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ACCEPTED PAPERS FOR JOURNAL PUBLICATION

A 053-98 Solitons in Highly Excited Matter: dissipative-thermodynamic and supersonic effects.

Marcus V. Mesquita, Áurea R. Vasconcellos, Roberto Luzzi

Solitary waves-arising out of nonlinearity-induced coherence of optical and acoustical vibrational modes in dissipative open systems(polymers and bulk matter) - are described in terms of a statistical thermodynamics based on a nonequilibrium ensemble formals. The undistorted progressive wave is coupled to the normal vibrations, and three relevant phenomena follow in sufficiently away-from-equilibrium conditions:(1) A large increase in the populations of the normal modes lowest in frequency, (2) accompanied by a large increase of the solitary wave lifetime, and (3) emergence of a Cherenkov-like effect, consisting in a large emission of phonons in privileged directions, when the velocity of propagation of the soliton is larger than the group velocity of the normal vibrations. Comparison with experiments is presented, which points out to the corroboraiton of the theory.

A 054-98 Halogenation Effects in Electron Scattering from CHF3, CH2F2,CH3F, CHCl3, CH2Cl2, CH3Cl, CFCl3, CF2Cl2.

A.P.P. Natalense, M. H. F. Bettega, L. G. Ferreira, M. A. P. Lima

We report differential elastic cross sections for low-energy electron scattering by CHF3, CH2F2, CH3F, CHCl3, CH2Cl2, CH3Cl, CFCl3, CF2Cl2, and CF3Cl, obtained with the Schwinger multichannel method with norm-conserving pseudopotentials. Our results are in excellent agreement with available experimental and theoretical data. We compare the present results with our previous results for CH4, CF4, and CCl4 and show that the oscillatory behavior of the cross sections is related to electron scattering from heavier centers (F or Cl), that favors the coupling of high partial waves. We also include a table with momentum transfer cross sections.

A 055-98 25-state Calculation for e- - Na2 Scattering.

A.P.P. Natalense, L. G. Ferreira, M. A. P. Lima

We use the Schwinger multichannel method with pseudopotentials to study low energy e- - Na2 scattering. Our cross sections, for impact energies from 0 to 10~eV, include polarization effects and up to 25 open channels related to all electronic states lying below 3.5 eV. Our results predict prominent threshold effects due to a very intense coupling between the B 1Piu state and the elastic channel, in an energy region where there is no experimental data. Our total 25-state cross sections are in very good agreement with available experimental data for energies below about 4 eV.

A 056-98 Diode-Pumped Nd:FAP Laser at 1.126 m m: a possible local oscillator for a Hg+ optical frequency standard.

Flavio C. Cruz, Brenton C. Yong, and James C. Bergquist

We report the efficient operation of a continuous-wave, single-frequency, diode-pumped Nd:FAP laser at 1.126 m m. When frequency quadrupled, such a laser might be used as a local oscillator for an optical frequency standard based on the single-photon 2S1/2- 2D5/2 electric-quadrupole transition of trapped and laser-cooled 199Hg+ ions. Since the frequencies of the atomic transition and the laser are harmonically related, this scheme helps to simplify the measurement of the S-D "clock" transition frequency by a phase-coherent chain to the cesium primary frequency standard.

A 057-98 Saturation Measurements of the a 3P0 - y 3D10 Ti I Transition by Optogalvanic Spectroscopy.

A. Mirage, F. C. Cruz, A. Scalabrin and D. Pereira.

The optogalvanic signal (OGS) induced in a Ti-Ar hollow-cathode discharge, stimulated by a modulated c. w. laser light tuned to the a 3P0 - y 3D10 Ti I transition, was measured as a function of the light intensity. By solving analytically the rate equations of a three-level system, that include the Ti I ground state, the lower metastable a 3P0 and the upper y 3D10 levels, an expression was obtained that relates the magnitude of the OGS to the laser intensity and the saturation parameter (1/s 0 ¡). The s 0 ¡ product was determined by fitting the theoretical curve to the experimental data.

A 058-98 The Informational-Statistical-Entropy Operator in a Nonequilibrium Ensemble Formalism.

Sergio A. Hassan, Áurea R. Vasconcellos and Roberto Luzzi.

We study the eigenvalue spectrum of the Informational-Statistical-Entropy Operator, a quantity that plays a fundamental role in the Nonequilibrium Statistical Operator Method. We obtain explicit expressions for the informational entropy for inhomogeneous nonequilibrium (dissipative) systems, relevant for the study of its nonclassical nonlinear hydrodynamics. Expressions for the single-particle dynamical matrix and, in particular, for the distribution functions of quasi-particles, in conditions arbitrarily away from equilibrium, are also derived. We apply the results considering some aspects of the hydrodynamics of a Fermion system in weak interaction with a thermal bath of Bosons.

A 059-98 Field Purification in the Intensity-Dependent Jaynes-Cummings model.

Dagoberto S. Freitas, A. Vidiella-Barranco, and J. A. Roversi.

We have found that, in the intensity-dependent Jaynes-Cummings model, a field initially prepared in a statistical mixture of two coherent states, | a ñ and | - a ñ , evolves toward a pure state. We have also shown that an even coherent state turns periodically a into rotated odd-coherent state during the evolution.

A 060-98 Quantum State Reconstruction in the Presence of Dissipation.

H. Moya-Cessa, S. M. Dutra, J. A. Roversi, and A. Vidiella-Barranco.

We propose a realistic scheme to determine the quantum state of a single mode cavity field even after it has started to decay due to the coupling with an environment. Although dissipation destroys quantum coherences, we show that at zero temperature enough information about the initial state remains, in an observable quantity, to allow the reconstruction of its Wigner function.

A 061-98 Environment of erbium in a-Si:H and a-SiOx:H C.

Piamonteze, A. C. Iñiguez, L. R. Tessler, M. C. Martins Alves and H. Tolentino

We present a new model for the incorporation of Er in a-Si:H and a-SiOx:H. The model explains the photoluminescence and anomalous doping properties of Er in these compounds. The chemical environment of Er was determined by extended x-ray absorption fine structure (EXAFS). Only one family of Er sites is found, coordinated on average with 2 to 3 O atoms

(compared to 6 in Er2O3. According to our model, Er is incorporated in the form of ErOd +3-2d complexes, with d £ 3. The minimum configuration energy, which corresponds to the shortest interatomic distance is achieved for d = 3 when the valence requirements of Er are fulfilled. The complexes are low symmetry environments that allow the Er3+ luminescent transition at 1.54 m m and reduce its temperature quenching. They are also the reason why Er is an acceptor in a-Si:H whereas it behaves as a donor in crystalline silicon.

Physical Review Letters 81 (21), 4652-4655, 1998

A 062-98 Hydrogen in Amorphous Germanium-Carbon

J. Vilcarromero and F.C. Marques

This work shows the study of the hydrogen influences in the structural properties of amorphous germanium-carbon alloys prepared by the rf cosputtering technique. The films were prepared in the all range of carbon content, from 0 to 100 at.%. The study of hydrogen properties was performed using thermal desorption, infrared and Raman spectroscopes. All the samples have total hydrogen content smaller than 25 at.%, indicating that the films have low presence of polymeric sites, bonded to germanium and carbon. The effusion spectra indicate that the hydrogen atoms are strongly bonded to germanium and carbon. The exo-diffusion promotes the increase in the concentration of germanium-carbon bonds, and graphite clusters.

Thin Solid Films 343-344, 445-448, Abr 1999

A 063-98 Hard a-C:H films deposited at high deposition rate

R. G. Lacerda, M. M. de Lima, Jr., J. Vilcarromero and F.C.Marques

In this work, we present hard-hydrogenated amorphous carbon films at high deposition rate. The films were prepared on the cathode electrode of a conventional rf sputtering system. Hydrogenated amorphous carbon films with excellent properties, i.e, high hardness (15 GPa), relatively low stress (~1.3 GPa) and with a very high deposition rate (~0.7 nm/s) were obtained at the conditions of high bias (- 800 V) and high methane gas pressure (0.12 mbar). The low band gap and the high ID/IG Raman ratio indicate that the films have high amount of sp2 sites.

Thin Solid Films 343-344, 222-225, Abr 1999

Errata:

C 022-98 Photothermal Reflectance Microscopy Applied to the Study of Electrostatic Dischage Degration in MOSFET Structures.

J. A. Batista, A. M. Mansanares and E. C. da Silva, O. J. Pagani Júnior, S. Eleutério Filho, M. B. C. Pimentel and N. Jannuzzi.

In: 13th International Conference on Microelectronics and Packging- Curitiba, 12-14 de agosto de 1998, Agosto 1998

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