Publications and Reports

"$Ca_{1-x}Y_xMnO_3$ Manganites Synthesis and EPR Characterization"

O.Aguero, A.G.Leyva, D.Vega, G.Polla, P.Konig, M.T.Causa

Physica B320 (2002) 47–50

Ceramic samples of Ca1_xYxMnO3 were synthesized by a liquid-mix method obtaining single phase materials, for 0:1pxp1; with orthorhombic structure. The cell volume increases with x indicating that changes in the Mn electronic state overcomes the progressive diminishing of the (Ca, Y) cationic radius, rCa > rY: We observed a continuous broadening of the electronic spin resonance line width with x: This is explained in terms of the increasing orthorhombic distortions. We have measured the DC magnetization for the x =1 compound YMnO3. Our results are compatible with a G-type antiferromagnet with T_N=44 K.

"Temperature Dependence of ESR Anisotropy in La7/8Sr1/8MnO3"

G. Alejandro, C. Ramos, D.R. Vega, M. T. Causa, J. Fontcuberta, M. Tovar

Physica B320 (2002) 26-29

We report X-ray diffraction, DC-susceptibility, electron spin resonance (ESR), and dilatometry measurements carried out on an La7=8Sr1=8MnO3 single crystal. Thermal expansion was measured along different crystallographic axes using a three-terminal dilatometer. The sharp anomalies observed in the temperature dependence of $\Delta l/l$ allowed us to locate the Jahn–Teller transition at T_{JT} = 285(1)K: ESR experiments were carried out in the paramagnetic regime from 220 to 570K, at 9.4 GHz. We measured the ESR line width ΔHpp(T) with the magnetic .eld parallel to the crystallographic directions [1 0 0] and [0 0 1], referred to the orthorhombic (Pbnm) axes. We correlate the temperature dependence of ΔHpp with the structural changes of the lattice.

"Site Survey for the Pierre Auger Observatory"

I. Allekotte, P. Bauleo, C. Bonifazi, A. Ceballos, B. Fick, A. Etchegoyen, A. Ferrero, A. Filevich, B. García, K. Gibbs, A. Letessier-Selvon, J.C. Meza, A. Rovero-For the Auger Collaboration

J. Phys. G: Nucl. Part. Phys. 28 (2002)1499-1509

Within the framework of the Pierre Auger Project it was necessary to identify suitable places for the observatory sites and to characterize them in order to make a final selection. 'Pampa Amarilla' in

the Province of Mendoza, Argentina, and Millard County, State of Utah, U.S.A., have been chosen for the southern and northern sites, respectively. Atmospheric, meteorological, and topography studies were performed at those sites

"Evaluación del Daño por Radiación de Celdas Solares de Distintos Materiales con Protones de 10 MeV"

M. Alurralde, M.J.L. Tamasi, M.G. Martínez Bogado, J. Plá

Avances en Energías Renovables y Medio Ambiente 6 (2002) 04.25

Se presentan los resultados correspondientes a experiencias de daño por radiación con protones de 10 MeV en celdas solares de distintos materiales. Se utilizaron celdas de doble juntura de GaAs sobre sustrato de Ge, heterojunturas de silicio amorfo o silicio cristalino epitaxial sobre silicio cristalino, y celdas de silicio cristalino con juntura obtenida por difusión. En el caso de las celdas de GaAs se irradiaron dispositivos con y sin vidrio protector con dosis de hasta 10^{11} p/cm^2, equivalente a las que recibiría en la misión SAOCOM, mientras que en el caso de las celdas heterojuntura se utilizaron dosis de hasta 10^{12} p/cm^2, y en aquellas de silicio cristalino se consideraron dosis intermedias que posibilitaron la medición de la vida media efectiva de los portadores minoritarios del dispositivo.

"No Evidence of Break-Up Effects on the Fusion of ^{9}Be with Medium-Light Nuclei"

R.M. Anjos, C. Muri, J. Lubian, P.R.S. Gomes, I. Padron, J.J.S. Alves, G.V. Martí, J.O. Fernández Niello, A.J. Pacheco, O.A. Capurro, D.Abriola, J.E. Testoni, M. Ramírez, R. Liguori Neto, N. Added

Physics Letters B534 (2002) 45-51

Fusion cross sections were measured for the ^{9}Be+ ^{27}Al and ^{19}F+ ^{9}Be, ^{12}C systems, at energies above the Coulomb barrier, in order to investigate the possible effect of fusion hindrance due to the break-up of the weakly bound nuclei. Comparisons with one dimensional barrier penetration models and with other similar systems, where no break-up is expected to occur, show no evidence of fusion hindrance.

"Measurement of the ^{25}Mg(p,γ) ^{26}Al Reaction at Stellar Energies"

A. Arazi, T. Faestermann, J.O. Fernández Niello, K. Knie, G. Korschinek, E. Richter, G. Rugel, A. Wallner

New Astronomy Reviews 46 (2002) 525

Stellar nuclear reactions, generally occurring at energies well below the Coulomb barrier, have extremely low cross sections posing a very difficult task for their determination using the usual prompt γ-ray detection method. We describe here the application of the highly sensitive Accelerator Mass Spectrometry technique (AMS) as an alternative method for the determination of the resonance strengths of the ^{25}Mg(p,γ) reaction, by off-line counting of the produced ^{26}Al nuclei.

"A Discrete Dinuclear Cu(II) Gd(III) Complex Derived from a Schiff Base Ligand, [CuGd(ems)(NO3)3 H2 O]Cu(ems) (ems: N,N -ethylene-bis-5-methoxy salicylaldiimine)"

A.M. Atria, Y. Moreno, E. Spodine, M.T. Garland, R.F. Baggio

Inorg. Chim. Acta 335 (2002) 1-6

A Cu(II) Gd(III) heteronuclear complex with N,N -ethylene-bis-5-methoxy salicylaldiimine (ems) as ligand has been synthesized. The complex crystallizes in the monoclinic system C2/c space group. The structure consists of two different discrete molecules: a mononuclear unit containing a single Cu(II) center, and a dinuclear one containing both a nine coordinated Gd(III) plus a four coordinated Cu(II) cation [CuGd(H 2 O)(NO 3)(ems)]. The complex was characterized by magnetic susceptibility and electron paramagnetic resonance. The Cu(II) Gd(III) complex presents a ferromagnetic interaction (J 1.88 cm1); its effective magnetic moment was found to increase with decreasing temperature. Both electronic and structural parameters are shown to influence the magnitude of the magnetic interaction.

"Bis(2-Acetato-O,O,O')-Diaqua-Bis(Acetato-O,O')-Dysprosium(III) Tetrahydrate"

R. Baggio, J.C. Muñoz, M. Perec

Acta Cryst. **C58** (2002) m498-m500

$[[Dy(C_2H_3O_2)_3\ (H_2O)_2],(H_2O)_2]_2$ crystallizes in the form of dimeric units related by an inversion center. Each cation has nine coordination, binding to two aqua molecules and three acetate groups, two of them bidentate and a third one tridentate. The latter acts as a bridge between neighbouring metals, leading to an interdimeric distance of 4.170(1)Å.

"Environment Effects on the Confined Surface State of Cu(111) in the Presence of Cu Nanostructures"

M.A. Barral, A.M. Llois

Physical Review B65 (2002) 235407

The confinement of the Cu(111) Shockley surface state by different kinds of deposited nanostructures has been studied as a function of environment by doing self-consistent electronic structure calculations. The population and depopulation of Shockley state is shown to depend both on the environment as on the type of defect considered.

"Discrete Wigner Functions and the Phase Space Representation of Quantum Computers"

P. Bianucci, C. Miquel, J.P. Paz, M. Saraceno

Phys.Lett. A297 (2002) 353

We show how to represent the state and the evolution of a quantum computer (or any system with an N-dimensional Hilbert space) in phase space. For this purpose we use a discrete version of the Wigner function which, for arbitrary N, is defined in a phase space grid of 2N×2N points. We compute such Wigner function for states which are relevant for quantum computation. Finally, we discuss properties of quantum algorithms in phase space and present the phase space representation of Grover's quantum search algorithm.

"Decoherence for Classically Chaotic Quantum Maps"

P. Bianucci, J.P. Paz, M. Saraceno

Phys. Rev. E65 (2002) 046226

We study the behavior of an open quantum system, with an N-dimensional space of states, whose density matrix evolves according to a nonunitary map defined in two steps: A unitary step, where the system evolves with an evolution operator obtained by quantizing a classically chaotic map (baker's map and Harper's map are the two examples we consider). A nonunitary step where the evolution operator for the density matrix mimics the effect of diffusion in the semiclassical (large N) limit. The process of decoherence and the transition from quantum to classical behavior are analyzed in detail by means of numerical and analytic tools. The existence of a regime where the entropy grows with a rate that is independent of the strength of the diffusion coefficient is demonstrated. The nature of the processes that determine the production of entropy is analyzed.

"First Experiment of Argentine Solar Cells in Space: Modules Fabrication, Characterisation, and Telemetry Data Analysis from SAC-A Satellite"

C.G. Bolzi, C.J. Bruno, J.C. Durán, E.M. Godfrin, M.G. Martínez Bogado, L.M. Merino, J.C. Plá, M.J.L. Tamasi, M. Barrera

Solar Energy Materials and Solar Cells 73 (2002) 269

On December 1998, the Endeavour space shuttle launched the Argentine satellite SAC-A. Among several technological experiments, this satellite included a set of crystalline silicon solar cells fabricated in Argentina to test them in the space environment. In this paper, we describe the experiments associated with these solar cells and analyse the corresponding telemetry data received from January to July 1999. Fabrication and characterisation of modules are presented. Some preliminary radiation damage experiments using 10 MeV protons supplied by a cyclotron accelerator were also performed.

"Radiómetros Fotovoltaicos de Bajo Costo desarrollados en la CNEA: Prototipo Comercial"

C.G. Bolzi, M.J.L. Tamasi, M.G. Martínez Bogado, J. Plá

Avances en Energías Renovables y Medio Ambiente 6 (2002) 11.01

Se construyeron radiómetros que utilizan celdas fotovoltaicas de silicio cristalino diseñadas y fabricadas por el Grupo Energía Solar de la CNEA. Se presenta una breve descripción del dispositivo, la caracterización eléctrica de las celdas y las mediciones de transmitancia de los vidrios con y sin adhesivo. La calibración fue realizada por personal de la Red Solarimétrica del Servicio Meteorológico Nacional.

"Features of the transformation of Hg^{II} by heterogeneous photocatalysis over TiO_2"

S.G.Botta, D.J.Rodriguez, A.G.Leyva and M.Litter

Catalysis Today 76(2-4) (2002) 247-258

UV/TiO_2 photocatalysis of 0.5 mM mercuric aqueous solutions has been analyzed starting from $Hg(NO_3)_2$, $Hg(ClO_4)_2$ and $HgCl_2$ at different pH (3, 7 and 11) and in the presence or absence of oxygen. Profiles of Hg II concentration with time were characterized by a relatively rapid initial conversion followed by a decrease or an arrest of the rate, the shape of profiles changing with the conditions. Conversions at 60 min and initial quantum efficiencies have been found dependent on the initial conditions and type of mercuric salt. The faster transformation took place at pH 11 for all salts. A good transformation yield is observed also for $HgCl_2$, which behaves differently to the other two salts, at pH 3 under nitrogen and pH 7 (N_2 or O_2).Inhibition by oxygen was observed in acid and neutral media but not at basic pH. When the conversion was 50% or more, pale or dark gray solids were deposited on the catalyst, identified as mixtures of Hg 0 , HgO or Hg_2Cl_2. A unique kinetic scheme could not be defined, which seemed to depend on the nature of the mercury salt, the ambient conditions and the type of deposit. Implications of the application of the technique to real systems are discussed.

"The Effect of Short Oxidation on $Zr(Fe,Cr)_2$ Laves Phases"

P.B. Bozzano, P.A. Vázquez, F. Saporiti, C. Ramos, R.A. Versaci, C. Saragovi

Hyperfine Interactions C5 (2002) 519-522

The behavior of $Zr(Fe,Cr)_2$ intermetallic compounds under oxidation are of great interest since $Zr(Fe,Cr)_2$ precipitates are present in Zry-4, a material widely used as fuel cladding in nuclear industry. Zr, Fe and Cr were found within non-oxidized and partially oxidized precipitates, while no Fe was detected inside the oxidized ones, suggesting that a progressive Fe rejection towards the oxidized precipitate / oxidized matrix interface takes place. An empirical model for selective oxidation was proposed after oxidizing in open furnace at 935K. Later three Laves phases remained $Zr(Cr_{0.4}Fe_{0.6})_2(C_{14})$, $Zr(Cr_{0.15}Fe_{0.85})_2$ (C_{15}) were oxidized during 7 min (open furnace, 923K). The corresponding Laves phases remained, but $Zr_{2-x}O_x$, α-Cr_2O_3, α-Cr, (Fe,Cr) oxides, α-Fe and α-Fe_2O_3, were formed in the Fe-rich precipitates. The appearance of α-Fe and hematite α-Fe_2O_3 suggests that 7 minutes was a longer time than the necessary to follow the oxidation kinetics. On the contrary, in the Cr-rich one only a $(Cr, Fe)_xO_y$ oxide appeared, showing that the same interval was insufficient for α-Fe to appear. In the present work results on $Zr(Cr_{0.4}Fe_{0.6})_2(C_{14})$ and on $Zr(Cr_{0.15}Fe_{0.85})_2$ $(C_{15})_2$ samples oxidized only 3 min in the same conditions are reported. The Laves phases $Zr_{2-x}O_x$, α-Cr_2O_3, α-Cr, (Fe,Cr) oxides, α-Fe and α-Fe_2O_3 were found; introduction of Cr and/or O ions in the two last lattices is suggested. The oxidation kinetics is finally discussed.

"Thermal Treatment of the Minority Game"

E. Burgos, H. Ceva, R.P.J. Perazzo

Physical Review E65 (2002) 36711

We study a cost function for the aggregate behavior of all the agents involved in the Minority Game (MG) or the Bar Attendance Model (BAM). The cost function allows to define a deterministic, synchronous dynamics that yields results that have the main relevant features than those of the probabilistic, sequential dynamics used for the MG or the BAM. We define a temperature through a Langevin approach in terms of the fluctuations of the average attendance. We prove that the cost function is an extensive quantity that can play the role of an internal energy of the many agent system while the temperature so defined is an intensive parameter. We compare the results of the thermal perturbation to the deterministic dynamics and prove that they agree with those obtained with the MG or BAM in the limit of very low temperature.

"Sistema de Seguimiento para Concinas Solares Alimentado por Módulo fotovoltaico"

C. Cadena, H. Bárcena, R. Echazú, R. Caso y L. Saravia, M.G. Martínez Bogado, M.J.L. Tamasi, E.M. Godfrin

Avances en Energías Renovables y Medio Ambiente 6 (2002) 04.37

Se ha diseñado y construido un módulo fotovoltaico de baja potencia para alimentar un sistema de seguimiento de concentradores como los empleados en cocinas solares. El conjunto permitirá un óptimo aprovechamiento de la radiación directa emitida por el sol por parte del dispositivo concentrador. La automatización del mismo, es un requisito casi imprescindible para una buena utilización de las cocinas, tal como se describe abundantemente en la bibliografía. Un seguidor y un motor constituyen la carga eléctrica del panel, el cual va montado en el mismo plano del concentrador.

"Thermal Transport in Chiral Conformal Theories and Hierarchical Quantum Hall States"

A. Cappelli, M. Huerta, G.R. Zemba

DFF-375-7-2001, Nov 2001. 16pp. E-Print Archive: cond/mat/0111437

Nucl. Phys. B636 (2002) 568-582

Chiral conformal field theories are characterized by a ground-state current at finite temperature, that could be observed, e.g. in the edge excitations of the quantum Hall effect. We show that the corresponding thermal conductance is directly proportional to the gravitational anomaly of the conformal theory, upon extending the well-known relation between specific heat and conformal anomaly. The thermal current could signal the elusive neutral edge modes that are expected in the hierarchical Hall states. We then compute the thermal conductance for the Abelian multi-component theory and the W-infinity minimal model, two conformal theories that are good candidates for describing the hierarchical states. Their conductances agree to leading order but differ in the first, universal finite-size correction, that could be used as a selective experimental signature.

"Barrier Distributions Derived from Quasielastic Excitation Functions for the ^{35}Cl + ^{105,106,110}Pd Systems"

O.A. Capurro, J.E. Testoni, D. Abriola, D.E. Di Gregorio, J.O. Fernández Niello, G.V. Martí, A.J. Pacheco, M.R. Spinella, M. Ramírez, C. Balpardo, M. Ortega

Physical Review C65 (2002) 064617

Quasielastic excitation functions for the ^{35}Cl+ ^{105,106,110}Pd systems were measured at a backward angle and at near barrier energies. Experimental fusion barrier distributions were derived from these measured cross sections and compared with simplified coupled-channel calculations. Coupling of

inelastic excitations up to second order were insufficient to explain the data. The inclusion of specific transfer reaction channels improved the fits to these fusion barrier distributions.

"High-Spin States in Doubly Odd ^{166}Tm"

M.A. Cardona, D. Hojman, M.E. Debray, A.J. Kreiner, M. Davidson, J. Davidson, D.R. Napoli, D. Bazzacco, N. Blasi, S.M. Lenzi, G. Lo Bianco, C. Rossi Alvarez

Phys. Rev. C66, Vol. 4 (2002) 044301

High-spin states in doubly odd ^{166}Tm were investigated by means of in-beam γ-ray spectroscopy techniques using the multidetector array GASP. Excited states of ^{166}Tm were populated using the ^{160}Gd(^{11}B,5n) reaction at a beam energy of 61 MeV. Known rotational bands have been extended to higher spins and their configurations have been discussed. Alignments, band crossing frequencies, and electromagnetic properties have been analyzed in the framework of the cranking model. Signature inversion in the $\pi h_{9/2}$ x νu $i_{13/2}$ structure is discussed. Calculations in the framework of the Particle Rotor Model with p-n interaction included have been able to reproduce the inversion. E1 decay modes were observed in competition with E2 intraband transitions.

"Scar Functions in the Bunimovich Stadium Billiard"

G. Carlo, E. Vergini, P. Lustemberg

J. Phys. A35 (2002) 7965-7982

In the context of the semiclassical theory of short periodic orbits, scar functions play a crucial role. These wavefunctions live in the neighborhood of the trajectories, resembling the hyperbolic structure of the phase space in their immediate vicinity. This property makes them extremely suitable for investigating chaotic eigenfunctions. On the other hand, for all practical purposes reductions to Poincare sections become essential. Here we give a detailed explanation of resonances and scar functions construction in the Bunimovich stadium billiard and the corresponding reduction to the boundary. Moreover, we develop a method that takes into account the departure of the unstable and stable manifolds from the linear regime. This new feature extends the validity of the expressions.

"Decoherence as Decay of the Loschmidt Echo in Lorentz Gas"

F.M. Cucchietti, H.M. Pastawski, D.A. Wisniacki

Phys. Rev. E65 (2002) 045206

Classical chaotic dynamics is characterized by the exponential sensitivity to initial conditions. Quantum mechanics, however, does not show this feature. We consider instead the sensitivity of quantum evolution to perturbations in the Hamiltonian. This is observed as an attenuation of the Loschmidt Echo, *M(t)*, i.e. the amount of the original state (wave packet of width) which is recovered after a time reversed evolution, in presence of a classically weak perturbation. By considering a Lorentz gas of size *L*, which for large *L* is a model for an *unbounded* classically chaotic system, we find numerical evidence that, if the perturbation is within a certain range, *M(t)* decays exponentially with a rate determined by the Lyapunov exponent of the corresponding classical dynamics. This exponential decay extends much beyond the Eherenfest time t_E and saturates at a time $t_s \cong \lambda^{-1} \ln \tilde{N}$, where $\tilde{N} \cong (L/\sigma)^2$ is the effective dimensionality of the Hilbert space. Since τ_φ quantifies the increasing uncontrollability of the quantum phase (decoherence) its characterization and control has fundamental interest.

"Appearance of Inverse Giant Magnetoresistance in Noncollinear Magnetic Systems"

S. Di Napoli, J. Milano, A.M. Llois, H. Dreyssé

Journal of Magnetism and Magnetic Materials 240 (2002) 203-205

We show for a simple d-band TB Hamiltonian that noncollinear magnetic configurations can contribute to large inverse giant magnetoresistance (IGMR) ratios. We make a systematic study as a function of band filling, magnetic moment and canting angle for some simple model examples and use the outcome of this study to interpret the experimentally observed IGMR ratios on $LaMn_2Ge_2$.

"Convenio de Cooperación CONAE-CNEA: Desarrollo, Fabricación y Ensayo de Paneles Solares para Misiones Satelitales Argentinas – Avances en el Último Año"

J.C. Durán, C.J. Bruno, M. Alurralde, F. Antonuccio, C.G. Bolzi, P. Cabot, E. Carella, J. Fernández Vázquez, A. Filevich, C.D. Franciulli, E.M. Godfrin, V. Goldbeck, M.G. Martínez Bogado, E. Mezzabolta, S.L. Nigro, J. Plá, S.E. Rodríguez, M.J.L. Tamasi

Avances en Energías Renovables y Medio Ambiente 6 (2002) 04.13

Se presentan los avances realizados durante el último año en el desarrollo de los paneles solares para el satélite de observación argentino SAOCOM. En particular, se analizan las actividades desarrolladas en los temas más relevantes: elaboración y caracterización de celdas solares, puesta a punto de los procesos de soldadura y pegado, y desarrollo de diversas técnicas y dispositivos para ensayos Se describen el diseño preliminar de los paneles y los componentes que lo conforman. La

instalación del laboratorio de integración y ensayo se encuentra prácticamente terminada, estimándose que el mismo estará operativo a fines de octubre de 2002.

"Losartan Potassium, a Non-Peptidic Agent for the Treatment of Arterial Hypertension"

D. Fernández, D.R. Vega, J. Ellena, G. Echeverría

Acta Cryst. C58 (2002) m418-m420

The title compound, calcium bis(3-ammonio-1-hydroxypropylidene-1,1-bisphosphonate) dihydrate, $Ca^{2+}\cdot 2C_3H_{10}NO_7P_2^-\cdot 2H_2O$, consists of calcium octahedra arranged in columns along the *c* axis and coordinated by hydrogen-bonded molecular anions. The Ca^{2+} cation lies on a twofold axis. Pamidronate adopts a twisted conformation of the hydroxyalkylamine backbone that enables the formation of an intramolecular N-H_2O hydrogen bond. The molecular anion is chelating monodentate as well as bidentate, with an O O bite distance of 3.0647(15)Å.

"The Calcium-Binding Properties of Pamidronate, a Bone-Resorption Inhibitor"

D. Fernández, D.R. Vega, A. Goeta

Acta Cryst. C58, N° 10 (2002) m494-497

In the title compound, potassium 2-butyl-4-chloro-1-{[2'-(5-tetrazolido)biphenyl-4-yl]methyl}-1*H*-imidazol-5-ylmethanol, $K^+\cdot C_{22}H_{22}ClN_6O^-$, the imidazole and tetrazole rings are at angles of 85.0(2) and 51.8(1)°, respectively, to the phenyl rings to which they are attached, while the dihedral angle between the latter two rings is 46.7(1)°. The coordination sphere of the metal cation consists of six tetrazoyl N atoms, the methanol O atom and the cloud of one of the phenyl rings. These interactions determine the formation of columns of molecular anions that lie parallel to the *b* axis, while hydrogen bonding contributes to intercolumnar cohesion. Far from the centre of the columns, the hydrocarbon chain is immersed in a hydrophobic environment.

"Enhanced Excitación of Giant Pairing Vibrations in Heavy-Ion Reactions Induced by Weakly-Bound Projectiles"

L. Fortunato, W. von Oertzen, H.M. Sofia, A. Vitturi

The European Physical Journal A14 (2002) 37-42

The use of radioactive ion beams is shown to offer the possibility to study collective pairing states at high excitation energy, which are not usually accessible with stable projectiles because of large energy mismatch. In the case of two-neutron stripping reactions induced by ^{6}He, we predict a population of the Giant Pairing Vibration in ^{208}Pb or ^{116}Sn with cross sections of the order of a millibarn, dominating over the mismatched transition to the ground state.

"Two Nickel Complexes Stabilized by Nitrate Counterions"

E. Freire, S. Baggio, J.C. Muñoz, R. Baggio

Acta Cryst. C58 (2002) m221-m224

$[Ni(tmp)_2(H_2O)_2]^{2+}.[(NO_3)^-]_2.(CH_4O)$ (1) and $[Ni(tpt)(H_2O)_3]^{2+}.[(NO_3)^-]_2.3(H_2O)$ (2) are reported. In both structures the cation is octahedrally coordinated, to two bidentate tmp and two aqua molecules in 1 and to one tridentate tpt and three aqua molecules in 2. Both structures are stabilized by profuse H-bonding interactions.

"Bis(1,10-Phenanthroline-N,N') (Thiosulfato-O:S) Manganese (II) Methanol Solvate and Catena-Poly[[Diaqua(2,9-Dimethyl-1,10-Phenanthroline)]-m-(Thiosulfato-O:S)Manganese(II)]"

E. Freire, S. Baggio, J.C. Muñoz, R. Baggio

Acta Cryst. C58 (2002) m455-m458

The structure of $Mn(phen)_2$ $(S_2O_3).(CH_4O)$ (i) is made up of Mn^{2+} centers coordinated to two bidentate phen groups and a chelate (S,O) thiosulfato to form non interacting monomeric entities. That of $Mn(dmph)(H_2O)_2$ $(S_2O_3)]_n$ (ii) is instead polymeric with elemental $Mn(bpy)(H_2O)_2$ units linked by thiosulfate anions acting in a (S,O) bridging mode.

"Magnetization Studies of Phase Separation in $La_{0.5}Ca_{0.5}MnO_3$"

R.S. Freitas, L. Ghivelder, P. Levy, F. Parisi

Phys. Rev. B65 (2002) 104403

We present magnetization studies in a series of phase separated $La_{0.5}Ca_{0.5}MnO_3$ samples, with different low temperature fractions of the ferromagnetic (FM) and charge ordered-antiferromagnetic (CO-AFM) phases. A particular experimental procedure probes the effect of the magnetic field applied while cooling the samples, which promotes FM fraction enlargement and enhances the melting of the CO phase. The response of the system depending on its magnetic field history indicates the existence of three different regimes in the phase separated state which develops below TC. Our data allows us to identify the onset temperature below which the system becomes magnetic and structurally phase separated and an onset field above which FM fraction enlargement occurs.

"Molecular Dynamics Study of the Fragmentation of Silicon-Doped Fullerenes"

C.C. Fu, J. Fava, R. Weht, M. Weissmann

Physical Review B66 (2002) 045405

Tight-binding molecular dynamics simulations, with a nonorthogonal basis set, are performed to study the fragmentation of carbon fullerenes doped with up to six silicon atoms. Both substitutional and adsorbed cases are considered. The fragmentation process is simulated starting from the equilibrium configuration in each case and imposing a high initial temperature to the atoms. Kinetic energy quickly converts into potential energy, so that the system oscillates for some picoseconds and eventually breaks up. The most probable first event for substituted fullerenes is the ejection of a C2 molecule, another very frequent event being that one Si atom goes to an adsorbed position. Adsorbed Si clusters tend to desorb as a whole when they have four or more atoms, while the smaller ones tend to dissociate and sometimes interchange positions with the C atoms. These results are compared with experimental information from mass abundance spectroscopy and the products of photo-fragmentation.

"Paneles Solares para la Misión Satelital SAOCOM: Primeras Etapas de Diseño"

E.M. Godfrin, J.C. Durán

Avances en Energías Renovables y Medio Ambiente 6 (2002) 04.19

En abril de 2001, la Comisión Nacional de Energía Atómica (CNEA) y la Comisión Nacional de Actividades Espaciales (CONAE) suscribieron un convenio de cooperación que dio lugar a la iniciación del Subproyecto Paneles Solares en el ámbito del Centro Atómico Constituyentes. El objetivo de este Subproyecto es diseñar, fabricar, ensayar y calificar en el país los paneles solares para la misión satelital SAOCOM. Los requerimientos de potencia y las diferentes restricciones impuestas por el proyecto hacen necesario un cuidadoso estudio del diseño del subsistema de potencia. En este trabajo se presenta el diseño preliminar de los paneles para el SAOCOM y los resultados de un conjunto de simulaciones de funcionamiento de los mismos a principios de la misión y al final de la misma.

"Fractionation of Elements by Particle Size of Ashes Ejected from Copahue Volcano, Argentina"

D. Gómez, P. Smichowski, G. Polla, A. Ledesma, S. Rezniski, S. Rosa

Journal of Environmental Monitoring 4 (6) (2002) 972-977

The volcano Copahue, Neuquén province, Argentina has shown infrequent explosive eruptions since the 18th century. Recently, eruptive activity and seismicity were registered in the period July-October, 2000. As a consequence, ash clouds were dispersed by winds and affected Caviahue village located at about 9 km east of the volcano. Samples of deposited particles from this area were

collected during this episode for their chemical analysis to determine elements of concern with respect to the health of the local population and its environment. Different techniques were used to evaluate the distribution of elements in four particle size ranges from 36 to 300 μm. X-ray powder diffraction (XRD) was selected to detect major components namely, minerals, silicate glass, fragments of rocks and sulphurs. Major and minors elements (Al, Ca, Cl, Fe, K, Mg, Mn, Na, S, Si and Ti), were detected by energy dispersive X ray analysis (EDAX). Trace elements (As, Cd, Cr, Cu, Hg, Ni, Pb, Sb, U, V and Zn) content was quantified by inductively coupled plasma-mass spectrometry (ICP-MS). Nuclear activation analysis (NAA) was employed for the determination of Ce, Co, Cs, Eu, Hf, La, Lu, Rb, Sc, Sm, Ta, and Yb. An enrichment was observed in the smallest size fraction of volcanic ashes for four elements (As, Cd, Cu and Sb) of particular interest from the environmental and human health point of view.

"Magnetic Anisotropy of Extended Defects and Vicinal Surfaces of 3d Transition Metals"

R. Gómez-Abal, A.M. Llois

Physical Review B65 (2002) 155426

The effect of linear defects and steps on the magnetocrystalline anisotropy energy (MAE) of ultrathin films of Co and Fe is self-consistently calculated using an electronic tight-binding theory. The presence of linear defects produces changes in the spontaneous orientation of the magnetic moments and the induced magnetic anisotropy depends, among others, on the relative orientation of the introduced defects with respect to the substrate. A variety of possible situations is also obtained as a function of orientation index in the case of vicinal surfaces. Within our theoretical framework we obtain results that agree well with experiments.

"Chiral Quark Models with Non-Local Separable Interactions at Finite Temperature and Chemical Potential"

D. Gómez Dumm, N.N. Scoccola

Phys.Rev. D65 (2002) 074021

Chiral quark models with non-local covariant separable interactions at finite temperature and chemical potential are investigated. We develop a formalism in which the different quark properties are evaluated taking into account the analytic structure of the quark propagator. In this framework we study the chiral restoration phase transition for several definite non-local regulators, including that arising within the instanton liquid picture. We find that in all cases the chiral transition is of first order for low values of T, turning into a smooth crossover at a certain "end point". Using model parameters which lead to the physical pion mass and decay constant, we find for the position of this

``end point" the values T_E, $_E$) ≈ (60-70, 180-210) MeV. We also discuss the special relevance of the first poles of the quark propagator.

"Dynamical effects in magnetic and transport properties of phase separated $La_{0.5}Ca_{0.5}Mn_{1-x}Fe_xO_3$"

L. Granja, E. Indelicato, P. Levy, G. Polla, D.R. Vega, F. Parisi

Physica B320 (1-4) (2002) 94-96

We have measured transport and magnetic properties of polycrystalline $La_{0.5}Ca_{0.5}Mn_{0.95}Fe_{0.05}O_3$, a phase separated manganite with ferromagnetic ground state. Cooling rate dependences and time relaxation were found. The coexistence of ferromagnetic and charge ordered regions determines a dynamics which influences physical properties. We show that a dynamical contribution to the resistivity can account for the observed cooling rate dependence and ageing effects on this phase separated manganite.

"Electronic and Magnetic Properties of the Inverse Magnetoresistant $Fe_{1-x}Co_xSi$ Alloys"

J. Guevara, V.L. Vildosola, J. Milano, A.M. Llois

Physica B320 (2002) 388

The alloy $Fe_{1-x}Co_xSi$ shows a remarkable behavior, while the two extremes are both non-magnetic almost all the intermediates show magnetic order, specially in the *Fe*-rich region. We present here *ab-initio* calculations within the LSDA approximation for these compounds and show that they behave as half metals for $x \leq .25$. This explains the linear dependence on x of the magnetic moment in this region. We also explain the magnetic behaviour for larger concentrations.

"Static and Dynamical Properties of SiC Polytypes"

E. Halac, E. Burgos, H. Bonadeo

Phys. Rev B65 (2002) 125202

Dynamical properties of 3C, 2H, 4H, 6H and 15R SiC polytypes have been calculated using a modification of Tersoff 's potential for covalent multicomponent systems. Structures and vibrational frequencies are in good agreement with experimental results. For uniaxial polytypes, the dependence of the optical frequencies on propagation angle, has been studied. The relative intensity of Raman bands has been calculated using a bond polarizability model. Isotope shifts, phonon eigenvectors and relative phase for longitudinal and transversal modes of 3C SiC for the dispersion branches along the direction have been determined and compared with experimental results.

"Structural Studies of Complexes Containing the Peroxodisulfate Anion. II. The Crystal and Molecular Structures of Cd(pds)(bpy)$_2$.H$_2$O and Hg (pds) (terpy)$_2$(acet)$_2$ (pds = Peroxodisulfate; bpy = 2,2'-Bipyridine; terpy = 2,2':6',2''-Terpyridine-N,N',N'', acet = Acetate)"

M.A. Harvey, S. Baggio, M.T. Garland, R. Baggio

Aust.J.Chem. 55 (2002) 711-716

The crystal structures of two transition metal complexes with different dinitrogenated bases and the unusual peroxodisulfate anion are presented: Cd(S_2O_8)*(bpy)$_2$*.H_2O (1) and Hg_2(S_2O_8)*(terpy)$_2$(acet)$_2$*. (2), *bpy*: 2,2'-bipyridine, *terpy*: terpiridine-N,N',N", *acet*: acetate. In both structures, though in different ways, the peroxodisulfate group acts as a bridge, giving rise to polymeric linear chains. To our knowledge these are the first structures reported where the anion displays such behavior. The cadmium compound crystallizes with one hydration water molecule which intervenes in medium strength H-bonds stabilizing the structure. The mercury complex is built up of similar, though independent, chains displaying double Hg-O-Hg bridges spanning Hg…Hg distances of 4.214(1) and 3.911(1) Å. The inter-chain link is achieved through weak C-H…O contacts. Compound (1) is triclinic P-1, a 7.213(3), b 9.841(6), c 16.371(5)Å, 82.94(4), 82.31(3), 86.32(4)°, V 1141.6(9)Å^3, Z = 2 conventional R (on F) being 0.0315 for 4019 N_o observed reflections (I>2(I)). Compound (2) is also triclinic P-1, a 10.653(2), b 12.195(3), c 14.641(3)Å, 88.295(19), 83.553(18), 73.921(19)°, V 1816.0(7)Å^3, Z = 2, R 0.0498, N_o 6179.

"A New Class of Matrix Models Arising from the W-Infinity Algebra"

H.D. Herce, G.R. Zemba

Mar 2002. 8pp. E-Print Archive: hep-th/0203228

Phys. Lett. **B537** (2002) 141-146

We present a new class of hermitian one-matrix models originated in the W-infinity algebra: more precisely, the polynomials defining the W-infinity generators in their fermionic bilinear form are shown to expand the orthogonal basis of a class of random hermitian matrix models. The corresponding potentials are given, and the thermodynamic limit interpreted in terms of a simple plasma picture. The new matrix models can be successfully applied to the full bosonization of interesting one-dimensional systems, including all the perturbative orders in the inverse size of the system. As a simple application, we present the all-order bosonization of the free fermionic field on the one-dimensional lattice.

"Amorphous Carbon Coatings Obtained from a C_{60} Fullerene Ion Beam"

H. Huck, E.B. Halac, M.E. Reinoso, A.G. Dall'Asén

Diamond and Related Materials V.11/3-6 (2002) 964

Carbon films have been produced by accelerating C_{60}+ ions on silicon substrates with energies between 100 eV and 800 eV. The resulting films have been characterized by Raman spectroscopy and electrical resistivity measurements. Different deposition regimes have been distinguished depending on the energy of the incident fullerenes. At low energies intermolecular covalent bonds begin to insinuate, while at higher energies there is a coexistence of polymeric and amorphous islands. The samples have been annealed in order to study their thermal behavior. The tendency with increasing voltage, as observed by Raman spectroscopy, is to reach a similar behavior to that of annealed amorphous carbon.

"Novel Applications of Particle Accelerators to Radiotherapy"

A.J. Kreiner, A.A. Burlón

Heavy Ion Physics 16, 1-4 (2002) 243.

Charged hadrons (protons and heavier ions) have very definite advantages over photons as far as radiotherapy applications are concerned. They allow for a much better spatial dose localization due to their charge, relatively high mass and nature of the energy deposition process. In the frame of an attempt to promote the introduction of hadrontherapy in Argentina we have installed and started using an external beam facility at our tandem accelerator TANDAR. The advantages of heavy ions can only be fully exploited for tumors of well defined localization. In certain types of malignancies, however, the region infiltrated by tumor cells is diffuse, with no sharp boundaries and with microscopic ramifications. In such cases (particularly in certain brain cancers) a more sophisticated scheme has been suggested called boron neutron capture therapy (BNCT). In this work, the use of the Tandar accelerator to produce neutrons for feasibility studies for BNCT through low-energy proton beams on a thick LiF target is being briefly described. Studies on the $^{13}C(d,n)$ reaction and a comparison with other neutron-producing reactions are also mentioned. Simulation work to optimize an accelerator-based neutron production target is discussed. A project is being prepared to develop a small proton accelerator in Argentina. Technical specifications of this machine will be briefly discussed.

"Characterisation of different brands used in a typical Argentinean beverage- mate- by means of an e-nose"

A. Lamagna, S. Reich, M. Negri, A. Boselli, M. Cocco, C. Di Natale

Thin Solids Films 418, 1 (2002) 42-44

The aim of this research work is to establish the capabilities of an electronic nose device to distinguish between different mixtures of herbs that are employed in a popular South American beverage (“mate”). Through the variability of the emitted odors it is possible to classify different brands and also it can constitute a useful tool for qualitty assurance procedures to guarantee homogeneity of production. We have employed a prototype of an electronic nose (Libra Nose) based on eight piezoelectric sensors provided by Technobiochip. Samples from three different brands were analyzed. They correspond to three mixtures of leaves sold under different commercial trademarks. Each standardized sample was put inside a 50 liter glass box so that diffusion of the odors is done under stationary conditions. The inlet to the nose pump was located 10 cm above the sample. Air was injected to the nose at a 0.2 liter/minute rate. Each sample was measured for time periods up to two hours and sensors response values were registered every two seconds. We have also analyzed the long term “odor” from the three mixtures.

“Homogeneity Characterisation of Sintered(U,Gd)02 Pellets by X-Ray Diffraction”

A.G. Leyva, D.R. Vega, V. Trimarco, D. Marchi

Journal of Nucl. Mat. 3030/1 (2002) 29-33

The $(U,Gd)O_2$ sintered pellets are fabricated by different methods. The homogeneity characterisation of Gd content seems to be necessary as a production control to qualify the process and the final product. The micrographic technique is the most common method used to analyse the homogeneity of these samples, this method requires time and expertise to obtain good results. In this paper, we propose an analysis of the X-ray diffraction powder patterns through the Rietveld method, in which the differences between the experimental data and the calculated from a crystalline structure model proposed are evaluated. This result allows us to determine the cell parameters, that can be correlated with the Gd concentration, and the existence of other phases with different Gd ratio.

“Novel Dynamical Effects and Persistent Memory in Phase Separated Manganites”

P. Levy, F. Parisi, L. Granja, E. Indelicato, G. Polla

Phys. Rev. Lett. 89 (2002) 137001

The time dependent response of the magnetic and transport properties of Fe-doped phase separated (PS) manganite La0:5Ca0:5MnO3 is reported. The nontrivial coexistence of ferromagnetic (FM)

and non-FM regions induces a slow dynamics which leads to time relaxation and cooling rate dependence within the PS regime. This dynamics influences physical properties drastically. On one hand, metallic-like behavior, assumed to be a fingerprint of percolation, can be also observed before the FM phase percolates as a result of dynamical contributions. On the other hand, two novel effects for the manganites are reported, namely, the rejuvenation of the resistivity after aging and a persistent memory of low magnetic fields (<1 T), imprinted in the amount of the FM phase.

"Non-Volatile Magnetoresistive Memory in Phase Separated $La_{0.325}Pr_{0.300}Ca_{0.375}MnO_3$"

P. Levy, F.Parisi, M. Quintero, L. Granja, J. Curiale, J. Sacanell, A.G. Leyva, G. Polla, R.S. Freitas, L. Ghivelder

Phys Rev. B65 (2002) 140401(R)

We have measured magnetic and transport response on the polycrystalline La5/8-yPryCa3/8MnO3 (y=0.30, average grain size 2 microns) compound. In the temperature range where ferromagnetic metallic and insulating regions coexist we observed a persistent memory of low magnetic fields (< 1 T) which is determined by the actual amount of the ferromagnetic phase. The possibility to manipulate this fraction with relatively small external perturbations is related to the phase separated nature of these manganese oxide based compounds. The colossal magnetoresistance figures obtained (about 80%) are determined by the fraction enlargement mechanism. Self-shielding of the memory to external fields is found under certain described circumstances. We show that this non-volatile memory has multilevel capability associated with different applied low magnetic field values.

"Campo del Cielo Iron Meteorite: Sample Shielding and Meteoroid's Preatmospheric Size"

R.G. Liberman, J.O. Fernández Niello, M.L. di Tada, L.K. Fifield, J. Masarik, R.C. Reedy

Meteoritics and Planetary Sciences 37 (2002) 295

Long-lived cosmogenic radioisotopes, ^{10}Be, ^{26}Al, ^{36}Cl, ^{41}Ca and ^{59}Ni, have been measured in five samples from the Campo del Cielo iron meteorite by accelerator mass spectrometry (AMS). The ^{36}Cl activities were significantly above the background. For the concentrations of the other four radioisotopes, only upper limits were obtained that were, however, consistent with the ^{36}Cl result. The measured ^{36}Cl activity allowed an estimate of the meteoroid's preatmospheric size: a radius larger than 300 cm and a mass of at least 840,000 kg. We conclude that this meteorite might be one of the largest meteorites to have been recovered.

"Parametrization of Optical Properties of Indium-Tin-Oxide Thin Films by Spectroscopic Ellipsometry: Substrate Interfacial Reactivity"

M. Losurdo, M. Giangregorio, P. Capezzuto, G. Bruno, R. De Rosa, F. Roca, C. Summonte, J. Plá, R. Rizzoli

Journal of Vacuum Science and Technology A20 (2002) 37

Indium-tin-oxide (ITO) films deposited by sputtering and e-gun evaporation on both transparent (Corning glass) and opaque (c-Si, c-Si/SiO2) substrates and in c-Si/a-Si:H/ITO heterostructures have been analyzed by spectroscopic ellipsometry (SE) in the range 1.5-5.0 eV. Taking the SE advantage of being applicable to absorbent substrate, ellipsometry is used to determine the spectra of the refractive index and extinction coefficient of the ITO films. The effect of the substrate surface on the ITO optical properties is focused and discussed. To this aim, a parametrized equation combining the Drude model, which considers the free-carrier response at the infrared end, and a double Lorentzian oscillator, which takes into account the interband transition contribution at the UV end, is used to model the ITO optical properties in the useful UV-visible range, whatever the substrate and deposition technique. Ellipsometric analysis is corroborated by sheet resistance measurements.

"Organodiiron(II)-Complexes Containing a Long Conjugated Hydrazonato Spacer. Synthesis, Characterization, Electrochemical and Structural Studies"

C. Manzur, M. Fuentealba, L. Millan, F. Gajardo, M.T. Garland, R. Baggio, J.A. Mata, J.R. Hamon, D. Carrillo

J. Organomet. Chem. (2002) 71-77

Organometallic hydrazines of general formula [(^{5}-Cp)Fe(^{6}-p -$RC_6H_4NHNH_2$)] $^{+}PF_6^{-}$(Cp= C_5H_5 ;R= H, (1) $^{+}PF_6^{-}$; Me, (2) $^{+}PF_6^{-}$; MeO, (3) $^{+}PF_6^{-}$; Cl, (4) $^{+}PF_6^{-}$) react with equimolar quantities of (E)-4-(2-ferrocenylvinyl)-benzaldehyde, (E)-[(^{5}-Cp) Fe(^{5}-C_5H_4) - CH= CH- C6 H4 CHO], to afford stereoselectively, the new homodimetallic hydrazones formulated as (E)-[(^{5}-Cp) Fe(^{6}-p-RC_6H_4)-NHN= CH-C_6H_4- CH= CH- (^{5}-C_5H_4)Fe(^{5}-Cp)] $^{+}PF_6^{-}$ (R =H, (5) $^{+}PF_6^{-}$; Me, (6) $^{+}PF_6^{-}$; MeO, (7) $^{+}PF_6^{-}$; Cl, (8) $^{+}PF_6^{-}$).These compounds were fully characterized by elemental analysis and spectroscopic techniques (^{1}H-and^{13}C-NMR, IR and UV/ vis) and, in the case of complex (6) $^{+}PF_6^{-}$, by single crystal X-ray diffraction methods. The rotations ofthe ferrocenyl unit by 37.2° out of the – NHN= CH- C_6H_4- CH= CH- spacer and coordinated phenyl ring planes, may generate an unfavorable structure to allow π -electron delocalization along the entire hydrazonato

backbone between the two metals separated through bonds by more than 1.8 nm, as confirmed by the electrochemical data.

"On the Slope Anomaly in Heavy Ion Transfer Reactions"

H.D. Marta, R. Donangelo, J.O. Fernández Niello, A.J. Pacheco

Nuclear Physics A697 (2002) 107

We discuss a semiclassical model of transfer reactions in heavy ion collisions, in which the nuclei are assumed to move along classical trajectories governed by the Coulomb and the real part of the optical potential. The model, originally proposed for the case of spherical nuclei, is here extended to deformed ones. It takes into account tunneling around the point of closest approach of the collision partners, and the effect of other channels is included as an absorption due to the imaginary part of the optical potential. The interplay between absorption and tunneling effects explains both the observed energy dependence of the transfer probabilities at large distances, and the so-called "slope anomaly" in neutron transfer reactions.

"Heterocyclization of 3-Deoxy-D-Erythro-Hexos-2-Ulose-1,2-Bis(Thiosemicarbazone). Crystal Structure of the Major Diastereomer"

M.A. Martins Alho, R. Baggio, M.T. Garland, N.B. D'Accorso, O. Varela

Carbohydrate Research 337 (2002) 1397-1403

Both thiosemicarbazone groups of the derivative 1 of 3-deoxy-D-erythro-hexos-2-ulose underwent, on acetylation, a heterocy-clization process to give (5R,5'R)-2,2_-diacetamido-4,4_-di-N-acetyl-5'-(1-deoxy-2,3,4-tri-O-acetyl-D-erythritol-1-yl)-5,5'-bis(1,3,4- thiadiazoline) (2) as a major product. The X-ray diffraction data of a single crystal of 2 indicated the R,R configuration for the stereocenters of the thiadiazoline rings (C-5 and C-5'). In the solid state, 2 adopts a sickle conformation (by clockwise rotation of the C-2–C-3 axis of the sugar chain) which has a S//O 1,3-parallel interaction. In solution, as determined by 1 H NMR spectroscopy which included NOE experiments, a similar sickle conformation was observed. From the reaction mixture of acetylation of 1 was isolated the bis(thiadiazoline) 3 as a by-product . The configuration of the C-5 and C-5' stereocenters of 3 were respectively assigned as S,R by comparison of the physical and spectroscopic data of this compound with those of 2.

"Casimir Interaction Between Two Concentric Cylinders: Exact versus Semiclassical Results"

F.D. Mazzitelli, M.J. Sánchez, N.N. Scoccola, J. von Stecher

Phys.Rev. D66 (2002) 114014

We compute the Casimir energy for two perfectly conducting, infinite, concentric cylinders. We first obtain the zero point electromagnetic energy using a semiclassical approximation that takes into account families of classical periodic orbits that reflect off both cylinders. Then we compute the exact energy using the mode-by-mode summation technique based on Cauchy's theorem. We analyze the validity of the semiclassical approximation and show that it improves the results obtained through the proximity theorem.

"Iron Mineral Modifications in the Sand Fraction of A Subtropical Soil from Argentina"

A. Mijovilovich, H. Causevic, H. Morrás, C. Saragovi

Hyperfine Interactions C5 (2002) 439-442

The sand fraction of a B_{t22} horizon (105-155 cm depth) of a clayey red Ultisol in a subtropical forest environment (Misiones, Argentina) was studied by X-ray diffraction (XRD), saturation magnetization (σ_s), optical microscopy (OM) and Mössbauer spectroscopy (MS). Saturation magnetization for the whole sand fraction (wsf), the non magnetic (nmsf) and the magnetic fractions (msf) gave σ_s values of 10.79 $JT^{-1}Kg^{-1}$, 16.92 $JT^{-1}Kg^{-1}$ and 1.50 $JT^{-1}Kg^{-1}$ respectively. Mainly quartz, ilmenite, Al-substituted hematite, magnetite together with maghemite contribution and goethite were found. Magnetite/maghemite contents are high, being magnetite predominant in the msf. Results are compared with those from the upper B_1 horizon (10-35cm depth) of the same soil, in which a lower wsf σ_s value and higher values of msf σ_s and of (σ_s (msf)- σ_s(wsf)) values were measured. These results confirm the stability of magnetite in this soil contrasting with other results on soils from neighbouring areas.

"Combined Impurity and Band Effects on the Appearance of Inverse Giant Magnetoresistance in Cu/Fe Multilayers with Cr"

J. Milano, A.M. Llois, L.B. Steren

Physical Review B66 (2002) 134405

We have studied the dependence of impurity *vs*. band effects in the appearance of inverse giant magnetoresistance (IGMR) in Cu/Fe superlattices with Cr. Current in plane (CIP) and current perpendicular to the plane (CPP) geometies are considered. For the calculation of the conductivities we have used the linearized Boltzmann equation in the relaxation times and the band effects through the semiclassical velocities obtained from the LDA calculated electronic structure. The larger the Cr/Fe hybridization strength, the bigger is the tendency towards IGMR. In particular, in CIP geometry roughness at these interfaces increases the IGMR range. The calculated GMR ratios have

been compared with the experimental results. From this comparison we conclude that the experimental data can only be explained by taking into account Cr bands.

"Calculation of Transport Properties of Co – Ag based Multilayered Granular Alloys"

J. Milano, A.M. Llois, L.B. Steren

Physica B320 (2002) 146

We calculate electronic transport property of multilayered granular alloys, composed by discontinuous *Co* layers embedded in *Ag* alternated with *Ag* layer. We focus our attention on the conductivity dependance on shape and size of the clusters. The electronic structure is selfconsistently calculated using a tight binding hamiltonian which includes a Hubbard term within the unrestricted Hartree Fock approximation. We obtain different transport regimes depending on growth conditions and transport direction.

"Quantum Computers in Phase Space"

C. Miquel, J.P. Paz, M. Saraceno

Phys. Rev. A65 (2002) 062309

We represent both the states and the evolution of a quantum computer in phase space using the discrete Wigner function. We study properties of the phase space representation of quantum algorithms: apart from analyzing important examples, such as the Fourier transform and Grover's search, we examine the conditions for the existence of a direct correspondence between quantum and classical evolutions in phase space. Finally, we describe how to measure directly the Wigner function in a given phase-space point by means of a tomographic method that, itself, can be interpreted as a simple quantum algorithm.

"Interpretation of Tomography and Spectroscopy as Dual Forms of Quantum Computation"

C. Miquel, J.P. Paz, M. Saraceno, E. Knill, R. Laflamme, C. Negrevergne

Nature 418 (2002) 59

Determining the state of a system and measuring properties of its evolution are two of the most important tasks a physicist faces. For the first purpose one can use tomography, a method that after subjecting the system to a number of experiments determines all independent elements of the density matrix. For the second task, one can resort to spectroscopy, a set of techniques used to determine the spectrum of eigenvalues of the evolution operator. In this letter, we show that tomography and spectroscopy can be naturally interpreted as dual forms of quantum computation. We show how to adapt the simplest case of the well-known phase estimation quantum algorithm to

perform both tasks, giving it a natural interpretation as a simulated scattering experiment. We show how this algorithm can be used to implement an interesting form of tomography by performing a direct measurement of the Wigner function (a phase space distribution) of a quantum system. We present results of such measurements performed on a system of three qubits using liquid state nuclear magnetic resonance (NMR) quantum computation techniques in a sample of trichloroethylene. Remarkable analogies with other experiments are discussed.

"Low Temperature Phase Formation of Sn-Doped LaMnO(3+d) Perovskite"

L. Morales, D.R. Vega, R. Zysler, H. Lanza, R. Mercader, A. Caneiro

J. Solid State Chem. 168, N° 1 (2002) 91-99

The incorporation of Sn into $LaMnO_3$ perovskite and its influence on magnetotransport properties were studied in samples synthesized at low temperature. Single-phase materials for two series of samples with La/(Sn+Mn)=1 and La/(Sn+Mn)<1 ratios were obtained by substitution of up to 10% of the Mn ions by Sn^{4+}. The effect of Sn substitution was monitored through measurements of thermal, "*M(T)*", and magnetic field, "*M(H)*", dependences of magnetization, as well as of resistivity, "*(T)*", at 0 and 70 kOe. These showed that this effect depends strongly on the perovskite cation site ratio (*A*/*B*). For La/(Sn+Mn)=1, *M* and T_C were depressed as Sn content was increased. The magnetization data suggest the presence of magnetic clusters with superparamagnetic behavior. No evidence of magnetoresistance (MR) was found. For La/(Sn+Mn)<1 ratio, the samples showed ferromagnetic behavior and MR and both *M* and T_C raised as Sn content increased. The results are discussed in terms of *A* site vacancies

"Phonons in Isostructural Compounds $Cu_xM_{1-x}(HCOO)_2\ 2H_2O$ (M=Mn, Co, Ni, Zn, and Cd): A Raman Scattering Study"

M.R. Moura, W.A. Pachoal, A.P. Ayala, I. Guedes, A.G. Leyva, G. Polla, D.R. Vega, P.K. Perazzo

Journal of Raman Spectroscopy 33, N° 1 (2002) 273-277

The Raman spectra of isostructural compounds $Cu_xM_{1-x}(HCOO)_2\ 2H_2O$ (M=Mn, Co, Ni, Zn, and Cd) at room temperature are presented. The phonons observed were assigned on the basis of formate and water group vibrations and correlations with previous data reported for other formates. The influence of metal-guest ion substitution is discussed in the system $Cu_{0.53}Mn_{0.47}(HCOO)_2\ 2H_2O$ when Mn is replaced by Cd.

"Monoclinic-Orthorhombic Phase Transition in $Ba_2Cu(HCOO)_4$ Crystals: A Raman Scattering Study"

C.W.A. Pachoal, A.P. Ayala, I. Guedes, P.T.C. Freire, M.R. Moura, F.E. Melo, J. Mendes Filho, A.G. Leyva, G. Polla, D.R. Vega, P.K. Perazzo

Journal of Raman Spectroscopy 33, N° 1 (2002) 37-41

The monoclinic-orthorrombic phase transition in $Ba_2Cu(HCOO)_6$ crystals, which takes place when the temperature is raised from 300 to 317K, was analysed in the light of Raman sacttering measurements. The disappearance of two modes related to HCOO vibratiosn is interpreted as the signature of phase transformation which is characterized by slight modifications in the atomic positions of HCOO in the unit cell. For the sake of completeness, we also show the evolution of the Raman spectrum from 50 to 300K, where no phase transformation is observed.

"Fusion of Stable Weakly Bound Nuclei with ^{27}Al and ^{64}Zn"

I. Padrón, P.R.S. Gomes, R.M. Anjos, J. Lubian, C. Muri, J.J.S. Alves, G.V. Martí, M. Ramírez, A J. Pacheco, O A Capurro, J.O Fernández Niello, J.E. Testoni, D. Abriola

Phys. Rev. C66 (2002) 044608

Fusion cross sections were measured for the ^{6,7}Li + ^{27}Al, ^{64}Zn systems, at energies above the Coulomb barrier, in order to study the influence of the break-up of stable weakly bound nuclei on the fusion process. The analysis was completed by the inclusion of the data of fusion induced by ^{9}Be and the strongly bound ^{16}O and ^{11}B projectiles on the same targets. The fusion excitation functions have similar behavior for all projectiles incident on both targets and they show no signature of fusion hindrance.

"Angular Dependence in the AC Response of YbaCuO Crystals with Columnar Defects"

G. Pasquini, L. Civale, H. Lanza, G. Nieva

Phys. Rev. B65 (2002) 214517

The main source of vortex pinning near the solid-liquid transition at different orientations of a low dc field in $YBa_2Cu_3O_7$ crystals with columnar defects is investigated by means of ac susceptibility measurements. The behavior is compared with that observed in nonirradiated samples. It is found that in a very wide angular region the tracks act as correlated defects and are the prevailing source of pinning. The results rule out the existence of an accommodation angle, determined by the competition between the pinning and elastic energies, in twined crystals: the interplay with natural correlated pinning centers has to be taken into account. The linear and nonlinear dynamic regimes when the field is tilted relative to the defects are analyzed. It is clearly shown that characterization of the dynamic regimes is crucial for the correct interpretation of the angular dependence in the ac response

"Homojunction and Heterojunction Silicon Solar Cells Deposited by Low Temperature-High Frequency PECVD"

J. Plá, E. Centurioni, C. Summonte, R. Rizzoli, A. Migliori, A. Desalvo, F. Zignani

Thin Solid Films 405 (2002) 249

Plasma enhanced chemical vapour deposition (PECVD) is widely used to deposit materials on a variety of substrates at low temperature. However, examples of epitaxial growth on silicon with this technique are scarce. In this paper, we present homojunction silicon solar cells, epitaxially grown by PECVD, and μc-Si/a-Si:H/c-Si heterojunction deposited with the same technique, made with a completely low temperature process. All cells incorporate an intrinsic buffer layer, whose deposition conditions were varied. It is shown that the best Voc is obtained when the intrinsic layer is deposited under two extreme conditions, i.e. zero or very high (= 99.4 %) hydrogen dilution of the gas mixture, resulting in totally amorphous or epitaxial i-layer. Intermediate conditions result in Voc degradation. Efficiencies as high as 13.7% were obtained in planar devices that include an amorphous i-layer, and 13.1% in homojunction devices.

"Mössbauer Spectroscopy studies of some intemetallics in the Zr-Nb-Fe system"

C. Ramos, C. Saragovi, M. Granovsky, D. Arias

Hyperfine Interactions 139/140 (2002) 363-368

Zr-Nb alloys are used in the pressure tubes of the CANDU-type nuclear power plants. Being Fe a fast diffusive element in Zr, it can be present as a minor component. Likewise, the multicomponent Zr-based alloys, with Sn, Nb, Fe and O, i.e. Zyrlo are being investigated as possible structural constituents of reactors. These materials present Zr-Nb-Fe precipitates. In any case, the knowledge of the mentioned ternary system is of paramount importance for the nuclear power industry. The Zr-Fe-Nb diagram has been barely studied at variance with binary phase diagrams (Zr-Fe, Zr-Nb and Fe-Nb) which have been extensively studied. We present results on as cast and heat-treated $Zr_{62}Nb_{14}Fe_{24}$, $Zr_{65}Nb_{10}Fe_{25}$ and $Zr_{52}Nb_{10}Fe_{38}$ samples to continue previous studies on this ternary system. Mössbauer spectroscopy of ^{57}Fe was used on these six samples and results are complemented with XRD (X-ray diffraction) and EM (electron microprobe analysis). All spectra were analyzed with overlapping doublets. $Zr_{62}Nb_{14}Fe_{24}$ and $Zr_{65}Nb_{10}Fe_{25}$ spectra showed two major doublets assigned to Zrβ and to a cubic Ti_2Ni type phase and traces corresponding to a hexagonal $MgZn_2$ type phase. $Zr_{52}Nb_{10}Fe_{38}$ spectra also showed two major doublets assigned to a cubic Ti_2Ni

type phase and to the hexagonal $MgZn_2$ type phase. The corresponding assignments contribute to a better understanding of this region of the diagram.

"Uso de Narices Electrónicas para la Determinación de Propiedades de Lúpulos"

S. Reich, D. Rodríguez, N.N. Scoccola, M. Cerdán, A. Lamagna

Cerveza y Malta XXXIX(4), N° 156 (2002)

Este trabajo presenta una aplicación de narices electrónicas para identificación de muestras de lúpulo mediante la detección de su aroma. Se ha utilizado una nariz electrónica, desarrollada en nuestros laboratorios, que utiliza sensores de película delgada. Hemos realizado una serie de mediciones de aromas de diversas variedades de lúpulos utilizados en la industria cervecera y bajo diversas condiciones ambientales y de almacenamiento. Con esta información hemos construido una base de datos de posibles "olores" de lúpulo con el objetivo de desarrollar el esquema de reconocimiento más adecuado. Para ello, hemos empleado la técnica algorítmica de Análisis de Componentes Principales y la comparamos con la identificación obtenida utilizando Mapas Autoorganizados. Los resultados son promisorios y dan cuenta de la utilidad del empleo de narices electrónicas para seguimiento y control de la calidad del lúpulo.

"Hyperbolic Scar Patterns in Phase Space"

A.M.F. Rivas, A.M. Ozorio de Almeida

Nonlinearity **15** (2002) 681

We develop a semiclassical approximation for the spectral Wigner and Husimi functions in the neighborhood of a classically unstable periodic orbit of chaotic two dimensional maps. The prediction of hyperbolic fringes for the Wigner function, asymptotic to the stable and unstable manifolds, is verified computationally for a (linear) cat map, after the theory is adapted to a discrete phase space appropriate to a quantified torus. The characteristic fringe patterns can be distinguished even for quasi-energies where the fixed point is not Bohr-quantified. The corresponding Husimi function dampens these fringes with a Gaussian envelope centered on the periodic point. Even though the hyperbolic structure is then barely perceptible, more periodic points stand out due to the weakened interference.

"Numerical Study of Quasiparticle Lifetime in Quantum Dots"

A.M.F. Rivas, E.R. Mucciolo, A. Kamenev

Phys. Rev. B65 (2002) 155309

The decay rate of quasiparticles in quantum dots is studied through the real time calculation of the single-particle Green function in the self-consistent approximation. The method avoids exact diagonalization, transforming the problem into a system of coupled non-linear integral equations which may be solved iteratively. That allows us to study systems larger than previously treated in the literature. The delocalization transition is soft rather than sharp. Three different regimes as function of the effective interaction strength may be clearly identified at high energies.

"Carboxylate-Bridged Copper(II)-Lanthanide(III) Complexes [{Cu3Ln2(oda)6(H2O)6}. 12H2O] n (Ln = Dy, Ho, Er, Y; oda = oxydiacetate)"

A.C. Rizzi, R. Calvo, R.F. Baggio, M.T. Garland, O. Peña, M. Perec

Inorg. Chem. **41** (2002) 5609-5614

The hydrothermal reaction of Ln2O3 (Ln) Dy and Ho), Cu(OAc)2â2H2O, and oxydiacetic acid in the approximate mole ratio of 1:3:8 resulted in the formation of two new members of the isostructural series of polymers formulated as [{Cu3Ln2(oda)6(H2O)6}â12H2O]n, crystallizing in the hexagonal crystal system, space group P6/*mcc* (No. 192). Temperature-dependent magnetic susceptibilities and EPR spectra are reported for the heterometallic compounds Cυ-Dy 1,Cυ-Ho 2,Cυ-Er 3, and Cυ-Y 4. The results are discussed in terms of the structure of the compounds, the electronic properties of the lanthanide ions, and the exchange interactions between the magnetic ions.

"Open Circuit Voltage in Homojunction and Heterojunction Silicon Solar Cells Grown by VHF-PECVD"

R. Rizzoli, E. Centurioni, J. Plá, C. Summonte, A. Migliori, A. Desalvo, F. Zignani

Journal of Non-Crystalline Solids 299-302 (2002) 1203

We present homojunction and µc-Si/a-Si:H/c-Si heterojunction silicon solar cells fabricated by PECVD. The H2 dilution used during the i-layer growth strongly affects the device efficiency. While intermediate H2 dilution of the gas mixture results in Voc degradation, the best Voc is obtained under zero or very high

(= 99.4 %) H2 dilution, resulting in totally amorphous or epitaxial i-layer respectively. A maximum value of 638 mV, with 13.7% efficiency, is observed in the former case, indicating improvement of interface quality. In the latter case, a 606 mV Voc and 13.1% efficiency are observed.

"Superconductivity Near Ferromagnetism in $MgCNi_3$"

H. Rosner, R. Weht, M. Johannes, W.E. Pickett, E. Tosatti.

Physical Review Letters 188 (2002) 027001

An unusual quasi-two-dimensional heavy band mass van Hove singularity (vHs) lies very near the Fermi energy in $MgCNi_3$, recently reported to superconduct at 8.5 K. This compound is strongly exchange enhanced and is unstable to ferromagnetism upon hole doping with 12% Mg --> Na or Li. The 1/4-depleted fcc (frustrated) Ni sublattice and lack of Fermi surface nesting argues against competing antiferromagnetic and charge density wave instabilities. We identify an essentially infinite mass along the M-Gamma line, leading to quasi-two-dimensionality of this vHs may promote unconventional p-wave pairing that could coexist with superconductivity.

"Structural, Electrical and Magnetic Characterisation of $La_{0.5}Ca_{0.5}MnO_3$ Thin Films Grown by Pulsed Laser Deposition"

D. Rubi, S. Duhalde, M. C. Terzzoli, G. Leyva, G. Polla, P. Levy, F. Parisi

Physica B320 (1-4) (2002) 86-89

Thin films of perovskite manganite, with nominal composition La0.5Ca0.5MnO3, have been prepared by pulsed laser deposition on (1 0 0) SrTiO3, (1 0 0) LaAlO3, (1 0 0) Si and YSZ/CeO2-buffered (1 0 0) Si substrates. Structural and electrical characterisation was performed on the films. The magneto-transport properties of all the thin .films depart from the bulk behaviour. The LCMO .lm grown on buffered Si shows an insulator–metallic transition around 130–150K while the one deposited directly on Si displayed a similar behaviour under a melting field of 1 T. However, that transition is absent in the .films grown on LAO and STO. We suggest that appropriate stress values induced by the substrate favour the formation of metallic percolative paths.

"Correlation Between Magnetic and Transport Properties of Phase Separated $La_{0.5}Ca_{0.5}MnO_3$"

J. Sacanell, P. Levy, L. Ghivelder, G. Polla, F. Parisi

Physica B320 (1-4) (2002) 90-93

The effect of low-magnetic fields on the magnetic and electrical transport properties of polycrystalline samples of the phase-separated compound La0.5Ca0.5MnO3 is studied. The results are interpreted in the framework of the field-induced ferromagnetic fraction enlargement mechanism. A fraction expansion coefficient af; which relates the ferromagnetic fraction f with the applied field H; was obtained. A phenomenological model to understand the enlargement mechanism is worked out.

"Characterization of the Laves phases Zr (Cr, Fe)$_2$ oxidized in an open furnace using Mössbauer spectroscopy"

F. Saporiti, P. Bozzano, R. Versaci, C. Ramos, I. Raspini, C. Saragovi

Hyperfine Interactions 139/140 (2002) 379-386

Zircaloy-4 (% wt Sn 1.45- 1.5, Fe 0.18- 0.24, Cr 0.07- 0.13, O 1400 ppm, Zr to balance) is widely used as fuel cladding material in nuclear reactors due to low neutron-capture cross-section, high mechanical strength, high thermal conductivity and good corrosion resistance in water and steam. Iron and chromium are essentially insoluble in Zr at low temperatures (< 600º C) therefore, they are present almost entirely in the form of precipitates . These precipitates are the Zr(Cr, Fe)$_2$ intermetallic compounds, which occur in hexagonal (C14) and in cubic (C15) structural forms. The structure, composition, average size and morphology of the mentioned second phase precipitates are closely related to the corrosion behaviour of Zry-4. Many studies were carried out in order to evaluate the growth and characterisation of oxide layers (ZrO_2) and the evolution of precipitates when Zry-4 is oxidized or neutron irradiated. Previous studies showed that precipitates undergo chemical composition changes during open furnace oxidation. EDS (Energy Dispersive Spectroscopy) showed the presence of Zr, Cr and Fe within both the non-oxidized and partially oxidized precipitates. A progressive iron rejection towards the oxidized precipitate / oxidized matrix interface takes place. Three Laves phases, $Zr(Cr_{0.4}\ Fe_{0.6})_2$, $Zr(Cr_{0.95}\ Fe_{0.05})_2$ and $Zr(Cr_{0.15}\ Fe_{0.85})_2$, samples were prepared and oxydized with the aim of further contribution to the mentioned experimental evidence. The first composition is the most frequently observed and it presents the hexagonal C14 structure meanwhile the other ones present the cubic C15 structure. Mössbauer spectroscopy (MS) together with X- Ray diffraction (XRD) and Electron Microscopy (EM) technique were applied. Results allowed to following a 7 min. oxidation process and confirmed that in Fe-rich Laves phases the above EDS results are sustained. In the case of the Cr rich Laves phase, 7 min oxidation is not enough to show the α-Fe presence.

"Masses of the 70-Baryons in Large Nc QCD"

C.L. Schat, J.L. Goity, N.N. Scoccola

Phys. Rev. Lett. 88 (2002) 102002-2

The masses of the negative parity 70-plet baryons are analyzed in large N_c QCD to order $O(1/N_c)$ and to first order in $SU(3)$ symmetry breaking. The existing experimental data are well reproduced and twenty new observables are predicted. The leading order $SU(6)$ spinflavor symmetry breaking is small and, as it occurs in the quark model, the subleading in $1/N_c$ hyperfine interaction is the

dominant source of the breaking. It is found that the (1405) and (1520) are well described as three-quark states and spin-orbit partners. New relations between splittings in different *SU(3)* multiplets are found.

"Relative Biological Effectiveness Measurements of Low Energy Proton and Lithium Beams on Tumor Cells"

J.A. Schuff, L. Policastro, H. Durán, A.J. Kreiner, A. Mazal, B.L. Molinari, A. Burlón, M.E. Debray, J.M. Kesque, H. Somacal, P. Stoliar, A. Valda Ochoa, O.A. Bernaola, A. Pérez de la Hoz, G. Saint-Martin, S. O'Connor, J. Davidson, M. Davidson, F. Naab, M.J. Ozafrán, M.E. Vázquez, S. Cáneva, S. Delacroix, F. Favaudon, Y. Henry, C. Nauraye, E. Brune, C. Gautier, J.L. Habrand, M. Palmieri, M. Ruffolo

Nuclear Instruments And Methods in Physics Research B, 187 (2002) 345.

External proton and ^{6,7}Li beams, of energies around 24 and 48 MeV respectively, were produced and characterized dosimetrically at the Tandem accelerator TANDAR in Buenos Aires and used for radiobiology studies on tumor and normal cell cultures. The beam monitoring instrumentation of a dedicated beam line is discussed. Relative biological effectiveness (RBE) values (at 10% survival) have been measured as functions of projectile energy (0 – 21 MeV) for protons and ^{6,7}Li ions for different tumor (PDV, PDVC57) and reference cell lines (V79). The RBE values for these cell lines have been determined here for the first time but are similar to those reported in the literature for other cell lines.

"Simulations of Electron Trajectories under the Influence of An Array of Permanent Magnets in a Compact Ion Source"

H. Somacal, H. Huck, D.E. Di Gregorio, J.O. Fernández Niello, M. Igarzábal

Nuclear Instruments and Methods A490 (2002) 9

Trajectories of electrons emitted from a filament in a discharge ion source are computer simulated in order to investigate their behavior under the influence of different magnetic fields. These calculations allowed a better understanding of the high efficiency of a recently developed compact ion source.

"Magnetic Properties of Fe/ZnSe/Fe Trilayers"

L.B. Steren, J. Milano, M. Eddrief, V.H. Etgens

Physica B320 (2002) 162

The magnetic properties of Fe/Zn/Fe trilayers have been studied by ferromagnetic resonance and magnetization measurements. These measurements have been used to investigate the magnetic anisotropy of the iron layers and the magnetic coupling across the semiconductor spacer. The angular dependence of the resonance spectra has been measured in-plane and out-of-plane in order to deduce magnetic anisotropy constants of the samples. Experimental data were fitted by using an energy-density expression that includes bulk cubic anisotropy, growth-induced uniaxial in-plane anisotropy and perpendicular-surface anisotropy terms. A small ferromagnetic coupling is observed in the trilayers with spacer thickness up to 50 A.

"Simple Model of Capillary Condensation in Cylindrical Pores"

L. Szybisz, I. Urrutia

Phys. Rev. E66 (2002) 051201

A simple model based on an approximation of the droplet-like model is formulated for studying adsorption of fluids into cylindrical pores. This model yields a nearly universal description of capillary condensation transitions for noble gases confined by alkali metals. The system's thermodynamical behavior is predicted from the values of two dimensionless parameters: D^* (the reduced asymptotic strength of the fluid-adsorber interaction, a function of temperature) and R^*(the reduced radius of the pore). The phenomenon of hysteresis inherently related to capillary condensation is discussed. The connection to a previously proposed universality for cylindrical pores is also established.

"Estudio Teórico-Experimental de Daño por Radiación con Protones de 10 MeV en Celdas Solares de Silicio Cristalino"

M.J.L. Tamasi, M.G. Martínez Bogado, M. Alurralde, J.C. Plá

Energías Renovables y Medio Ambiente 11 (2002) 19

Se estudió la degradación de los parámetros eléctricos y electrónicos de celdas solares de silicio cristalino bajo los efectos de la irradiación con protones de 10 MeV y fluencias entre 108 y 1013 p/cm2, utilizando un haz externo del acelerador TANDAR de la CNEA. Asimismo, se realizaron simulaciones teóricas con el fin de verificar la relación entre las características eléctricas de las celdas (corriente de cortocircuito, tensión a circuito abierto y factor de forma) y la vida media de los portadores minoritarios en la base, la cual se ve afectada directamente en este tipo de ensayo. Se llevaron a cabo dos experimentos que permitieron medir in situ la curva característica corriente-

tensión entre irradiaciones de las celdas estudiadas, las cuales fueron elaboradas en el Grupo Energía Solar de la CNEA.

"Charge Ordering in the Electron Doped $Ca_{1-x}Y_xMnO_3$ Manganites"

D. Vega, C. Ramos, H. Aliaga, M. T. Causa, B. Alascio, M. Tovar, G. Polla, G. Leyva, P. König, I. Torriani

Physica B320 (2002) 37–39

Structural studies on the electron doped Ca1-xYxMnO3 are presented. At 300 K, orthorhombic O-phase was observed in all cases, associated to low electric resistivity and high Curie–Weiss temperature. For samples with x > 0.07; structural phase transitions to more distorted orthorhombic and monoclinic phases were found at T<170K. In these phases only weak ferromagnetic interactions were observed.

"Disodium Pamidronate"

D.R. Vega, D. Fernández, J. Ellena

Acta Cryst. C58 (2002) m77-m80

The title compound, disodium 3-ammonium-1-hydroxypropylidene-1,1-bisphosphonate pentahydrate, $2Na^{+}\cdot C_3H_9NO_7P_2^{2-}\cdot 5H_2O$, is used for the diagnosis and treatment of a number of bone disorders. In the solid state, disodium pamidronate shows zwitterionic character and has four different modes of chelation to sodium. The metal is octahedrally coordinated by zwitterion and water O atoms. Both coordination to sodium and hydrogen bonding determine the packing in the crystal, which comprises columns lying parallel to the crystallographic *a* axis.

"Magneto-Electronic Properties of a Ferrimagnetic Semiconductor: The Hybrid Cupromanganite $CaCu_3Mn_4O_{12}$"

R. Weht, W.E. Pickett

Physical Review B65 (2002) 014415

The mixed manganite-cuprate $CaCu_3Mn_4O_{12}$ is calculated, using density functional methods, to be a spin asymetric ferrimagnetic semiconductor. Cu (formally S=1/2) antialigns with Mn (formally S=3/2), and the net spin moment is 9 μ_B, consistent with the formal spins. The valence bands maximun has Cu d_{xy}O p_σ character with spin aligned antiparallel to the net magnetization; the conduction-band minimum has opposite spin and mixed Cu-Mn character. This spin asymetric gap

(1) implies a thermally induced current that is 100% spin polarized and (2) leads to a field-induced gap. The relationship of these properties to the reported magnetoresistance is discussed.

"Sensitivity to Perturbations in a Quantum Chaotic Billiard"

D.A. Wisniacki, E.G. Vergini, H.M. Pastawski, F.M. Cucchietti

Phys. Rev. **E65** (2002) 055206

The Loschmidt echo (LE) measures the ability of a system to return to the initial state after a forward quantum evolution followed by a backward perturbed one. It has been conjectured that the echo of a classically chaotic system decays exponentially, with a decay rate given by the minimum between the width Γ of the local density of states and the Lyapunov exponent. As the perturbation strength is increased one obtains a cross-over between both regimes. These predictions are based on situations where the Fermi Golden Rule (FGR) is valid. By considering a paradigmatic fully chaotic system, the Bunimovich stadium billiard, with a perturbation in a regime for which the FGR manifestly does not work, we find a cross over from Γ to Lyapunov decay. We find that, challenging the analytic interpretation, these conjetures are valid even beyond the expected range.

"A Mössbauer study on gray stains in electrogalvanized steel"

M. Zapponi, T. Pérez, C. Ramos, G. Polla, C. Saragovi, D. Cook

Hyperfine Interactions 139/140 (2002) 447-453

Electrogalvanized steel is being used increasingly for the manufacture of automobiles, domestic appliances and other products. Both one-side and two-side electrogalvanized steel sheets are being produced. The one-side coated product is particularly desirable in applications that require superior protection on the inside of the low carbon steel panel, where corrosion usually starts. The steel also contains one high quality surface that can be formed, joined and painted in the usual way. Such parts, needing a good superficial finish, require an uncoated surface with properties as close to that of cold rolled sheet as possible. Plating only one side, turning off the plating current to the anodes facing the side that remains uncoated, produces one-side electrogalvanized sheets. As the steel strip travels through the plating section, the uncoated side is attacked by the acid electrolyte. This pickling action leads to highly active surface, appearing sometimes "gray stains". The degree of stain formation depends upon many variables such as history and grade of steel, pretreatment practices and plating process conditions. It is of economical importance to know the origin of these defects and their effect on the final performance and esthetics of the material. With the aim of identifying the origin of the stain defects, we performed studies of the steel surfaces using

Mössbauer spectroscopy (MS) and X-ray diffraction (XRD). Powders were removed from the "stained" and "non-stained" areas of the uncoated steel surfaces, by tape, scraping and ultrasonic bathing. They were analyzed by TMS. Spectra were compared with those obtained from CEMS on the sheets where the powder was left attached. Results show that a Mössbauer inactive coating was covering both areas, being that over the stained area wider and in amorphous state. The results suggest that this coating formed after the production processing thereby not effecting the performance of the steel. The combined Mössbauer analysis showed that a layering of iron-bearing species was present in both areas; α-Fe and Fe_3C being present at larger depths and Fe-C more superficially. XRD did not identify the presence of any Zn-bearing species.

"Novel Pteridine Alkaloids from the Sponge Clathria sp."

I. Zuleta, M.L. Vitelli, R. Baggio, M.T. Garland, A.M. Seldes & J. Palermo

Tetrahedron 58 (2002) 4481-4486

Three novel pteridine alkaloids, pseudoanchynazines A-C (1-3) have been isolated from the sponge *Clathria* sp. collected by trawling (-100m) in a a commercial clam fishery near the coasts of Rio Negro, Argentina, and their structures determined by a combination of chemical and spectroscopic techniques, with emphasis in 2D NMR and tandem mass spectrometry. Compounds 1-3 have two pteridine units and a tryptophan core with a methyl carbamate substituent.