zenith-angle dependent deficit of atmospheric neutrinos observed in the SuperKamiokande experiment, without directly invoking neither neutrino mass, nor mixing. We find that FC n m matter interactions provide a good fit to the observed zenith angle distributions, comparable in quality to the neutrino oscillation hypothesis. The required FC interactions arise naturally in many attractive extensions of the Standard Model.

Physical Review Letters 82 (16), 3202-3205, 1999**[A015-99] "Current Status of the Resonant Spin-Flavor Precession Solution to the Solar Neutrino Problem."**

M. M. Guzzo, H. Nunokawa

We discuss the current status of the resonant spin-flavor precession (RSFP) solution to the solar neutrino problem. We perform a fit to all the latest solar neutrino data for various

assumed magnetic field profiles in the Sun. We show that the RSFP can account for all the solar neutrino experiments, giving as good fit as other alternative solutions such as MSW or Just so, and therefore can be a viable solution to the solar neutrino problem

Astroparticle Physics 12 (1-2), 87-95, 1999**[A016-99] "Thermomagnetic Flux-Jump Instabilities and Second Magnetization Peak in Bi2Sr2CaCu2O8 High-Tc Superconducting Crystals."**

Y. Kopelevich, S. Moehlecke, J. H. S. Torres, R. Ricardo da Silva, P. Esquinazi

Measurements of the magnetization hysteresis loop performed on Bi2Sr2CaCu2O8 high-Tc superconducting single crystal reveal the occurrence of pronounced jumps of the irreversible magnetization at $T > 40$ K. In this work we demonstrate their thermomagnetic origin. It is also shown that the low-field hollow in the magnetization hysteresis loops measured at $T < 40$ K and leading to the so-called "second magnetization peak", is the manifestation of a thermomagnetic instability effect. It is suggested that the plastic vortex motion triggers the magnetic instabilities.

Journal of Low Temperature Physics 116 (3-4), 261-276, 1999**[A017-99] "A Geometric and Spectroscopic Study of Some Molecules Related to Eumelanins. Part I - Monomers."**

L.E. Bolívar-Marinez, D. S. Galvão, M.J. Caldas

We have carried out ab initio and semi-empirical PM3 (Parametric Method 3) and ZINDO (Zerner's Intermediate Neglect of Differential Overlap) calculations on neutral and charged 5,6,indolequinone and its reduced forms semiquinone and hydroquinone. These molecules are believed to compose the major part of the active material of eumelanin, a biological pigment present in illuminated and non-illuminated areas in living organisms. Our results show that these molecules can behave as electron acceptors and their electronic behavior is consistent with the semiconductor models proposed for melanins. The relationship between electronic behavior and biological functions is also addressed.

The Journal of Physical Chemistry B 103 (15), 2993-3000, 1999**[A018-99] "Transfer of Coherence from Atoms to Mixed Field States in a Two-photon Lossless Micromaser."**

A.F. Gomes, J.A. Roversi, A. Vidiella-Barranco

We propose a two-photon micromaser-based scheme for the generation of a nonclassical state from a mixed state. We conclude that a faster, as well as a higher degree of field purity is achieved in comparison to one-photon processes. We investigate the statistical properties of the resulting field states, for initial thermal and (phase-diffused) coherent states. Quasiprobabilities are employed to characterize the state of the generated fields.

Journal of Modern Optics 46 (9), 1421-1430, 1999**[A019-99] "Suppression of Superconductivity with Pr Substitution in Nd1-xPrxBaCaCu3O7 System."**

V. P. S. Awana, C. A. Cardoso, O. F. de Lima, R. Singh, A. V. Narlikar, W. B. Yelon, S. K. Malik.

Structural, superconducting and magnetic properties of Nd1-xPrxBaCaCu3O7 system with $x = 0.0, 0.10, 0.25, 0.35, 0.50, 0.75$ and 1.0 have been investigated. X-ray diffraction results reveal that Pr substitutes iso-structurally in NdBaCaCu3O7 (Nd:1113) superconductor with complete solubility. The

superconducting transition temperature (T_c), measured by ac susceptibility technique, decreases with increasing x . However, suppression of T_c with increasing Pr substitution is less in Nd:1113 superconductor compared to that reported for Nd_{1-x}Pr_xBa₂CaCu₃O₇ system. Interestingly, in the fully Pr substituted compounds of the above series, i. e. , in PrBaCaCu₃O₇ and PrBa₂Cu₃O₇, the Pr moments order antiferromagnetically with TN of 10K and 17K, respectively. The present results along those reported earlier [1,2], clearly suggest that there is a correlation between the T_c suppression due to Pr and the magnetic ordering temperature of the fully substituted Pr moments in these systems. The TN may be taken to be a measure of the strength of hybridization between the Pr-4f electrons with Cu-O conduction band, and hence a lower TN may imply a less deleterious effect on superconductivity.

Physica C 316 (1-2), 113-118, 1999

[A020-99] "Leading Particle Effect, Inelasticity and the Connection Between Average Multiplicities in $e^+ e^-$ and p Processes."

M. Batista, R. J. M. Covan

The Regge-Mueller formalism is used to describe the inclusive spectrum of the proton in pp collisions. From such a description the energy dependences of both average inelasticity and leading proton multiplicity are calculated. These quantities are then used to establish the connection between the average charged particle multiplicities measured in $e^+ e^-$ and pp processes. The description obtained for the leading proton cross section implies that Feynman scaling is strongly violated only at the extreme values of x_F , that is at the central region ($x_F \approx 0$) and at the diffractive region ($x_F \approx 1$), while it is approximately observed in the intermediate region of the spectrum.

Physical Review D 5905 (5), 054006, 1999

[A021-99] "Multiple Scattering Effects in Proton-Nucleus Collisions and the Behavior of the Total and Partial Inelasticities."

M. Batista, R. J. M. Covan

A modified version of a multiple scattering model is applied to describe nuclear inclusive reactions of the type $p A \rightarrow p X$ and investigate the behavior of the inelasticity in nuclear processes. The modifications are such that some recent developments in the pomeron physics are incorporated into the new theoretical scheme. The particular attention paid to the diffractive region of the spectrum results in a very good description of the diffractive cross section in terms of the atomic mass. Another important outcome resulting from this analysis is the average total inelasticity whose atomic mass and energy dependences are shown to be in agreement with the available data. Moreover, the behavior of partial inelasticities in intranuclear collisions is also discussed.

Physical Review C 6001 (1), 014902, 1999

[A022-99] "Charged Particle Multiplicity in Diffractive Deep Inelastic Scattering."

R. J. M. Covan, A. V. Kisselev

The recent data from H1 Collaboration on hadron multiplicity in diffractive DIS has been studied in the framework of perturbative QCD as a function of invariant diffractive mass. The formulas obtained explain the observed excess of particle production in diffractive DIS relative to that in DIS and $e^+ e^-$ annihilation. It is shown that the results are sensitive to the quark-gluon structure of the pomeron. Namely, the data say in favour of a super-hard gluon distribution at the initial scale.

Physical Review D 6003 (3), 034003, 1999

[A023-99] "Structural Changes Induced by Nitrogen in the a-Ge:H Network."

R. R. Campomanes, D. Comedi, I. Chambouleyron

The structural modifications induced by the incorporation of nitrogen (2 at % < CN < 6 at. %, CN = N concentration) in radio frequency-sputtered hydrogenated amorphous germanium (a-Ge:H) has been studied by infrared spectroscopy. At all N concentrations there is a substantial increase of the density of voids, as indicated by the strength of the absorption band associated with the surface-like stretching vibration of the Ge-H dipole. As CN increases, the peak position of this mode shifts to smaller values. These effects are also detected through the analysis of the wagging vibration modes of the Ge-H dipole. Comparison of the present results with similar data for H-free a:GeN indicates that the presence of H in the reaction hinders the incorporation of the NGe₃ skeletal group, characteristic of b-Ge₃N₄. The overall data indicate that almost all N incorporates in N-H and N-H₂ configurations, which are responsible for the formation of a large quantity of small-size voids.

Journal of Applied Physics 85 (6), 3108-3113, 1999

[A024-99] "Local Coordination of Ga Impurity in Hydrogenated Amorphous Germanium Studied by Extended X-ray Absorption Fine-Structure Spectroscopy."

G. Dalba, P. Fornasini, R. Grisenti, F. Rocca, D. Comedi, I. Chambouleyron

The local structure of Ga-doped a-Ge:H films has been investigated by extended x-ray absorption fine-structure (EXAFS) fluorescence for impurity concentrations ranging from 1.5×10^{18} atoms cm⁻³ to 4.5×10^{20} atoms cm⁻³. The mean-coordination number of Ga atoms changes from around 4 (1.5×10^{18} - 1.5×10^{19} cm⁻³) to below 3 (1.5×10^{20} - 4.5×10^{20} cm⁻³) with rising concentration. The change from fourfold to threefold coordination occurs in a rather narrow impurity concentration range. The variance of the distance distribution function decreases with increasing Ga content, suggesting that well-ordered sites are present at high-impurity concentration. From EXAFS phase analysis the first Ga-Ge shell distance has been found to be 0.03 Å larger in the amorphous network than in Ga-doped crystalline Ge.

Applied Physics Letters 74 (2), 281-283, 1999

Capítulo de Livro

L001-99 "Optical Detection of the Photothermal Phenomena in Operating Electronic Devices: Temperature and Defects Imaging."

Antonio Manoel Mansanares

This chapter is planned to review the optical detection (mainly through reflectance) of the photothermal phenomena in operating electronic devices. The knowledge of the temperature distribution in these devices in operation is of crucial importance since the temperature distribution is directly connected to the heat source distribution. Therefore, the existence of "hot/dark" points may indicate device failure. Furthermore, excessive heating may launch thermal run-away processes that will finish by degrading the device. The high lateral resolution achieved with Photothermal Reflectance Microscopy makes the technique especially suited for the investigation of microelectronics and optoelectronics devices such as transistors, laser diodes, metallic tracks etc. Its non-destructive and non-invasive (non-contact) character enables samples to be re-tested after treatment, as in the case of aging tests. Section 1 of the Chapter is an Introduction to the subject including the historical perspective. In Section 2 the experimental apparatuses used for photothermal imaging of operating devices are presented, with emphasis to Photothermal Reflectance Microscopy.

Section 3 deals with the temperature distribution of operating laser diodes, while in Section 4 both temperature and electric field distributions in single biased MOSFET structures are treated. Section 5 discusses interesting aspects of the Joule microscopy in single metallic tracks. Finally, the conclusions and perspectives are presented in Section 6.

Mansanares, A.M. "Optical detection of photothermal phenomena in operating electronic devices: temperature and defects imaging", "Semiconductors and Electronic Materials", 10/2000, CAPÍTULO, ed. 2, SPIE Optical Engineering, Vol. 4, pp. 36, pp.75-110, 2000.

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