

Progress Report

1997-1999

**Department of Physics
Comisión Nacional de Energía Atómica**

Elena M. Godfrin – Rubén Weht
Editors

Graciela Mastrogiacomo
Secretary

Buenos Aires – Argentina
2000

INDEX

Introduction	1
Nuclear Physics	
Nuclear Spectroscopy	3
Heavy Ion Physics and Accelerator Mass Spectrometry	10
Astrophysics	
Astroparticles	15
Pierre Auger Project	17
Applied and Atomic Physics	
Structural coatings, Surfaces Studies and Ion Implementation	21
Condensed Matter	23
Solar Energy	31
Theoretical Physics	35
Data Communication, Data Acquisition and Computational Facilities	39
Contribution to Conferences	41
Publications	63
Establishment of National Standards	79
Theses	81
Special Works	85
Scientific Cooperation Programs	87
Visitors and Visits	89
Grants and Awards	93
Teaching	95
Personnel	97

Introduction

This report describes the activities of the Physics Department for the three-year period 1997-99. It includes basic and applied research, both experimental and theoretical, in areas of nuclear and condensed matter physics and solar energy, technical developments, services and teaching activities at all levels. Other areas of interest are chaos, complex systems, high-Tc superconductivity, astrophysics, intermediate energies and surface physics.

The Department maintains strong research ties with the international scientific community and a great part of its research is conducted in collaboration with scientists from all over the world. It is worthwhile to mention the participation of several of our staff researchers in the Pierre Auger Project, an international project involving scientists from many countries, led by Dr. James W. Cronin. Its objective is the installation of two observatories for studying the highest-energy cosmic rays observed on earth, one in the United States and the other in Argentina. Other experimental research activities are carried out at the National Laboratory of Legnaro, Italy, in themes of nuclear spectroscopy and reactions, at the Physics Department of Chile University in X-ray diffraction, at the National Laboratory of Synchrotron Radiation, Brazil, in condensed matter and at the LAMEL Institute, Italy, in the development of solar cells and gas sensors.

We also collaborate with many other Argentine scientific groups. An important highlight was the design and construction of solar cells incorporated to the Argentine satellite SAC-A, launched in December 1998.

Several of our researchers work in the development and application of high-precision nuclear techniques useful in other scientific disciplines and a relevant contribution is made in the framework of interdisciplinary groups.

The Department maintains its strong involvement in teaching programs at all levels both encouraging formal teaching by its staff at local universities and engaging in activities of its own. Many graduate and undergraduate theses are conducted in its laboratories.

Besides the support from the Argentine Atomic Energy Commission (CNEA), we wish to acknowledge the essential support from other agencies and institutions, Fundación Antorchas, the Argentine National Research Council (CONICET), the Argentine National Agency for Science and Technology and the International Centre for Theoretical Physics (ICTP), without which the normal functioning of the Department would have been impossible. I want to thank the commitment of all the staff for maintaining a good level of scientific activity, in spite of the very difficult budgetary situation. Finally the efforts of the editors of this progress report, Drs. Elena Godfrin and Rubén Weht, are greatly appreciated.

María Cristina Cambiaggio
March 2000

Nuclear Physics

Nuclear Spectroscopy

The activities of the group include two sets of different problems. Both subjects utilize in general similar nuclear spectroscopy techniques and the same heavy ion beams produced by the TANDAR accelerator.

The first set of problems corresponds to applied research (from the point of view of nuclear physics) and tries to contribute in other areas generating interdisciplinary and partly technological activities. Applications to biomedical and environmental problems are being pursued. On this sector, we can distinguish three lines:

trace element analysis, development of a heavy ion microbeam, feasibility studies on novel accelerator-based cancer therapy modalities.

The second set of problems is in the field of basic research on nuclear structure.

Trace Element Analysis

The most frequently used techniques are PIXE and PIGE (Particle Induced X-ray (Gamma) Emission). The first one is a high sensitivity multielement analysis technique based on the heavy ion excitation and detection of characteristic X-rays of the elements present in samples of diverse origin. In biomedicine, the most important application has been a study of the correlation between the aluminium concentration and the incidence of Alzheimer's disease. As far as environmental problems are concerned the PIXE technique has been applied to the determination of lead concentration and other polluting agents in atmospheric aerosols of Buenos Aires city and surroundings. The PIGE technique, which utilizes gamma-rays of nuclear origin induced by heavy ions, is an interesting alternative in the case of very light elements. We have applied it for the detection of boron traces in connection with BNCT (Boron Neutron Capture Theory)

Heavy ion microbeam

We aim at implementing in one of the beam lines of the TANDAR accelerator a facility which could be characterized as a nuclear microscope, i.e., a heavy ion micropobe. This microbeam in conjunction with nuclear and atomic techniques of excitation and detection like PIXE, PIGE, HIRBS (Heavy Ion Rutherford Backscattering), STIM (Scanning Transmission Ion Microscopy), etc., will allow the quantitative determination of the multielementary composition, the modification of properties and structural characterization of different systems with a space resolution of the order of a micron.

Feasibility Studies related to Cancertherapy

- **Protontherapy**

The charged particle beams have definite advantages compared to other types of radiation (like gamma rays) for tumor treatment. In some cases, like eye melanoma, spectacular success has been achieved. This technique is known as protontherapy. There is interest to stimulate activity which may eventually lead to the introduction of this modality in our country. In this context an external proton beam has been produced at the TANDAR laboratory and small animal and cell culture irradiations were started in collaboration with radiobiology personnel.

- **Boron Neutron Capture Therapy (BNCT)**

With the proton or deuteron beams available at the TANDAR accelerator it is possible to generate a neutron flux that can be used to carry out feasibility studies related to a possible therapy by boron neutron capture, BNCT, based on the very high cross section of the capture reaction $^{10}\text{B}(n,\alpha)^7\text{Li}$. The idea is to load selectively a tumor with boron and irradiate it with neutrons. The "microexplosion" associated to each reaction has a high lethality for cancer cells affecting only the immediately surrounding tissue. In the past BNCT has been based exclusively on nuclear reactors for research and treatment. There is however currently a strong tendency and important progress towards the development of accelerator-based neutron sources. There is a generalized perception that if BNCT is to become an option for cancer treatment it would be necessary to have accelerator-based neutron sources, not only due to their much lower cost and complexity

but also because the implantation of a nuclear reactor in a hospital would not be acceptable given the public perception in relation with this type of facility. We have started to explore the neutron production via protons of relatively low energy (some MeV) on a lithium target.

Basic research on nuclear structure

This program includes several high-spin nuclear structure topics of current interest. One is the study of coupling schemes of valence nucleons in deformed nuclei, in particular in doubly odd species, in which we have recently found connections to the identical band problem. Here our attention is focused on structures which included aligned pseudospins as means to produce twin bands in neighboring nuclei. Also the problem of signature inversion has been the subject of several investigations. Finally, we mention the study of the octupole instability in the actinide region. The aim has been here to map out the reflection asymmetry degree of freedom to reach the predicted maximum in this deformation and to establish the limits for performance of in-beam spectroscopic studies in the presence of a very severe fission competition.

Application of heavy ions backscattering spectrometry to diffusion studies

R.A. Perez, G. García Bermúdez, D. Abriola, F. Dymont and H. Somacal

The feasibility of using HIRBS (Heavy-Ion Rutherford Backscattering Spectrometry) to measure the concentration profile induced by the diffusion of one element in other is analysed. The principal advantage of HIRBS over conventional RBS (Rutherford Backscattering Spectrometry) is the improved mass resolution for the analysis of high atomic number samples. This property allows us to measure the diffusion profile deep into the sample avoiding surface effects that could perturb the diffusion process. The application of HIRBS to diffusion measurement makes it possible to bridge the gap between different techniques, such as RBS and the serial sectioning technique.

* *Diffusion and Defect Forum* **143** (1997) 1335.

Transition strengths in ^{86}Nb and ^{86}Zr

R.A. Kaye, J. Adams, A. Hale, C. Smith, G.N. Sylan, S.L. Tabor, G. García Bermúdez, M.A. Cardona, A. Filevich and L. Szybisz

Mean lifetimes of states in ^{86}Nb and ^{86}Zr produced by the $^{58}\text{Ni}(^{32}\text{S},3\text{pn})^{86}\text{Nb}$ and $^{58}\text{Ni}(^{32}\text{S},4\text{p})^{86}\text{Zr}$ reactions at 130 MeV have been measured using the recoil-distance method. The B(E2) strength of 11(2) W.u. for the $8^+ \rightarrow 6^+$ transition in ^{86}Nb implies weak collectivity at low excitation energies for the $\pi = +$ yrast band. The weak dipole transition strength of the $8^+ \rightarrow 7$ decay suggests that the configuration for the 7 state is different from that of the other yrast states. In general, the B(E2) rates obtained for transitions in ^{86}Zr agree with those previously published, thus supporting the suggestion of a weakly collective

structure based on shell-model excitations at low energies. Hartree-Fock-Bogolyubov cranking calculations indicate a spherical shape for low-spin vacuum configuration states in ^{86}Zr .

* *Physical Review C* **57** (1998) 2189.

Lifetime measurements in ^{135}Pr

S. Botelho, W.A. Seale, L.G.R. Emediato, J.R.B. Oliveira, R.V. Ribas, N.H. Medina, M.N. Rao, E.W. Cybulska, M.A. Rizzutto, F.R. Espinoza-Quñones, G. García Bermúdez, H. Somacal, and M.A. Cardona

Lifetimes of low-lying levels in the $\Delta I=2$ band built on the $\pi h_{1/2}$ state in the Z-odd nucleus ^{135}Pr were measured with the Doppler-shift recoil-distance technique. Reduced transition probabilities B(E2) were extracted in order to calculate the deformation parameters. These values were compared to theoretical results of the total Routhian surface (TRS) calculations. While the quadrupole moments obtained for the $\pi h_{1/2}$ excited levels below the first backbend in ^{135}Pr are very similar to those of the ^{134}Ce core, TRS results predict a quadrupole moment of about 50% larger for the core.

* *Physical Review C* **58** (1998) 3726.

Collective structure in ^{70}As

G. García Bermúdez, J. Doring, G.D. Johns, R.A. Kaye, M.A. Riley, S.L. Tabor, C.J. Gross, M.J. Brinkman and H.Q. Jin

High-spin states in ^{70}As were populated using the $^{58}\text{Ni}(^{16}\text{O},3\text{pn})$ reaction at 70 MeV energy. Lifetime measurements of the $11^+ \rightarrow 9^+$ 980.7 keV and $13^+ \rightarrow 11^+$ 1342.7 keV transitions using the Doppler-shift attenuation method determined that both are enhanced E2 transitions. This measurement indicates the onset of deformation

with increasing spin in ^{70}As , as has been seen in neighboring nuclei.

* *Physical Review C* 56 (1997) 2869.

Pseudo-spin doublet aligned structure in doubly odd ^{186}Ir

M.A. Cardona, M.E. Debray, G. García Bermúdez, D. Hojman, A.J. Kreiner, H. Somacal, A. Burlon, J. Davidson, M. Davidson, G. Levinton, J.M. Kesque, M. Ozafran, M. Vazquez, A. Romo, D.R. Napoli, D. Bazzacco, S.M. Lenzi, N. Medina, C. Rossi Alvarez, N. Blasi, G. Lo Bianco, J. de Boer, D. Frischke and H.J. Maie

^{186}Ir has been restudied through the $^{180}\text{Hf}(^{11}\text{B},5n)$ reaction at 65 MeV using in-beam gamma-ray and conversion-electron spectroscopy. The unfavored component of the doubly decoupled band was established and shown to be consistent with a description in terms of the $\pi h_{9/2} \otimes \nu[411\ 1/2,3/2]$ structure, i.e., the coupling of an aligned proton and a neutron pseudospin doublet.

* *Physical Review C* 55 (1997) 144.

Transition strengths in odd-odd ^{80}Rb

M.A. Cardona, G. García Bermúdez, G.N. Solomon, R.A. Kaye and S.L. Tabor

Lifetimes of levels in ^{80}Rb have been measured using the Doppler shift attenuation method. The high-spin states have been populated through the $^{55}\text{Mn}(^{28}\text{Si},2pn)$ reaction at 90 MeV. Collective enhancement was observed in the B(E2) values of the two most populated bands while the B(M1) values of the yrast band exhibit a large alternating pattern. Transition quadrupole moments were deduced from E2 transition strengths and compared with those predicted by Woods-Saxon cranking calculations.

* To be published in *Physical Review C*

Signature inversion in odd-odd nuclei around A=80.

G. García Bermúdez and M.A. Cardona

Signature inversion in odd-odd nuclei have been found systematically in regions of mass number $A \approx 80, 130$ and 160 , and although several explanations have been proposed to interpret this phenomenon, it is still not well understood. The data of electromagnetic properties obtained through lifetime measurements, will be very useful to elucidate this phenomenon. In the present work, we review several lifetime studies that measured the B(M1) strengths in the mass $A \approx 80$ region.

The results show that the alternating pattern in the B(M1) strengths is preserved across the signature inversion region. Also is reviewed the critical angular momentum, frequency and moment of inertia at the signature inversion point for several mass regions. The correlations among these and other nuclear parameters are discussed.

* To be published in *Acta Physica Hungarica New Series*

Pixe analysis of atmospheric aerosols in the city of Buenos Aires

M.J. Ozafrán¹, M.E. Vázquez¹, A. Burlón^{1,2}, M. Buhler², M.A. Cardona^{1,2}, M.E. Debray^{1,2}, D. Hojman^{1,2,4}, J.M. Kesque¹, A.J. Kreiner^{1,2,4}, G. Levinton¹, J.J. Menendez, F. Naab^{1,2}, P. Stoliar^{1,2}, M. Davidson^{3,4}, J. Davidson^{3,4}.

Lead pollution present in atmospheric aerosols in the city of Buenos Aires was measured in 1989, using Heavy Ion PIXE. Since then, environmental conditions have changed significantly. The usage of unleaded gasoline was introduced, and the utilization of compressed natural gas as car fuel has increased. Recently, a new sampling campaign of atmospheric aerosols has started, partly in collaboration with the Greenpeace Foundation. The present studies reveal that lead pollution in Buenos Aires has significantly decreased since 1989. The concentrations of other elements are determined as well.

¹ Department of Physics, CNEA

² School of Science and Technology, UNSaM

³ Department of Physics, FCEyN, UBA

⁴ CONICET, Argentina

Accumulation of Zn in toad ovaries. Effect on carbohydrate metabolism.

T.M. Fonovich de Schroeder, A.F. Preller, F. Naab, M.E. Caraballo, A. Burlón, M.A. Cardona, M. Debray, D. Hojman, M. Ozafrán, M. Vázquez, A. M. Pechén de D'Angelo.

Females of the toad *Bufo Arenarum* accumulate Zn when they are maintained in a cage besides the Reconquista river (province of Buenos Aires). Ovulation occurs normally when these animals are injected with homologous hypophysis, as compared to control ones. Oocytes from these females can not only be fertilized but also develop until they reach the gastrula stage. Significant inhibition (27 %) of embryonic development can be observed from the muscular response stage on. *In vivo* simultaneous microinjection with Zn and [^{14}C]Glucose rendered a decrease in the incorporation of the label in glycogen as well as in CO_2 . Glucose-6-P dehydrogenase activity was inhibited *in vitro* by Zn at 1,53 mM, a

concentration similar to the ones accumulated in the ovary and microinjected into the oocytes in the previous experiments. Our results are in agreement with an inhibitory effect of Zn on early developmental stages of the embryos, probably due to deficient production or NADPH, ribose-5-phosphate and ATP.

High-spin states in doubly odd $^{162,164}\text{Lu}$

M.A. Cardona^{1,2}, J. Davidson^{3,4}, D. Hojman^{1,2,4}, M.E. Debray^{1,2}, A.J. Kreiner^{1,2,4}, H. Somacal^{1,2}, M. Davidson^{3,4}, D.R. Napoli⁵, D. Bazzacco⁶, N. Blasi⁷, R. Burch⁵, D. De Acuña⁵, S.M. Lenzi⁶, G. Lo Bianco⁷, J. Rico⁵ and C. Rossi Alvarez⁶

High-spin states in ^{162}Lu and ^{164}Lu have been studied by means of in-beam gamma-ray spectroscopy techniques using the multidetector array GASP. The excited states have been populated through the $^{139}\text{La}(^{28}\text{Si},5n)^{162}\text{Lu}$ and $^{139}\text{La}(^{29(30)}\text{Si},4(5)n)^{164}\text{Lu}$ reactions. Level schemes were constructed for both nuclei. Configurations for the rotational bands have been discussed. Alignments, band crossing frequencies, and $B(M1)/B(E2)$ ratios have been analyzed in the framework of the cranking model. The systematic evolution of the signature inversion in the $\pi h_{11/2} \times \nu i_{13/2}$ structure is reviewed.

¹ Department of Physics, CNEA

² UNSaM

³ Department of Physics, FCEyN, UBA

⁴ CONICET

⁵ INFN, Laboratori Nazionali di Legnaro, Legnaro, Italy

⁶ Dipartimento di Fisica and INFN, Padova, Italy

⁷ Dipartimento di Fisica and INFN, Milano, Italy

Band termination and second backbending in ^{50}Cr

S.M. Lenzi, C.A. Ur, D.R. Napoli, M.A. Nagarajan, D. Bazzacco, D.M. Brink, M.A. Cardona, G. de Angelis, M. de Poli, A. Gadea, D. Hojman, S. Lunardi, N.H. Medina, C. Rossi Alvarez.

High-spin states in ^{50}Cr have been investigated with the reaction $^{24}\text{Mg}(^{32}\text{S}, a2p)$ at 130 MeV bombarding energy, using the 4π GASP g-ray array plus the 4π charged-particle detector ISIS. The level scheme has been extended up to the 18^+ state at 17.954 MeV excitation energy. Several high-spin states which de-excite by emitting high energy γ -rays have been identified. A second backbending is observed at $I=18\hbar$, well above the 14^+ state which exhausts the total spin available in a pure $(f_{7/2})^{10}$ configuration.

Phys. Rev. C 56 (1997) 1313

Nonidentical twin bands in doubly odd ^{170}Lu

G. Levinton¹, A.J. Kreiner^{1,2,4}, M.A. Cardona^{1,2}, M.E. Debray^{1,2}, D. Hojman^{1,2,4}, J. Davidson^{3,4}, G. Martí¹, A. Burlón^{1,2}, M. Davidson^{3,4}, D.R. Napoli⁵, M. De Poli⁵, D. Bazzacco⁶, N. Blasi⁷, S.M. Lenzi⁶, G. Lo Bianco⁷, C. Rossi Alvarez⁶ and V. R. Vanin⁸

The doubly odd nucleus ^{170}Lu has been studied using the $^{164}\text{Dy}(^{11}\text{B},5n)$ reaction at 63 MeV bombarding energy. A near yrast level scheme was constructed comprising 11 rotational bands. Among them, the $\pi h_{9/2} \times \nu i_{13/2}$ staggered semidecoupled structure has been established up to $I = 30$. The doubly decoupled band $\pi h_{9/2} \times \nu i_{1/2}^- [521]$ and a Newby shifted $K = 0$ band were also found. A set of three bands resembles a band structure present in the neighboring odd-A isotopes. One of these shows a striking similarity in transition energies to $\pi 1/2^+ [404]$ band in ^{171}Lu and hence this pair has been cataloged as *twin bands*. However, their extracted moments of inertia appear to be very different and therefore they cannot be considered identical bands in the usual sense.

¹ Department of Physics, CNEA

² School of Science and Technology, UNSaM

³ Department of Physics, FCEyN, UBA

⁴ CONICET

⁵ INFN, Laboratori Nazionali di Legnaro, Legnaro, Italy

⁶ Dipartimento di Fisica and INFN, Padova, Italy

⁷ Dipartimento di Fisica and INFN, Milano, Italy

⁸ Instituto de Física, Universidade de São Paulo, Brazil

Alternating parity bands in $^{218}\text{Fr}_{87}$

M. Debray^{1,2}, M. Cardona^{1,2}, D. Hojman^{1,2,3}, A.J. Kreiner^{1,2,3}, M. Davidson^{3,4}, J. Davidson^{3,4}, H. Somacal^{1,2}, G. Levinton¹, D.R. Napoli⁵, S. Lenzi⁶, G. de Angelis⁵, M. De Poli⁵, D. Bazzacco⁶, C. Rossi Alvarez⁶ and N. Medina⁵

States in doubly odd ^{218}Fr have been studied using in-beam α - γ coincidence spectroscopy techniques mainly through the $^{209}\text{Bi}(^{18}\text{O}, 2\alpha n)$ fusion-evaporation reaction at 94 MeV bombarding energy, using the 8π GASP-ISIS spectrometer at Legnaro. ^{218}Fr shows a band structure, with interleaved states of alternating parities connected by enhanced B(E1) transitions. Tentative spin assignments and the relation between the structure of ^{218}Fr and its isotone ^{220}Ac are discussed.

¹ Department of Physics, CNEA.

² School of Science and Technology - UNSaM

³ CONICET,

⁴ Department of Physics - FCEyN, UBA.

⁵ INFN, Laboratori Nazionali di Legnaro, Legnaro, Italy

⁶ Dipartimento di Fisica, Sezione di Padova, Padova, Italy

High-spin states and band structures in ^{182}Pt

D.G. Popescu, J.C. Waddington, J.A. Cameron, J.K. Johansson, N.C. Schmeing, W. Schmitz, M.P. Carpenter, V.P. Janzen, J. Nyberg, L.L. Riedinger, H. Hübel, G. Kajrys, S. Monaro, S. Pilotte, C. Bourgeois, N. Perrin, H. Sergolle, D. Hojman and A. Korichi.

Excited states in ^{182}Pt have been studied via the heavy-ion reactions $^{170}\text{Yb}(^{16}\text{O},4n)$, $^{162}\text{Dy}(^{24}\text{Mg},4n)$, and $^{163}\text{Dy}(^{24}\text{Mg},5n)$. γ -ray coincidence measurements were performed with arrays of HPGe detectors at the McMaster University Tandem Accelerator Laboratory (^{16}O -induced reaction) and the Institut de Physique Nucleaire, Orsay (^{24}Mg -induced reactions). The ground-state rotational band has been extended to $I=26\hbar$, and six new band structures have been identified and assigned quasiparticle configurations. The γ -vibrational band and the band built upon the first excited 0^+ state have also been extended. Properties of the rotational bands are compared with cranked-shell-model and total-Routhian-surface calculations. Evidence concerning shape-coexistence at low spin and band crossings at high spin is discussed.

* *Phys. Rev. C 55 (1997) 1175.*

Transition strengths and signature inversion in odd-odd ^{74}Br

G. García Bermúdez, M.A. Cardona, A. Filevich, R.V. Ribas, H. Somacal and L. Szybisz

Lifetimes of states in ^{74}Br produced by the $^{60}\text{Ni}(^{16}\text{O},np)$ reaction at 50 MeV have been measured by using the recoil-distance method. From these experiments several reduced transition strengths for the low energy states have also been determined. The results show that the alternating pattern in the $B(M1)$ strengths of the yrast positive parity band is preserved across the signature inversion region.

* *Physical Review C 59 (1999) 1999.*

A dipole band in ^{124}Xe

G.Lo Bianco, Ch. Protochristov, G. Falconi, N. Blasi, D. Bazzacco, G.de Angelis, D.R. Napoli, M.A. Cardona, A.J. Kreiner, H. Somacal

High-spin states in ^{124}Xe were populated by means of the $^{110}\text{Pd}(^{18}\text{O},4n)$ reaction. In-beam γ rays were measured using the GASP spectrometer. A dipole band, similar to those previously found in

other nuclei of this mass region, was identified in ^{124}Xe .

* *Z.Phys. A359 (1997) 347.*

Evidence for enhanced aluminum concentration in brain tissue from Alzheimer's disease patients using PIXE

M.E. Debray^{1,2}, A.J. Kreiner^{1,2,6}, M. Buhler¹, M.A. Cardona^{1,2}, D. Hojman^{1,2,6}, J.M.Kesque¹, G. Levinton¹, J.J. Menéndez¹, F. Naab^{1,2}, M.J. Ozafrán¹, H. Somacal^{1,2}, M.E. Vázquez¹, H. Grahmann¹, M. Davidson^{3,6}, J. Davidson^{3,6}, M.E. Levin⁴, C.A. Mangone⁴, R.L. Caccuri⁴, A. Tokuda⁴, A.A. Eurnekian⁴, D. González⁵, C. López⁵ and O.E. Roses⁵

The Particle Induced X-Ray Emission (PIXE) analytical technique with ^{16}O ion beams (18 MeV) was applied to the study of elemental composition at different brain regions of patients with a confirmed post-mortem diagnosis of Alzheimer's disease and in samples from control subjects. The results obtained in the actual study show a clear correlation between occurrence of Alzheimer's disease and the presence and increased concentration of aluminum (Al).

¹ Department of Physics, CNEA

² UNSaM

³ Department of Physics, FCEyN, UBA

⁴ Hospital Santojanni, Buenos Aires

⁵ Cátedra de Toxicología y Química Legal, Facultad de Farmacia y Bioquímica, Universidad de Buenos Aires

⁶ CONICET

High-spin states in doubly odd ^{176}Re and signature inversion in $\pi h_{11/2} \times \nu i_{13/2}$ structures

M. A. Cardona,^{1,2} A. J. Kreiner,^{1,2,4} D. Hojman,^{1,2,4} G. Levinton,¹ M. E. Debray,^{1,2} M. Davidson,^{3,4} J. Davidson,^{3,4} R. Pirchio,³ H. Somacal,^{1,2} D. R. Napoli,⁵ D. Bazzacco,⁶ N. Blasi,⁷ R. Burch,⁵ D. De Acuña,⁵ S. M. Lenzi,⁶ G. Lo Bianco,⁷ J. Rico,⁵ and C. Rossi Alvarez⁶

High-spin states in doubly odd ^{176}Re were investigated by means of in-beam gamma-ray spectroscopy techniques using the multidetector array GASP. Excited states of ^{176}Re were populated using the $^{165}\text{Ho}(^{16}\text{O},5n)$ reaction at a beam energy of 101 MeV. Seven rotational bands have been observed 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 phenomena in the $\pi h_{11/2} \times \nu i_{13/2}$ and $\pi h_{9/2} \times \nu i_{13/2}$ structures are discussed. In the latter case signature inversion is traced to a large repulsive

matrix element of the $p - n$ force acting in the maximally aligned $J = 11$ state.

¹ Department of Physics, CNEA

² School of Science and Technology, UNSaM

³ Department of Physics, FCEyN, UBA

⁴ CONICET

⁵ INFN, Laboratori Nazionali di Legnaro, Legnaro, Italy

⁶ Dipartimento di Fisica and INFN, Padova, Italy

⁷ Dipartimento di Fisica and INFN, Milano, Italy

Excited states and terminating bands in ^{123,124}I

D.L. Balabanski, G. Rainovski, N. Blasi, G.Lo Bianco, G. Falconi, S. Signorelli, D. Bazzacco, G.de Angelis, D.R. Napoli, M.A. Cardona, A.J. Kreiner, H. Somacal

High spin states in ^{123,124}I were populated via the ¹¹⁶Cd(¹¹B,xn) reaction at 38 MeV bombarding energy and via the ¹¹⁰Pd(¹⁸O,pxn) reaction at 75 MeV energy. γ -ray energies, intensities, $\gamma\gamma$ coincidences and DCO ratios were measured with the GASP spectrometer. The level schemes were extended considerably. Band terminations were observed for both nuclei. In ¹²³I the rotational band, which is built on the $\pi h_{11/2}$ single-particle state was extended to spin $I=(35/2)^-$; at higher spin the level spacings and the feeding pattern were found to become irregular, indicating a sudden change of structure. The $39/2^-$ state and a higher-lying $43/2^-$ level were interpreted as aligned oblate states. In ¹²⁴I a decoupled band was found to terminate in the same spin region. Total Routhian surface calculations were performed which support the occurrence of a band termination.

* *Acta Phys.Hung.N.S.* **6** (1997) 275.

Band termination in ¹²³I

G.L. Balabanski, G. Rainovski, N. Blasi, G. Falconi, G.Lo Bianco, S. Signorelli, D. Bazzacco, G.de Angelis, D.R. Napoli, M.A. Cardona, A.J. Kreiner, H. Somacal

High-spin states in the nucleus ¹²³I were populated by the ¹¹⁰Pd(¹⁶O,p4n) reaction at 75 MeV. γ -ray energies, intensities, $\gamma-\gamma$ coincidences, and directional correlation ratios were measured. The rotational band built on the $\pi h_{11/2}$ single-particle state was extended to spin $I=35/2^-$; at higher spin the level spacings and the feeding pattern were found to become irregular, indicating a sudden change of structure. The $39/2^-$ state and a higher-lying $43/2^-$ level were interpreted as aligned oblate states, in line with the systematics of the lighter odd-A iodine isotopes. Total Routhian surface calculations were performed and were found to support the occurrence of a band

termination. Higher-lying levels that feed the $h_{11/2}$ band were identified, reaching spin $I>47/2$ and an excitation energy of about 9 MeV.

* *Physical Review C* **56** (1997) 1629

Detection of ¹⁰B in biological samples through the Particle Induced Gamma ray Emission technique (PIGE).

M.Salfity¹, A. Burlón^{1,3}, A.J. Kreiner^{1,3,5}, M. Debray^{1,3}, M. Caraballo¹, D. Hojman^{1,3,5}, M.Cardona^{1,3}, J. Kesque¹, P. Stoliar^{1,3}, F. Naab^{1,3}, M. Ozafrán¹, M. Vázquez¹, R. Rey¹, G. Levinton¹, J. Schuff¹, M. Davidson^{4,5}, J. Davidson^{4,5}, M. Buhler³, L. Policastro², G. Beraldi⁵, L. Bocanera², H. Durán², A. Dagrosa², E. Kreimann², M. Pisarev² and A. Schwint²

The applicability of the ¹⁰B(p,p')¹⁰B* reaction, using 7.2 MeV protons, for the detection of ¹⁰B in biological samples has been studied. The proton beam was produced by the 20 MV Tandem accelerator TANDAR at CNEA. The samples studied were cell cultures and tumoral tissues. A detection limit of about 10 ppm was achieved.

¹ Department of Physics, CNEA

² Department of Radibiology, CNEA

³ School of Science and Technology - UNSaM

⁴ Department of Physics, FCEyN, UBA

⁵ CONICET

Nuclear structure of neutron-deficient Au and Pt isotopes from high-resolution laser spectroscopy at ISOLDE

J.Sauvage, L.Cabaret, J.Crawford, H.T.Duong, J.Genevey, M.Girod, A.Gizon, D.Hojman, G.Huber, F.Ibrahim, A.Knipper, M.Krieg, F.Le Blanc, J.K.P.Lee, D.Lunney, G.Marguier, J.Obert, J.Oms, J.Pinard, J.C.Putaux, B.Roussiere, V.Sebastian, A.Wojtasiewicz, S.Zemlyanoy, D.Forkel-Wirth, J.Letry, and the ISOLDE Collaboration.

Atomic spectroscopy measurements were carried out using the COMPLIS setup installed at the ISOLDE-BOOSTER facility. Hyperfine structure (HFS) spectra and isotope shift (IS) values were obtained for the neutron-deficient ¹⁷⁸⁻¹⁸⁵Pt and for ¹⁸⁴Au^{g,m}, providing deformation parameters β , magnetic moments μ and spectroscopic quadrupole moments (for $I \geq 1$) Q_s . In Pt isotopes, a deformation drop for A=178 and an inverted odd-even staggering for the charge radius around the neutron mid-shell N=104, have been observed very clearly. Furthermore, deformation changes $\delta\beta$ between isomeric and ground states for ¹⁸³⁻¹⁸⁵Pt and ¹⁸⁴Au have been put forward. Thus, the influence of the proton-neutron coupling on the $\delta\beta$ value in

^{184}Au relatively to that in its isotope ^{183}Pt has been determined. Besides, the $h_{9/2}$ proton state that is decoupled from the core in $^{183,185}\text{Au}$, becomes the $3/2$ [532] state strongly coupled in ^{184}Au . The spin and parity values $I^\pi = 3+$ have been assigned to the ^{182}Ir ground state from internal conversion electron measurements to prepare atomic spectroscopy studies in the Ir isotopic series.

* *Acta Phys. Pol. B* **30** (1999) 1393

Study of $f_{7/2}$ $N=Z$ nuclei with GASP

C.A. Ur, S.M. Lenzi, D. Bucurescu, A. Gadea, D.R. Napoli, D. Bazzacco, F. Brandolini, J.A. Cameron, M.A. Cardona, G. de Angelis, D. Hojman, S. Lunardi, M.A. Nagarajan, M. De Poli, C. Rossi Alvarez, C. Svenson.

New results on the high spin structure of the $N=Z$ nuclei ^{48}Cr and ^{52}Fe are presented. Experiments were performed using the GASP array in coincidence with the 4π charged particle detector ISIS which allows a better selection of the reaction channel γ - γ -particles and γ - γ - γ -particles coincidences.

* *Prog. Part. Nucl. Phys.* **38** (1997) 223

High-spin state spectroscopy in ^{143}Tb

F.R. Espinoza-Quñones, M.A. Rizzutto, E.W. Cybulska, W.A. Seale, J.R.B. Oliveira, N.H. Medina, R.V. Ribas, M.N. Rao, D. Bazzacco, F. Brandolini, S. Lunardi, C.M. Petrache, Zs. Podolyak, C. Rossi-Alvarez, F. Soramel, C.A. Ur, M.A. Cardona, G. de Angelis, D.R. Napoli, S. Spolaore, A. Gadea, D. De Acuña, M. De Poli, E. Farnea, D. Foltescu, M. Ionescu-Bujorm, A. Iordachescu, V. Roca, F. Terrasim, A. Chatterjee, A. Saxena and L. Sajo Bohus

The ^{143}Tb nucleus has been studied with the $^{92}\text{Mo} (^{54}\text{Fe}, 3p\gamma)$ reaction at 240-MeV incident energy, extending the systematics of odd-A, $N=78$ isotones to higher Z. For the yrast band, excited states up to a spin of $59/2^-$ have been observed. The first allowed backbend occurs at a rotational frequency of $\hbar\omega=0.38$ MeV. Three- and five-quasiparticle structures were identified, similar to those seen in lower mass $N=78$ isotones. Two of these structures have characteristics typical of mixed proton-neutron oblate configurations with one pair of aligned $h_{11/2}$ neutrons. In addition, two bands consisting of stretched E2 transitions have been observed with no known analogous structures in neighboring nuclei. The results are discussed in terms of the cranking model.

Phys. Rev. C **60** (1999) 054304-1

Changes of shape and second backbending in ^{50}Cr

S.M. Lenzi, C. Ur, D. Bazzacco, S. Lunardi, C. Rossi Alvarez, D.R. Napoli, M.A. Nagarajan, G. de Angelis, M. De Poli, A. Gadea, D.M. Brink, M.A. Cardona, D. Hojman

The nucleus ^{50}Cr has been studied, following the reaction $^{24}\text{Mg}(^{32}\text{S}, \alpha 2p)$ at 130 MeV bombarding energy, with the γ -ray array GASP plus the 4π charged-particle detector ISIS of the Legnaro National Laboratory. We have identified several high-energy transitions above 4 MeV and constructed a complex level scheme up to the 18+ state. The yrast band of ^{50}Cr shows a rotational-like structure at low spin consistent with a prolate deformation. At $I = 10$ the first backbending can be understood in terms of a change of shape from prolate to triaxial: with increasing angular momentum, the four protons drive the nucleus into prolate deformation while the two neutron holes drive it into the oblate direction. At $I = 14$ the nucleus reaches the maximum angular momentum that can be constructed with 4 protons and 6 neutrons in the isolated $f_{7/2}$ shell. This is consistent with the fact that at high rotational frequency, the spins of the valence particles in a high-j shell become increasingly aligned along the rotational axis. The nucleons thus rotate in orbits near the equator of the core, making an oblate, non-collective state. The generation of high angular momentum by such a mechanism is energetically favoured and at $I = 14$ the valence-particle spins become fully quantized along the rotational axis which gives rise to a band-termination state.

* *International Symposium on Exotic Nuclear Shapes, Debrecen, Hungary, May 1997*

Coupling modes in doubly odd nuclei: the case of ^{172}Ta

D. Hojman, M.A. Cardona, M. Davidson, M.E. Debray, A.J. Kreiner, F. Le Blanc, A. Burlon, J. Davidson, G. Levinton, H. Somacal, J.M. Kesque, F. Naab, M. Ozafrán, P. Stoliar, M. Vázquez, D.R. Napoli, D. Bazzacco, N. Blasi, S.M. Lenzi, G. Lo Bianco, J. Rico and C. Rossi Alvarez.

High-spin states in doubly odd ^{172}Ta were investigated in two different experiments by means of in-beam γ -ray and internal-conversion electron spectroscopy techniques. Excited states of ^{172}Ta were populated using the $^{159}\text{Tb}(^{18}\text{O}, 5n)$ and $^{165}\text{Ho}(^{12}\text{C}, 5n)$ reactions at beam energies of 93 and 79 MeV respectively. Eleven rotational bands, including twin bands in the normal deformation regime, have been observed and their

configurations discussed. Three isomeric states have been found and their half lives measured. Alignments, band crossing frequencies and electromagnetic properties have been analyzed in the framework of the cranking model.

Collective versus single-particle degrees of freedom in $1f_{7/2}$ -shell nuclei

S.M. Lenzi, C.A. Ur, D.R. Napoli, F. Brandolini, D. Bazzacco, D.M. Brink, D. Bucurescu, J.A. Cameron, M.A. Cardona, G. de Angelis, M.De Poli, A. Gadea, D. Hojman, S. Lunardi, G. Martinez-Pinedo, N.H.Medina, M.A. Nagarajan, C. Rossi Alvarez and C.E. Svensson

In this work we will present recent data in several $1f_{7/2}$ nuclei obtained with the γ array GASP and the particle detector array ISIS at the Legnaro National Laboratory. High spin states in ^{48}Cr , ^{50}Cr , ^{52}Fe , and other neighboring nuclei have been observed. Life times have been measured in most of them which are compared with shell model calculations. Along the yrast bands, these nuclei present several interesting phenomena as backbending, bandcrossing, changes of shape, spin inversion and band termination. Non yrast bands have also been observed in most of these nuclei that can be interpreted as particle hole excitations involving the $1d_{3/2}$ shell.

New Spectroscopy and Nuclear Structure 1997, Copenhagen, Denmark, September 1997

Deformation change between isomeric and ground states of isotones $N=105$

J. Sauvage, N. Boos, L. Cabaret, J. Crawford, H.T. Duong, J. Genevey, A. Gizon, D. Hojman, G. Ruber, F. Ibrahim, P. Kucher, A. Knipper, M. Krieg, F. Le Blanc, J.K.P. Lee, J. Libert, D. Lunney, O. Margujer, J. Oben, J. Oms, J. Pinard, J.C. Putaux, M. Rarridhane, B. Roussiere, V. Sebastian, A. Wojtasiewicz and the ISOLDE collaboration

The properties of the ^{182}Ir and ^{184}Au doubly-odd isotones are compared. Results on conversion-electron measurements performed with a high resolution spectrograph for the ^{182}Pt and $^{183\text{m}}\text{Pt}$ β^+/EC decays are also presented. They confirm the $\pi\otimes\nu$ configurations proposed for the ^{182}Ir ground state and the ^{184}Au isomeric and ground states. It is also shown that the anomaly observed in ^{184}Au cannot be explained by the influence of the V_{pn} residual interaction but would be rather due to a small deformation change either between the isomeric level and the ground state of ^{184}Au or between ^{184}Au and its neighbouring odd-A nuclei.

** International Workshop on Hyperfine Structure and Nuclear Moments of Exotic Nuclei by Laser Spectroscopy, Poznan, Poland, February 1997*

Heavy-Ion Physics And Accelerator Mass Spectrometry

The field of interest of our research group includes two lines that are well differentiated as far as their final goals are concerned, but which share to a large extent a variety of methodological and instrumental aspects.

One of these research lines addresses the different aspects that come into play when two nuclei collide at low energies (i.e, at energies close or somewhat below that of the corresponding Coulomb barrier). It comprises the following projects:

1) Search for chaotic behavior in nuclear reactions: Theoretical studies predict that, under certain conditions, nuclear scattering might exhibit peculiar behavior associated with the quantum manifestation of chaotic phenomena. In order to elucidate this problem we have studied the reaction $^{16}\text{O} + ^{28}\text{Si}$ and we have compared the experimental with the theoretical two-dimensional maps for the elastic and inelastic cross sections as a function of the energy and the scattering angle.

2) Transfer reactions at near-barrier energies: This project involves the experimental and theoretical study of the transfer probabilities as a function of the distance of closest approach between the colliding nuclei, with emphasis on the so called "slope anomalies".

3) Subcoulomb fusion-barrier distributions: Fusion cross sections at energies close to or below the Coulomb barrier present behaviors which are related to various structural aspects of the nuclei involved in the collision. These features become particularly noticeable when the results are analyzed in terms of the so called "barrier distributions". We have studied several reaction systems with the aim of identifying the effect of transfer channels in the barrier distributions obtained from the measurement of quasi-elastic scattering at backward angles.

The other research line relates to an application of the heavy-ion accelerator Tandem to mass spectrometry. The isotopic-analysis technique known as AMS ("Accelerator Mass Spectrometry") is

extremely sensitive for the identification and quantitative determination of very low concentration of nuclear species, in particular long-lived radioactive isotopes, in samples of interest for various disciplines. The activities that we have undertaken in this period in the field of AMS have been related, to a large extent, to the adaptation of different techniques and procedures associated with the heavy-ion accelerator, since it has been originally designed for nuclear-physics research. The need for this work arises mainly from the fact that AMS involves the acceleration of extremely weak beams which are therefore "invisible" for the usual beam-control devices of the accelerator. As far as the applications are concerned, we have studied chlorine 36 contents in rainwater samples collected at different latitudes in the southern hemisphere. These measurements provide information on transport processes between the stratosphere and the troposphere. We have also started studies of the radioactive isotope nickel 58 in meteorite samples, aimed at the determination of the irradiation history before and after the arrival of this extraterrestrial material to our planet. We have also started preliminary work for the determination of the concentration of iodine 129 in environmental samples which can be useful in monitoring human activities in the nuclear field.

Average angular momentum in compound nucleus reactions deduced from isomer ratio measurements

O.A. Capurro, D.E. DiGregorio, S. Gil, D. Abriola, M. di Tada, J.O. Fernández Niello, A.O. Macchiavelli, G.V. Martí, A. J. Pacheco, J.E. Testoni, D. Tomasi, I. Urteaga

We have measured the ratio of the yields for the metastable and ground states of ^{119}Te produced in the fusion-evaporation reactions $^{110}\text{Pd}(^{12}\text{C},3\text{n})$ and $^{115}\text{In}(^7\text{Li},3\text{n})$ by off-line observation of delayed γ -ray emission. The absolute cross sections for the formation of the metastable ($J_\pi = 11/2^-, T_{1/2} = 4.68$ d) and ground ($J_\pi = 1/2^+, T_{1/2} = 16.05$ h) states were determined at energies close to the Coulomb barrier for both systems. We have deduced the average angular momentum from these isomer ratio measurements through statistical model calculations. The deduced mean angular momentum agrees quite well with those calculated by a simple fusion model. The expected constant value of the average total angular momentum at subbarrier energies was confirmed for the $^{12}\text{C}+^{110}\text{Pd}$ system. The predicted variation of the mean orbital angular momentum with the reduced mass of the entrance channel was also verified.

* *Phys. Rev. C 55 (1997) 766.*

The AMS program at the TANDAR accelerator

D.E. Alvarez, J.O. Fernández Niello, M. di Tada, A.M.J. Ferrero, G.V. Martí, O.A. Capurro, A.J. Pacheco, J.E. Testoni, D. Abriola, A. Etchegoyen, E. Achterberg, M. Ramírez

The accelerator mass spectrometry (AMS) program that is under development using the 20UD electrostatic accelerator TANDAR at Buenos Aires is presented. Tests and measurements in order to

evaluate and to improve the accelerator performance are described. Preliminary measurements have been done by tuning ^{14}C beams using as detection system DE-E telescope. For the detection of heavier isotopes some new developments are being currently implemented in a quadrupole-dipole-dipole (QDD) magnetic spectrometer. Furthermore, work is in progress to construct a time-of-flight system using two micro-channel plates prior to the entrance to the QDD spectrometer.

* *Nucl. Inst. B 123 (1997) 39.*

Absorption and tunneling effects in one- and two-proton transfer reactions

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

We analyze proton transfer data for the $^{12}\text{C} + ^{197}\text{Au}$ system. We show that the interplay between absorption and tunneling effects explains the observed energy dependence of the transfer probabilities at large distances, including the apparently anomalous behavior at high energies.

* *Phys. Rev. C 55 (1997) 2975.*

Analytical determination of aluminium-26 in biological materials by accelerator mass spectrometry

S.J. King, C. Oldham, J. Popplewell, R.S. Carling, J.P. Day, L.K. Fifield, R.G. Cresswell, K. Liu and M. di Tada.

Studies of the biological chemistry of the aluminium can gain significantly from the use of the long-lived isotope ^{26}Al as a tracer, although the cost of the isotope often precludes its determination by radiochemical counting techniques. Accelerator Mass Spectrometry (AMS) provides an ultra-sensitive method of determination, free from isobaric interference from atomic (^{26}Mg) or

molecular species. The source materials for AMS can be aluminium oxide or phosphate, both of which can be readily prepared at a sufficient level of purity from biological substrates. Natural aluminium (^{27}Al , 100%) is added to the preparations as a chemical yield monitor and to provide the reference for the isotope ratio measurement. $^{26}\text{Al}/^{27}\text{Al}$ ratios can be determined over the range 10^{-14} - 10^{-7} , implying a limit of detection for ^{26}Al of around 10^{-18} g. The precision of measurement and long-term reproducibility are 5% and 7% (RSD), respectively. Chemical methodologies for routine measurements on blood and urine samples have been developed.

* *Analyst* **122** (1997) 1049.

Comment on experimental fusion barrier distributions reflecting projectile octupole state coupling to prolate and oblate target nuclei

C.H. Dasso and J. Fernández Niello

The authors comment on the Letter by J.D. Bierman et al., *Phys. Rev. Lett.* **76**, 1587(1996), and show the method by which they have been constructed is not the most appropriate.

* *Phys. Rev. Lett.* **78** (1997) 3975.

Methodological issues in the radiocarbon dating of rock paintings

R.E.M. Hedges, C. Bronk Ramsey, G.J. van Klinken, P.B. Pettitt, C. Nielsen-Marsh, A. Etchegoyen, J. Fernández Niello, M.T. Boschini, A.M. Llamazares.

Chemical and isotopic analyses have been made of pigment samples from two separate rock art sites in Argentina. The purpose of the study has been to establish the feasibility of extracting carbonaceous material from the samples which will permit reliable radiocarbon dates for the time of painting. Two sites, Catamarca and Río Negro, present quite different problems. Most of the paper is concerned with Catamarca, and here we have shown that the paint pigments contain very little or no organic binder, but they do contain calcium oxalate derived from local cacti, and calcium carbonate derived probably from local plant ash. We describe a method to purify carbon extracted from the calcium oxalate, and present the dates obtained on both components. We show that, though rare, natural deposits containing both calcium oxalate and calcite do occur, but that they are very distinct in both ^{13}C and ^{14}C compositions, and we argue that they are very unlikely to

contaminate the pigments to such an extent that the ^{14}C dates are altered. For the Río Negro site we show that the ground for the paint pigments contains carbon derived from fires burnt inside the cave, and discuss how analytical methods provide information to develop a strategy for extracting material, from both ground and pigment, for more reliable dating.

* *Radiocarbon* **40** (1998) 35

Role of the gamma degree of freedom in subbarrier fusion phenomena and effective barrier distributions

C.H. Dasso, J. Fernández Niello and A. Vitturi

We investigate subbarrier fusion phenomena in the presence of triaxial static deformations and under conditions of γ instability. It is found that the distributions of effective barriers can reflect in a distinct way a general quadrupole profile specified in terms of both β_2 and γ . Fusion cross sections as a function of energy are, on the other hand, rather insensitive to the gamma-degree of freedom.

* *Phys. Rev. C* **55** (1997) 2112.

Slope anomaly in neutron transfer reactions

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

We study one- and two-neutron transfer probabilities in heavy-ion reactions within a semiclassical model. As in the case of the already studied proton transfer reactions, the interplay between absorption and tunneling effects qualitatively reproduces the overall properties of these probabilities and in particular the so-called slope anomaly observed in these reactions.

* *Phys. Rev. C* **58** (1998) 601.

Average angular momentum in fusion reactions deduced from evaporation-residue cross sections

O.A. Capurro and D.E. DiGregorio

Average angular momenta of compound nucleus were deduced from measured evaporation-residue cross sections on the basis of statistical model calculations. We have applied this method to the following systems: $^4\text{He}+^{197}\text{Au}$, $^{16}\text{O}+^{147,149,152,154}\text{Sm}$, $^{32}\text{S}+^{138}\text{Ba}$, and $^{48}\text{Ti}+^{122}\text{Sn}$. For some of these systems, the average angular momenta were compared with those extracted from early gamma-multiplicity measurements. A reasonable agreement was found between the values of the deduced average angular momentum

obtained from both methods, giving support to the validity of the present method. The average angular momenta for all the systems exhibit the energy dependence predicted by a standard fusion model calculation.

* *Physical Review C* 57 (1998) 430.

Search for experimental evidence of chaotic behavior in nuclear scattering

G.V. Martí, A.J. Pacheco, J.E. Testoni, D. Abriola, O.A. Capurro, D.E. Di Gregorio, J.O. Fernández Niello, E. Achterberg, D.E. Alvarez,

Angular distributions for the elastic and inelastic scattering in the $^{16}\text{O} + ^{28}\text{Si}$ system have been measured in two energy regions, one close to the Coulomb barrier and the other well above. Fine steps in both bombarding energy and scattering angle make it possible to compare the data with the theoretical calculations that predict, for each of these regions, distinctive cross-section patterns in correspondence with the classical occurrence of either regular or chaotic regimes. The experimental results show specific differences between the two explored energy ranges in qualitative agreement with the theoretical predictions.

* *Phys. Lett. B* 447 (1999) 41.

AMS measurements of South American rainwater samples

J. O. Fernández Niello, D.E. Alvarez, A.M.J. Ferrero, O.A. Capurro, D. Abriola, G.V. Martí, A.J. Pacheco, J.E. Testoni, R.G. Liberman, K. Knie, G. Korschinek

Accelerator mass spectrometry (AMS) is one of the most powerful applications of heavy-ion beams in fields not directly related to their specific use in nuclear physics research. AMS applies to a diversity of fields like material sciences, medicine, archaeology, and environmental studies and has been grown in importance since its beginning in the early eighties. The development of this highly sensitive technique at the electrostatic accelerator of TANDAR laboratory has recently been accomplished. Aiming at environmental applications and as a part of the AMS activities of the TANDAR laboratory, we have established a research program using the radioisotope ^{36}Cl as an atmospheric tracer, in cooperation with the AMS group of the Technical University of Munich.

* *Acta Phys. Pol.* 30 (1999) 1629.

Observation of a $(\nu^{7/2} [514])^2$ crossing in ^{180}Os

R. Lieder, Ts. Venkova, S. Utzelmann, W. Gast, H. Schnare, K. Spohr, P. Hoernes, A. Georgiev, D. Bassacco, R. Menegazzo, C. Rossi-Alvarez, G. De Angelis, R. Kaczarowski, T. Rzaca-Urban, T. Morek, G.V. Martí, K.H. Maier, S. Frauendorf

High-spin states in ^{180}Os have been populated by means of the $^{150}\text{Nd}(^{36}\text{S},6n)$ reaction at 177 MeV and studied with the gamma spectrometers OSIRIS and GASP. Eight known bands have been extended to higher spins and a new strongly coupled band has been discovered. Configuration assignments of the bands have been carried out in the framework of the tilted-axis cranking model utilizing experimental ratios of reduced transition probabilities $B(M1)/B(E2)$. The investigation of the alignment behaviour of the bands revealed that besides the well-known first band crossing caused by the alignment of an $i_{13/2}$ quasineutron pair, a second band crossing occurs in four of the bands. The crossing frequency is greater than 0.38 MeV and the alignment gain is fairly small, ranging between $2h$. The crossing can consistently be explained as a two-quasineutron $(\nu^{7/2} [514])^2$ alignment. This crossing has been observed for the first time.

* *Nucl. Phys. A* 645 (1999) 465

Kinetics of uptake and elimination of silicic acid by a human subject: a novel application of ^{32}Si and accelerator mass spectrometry

J. Popplewell, S.J. King, J.P. Day, P. Ackrill, L.K. Fifield, R.G. Cresswell, M. di Tada and K. Liu.

Silicon is possibly important in human physiology in protecting against the toxic effects of aluminium, but the kinetics of uptake and excretion of silicic acid, the bioavailable form, are not well characterised. We have used ^{32}Si as a tracer in a human uptake experiment to determine a gastrointestinal uptake factor for silicic acid, and to elucidate the kinetics of renal elimination. Urine collections were made for extending intervals from 2 to 12 h over 2 days following ingestion by a single human subject of a neutral silicic acid solution containing tracer levels of ^{32}Si ($t_{1/2}$ approx 150 y). Silicon was isolated as SiO_2 and the ^{32}Si content determined by accelerator mass spectrometry (AMS), using a gas-filled magnet technique to eliminate a prolific isobaric interference from ^{32}S . Silicon uptake appears to have been essentially complete within 2 h of ingestion. Elimination occurred by two

simultaneous first-order processes with half-lives of 2.7 and 11.3 h, representing around 90% and 10%, respectively, of the total output. The rapidly eliminated ^{32}Si was probably retained in the extracellular fluid volume, whilst the slower component may represent intracellular uptake and release. Elimination of absorbed ^{32}Si was essentially complete after 48 h and was equivalent to 36% of the ingested dose. This establishes only a lower limit for gastrointestinal absorption as, although there was no evidence for longer term retention of additional ^{32}Si , the possibility could not be excluded by these results.

* *Journal of Inorganic Biochemistry* **69** (1998) 177.

Evaluation of fusion cross sections at near-barrier energies using a coupled-channel formalism

J.E. Testoni, O. Dragun, M.R. Spinella, H. Hassman

A coupled-channel formalism is presented which allows to calculate, simultaneously, cross sections corresponding to elastic, inelastic, transfer of two neutrons and fusion. The nuclear excitations are considered as rotations in the real space and the two-neutron transfer as a rotation in a *gauge* space. The target as well as the projectile are considered to have zero spin. For different reaction channels the formalism permits to obtain wave functions, angular distributions of differential cross sections, total cross sections, excitation functions and spin distributions.

A coupled-channel analysis of scattering, two-neutron transfer and fusion in medium heavy-ion collisions

J.E. Testoni, O. Dragun, H. Massmann, M.R. Spinella

Scattering, two-neutron transfer and fusion processes are analyzed in the scope of a coupled-

channel formalism using collective excitations in the real and a gauge space. A small set of collective states simplifies the calculation of form factors allowing an easy evaluation of interesting physical quantities such as cross-sections, probability densities, currents, fusion rates, spin distributions and probability sources and sinks in the different channels. The availability of these quantities makes possible an insight that clarifies the underlying reaction mechanisms. In particular, a barrier, modified by the coupling between channels, is introduced, permitting an interpretation of relevant characteristics of the interaction processes. The system $^{18}\text{O}+^{60}\text{Ni}$ is specifically studied at energies of $E_{\text{lab}}=63$ and 65 MeV for the scattering and two-neutron transfer, respectively, and at energies around the Coulomb barrier for fusion. In this case, it can be observed that the presence of the transfer channel plays a catalytic role in the enhancement of the fusion cross-section by incrementing the contribution of the dispersion channels.

* *Nucl. Phys.* (in press)

Barrier distribution for the $^{32}\text{S} + ^{110}\text{Pd}$ system derived from the quasi-elastic scattering excitation function

O.A. Capurro, J.E. Testoni, D. Abriola, D.E. Di Gregorio, G.V. Martí, A.J. Pacheco and M.R. Spinella

We measured the quasi-elastic scattering excitation function for the $^{32}\text{S} + ^{110}\text{Pd}$ system at a backward angle and at energies around the Coulomb barrier. A fine enough energy step was adopted in order to obtain a representation of the barrier distribution through the first differentiation of the data. Our results were compared with the barrier distribution that was deduced from fusion data for the same system.

* *Phys Rev. C* (in press)

Astroparticles

- 1) Search for Dark Matter and Solar Axions at the Sierra Grande Underground Laboratory,
- 2) ^{54}Mn and ^{144}Pm as Cosmic-Ray Chronometers.

This group is devoted to theoretical and experimental research in areas in the frontiers between nuclear physics, particle physics and astrophysics. Specifically we conducted a series of experiments at the Sierra Grande Underground Laboratory with the aim of search and identification of cold dark matter candidates (such as WIMPs = weakly interacting massive particles) existing in the Milky Way and axions created in the Sun.

Results: The Sierra Grande Laboratory, built in May 1994 in a tunnel (at a depth of 380 m) of the iron mine HIPARSA in the province of Rio Negro, is the first and unique underground facility in South America. An ultralow background germanium detector of 1.033 kg was setup. A lead shielding made of archaeological material (2000 years old) and contemporary bricks surrounds the detector and protects against the local natural radioactivity in the mine. Since the beginning of its operation in June 1994, the experiment extended over a period of 1142 days almost without interruption until the end of 1997, with a total effective running exposure of 804 days. The analysis of the data was focused in the possible identification of cold dark matter candidates by using three methods: exclusion plots, and diurnal and annual modulation of the expected signal. By proposing a novel technique, the same set of data was also used to search for solar axions using the single crystal germanium detector. This technique exploits the coherent Primakoff conversion of axions into photons when their angle of incidence satisfies a Bragg condition with a given crystalline plane. This area of research was extended to other topics of astrophysics. In particular, in collaboration with the Nuclear Astrophysics group from the Lawrence Berkeley National Laboratory, a series of experiments were performed to determine the β -decay half-life of ^{54}Mn and ^{144}Pm which are needed to employ these isotopes as cosmic-ray chronometers.

Galactic confinement time of iron-group cosmic rays derived from the ^{54}Mn chronometer

K. Zaerpoor, Y.D. Chan, D.E. Di Gregorio, M.R. Dragowsky, M.M. Hindi, M.C.P. Isaac, K.S. Krane, R.M. Larimer, A.O. Macchiavelli, R.W. MacLeod, P. Miocinovic and E.B. Norman.

The β -decay half-life of ^{54}Mn is needed to employ this isotope as a cosmic ray chronometer. We have determined the partial half-life of ^{54}Mn for positron emission by counting a highly purified 35- μCi source of ^{54}Mn in GAMMASHPERE to search for the astrophysically interesting β^+ decay branch through the observation of coincident positron-annihilation γ -rays. A careful analysis of 97 hours of source counting and 61 hours of background shows a net signal of 24 ± 10 back-to-back 511-511 keV coincident events. Based on this result, the branch for this decay mode is $(2.2 \pm 0.9) \times 10^{-7} \%$. The implications of this result for the

^{54}Mn cosmic-ray chronometer problem are discussed.

** Phys. Rev. Lett. 70 (1997) 4306.*

Cold dark matter identification. Diurnal modulation reexamined

F. Hasenbalg, D. Abriola, J.I. Collar, D.E. Di Gregorio, A.O. Gattone, C.K. Guérard and H. Huck

We report on new estimates of the modulation expected in semiconductor detectors due to the eclipsing of dark matter particles in the Earth. We reevaluate the theoretical modulation significances and discuss the differences found with previous calculations. We find that a significantly larger statistics than previously estimated is needed to achieve the same level of sensitivity in the modulated signal.

** Phys.Rev. D 55 (1997) 7350.*

Cosmic-ray half-life of ^{144}Pm

K. Zaerpoor, Y.D. Chan, D.E. Di Gregorio, M.R. Dragowsky, M.M. Hindi, M.C.P. Isaac, K.S. Krane, R.M. Larimer, A.O. Macchiavelli, R.W. MacLeod, P. Miocinovic, and E.B. Norman.

In order to test the possibility of using ^{144}Pm as a clock to measure the mean cosmic-ray confinement time in the Galaxy, we counted a highly purified 1.4 μCi source of this isotope in GAMMASHEPERE and searched for its astrophysically interesting β^+ decay branch through the observation of coincident positron-annihilation γ -rays in coincidence with the characteristic 697-keV γ -ray. Analysis of 57 h of source and 15 h of background shows no net signal and results in an upper limit of 3.7 of 511-511-697 keV coincident events. From this result we establish a 90 % confidence level upper limit on the branch for this decay mode to be 7.4×10^{-6} %. The implications of this result for the ^{144}Pm cosmic-ray problem are discussed.

* *Phys. Rev. C 57 (1998) 2046.*

Theory for the direct detection of solar axions by coherent primakoff conversion in germanium detectors

R.J. Creswick, F.T. Avignone III, H. A. Farach, J.I. Collar, A.O. Gattone, S. Nussinov and K. Zioutas.

It is assumed that axion-like Nambu Goldstone bosons exist and are created in the sun by Primakoff conversion of photons in the Coulomb fields of nuclei. Detection rates are calculated in germanium detectors due to the coherent conversion of axions to photons in the lattice when the incident angle fulfills the Bragg condition for a given crystalline plane. The rates are correlated with the relative positions of the sun and detector yielding a definite recognizable sub-diurnal temporal pattern. A major experiment is proposed based on a large detector array.

* *Phys. Lett. B 427 (1998) 235.*

Experimental search for solar axions

A.O. Gattone, D. Abriola, F.T. Avignone, R.L. Brodzinski, J.I. Collar, R. J. Creswick, D.E. Di Gregorio, H. A. Farach, C. K. Guérard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, S. Nussinov, A. Ortiz de Solórzano, J.H. Reeves, J. A. Villar, and K. Zioutas.

A new technique has been used to search for solar axions using a single crystal germanium detector. It exploits the coherent conversion of

axions into photons when their angle of incidence satisfies a Bragg condition with a crystalline plane. The analysis of approximately 1.94 kg-yr of data from the 1 kg DEMOS detector in Sierra Grande, Argentina, yields a new laboratory bound on axion-photon coupling of $\gamma\gamma < 2.7 \times 10^{-9}$ GeV $^{-1}$ independent of axion mass up to ≈ 1 keV.

Nucl. Phys. B 70 (Proc. Suppl.) (1998) 59.

Experimental search for solar axions via coherent primakoff conversion in a germanium spectrometer

F.T. Avignone III, D. Abriola, R.L. Brodzinski, J.I. Collar, R.J. Creswick, D.E. Di Gregorio, H.A. Farach, A.O. Gattone, C.K. Guérard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, S. Nussinov, A. Ortiz de Solórzano, J.H. Reeves, J. Villar and K. Zioutas.

Results are reported of an experimental search for the unique, rapidly varying temporal pattern of solar axions converting into photons via the Primakoff effect in a single crystal germanium detector when axions are incident at a Bragg angle with a crystalline plane. The analysis of 1.94 kg-yr of data from the 1 kg DEMOS detector in Sierra Grande, Argentina, yields a new laboratory bound by an axion-photon coupling of $\gamma\gamma < 2.7 \times 10^{-9}$ GeV $^{-1}$, independent of axion mass up to ≈ 1 keV.

* *Phys. Rev. Lett. 81 (1998) 5068.*

Search for annual modulation of dark-matter signals with a germanium spectrometer at the Sierra Grande laboratory

D. Abriola, F.T. Avignone III, R.L. Brodzinski, J.I. Collar, D.E. Di Gregorio, H.A. Farach, E. García, A.O. Gattone, C. Guerard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, A. Ortiz de Solórzano, J. Puimedón, J.H. Reeves, A. Salinas, M.L. Sarsa, and J.A. Villar.

Results of a search for dark-matter induced annual modulation using 830.5 kg-days of data collected at the Sierra Grande underground laboratory with a germanium detector are presented. The analysis of the data does not show any indication of seasonal effects.

Data collected during three years have been analyzed for distinctive features of annual modulation of the signal induced by WIMP dark matter candidates. The main motivation for this analysis was the recent suggestion (by the DAMA collaboration) that a yearly modulation signal could not be rejected at the 90 % confidence level when

analyzing data obtained with a high-mass low-background scintillator detector. In our work, two different analyses of the data were performed. First, the statistical distribution of modulation-significance variables (expected from an experiment running under the conditions of Sierra Grande) was compared with the same variables obtained from the data. Second, the data were analyzed in energy bins as an independent check of the first result and to allow for the possibility of a crossover in the expected signal. In both cases no statistically significant deviation from the null result was found, which could support the hypothesis that the data contain a modulated component. Finally, a plot was presented to be able to compare our results to those of the DAMA collaboration.

* *Astropart. Phys.* **10** (1999) 133.

Solar Axion Experiments Using Coherent Primakoff Conversion in Single Crystals

F.T. Avignone III, D. Abriola, R.L. Brodzinski, J.I. Collar, R.J. Creswick, D.E. Di Gregorio, H.A. Farach, A.O. Gattone, C.K. Guerard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, S. Nussinov, A. Ortiz de Solorzano, J.H. Reeves, J. Villar, and K. Zioutas

The results of a 1.94 kg-yr pilot search for solar axions with an ultralow background Ge detector are reviewed. The detection method is based on Bragg-coherent Primakoff conversion of axions into photons when the momentum vectors of the axion and photon satisfy the Bragg condition. The theory of the experiment are presented for Ge

and TeO₂ crystals. Future prospects of large volume experiments are discussed.

* *Nuclear Instruments & Methods in Physical Research A* **425** (1999) 480

A decommissioned LHC model magnet as an axion telescope

K. Zioutas, C.E. Aalseth, D. Abriola, F.T. Avignone III, R.L. Brodzinski, J.I. Collar, R.J. Creswick, D.E. Di Gregorio, H.A. Farach, A.O. Gattone, C.K. Guerard, F. Hasenbalg, M. Hasinoff, H. Huck, A. Liolios, H.S. Miley, A. Morales, J. Morales, D. Nikas, S. Nussinov, A. Ortiz, E. Savvidis, S. Scopel, P. Sievers, J.A. Villar, L. Walckiers

The 8.4 T, 10 m long transverse magnetic field of a twin aperture LHC bending magnet can be utilized as a macroscopic coherent solar axion-to-photon converter. Numerical calculations show that the integrated time of alignment with the Sun would be 33 days/yr with the magnet on a tracking table capable of $\pm 5^\circ$ in the vertical direction and $\pm 40^\circ$ in the horizontal direction. The existing lower bound on the axion-to-photon coupling constant can be improved by a factor between 30 and 100 in 3 yr, i.e., $g_{a\gamma\gamma} \leq 9 \times 10^{-11} \text{ GeV}^{-1}$ for axion mass $\leq 1 \text{ eV}$. This value falls within the existing open axion mass window. The same set-up can simultaneously search for low- and high-energy celestial axions, or axion-like particles, scanning the sky as the Earth rotates and orbits the Sun.

* *Nuclear Instruments & Methods in Physical Research A* **425** (1999) 480.

Pierre Auger Project

The Pierre Auger Project consists of two similar observatories over an area of 3,000 km² each, in order to study ultra energetic cosmic rays coming from outer space with the larger energies known in nature. There will be a observatory in each hemisphere as to have an ample sky coverage, one to be built in the Province of Mendoza – Argentina and the other in the State of Utah – USA. The Observatories consist of fluorescence telescopes and water tank detectors, in order to measure the longitudinal and transverse shower profiles, respectively.

The Tandar Auger Group has been working in the management, water detector systems, detector simulations, site infrastructure, solar power, bacteria growth in water, water temperature monitoring, and administration. We have done a wide spectrum of tasks leading to the Observatory ground-breaking ceremony on March 17th, 1999.

We are mounting a three water detector array at the Centro Atómico Constituyentes. These detectors are in a 1:1 scale to the Observatory detectors and consist in 12 tons water tanks with three 8" photomultiplier tubes to collect the charge deposited by the Cherenkov light produced by impinging shower particles. We will measure cosmic showers with energies 10¹⁵ – 10¹⁶ eV. We also collaborated installing two water tanks at the Observatory site in order to analyze the water thermal behavior, and doing the data analysis.

Several works were performed in relation with the site infrastructure. Fifty-eight out of a 108 contracts were signed with landowners to allow Auger to install the detectors in their properties and do their maintenance.

The first telecommunication tower, 40 m high, was built at the Los Leones hill, 15 km away from the city of Malargüe.

The Environmental Impact study was performed and has been submitted to the government of Mendoza for approval.

We have finished with the architectural project for the Los Leones fluorescence detector building and the complete Central Station buildings and services and we are now ready to call for a construction bidding. These buildings consists in:

Fluorescence Detector at Los Leones hill. It consists of 6 rooms were the telescopes and their electronics will be placed, a data acquisition room, an optic calibration laboratory, a workshop, a small kitchen and a bathroom (Fig.1).

Central Station at the City of Malargüe. It consists of an office building, a workshop, dormitories, parking lot, and tank storage place (Fig.2).

The Office Building (Fig. 3) has a control and data acquisition room, offices, meeting rooms, reception, visitor's center, small cafeteria, etc. The Workshop (Fig. 4) is mainly intended for assembly of water tank detectors. It has an electronic workshop, an optic calibration laboratory, an ultra pure water plant location, an storage room, a mechanical workshop, a lunch area and services. The Dormitories are displayed in Fig. 5 and this building has 10 two-bed dormitories, a common room, a kitchen, a lunch and a washing areas.

We expect to have and Engineering Array, consisting in 40 fully installed water tanks, a telescope at Los Leones, telecommunication and main buildings finished and operational by the end of 2001.

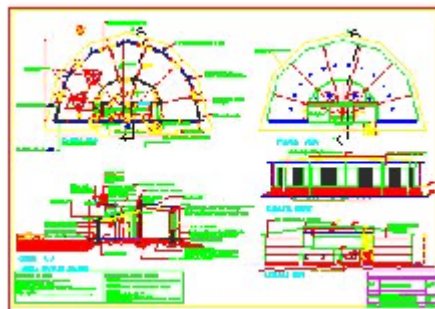


Figure 1

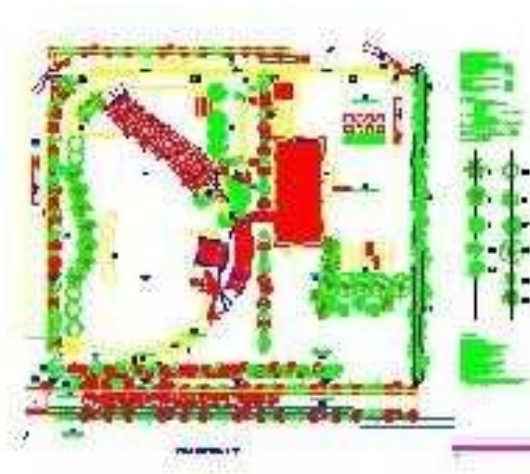


Figure 2

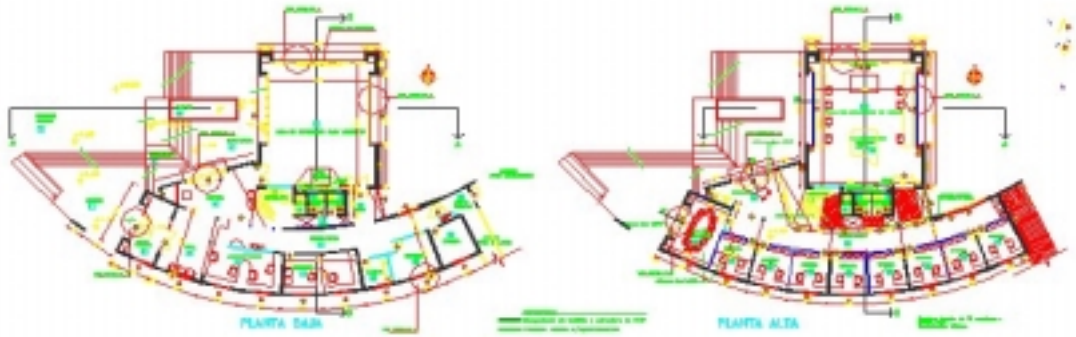


Figure 3

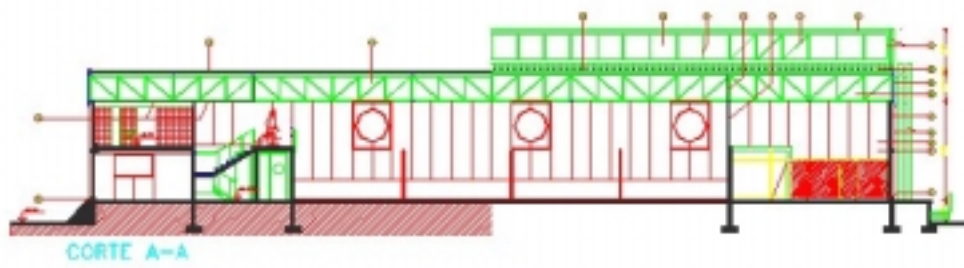


Figure 4

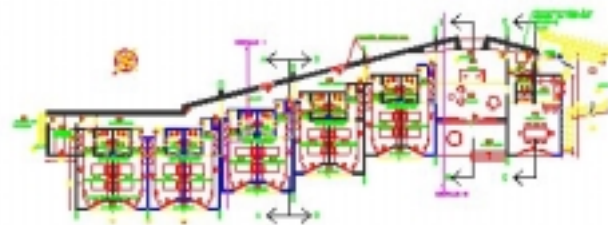


Figure 5

Structural coatings, Surfaces studies and ionic implantation

The properties of the surface are modified by means of two techniques: the first one is ion implantation with energies ranging between 100 and 400 keV and the second one is to coat the surface with a hard amorphous carbon film or a related material. The aim of ion implantation technique is to modify the allotropic properties or the crystalline structure of the surface of the different materials. The aim of the second one is to grow a hard film using a CH₃⁺ ion beam to protect the surface of the wear produced by abrasion or chemical attack. The characteristics of the substrate modified using these procedures are evaluated by various methods. They are Raman Spectroscopy, XPS and EELS for the structural studies, and the utilization of heavy ion beams for the measurement of the composition and concentration of different elements in the treated surface, by means of HIRBS and ERDA techniques.

The principal protecting coatings produced and studied are hard amorphous carbon films (a:C) of about 1 μm thickness, N containing a:C films and amorphous carbon rich SiC films.

During the last years, several developments have been performed with the purpose of using the heavy ion beam in the analysis of materials. In particular for the determination of the concentration profile of elements, as a function of depth, near the surface of materials (around one micron). Several diffusion coefficients were obtained using the HIRBS technique with fluor beam of 38 MeV energy.

A new gaseous detector E-Delta E was developed and tested to be used with the ERDA technique to identify light elements.

Application of Heavy Ions Backscattering Spectrometry to diffusion studies

R. A. Pérez, G. García-Bermúdez, D. Abriola, F. Dymont and H. Somacal.

The feasibility of using HIRBS (Heavy-Ion Rutherford Backscattering Spectrometry) to measure the concentration profile induced by the diffusion of one element in other is analyzed. The principal advantage of HIRBS over conventional RBS (Rutherford Backscattering Spectrometry) is the improved mass resolution for the analysis of high atomic number samples. This property allows us to measure the diffusion profile deep into the sample avoiding surface effects that could perturb the diffusion process. The application of HIRBS to diffusion measurement makes it possible to bridge the gap between different techniques, such as RBS and the serial sectioning technique.

** Diffusion and Defect Forum 143 (1997) 1335.*

Surface analysis using heavy ion beams

G. García-Bermúdez, M. Alurralde.

It is a review of the heavy ions techniques applied to the analysis of materials. Describe the physical principle and their main characteristic. The

techniques are: NRA (Nuclear Reaction Analysis), HIRBS (Heavy Ion RBS), CEBS (Coulomb Excited Backscattering Spectrometry), and ERDA (Elastic Reaction Detection Analysis).

Structure and thermal behavior of N containing a-C thin films obtained by high energy ion beam deposition

E.B. Halac, H. Huck, G. Zampieri, R.G. Pregliasco and M.A.R. de Benyacar

a-C:N films have been obtained by high energy ion beam deposition at ambient temperature, using CH₄-N₂ and CH₄-NH₃ as starting gas mixtures. The as-deposited and thermally annealed samples were studied using APS, Raman, KVV Auger and EELS spectroscopies. The experimental results indicate that the sp² bonded C content is about 60% and that there is a reduced short range order in the a-C:N films as compared with a-C ones. Thermal graphitization is dependent on the thickness and chemical composition of the films; it is suggested that the size of the graphitic cluster is higher in annealed a-C:N samples than in annealed N free films.

Applied Surface Science 120 (1997) 139.

Microstructural analysis of hard amorphous carbon films deposited with high-energy ion beams

R.S. Brusa, A. Somoza, H. Huck, N. Tiengo, G.P. Karwasz, A. Zecca, M. Reinoso and E.B. Halac

Hard amorphous carbon films produced using high-energy (ca. 30 keV) ion beam deposition of CH_3^+ and CH_4^+ on silicon wafers, have been investigated by Positron Annihilation Spectroscopy, the results are correlated with Raman Spectroscopy and Electrical Resistivity measurements. The microstructural modifications of the films as a function of the annealing temperature in the 300-600 °C range have been studied. The evolution of the fractions of sp^2 and sp^3 bonds is described and related to the changes of the open volume defect distribution and the graphitization process.

* *Applied Surface Science* **150** (1999) 202.

Growth of amorphous $\text{Si}_x\text{C}_{1-x}$ thin films using a methane-silane high energy ion beam

E.B. Halac, H. Huck, C. Oviedo, M. E. Reinoso, M. A. R. de Benyacar

Amorphous $\text{Si}_x\text{C}_{1-x}$ films, with x ranging from 0.25 to 0.50, were grown by high-energy ion beam deposition starting from a methane-silane gas mixture. XPS analysis of the samples shows that it is possible to incorporate silicon to the amorphous carbon matrix giving a Si/C ratio depending on the methane-silane gas mixture. Raman spectra of the thermally annealed films indicate that the silicon incorporation in a-C films increases their thermal stability. There is no evidence of a complete graphitization up to 900 °C, while in a-C samples graphitization occurs at about 500 °C. This result shows that thermal stability is a function of the film composition.

Surface and Coating Technology **122** (1999) 51.

Characterization of amorphous carbon rich SiC thin films obtained using high energy hidrocarbon ion beam on Si

H. Huck, E.B. Halac, C. Oviedo, G. Zampieri and M. Benyacar

Amorphous $\text{Si}_{1-x}\text{C}_x$ films, with x ranging from 0.54 to 0.71 and low hydrogen content (less than 5

%) were grown by high-energy hydrocarbon ion beam deposition on silicon wafers. The resulting films were studied using XPS, AES, EELS and Raman spectroscopies. As x increases, there is a higher number of C atoms in sp^2 sites, showing that for high carbon concentrations the bonding character of the C atoms is a function of the Si/C relative content in the films. Films annealed at different temperatures were studied by Raman and XPS spectroscopies; there is no evidence of a complete graphitization up to 900 °C. It is concluded that the presence of Si in the films increases their thermal stability.

* *Applied Surface Science* **141** (1998) 141.

Cratering in PMMA induced by gold ions: dependence on the projectile velocity.

R.M. Papaleo, L.S. Farenzena, M.A. de Araujo, R.P. Livi, M. Alurralde and G. García Bermúdez

Surface tracks induced by individual ion impacts on the surface of poly(methyl methacrylate) thin films are investigated for Au ions of different velocities v (from 0.02 to 1 MeV/u). The incident ions hit the surface at 79° to the surface normal, inducing particle ejection (a crater) and surface plastic deformation (a hillock) close to the zone of impact. Crater and hillock dimensions were measured using scanning probe microscopy in the tapping mode. Typical craters for 197 MeV impacts are 22 nm wide, 60 nm long, and 10 nm deep. For 20 MeV ions average dimensions are: 20 nm (width), 35 nm (length), and 2.5 nm (depth). Crater length and depth, as well as hillock length and height increase with projectile velocity up to v around 0.7 cm/ns and tend to saturate for higher velocities. Crater width, however, varies very weakly with projectile velocity. The total mass of ejected particles per MeV ion impact, Y , is estimated to be around $3 \cdot 10^6$ u for 197 MeV Au ions and of the order of $3 \cdot 10^5$ u for 20 MeV Au ions. A power fit to the data gives $Y \propto v^2$, but for $v > 1$ cm/ns the trend is a saturation of the total sputtering yield.

* *Nuclear Instruments and Methods. B* **148** (1999) 126.

Condensed Matter

The staff consists of 20 professionals and 2 technicians, plus a variable number of research students (at present: 5)

Projects on the move, all of them on solid state physics or condensed matter in general, include a variety of topics and techniques, with an important thematic inbreeding linking them. A brief description of the intervening Groups and Laboratories follows.

Laboratory Of Chemical Synthesis And Characterization:

A variety of perovskitic materials are obtained and characterized, in particular substituted manganese oxides. Among other materials of interest we find copper and alkaline earth metals, anhydrous formates, mixed copper and transition metals hydrated formates, and other related compounds of biological or technological interest. In this area some hydroxyapatites as well as their cationic and anionic substitution derivatives are also studied.

X-Ray Diffraction:

Areas of interest are: molecular structures of new coordination compounds with transition metals and polymorphs with a pharmacological interest, structural phase transitions and the study of compounds with modulated structures. The Laboratory runs a facility for the identification of third party crystalline samples by x-ray powder diffractometry.

Raman Spectroscopy:

Systematic studies are performed on thin films of amorphous carbon (diamond like) over different substrates, in order to fully characterize them.

Mössbauer Spectroscopy:

The technique is applied to iron alloys and ferrites, minerals and soils, nanoparticles, etc.

Electrical Properties:

Measurements of dielectric constants, electrical conductivity and alternate magnetic susceptibility are performed on ceramics and single crystals, as a function of temperature (30-300 K), in the presence of a magnetic field of up to 1 Tesla. Presently, the interest is centered on the study of manganese oxides with magnetoresistent properties.

Condensed Matter Theory:

The different lines include: electronic structure and magnetic properties calculations of different metallic systems of low dimensionality through 'ab-initio' methods (LMTO-FLAPW). Numeric simulation of transition metals. Calculation of transport properties tunnel effect on disordered systems and metallic superlattices. Dynamical properties of molecular crystals, using molecular dynamics. Static and dynamic properties of incommensurate phases. Molecular dynamics as applied to C₆₀-like molecules. Montecarlo calculations to obtain the phase diagram and dielectric constant of dipolar molecular liquids and antiferromagnetic systems with defects. Extended dynamical systems with self-criticality. Study of the liquid-solid transition, from the point of view of a broken translation symmetry in a liquid. Order-disorder phase transitions in periodic systems with competing interactions which end up in a modulation of the disorder for intermediate temperatures. Structural and dynamical properties of C and Si compounds using semiempirical potentials

The polarizability and intermolecular potential of C₆₀

Z. Gamba

An intermolecular potential model of C₆₀ that includes repulsive, dispersive and coulombic terms is proposed. The repulsive and dispersive terms are represented by one simple Lennard-Jones (LJ) interaction site that gives account of the almost spherical form of this molecule. The deviations of its spherical form are fully given by the coulombic interactions. A model of distributed polarizable dipoles that reproduce the ab initio electrostatic multipolar moment and polarizability of C₆₀ molecule is proposed. The configurational energy, main molecular orientation and several barriers to reorientational motion of low temperature C₆₀ crystals are well reproduced.

Phys. Rev B 57 (1998) 1402.

The ordered, orientationally disordered and glassy crystalline phases of P₄S₃

D. Bougeard¹ and Z. Gamba

The phase diagram of P₄S₃ crystals is studied by a series of constant pressure molecular dynamics simulations at several temperatures and zero pressure. The weak van der Waals intermolecular interaction forces are represented by a simple atom-atom semiempirical model. The calculations reproduce the experimental data on ordered α -P₄S₃ below 300 K, but also show the possible existence of a polymorph α -P₄S₃. The structure and dynamical properties of orientationally disordered β -P₄S₃ are predicted. This work stresses the need of further experimental data in order to improve the potential model as well as clarify the issue of a possible new phase.

* *Mol. Phys.* 94 (1998) 815.

¹LASIR, Université de Sciences et Technologies de Lille, Bat. C5, 59655, Villeneuve D'Asq, France.

The ordered and orientationally disordered crystalline phases of the flexible C₄F₈ molecule

Z. Gamba and B. M. Powell¹

There is ample experimental evidence for the existence of several crystalline phases of C₄F₈, although they still have been not clearly identified. In this paper we report a series of molecular dynamics (MD) simulations using a partially flexible molecular model, which takes into account the mixing of the low frequency intramolecular

modes and lattice modes. The calculations are carried out at constant pressure and constant temperature and the algorithm employed allows for volume and symmetry changes of the MD sample as a function of thermodynamic variables. Although several stable crystalline phases are found, their number is still less than determined by experiments.

* *J. Chem. Phys.* in press (1999).

¹B. M. Powell, National Research Council of Canada, Steacie Institute for Molecular Sciences, Neutron Program for Materials Research, Chalk River Labs. Canada

Test of a simple and flexible molecule model for α , β and γ -S₈ crystals

C. Pastorino and Z. Gamba

S₈ is the most stable compound of elemental sulfur in solid and liquid phases, at ambient pressure and below 400K. Three crystalline phases of S₈ have been clearly identified in this range of thermodynamic parameters, although no calculation of its phase diagram has been performed yet. α - and γ -S₈ are orientationally ordered crystals while β -S₈ is measured as orientationally disordered. In this paper we analyze the phase diagram of S₈ crystals, as given by a simple and flexible molecule model, via a series of molecular dynamics (MD) simulations. The calculations are performed in the constant pressure-constant temperature ensemble, using an algorithm that is able to reproduce structural phase transitions.

* *J. Phys. Chem.* in press (1999)

Test of a simple and flexible S₈ model molecule in α -S₈ crystals

C. Pastorino and Z. Gamba

α -S₈ is the most stable crystalline form, at ambient pressure and temperature (STP), of elemental sulfur. In this paper we analyze the zero pressure low temperature part of the phase diagram of this crystal, in order to test a simple and flexible model molecule. The calculations consist in a series of molecular dynamics (MD) simulations, performed in the constant pressure-constant temperature ensemble. Our calculations show that this model, that gives good results for three crystalline phases at STP and T_{sim}>300K, fails at low temperatures, predicting a structural phase transition at 200K where there should be none.

* Submitted to *Chem. Phys. Lett.* (1999)

Cobalt impurities on noble metal surfaces

Mariana Weissmann, Andrés Saúl¹, Ana María Llois, and Javier Guevara

First principles calculations, based on the local spin density approximation, are performed for cobalt atoms deposited on noble metal surfaces. The local density of states at the cobalt site shows a narrow peak at the Fermi energy, which is of minority spin and d character. The d orbital of $m = 0$ symmetry, which must be mostly responsible for tunneling conductance from this surface site, makes a substantial contribution at E_F . Due to hybridization the same peak also appears, but reduced, at neighbor atoms. This result can be used for the interpretation of recent cryogenic scanning tunneling microscopy experiments.

¹ Centre de Recherche sur les Mécanismes de la Croissance Cristalline, CNRS, France

Model Hamiltonian for the conductivity oscillations of magnetic multilayers

Miguel Kiwi¹, Ana María Llois, Ricardo Ramírez¹, and Mariana Weissmann

The behavior of the electrical conductivity as a function of layer thickness of the superlattice systems Ni/Co, Ni/Cu and Pd/Ag is studied. Experimentally an oscillatory dependence was found for the first two, while the latter exhibited a monotonous behavior. In our calculations we find that, in these superlattices, the current is carried by the sp -character electrons, which are quite insensitive to the interfaces. To interpret the experimentally observed resistivity oscillations we suggest a scattering mechanism of these carriers against d -character quantum well states that are present in only one of the superlattice materials, when the well state energy is close to E_F .

¹ Facultad de Física, Pontificia Universidad Católica de Chile

On the magnetic contribution to the segregation energies in magnetic-nonmagnetic systems

Andrés Saúl¹ and Mariana Weissmann

The segregation energy of magnetic materials (Fe, Co, Ni) embedded in some nonmagnetic hosts (Pd, Ag, Cu) is calculated using an approximate procedure based on ab-initio calculations of three dimensional periodic systems, performed in the spin polarized and paramagnetic states. Slabs with full layers of magnetic impurities or with ordered alloy layers are considered, separated by sufficient empty space so as to simulate free surfaces. We

find that the considered magnetic atoms always prefer to lie embedded in the host metal and not to be located at the surfaces (positive segregation energy). The ferromagnetic state has a systematically lower segregation energy than the paramagnetic state, but never so much as to change its sign. The resulting energies are compared to a simple Ising Model, whose parameters are the surface energies of the pure constituents and the effective pair interaction, that give the tendency of the alloy to phase separate. We found that a better agreement with the ab-initio segregation energies is found if we assume an enhancement of the effective pair interaction at the surface.

¹ Centre de Recherche sur les Mécanismes de la Croissance Cristalline, CNRS, France

Tight-binding molecular dynamics study of amorphous carbon deposits over silicon surfaces

Chu-Chun Fu and Mariana Weissmann

We report in this paper a procedure to simulate the deposit of carbon diamond-like films over the Si(001) surface. We use the method of tight-binding molecular dynamics and well known transferable C-C and Si-Si interactions. We propose for the Si-C interaction a weighted average of them and test it by studying crystalline SiC, the molecule SiC, some small mixed clusters and the surfaces of β SiC(001).

The first results of the deposition simulation are presented, showing the characteristics of the thin mixed interface layer, with a low carbon concentration.

Structural evolution of free Co cluster magnetism

J. Guevara and Ana María Llois, F. Aguilera-Granja¹ and J.M. Montejano-Carrizales¹

We present a systematic study of the average magnetic moments of free CO_N clusters having different geometry: hexahedral, decahedral and octahedral. The spin polarized electronic structure is calculated with a parameterized Hubbard Hamiltonian with spd electrons within the unrestricted Hartree-Fock approximation, and spillover effects are considered.

We compare with our calculations with other theoretical calculations in the literature, we also comment the experimental results.

¹ Instituto de Física, "Manuel Sandoval Vallarta", Universidad Autónoma de San Luis Potosí, México.

Large variations in the magnetization of Co clusters induced by noble metal coating

Javier Guevara, Ana Maria Llois and Mariana Weissmann

We report calculations of the electronic and magnetic properties of small Co clusters, coated with Ag or Cu, performed with a parametrized tight-binding method. For a given number of Co atoms in a cluster we obtain a large range of magnetization values, depending on the size and shape of the coating. The noble metal develops a net polarization that changes appreciably the total magnetic moment of the cluster. This result is reinforced by ab-initio calculations for Co slabs, where the corrugation of a non magnetic covering also produces important variations in the total magnetic moment.

Magnetic structure of small Fe-Ni clusters: calculations in the Ni rich region

Javier Guevara, and Ana María Llois

Small clusters present many novel properties absent in bulk materials. One of the most relevant features of small transition metal systems is their magnetic behavior. Monoatomic clusters show a magnetic moment per atom larger than the in the bulk. However, Fe-Ni clusters have experimentally a lower magnetization than the corresponding bulk alloy values. In this contribution we calculate electronic and magnetic structure of $\text{Fe}_{1-x}\text{Ni}_x$ clusters, for $x > .5$. We find ferro- and antiferromagnetic self-consistent solutions, in the antiferro solutions the Fe atoms are antiferromagnetically aligned among themselves, while the Ni atoms have a lower local magnetization than in the bulk.

On the metallic behavior of Co clusters

F. Aguilera-Granja¹ and J.M. Montejano-Carrizales¹ J. Guevara and Ana Maria Llois

The nonmetal-metal transition in free Co_N clusters is studied by using a parameterized Hubbard Hamiltonian with s , p and d electrons within the unrestricted Hartree-Fock approximation considering spillover effects. The non-metal-metal transition occurs when the density of states at the Fermi level exceeds $1/k_B T$ and the discrete energy levels begin to form a quasi-continuous band. The role of the cluster structure in the nonmetal-metal is investigated by performing calculations for different geometries: hexahedral, octahedral and decahedral. We found that the metallic behavior in

small clusters ($N \leq 40$) is strongly related with the geometrical structure of the cluster. We compare our calculations with Friedel's model and comment on the experimental results base on the Ionization Potential measurements.

¹ Instituto de Física, "Manuel Sandoval Vallarta" Universidad Autónoma de San Luis Potosí, México

Spin-flip contribution to the conductivity of magnetic multilayers

Ricardo Gomez Abal, Ana María Llois, and Mariana Weissmann

The conductivity of magnetic multilayers is calculated within the semiclassical approximation. The band structure is obtained with a tight-binding Hubbard Hamiltonian solved in the Hartree-Fock approximation. Once self-consistency is reached, the spin-orbit coupling term is added and a further diagonalization is performed. As it is well known, quantum well states appear in the band structure of superlattices. By calculating the conductivity as a function of the Fermi energy we find that there is a considerable influence of these quantum well states if their energy is close to the Fermi level when the spin-orbit coupling is taken into account.

Self-organization, resources and strategies in a minority game

Horacio Ceva

We find that the existence of self-organization of the members of a recently proposed minority game depends on the type of update rules used. The resulting resource distribution is studied in some detail, and a related strategy scheme is considered, as a tool to improve the understanding of the model.

* To be published in *Physica A*

On the asymptotic behavior of an earthquake model

Horacio Ceva

We present evidence showing that there are important differences in the relaxation times associated with different aspects of the model of Olami, Feder and Christensen. The asymptotic behavior is characterized by a critical exponent that is independent of α , the degree of conservation of the model. The analysis of temporal series of avalanches gives helpful information to study the approach to self-organized criticality, and to put in evidence any quasi-periodic evolution.

* *Physics Letters A* 245 (1998) 413

Hybrid quantum and classical mechanical Monte Carlo simulations of the interaction of Hydrogen Chloride with solid water clusters

Dario A. Estrin¹, Jorge Kohanoff², Daniel H. Laria^{1,3}, Ruben O. Weht.

Monte Carlo simulations using a hybrid quantum and classical mechanical potential were performed for crystal and amorphous-like HCl–water(n) clusters. The subsystem composed by HCl and one water molecule was treated within Density Functional Theory, and a classical force field was used for the rest of the system. Simulations performed at 200 K suggest that the energetic feasibility of HCl dissociation strongly depends on its initial placement within the cluster. An important degree of ionization occurs only if HCl is incorporated into the surface. We observe that local melting does not play a crucial role in the ionization process.

* *Chemical Physics Letters* 280 (1997) 280.

¹ Department of Chemistry, UBA

² ICTP, Trieste, Italy.

³ Department of Chemistry, CNEA.

Correlations in the sand pile model: from the log-normal distribution to self-organized criticality.

Horacio Ceva and Javier Luzuriaga

We have studied the approach of the abelian sand pile model towards the stationary, self-organized criticality state. The uncorrelated limit is shown both numerically and by a simple analysis to follow the log-Normal distribution. We introduce and evaluate several correlation functions to study the correlated region.

* *Physics Letters A* 250 (1998) 275

An ab initio path integral Monte Carlo simulation method for molecules and clusters: application to Li₄ and Li₅⁺

Ruben O. Weht, Jorge Kohanoff¹, Dario A. Estrin², Charusita Chakravarty^{1,3}

A novel method for simulating the statistical mechanics of molecular systems in which both nuclear and electronic degrees of freedom are treated quantum mechanically is presented. The scheme combines a path integral description of the nuclear variables with a first-principles adiabatic description of the electronic structure. The electronic problem is solved for the ground state

within a density functional approach, with the electronic orbitals expanded in a localized (Gaussian) basis set. The discretized path integral is computed by a Metropolis Monte Carlo sampling technique on the normal modes of the isomorphic ring-polymer. An effective short-time action correct to order τ^4 is used. The validity and performance of the method are tested in two small Lithium clusters, namely Li₄ and Li₅⁺. Structural and electronic properties computed within this fully quantum-mechanical scheme are presented and compared to those obtained within the classical nuclei approximation. Quantum delocalization effects are significant but tunneling turns out to be irrelevant at low temperatures.

* *Journal of Chemical Physics* 108 (1998) 888.

¹ ICTP, Trieste, Italy.

² Department of Chemistry, UBA.

³ Department of Chemistry, Indian Institute of Technology.

Extended moment formation and second neighbor coupling in Li₂CuO₂

Ruben Weht, W.E. Pickett¹

Comprised of ferromagnetic edge-sharing CuO₂ chains that order in antialigned fashion at T_N=9 K, Li₂CuO₂ is found from local spin density calculations to display several surprising characteristics: (1) the ordered moment/f.u. of 0.92 μ_B is the largest for any low dimensional cuprate system, in agreement with experiment, (2) 40% of this moment lies on the neighboring O ions, making it the largest oxygen moment yet reported, and (3) the second neighbors couplings are larger than nearest neighbors couplings. All of these phenomena arise naturally due to a well defined effective d_{yz} type orbital that includes very strong O p σ character. We interpret the large moment as surviving reduction by quantum fluctuations due to extension caused by the d-p hybridization.

* *Physical Review Letters* 81 (1998) 2502.

¹ Department of Physics, University of California, Davis, USA.

Excitonic correlations in the intermetallic Fe₂VAl

Ruben Weht and W.E. Pickett¹

The intermetallic compound Fe₂VAl looks non-metallic in transport and strongly metallic in thermodynamic and photoemission data. It has in its band structure a highly differentiated set of valence and conduction bands leading to a semimetallic system with a very low density of

carriers. The pseudogap itself is due to interaction of Al states with the d orbitals of Fe and V, but the resulting carriers have little Al character. The effects of generalized gradient corrections to the local density band structure as well spin-orbit coupling are shown to be significant, reducing the carrier density by a factor of three. Doping of this nonmagnetic compound by 0.5 electrons per cell in a virtual crystal fashion results in a moment of 0.5 bohr magnetons and destroys the pseudogap. We assess the tendencies toward formation of an excitonic condensate and toward an excitonic Wigner crystal, and find both to be unlikely. We propose a model in which the observed properties result from excitonic correlations arising from two interpenetrating lattices of distinctive electrons (e_g on V) and holes (t_{2g} on Fe) of low density (one carrier of each sign per 350 formula units).

* *Physical Review B* **58** (1998) 6855.

¹ Department of Physics, University of California, Davis, USA.

Half-metallic ferrimagnetism in Mn_2VAl

Ruben Weht and Warren E. Pickett¹

We show that Mn_2VAl a compound for which the generalized gradient approximation (GGA) to the exchange-correlation functional in density functional theory makes a qualitative change in predicted behavior compared to the usual local density approximation (LDA). Application of GGA leads to prediction of Mn_2VAl being a half-metallic ferrimagnet, with the minority channel being the conducting one. The electronic and magnetic structure is analyzed and contrasted with the isostructural enhanced semimetal Fe_2VAl .

* *Physical Review B* **60** (1999) 13006.

¹ Department of Physics, University of California, Davis, USA.

Electron doping in the honeycomb bilayer superconductors $(Zr,Hf)NCl$

Ruben Weht, Alessio Filippetti¹ and Warren E. Pickett¹

Based on a virtual crystal treatment, we show that alkali doping introduces electron carriers into a single light mass ($m^* = 0.6$), low density of states band in Li_xZrNCl and Na_xHfNCl (which have superconducting T_c up to 25 K) that is a symmetric interlayer combination of d_{xy} , $d_{x^2-y^2}$ character. Doping leads to simple K-centered three-fold symmetrical cylindrical Fermi surfaces that concentrate low energy scattering into distinct regions of momentum. The lack of any observed magnetic tendencies, together with our calculation

of small electron-phonon strength, suggests a pairing mechanism that is distinct from known superconductors.

* *Europhysics Letters* **48** (1999) 320.

¹ Department of Physics, University of California, Davis, USA.

Superconductivity in ferromagnetic $RuSr_2GdCu_2O_8$

W. E. Pickett¹, Ruben Weht and A. B. Shick¹

Relying on the inhomogeneous (layered) crystal, electronic, and magnetic structure, we show how superconductivity can coexist with the ferromagnetic phase of $RuSr_2GdCu_2O_8$ as observed by Tallon and coworkers. Since the Cu $d_{x^2-y^2}$ orbitals couple only to apical O p_x , p_y orbitals (and only weakly), which also couple only weakly to the magnetic Ru t_{2g} orbitals, there is sufficiently weak exchange splitting, especially of the symmetric CuO_2 bilayer Fermi surface, to allow singlet pairing. The exchange splitting is calculated to be large enough that the superconducting order parameter may be of the Fulde-Ferrell-Larkin-Ovchinnikov type. We also note that π -phase formation is preferred by the magnetic characteristics of $RuSr_2GdCu_2O_8$.

* *Physical Review Letters* **83** (1999) 3713.

¹ Department of Physics, University of California, Davis, USA.

Modulated phases in Ising lattices. Phase diagrams in the mean field approximation.

Vittorio Massida

Order-disorder transitions of Ising systems are studied in the mean-field approximation. Depending on the value of the interaction constants (J_i) between different sites, at intermediate temperatures these systems have a spatially modulated disorder. We applied the formalism to binary alloys and to magnetic systems with interactions up to third-nearest neighbours, investigating the dependence of the modulation wavelength on the temperature and on the J_i 's.

Mössbauer spectra of intermolecular Fe in L-Alanine

D. Rodríguez Sierra, E. Winkler¹, C. Saragovi and C. Fainstein¹

Crystals of nominal 4%Fe:L-alanine have been grown from aqueous solution, introducing Fe as ferric nitrate. Mössbauer spectra of the powdered

crystals were obtained at 295K and 15K. The spectra were fitted with quadrupolar distributions, two at 295K, and three at 15K. For both temperatures, the found IS values indicate that Fe is in a state of charge 3+. Results of experimental EFG values are compared with calculations carried out for Fe at a possible site in the lattice. The spectra at both temperatures is discussed in terms of dynamic effects.

* *Hyperfine Interactions C 3 (1998) 65.*

¹ CAB - CNEA and Instituto Balseiro, Argentina

Evaluation of pyrophosphate-extractable Fe from each horizon of an Argentinian soil profile

A. Mijovilovich, C. Saragovi, S.G. Acebal¹, E.H. Rueda¹ and M.E. Aguirre²

Sodium pyrophosphate (0.1M, pH10) is commonly used to extract iron and aluminium from soil organic complexes, but there is evidence that in some soils it also extracts non-organic forms. A Mössbauer study of the effect of Na-pyrophosphate treatment on the Fe extraction on a Mollisol (< 50µm fraction) from Bahía Blanca, Argentina is presented. Samples from different horizons, A_p, A₁, AC and C_k, were measured before and after treatment.. Spectra were fitted using two doublets and two sextets distributions. From the areas results, the variation of the Fe content with depth is discussed. Comparison with the obtained chemical data is made.

* *Hyperfine Interactions C 3 (1998) 336.*

¹ Department of Chemistry and Chemical Engineering, Universidad Nacional del Sur - Bahía Blanca, Argentina.

² Department of Agronomy - Universidad Nacional del Sur- Bahía Blanca, Argentina.

Magnetic and Mössbauer experiments on disperse hematite nanoparticles

R. D. Zysler^a, C. Arciprete^a, M. Dimitrijewits^a, C. Saragovi and J. M. Greneche^b

Nanoparticles of hematite with sizes comprised in the range 4-5 nm were prepared and dispersed in a non-magnetic polymer matrix. Magnetic studies and Mössbauer measurements were performed on three samples with following concentrations: 10%, 1%, 0.1% wt, respectively, in order to follow the influence of the interparticle interactions. The magnetic studies show a maximum in the DC magnetization as a function of the temperature measured under zero-field cooling (ZFC) at T_m=16K. This maximum was associated to the blocking of the nanoparticles magnetic moment. First series of Mössbauer spectra were performed at

300K and 15K. The obtained results were presented and discussed.

* *Hyperfine Interactions C 3 (1998) 33.*

^a CAB - CNEA and Instituto Balseiro.

^b Laboratoire de Physique de l'Etat Condensé, Le Mans Cedex 9, France

Magnetic fraction of an ultisol from Misiones, Argentina

A. Mijovilovich, H. Morrás (1), C. Saragovi, G. Santana(2) and J.D. Fabris (2)

The magnetic fractions of the B1 horizon from three profiles of a subtropical soil derived from a basaltic rock from Misiones Argentina were studied. The samples were separated by particle size into their sand, silt and clay fractions. Magnetic concentrates of sand and silt were extracted with a hand magnet. Measurements by XRD and Mössbauer spectroscopy and of saturation magnetization were performed. The results indicate the presence of large amounts of hematite and magnetite, but maghemite is very likely also present. To contrast other results on soils of neighbouring areas, magnetite appears pedogenetically stable in this environment.

* *Hyperfine Interactions C 3 (1998) 332.*

(1) INTA-CIRN, Castelar, Argentina.(2) Dept of Chemistry, UFMG, Belo Horizonte, MG, Brazil

Magnetic interaction evidence in α-Fe₂O₃ nanoparticles by magnetization and Mössbauer measurements

M. Vasquez-Mansilla¹, R. D. Zysler¹, C. Arciprete¹, M.I. Dimitrijewits¹, C. Saragovi and J. M. Greneche²

Magnetic properties of α-Fe₂O₃ antiferromagnetic particles of 5 nm mean diameter prepared by sol-gel method were investigated by means of static magnetic measurements and 57Fe Mössbauer spectrometry. The large magnetic moment as well as the anisotropy energy are attributed to the lack of compensation of the antiferromagnetic arrangement essentially located at the surfaces. Zero-field and in-field Mössbauer experiments reveal the existence of magnetic interaction among antiferromagnetic nanoparticles in the sample with higher particle concentration and established the presence of a 2 atomic thick surface magnetic layer estimated from a core-shell model.

* *J. Magnetism and Magnetic Materials 204 (1999) 29*

¹ CAB - CNEA.

² Laboratoire de Physique de l'Etat Condensé, Université du Maine, France

Mössbauer spectroscopy of the Zr-rich region in Zr-Nb-Fe Alloys with low Nb contents

C. Ramos¹, C. Saragovi, M. Granovsky² and D. Arias²

Intermetallic phases and solid solutions in the Zr-rich region of the Zr-Nb-Fe system with low Nb content are studied by Mössbauer Spectroscopy complemented with X-ray diffraction, optical and scanning electron microscopy and electron microprobe analysis.

The phases found in each sample were those expected from the corresponding binary Zr-Fe system. Furthermore, one of the samples showed a ternary cubic Ti₂Ni type phase with a similar stoichiometry to the tetragonal Zr₂Fe compound. Mössbauer parameters were suggested to this phase [IS: -0.12 mm/s, QS: 0.30 mm/s], to the bcc Zr(β) phase [IS: (-0.11±0.01) mm/s, QS: (0.23±0.02) mm/s] and to the hcp Zr(β^T) phase [IS: (-0.24±0.02) mm/s, QS: (0.45±0.02) mm/s].

* *Hyperfine interactions* 122 (1999) 201.

¹ FCEyN, UBA

² Departamento de Materiales, CNEA

Mössbauer study of the Fe mineralogy in two different argentine soils

A. Mijovilovich, H. Morrás(1) , H. Causevic (2) and C. Saragovi.

Two Argentine featuring different characteristics and compositions (Mollisols and Ultisols) have been studied by Mössbauer Spectroscopy and X-ray diffraction. The first type has a weakly developed profile with a solum thickness of 40cm; the Fe oxyhydroxides are present in low concentrations in mixtures with other slightly weathered minerals (e.g. quartz, feldspars, 2:1 phyllosilicates, etc). The second one is a Typic Kandihumult, which is a highly weathered red coloured, deep soil. The Fe oxyhydroxides are abundant, mixtured mainly with kaolinite clay minerals. Analyses of iron mineralogy show hematite and goethite in both soils. Their ratio is low in the first case and high in the last case. Magnetite-maghemite are also present in both situations, but in the Mollisol their content is much lower than in the Ultisol. The mineralogy found is related to the different lithological characteristics and processes of pedological evolution on both soils.

* *Hyperfine Interactions* 122 (1999) 83.

(1) Instituto de Suelos, INTA-CIRN Argentina.

(2) FCEyN, UBA.

Iron oxide mineralogy of a mollisol from Argentina by selective dissolution techniques, X-ray diffraction and Mössbauer spectroscopy

Silvia G. Acebal (1), Ana Mijovilovich, Elsa. H. Rueda (1), María. E. Aguirre (2) and Celia Saragovi.

Selective dissolution techniques using ammonium oxalate (OX), DCB and D-EDTA together with X-Ray diffraction and Mössbauer spectroscopy are applied to identify and characterize iron oxides and oxyhydroxides in the <2 mm, <50 μm and <2 μm fractions of a Mollisol from Bahía Blanca, Argentina. Iron compounds are present at low concentrations in mixtures with other main minerals, such as quartz, illite-montmorillonite, etc. Total Fe and Al content increase as soil particle size decreases, from 4.3 and 13.3 wt. % in <2 mm fraction to 8.5 and 22.8 wt. % in clay fraction respectively. No more than 25% - 30% of the total Fe is associated with crystalline and amorphous Fe oxides. Hematite and goethite are identified in the different fractions, both small sized and/or of low crystallinity and Al substituted. Crystalline magnetite-maghemite are scarce. These Fe compounds are probably coating coarser particles. In all fractions, the efficiency for Fe removal is highest for the D-EDTA treatment whereas for the OX is the least, regardless of particles size. The opposite is true for Al removal. OX-extracted amorphous oxides are only present in coarser fractions. DCB and D-EDTA-extracted amorphous and crystalline oxides are present in coarser fractions disappearing completely only in the clay fraction. In illite, DCB treatment dissolves Fe and Al hydroxy interlayers while D-EDTA does not.

* *Clays and Clay Minerals* (1999).

(1) Departamento de Química e Ingeniería Química. Universidad Nacional del Sur. - Bahía Blanca, Argentina.

(2) Departamento of Agronomía Universidad Nacional del Sur - Bahía Blanca, Argentina.

Solar Energy

The Solar Energy Group (GES) performs research and development activities related with photovoltaic solar energy conversion. Main tasks are design, simulation, elaboration and characterization of crystalline silicon devices (solar cells and modules) for space and terrestrial applications. During 1997, solar cells based on monocrystalline Czochralski silicon and with 17% conversion efficiency were obtained.

The development of solar devices for space applications begun by the end of 1995, within the frame of a cooperation agreement between this National Atomic Energy Commission (CNEA) and the National Commission of Space Activities (CONAE). Activities in this field include: test of solar devices in argentine satellites, radiation damage experiments in Earth and development of characterization techniques. The main goal in the mean-range is to set up fabrication techniques for space solar modules, in order to supply in the future the power requirements (totally or partially) of missions programmed in the National Space Plan.

On December 14th 1998, the Endeavour space shuttle launched the argentine satellite SAC-A at 410 km height. This satellite performed the first experiment of argentine silicon solar cells in space including: (i) 2 panels with 7 solar cells each, to analyze the cells performance in the space environment; (ii) 4 single cells plus 1 cell in each panel, for the determination of the angular position of the satellite, being a fundamental part of the orientation subsystem of SAC-A. Telemetry showed the correct performance of all these cells during the whole mission. In parallel, several theoretical and experimental studies of radiation damage produced by 10 MeV protons were performed in Earth. Moreover, appropriate electrical and electronic characterization techniques and equipment have been developed.

For terrestrial applications, the GES promotes and participates in the establishment of national standards for solar energy systems in the frame of the Argentine Institute for Standards (IRAM). Between 1997 and 1999, 11 standards for photovoltaic modules were established.

The GES begun the development of low cost solar radiation sensors (pyranometers) based on photovoltaic cells. During 1999 two prototypes were tested and calibrated by the National Meteorological Service.

Research activities related with the deposition and characterization of thin films (InP, CdTe, YBaCuO) for solar cells, gas sensors and superconductors, are also performed in collaboration with other institutions. In particular, the GES has participated in the installation in Argentina of a Laser ablation system for thin film growing.

Since 1998, the GES participates in the development of SnO₂ thin film micromachined solid state gas sensors in collaboration with LAMEL Institute of the CNR (Italy) and with CITEFA (Argentina). A NO₂ selective gas sensor in the ppm range has been developed and is being tested in an electronic nose in collaboration with INQUIMAE (Facultad de Ciencias Exactas y Naturales-Universidad de Buenos Aires).

Elaboration and characterization of crystalline silicon solar cells and panels for testing in the argentine satellite SAC-A

C.G. Bolzi, L.M. Merino, M.J.L. Tamasi, J.C. Plá, J.C. Durán, C.J. Bruno, E.M. Godfrin, A. Lamagna, M.P. Barrera^a and L.B. Quintero^a

A set of photovoltaic cells and panels has been elaborated and integrated into the argentine satellite SAC-A. Elaboration processes include fabrication of the cells, interconnection and integration of the panels. The solar cells have been electrically characterized before and after the integration of the panels. This is the first time that solar devices fabricated in Argentina are tested in space. Six cells are used as solar sensors for the determination of

the angular position of the satellite, while two panels (seven cells each) are applied for the analysis of the electrical performance of the cells during the mission. Experiments of radiation damage produced by protons and neutrons in laboratory facilities have also been performed.

** Avances en Energías Renovables y Medio Ambiente 1 (2), 1 (1997).*

^a Under-graduate students, University of Buenos Aires.

Design, elaboration and characterization of crystalline silicon solar cells with textured surface

J.C. Plá, E.M. Godfrin and J.C. Durán

The development of crystalline silicon solar cells with random texture plus a SiO₂ layer as

antireflecting technique is presented. The antireflecting performance of the surface is analyzed in detail; the oxide thickness is optimized in order to maximize the electric response of the cell. Moreover, the appropriate parameters for growing the SiO_2 are determined. A brief description of the whole process is also included: SiO_2 growing, used as a mask for the definition of the active area of the device; n^+p and pp^+ junctions generation with simultaneous growing of a SiO_2 layer, which passivates the surface and contributes to the antireflecting characteristic; deposition of the front contact grid by means of a photolithographic technique. The current-voltage curve of the best device obtained, which has an efficiency larger than 17%, is shown.

* *Energías Renovables y Medio Ambiente* 4, 1 (1998).

Comparison of different simple fabrication processes for high efficiency silicon solar cells

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

Two simple fabrication processes for high efficiency crystalline silicon solar cells, proposed in the literature during the last years, are analyzed and compared, essentially in what concerns to the diffusion and drive-in steps. Both use $POCl_3$ liquid source for n^+ doping. Alternative processes are also proposed. The influence of the concentration of $POCl_3$ during the predeposition step on the repeatability of the wafers sheet resistance is evaluated. The thickness of the passivating SiO_2 layers grown during the diffusion process for different techniques are also presented. Techniques to produce devices with a thin SiO_2 film, appropriate as a passivation interface but not interfering with a more sophisticated antireflecting coating, are proposed and analyzed. Several n^+pp^+ silicon solar cells were fabricated on Czochralski p -type wafers using the processes previously analyzed. Characterisation of the final devices is given.

* *Proc. Second World Conference on Photovoltaic Energy Conversion, Vienna, Austria, p. 1874 (1998).*

Ray tracing vs. electromagnetic methods in the analysis of antireflective textured surfaces: a first approach

J.C. Plá, J.C. Durán, D.C. Skigin^a and R.A. Depine^a

We investigate the validity of the ray optics approach for the analysis of antireflecting structures used in photovoltaic solar cells. The antireflecting

structure is simulated by a periodic grating with triangular profile and the reflected fields are calculated using two methods: one based on the ray optics approach and the other based on rigorous electromagnetic theory. As a first approach to the real problem, we consider a perfect conductive media. The parameter used for the characterisation of the problem is the wavelength to period ratio λ/d . The theoretical analysis presented here shows important discrepancies between the results obtained using the ray tracing approximation and those obtained using a rigorous electromagnetic method, even for small values of λ/d (of the order of 0.1) for which the geometrical optics approach is usually expected to hold.

* *Optik* 107, 141 (1998).

^a Grupo de Electromagnetismo Aplicado, Dpto. Física, Fac.de Ciencias Exactas y Naturales, Universidad de Buenos Aires

Determination of minority carrier lifetime in solar cells: a novel biased OCVD technique

C.J. Bruno, M.G. Martínez Bogado, J.C. Plá and J.C. Durán

A new simple method for the determination of the minority carrier lifetime (τ), based on a biased open circuit voltage decay (OCVD) technique, is analyzed. In this case the excitation is given by a pulsed light source (time dependent contribution) added to a continuous background illumination (continuous forward bias). Under appropriate conditions this configuration produces an exponential voltage decay with a time constant which depends on the bias. This constant tends to an effective lifetime for the base region for large values of the bias voltage (typically, 400-500 mV).

An inexpensive equipment has been developed. Measurements have been made on several crystalline silicon solar cells and on one high efficiency float zone silicon solar cell. Experimental results show good agreement with the theoretical model presented and with numerical PC-1D simulations.

* *Physica Status Solidi (a)* 174, 231 (1999).

Short circuit current vs. cell thickness in solar cells under rear illumination: a direct evaluation of diffusion length

J.C.Plá, M.J.L. Tamasi, C.G.Bolzi, G.L.Venier and J.C.Durán

The dependence of the short circuit current of a solar cell with its thickness is analysed for rear illumination. Under certain conditions, a simple

linear regression in a semilogarithm scale is found. Using these results, an almost direct evaluation of the minority carrier diffusion length in the base region of crystalline silicon solar cells is achieved. For the other hand, from the experimental point of view, monochromatic light is not required and the equipment requirements are minimised. The model presented in this paper is theoretically evaluated using a 1-dimensional simulation code. Some preliminary experimental results are also shown.

* *Solid State Electronics*, in press (1999).

Construction and testing of low cost photovoltaic pyranometers developed in the Argentine National Atomic Energy Commission (CNEA)

C.G. Bolzi, J.C. Durán, O. Dursi^a, G. Renzini^a and H. Grossi Gallegos^a

Pyranometers based on crystalline silicon photovoltaic cells were constructed using two kinds of cover-glasses (transparent and burnished glass). The angular response, from normal incidence till 90° incidence angle, was measured and compared to the cosine law. The performance of the pyranometers have been studied under actual operating conditions in the open air. They were calibrated towards a precision thermoelectric pyranometer. Both daily and hourly integrals were analyzed. The linear regression used for the determination of the daily mean calibration constant gave rise to a determination coefficient of 0.99, similar to values obtained for commercial photovoltaic pyranometers.

* *Avances en Energías Renovables y Medio Ambiente 3 (1)*, 04.29 (1999).

^a Red Solarimétrica, Servicio Meteorológico Nacional, San Miguel, Argentina.

First experiment of argentine solar cells in space: preliminary analysis of the performance

E.M. Godfrin, M.G. Martínez Bogado^a, M.J.L. Tamasi and J.C. Durán

A preliminary evaluation of the electrical performance of the argentine solar devices mounted on the scientific applications satellite SAC-A has been accomplished. SAC-A was launched on December 1998 and has been in orbit till October 1999. Telemetry data include electrical measurements (e.g., open circuit voltage and short circuit current) and operation temperature of solar devices. Electrical characteristics of solar cells as a function of time for few orbits are presented and its dependence on the operation temperature is

analyzed. Open circuit voltage data show good linear correlation with temperature, in good agreement with theoretical simulations. On the other hand, the short circuit current has a more complicated characteristic as a function of temperature, due to the influence of the solar radiation reflected on the Earth. The evolution of the electrical performance of the cells during the mission is evaluated in order to estimate degradation associated with radiation damage.

* *Avances en Energías Renovables y Medio Ambiente 3 (1)*, 04.25 (1999).

^a Fellowship of the Agencia Nacional de Promoción Científica y Tecnológica (ANPCyT).

Pulsed laser deposition of Al₂O₃ thin film on Si

A.Lamagna, S. Duhalde¹, L.Correra² y S. Nicoletti²

Al₂O₃ thin films were fabricated by pulsed laser deposition (PLD) on Si₃N₄/Si, to improve the thermal and electrical isolation of gas sensing devices. The microstructure of the films is analyzed as a function of the deposition conditions (laser fluence, oxygen pressure, target-substrate distance and substrate temperature). X-ray analysis shows that only a sharp peak that coincides with the corundum (116) reflection can be observed in all the films. But, when they are annealed at temperatures above 1200°C, a change in the crystalline structure of some films occurs. The stoichiometry and morphology of the films with and without thermal treatment are compared using environmental scanning electron microscopy (ESEM) and EDAX analysis.

¹ Departamento de Física, Facultad de Ingeniería, Universidad de Buenos Aires, Paseo Colón 850, 1063 Buenos Aires, Argentina.

² Instituto LAMEL-CNR, Via Gobetti 101, 40129, Bologna, Italia.

Identification of pollutant gases with a multisensorial arrange

R.M.Negri¹, S.Reich², D.Fernandez¹, A-C. Romain³, J. Nicolas³, A. Lamagna and L. Dori⁴

The measurement of low concentrations of NO₂ and CO in air atmosphere with solid state gas sensors cannot be carried out with a unique sensor, due to the concurrent reactions of the oxidizing NO₂ and the reducing CO, resulting in a near zero output signal. It is well known that the semiconductor metal oxide films as SnO₂ are basically used for the detection of reducing gases, otherwise the phthalocyanines are organic semiconductors with high thermal and chemical stability that have been used as active element for the detection of oxidizing gases.

In this work we show preliminary results of the variation in the performance of 100 nm thick SnO₂ sensors doped with 30 nm of tetra t-Butyl Zinc Phthalocyanine (t-Bu-ZnPc), in order to enhance or at least change the selectivity to NO₂.

¹ INQUIMAE. FCEyN, UBA.

² UNSaM

³ Fondation Universitaire Luxemburgeoise. Belgium.

⁴ CNR-Istituto Lamel. Bologna, Italy.

Thin film CdS/CdTe solar cells prepared by electrodeposition using low cost materials

F.J.Alvarez, N.Di Lalla and A. Lamagna

This article describes the elaboration process of thin films for CdS/CdTe solar cells using low cost materials and a very simple process. The device

structure (SnO₂:F/ /CdS/CdTe/Cu/Au) is deposited on coverglass substrates.

The crystal structure of the films were determined by X-ray diffraction analysis. The surface morphology and microstructure of both films were subsequently characterized using a conventional scanning electron microscopy (SEM) and an atomic force microscopy (AFM). An enlargement of the grain size structure is observed after the thermal annealing.

Finally, the solar cells prepared using this process exhibited a short circuit current density of $J_{sc} = 18 \text{ mA/cm}^2$, open circuit voltage of $V_{oc} = 600 \text{ mV}$ and efficiencies above 5% under AM 1 simulated solar illumination.

Theoretical Physics

Structure and Nuclear Reactions in low and intermediate Energies:

Methods and concepts of field theory and many-body perturbative and variational techniques are applied to the study of nuclear phenomena. In particular it is studied the BRST treatment for collective variables, nuclear deformations and the formation of alpha substructures. In the range of intermediate energies it is studied the electromagnetic structure of the hyperons with solitonic models. Additionally, it is analyzed the density of dark matter of the Universe with models that use different possibilities of weak-interacting particles

Chaos and Complex Systems

It is analyzed the quantum properties of systems that are classically chaotic.

It is studied the semiclassical approximation and the structure of the eigenstates highly excited in bidimensional billiards and quantum maps. The results are applied to the determination of the chaotic effects in nuclear reactions. Additionally, it is started the study of the semiclassical properties of some circuits that can be applied to quantum computation.

Atomic Clusters.

Measurements of absolute inelastic cross-sections corresponding to collisions between electrons of low energy and sodium clusters suggest that the dominant process for the lower energies than the ionization energy, is the capture of the incident electron. That process would produce the temporary formation of a Na anion followed by some mechanism of energy dissipation. Among the probable processes of the anion creation it have been analyzed the inverse photoemission. Within this idea, it has been done theoretical quantum calculations that produce absolute cross-sections. It has been used a hamiltonian that include the interaction of the incident electron with the quantified field of the electromagnetic radiation. Through this interaction, the electron loses a discrete amount of energy and makes a transition from an state of the continuum to a bound state of the cluster, emitting a photon.

Numerical verification of Percival's conjecture in a quantum billiard

Gabriel Carlo, Eduardo Vergini and Alejandro J. Fendrik

In order to verify Percival's conjecture we study a planar billiard in its classical and quantum versions. We provide an evaluation of the nearest neighbour level spacing distribution for the Cassini oval billiard, taking into account relations with classical results. The statistical behaviour of integrable and ergodic systems have been extensively confirmed numerically, but that is not the case for the transition between these two extremes. Our system's classical dynamics undergoes a transition from integrability to chaos by varying a shape parameter. This feature allows us to investigate the spectral fluctuations, comparing numerical results with semiclassical predictions founded on Percival's conjecture. We obtain good *global* agreement with those predictions, in clear contrast with similar

comparisons for other systems found in the literature. The structure of some eigenfunctions, displayed in the quantum Poincaré section, provide a clear explanation of the conjecture.

** Phys. Rev. E 57 (1998) 5397.*

Localized structures embedded in the eigenfunctions of chaotic Hamiltonian systems

E. Vergini and D.A. Wisniacki

We study quantum localization phenomena in chaotic systems with a parameter. The parametric motion of energy levels proceeds without crossing any other and the defined avoided crossings quantify the interaction between states. We propose the elimination of avoided crossings as the natural mechanism to uncover localized structures. We describe an efficient method for the elimination of avoided crossings in chaotic billiards and apply it to the stadium billiard. We find many scars of short periodic orbits revealing the skeleton on which quantum mechanics is built. Moreover, we have

observed strong interaction between similar localized structures.

* *Phys. Rev. E* **58** (1998) R5225.

The influence of phase space localization in the quantum dynamics of a chaotic billiard

D.A. Wisniacki and E. Vergini

The quantum dynamics of a chaotic billiard with moving boundary is considered in this work. We found a perturbative expansion of the Hamiltonian corresponding to a planar billiard in powers of the shape parameter which enables long time evolution of the system. In particular, the dispersion of the energy is studied in the Bunimovich stadium billiard with oscillating boundary. The results showed that the distribution of energy spreads diffusively for the first oscillations of the boundary ($\langle \Delta E^2 \rangle = D t$).

We studied the diffusion constant D as a function of the velocity of the boundary and found differences with theoretical predictions. We showed numerical evidences that such differences are due to localization in phase space.

* *Phys. Rev. E* **59** (1999) 6579.

Quantitative study of scars in the boundary section of the stadium billiard

Fernando P. Simonotti, Eduardo Vergini and Marcos Saraceno

We construct a semiclassically invariant function on the boundary of the billiard, taken as the Poincaré section in Birkhoff coordinates, based on periodic orbit information, as an ansatz for the normal derivative of the eigenfunction. Defining an appropriate scalar product on the section, we can compute the *scar intensity* of a given periodic orbit on an eigenstate, as the overlap between the constructed function and the normal derivative on the section of the eigenstate. In this way, we are able to investigate how periodic orbits scar the spectrum and how a given eigenstate decompose into *scar functions*.

We use this scheme on the Bunimovich stadium.

* *Phys. Rev. E* **56** (1997) 3859.

Boundary contributions to the semiclassical traces of the Baker's map

F. Toscano, R. O. Vallejos and M. Saraceno

We evaluate the leading asymptotic contributions to the traces of the quantum baker's map propagator. Besides the usual Gutzwiller

periodic orbit contribution, we identify boundary paths giving rise to anomalous $\log(h)$ terms. Some examples of these anomalous terms are calculated both numerically and analytically.

* *Nonlinearity* **10** (1997) 965.

Temperature antipairing effect over the energy weighted sum rule and the effective nuclear mass

*E.C. Seva, H.M.Sofia and A.Tonina*¹

We study the temperature dependence of the sum rules using the discontinuity of the first derivative of the Matsubara Green's functions of a bilinear particle-hole operator. Particularly we study the behavior of the dipole particle-hole operator. We applied the calculation to ¹¹⁴Sn, ¹³⁸Ba, ¹⁵⁴Gd and ¹⁷⁰Yb. It is found that the energy weighted sum rule for the dipole operator changes as a function of the temperature depending on the square of the gap. This fact is related to the antipairing effect of the temperature over the nuclear system.

¹ Centro de Investigación y Desarrollo en Física, INTI.

Quantization of multidimensional cat maps

*A.M.F. Rivas*¹, *M. Saraceno* and *A.M. Ozorio de Almeida*²

In this work we study cat maps with many degrees of freedom. Classical cat maps are classified using the Cayley parametrization of symplectic matrices and the closely associated center and chord generating functions. Particular attention is dedicated to loxodromic and elliptic-hyperbolic behavior, which are new features of four-dimensional maps: we construct a map that is not Anosov, but is ergodic and mixing. The maps are then quantized using a Weyl representation on the torus and the general condition on the Floquet angles is derived for a particular map to be quantizable. The semiclassical approximation is exact, regardless of the dimensionality or of the nature of the fixed points. We single out the study of the Quantum Period Function (QPF), that is the period of the quantum map as a function of the finite Hilbert space dimension. It is found that the QPF is insensitive to the structural stability, though it depends on the ergodicity and on the existence of degenerated Lyapunov exponents for some power of the cat map.

* *To be published in Nonlinearity*

¹ Departamento de Física, Pontifícia Universidade Católica do Rio de Janeiro, Rio de Janeiro, Brazil

² Centro Brasileiro de Pesquisas Físicas, Rio de Janeiro, Brazil

The construction of a quantum markov partition

Raúl O. Vallejos¹ and Marcos Saraceno

We present a method for constructing a quantum Markov partition. Its elements are obtained by quantizing the characteristic function of the classical rectangles. The result is a set of quantum operators which behave asymptotically as projectors over the classical rectangles except from edge and corner effects. We investigate their spectral properties and different methods of construction. The quantum partition is shown to induce a symbolic decomposition of the quantum evolution operator. In particular, an exact expression for the traces of the propagator is obtained having the same structure as Gutzwiller periodic orbit sum.

¹Instituto de Física, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Brazil.

Electron and photon collisions on potassium clusters

M.R. Spinella, M. Bernath, O. Dragún

A theoretical analysis of electron elastic collisions on K_{19} clusters was performed. We also evaluate the photoemission (electron detachment) and inverse photoemission (electron attachment) processes for low electron energies. We perform a quantum-mechanical calculation in the framework of the Local Density Approximation (LDA) to Density Functional Theory (DFT). The quasi-bound states presented in the elastic channel are also manifested in the other two processes. Thus, the corresponding cross sections, when studied as a function of the photon energies, are highly structured providing valuable theoretical information about the differences between the single particle energies below and above de Fermi level in the K_{19} cluster.

Temperature dependence and fragmentation of the particle-hole giant resonances

E.C. Seva and H. M.Sofia

We evaluate the spreading width of the Giant Multipole Resonances at finite temperature using the discontinuity in the second derivative of the Green's function of the vibrational boson, in the Matsubara's framework. Our method allows us to identify the processes that contribute to the spreading width in terms of the Feynman diagrammatic expansion of the full boson

propagator. We have applied the calculation of the spreading width to the ^{208}Pb and the ^{90}Zr obtaining an increment of the spreading width with the temperature. We have not reached any saturation of the spreading width increment, at least up to the temperature of our calculation.

* *Phys. Rev. C* **56** (1997) 3107.

How to scale the wave functions in a simple solvable model

M.C.Cambiaggio, L.M.Sanchez and G.G.Dussel

The scaling properties of the exact wave functions in the two-level pairing model are studied and a well-defined limit, when the number of pairs goes to infinity, is found. An approximate method for obtaining the scaled wave functions is discussed. Well-known methods for relating finite-difference equations with differential ones are used, together with a semiclassical expansion. The approximate results obtained agree well with the exact ones. A comparison with the time-dependent Hartree-Fock approach is also done.

Phys. Rev. C **56** (1997) 2508

Excitation of isovector modes in very neutron-rich nuclei via heavy-ion isoscalar probes

C. H. Dasso¹, H.M.Sofia, S. M. Lenzi², M. A. Nagarajan³, A. Vitturi⁴

The existence of a neutron skin in neutron-rich nuclei is discussed in connexion with the excitation of isovector dipole and quadrupole giant modes via isoscalar nuclear probes. In the case of large neutron excess, important contributions are obtained from the nuclear excitation, which may even become predominant according to proper kinematical conditions. At variance with the usual situation encountered in inelastic processes, constructive interference can be found between nuclear and Coulomb contributions

* *Nucl. Phys. A* **627** (1997) 349.

¹The Niels Bohr Institute, Denmark

²Dipartimento di Fisica and INFN, Padova, Italy

³ECT, Villazano (Trento), I-38050, Italy

⁴Dipartimento di Fisica and INFN, Padova, Italy

Comparison between a thermal and a time-dependent mean-field description of a two level bosonic model

M.C.Cambiaggio, G.G.Dussel and A.M.Szyferman

The thermal mean-field (Hartree-Bose-Bogoliubov) approximation is applied to a simple bosonic model that is related to the phase transition

from spherical to deformed nuclei. Similarities and differences with the time-dependent approach are discussed, in particular the sensitivity of each method for the detection of the phase transition.

* *Phys. Rev. C* **60** (1999) 443.

Integrability of the pairing Hamiltonian

M.C.Cambiaggio, A.M.F.Rivas and M.Saraceno

We show that a many-body Hamiltonian that corresponds to a system of fermions interacting through a pairing force is an integrable problem, i.e. it has as many constants of the motion as degrees of freedom. At the classical level this implies that the time-dependent Hartree-Fock-Bogoliubov dynamics is integrable and at the quantum level that there are conserved operators of two-body character which reduce to the number operators when the pairing strength vanishes. We display these operators explicitly and study in detail the three-level example.

* *Nucl. Phys. A* **624** (1997) 157.

The pairing interaction and the Galileo invariance

G.G.Dussel^{1,2}, H.M.Sofia² and A.Tonina¹

The relation between Galileo invariance and the Energy Weighted Sum Rule for a mass dipole operator is discussed using a monopole pairing interaction. It is found that the energy weighted sum rule for the mass dipole operator change as much as 18% in medium and heavy nuclei.

* *Phys. Rev. C* **56** (1997) 804.

¹ FCEyN, UBA

² CONICET

Data Communication, Data Acquisition and Computational facilities

The stringent budgetary situation continued during the period 1997-1999 reported here. Nevertheless advances were made in the development of the Physics Department's computer network, the available equipment was kept in usable condition and some new equipment was added and a dedicated link with the Internet was installed and is in operation.

Data Communication

Most efforts were devoted to this area, managing, developing and improving the Department's network and the services offered. The network comprises 150 machines, including 20 multiuser systems and workstations (SUN, VAX, IBM/AIX). The remaining are PCs, with 20 running Linux and one Solaris_x86. One SUN Sparc-10 was refurbished to be our main server for e-mail (POP), files (including an MS-Windows file repository through "Samba" software) and print. There are three HP postscript laser network printers. Accounting of resources usage has been implemented. A www server was also installed (www.tandar.cnea.gov.ar). A purchase order was placed by the end of 1999 for a SUN Ultra-10, as replacement for the SUN Sparc-10 'server', to be delivered early in 2000. This purchase started in mid 1998, being delayed by budget constraints. The network wiring in the Department's premises provides nearly full office coverage. An optoisolated segment was added for access in the laboratories, shops and experimental data acquisition areas. Hubs and local wiring were added, to meet additional needs and reach new areas in the building. Legacy wiring is being rebuilt, to migrate from the former Ethernet 10BASE5 backbone plus 10BASE2 segments to a 10BASE-T configuration. A "switch" (3Com 1100) was installed, to serve as the central point for the local network. It connects also a 100 MHz segment (with SUN and Silicon Graphics machines and one HP printer). The "router" connecting the local network with CNEA backbone (and the Internet) was improved in hardware and software. A dedicated link with the Internet was installed and put into operation (Sep '99), with the help of the Argentinean 'Asociación Ciencia Hoy' through its 'Proyecto Retina'. A definite improvement in the service quality resulted, as compared with the very congested CNEA's general purpose link used before. All machines in the network were reconfigured to comply with the domain change decided by CNEA's authorities, to 'cnea.gov.ar' instead of 'cnea.edu.ar' (Apr '99). Efforts were also devoted to accounting, monitoring and security. SUN Solaris_x86 for Intel was installed in one machine for testing and evaluation purposes. Some utilities were ported to this new platform. A temporary subnetwork was setup for use during a training course in computational techniques ('98).

Data acquisition and Computational facilities

The already available equipment (described in previous reports) was used for Data acquisition: a multiparameter data acquisition system based on CAMAC modules with a DEC microVAX 3300 running the "XSYS" software package. Several PC-based MultiChannel Analyzers are also available. A number of PC's (Pentiums) and two network printers (HP LJ5M, HP 4000N) were added. Older PC equipment was reassigned and reconfigured to suit the needs of their new users.

General Support

Maintenance to the operating systems (patches and updates for SunOS, Solaris and Linux, etc.) and backups. Significant efforts were devoted to keep in working order a number of legacy systems (processors, peripherals, software). The installed PCs (ranging from /286 to P-III) demanded many work hours to deal with software and hardware failures. Routine assistance to users in matters of data acquisition, processing and communications, operation and equipment maintenance and purchases, where also our duties during the period.

Acknowledgements

To E. Achterberg, who kept his collaboration ad-honorem after formal retirement from his position at CNEA. To J. Vidallé (deceased 24-JUN-99), C. Bolaños, and their staffs, for their help with electronics and electromechanical equipment maintenance and repairs.

Contribution to Conferences

Journal Club Institute for Nuclear and Particle Astrophysics, LBNL. Berkeley, USA. January 1997

- *Cold Dark Matter Search in the Southern Hemisphere (Invited talk)*
D. E. Di Gregorio

VIII J.A. Swieca Summer School. Campos do Jordao, Brazil. January-February 1997.

- *Chaotic Scattering in Heavy-Ion Reactions. (Course).*
M. Saraceno, C.H. Dasso.
- *SU(3) Symmetry Breaking and Baryon Electromagnetic Properties.*
N. Scoccola.

International Workshop on Hyperfine Structure and Nuclear Moments of Exotic Nuclei by Laser Spectroscopy. Poznan, Poland. February 1997.

- *Deformation Change Between Isomeric and Ground States of Isotones $N=105$.*
J. Sauvage, N. Boos, L. Cabaret, J. Crawford, H.T. Duong, J. Genevey, A. Gizon, D. Hojman, G. Huber, F. Ibrahim, P. Kilcher, A. Knipper, M. Virieg, F. Le Blanc, J.K.P. Lee, J. Libert, D. Lunney, G. Marguier, J. Obert, J. Oms, J. Pinard, J.C. Putaux, M. Ramdhane, B. Roussière, V. Sebastian, A. Wojtasiewicz.

Workshop on Itinerant Magnetism. Brasilia, Brazil. February 1997.

- *From Bulk to Surface, from Surface to Clusters: Electronic and Magnetic Properties of Transition Metal Clusters.*
A.M. Llois.
- *Transport Properties of Magnetic Multilayers.*
M. Weissmann.

Workshop on Chaotic Dynamics and Quantum Many-Body Systems. European Centre for Theoretical Nuclear Physics (ECT). Trento, Italy. February 1997.

- *Chaotic Scattering in Heavy-Ion Reactions.*
M. Saraceno.

X Congreso Argentino de Físicoquímica. Tucumán, Argentina. April 1997.

- *Comportamiento Térmico de Formatos Mixtos de Cobre Hidratados Isoestructurales.*
A.G. Leyva, G. Polla, P.K. de Perazzo, M.A.R. Benyacar.
- *Estudio Comparativo del Comportamiento Térmico de los Formatos de Cu-Ca and Cu-Ba.*
A.G. Leyva, G. Polla, P.K. de Perazzo, M.A.R. Benyacar, P. Smichowski, F. Parisi, H. Lanza.
- *Estructura y Transición de Fase del Compuesto $Ba_2Cu(HCOO)_6$.*
D. Vega, R. Baggio, M.A.R. Benyacar, H. Lanza, P.K. de Perazzo, A.G. Leyva, G. Polla, J. Ellena.
- *Estudio por Difracción de Rayos X de la Evolución de Películas de Óxido crecidas en Aleaciones de Circonio.*
A.M. Olmedo, P.K. de Perazzo, R. Bordoni, M. Miyagusuku, M. Villegas.

- *Estructuras Cristalinas de Dos Complejos M Oda Imid₂, (M: Cd, Zn; Oda: Oxidiacetato; Imid: Imidazol).*
M. Pereg, R. Baggio, D. Vega, M.T. Garland.

International Symposium on Exotic Nuclear Shapes. Debrecen, Hungary. May 1997.

- *Changes of shape and second backbending in ⁵⁰Cr.*
S.M. Lenzi, C. Ur, D. Bazzacco, S. Lunardi, C. Rossi Alvarez, D.R. Napoli, M.A. Nagarajan, C. de Angelis, M. De Poli, A. Gadea, D.M. Brink, M.A. Cardona, D. Hojman.

Primer Workshop sobre Caracterización y Estudio de Materiales por Técnicas Nucleares, IFIMAT. Tandil, Argentina. May 1997.

- *Análisis de Superficies Utilizando Iones Pesados.*
G. García Bermúdez, M. Alurralde.
- *Análisis Multielemental de Trazas con el Método PIXE (Invited talk).*
A.J. Kreiner.

Congreso de la Colaboración Internacional del Proyecto Pierre Auger. Park City, USA. May 1997.

- *A Water Tank Cerenkov Detector for Very High Energy Astroparticles.*
P. Bauleo, J. Rodríguez Martino et al.
- *Calculation of the Number of Photoelectrons with the Water Cerenkov Detector Model.*
D. Ravignani, A.M.J. Ferrero et al.
- *The Experimental Comparison in Water Tank Detectors with Tyvek and Black Top Surfaces.*
F. Hasenbalg, D. Ravignani, A. Etchegoyen et al.
- *Biological Experience, Revisited.*
R. Pizarro, A. Filevich et al.
- *Segmentation of a Water Cerenkov Tank.*
C.K. Guerard, A.M.J. Ferrero, P. Bauleo et al.
- *Geometrical Optimization of a Water Cerenkov Detector.*
J. Rodríguez Martino, P. Bauleo, A.M.J. Ferrero et al.

International Conference on Advanced Materials (ICAM'97). Strasbourg, France. June 1997.

- *Spin-flip contribution to the conductivity of magnetic multilayers.*
R. Gómez Abal, A.M. Llois, M. Weissmann.
- *The effect of spill over in the electronic and magnetic properties of Ni, Co and Fe Clusters.*
J. Guevara, A.M. Llois, M. Weissmann.
- *Interaction of Cu(111) surface states with different extended defects.*
A. Barral, A.M. Llois.

Escuela de Superficies (EDES). Buenos Aires, Argentina. July 1997.

- *Experimental set-up for Pulse Laser Deposition of Thin Films.*
S. Duhalde, A. Lamagna, M. Villafuerte, A. Schwarzman and L. Correr.
- *Calculation of Electronic, Magnetic and Transport Properties of Low Dimensional Systems.*
M. Weissmann.

International Workshop on Non-Accelerator New Physics. Dubna, Russia. July 1997.

- *First results from SOLAX: A new technique to detect axions from the Sun.*
V.T. Avignone III, D. Abriola, R.L. Brodzinski, J.I. Collar, R.J. Creswick, D.E. Di Gregorio, H.A. Farach, A.O. Gattone, C.K. Guerard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, S. Nussinov, A. Ortiz de Solórzano, J.H. Reeves, J.A. Villar, K. Zioutas.

International Conference on Advances in Nuclear Physics and Related Areas. Tesalonika, Greece. July 1997.

- *Search for axions or axion-like particles.*
C.A. Aalseth, V.T. Avignone III, D. Abriola, R.L. Brodzinski, J.I. Collar, R.J. Creswick, J.P. Dauvergne, D.E. Di Gregorio, H.A. Farach, A.O. Gattone, C.K. Guerard, F. Hasenbalg, M. Hasinoff, H. Huck, A. Liolios, H.S. Miley, A. Morales, J. Morales, D. Nikas, S. Nussinov, A. Ortiz de Solórzano, E. Savvidis, S. Scopel, P. Sievers, J.A. Villar, L. Walckiers, K. Zioutas.

Workshop on Solitons: Properties, Dynamics, Interactions and Applications. Kingston, Canada. July 1997.

- *Collective Coordinates and Inequivalent Coset Space Quantizations.*
J. P. Garrahan, M. Kruczenski.
- *Electroweak baryon properties in soliton models.*
N.N. Scoccola.

25th International Cosmic-Ray Conference. Durban, South Africa. July-August 1997.

- *On the Cosmic-Ray Half-Life of ^{54}Mn .*
Y.D. Chan, D.E. Di Gregorio, M.R. Dragowsky, M.M. Hindi, M.C.P. Isaac, K.S. Krane, R.M. Larimer, A.O. Macchiavelli, R.W. MacLeod, P. Miocinovic, E.B. Norman, K. Zaerpoor.
- *On the Cosmic-Ray Half-Life of ^{144}Pm .*
Y.D. Chan, D.E. Di Gregorio, M.R. Dragowsky, M.M. Hindi, M.C.P. Isaac, K.S. Krane, R.M. Larimer, A.O. Macchiavelli, R.W. MacLeod, P. Miocinovic, E.B. Norman, S.J. Robinson, K. Zaerpoor.

Jornada de Trabajo sobre Contaminación Atmosférica Urbana. Defensoría del Pueblo de la Ciudad de Buenos Aires. Buenos Aires, Argentina. August 1997.

- *Análisis de aerosoles atmosféricos de la ciudad de Buenos Aires (Invited talk).*
A.J. Kreiner.

32nd. International Conference on Coordination Chemistry. Santiago de Chile, Chile. August 1997.

- *Synthesis, characterization and crystal structures of novel homo- and hetero- nuclear Lanthanide complexes (La-La, Y-Y, Eu-Eu, La-Gd and Cu-Eu) with the oxydiacetate ligand (ODA = $2\text{CCH}_2\text{OCH}_2\text{CO}_2$).*
M. Perec, R. Baggio, M.T. Garland.

Conference on Relativistic Aspects of Nuclear Physics. Río de Janeiro, Brazil. August 1997.

- *Baryon-Baryon Interactions in an $SU(3)$ Extended Soliton Model.*
G.L. Thomas, V. Hercovitz, C.L. Schat, N.N. Scoccola.

International Discussion Meeting "Hydrogen Transfer: Experiment and Theory". Berlin, Germany. September 1997.

- *Simulation of Hydrochloric Acid Dissociation at the Surface of Ice Films.*
D.H. Laría, D.A. Estrin, J. Kohanoff, R. Weht.

Technical Committee Meeting on Feasibility and Motivation for Hybrid Concepts for Nuclear Energy Generation and Transmutation. Madrid, Spain. September 1997.

- *Accelerators in Argentina.*
A.J. Kreiner.

III Iberoamerican Congress of Biophysics. Buenos Aires, Argentina. September 1997.

- *The Particle Induced X-Ray Technique with Heavy Ions for Trace Element Determination (Invited talk).*
A.J. Kreiner.

International Conference on the Applications of the Mössbauer Effect. Río de Janeiro, Brazil. September 1997.

- *Intermolecular Fe in Irradiated L-alanine.*
D. Rodríguez Sierra, C. Saragovi, E. Winkler, C. Fainstein.
- *Evaluation of Phyrophosphate-extractable Fe from Each Horizon of an Argentinian Soil Profile.*
A. Mijovilovich, C. Ramos, C. Saragovi, S.G. Acebal, E.H. Rueda, M.E. Aguirre.
- *Magnetic and Mössbauer Experiments on Disperse Hematite Nanoparticles.*
R.D. Zysler, C. Aripestre, M. Dimitrijewits, D. Rodríguez Sierra, C. Saragovi, J.M. Greneche.
- *Magnetic Fraction of an Ultisol from Misiones, Argentina.*
A. Mijovilovich, H. Morras, C. Saragovi, G. Santana, J.D. Fabris.

XX Reunión de Trabalho sobre Física Nuclear no Brasil. Guaratinguetá, Brazil. September 1997.

- *The Current Status of the AMS Program at the TANDAR Laboratory.*
J. Fernández Niello, D.E. Alvarez, R.G. Liberman, A. Arazi, D. Abriola, E. Achterberg, O.A. Capurro, A.M.J. Ferrero, M. di Tada, G.V. Martí, A.J. Pacheco, M. Ramírez, J.E. Testoni.

I Worskshop Brasileiro sobre Espectrometría de Massa com Aceleradores (AMS). Universidad Federal Fluminense. Niteroi, Brazil. September 1997.

- *New Developments for the AMS Program at the TANDAR Laboratory.*
J. Fernández Niello, D.E. Alvarez, R.G. Liberman, A. Arazi, D. Abriola, E. Achterberg, O.A. Capurro, A.M.J. Ferrero, M. di Tada, G.V. Martí, A.J. Pacheco, M. Ramírez, J.E. Testoni.

Fifth International Workshop on Topics in Astroparticle and Underground Physics, TAUP'97. Gran Sasso, L'Aquila, Italy. September 1997.

- *Experimental Search for Solar Axions with a Germanium Spectrometer.*
A.O. Gattone, D. Abriola, F.T. Avignone, R.L. Brodzinski, J.I. Collar, R.J. Creswick, D.E. Di Gregorio, H.A. Farach, C.K. Guerard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, S. Nussinov, A. Ortiz de Solórzano, J.H. Reeves, J.A. Villar, K. Zioutas.
- *Cold Dark Matter Identification. Diurnal Modulation Reexamined.*
F. Hasenbalg, D. Abriola, J.I. Collar, D.E. Di Gregorio, A.O. Gattone, H Huck, D. Tomasi, I. Urteaga.

82a Reunión Nacional de Física de la Asociación Física Argentina. San Luis, Argentina. September 1997.

- *Análisis de Aerosoles Atmosféricos de la Ciudad de Buenos Aires.*
M.J. Ozafrán, M.E. Vázquez, A. Burlón, M.A. Cardona, M.E. Debray, D. Hojman, J.M. Kesque, A.J. Kreiner, G. Levinton, F. Naab, P. Stoliar, M. Davidson, J. Davidson.
- *Anisotropía Magnética en Capas Delgadas de Metales de Transición.*
R. Gómez Abal, A.M. Llois, M. Weissmann
- *Punto triple en una aleación con ordenamiento composicional modulado*
V. Massidda
- *Aplicaciones de una Cámara de Ionización de Anodo Segmentado.*
A. Arazí, R.G. Liberman, D. Abriola, E. Achterberg, O.A. Capurro, J.O. Fernández Niello, G.V. Martí, A.J. Pacheco, G. Quinteiro, M. Ramírez, J.E. Testoni, M. Vieytes
- *Búsqueda Experimental de Axiones Solares a Través del Efecto Primakoff Coherente en un Espectrómetro de Germanio.*
F.T. Avignone, D. Abriola, R.L. Brodzinski, J.I. Collar, R.J. Creswick, D.E. Di Gregorio, H.A. Farach, A.O. Gattone, C.K. Guerard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, S. Nussinov, A. Ortiz de Solórzano, J.H. Reeves, J.A. Villar, K. Zioutas.
- *Búsqueda Experimental de Comportamiento Caótico en Reacciones Nucleares.*
G.V. Martí, A.J. Pacheco, J.E. Testoni, D. Abriola, D.E. Alvarez, E. Achterberg, O.A. Capurro, D.E. Di Gregorio, J. Fernández Niello.
- *Contribución del spin-flip a la Conductividad in plane de Multicapas Magnéticas.*
R. Gómez Abal, A.M. Llois, M. Weissmann.
- *Cuantificación de Minisuperespacios como Sistemas Ordinarios de Gauge.*
C. Simeone.
- *De Galileo al Principio de Mínima Acción.*
C. Simeone, D. Vaccaro.
- *Defectos Absorbidos y Adsorbidos en la Superficie del Cu(III): Efecto sobre los Estados de Superficie.*
M.A. Barral, A.M. Llois, A. Saúl.
- *Dependencia Angular de la Magnetización en Superconductores Tipo II: Influencia de la Geometría, la Anisotropía y los Defectos Columnares.*
S. Candia, L. Cívale, G. Pasquini, G. Nieva, H. Lanza.
- *Diagrama Dinámico Obtenido con Mediciones de Susceptibilidad Alterna en Cristales de YBaCuO con Defectos Columnares.*
G. Pasquini, L. Cívale, G. Nieva, H. Lanza.
- *El Proyecto Pierre Auger.*
A. Etchegoyen.
- *Métodos Numéricos para la Obtención de Parámetros Característicos de Celdas Solares.*
E.M. Godfrin, M.G. Martínez Bogado, M.J.L. Tamasi, J.C. Durán, C.J. Bruno.
- *Análisis de Distintos Procesos de Difusión Sencillos para la Elaboración de Celdas Solares de Alta Eficiencia.*
J.C. Plá, C.G. Bolzi, M.J.L. Tamasi, G.L. Venier, M.G. Martínez Bogado, J.C. Durán.
- *Elaboración de Paneles con Celdas de Silicio Monocristalino para Uso Espacial.*
C.G. Bolzi, C.J. Bruno, J.C. Durán, E.M. Godfrin, A. Lamagna, L.M. Merino, J.C. Plá, M.J.L. Tamasi.

- *Espectroscopía Mössbauer de L-Alanina Dopada con Fe.*
D. Rodríguez Sierra, C. Saragovi, E. Winkler, C. Fainstein.
- *Espesores de Películas de Fosforo de Indio Electrodepositadas Calculados a Partir de Mediciones de Concentración Atómica.*
S. Gueijman, C. Schvezov, A. Lamagna.
- *Efectos de daño por radiación en celdas solares de silicio para uso espacial.*
L. Quintero, M. Barrera, A. Lamagna.
- *Estructuras Moduladas en el Régimen de Disconmensuraciones.*
F. Parisi, H. Bonadeo.
- *Estudio Cuantitativo de Cicatrices en la Sección de Poincaré del Estadio de Bunimovich.*
F.P. Simonotti, E. Vergini, M. Saraceno.
- *Estudio de Clusters de C y Si por Tight Binding Molecular Dynamics.*
Ch. Fu, M. Weissmann.
- *Estudio de Correlaciones en un Sistema con Criticalidad Auto Organizada.*
H. Ceva, J. Luzuriaga.
- *Estudio de la Disociación del Acido Clorhídrico sobre Superficies de Hielo.*
D.A Estrin, J. Kohanoff, D. Laría, R.O. Weht.
- *Estudio de las Amplitudes de Transición Partícula-Agujero en Agregados Metálicos Neutros e Iónicos.*
M. Bernath, O. Dragún, H. Massmann, M.R. Spinella.
- *Estudio del Sistema Zr-Nb-Fe con Bajos Contenidos de Nb.*
E. Lena, C.P. Ramos, M.S. Granovsky, C. Saragovi, D. Arias.
- *Estudio Experimental de un Detector Cherenkov de Agua Segmentado para la Detección de Rayos Cósmicos de Altas Energías.*
C.K. Guerard, A.M.J. Ferrero, P.M. Bauleo, A. Etchegoyen, A. Filevich, F. Hasenbalg, D. Ravignani, J.C. Rodríguez Martino.
- *Estudio Geométrico y Capacidad de Identificación entre Muones y Cascadas Electromagnéticas para un Detector de Efecto Cherenkov en Agua.*
P. Bauleo, A. Etchegoyen, A. Ferrero, A. Filevich, F. Hasenbalg, M. Mostafá, D. Ravignani, J. Rodríguez Martino.
- *Evaluación del Fe Extraído con Pirofosfato en Cada Horizonte de un Perfil de un Suelo Argentino.*
A. Mijovilovich, C. Ramos, C. Saragovi, S.G. Acebal, E.H. Rueda, M.E. Aguirre.
- *Evolución del Diámetro de Trazas Nucleares en Mica a Nivel Submicroscópico.*
O.A. Bernaola, G. Saint-Martin, I. Nemirovsky, P. Meoli, G. Olivera.
- *Excitación de Modos Isovectoriales en Núcleos muy Ricos en Neutrones.*
C.H. Dasso, S.M. Lenzi, M.A. Nagarajan, H.M. Sofía, A. Vitturi.
- *Experimentos Magnéticos y Mössbauer sobre Nanopartículas de Hematita Dispersas.*
D. Zysler, C. Archiprete, M. Dimitrijewits, D. Rodríguez Sierra, C. Saragovi, J.M. Greneche.
- *Fluctuaciones Espectrales en la Transición entre Integrabilidad y Caos.*
G.G. Carlo, A.J. Fendrink, E.G. Vergini.
- *Formalismo de Canales Acoplados para Estudiar la Transferencia de Dos Neutrones, Excitaciones Inelásticas 2+ y Procesos de Fusión.*
J.E. Testoni, O. Dragún, M.R. Spinella, H. Massmann.

- *Fotoemisión Inversa en Agregados Metálicos de Sodio.*
M. Bernath, O. Dragún, J.E. Testoni, M.R. Spinella.
- *Fracción Magnética de un Utilisol de Misiones, Argentina.*
A. Mijovilovich, H. Morras, C. Saragovi, G. Santana, J.D. Fabris.
- *Función Generatriz del Mapa Correspondiente a un Problema de Dispersión Caótico.*
M.F. D'Atri, M. Saraceno.
- *Las Fases Cristalinas Ordenadas y Orientacionalmente Desordenadas de $P_4 S_3$.*
D. Bougeard, Z. Gamba.
- *Movimiento de Partículas Relativistas en Presencia de una Cuerda Cósmica.*
A. Arazi, C. Simeone, S. Grinstein.
- *Nuevo Precursor de monocristales Superconductores de YBaCuO.*
L. Morales, G. Polla, D. Vega, H. Lanza, G. Leyva.
- *Sobre la Estabilidad de Películas Libres de ^4He a $T=0\text{ K}$.*
L. Szybisz.
- *Técnica de Tiempo de Vuelo para Identificación en Masa de Iones.*
A. Arazi, E. Achterberg, D. Abriola, D.E. Alvarez, O.A. Capurro, G. Castelleti, G. Catren, J.O. Fernández Niello, A.J. Ferrero, R.G. Liberman, G.V. Martí, A.J. Pacheco, A. Pérez, J.E Testoni.
- *Un Modelo Reticular para la Transición Líquido-Sólido.*
J.A. Hernando.
- *Un Tratamiento para Potenciales Deformados.*
G. Segura, E. Maqueda.
- *Variación Angular del Anclaje de la Red de Vórtices en Monocristales de YBCO con Defectos Columnares Cruzados.*
J.A. Herbsommer, J. Luzuriaga, L. Civale, G. Pasquini, H. Lanza, P. Levy.

New Spectroscopy and Nuclear Structure 1997. Copenhagen, Denmark. September 1997

- *Collective versus Single-particle Degrees of Freedom in $1f7/2$ -shell nuclei*
S.M. Lenzi, C.A. Ur, D.R. Napoli, F. Brandolini, D. Bazzacco, D.M. Brink, D. Bucurescu, J.A. Cameron, M.A. Cardona, G. de Angelis, M. De Poli, A. Gadea, D. Hojman, S. Lunardi, G. Martinez-Pinedo, N.H. Medina, M.A. Nagarajan, C. Rossi Alvarez and C.E. Svensson

V Latin American Workshop on Nonlinear Phenomena. Canela, Brazil. September-October 1997.

- *Quantitative Study of Scars in the Boundary Section of the Stadium Billiard.*
F.P. Simonotti, E. Vergini, M. Saraceno.
- *Spectral Fluctuation in the Transition Between Integrability and Chaos.*
G. Carlo, A. Fendrik, E. Vergini.

Workshop on Nonlinear Dynamics & chaos in Physical & Biological Systems. San Pablo, Brazil. October 1997.

- *Chaos in heavy-ion reactions.*
M. Saraceno.

First International Symposium on Nuclear and Related Techniques in Agriculture, Industry, Health and Environment. La Habana, Cuba. October 1997.

- *Análisis de aerosoles atmosféricos de la ciudad de Buenos Aires.*
M.J. Ozafrán, M.E. Vázquez, A. Burlón, M.A. Cardona, M.E. Debray, D. Hojman, J.M. Kesque, A.J. Kreiner, G. Levinton, J.J. Menéndez, F. Naab, P. Stoliar, M. Davidson, J. Davidson.

Division of Nuclear Physics Meeting of the American Physical Society. British Columbia, Canada. October 1997.

- *Cosmic-Ray Half-Life of ^{54}Mn .*
K. Zaerpoor, M.R. Dragowsky, K.S. Krane, Y.D. Chan, M.C. Perillo Isaac, R.M. Larimer, A.O. Macchiavelli, R.W. MacLeod, E.B. Norman, D.E. Di Gregorio, M.M. Hindi, P. Miocinovic.
- *Cosmic-Ray Half-Life of ^{144}Pm .*
E.B. Norman, Y.D. Chan, M.C. Perillo Isaac, R.M. Larimer, A.O. Macchiavelli, R.W. MacLeod, M.R. Dragowsky, K.S. Krane, K. Zaerpoor, D.E. Di Gregorio, M.M. Hindi, S.J. Robinson, P. Miocinovic.
- *Angular Correlations in ^{144}Nd using Gammasphere.*
S.J. Robinson, M.M. Hindi, E.B. Norman, Y.D. Chan, M.C. Perillo Isaac, R.M. Larimer, A.O. Macchiavelli, R.W. MacLeod, D.E. Di Gregorio, M.R. Dragowsky, K.S. Krane, K. Zaerpoor, P. Miocinovic.

26th. IEEE Photovoltaic Specialists Conference. Anaheim, USA. October 1997.

- *Determination of the diffusion length and surface recombination velocity: two simple methods.*
J.C. Durán, G.L. Venier, M.J.L. Tamasi, C.G. Bolzi, J.C. Plá, E.M. Godfrin.
- *A new method for the determination of the minority carrier lifetime based on a biased OCVD technique.*
C.J. Bruno, M.G. Martínez Bogado, J.C. Plá, J.C. Durán.
- *Ray tracing vs. electromagnetic methods in the analysis of antireflective textured surfaces.*
J.C. Plá, J.C. Durán, D.C. Skigin, R.A. Depine.
- *Thin film CdS/CdTe solar cells prepared by electrodeposition using low cost materials.*
F.J. Álvarez, N. Di Lalla, A. Lamagna.

2nd International Conference on Isotopes. Sydney, Australia. October 1997

- *Biomedical applications of Accelerator Mass Spectrometry at ANU*
L.K. Fifield, M. di Tada, K. Liu, R.G. Cresswell, J.P. Day, C.L. Oldham, J. Popplewell and R. Carling

XX Reunión de Trabajo de la Asociación Argentina de Energía Solar (ASADES). Río Cuarto, Argentina. November 1997.

- *Elaboración y caracterización de celdas y paneles solares de silicio cristalino para su ensayo en el satélite SAC-A.*
C.G. Bolzi, L.M. Merino, M.J.L. Tamasi, J.C. Plá, J.C. Durán, C.J. Bruno, E.M. Godfrin, A. Lamagna, M.P. Barrera, L.B. Quintero.

Latin American School on Complex Systems. San Luis, Argentina. November 1997.

- *Quantitative Study of Scars in the Boundary Section of the Stadium Billiard.*
F.P. Simonotti, E. Vergini, M. Saraceno.

VIII Workshop Anual de Usuarios de LNLS. Campinas, Brazil. November 1997.

- *Determinación de Estructuras Cristalinas con Datos de Difracción de Polvo.*
D. Vega, P. König, G. Polla, G. Leyva.

- *Difracción de Rayos-X Resonante: Formatos Mixtos de Cu y Metales de Transición.*
G. Leyva, G. Polla, D. Vega, P. König, M.A.R. Benyacar.

Congreso de la Colaboración Internacional del Proyecto Pierre Auger. Centro Europeo de Investigaciones Nucleares (CERN). Geneva, Switzerland. November 1997.

- *Spectral-Directional Reflectivity of Tyvek Immersed in Water.*
A. Filevich, P. Bauleo, H. Bianchi, J. Rodríguez Martino.
- *Performances of Different Surface Detectors.*
P. Bauleo, A. Etchegoyen et al.
- *Informe de Avance de la Colaboración Argentina del Proyecto Pierre Auger.*
A. Etchegoyen.
- *Informe sobre el Estado de las Mediciones en Southern Site.*
A. Filevich.

10th AINSE Conference on Nuclear Techniques of Analysis. Canberra, Australia. November 1997

- *A biomedical application of ^{32}Si using Accelerator Mass Spectrometry*
M. di Tada, L.K. Fifield, K. Liu, R.G. Cresswell, J.P. Day, C.L. Oldham, J. Popplewell and R. Carling
- *Analysis of plutonium and neptunium at ultra-trace levels by AMS*
K. Liu, L.K. Fifield, M. di Tada, R.G. Cresswell, T.R. Ophel, J.P. Day, M.L. Keith--Roach and F.R. Livens
- *^{36}Cl in the vadose zone: Matching rainfall to recharge*
R.G. Cresswell, L.K. Fifield, K. Liu and M. di Tada.

XIV Congreso Brasileiro de Engenharia Mecanica. San Pablo, Brazil. December 1997.

- *Diamond-like carbon coatings: an example of application to the chemical industry.*
H. Huck, E.B. Halac, J. Orecchia, M. Igarzabal, H. González, M.A.R. de Benyacar.

Congreso de la Colaboración Brasileña del Proyecto Pierre Auger. Itatiaia, Brazil. December 1997.

- *Identificación de Muones para Diferentes Tipos de Detectores de Superficie.*
A.M.J. Ferrero, P. Bauleo et al.
- *Informe de las Actividades realizadas en el Prototipo de Detector de Superficie Instalado en el Laboratorio Tandar.*
A.M.J. Ferrero.

XIV Simposio Latinoamericano de Física del Estado Sólido (XIV SLAFES). Oaxaca, Mexico. January 1998

- *The hardness of symmetry effects: electronic and magnetic properties of transition metal clusters and surfaces (Invited talk)*
A.M. Llois.
- *Magnetic properties of Co clusters embedded in Ag*
J. Guevara, A.M. Llois and M. Weissmann.
- *Magnetic anisotropy in transition metal ultrathin films*
R. Gómez Abal, A.M. Llois and M. Weissmann.

- *Magnetic structure of Fe-Ni small clusters: calculations in the Ni rich region*
J. Guevara and A.M. Llois.

Workshop on Hadron Physics 1998. Florianopolis, Brazil. March 1998

- *Rational Maps and Strange Multiskyrmions*
M. Schvellinger, N.N.Scoccola
- “*The Lambda-Nucleon interaction potential in the bound state approach*”
G.L. Thomas, V.E. Herscovitz, C.L. Schat y N.N. Scoccola.

Scientific Advisory Group in Experimental Non Accelerator Physics (SAGENAP). Washington, D.C., USA. April 1998

- *The Auger International Collaboration*
Alberto Etchegoyen.

Semestral Congress on the Pierre Auger Collaboration Meeting. Itacuruça, Río de Janeiro, Brazil. May 1998

- *Thermal Models for the Pierre Auger Tanks*
A.M.J. Ferrero, A. Etchegoyen, A. Filevich, C. Bonifazi and A. Reguera
- *Report on the Argentinian Tanks’ Suppliers*
A.M.J. Ferrero

Workshop “N* Physics and Non-Perturbative QCD”, ECT*. Trento, Italy. May 1998

- *Baryon Properties in Soliton Models*
N.N. Scoccola.

Workshop on “The Physics of the Electronic Behaviour in the Core Region: All Electron LAPW Electronic Structure Calculations”. Trieste, Italy. June-July 1998

- *Surface and segregation energies in magnetic-nonmagnetic layered systems (Invited talk)*
M. Weissmann.

International Conference on the Centennial of the Discovery of Polonium and Radium. Nuclear Physics Close to the Barrier. Varsovia University, Poland. June-July 1998

- *AMS Measurements of South American Rainwater Samples*
J.O. Fernández Niello, D.E. Alvarez, A.M.J. Ferrero, O.A. Capurro, D. Abriola, G.V. Martí, A.J. Pacheco, J.E. Testoni, R.G. Liberman.

39th Annual Meeting of the American Society of Pharmacognosy. Coronado Spring Resort, Florida, USA. July 1998

- *Azorellane, a new diterpene skeleton type from AZORELLA CRYPTANTA*
C.B. Colloca, D.B. Pappano, D.A. Bustos, V.E. Sosa, R.F. Baggio, M.T. Garland and R. Gil.

Latin-American Winter School “Chaos and Quantum Mechanics: Theory an Applications”. CBPF, Río de Janeiro, Brazil. July 1998

- *Billiards on the Sphere*
M.E. Spina.
- *Semiclassical Propagator in Coherent States for Billiards Problems*
F.P. Simonotti, M. Saraceno.

- *Semiclassical Projector on Single Husimi Eigenstates for Chaotic Systems*
A. Monastra and M. Saraceno.
- *Localized Structures Embedded in the Eigenfunctions of Chaotic Hamiltonian Systems*
E. Vergini and D.A. Wisniacki.
- *The Construction of a Quantum Markov Partition*
R.O. Vallejos and M. Saraceno.

School of Environmental Science and Technology (EdeA). Buenos Aires, Argentina. August 1998

- *Retention of Sb(III) by synthetic apatites $Ca_{10}(PO_4)_6Z_2$: a possibility for remediating contaminated waters*
A.G. Leyva, J. Marrero and P. Smichowski.
- *PIXE Analysis of Atmospheric Aerosols in the City of Buenos Aires*
M. Ozafrán, M. Vázquez, A. Burlón, M. Buhler, M.A. Cardona, M. Debray, D. Hojman, J.M. Kesque, A.J. Kreiner, G. Levinton, J.J. Menéndez, F. Naab, P. Stoliar, J. Davidson and M. Davidson.
- *Evaluation of Water Contamination with Zn through Fertilization and Development of the Toad Bufo Arenarum*
T.M. Fonovich, F. Naab, M.E. Caraballo, A.J. Kreiner, M. Debray et al.
- *Particle induced X-ray emission for the detection of air, water and soil contamination (Invited talk).*
A.J. Kreiner.
- *Pixe Analysis of Atmospheric Aerosols in the City of Buenos Aires*
M.J. Ozafrán, M.E. Vázquez, A. Burlón, M. Buhler, M.A. Cardona, M.E. Debray, D. Hojman, J.M. Kesque, A.J. Kreiner, G. Levinton, J.J. Menéndez, F. Naab, P. Stoliar, M. Davidson and J. Davidson
- *Global fallout of ^{36}Cl in South America*
J. Fernández Niello, D.E. Alvarez, M. di Tada, O.A. Capurro, A.M.J. Ferrero, R. Liberman, G.V. Martí, A.J. Pacheco, J.E. Testoni, M. Ramírez and E. Achterberg.

Workshop on Magnetoresistant Materials. Centro Atómico Bariloche, Argentina August 1998

- *Energy band contribution to the conductivity and magnetoresistance of magnetic-nonmagnetic materials(Invited talk)*
M. Weissmann.
- *Coated magnetic clusters and magnetoresistance (Invited talk)*
A.M. Llois.

Escuela de Ambiente. UNSAM-CNEA. Buenos Aires, Argentina. August 1998.

- *Preliminary results in radiation modification of the sensitivity of SnO_2 miniaturised sensors*
A. Lamagna , C.F. Arrieta, J.L. Giménez , S. Nicoletti and L. Dori.

International Workshop on the Identification of Dark Matter. Buxton, United Kingdom. September 1998

- *Search for an Annual Modulation of Dark-Matter Signals with a Germanium Spectrometer at the Sierra Grande Laboratory*
D. Abriola, F.T. Avignone III, R.L. Brodzinski, J.I. Collar, D.E. Di Gregorio, H.A. Farach, E. García, A.O. Gattone, C.K. Guérard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, A. Ortiz de Solórzano, J. Puimedón, J.H. Reeves, A. Salinas, M.L. Sarsa, J.A. Villar

XXI Workshop on Nuclear Physics in Brazil. Itatiaia, Río de Janeiro, Brazil, September 1998

- *Descripción de las Actividades del Acelerador Tandem*
A.J. Pacheco
- *Classification of Single Nucleon Levels in Potentials with Tetrahedral Symmetry*
E.E. Maqueda and G. Segura
- *Efectos Gravitatorios de Cuerdas Cósmicas Locales*
A. Arazi, C. Simeone and S. Grinstein

9th European Conference on Diamond, Diamond-Like Materials, Nitrides and Silicon Carbide. Creta, Greece, September 1998

- *Characterization of Amorphous Si_xCl_{1-x} Thin Films obtained using High Energy Ion Beam Deposition on Si*
H. Huck, E.B. Halac, C. Oviedo, G. Zampieri, M.E. Reinoso, M.A.R. de Benyacar

83a Reunión Nacional de Física de la AFA. La Plata, Argentina. September 1998

- *Determinación del momento cuadrupolar nuclear del ^{57}Fe a partir de primeros principios*
D.A. Rodríguez Sierra and A.M. Llois.
- *Medición de vidas medias nucleares en el ^{74}Br*
G. García Bermúdez, M.A. Cardona, A. Filevich, R.V. Ribas, H. Somacal and L. Szybisz.
- *Medición de vidas medias en el núcleo ^{80}Rb*
M.A. Cardona, G. García Bermúdez, S.L. Tabor, R.A. Kayes and G. Sylvan.
- *Evaluación de secciones eficaces de fusión a energías próximas a la barrera Coulombiana utilizando un nuevo formalismo de canales acoplados*
J.E. Testoni, O. Dragún, M.R. Spinella and H. Massmann.
- *Captura electrónica por agregados de sodio con emisión de fotones*
M.R. Spinella, M. Bernath and O. Dragún.
- *Estructura magnética de pequeños agregados de Fe-Ni: cálculos en la región rica en Ni*
J. Guevara and A.M. Llois.
- *Simulación de depósito de carbonos sobre silicio*
Ch.Ch. Fu and M. Weissmann.
- *Las fases condensadas de la molécula S_8*
C. Pastorino and Z. Gamba.
- *Las fases cristalinas ordenada y plástica de C_4F_8*
Z. Gamba and B. M. Powell.
- *Magnetorresistencia inversa en multicapas magnéticas*
J. Milano and A.M. Llois.
- *Plausibilidad de magnetismo en compuestos de tierras raras y metales de transición*
V.L. Vildosola, A.M. Llois and M. Weissmann.
- *Evolución del estado de superficie Shockley en presencia de defectos absorbidos y adsorbidos en la superficie (111) del Cu*
M.A. Barral and A.M. Llois.
- *Estructura electrónica de superficie de aleaciones Au-Cu: estados de superficie tipo Tamm*
M.A. Barral and A.M. Llois.

- *Vórtices en $YBa_2Cu_3O_7$ con defectos columnares inclinados: observación de fase lock-in y estructuras de escalera*
A.V. Silhanek, L. Civale, S. Candia, G. Pasquini, G. Nieva, and H. Lanza.
- *Dependencia angular del anclaje de vórtices por defectos columnares en $YBaCuO$ cerca de la transición vidrio-líquido*
G. Pasquini, L. Civale, E. Righi, G. Nieva, and H. Lanza.
- *Corrientes de transporte inhomogéneas y distribución de voltaje en películas superconductoras de $YBCo$*
M. Monteverde, A. Moreno, V. Bekeris, P. Levy and L. Corraera.
- *Anisotropía magnética en sistemas de baja dimensionalidad de metales de transición*
R. Gómez Abal, A.M. Llois and M. Weissmann.
- *Efecto de la sustitución con Fe en la perovskita La-Ca-Mn-O*
D. Vega, D. Rodríguez Sierra, P. Levy, F. Parisi, H. Lanza, A.G. Leyva, G. Polla, C. Saragovi, A. Esteban, P. König and R. Baggio.
- *Sensibilidad a NO_x en sensores MOS de compuerta catalítica porosa*
D. Filippini, R. Aragón, A. Lamagna and P. Willshaw.
- *Películas delgadas de Al_2O_3 sobre Si preparadas por ablación láser*
A. Lamagna, S. Duhalde, L. Corraera and S. Nicoletti.
- *Espectroscopía Mössbauer en aleaciones de Zr-Nb-Fe*
C. Ramos, C. Saragovi, M. Granovsky and D. Arias.
- *Celdas solares de silicio cristalino con textura superficial como tratamiento antirreflectante: optimización, elaboración y caracterización*
J.C. Plá, E.M. Godfrin and J.C. Durán.
- *Comparación de diferentes procesos de elaboración simples para celdas solares de silicio de alta eficiencia*
M.J.L. Tamasi, J.C. Plá, C.G. Bolzi, M.G. Martínez Bogado, M.P. Barrera and J.C. Durán.
- *Propuestas para reducir el error de medición en solarímetros de fotodiodos de silicio*
J.C. Durán, C.G. Bolzi, E.M. Godfrin, J.C. Plá, L.M. Merino and C.J. Bruno.
- *Resultados preliminares en la fabricación de sensores miniaturizados de película de SnO*
A. Lamagna, C.F. Arrieta, J. L. Giménez, S. Nicoletti and L. Dori.
- *Haz externo de protones en el Acelerador TANDAR*
R. Rey, J.A. Schuff, A. Pérez de la Hoz, M.E. Debray, D. Hojman, A.J. Kreiner, J.M. Kesque, P. Stoliar, G. Saint-Martin, O.D. Bernaola, A. Mazal, A. Burlón, M.A. Cardona, M.E. Vázquez, M.F. Salfity, M.E. Caraballo, M.J. Ozafrán, F. Naab, G. Levinton, M. Davidson, J. Davidson and M. Buhler.
- *Identificación de mineralizaciones patológicas humanas*
A.G. Leyva, S.L. Maguid and M.A.R. de Benyacar.
- *Detección de ^{10}B en muestras biológicas utilizando la técnica PIGE (Particle Induced Gamma Ray Emission)*
M.F. Salfity, A. Burlón, A.J. Kreiner, M.E. Debray, M.E. Caraballo, D. Hojman, M.A. Cardona, J.M. Kesque, P. Stoliar, F. Naab, M.J. Ozafrán, M.E. Vázquez, R. Rey, G. Levinton, J.A. Schuff, M. Davidson, J. Davidson, M. Buhler, L. Policastro, G. Beraldi, L. Bocanera, H. Durán, M. Pisarev and A. Schwint.

- *Búsqueda de señales de modulación anual de materia oscura en el laboratorio subterráneo de Sierra Grande*
D. Abriola, F.T. Avignone III, R.L. Brodzinski, J.I. Collar, D.E. Di Gregorio, H.A. Farach, E. García, A.O. Gattone, C.K. Guérard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, A. Ortiz de Solórzano, J. Puimedón, J.H. Reeves, A. Salinas, M.L. Sarsa and J.A. Villar.
- *Propagador semiclásico para billares en estados coherentes*
F.P. Simonotti and M. Saraceno.
- *Entropía en modelos tipo Ising*
J.A. Hernando.
- *Sobre la pendiente anómala en las reacciones nucleares de transferencia*
D. Tomasi, H.D. Marta, R. Donángelo, J.O. Fernández Niello and A.J. Pacheco.
- *El Proyecto Pierre Auger en Argentina*
A. Etchegoyen.
- *Mediciones AMS sobre muestras de agua de lluvia en Sudamérica*
J. Fernández Niello.

16th World Congress of Soil Science. Montpellier, France. September 1998

- *Mn and Fe doped Alanine: an EPR and Mössbauer study*
E. Winkler, C. Fainstein, D. Rodríguez Sierra and C. Saragovi.
- *Modification of Iron Mineralogy induced by management practices in an Ultisol from Misiones, Argentina,*
H. Morrás, A. Mijovilovich, E. Leiva and C. Saragovi

Latin-american Conference on Applications of the Mössbauer Effect - LACAME'98. Colombia. September 1998

- *Mössbauer study of different Fe content argentine soils (Invited talk)*
C. Saragovi.
- *Mössbauer spectroscopy of the Zr-rich region in Zr-Nb-Fe alloys with low Nb content (Invited talk)*
C. Saragovi.

Inorganic Materials. Versailles, France. September 1998

- *The ordered, disordered and glassy phases of P_4S_3*
D. Bougeard and Z. Gamba.

XVIII Jornadas Interdisciplinarias de Toxicología. Buenos Aires, Argentina. September 1998

- *Efecto de la incorporación de Zn y Cu sobre el desarrollo embrionario temprano*
T.M. Fonovich, F. Naab, A. Burlón, M. Buhler, M.E. Caraballo, M.D. Carattino, M.A. Cardona, J. Davidson, M. Davidson, M.E. Debray, D. Hojman, J.M. Kesque, A.J. Kreiner, G. Levinton, M.J. Ozafrán, A.M. Pechén, R. Rey, M.F. Salfity, J.A. Schuff, P. Stoliar and M.E. Vázquez.

VII Materials Processing I, The 1998 TMS Annual Meeting & Exhibition, Los Alamos National Laboratory, Los Alamos, New Mexico, U.S.A., September 1998.

- *Electrodeposition of Indium Phosphide*
S. Guejman, C. Schvezov and A. Lamagna.

International Conference on Nuclear Models 1998 Interacting Bosons and Fermions. Camerino, Italy. October 1998

- *Excitation of Isovector Modes in very Neutron-Rich Nuclei via Heavy-Ion Isoscalar Probes*
C.H. Dasso, H.M. Sofia, S.M. Lenzi, M.A. Nagarajan, A. Vitturi

Ab-initio Molecular Dynamics Study Weekend. Daresbury Laboratory. Warrington, United Kingdom. October-November 1998

- *Tight binding molecular dynamics simulation of amorphous carbon deposit over Si (001)*
Ch.-Ch. Fu.

VI Seminario Latinoamericano de Análisis por Técnicas de Rayos X. Huerta Grande, Córdoba, Argentina. November 1998

- *Análisis de Aerosoles Atmosféricos en dos Sitios de la ciudad de Buenos Aires*
M. Ozafrán, M. Vázquez, A. Burlón, M.E. Caraballo, M. Buhler, M.A. Cardona, M.E. Debray, D. Hojman, J.M. Kesque, A.J. Kreiner, G. Levinton, J.J. Menéndez, F. Naab, P. Stoliar, M. Davidson and J. Davidson.
- *Los métodos de difracción de rayos X y EDAX en el análisis de cuerpos extraños en tejidos biológicos*
A.G. Leyva, S.L. Maguid, M.A.R. de Benyacar

Centro Latinoamericano de Física (CLAF, Reunión de la Comisión Directiva). Río de Janeiro, Brazil. November 1998

- *Magnetismo en sistemas de baja dimensión (Invited talk)*
M. Weissmann.

Primer Congreso Iberolatinoamericano y del Caribe. Asociación Latinoamericana de Física Médica. Mexico DF, Mexico. November 1998

- *Haz Externo de Protones en el Acelerador TANDAR.*
R. Rey, J.A. Schuff, A. Pérez de la Hoz, M.E. Debray, D. Hojman, A.J. Kreiner, J.M. Kesque, P. Stoliar, G. Saint-Martin, O.D. Bernaola, A. Mazal, A. Burlón, M.A. Cardona, M.E. Vázquez, M.F. Salfity, M.E. Caraballo, M.J. Ozafrán, F. Naab, G. Levinton, M. Davidson, J. Davidson and M. Buhler.

V Reunión de la Sociedad Uruguaya de Física. Universidad de la República, Montevideo, Uruguay. December 1998

- *Espectrometría de Masas utilizando Aceleradores de Partículas: Análisis Ultrasensitivo con Aplicaciones Multidisciplinarias*
J.O. Fernández Niello.

XXV Reunión Anual de la Asociación Argentina de Tecnología Nuclear. Buenos Aires, Argentina. December 1998

- *Detección de ^{10}B en Muestras Biológicas utilizando la Técnica PIGE (Particle Induced Gamma Ray Emission)*
M. Salfity, A. Burlón, A.J. Kreiner, M. Debray, D. Hojman M.A. Cardona, J.M. Kesque, P. Stoliar, F. Naab, M.J. Ozafrán, M.E. Vázquez, R. Rey, G. Levinton, J. Schuff, M. Davidson, J. Davidson, M. Buhler, L. Policastro, G.Beraldi, L. Bocanera, H. Durán, A. Dagrosa, E. Kreimann, M. Pisarev and A. Schwint.
- *Haz Externo de Protones en el Acelerador TANDAR*
R. Rey, J.A. Schuff, A. Pérez de la Hoz, M.E. Debray, D. Hojman, A.J. Kreiner, J.M. Kesque, P. Stoliar, G. Saint-Martin, O.D. Bernaola, A. Mazal, A. Burlón, M.A. Cardona, M.E. Vázquez, M.F. Salfity, M.E. Caraballo, M.J. Ozafrán, F. Naab, G. Levinton, M. Davidson, J. Davidson and M. Buhler.

Nuclear Theory Program INT-98-3, the Physics of Strangeness. Seattle, USA. September-December 1998

- *Strangeness in Soliton Models*
N.N. Scoccola.

Journal Club Institute for Particle and Nuclear Astrophysics, LBNL. Berkeley USA.. December 1998

- *Dark Matter Searches in the Sierra Grande Underground Laboratory (Invited talk)*
D. E. Di Gregorio

Congreso Latinoamericano de Orgaos Artificiais e Biomateriais. Belo Horizonte, Brazil. December 1998

- *Depósitos minerales patológicos: presencia de calcificaciones y de silicio en tejidos y su eventual relación con diferentes tipos de prótesis*
A.G. Leyva, S.L. Maguid, M.A.R. de Benyacar.

Asociación Chilena de Física. Reunión en homenaje al Dr. M. Kiwi. Santiago de Chile, Chile. December 1998

- *Magnetismo en sistemas de baja dimensión*
M. Weissmann.

13° CBECIMAT/VI SEMEL, 13° Congresso Brasileiro de Engenharia e Ciência dos Materiais, Curitiba, Brazil. December 1998.

- *Estructura cristalográfica de depósitos de fosfuro de indio obtenidos por electrodeposición*
S. Gueijman, C. Schvezov and A. Lamagna,.

IX Escuela de verano de Física Nuclear Teórica J.A. Swieca. San Pablo, Brazil. January 1999.

- *Realistic single particle potencial with tetrahedral symmetry*
E.E. Maqueda and G. Segura

Topical Conference on Microstructure and Surface Morphology Evolution in Thin Films. ICTP. Trieste, Italy. March 1999.

- *Comparative study of the microstructures between SnO₂ thin films grown by physical evaporation and pulsed laser deposition*
A. Lamagna, S. Duhalde, C. Arrieta, L. Quinteros and J. Giménez.

Algebraics Methods in Many Body Physics Workshop. Institute for for Nuclear Theory. Seattle, USA. March 1999.

- *Pairing isovector and isoscalar interaction in soluble algebraic models*
E.E. Maqueda

Forum Expertos de Transferencia de Tecnología de Argentina, Sudáfrica, India e Italia. Bologna, Italy. June 1999.

- *The first technopole in Argentina: Polo Tecnológico Constituyentes*
A. Lamagna (Invited talk).

XII Congreso de Bioingeniería, Universidad Favaloro. Buenos Aires, Argentina. June 1999.

- *Aplicaciones Novedosas de Aceleradores a Cancerterapia: Terapia por captura neutrónica en boro y hadronterapia (Invited talk).*
A.J. Kreiner
- *Haz externo de protones*
R. Rey, J. Schuff, A. Perez de la Hoz, M.E. Debray, D. Hojman, A.J. Kreiner, J.M. Kesque, G. Saint-Martin, O. Oppezzo, O.A. Bernaola, B.L. Molinari, J. Ibañez, P. Stoliar, A. Mazal, M.E. Caraballo, A. Burlón, M.A. Cardona, M.E. Vázquez, M.F. Salfity, M.J. Ozafrán, F. Naab, G. Levinton, M. Davidson, J. Davidson, M. Buhler

IX Congreso Latinoamericano de Ciencias de superficies y sus Aplicaciones. La Habana, Cuba. July 1999.

- *Positron annihilation and Raman spectroscopy analysis of amorphous carbon films*
E. Halac, A. Somoza, H. Huck, R.S. Brusa, M. Reinoso

4th Summer School/Conference “Let’s face Chaos Though Nonlinear Dynamics”. CAMPT, University of Maribor. Slovenia. June 1999.

- *Semiclassical Theory of short periodic orbits and quantum chaos.*
G. Carlo and E. Vergini
- *Semiclassical quantization with short periodic orbits*
G. Carlo and E. Vergini

Congreso Nacional de la Sociedade Brasileira para o Progresso da Ciencia (SBPC). Porto Alegre, Brazil. July 1999.

- *Análise de processos de fabricação de células solares através da medida de tempo de vida dos portadores minoritários*
A. Moehlecke, I. Zanesco, J.C. da Silva, C.G. Bolzi, M.G. Martínez Bogado, M.J.L. Tamasi, J.C. Plá and J.C. Durán.

1^{er} Conferencia Iberoamericana sobre Procesamiento de Materiales por Laser. FI-UBA. Buenos Aires, Argentina. July 1999.

- *Microestructura de películas delgadas de SnO₂ obtenidas por RTGO y por PLD para ser utilizadas en sensores de gases tóxicos*
A. Lamagna, M.F. Vignolo, J. Giménez, C. Arrieta and S. Duhalde.

Workshop on complexity computation and the Physics of information. Isaac Newton Institute of Mathematical Science. Cambridge, United Kingdom. July 1999.

- *Quantum maps and quantum computers*
M. Saraceno

School of Energetic Studies. UNSAM-CNEA. Buenos Aires, Argentina. August 1999.

- *Silicon Solar Cells development in Argentina*
C.G. Bolzi, C.J. Bruno, E.M. Godfrin, A. Lamagna, M.G. Martínez Bogado, L.M. Merino, S.E. Rodríguez, J.C. Plá, M.J.L. Tamasi and J.C. Durán.
- *Crystalline Silicon Solar Cells for Testing in Space*
C.G. Bolzi, C.J. Bruno, E.M. Godfrin, M.G. Martínez Bogado, L.M. Merino, J.C. Plá, M.J.L. Tamasi, M.P. Barrera and J.C. Durán.

8th International Conference on Accelerator Mass Spectrometry. Viena, Austria. September 1999.

- *The AMS System and Research Program at the TANDAR Laboratory*
J.O. Fernández Niello, R.G. Liberman, O.A. Capurro, A.M.J. Ferrero, G.V. Martí, A.J. Pacheco, D. Abriola, M. Ramirez, J.E. Testoni, E. Achterberg, D.E. Alvarez, and M. di Tada.

84^a Reunión de la AFA. Tucumán, Argentina. September 1999.

- *Estudio de la fase cristalina desordenada de la molécula S₈*
C. Pastorino y Z. Gamba.
- *Modulación del desorden y componentes armónicas*
V. Massidda.
- *Diagrama de fases para un fluido de L.J. a partir de la Función de Partición*
I. Urrutia y J. Hernando.
- *Evolución del magnetismo del Ni en función del entorno: átomo, dímero y aleaciones ordenadas NiCu*
E. Ascitutto, G. Berlín, M.P. Gómez, A. Libertun, D. Estrin y A.M. Llois.
- *Estructura de mandas de los distemas Ln₇RH₃ (Ln=La,Ce)*
V. Vildosola, A.M. Llois, M. Weissmann, C.O. Rodríguez y J.G. Sereni.
- *Comportamiento magnético desde una visión LDA de compuestos de Ce con Metales de Transición*
V. Vildosola, A.M. Llois, M. Weissmann y J.C. Sereni.
- *Cálculo de la magnetorresistencia en multicapas Y_{1-x}La_xMn₂Ge₂*
J. Milano y A.M. Llois.
- *Confinamiento de electrones debido a la presencia de defectos sobre la superficie*
M.A. Barral y A.M. Llois.
- *Magnetorresistencia gigante en sistemas Ag/Co_{0.9}Fe_{0.1}*
J. Milano y L. Steren.
- *Cálculo ab-initio de la corriente túnel de una impureza magnética adsorbida sobre la superficie de Au(111)*
M. Weissmann y A.M. Llois.
- *Impurezas de metales de transición sobre Au(111): interpretación LDA de experimentos con STM*
A.M. Llois, M. Weissmann, D. Estrin y J. Guevara.
- *Propiedades estructurales y de transporte eléctrico en La_{1-x}Ca_xMnO_{3+δ}*
E. Indelicato., L. Granja, D. Vega., P. Levy, G. Polla, F. Parisi, G. Leyva., A. Esteban, F. Pusitanella
- *Sustitución parcial de Mn por Fe³⁺ en La_{1/2}Ca_{1/2}MnO_{3+δ}*
L. Granja., E. Indelicato, D. Vega, P. Levy, G. Polla., F. Parisi., D. Rodríguez Sierra.
- *Estudio de LnMnO₃ dopado con Sn mediante difracción de rayos x y magnetización*
L. Morales, D. Vega, D. Lamas y A. Caneiro.
- *Doble intercambio en manganitas Ca_(1-x)Y_xMnO₃ dopadas con electrones*
H. Aliaga, B. Alascio, G. Leyva, G. Polla, P. Perazzo y D. Vega.
- *Caracterización de productos de corrosión por espectroscopía Mossbauer*
E. Chung, I. Raspini y C. Saragovi.

- *Construcción y ensayo de piranómetros fotovoltaicos de bajo costo desarrollados en la CNEA*
C.G. Bolzi, J.C. Durán, O. Dursi, G. Renzini and H. Grossi Gallegos,
- *Análisis de procesos de elaboración de celdas solares mediante la determinación de la vida media de portadores minoritarios*
C.G. Bolzi, M.G. Martínez Bogado, M.J.L. Tamasi, J.C. Plá, J.C. Durán, A. Moehlecke, I. Zanesco and J.C. da Silva
- *Celdas solares argentinas en el satélite SAC-A: Análisis de datos*
E.M Godfrin, M.J.L. Tamasi, M.G. Martínez Bogado and J.C. Durán
- *Estudio del daño por radiación en celdas solares de silicio para uso espacial*
M.P. Barrera, J.C. Durán, L. M. Merino, J.C. Plá and M.J.L. Tamasi
- *Crecimiento y caracterización de películas sensoras de SnO₂*
L. Quintero, S. Balart, J. Giménez, C. Arrieta, S. Duhalde and A. Lamagna.
- *Películas delgadas de SnO₂, Sn_(1-x)V_xO_y y Sb_xO_y obtenidas por ablación láser para sensores de gases*
M.F. Vignolo, S. Duhalde, A. Lamagna, S. Balart, R. Mercader and G. Quintana.
- *Aplicaciones del Acelerador Tandem a la Terapia por Captura Neutrónica en Boro.*
A.J. Kreiner
- *Haz externo de Protones*
R. Rey, J. Schuff, A. Perez de la Hoz, M.E. Debray, D. Hojman, A.J. Kreiner, J.M. Kesque, G. Saint-Martin, O. Opezzo, O.A. Bernaola, B.L. Molinari, J. Ibañez, P. Stoliar, A. Mazal, M.E. Caraballo, A. Burlón, M.A. Cardona, M.E. Vázquez, M.F. Salfity, M.J. Ozafrán, F. Naab, G. Levinton, M. Davidson, J. Davidson, M. Buhler
- *Búsqueda de comportamientos caóticos en reacciones nucleares*
G.V. Martí, A.J. Pacheco, J.E. Testoni, D. Abriola, O.A. Capurro, D.E. Di Gregorio, J.O. Fernández Niello, E. Achterberg, D.E. Alvarez, M.R. Spinella
- *Utilización de Radioisótopos como trazadores en aplicaciones medioambientales y astrofísicas*
D. Abriola, E. Achterberg, D.E. Alvarez, O.A. Capurro, J.O. Fernández Niello, A.M.J. Ferrero, R.G. Liberman, G.V. Martí, A.J. Pacheco, M. Ramirez, J.E. Testoni
- *Mecanismos de reacción en procesos de dispersión, transferencia de dos neutrones y fusión en el sistema ¹⁸O + ⁶⁰Ni*
J.E. Testoni, O. Dragún, H. Massmann, M.R. Spinella
- *Mediciones de Secciones Eficaces de Reacciones cuasi-elásticas en los sistemas ^{12,13}C + ^{105,106}Pd*
O.A. Capurro, J.E. Testoni, D. Abriola, E. Achterberg, D.E. Di Gregorio, G.V. Martí, A.J. Pacheco, M.R. Spinella
- *Sistema de tiempo de vuelo para el espectrómetro magnético del laboratorio TANDAR*
D.E. Alvarez, J.O. Fernández Niello, G.V. Martí, A.J. Pacheco, M. Ramirez, J.E. Testoni, K. Koide, E. Achterberg

III Latinamerican Workshop on Nuclear and Heavy Ions Physics. San Andres Islands. Colombia. September 1999.

- *Signature inversion in odd-odd nuclei around A=80.*
G. García-Bermúdez, M. A. Cardona.
- *Twin bands in the normal deformation regime (Invited talk)*
A.J. Kreiner

- *Accelerator based biomedical and environmental applications of nuclear techniques in Argentina (Invited talk)*
A.J. Kreiner
- *Search for chaotic behavior in nuclear scattering*
G.V. Martí, A.J. Pacheco, J.E. Testoni, D. Abriola, O.A. Capurro, D.E. Di Gregorio, J.O. Fernández Niello, E. Achterberg, D.E. Alvarez, M.R. Spinella
- *Status of the AMS Program at the TANDAR Laboratory*
J.O. Fernández Niello, R. Liberman, D.E. Alvarez, D. Abriola, E. Achterberg, O.A. Capurro, M. di Tada, A. Ferrero, G.V. Martí, A.J. Pacheco, M. Ramirez, J.E. Testoni
- *Quasi-elastic scattering measurements in the system $^{12,13}\text{C} + ^{105,106}\text{Pd}$*
O.A. Capurro, J.E. Testoni, D. Abriola, E. Achterberg, D.E. DiGregorio, G.V. Martí, A.J. Pacheco
- *“Slope anomaly in heavy-ion transfer reactions by means of a semiclassical model”*
H.D. Marta, R. Donangelo, D. Tomasi, J.O. Fernández Niello, A.J. Pacheco

XXII Workshop on Nuclear Physics in Brazil. Sao Lourenco, MG, Brazil. September 1999.

- *Some current topics in high spin nuclear structure (Invited talk)*
A.J. Kreiner

Workshop on Hadron Physics 1999. Coimbra, Portugal. September 1999.

- *Multibaryons in the Skyrme model*
N.N. Scoccola

School on Electromagnetic probes and the structure of hadrons and nuclei. Erice, Italy. September 1999.

- *Electromagnetic and weak decays of hyperons in the Skyrme model*
N.N. Scoccola

8th European Conference on Applications of Surface and Interface Analysis. Sevilla, Spain. October 1999.

- *Raman and XPS characterization of amorphous $\text{Si}_x\text{C}_{1-x}$ thin films obtained using high hydrocarbon ion beam on Si.*
H. Huck, E.B. Halac, C. Oviedo, G. Zampieri, M. Reinoso, M.A.R. de Benyacar.

IV Jornadas de Ciencia, Tecnología y Medio Ambiente. Chubut, Argentina. October 1999.

- *Aprovechamiento de la energía solar-Actividades del Grupo Energía Solar de la CNEA*
C.G. Bolzi, C.J. Bruno, J.C. Durán, E. M. Godfrin, A. Lamagna, M.G. Martínez Bogado, L.M. Merino, S.E. Rodríguez, J.C. Plá, M.J.L. Tamasi and M.P. Barrera,

Conference on Advanced Laser Processing Technology (ALT 99). Potenza, Italy. October 1999.

- *$\text{Sn}_{(1-x)}\text{V}_x\text{O}_y$ thin films deposited by pulsed laser ablation for gas sensing devices*
S. Duhalde, M.F. Vignolo, G. Quintana, R. Mercader and A. Lamagna

International Conference on Selected Topics in Nuclear and Atomic Physics. Fiera di Primiero, Italy. October 1999.

- *Structure of the vacuum states in the presence of isovector and isoscalar pairing correlation.*
E.E. Maqueda

VI Latin American Workshop of Non-Linear Phenomena (LAWNP'99). Huerta Grande, Pcia. de Córdoba, Argentina. October 1999.

- *Liquid-drop-like model for cylindrical helium systems.*
L. Szybisz

Encontro Nacional de Física de Partículas e Campos, San Lourenço, MG, Brazil. October 1999.

- *Effective field theory and neutral gauge boson production at LEP2.*
D. Gomez Dumm

XXVIª Reunión de la AATN. Bariloche, Argentina. November 1999.

- *Análisis estructural en el sistema $YMnO_3$ - $CaMnO_3$*
D. Vega, A.G. Leyva., G. Polla., P. Konig, H. Aliaga, M.T. Causa., F. Pusitanella, A. Esteban
- *Caracterización de productos de corrosión por espectroscopía mossbauer*
E. Chung, C. Saragovi., I. Raspini
- *Dosimetría ESR/Alanina II: propiedades espectroscópicas del-alanina con impurezas de Fe(III)*
D. Rodríguez Sierra, E. Winkler , C. Fainstein, C. Saragovi, A. Fainstein, P. Etchegoin
- *Tratamientos térmicos y orden de carga en $La_{1/2}Ca_{1/2}MnO_{3+\delta}$*
P. Levy, G. Polla, D. Vega, F. Parisi, L. Granja, E. Indelicato, G. Leyva, H. Lanza
- *Estudio de homogeneidad en pastillas de $(U,Gd)O_2$ por análisis de DRX mediante el método de Rietveld*
A.G. Leyva, D. Vega, V. Trimarco, D. Marchi
- *Aplicaciones del Acelerador TANDAR a la Técnica BNCT*
A. Burlón , M. Salfity, A.J. Kreiner , M.E. Debray, M.E. Caraballo, D. Hojman, M.A. Cardona, J.M. Kesque, P. Stoliar, F. Naab, M.J. Ozafrán, M.E. Vázquez, R. Rey, G. Levinton, J. Schuff., M. Davidson, J. Davidson, L.Policastro, G. Beraldí, L. Bocanera, H. Durán, S. Chimento, A. Dagrosa, E. Kreimann, M. Pisarev, A. Schwint
- *Aceleradores de iones pesados utilizados como espectrómetros ultrasensibles: Aplicaciones en el laboratorio TANDAR.*
D. Abriola, E. Achterberg, D. E. Alvarez, O. A. Capurro, J. O. Fernández Niello, A. M. J. Ferrero, R. G. Liberman, G. V. Martí, A. J. Pacheco, M. Ramirez, J. E. Testoni.
- *Sistema de detección para separación e identificación de iones pesados.*
D. Abriola, A. Arazi, E. Achterberg, O. A. Capurro, J. O. Fernández Niello, A. M. J. Ferrero, R. G. Liberman, G. V. Martí, A. J. Pacheco, M. Ramirez, J. E. Testoni.

VIII Congreso Argentino de Física Médica. Mendoza. Argentina. November 1999.

- *Aceleradores para terapia por captura neutrónica*
A.J. Kreiner
- *Haz externo de protones*
R. Rey, J. Schuff, A.Perez de la Hoz, M.E. Debray, D. Hojman, A.J. Kreiner, J.M. Kesque, G. Saint-Martin, O. Oppezzo, O.A. Bernaola, B.L. Molinari, J. Ibañez, P. Stoliar, A. Mazal, M.E. Caraballo, A. Burlón, M.A. Cardona, M.E. Vázquez, M.F. Salfity, M.J. Ozafrán, F. Naab, G. Levinton, M. Davidson, J. Davidson, M. Buhler

Publications

- *Application of Heavy Ions Backscattering Spectrometry to diffusion studies*
R. A. Pérez, G. García-Bermúdez, D. Abriola, F. Dymont and H. Somacal.
Diffusion and Defect Forum 143 (1997) 1335.
- *Surface analysis using heavy ion beams*
G. García-Bermúdez, M. Alurralde.
First Workshop on “Characterization and study of Materials by Nuclear Techniques”.
Editors: A. Somoza, A. López García, Tandil, UNCentro (1997).
- *The orientationally ordered and disordered phases of crystalline P_4S_3*
D. Bougeard and Z. Gamba
Disorder en Materials 11 (1997) 1.
Published by invitation of the Editors.
- *Determination of the diffusion length and surface recombination velocity: two simple methods*
J.C. Durán, G.L. Venier, M.J.L. Tamasi, C.G. Bolzi, J.C. Plá and E.M. Godfrin
Proc. 26th. IEEE PVSC (1997) 195.
- *A new method for the determination of the minority carrier lifetime based on a biased OCVD technique*
C.J. Bruno, M.G. Martínez Bogado, J.C. Plá and J.C. Durán
Proc. 26th. IEEE PVSC (1997) 191.
- *Ray tracing vs. electromagnetic methods in the analysis of antireflective textured surfaces*
J.C. Plá, J.C. Durán, D.C. Skigin and R.A. Depine
Proc. 26th. IEEE PVSC (1997) 187.
- *Thin film CdS/CdTe solar cells prepared by electrodeposition using low cost materials*
F.J. Álvarez, N. Di Lalla and A. Lamagna
Proc. 26th. IEEE PVSC (1997) 459.
- *Elaboración y caracterización de celdas y paneles solares de silicio cristalino para su ensayo en el satélite SAC-A*
C.G. Bolzi, L.M. Merino, M.J.L. Tamasi, J.C. Plá, J.C. Durán, C.J. Bruno, E.M. Godfrin, A. Lamagna, M.P. Barrera and L.B. Quintero
Avances en Energías Renovables y Medio Ambiente 1 (1997) 1.
- *Pseudo-spin doublet aligned structure in doubly odd ^{186}Ir*
M.A. Cardona, M.E. Debray, G. García Bermúdez, D. Hojman, A.J. Kreiner, H. Somacal, A. Burlon, J. Davidson, M. Davidson, G. Levinton, J.M. Kesque, M. Ozafran, M. Vazquez, A. Romo, D.R. Napoli, D. Bazzacco, S.M. Lenzi, N. Medina, C. Rossi Alvarez, N. Blasi, G. Lo Bianco, J. de Boer, D. Frischke and H.J. Maier
Physical Review C 55 (1997) 144.
- *Collective structure in ^{70}As*
G. García Bermúdez, J. Doring, G.D. Johns, R.A. Kaye, M.A. Riley, S.L. Tabor, C. J. Gross, M.J. Brinkman, and H.Q. Jin
Physical Review C 56 (1997) 2869.
- *Mediciones de concentración atmosférica de plomo utilizando la técnica PIXE*
A.J. Kreiner,
Anales de la Academia Nacional de Ciencias Exactas, Físicas y Naturales, vol. 48 (1997) 171.

- *Evidence for enhanced aluminum concentration in brain tissue from Alzheimer's disease patients using heavy ion PIXE*
M.E. Debray, A.J. Kreiner, M. Buhler, M.A. Cardona, D. Hojman, J.M. Kesque, G. Levinton, J.J. Menéndez, F. Naab, M.J. Ozafrán, H. Somacal, M.E. Vázquez, H. Grahmann, M. Davidson, J. Davidson, M.E. Levin, C.A. Mangone, R.L. Caccuri, A. Tokuda, A.A. Eurnekian, D. González, C. López and O.E. Roses
Applications of Accelerators in Research and Industry, AIP Press, New York (1997) 567.
- *High spin states in doubly odd $^{162,164}\text{Lu}$*
M.A. Cardona, J. Davidson, D. Hojman, M.E. Debray, A.J. Kreiner, H. Somacal, M. Davidson, D.R. Napoli, D. Bazzacco, N. Blasi, R. Burch, D. De Acuña, S.M. Lenzi, G. Lo Bianco, J. Rico, C. Rossi Alvarez
Phys. Rev. C 56 (1997) 707.
- *Rayos X inducidos por ^{16}O sobre distintos elementos*
M.J. Ozafrán, M.E. Vázquez, J.J. Menéndez, M.A. Cardona, M.E. Debray, D. Hojman, A.J. Kreiner, J.M. Kesque, A. Romo, H. Somacal, J. Davidson, M. Davidson
Avances en análisis por técnicas de Rayos X. Vol. IX (1997) 195.
- *Análisis de aerosoles atmosféricos en la ciudad de Buenos Aires*
M.J. Ozafrán, M.E. Vázquez, M. Davidson, A. Burlón, M.A. Cardona, M.E. Debray, D. Hojman, J.M. Kesque, A.J. Kreiner, G. Levinton, F. Naab, P. Stoliar, J. Davidson
Anales de la AFA, Vol.9, Pgs. 241-244, San Luis (1997).
- *Band Termination in ^{123}I*
D.L. Balabanski, G. Rainovski, N. Blasi, G. Falconi, G. Lo Bianco, S. Signorelli, D. Bazzacco, G. de Angelis, D.R. Napoli, M.A. Cardona, A.J. Kreiner, H. Somacal
Phys. Rev. C 56 (1997) 1629.
- *A dipole band in ^{124}Xe*
G. Lo Bianco, Ch. Protochristov, G. Falconi, N. Blasi, D. Bazzacco, G. de Angelis, D.R. Napoli, M.A. Cardona, A.J. Kreiner and H. Somacal
Z. Phys. A 359 (1997) 347.
- *Cold Dark Matter Identification. Diurnal Modulation Reexamined*
F. Hasenbalg, D. Abriola, J.I. Collar, D.E. Di Gregorio, A.O. Gattone, C. K. Guérard and H. Huck.
Phys. Rev. D 55 (1997) 7350.
Nucl. Phys. B 70 (Proc. Suppl.) (1998) 114.
- *Galactic Confinement Time of Iron-Group Cosmic Rays Derived from the ^{54}Mn Chronometer*
K. Zaerpoor, Y.D. Chan, D.E. Di Gregorio, M.R. Dragowsky, M.M. Hindi, M.C.P. Isaac, K.S. Krane, R.M. Larimer, A.O. Macchiavelli, R.W. MacLeod, P. Miocinovic, and E.B. Norman
Phys. Rev. Lett. 79 (1997) 4306.
- *Average angular momentum in compound nucleus reactions deduced from isomer ratio measurements*
O.A. Capurro, D.E. DiGregorio, S. Gil, D. Abriola, M. di Tada, J.O. Fernández Niello, A.O. Macchiavelli, G.V. Martí, A. J. Pacheco, J.E. Testoni, D. Tomasi, I. Urteaga.
Phys. Rev. C 55 (1997) 766.
- *The AMS program at the TANDAR accelerator*
D.E. Alvarez, J.O. Fernández Niello, M. di Tada, A.M.J. Ferrero, G.V. Martí, O.A. Capurro, A. J. Pacheco, J.E. Testoni, D. Abriola, A. Etchegoyen, E. Achterberg, M. Ramírez.
Nucl. Inst. B 123 (1997) 39.
- *Absorption and Tunneling Effects in One- and Two-Proton Transfer Reactions*
H.D. Marta, R. Donangelo, D. Tomasi, J.O. Fernández Niello, A. J. Pacheco.
Phys. Rev. C 55 (1997) 2975,

- *Comment on Experimental Fusion Barrier Distributions Reflecting Projectile Octupole State Coupling to Prolate and Oblate Target Nuclei*
C.H. Dasso, J. Fernández Niello.
Phys. Rev. Lett. 78 (1997) 3975.
- *Role of the Gamma Degree of Freedom in Subbarrier Fusion Phenomena and Effective Barrier Distributions.*
C.H. Dasso, J. Fernández Niello and A. Vitturi.
Phys. Rev. C 55 (1997) 2112.
- *Analytical determination of aluminium-26 in biological materials by accelerator mass spectrometry.*
S.J. King, C. Oldham, J. Popplewell, R.S. Carling, J.P. Day, L.K.Fifield, R.G.Cresswell, K. Liu, and M. di Tada.
Analyst 122 (1997) 1049.
- *High-spin states and band structures in ^{182}Pt*
D.G. Popescu, J.C. Waddington, J.A. Cameron, J.K. Johansson, N.C. Schmeing, W. Schmitz, M.P. Carpenter, V.P. Janzen, J. Nyberg, L.L. Riedinger, H. Hübel, G. Kajrys, S. Monaro, S. Pilotte, C. Bourgeois, N. Perrin, H. Sergolle, D. Hojman and A. Korichi.
Phys. Rev. C 55 (1997) 1175.
- *Band termination and second backbending in ^{50}Cr*
S.M. Lenzi, C.A. Ur, D.R. Napoli, M.A. Nagarajan, D. Bazzacco, D.M. Brink, M.A. Cardona, G.de Angelis, M. de Poli, A. Gadea, D. Hojman, S. Lunardi, N.H. Medina, C. Rossi Alvarez.
Phys. Rev. C 56 (1997) 1313
- *Study of $f_{7/2}$ $N=Z$ nuclei with GASP*
C.A. Ur, S.M. Lenzi, D. Bucurescu, A. Gadea, D.R. Napoli, D. Bazzacco, F. Brandolini, J.A. Cameron, M.A. Cardona, G. de Angelis, D. Hojman, S. Lunardi, M.A. Nagarajan, M. De Poli, C. Rossi Alvarez, C. Svenson.
Prog. Part. Nucl. Phys. 38 (1997) 223
- *Excited States and Terminating Bands in $^{123,124}\text{I}$*
D.L. Balabanski, G. Rainovski, N. Blasi, G. Lo Bianco, G. Falconi, S. Signorelli, D. Bazzacco, G.de Angelis, D.R. Napoli, M.A. Cardona, A.J. Kreiner, H. Somacal
Acta Phys.Hung.N.S. 6 (1997) 275.
- *Structure and Thermal behaviour of N-containing a-C films obtained by high energy ion beam deposition*
E.B. Halac, H. Huck, G. Zampieri, R.G.Pregliasco, E. Alonso and M.A.R. Benyacar.
Appl. Surf. Science 120 (1997) 139.
- *Thermal decomposition of copper(II) dicalcium(II) formate*
P.K. de Perazzo, A.G. Leyva, G. Polla, F. Parisi, M.A.R.de Benyacar, P. Smichowski and H. Lanza.
J. Sol. St. Chem. 132 (1997) 235.
- *Linear ac. susceptibility of pinned vortices in $\text{YBa}_2\text{Cu}_3\text{O}_7$ crystals with correlated disorder*
G. Pasquini, P. Levy, L. Civale, G. Nieva, H. Lanza.
Physica C 274 (1997) 165.
- *Fabrication of step edges on R-plane sapphire using a selective wet etch process for grain boundary based Josephson junctions*
P. Levy, S. Nicoletti, L. Corra, M. Cervera, M. Bianconi, F. Biscarini, F. Corticelli and E. Gabilli.
Il Nuovo Cimento 19D, N.8-9 (1997) 1389.

- *Enhancement of c-axis vortex correlation by twin boundaries and columnar defects in $YBa_2Cu_3O_{7-d}$*
E.F. Righi, S. A. Grigera, D. López, G. Nieva, F. de la Cruz, L. Civale, G. Pasquini, and P. Levy
Phys. Rev. B 55 (1997) 5663.
- *AC Susceptibility characterization of BiSrCaCuO (2212) single crystals: Annealing effects*
A.J. Moreno, G. Leyva, G. Polla, P. Levy, D. Vega, E. Manghi.
Solid State Ionics 99 (1997) 251.
- *Nanoscale caliper for direct measurement of scanning force microscopy probes*
F. Biscarini and P. Levy
App. Phys. Lett. 71 (1997) 888.
- *Wet etching of Al_2O_3 for selective patterning of microstructures using Ar^+ ion implantation and H_3PO_4*
P. Levy, M. Bianconi and L. Correr.
J.Electrochem. Soc. 145 (1997) 344.
- *Application of the high-symmetry superspace group description to the refinement of the lock-in structure of Rb_2ZnCl_4*
F. Parisi and H. Bonadeo.
Acta Cryst. A 53 (1997) 286.
- *Electronic properties of transition metal clusters: Consideration of the spill over in a bulk parametrization*
Javier Guevara, Francisco Parisi, Ana María Llois and Mariana Weissmann.
Phys. Rev. B 55 (1997) 13283,
- *Hybrid Quantum and Molecular Mechanical Monte Carlo Simulations of the Interaction of Hydrogen Chloride with Solid Water Clusters*
Darío Estrin, Jorge Kohanoff, Daniel H. Laria y Ruben Weht
Chemical Physics Letters 280 (1997) 280.
- *The Local Density Approximation (LDA) Bandstructure and Fermi Surface of $YBa_2Cu_3O_7$*
C.O.Rodriguez, Ruben Weht y N.E.Christensen
Physica C 282-287 (1997) 1621.
- *Preparation and x-ray crystal Structure of the polymeric Zirconium(IV) Oxalate Complex $[K_2\{Zr(C_2O_4)_3\} \cdot H_2C_2O_4 \cdot H_2O]_n$*
R.F. Baggio, M.T. Garland. & M. Perec.
Inorganic. Chemistry 36 (1997) 737.
- *Synthesis and X-ray Structure of the Mononuclear Nine-Coordinate Gadolinium(III) Hydrogen Oxydiacetate $[Gd(C_4H_5O_5)_3 \cdot C_4H_6O_5 \cdot H_2O]$*
R.F. Baggio, M.T. Garland, M. Perec.
Inorganic. Chemistry 36 (1997) 950.
- *Preparation and crystal structure of the new ionic bis-[hydrazido]-molybdenum complex $[Mo(NNPh_2)_2(acac)(PPh_3)_2]^+ Ot^-$*
C. Manzur, D. Carrillo, R. Baggio & M.T.Garland.
J. Chem. Crystallogr. 27 (1997) 339.
- *Sodium (μ -hydroxo)-bis(1,10-phenanthroline-N,N')bis (thiosulfate-S,O)-di-Zinc(II), 4.35 hydrate, 0.85 methanolsolvate*
S. Baggio, M.I. Pardo, R.F. Baggio & M.T. Garland.
Acta Cryst C 53 (1997) 551.

- *4-Benzyl-5-Ethylthio-3H-1,2-Dithiole-3-Thione*
R.F. Baggio, D. Vega, L.L. Aimar, R.H. de Rossi & J. Ellena"
Acta Cryst.C 53 (1997) 1125.
- *Cadmium(II) thiosulfate, hydrate*
S. Baggio, M.I. Pardo, R. Baggio & O. Gonzalez
Acta Cryst.C 53 (1997) 1521.
- *A binuclear Zirconium(IV) Oxalate Complex with a μ -Oxalate Coordination Mode. Crystal Structure of $[K_6\{Zr(C_2O_4)_3\}_2(\mu-C_2O_4)\cdot 4H_2O]$*
R.F. Baggio, M.T. Garland and M. Perec.
Inorganic. Chemistry 36 (1997) 3198.
- *Tris Phenanthroline zinc(II) thiosulfate, hydrate*
S. Baggio, M.I. Pardo, R. Baggio & M.T. Garland
Acta Cryst.C53 (1997) 1570.
- *A Chromium(III) 2,2'-bipyrimidine (bipym) complex: $(Et_4N)[Cr(NCS)_4(bipym)]$*
M.T. Garland, R. Baggio, F. Berezovsky, S. Triki & J. Sala Pala
Acta Cryst C 53 (1997) 1803.
- *Magnetic Properties of Dinuclear Copper (II) Complexes with a N6-Pyridazine Derived Ligand*
E. Spodine, A.M. Atria, J. Manzur, A.M. García, M.T. Garland, A. Hocquet, E. Sanhueza, R.F. Baggio, O. Peña, J.Y. Saillard.
J. Chem. Soc, Dalton Transactions, (1997), 3683.
- *Structural investigation of 1-amino-2,4,6-trinitrobenzenes in the solid state and in solution*
R. Baggio, M.V. Remedi, M.T. Garland. & E. Bujan
J. Chemical Crystallography 27 (1997) 499.
- *Oscillations in the conductivity of magnetic multilayers*
M. Kiwi, A.M. Llois, R. Ramirez and M. Weissmann
Phys. Rev. B 55 (1997) 14117.
- *Modulated phases in triangular binary alloys*
V. Massidda
Physica B 240 (1997) 142
- *Quantitative study of scars in the boundary section of the stadium billiard*
Fernando P. Simonotti, Eduardo Vergini and Marcos Saraceno.
Phys. Rev. E 56 (1997) 3859.
- *Integrability of the pairing Hamiltonian*
M.C. Cambiaggio, A.M. Rivas and M. Saraceno
Nucl. Phys. A 624 (1997) 157.
- *How to scale the wave function in a simple solvable model*
M.C. Cambiaggio, L.M. Sanchez and G.G. Dussel
Phys. Rev. C 56 (1997) 2508.
- *Characterization of amorphous carbon rich SiC thin films obtained using high energy hydrocarbon ion beam on Si*
H. Huck, E. B. Halac, C. Oviedo, G. Zampieri and M. Benyacar
Applied Surface Science 141 (1998) 141
- *Cosmic-ray Half-life of ^{144}Pm*
K. Zaerpoor, Y.D. Chan, D.E. Di Gregorio, M.R. Dragowsky, M.M. Hindi, M.C.P. Isaac, K.S. Krane, R.M. Larimer, A.O. Macchiavelli, R.W. MacLeod, P. Miocinovic, and E.B. Norman.
Phys. Rev. C 57 (1998) 2046. Nucl. Phys. B 70 (Proc. Suppl.) (1998) 114.

- *Theory for the Direct Detection of Solar Axions by Coherent Primakoff Conversion in Germanium Detectors*
R. J. Creswick, F.T. Avignone, H. A. Farach, J.I. Collar, A.O. Gattone, S. Nussinov, and K. Zioutas.
Phys. Lett. B 427 (1998) 235.
- *Experimental Search for Solar Axions*
A.O. Gattone, D. Abriola, F.T. Avignone, R.L. Brodzinski, J.I. Collar, R. J. Creswick, D.E. Di Gregorio, H. A. Farach, C. K. Guérard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, S. Nussinov, A. Ortiz de Solórzano, J.H. Reeves, J. A. Villar, and K. Zioutas
Nucl. Phys. B 70 (Proc. Suppl.) (1998) 59..
- *Experimental Search for Solar Axions via Coherent Primakoff Conversion in a Germanium Spectrometer*
F. T. Avignone III, D. Abriola, R. L. Brodzinski, J. I. Collar, R. J. Creswick, D.E. Di Gregorio, H. A. Farach, A. O. Gattone, C. K. Guérard, F. Hasenbalg, H. Huck, H. S. Miley, A. Morales, J. Morales, S. Nussinov, A. Ortiz de Solórzano, J. H. Reeves, J. Villar, and K. Zioutas
Phys. Rev. Lett. 81 (1998) 5068.
- *Análisis Multielemental de Trazas con la Técnica PIXE*
A.J. Kreiner.
Caracterización y Estudio de Materiales por Técnicas Nucleares, Chap. 3, Pgs. 49-62. Ed. A.Somoza, A.López García (1998).
- *Desarrollo de Carreras Interdisciplinarias en Ciencia y Tecnología*
A.J. Kreiner.
Infomec, Vol. 5, (1998).
- *On the Slope Anomaly in Neutron Transfer Reactions*
H.D. Marta, R. Donangelo, D. Tomasi, J.O. Fernández Niello, A. J. Pacheco.
Phys. Rev. C 58 (1998) 601.
- *Methodological issues in the radiocarbon dating of rock paintings*
R.E.M. Hedges, C. Bronk Ramsey, G.J. van Klinken, P.B. Pettitt, C. Nielsen-Marsh, A. Etchegoyen, J. Fernández Niello, M.T. Boschin, A.M. Llamazares.
Radiocarbon 40 (1998) 35.
- *Average angular momentum in fusion reactions deduced from evaporation-residue cross sections*
O.A. Capurro and D.E. Di Gregorio
Physical Review C 57 (1998) 430.
- *Kinetics of uptake and elimination of silicate acid by a human subject: a novel application of ³²Si and accelerator mass spectrometry*
J. Popplewell, S.J. King, J.P. Day, P. Ackrill, L.K. Fifield, R.G. Cresswell, M. di Tada and K. Liu.
Journal of Inorganic Biochemistry 69 (1998) 177.
- *Evaluación de secciones eficaces de fusión a energías próximas a la barrera coulombiana utilizando un formalismo de canales acoplados*
J.E. Testoni, O. Dragun, M.R. Spinella, H. Massman
Anales AFA Vol.10 (1998) 4751
- *¿Cómo se determinan las paleotemperaturas?*
J. Fernández Niello. Ciencia Hoy 45 (1998) 56.
- *$|\Delta S| = 1$ hadronic weak decays of hyperons in a soliton model*
N.N. Scoccola.
Phys. Lett. B 428 (1998) 8.

- *Strange multiskyrmions*
M. Schvellinger and N.N. Scoccola.
Phys. Lett. B 430 (1998) 32.
- *Casimir corrections in the bound state soliton model*
N.N. Scoccola and H. Walliser.
Phys. Rev. D 58 (1998) 094037.
- *Two dimensional skyrmions on the sphere*
N.N. Scoccola and D.R. Bes.
Journal of High Energy Physics 09 (1998) 012.
- *The bound states in the Skyrme model*
N.N. Scoccola and D.O. Riska.
Phys. Lett. B 444 (1998) 21
- *High-spin states in the odd-odd $N = Z$ nucleus ^{50}Mn*
C.E. Svensson, S.M. Lenzi, D.R. Napoli, A. Poves, C.A. Ur, D. Bazzacco, F. Brandolini, J.A. Cameron, G.de Angelis, A. Gadea, D.S. Haslip, S. Lunardi, E.E. Maqueda, G. Martínez-Pinedo, M.A. Nagarajan, C. Rossi Alvarez, A. Vitturi and J.C. Waddington.
Physical Review C 58 (1998) R2621.
- *Transition strengths in ^{86}Nb and ^{86}Zr*
R.A. Kaye, J.B. Adams, A. Hale, C. Smith, G.Z. Solomon, S.L. Tabor, G. García-Bermúdez, M.A. Cardona, A. Filevich, and L. Szybisz.
Physical Review C 57 (1998) 2189.
- *Confirmation using Monte Carlo ground-state energies of the instability of free planar films of liquid ^4He at $T=0\text{ K}$*
L. Szybisz.
Physical Review B 58 (1998) 109.
- *Localized Structures Embedded in the Eigenfunctions of Chaotic Hamiltonian Systems*
E. Vergini and D. Wisniacki.
Phys. Rev. E 58 (1998) R5225.
- *Numerical Verification of Percival's Conjecture in a Quantum Billiard*
G. Carlo, E. Vergini and A. Fendrik.
Phys. Rev. E 57 (1998) 5397.
- *Chaotic Scattering in Heavy Ion Reactions*
M. Saraceno, C.H. Dasso
Proceedings of the VIII A. Swieca Summer School, C.A. Bertulani, M.E. Bracco, B. V. Carlson, M. Nielsen, eds. World Scientific Publishing Co.(1998).
- *Ray tracing vs. electromagnetic methods in the analysis of antireflective textured surfaces: a first approach*
J.C. Plá, J.C. Durán, D.C. Skigin and R.A. Depine.
Optik **107** (1998) 141..
- *Comparison of different simple fabrication processes for high efficiency silicon solar cells*
M.J.L. Tamasi, J.C. Plá, C.G. Bolzi, M.G. Martínez Bogado, G.L. Venier and J.C. Durán.
Proc. Second World Conference on Photovoltaic Energy Conversion (1998) 1874.
- *Influence of the deposition parameters on the structural and transport properties of YBaCuO thin films prepared by PLD*
S. Duhalde, A. Lamagna, M. Villafuerte, A. Schwartzman, L. Corraera and G. Quintana.
Applied Surface Science 127-129 (1998) 520.

- *Películas delgadas de Al₂O₃ sobre Si preparadas por Ablación Laser*
A. Lamagna, S. Duhalde, L. Corraera and S. Nicoletti.
Revista de Metalurgia (Spain) 34 (1998) 73.
- *Diseño, elaboración y caracterización de celdas solares de silicio cristalino con textura superficial*
J.C. Plá, E.M. Godfrin and J.C. Durán.
Energías Renovables y Medio Ambiente 4 (1998) 1.
- *Fabricación de solarímetros de bajo costo en la Argentina: algunas propuestas teóricas y primeras experiencias*
J.C. Durán, C.G. Bolzi, E.M. Godfrin, J.C. Plá, L.M. Merino, C.J. Bruno and M.J.L. Tamasi.
Avances en Energías Renovables y Medio Ambiente 2 (1998) 05.9.
- *Elaboración de películas de CdTe para uso solar*
R. Picicelli, J.L. Dragone, A. Lamagna and N. Di Lalla.
Avances en Energías Renovables y Medio Ambiente 2 (1998) 04.29.
- *Elaboración de películas de óxidos conductores transparentes para uso solar*
R. Picicelli, J.L. Dragone, A. Lamagna and N. Di Lalla
Avances en Energías Renovables y Medio Ambiente 2 (1998) 04.33.
- *Determinación de la longitud de difusión de portadores minoritarios en celdas solares mediante iluminación posterior: consideraciones teóricas y resultados experimentales*
J.C. Plá, C.G. Bolzi, J.C. Durán and M.J.L. Tamasi
Anales AFA 10 (1998) 344.
- *Renewable Energies in Argentina: Present and Future*
M. Fuentes, A. Lamagna and O. Frumento
The World Directory of Renewable Energy 1998. Editor: Bruce Cross. James & James Science Publishers Ltd, UK (1998).
- *Lifetime measurements in ¹³⁵Pr*
S. Botelho, W.A. Seale, L.G. R. Emediato, J.R.B. Oliveira, R.V. Ribas, N.H. Medina, M.N. Rao, E.W. Cybulska, M.A. Rizzutto, F.R. Espinoza-Quiñones, G. García Bermúdez, H. Somacal, and M.A. Cardona
Physical Review C 58 (1998) 3726.
- *Mössbauer spectra of intermolecular Fe in L-alanine*
D. Rodríguez Sierra, C. Saragovi, E. Winkler and C. Fainstein.
Hyp. Int. C 3 (1998) 65.
- *Evaluation of Phyrophosphate-extractable Fe from each horizon of an argentinian soil profile*
A. Mijovilovich, C. Ramos, C. Saragovi, S.G. Acebal, E.H. Rueda and M.E. Aguirre.
Hyp. Int C 3 (1998) 336.
- *Magnetic and Mössbauer experiments on disperse hematite nanoparticles*
R.D. Zysler, C. Arcipestre, M. Dimitrijewits, D. Rodríguez Sierra, C. Saragovi and J.M. Greneche.
Hyp. Int C 3 (1998) 33.
- *Magnetic Fraction of an Ultisol from Misiones, Argentina*
A. Mijovilovich, H. Morras, C. Saragovi, G. Santana and J.D. Fabris.
Hyp. Int C 3 (1998) 332.
- *Mn and Fe doped Alanine: an EPR and Mössbauer study*
E. Winkler, C. Fainstein, D. Rodríguez Sierra and C. Saragovi.
Proceedings of the 29th Ampere Congress and 13th ISMAR, Berlin (1998)

- *A triple point in an alloy with modulated compositional order*
V. Massidda.
Physica B 253 (1998) 313.
- *Large variations in the magnetization of Co clusters induced by noble metal coating*
J. Guevara, A.M. Llois and M. Weissmann.
Phys.Rev.Lett. 81 (1998) 5306.
- *Spin flip contribution to the “in-plane” conductivity of magnetic multilayers*
R. Gómez Abal, A.M. Llois and M. Weissmann.
Comput.Materials Sci. 10 (1998) 395.
- *Electronic properties of mixed transition metal clusters*
J. Guevara, A.M. Llois and M. Weissmann
Revista Mex. de Física 44, supl. 3, (1998) 29.
- *“The effects of the spill over in the electronic and magnetic properties of Ni, Co, and Fe clusters*
Javier Guevara, Francisco Parisi, Ana María Llois and Mariana Weissmann.
Computational Materials Science 10 (1998) 440.
- *Interaction of Cu(III) surface state with different extended defects*
Andrea Barral and Ana María Llois.
Computational Materials Science 10 (1998) 154.
- *Magnetic structure of small Fe-Ni clusters: calculations in the Ni rich region*
J. Guevara and A.M. Llois.
Rev. Mex. De Física 44 (1998) 22.
- *Anisotropía magnética en capas delgadas de metales de transición*
R. Gómez Abal and A.M. Llois.
Rev. Mex. De Física 44 (1998) 208.
- *The polarizability and intermolecular potential of C₆₀'*
Z. Gamba.
Phys. Rev. B 57 (1998) 1402.
- *The ordered, orientationally disordered and glassy crystalline phases of P₄S₃*
D. Bougeard and Z. Gamba.
Mol. Phys. 94 (1998) 815.
- *Single crystal growth of YBa₂Cu₃O_{7-δ} through a Pt compound intermediate phase*
L. Morales, G. Polla, D. Vega, H. Lanza, P. Levy, A.G. Leyva.
Solid State Ionics 116 (1998) 139.
- *Nonhomogenous transport current density and voltage distribution in isotropic high T_c superconductors*
V. Bekeris, R. Schifini, M. Monteverde, P. Dmitruk, H. Ferrari, G. Polla, F.de la Cruz.
Physica C 299 (1998) 59.
- *Angular variation of pinning near the irreversibility temperature in single crystals YBaCuO with splayed columnar defects*
A. Herbsommer, J. Luzuriaga, L. Civale, G. Pasquini, H. Lanza and P. Levy.
Physica C 304 (1998) 112.

- *On the asymptotic behavior of an earthquake model*
Horacio Ceva.
Phys. Letters A 245 (1998) 413.
- *Correlations in the sand pile model: from the log-normal distribution to self Organized Criticality*
H. Ceva and J. Luzuriaga.
Physics Letters A 250 (1998) 275.
- *A semiempirical potential for the statics and dynamics of covalent carbon systems*
E. Burgos, E. Halac and H. Bonadeo.
Chem. Phys. Lett. 298 (1998) 273.
- *Reactivity of tungsten(V) mononuclear complexes towards LiTCNQ and TCNQ. Comparison of the crystal structures of [W(Me2dtc)4](TCNQ) and [Mo(Me2dtc)4](TCNQ), CH3CN [Me2dtc = S2CN(CH3)2]*
Le Stang, F. Conan, J. Sala Pala, Y. Le Mest, M.T. Garland, R. Baggio, E. Faulques, A. Leblanc, P. Molinié and L. Toupet.
J. Chem. Soc., Dalton Trans., (1998) 489.
- *Monosodium 3(N,N-dimethyl)-1-hydroxy-1,1'-bisphosphonate, hydrate (Olpadronate)*
D. Vega, R., Baggio. & O. Piro.
Acta Cryst C 54 (1998) 324.
- *Bis(1,10-Phenanthroline)-copper(ii) tetrathionate and Tris(1,10-Phenanthroline)-copper(ii) tetrathionate, pentahydrate*
E. Freire, S. Baggio, R. Baggio & M.T. Garland.
Acta Cryst C 54 (1998) 464.
- *Tri-aquo-tris-(oxydiacetate) (europium(III) lanthanum(III))-pentahydrate*
R. Baggio, M.T. Garland. & M. Pereg.
Acta Cryst C 54 (1998) 591.
- *Aqua(1,10-phenanthrolyne-N,N')(μ-thiosulfato-S,O) cadmium(II), hydrate*
S. Baggio, R. Baggio, M.T. Garland.
Acta Cryst C 54 (1998) 1099.
- *Hexakis(imidazole)nickel(II) carbonate pentahydrate*
V. Povse, M. Pereg, R. Baggio. & M.T. Garland.
Acta Cryst C 54 (1998) 1817.
- *3,3'-dimethyl -2,2'-biquinoline)bromotricarbonyl rhenium(i)*
J. Guerrero, S.A. Moya, M.T. Garland & R. Baggio.
Acta Cryst C 54 (1998) 1592.
- *5-R-3H-1,2-Dithiole-3-Thione(R = ethylthio, methylthio)*
R.F. Baggio, L.L. Aimar, R.H. de Rossi & L. Suescun.
Acta Cryst.C 54 (1998) 1902.
- *2,9-Dimethyl-1,10-phenanthroline dihydrate*
S. Baggio, R. Baggio, A. Mombrú.
Acta Cryst.C 54 (1998) 1900.
- *((4R,5S,2'R)-1,5-Dimethyl-4-phenyl-3-acetyl-[2'-phenyl-2'(1-naphthyl)])*
R.F. Baggio, G. Lotz, S. Palacios, R. Mariezcurrena.
Acta Cryst.C 54 (1998) 1677.

- *Synthesis and X-ray crystal structure determination of four novel lanthanide(III) oxydiacetate complexes*
R.F. Baggio, M.T. Garland and M. Pereg.
Inorg. Chim. Acta 281/1 (1998) 18.
- *Synthesis and crystal structure of a new salt of the complex anion [(TCNQ)₃]²⁻ [Mo₂((2-S₂)₂(S₂CNMe₂)₄)(TCNQ)₃*
F. Conan, J. Sala Pala, M.T. Garland & R. Baggio.
Inorg. Chim. Acta 278/1 (1998) 108.
- *Structural and spectroscopic investigation of 1-amino-2,4,-dinitrobenzenes*
M.V. Remedi, E. Bujan, R. Baggio & M.T. Garland.
J. Phys. Org. Chem. Vol. 11 (1998) 895.
- *A Water Tank Cherenkov Detector for Very High Energy Astroparticles*
P. Bauleo, A. Etchegoyen, J.O. Fernández Niello, A.M.J. Ferrero, A. Filevich, C.K. Guérard, F. Hasenbalg, D. Ravignani and J. Rodríguez Martino.
Nucl. Inst. and Meth.. A406, 69-77, (1998).
- *Characterisation of amorphous Si_xCl_{1-x} thin films obtained using high energy ion beam deposition on Si*
H. Huck, E. B. Halac, C. Oviedo, G. Zampieri, M. E. Reinoso, M.A.R. de Benyacar.
Proceedings IX European Conference on Diamond, Diamond-like materials, Nitrides and Silicon Carbide. Crete, Greece, (1998).
- *WCD routines used in wtank code*
P. Bauleo and J. Rodríguez Martino.
GAP-98-50
- *Optical impact of a thin ice layer in a water Cherenkov detector*
P. Bauleo, C. Bonifazi, A. Ferrero and A. Reguera.
GAP-98-060
- *Search for Annual Modulation of Dark-Matter Signals with a Germanium Spectrometer at the Sierra Grande Laboratory*
D. Abriola, F.T. Avignone III, R.L. Brodzinski, J.I. Collar, D.E. Di Gregorio, H.A. Farach, E. García, A.O. Gattone, C. Guerard, F. Hasenbalg, H. Huck, H.S. Miley, Morales, J. Morales, A. Ortiz de Solórzano, J. Puimedón, J.H. Reeves, A. Salinas, M.L. Sarsa, and J.A. Villar.
Astropart. Phys. 10 (1999) 133.
- *Solar Axion Experiments Using Coherent Primakoff Conversion in Single Crystals*
F.T. Avignone III, D. Abriola, R.L. Brodzinski, J.I. Collar, R.J. Creswick, D.E. Di Gregorio, H.A. Farach, A.O. Gattone, C.K. Guerard, F. Hasenbalg, H. Huck, H.S. Miley, A. Morales, J. Morales, S. Nussinov, A. Ortiz de Solorzano, J.H. Reeves, J. Villar, and K. Zioutas.
Nucl. Phys. B 72 (Proc. Suppl.) (1999) 176.
- *A Decommissioned LHC Model Magnet as an Axion Telescope*
K. Zioutas, C.E. Aalseth, D. Abriola, F.T. Avignone III, R.L. Brodzinski, J.I. Collar, R.J. Creswick, D.E. Di Gregorio, H. A. Farach, A.O. Gattone, C. K. Guerard, F. Hasenbalg, M. Hasinoff, H. Huck, A. Liolios, H.S. Miley, A. Morales, J. Morales, D. Nikas, S. Nussinov, A. Ortiz, E. Savvidis, S. Scopel, P. Sievers, J. A. Villar, L. Walckiers.
Nuclear Instruments & Methods in Physics Research A 425 (1999) 480.
- *Transitions between modulated phases in an Ising model with third-neighbour interactions (mean-field approximation).*
V. Massidda
J. of Magnetism and Magnetic Materials 192 (1999) 505.

- *Comment on 'A note on the long period commensurate structure'*
V. Massidda
J. Phys. Soc. Japan 68 (1999) 315.
- *The influence of phase space localization in the quantum dynamics of a chaotic billiard*
D.A. Wisniacki and E. Vergini.
Phys. Rev. E 59 (1999) 6579.
- *Comparison between a thermal and a time-dependent mean-field description of a two level bosonic model*
M.C. Cambiaggio, G.G. Dussel and A.M. Szyferman.
Phys. Rev. C 60 (1999) 443.
- *Radiative electron attachment in Sodium clusters*
M.R. Spinella, M. Bernath, O. Dragún
Phys. Rev. A 58 (1998) 2985.
- *Determination of minority carrier lifetime in solar cells: a novel biased OCVD technique*
C.J. Bruno, M.G. Martínez Bogado, J.C. Plá and J.C. Durán
Physica Status Solidi (a) 174 (1999) 231.
- *Primera experiencia de celdas solares argentinas en el espacio: análisis preliminar de los resultados*
E.M. Godfrin, M.G. Martínez Bogado, M.J.L. Tamasi and J.C. Durán
Avances en Energías Renovables y Medio Ambiente 3 (1999) 04.25.
- *Construcción y ensayo de piranómetros fotovoltaicos de bajo costo desarrollados en la CNEA*
C.G. Bolzi, J.C. Durán, O. Dursi, G. Renzini and H. Grossi Gallegos
Avances en Energías Renovables y Medio Ambiente 3 (1999) 04.29.
- *Deposition of $\text{Sn}_{(1-x)}\text{Sb}_x\text{O}_{(2-y)}$ thin films for gas sensing devices*
S. Duhalde, M.F. Vignolo, G. Quintana, A. Lamagna, C. Arrieta and J. Giménez
Proc. Euromat 99, International Congress on Advanced Materials and Processes, Munich, Germany (1999).
- *Identification of Pollutant Gases with a Multisensorial Arrange*
R.M. Negri, S. Reich, A. Roman, J. Nicolas, A. Lamagna and G. Dori
Proc. 6th International Symposium Olfaction & Electronic Nose, Tubingen, Germany (1999).
- *Cratering in PMMA induced by gold ions: dependence on the projectile velocity*
R.M. Papaleo, L.S. Farenzena, M.A. de Araujo, R.P. Livi, M. Alurralde, and G. García Bermúdez
Nuclear Instruments and Methods B 148 (1999) 126.
- *Transition strengths and signature inversion in odd-odd ^{74}Br*
G. García Bermúdez, M.A. Cardona, A. Filevich, R.V. Ribas, H. Somacal, and L. Szybisz
Physical Review C 59 (1999) 1999.
- *Spectral-directional reflectivity of Tyvek immersed in water*
A. Filevich, P. Bauleo, H. Bianchi, J. Rodríguez Martino and G. Torlasco.
Nuclear Instruments and Methods A423 (1999) 108.
- *High-spin states in doubly odd ^{176}Re and signature inversion in $\pi h_{9/2} \otimes \nu i_{13/2}$ structures*
M.A. Cardona, A.J. Kreiner, D. Hojman, G. Levinton, M.E. Debray, M. Davidson, J. Davidson, R. Pirchio, H. Somacal, D.R. Napoli, D. Bazzacco, N. Blasi, R. Burch, D. De Acuña, S.M. Lenzi, G. Lo Bianco, J. Rico and C. Rossi Alvarez
Phys. Rev. C 59 (1999) 1298.

- *Non-Identical Twin Bands in Doubly Odd ^{170}Lu*
G. Levinton, A.J. Kreiner, M.A. Cardona, M.E. Debray, D. Hojman, J. Davidson, D.R. Napoli, D. Bazzacco, N. Blasi, S.M. Lenzi, G. Lo Bianco, J. Rico, C. Rossi Alvarez and V.R. Vanin
Phys. Rev. C 60 (1999) 044309.
- *Nuclear Structure of Neutron-Deficient Au and Pt Isotopes from High-Resolution Laser Spectroscopy at ISOLDE*
J. Sauvage, L. Cabaret, J. Crawford, H.T. Duong, J. Genevey, M. Girod, A. Gizon, D. Hojman, G. Huber, F. Ibrahim, A. Knipper, M. Krieg, F. Le Blanc, J.K.P. Lee, D. Lunney, G. Marguier, J. Obert, J. Oms, J. Pinard, J.C. Putaux, B. Roussiere, V. Sebastian, A. Wojtasiewicz, S. Zemlyanoy, D. Forkel-Wirth, J. Lettry, and the ISOLDE Collaboration.
Acta Phys.Pol. B 30 (1999) 1393
- *High-spin state spectroscopy in ^{143}Tb*
F.R. Espinoza-Quiñones, M.A. Rizzutto, E.W. Cybulska, W.A. Seale, J.R.B. Oliveira, N.H. Medina, R.V. Ribas, M.N. Rao, D. Bazzacco, F. Brandolini, S. Lunardi, C.M. Petrache, Zs. Podolyak, C. Rossi-Alvarez, F. Soramel, C.A. Ur, M.A. Cardona, G. de Angelis, D.R. Napoli, S. Spolaore, A. Gadea, D. De Acuña, M. De Poli, E. Farnea, D. Foltescu, M. Ionescu-Bujorm, A. Iordachescu, V. Roca, F. Terrasim A. Chatterjee, A. Saxena and L. Sajo Bohus
Phys. Rev. C 60 (1999) 054304
- *Search for experimental evidence of chaotic behavior in nuclear scattering*
G.V. Martí, A. J. Pacheco, J.E. Testoni, D. Abriola, O.A. Capurro, D.E. Di Gregorio, J.O. Fernández Niello, E. Achterberg, D.E. Álvarez.
Phys Lett B 447 (1999) 41.
- *AMS measurements of South American rainwater samples*
J. Fernández Niello, D.E. Alvarez, A.M.J. Ferrero, O.A. Capurro, D. Abriola, G.V. Martí, A. J. Pacheco, J. E. Testoni, R. G. Liberman, K. Knie, G. Korschinek.
Acta Phys.Pol. 30 (1999) 1629.
- *Observation of a $(\nu^{7/2} - [514])^2$ crossing in ^{180}Os*
R.M. Lieder, Ts. Venkova, S. Utzelmann, W. Gast, H. Schnare, K. Spohr, P. Hoernes, A. Georgiev, D. Bazzacco, R. Menegazzo, C. Rossi-Alvarez, G. de Angelis, R. Kaczarowski, T. Rzaca-Urban, T. Morek, G.V. Martí, K.H. Maier, S. Frauendorf.
Nucl. Phys. A 645 (1999) 465.
- *Aluminum containing particles in synovial fluid of a patient with normal renal function and chondrocalcinosis*
G. Mora, A.G. Leyva, M.A. Benyacar, L.M. Cayetti, H.O. Venarotti.
J. of Clinical Rheumatology, Vol.5 (1999) 83.
- *Adduct formation between zinc and cadmium oxydiacetates imidazol. Crystal structures of $[\text{Zn}(\text{Him})_2(\text{oda})]_n [\text{Cd}_2(\text{Him})_4(\text{oda})_2(\text{H}_2\text{O})]_2 \cdot 6\text{H}_2\text{O}$ (Him=imidazol, oda=oxydiacetate*
R.F. Baggio, M.T. Garland, M. Percec and D. Vega
Inorg. Chim. Acta 284/1 (1999) 49.
- *Binuclear copper(II) thioacetate complex with Cu-S(thioether) bonds and an acetate group in a mono atomic bridging mode: $[\text{Cu}(\text{tda})(\text{phen})]_2 \cdot 2\text{H}_2\text{tda}$*
R. Baggio, M.T. Garland, J. Manzur, O. Pena, M. Percec, E. Spodine & A. Vega.
Inorg. Chim. Acta 296/1 (1999) 174.
- *(Acetato -O, O')-(acetato-O)-(2,9-Dimethyl-1,10-phenanthroline) zinc(ii)*
M. Harvey, S. Baggio, R. Baggio & A.W. Mombrú.
Acta Cryst. C 55 (1999) 308.
- *Trans-Dicarbonyl(2,3,5,6-tetrafluorophenyl) bromo(η^5 cyclopentadienyl)rhenium(III)*
M.T. Garland, R. Baggio, A.H. Klahn & B. Oelckers
Acta Cryst. C 55 (1999) 61.

- *Bromotricarbonyl(3,3'-dimethylene-2,2'-biquinoline) rhenium(i)*
J. Guerrero, S.A. Moya, M.T. Garland & R. Baggio
Acta Cryst. C 55 (1999) 932.
- *Hexakis(imidazole)nickel(II) oxydiacetate, ethanol solvate*
M. Perec, R. Baggio & M.T. Garland.
Acta Cryst. C 55 (1999) 858.
- *Solid State Coordination Chemistry of Pyridinedicarboxylic Acid Isomers. I. Copper(II) Disodium bis(2,3-Pyridinedicarboxylato)Octahydrated and Copper(II) (3,4-Pyridinedicarboxylato) 3.5Hydrated*
E.E. Sileo, D. Vega, R. Baggio, M.T. Garland and M.A. Blesa.
Austr. Jour. Chem. 52 (1999) 205.
- *Catena-(2,2'-bipyridine-*N,N'*)-(μ -3~ -sulfato O:O:O) cadmium(II), dihydrate*
Miguel Harvey; Sergio Baggio, Ricardo Baggio & Helena Pardo
Acta Cryst. C 55 (1999) 1278.
- *Tetraqua-(2,2'-bipyridyl-*N,N'*)-cadmium(ii) sulfate and catena-((μ -2-Sulfato-O,O')-diaqua-(2,2'-bipyridyl-*N,N'*)-cadmium(ii), monohydrate*
Miguel Harvey; Sergio Baggio, Ricardo Baggio & Alvaro Mombrú
Acta Cryst. C 55 (1999) 1457.
- *Triaqua-(2,2'-bipyridyl-*N,N'*)-(thiosulfato-O)-nickel(II) dihydrate and Triaqua-(2,10-phenanthroline-*N,N'*)-(thiosulfato-O)-nickel(II) monohydrate*
E. Freire, S. Baggio, R. Baggio & L. Suescun
Acta Cryst. C 55 (1999) 1780.
- *Ba₂Cu(HCOO)₆, thermal behavior and crystal structure of the room temperature phase*
D. Vega, G. Polla, A.G. Leyva, H. Lanza, P.K. de Perazzo, R. Baggio, M.A.R. Benyacar, J. Ellena, H. Tolentino, M. Martins Alves.
J. Solid State Chem 147 (1999) 545.
- *“Characterization of amorphous carbon rich SiC thin films obtained using high energy hydrocarbon ion beams on Si*
H. Huck, E. B. Halac, C. Oviedo, G. Zampieri and M. Benyacar
Applied Surface Science 141 (1999) 141
- *Microstructural analysis of hard amorphous carbon films deposited with high-energy ion beams*
R.S. Brusa, A. Somoza, H. Huck, N. Tiengo, G.P. Karwasz, A. Zecca, M. Reinoso and E.B. Halac
Applied Surface Science 150 (1999) 202.
- *Molecular Structure and dynamical properties of C₆₀: a semi-empirical calculation*
E. Halac, E. Burgos, H. Bonadeo.
Chemical Physics Letters 299 (1999) 64.
- *Dynamic regimes in the a.c. response of YBCO with columnar defects: intra- and inter valley vortex motions*
G. Pasquini, L. Civale, H. Lanza, G. Nieva
Phys.Rev.B 59 (1999) 9627.
- *Growth of amorphous Si_xC_{1-x} thin films using a methane-silane high energy ion beam*
E.B. Halac, H. Huck, C. Oviedo, M.E. Reinoso, M.A.R. de Benyacar
Surface and Coatings Technology vol.122/1 (1999) 51

- *Evidence for vortex staircases in the whole angular range due to competing correlated pinning mechanisms*
A. Silhanek, L. Civale, S. Candia, G. Nieva, G. Pasquini, H. Lanza
Phys. Rev. B 59 (1999) 13620.
- *Magnetic interaction evidence in α -Fe₂O₃ nanoparticles by magnetization and Mössbauer measurements*
M. Vazquez-Mansilla, R.D. Zysler, C. Arciprete, M.I. Dimitrijewits, C. Saragovi and J.M. Greneche
J of Magnetism and Magnetic Materials 204/1-2 (1999) 29.
- *Iron oxide mineralogy of a dlesol from Bahía Blanca by selective dissolution techniques, x-ray diffraction and Mossbauer spectroscopy*
S.G. Acebal, A. Mijovilovich E.H. Rueda., M.E. Aguirre & C. Saragovi.
Clays & Clay Minerals (1999).
- *Cobalt impurities on noble-metal surfaces*
A. Saul, J. Guevara, A.M. Llois, M. Weissmann
Phys. Rev. B 59 (1999) 8405.
- *Magnetic contribution to the segregation energy in magnetic-nonmagnetic systems*
A. Saul and M. Weissmann
Phys. Rev. B 60 (1999) 4982.
- *Tight-binding molecular dynamics study of amorphous carbon deposits over Silicon surfaces*
Chu-chun Fu and M. Weissmann
Phys. Rev. B 60 (1999) 2762.
- *Magnetic anisotropy of 4d transition metal monolayers: The role of low energy valence bands*
Ricardo Gomez Abal and A.M. Llois
Phys. Rev. B 60 (1999) 12841.
- *Structural evolution of free Co clusters magnetism*
J. Guevara, A.M. Llois, F. Aguilera Granja and J.M. Montejano Carrizales.
Solid State Comm. 111 (1999) 335.
- *On the metallic behavior of Co clusters*
F. Aguilera-Granja, J.M. Montejano-Carrizales, J.Guevara and A.M. Llois.
Solid State Comm. 113 (1999) 147
- *Superconductivity in Ferromagnetic RuSr₂GdCuO₈*
Warren E. Pickett, Ruben Weht and A.B. Shick
Physical Review Letters 83 (1999) 3713.
- *Electron Doping in the Honeycomb Bilayer Superconductors (Zr,Hf)NCl*
Ruben Weht, Alessio Filippetti and Warren Pickett.
Europhysics Letters 48 (1999) 320.
- *Half-Metallic Ferrimagnetism in Mn₂VAl*
Ruben Weht and Warren Pickett.
Physical Review B 60 (1999) 13006.
- *8-chloro-1-methyl-6-phenyl-4H-1,2,4-triazolo[4,3-a]-[1,4] benzodiazepine (Alprazolam)*
Daniel R. Vega, Ricardo Baggio, Silvia Russi.
Acta Cryst. C 55 (1999) 294.
- *Pixe Analysis of atmospheric aerosols in the city of Buenos Aires*
M.J. Ozafrán, M.E. Vázquez, A. Burlón, M. Buhler, M.A. Cardona, M.E. Debray, D. Hojman, J.M. Kesque, A.J. Kreiner, G. Levinton, J.J. Menéndez, F. Naab, P. Stoliar, M. Davidson and J. Davidson
International Journal of PIXE (1999).

- *Mössbauer spectroscopy of the Zr-rich region in Zr-Nb-Fe alloys with low Nb content*
C. Ramos, C. Saragovi, M. Granovsky and D. Arias
Hyp Interact 122 (1999) 201.
- *Mössbauer Study of the Fe mineralogy in different argentine soils*
A. Mijovilovich, H. Morrás , H. Causevic and C. Saragovi
Hyp. Interact 122 (1999) 83.
- *Collective description of nuclear double beta decay transitions*
D.R Bes, O. Civitarese y N.N. Scoccola
Phys.Lett. B 446 (1999) 93
- *The Lambda-Nucleon interaction potential in the bound state soliton model*
G.L. Thomas, V.E. Herscovitz, C.L. Schat y N.N. Scoccola
Nucl.Phys. A646 (1999) 108
- *On the Classical Dynamics of Billiards on the Sphere*
M. E. Spina, M. Saraceno
J.Phys. A (Math.Gen.) 32 (1999) 7803.
- *The Construction of Quantum Markov Partitions*
R. O. Vallejos, M. Saraceno
J. Phys. A (Math.Gen.) 32 (1999) 7273.
- *Charge exchange reactions in the Glauber approximation*
E.E. Maqueda, S.M. Lenzi, A. Vitturi and F. Zardi
Physical Review C 59 (1999) 2297
- *Reply to Comment on ``The Pairing interaction and the Galilei Invariance''*
G.G. Dussel, H.M. Sofia and A. Tonina.
Phys. Rev. **C59** (1999)2954.
- *Energetics, surface tension, and prewetting jump of superfluid ^4He films adsorbed on planar substrates*
L. Szybisz.
Journal of Low Temperature Physics 116 (1999) 215.

Establishment of National Standards

IRAM Standards: “Solar Energy-Photovoltaic Modules”

- *210013-1: Visual inspection*
- *210013-2: Electrical characteristics at standard test conditions*
- *210013-3: Insulation test*
- *210013-4: Robustness test of terminations*
- *210013-5: Twist test*
- *210013-6: Mechanical load test*
- *210013-7: U.V. exposure test*
- *210013-8: Hail resistance test*
- *210013-9: Thermal cycling test*
- *210013-10: Humidity freeze test*
- *210013-11: Damp heat test*

Theses

Ph.D. Theses

- **G.L. Venier.** “*Celdas fotovoltaicas de silicio cristalino: simulación, diseño, elaboración y* Universidad de Buenos Aires - April 1997.
Advisor: J.C. Durán.
- **María R. Spinella.** “*Dispersión de Electrones de Baja Energía por Agregados Metálicos*”. Universidad de Buenos Aires - April 1997.
Advisor: O. Dragún.
- **Juan P. Garrahan.** “*Tratamiento BRST Lagrangiano de Coordenadas Colectivas*”. Universidad de Buenos Aires - June 1997.
Advisor: D.R. Bes.
- **Ana E. Mijovilovich.** “*Estudio Mössbauer de óxidos e hidróxidos de Fe: Aplicación al estudio de suelos*”. Universidad de Buenos Aires - September 1997.
Advisor: C. Saragovi.
- **Oscar A. Capurro.** “*Valor medio de la distribución de espín a través de relaciones isoméricas*” Universidad de Buenos Aires – September 1997.
Advisor: D.E. Di Gregorio.
- **Luis M. Kruczenski Gainza.** “*Aspectos cuánticos de los solitones en teorías de campos*”. Universidad de Buenos Aires – March 1998.
Advisor N.N. Scoccola.
- **Gabriela Pasquini.** “*Dinámica de vórtices en cristales de YBaCuO con defectos columnares cerca de la transición vidrio-líquido*”. Universidad de Buenos Aires – March 1998.
Advisors: L. Civale, H. Lanza
- **Juan C. Plá.** “*Tratamientos superficiales antirreflectantes y elaboración de juntas para celdas solares de Si cristalino*”. UBA. Universidad de Buenos Aires – May 1998.
Advisor: J.C. Durán.
- **Javier Guevara.** “*Estabilidad y propiedades electrónicas de agregados de metales de transición*”. Universidad de Buenos Aires – September 1998.
Advisor: A.M. Llois.
- **Daniela Alvarez.** “*Medición de la deposición de ^{36}Cl mediante la técnica AMS*” Universidad de Buenos Aires – November 1998
Advisor: J. Fernández Niello.
- **Ricardo Gomez Abal.** “*Anisotropía magnética en películas delgadas de metales de transición.*” Universidad de Buenos Aires –1999.
Advisor: Ana María Llois.

Licenciatura (Master) Theses

- **Isabel Rodríguez.** “*Estudio del compuesto $\text{Bi}_2\text{BaNb}_2\text{O}_9$ y sus derivados sustitucionales con La ($\text{Bi}_2\text{Ba}_{1-n}\text{La}_n\text{Nb}_2\text{O}_9$)*”. Instituto de Tecnología, UNSAM. - March 1997.
Advisor: G. Leyva.Co-Advisor: D. Vega.

- **G. Carlo.** “*Estadística de niveles y estudio de las funciones de onda de un sistema cuya dinámica clásica es mixta*”.
Universidad de Buenos Aires – April 1997.
Advisor: E. Vergini. Abril 1997.
- **M.G. Martínez Bogado.** “*Elaboración y caracterización de celdas solares bifaciales de silicio cristalino - Medición de vida media de portadores minoritarios*”.
Universidad de Buenos Aires – May 1997.
Advisor: J.C. Durán
- **G. Carrau.** “*Estudio de la transición de fase inconmensurada-commensurada ferroeléctrica del Rb_2ZnCl_4 : influencia de defectos introducidos por irradiación*”.
Universidad de Buenos Aires – May 1997.
Advisor: H. Lanza.
- **L. Morales.** “*Obtención y caracterización de monocristales de $Yba_2Cu_3O_{7-d}$* ”.
Universidad de Buenos Aires – June 1997.
Advisor: G. Polla. Co-Advisor: H. Lanza.
- **A. Arazi.** “*Cámara de ionización para la detección de iones pesados*”.
Universidad de Buenos Aires – June 1997.
Advisor: J. Fernández Niello.
- **S. Gueijman.** “*Deposición electroquímica y caracterización de películas de InP.*”
Instituto de Tecnología, UNSAM - September 1997.
Advisor: C. Schvezov (Univ. Nac. Misiones); Co-Advisor: A. Lamagna.
- **D. Rodríguez Sierra.** “*Estudio por Espectroscopía Mössbauer del entorno del Fe dopado en L-alanina.*”
Universidad de Buenos Aires – November 1997.
Advisor: C. Saragovi.
- **A. Monastra.** “*Cálculo Exacto y Semiclásico de Autoestados en Sistemas Caóticos*”.
Universidad de Buenos Aires – December 1997.
Advisor: M. Saraceno.
- **R.A. Pérez** “*Sistema de Tiempo de Vuelo para la Identificación en Masa de Iones Pesados*”
(Master Degree in Nuclear Engineering, I.B.)
Universidad Nacional de Cuyo. – 1997.
Advisor: J. Ernández Niello
- **M.J. Villafuerte.** “*Crecimiento de Películas Delgadas de YBaCuO por ablación Láser y su Caracterización Estructural y Eléctrica*”.
Instituto de Tecnología, UNSAM - June 1998.
Advisor: A. Lamagna.
- **Cynthia Ramos.** “*Estudio de las fases presentes en el sistema ternario Zr-Nb-Fe*”.
Universidad de Buenos Aires – August 1998.
Advisors: M.Granovsky, C.Saragovi.
- **María Elba Reinoso.** “*Estudio de los parámetros relevantes en la generación de películas policristalinas de diamante*”.
Universidad de Buenos Aires – September 1998.
Advisor: Hugo Huck.
- **M. Alinovi.** “*Construcción Semiclásica de funciones de Onda en Sistemas Cuasi integrables*”.
Universidad de Buenos Aires – September 1998.
Advisor: Eduardo Vergini.

- **Claudio Pastorino.** “*The crystalline phases of the molecule S_8* ”.
Universidad de Buenos Aires, December 1998.
Advisor: Zulema Gamba
- **Julián Milano.** “*Magnetorresistencia inversa en multicapas magnéticas*”.
Universidad de Buenos Aires, December 1998.
Advisor: A.M. Llois.
- **Verónica Vildosola.** “*Estudios de magnetismo en compuestos de Ce y metales de transición 4d*”.
Universidad de Buenos Aires, December 1998.
Advisor: A.M. Llois.
- **Ma. Fernanda Salfity.** “*Detección de ^{10}B en muestras biológicas utilizando la técnica PIGE*”.
Universidad Nacional de Salta. -. December 1998.
Advisor: A.J. Kreiner.
- **Asthriesslav Rocuts.** “*Conversión fotovoltaica de la energía solar: principios fundamentales, medición de celdas y paneles solares, y dimensionamiento de sistemas*”
Universidad Distrital, Bogotá, Colombia, 1999.
Advisor: J.C. Durán. Co-Advisor: Elena M. Godfrin
- **Isabel Raspini.** “*Estudio por espectroscopía Mossbauer de productos de corrosión formados sobre aceros de aplicación en petróleo y gas*”.
Universidad Nacional de San Martín. 1999.
Advisor: C.Saragovi.

Special Works

- **C.J. Bruno**
Secretary of Solar Energy Commission at IRAM
- **J.C. Durán**
Secretary of the Buenos Aires Section of the Argentine Physics Association
- **G. García Bermúdez**
Miembro del Cuerpo Consultor de la Comisión Asesora de Ciencias Exactas y Naturales. CONICET 1997-1998
Evaluador del Programa de Incentivos Area Física, Universidad Nacional de la Plata 1998, 1999.
Coordinador del Proyecto de Inversión. BAPIN. Centro de Aceleración de Iones Since 1996.
- **A. Lamagna**
Treasurer of the Buenos Aires Section of the Argentine Physics Association
Coordinator of Environment Area of the Polo Tecnológico Constituyentes
- **N.N. Scoccola**
Fellowship evaluation Committee of the Fundación Antorchas
Fellowship evaluation Committee of the CONICET
Organizing Committee of the Carrer for the doctor degree in Physics of the Department of Physics, CNEA

Scientific Cooperation Programs

D. Di Gregorio

University of South Carolina (U.S.A.), Pacific Northwest Laboratory, University of Zaragoza (Spain) and C.N.E.A. 1994-1999.

Lawrence Berkeley National Laboratory (U.S.A.) and C.N.E.A. 1997-2000

J.C. Durán

CNEA-CONAE (Comisión Nacional de Actividades Espaciales)

Subject: R&D Project of Solar Devices for Space Applications, 1997-1999

G. García Bermúdez

Dept. of Physics Federal State University Tallhassee, Florida USA CONICET - National Science Foundation.

Subject: Altos Momentos Angulares en Núcleos de Masa 80, 1995-1997

Dept. de Física. Universidad federal de Rio Grande do Sul. Porto Alegre. Brazil CONICET -CNPq

Subject: Difusion: Mediciones a Bajas Temperaturas y Aumentadas por Irradiación, 1997-98

Dept. de Materiales . Universidad Federal de Rio Grande do Sul. Porto Alegre. Brazil. Programa CAPES (Brazil) - SeCyT (Argentina)

Subject: Estudios de Difusión Medidos por Técnicas Nucleares. 1999-2000.

A.J. Kreiner

Programa ANPCyT - ECOS. Proyecto A97B02, 1997

Subject: Estudios de factibilidad para la introducción de la protonterapia en la Argentina.

A. Lamagna

LAMEL Institute/CNR (Italy) - Faculty of Engineering (University of Buenos Aires) – CITEFA - CNEA

Subject: R&D Project on Solid State Micromachinated Gas Sensors.

Visitors and Visits

Visitors

1997

- Avignone III, F.T. University of South Carolina, Columbia, U.S.A.
- Blaha, P. Universidad Técnica de Viena, Austria
- Blum, L. Universidad de Puerto Rico, Puerto Rico
- Bragagnolo, J. Pacific Solar Pty. Ltd., Australia.
- Camín, D. Universidad de Milán, Italy
- Claro, F. Universidad Católica, Santiago, Chile
- Correrá, L. LAMEL, Bologna, Italy.
- Creswick, R.J. University of South Carolina, Columbia, U.S.A.
- Collar, J.I. CERN, Switzerland
- Cronin, J.W. University of Chicago, USA.
- D'Olivo, J.C. Universidad Nacional Autónoma de México, Mexico
- De Boer, J. Universidad de Munich, Germany
- Donangelo, R. Universidad Federal de Rio de Janeiro, Brazil
- Dori, L. LAMEL, Bologna, Italy.
- Dukelsky, J. Universidad Autónoma de Madrid, Spain
- Farach, H.A. University of South Carolina, Columbia, USA.
- Fifield, K. Universidad Nacional de Australia, Canberra, Australia
- Gordon, M. CENG, Grenoble, France
- Grenpelg, D. CENG, Grenoble, France
- Guerard, C. Universidad de South Carolina, USA.
- José, J.V. Northeastern University, Boston, USA.
- Korschinek, G. Universidad Técnica de Munich, Germany
- Levy Yeyati, A. Universidad Autónoma de Madrid, Spain
- Lorenzana, J. Centro Atómico Bariloche, Prov. de Río Negro, Argentina
- Milley, H.S. Pacific Northwest National Laboratory, Richland, USA
- Marta, D. Universidad de Uruguay, Montevideo, Uruguay
- Massmann, H. Universidad de la Frontera, Chile
- Mazal, A. Centro de Protonterapia, Orsay, France
- Meigikos, R. Universidad Federal Fluminense, Niteroi, Brazil
- Nicoletti, S. LAMEL, Bologna, Italy
- Nusinov, S. Department of Physics, Tel Aviv, Israel.
- Papaleo, R.M. Universidad Federal de Rio Grande do Sul, Brazil
- Petrilli, H. Universidad de San Pablo, Brazil
- Ramírez, R. Universidad Católica, Santiago, Chile
- Rosenwald, J.C. Instituto Curie, París, France
- Saúl, A. CNRS, Marsella, France
- Shellard, R. Centro Brasileño de Pesquisas Fisicas, Brazil
- Silveira Gomes, P. Universidad Federal Fluminense, Niteroi, Brazil
- Solomon, G.N. Department of Physics, Florida State University, Tallahassee, Florida, USA
- Tabor, S. Department of Physics, Florida State University, Tallahassee, Florida, USA
- Thomas, G. Universidad Federal de Rio Grande do Sul, Brazil
- Touati, A. Instituto Curie, París, France
- Zardi, F. Universidad de Padua, Padua, Italy
- Zioutas, K. University of Thessaloniki, Greece.

1998

- Ambrosch Drax, C. Universidad de Graz, Austria
- Blum, L. Dto. de Física, Universidad de Puerto Rico
- Baranger, M. Massachusset Institute of Technology, USA.
- Camín, D. Universidad de Milán, Italy
- Cassidy, M. University of Utah, USA.
- Cester, R. Universidad de Turin, Italy
- Correra, L. CNR-Lamel, Bolonia, Italy
- Cronin, J. University of Chicago, USA.
- Dori, L. CNR-Lamel, Bolonia, Italy
- Fick, B. University of Utah, USA.
- Gibbs, K. University of Chicago, USA.
- Guerard, C. Dep. of Physics and Astronomy, Univ. of S. Carolina, USA.
- Kalbitzer, S. Max Planck Institut für Kernphysik, Heidelberg, Germany
- Lenzi, S. Dipartimento di Fisica “Galileo Galilei”. Univ. de Padua, Italy
- Moehlecke, A. Pontificia Universidade Católica do Rio Grande do Sul, Brazil
- Nápoli, D. Lab. Nazionale di Legnaro, INFN, Italy
- Navarra, G. Universidad de Turín, Italy
- Norman, E. Nuclear Science Div., Lawrence Berkeley Nat. Lab., USA.
- Papaléo, R. Universidad Católica de Porto Alegre, Brazil
- Paxton, A. Queen's Unniversity of Belfast, UK.
- Voros, A. Centre DÉtudes Nucleaires, Saclay, France
- Weekes, T. Univ. of Harvard y Harvard Smithsonian Center, USA.
- Zanesco, I. Pontificia Universidade Católica do Rio Grande do Sul, Brazil

1999

- Added, N. Univ. Sao Paulo, Brazil
- Barbosa de Moraes, S. Universidade Federla Fluminense, Niteroi RJ, Brazil
- Baranger, M. MIT, Massachussets, USA
- Bertocco, S. Laboratorio Nacional de Legnaro, Italy
- Bohigas, O. Univ. De Paris-Seis, France
- Correra, L. CNR-Lamel, Bolonia, Italy
- De Poli, M. Laboratorio Nacional de Legnaro, Italy
- Farenzena, L. Instituto de Física, PUCRS, Porto Alegre, Brazil
- Fifield, K. Univ. Nac. de Australia, Australia
- Garraham, J.P. Univ. Of Oxford, United Kingdom
- Gomes, P. Univ. Federal Fluminense, Niteroi, Brazil
- Jalaver, R. Univ. De Strasbourg, France
- Leboeuf, P. Univ. De Paris-Seis, France
- Marta, D. Univ. De la República, Montevideo, Uruguay
- Massmann, H. Universidad de la Frontera, Chile
- Meigikos, R. Univ. Federal Fluminense, Niteroi, Brazil
- Napoli, D. Laboratorio Nacional de Legnaro, Italy
- Ozorio de Almeida, A. Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro, Brazil
- Padron Diaz, I. Univ. Federal Fluminense, Niteroi, Brazil
- Paxton, A. Queen's Unniversity of Belfast, UK.
- Pickett, W. University of California, Davis. USA.
- Rivas, A. CBPF, Brazil
- Schat, C.L. CBPF, Brazil
- Simone Univ. Federal Fluminense, Niteroi, Brazil
- Vallejos, R. UERJ, Brazil
- Walliser, H. Univ. Of Siegen, Germany
- Yanch, J. Massachusetts Institute of Technology (MIT), USA

Visits

1997

- Capurro O.A International Workshop on Rare Nuclear Processes in Low Energy Heavy Ion Physic, New Delhi, Indies
- D. Di Gregorio. The Lawrence Berkeley National Laboratoty, USA
- J. Fernández Niello Technische Universitaet Munich, Munich, Germany
- M.R. Liberman Univ. Fed. Fluminense, Brazil/ Univ. Sao Paulo, Brazil
- G. Martí Univ. Fed. Fluminense, Brazil/ Univ. Sao Paulo, Brazil)
- R. Weht ICTP. Italy. Postdoctorate Associate.

1998

- Capurro O.A Dept. of Nuclear Physics, ANU. Canberra, Australia
- D. Di Gregorio The Lawrence Berkeley National Laboratoty, USA
- J. Fernández Niello International Conference on the Centennial of the Discovery of Polonium and Radium. Nuclear Physics Close to the Barrier. Varsovia, Poland
- J. Fernández Niello Technische Universitaet Munich, Munich, Germany
- J. Fernández Niello Universidad de la República, Montevideo, Uruguay
- A. Pacheco Nuclear Physics close to the Barrier, Varsovia, Poland
- A. Pacheco XXI Reuniao de Trabalho sobre Física Nuclear no Brasil, Itatiaia, Brazil
- A. Pacheco Reunión Anual de la Soc. Uruguaya de Física, Montevideo, Uruguay
- F. Parisi Facultad de Ciencias. Universidad del País Vasco. Spain
- R. Weht. University of California at Davis, USA. Postdoctorate Associate.

1999

- C.J. Bruno. Alenia-Difesa, Milan, Italy
- O. Capurro III Latin American Workshop on Nuclear and Heavy-ion Physics, Colombia.
- D. Di Gregorio The Lawrence Berkeley National Laboratoty, USA
- J.C. Durán. Alenia-Difesa, Milan, Italy
- J.C. Durán LAMEL, Bologna, Italy
- J. Fernández Niello 8th International Conference on Accelerator Mass Spectrometry, Austria
- Z. Gamba. Dept. of Physics of the University of Puerto Rico
- A. Pacheco 8th International Conference on Accelerator Mass Spectrometry, Austria
- A. Lamagna LAMEL, Bologna, Italy
- E.E. Maqueda Instituto di Fisica, Univ. di Padova, Italy
- G. Martí III Latin American Workshop on Nuclear and Heavy Ions Physics, Colombia
- J.C. Plá LAMEL, Bologna, Italy.
- H.M. Sofia Instituto di Fisica, Univ. di Padova, Italy
- M. Saraceno Newton Institute, Cambridge, United Kingdom
- M.E. Spina Lab. de Physique Théorique et Modeles Statistiques. Orsay Cedex, France
- E. Vergini Lab. de Physique Théorique et Modeles Statistiques. Orsay Cedex, France
- R. Weht The Queen's University of Belfast. Northern Ireland.
- R. Weht Institut de Ciencia de Materials, Barcelona, Spain
- R. Weht ITP. University of California at Santa Barbara, USA

Grants and Awards

Grants

- E. Burgos. CONICET – Proyect plurianual PMT-PICT N° 0051: “Estudio interdisciplinario de propiedades físicas de materiales solidos no metalicos”.
- J.C. Durán. Agencia Nacional de Promoción Científica y Tecnológica – PICT N° 10-00000-00673/97: “Solar cells for space applications”, two years grant
- J. Fernández Niello. Agencia Nacional de Promoción Científica y Tecnológica – PICT N° 03-00000-02201/97: “Espectrometría de masas con aceleradores de partículas”.
- Z. Gamba (jointly with Dr. J. Hernando). CONICET Grant 0859/98: “Statistical mechanics of confined fluids”; since Sept. 1998 to Sept. 2001.
- G. García Bermúdez. CONICET: “Utilización de Haces de Iones Pesados en el Análisis de Superficies”, 1997-1998
- H.Huck. Agencia Nacional de Promoción Científica y Tecnológica – PICT N° 12-00000-01358/97: “Obtención y estudio de películas delgadas simil diamnate con incorporaciónd Si”.
- A.J. Kreiner. PIP 4485/96, CONICET: “Análisis de trazas en problemas biomédicos y medioambientales”
- A.J. Kreiner. PICT 03-00000-01901/97, ANPCYT: “Estructura nuclear a bajas energías”
- A.M. Llois. Agencia Nacional de Promoción Científica y Tecnológica – PICT N° 03-00105-02043/97: “Cálculos ab-initio y simulación computacional de estrados electrónicos en sistemas desordenados y de baja dimensión”
- G.V. Marti. CONICET PIA 6648-502/98: “Construcción y evaluación de un detector de tiempo de vuelo”
- A.J. Pacheco. CONICET PIP 4487/96: “ Reacciones nucleares cuasielásticas”
- M. Saraceno. Agencia Nacional de Promoción Científica y Tecnológica – PICT N° 03-00050-01015/97: “Caos en mecánica cuántica”
- N. Scoccola. Agencia Nacional de Promoción Científica y Tecnológica – PICT N° 03-00000-00133/97: “Modelos de teoría de campos en física nuclear, hadrónica y de materia condensada”.
- J. Testoni. Agencia Nacional de Promoción Científica y Tecnológica – PICT N° 03-00000-01357/97: “Reacciones nucleares inducidas por iones pesados”.
- R. Weht. Fundación Antorchas. Reentry grant A13661/1-27.
- R. Weht. Fundación Antorchas. Research grant A-13622/1-103.

Awards

- M.Weissmann: Member of the National Academy of Science, Argentina (1997), “Investigador superior”, CONICET (1999).
- M.A.R.Benyacar: Award “M.A.Centeno”, for her work “Epilepsia, enfermedad celíaca y calcificaciones cerebrales” (1998).
- C.Saragovi: Expert CNEA for technical assistance to Peru (1999).
- A. Lamagna. Associated ICTP Membership Award, International Centre for Theoretical Physics (ICTP- UNESCO), Trieste, Italy, TRIL Programme, 1999-2004.

Teaching

Regular Teachers

- Burlón A. Teaching Assistant. School of Science and Technology, UNSaM
- M.A. Cardona. Assistant Professor. School of Science and Technology, UNSaM
- M. Debray. Assistant Professor. School of Science and Technology, UNSaM
- D. Di Gregorio. Assistant Professor. School of Science and Technology, UNSaM
- H. Di Paolo. Lecturer. School of Science and Technology, UNSaM
- J. Fernández Niello. Assistant Professor. School of Science and Technology, UNSaM
- A. Ferrero. Assistant Professor. School of Science and Technology, UNSaM
- G. García Bermúdez. Associated Professor. School of Science and Technology, UNSaM
- E.B. Halac. Associated Professor. School of Science and Technology, UNSaM
- H. Huck. Assistant Professor. School of Science and Technology, UNSaM
- A. Kreiner. Full Professor. School of Science and Technology, UNSaM
- A. Lamagna. Assistant Professor. School of Science and Technology UNSaM
- A.G. Leyva. Assistant Professor. School of Science and Technology, UNSaM
- G. Martí. Assistant Professor. School of Science and Technology, UNSaM
- F. Parisi. Assistant Professor. School of Science and Technology, UNSaM
- M.E. Reinoso. Teaching Assistant. School of Science and Technology, UNSaM
- M. Saraceno. Full Professor. School of Science and Technology, UNSaM
- H.M. Sofia. Associated Professor. Department of Physics, UBA
- M.R. Spinella. Teaching Assistant, Physics Department, FCEyN, UBA
- P.A. Stoliar. Teaching Assistant. School of Science and Technology, UNSaM
- L. Szybisz. Full Professor. Department of Physics, UBA
- D. Vega. Assistant Professor. School of Science and Technology, UNSaM
- E. Vergini. Assistant Professor. School of Science and Technology, UNSaM

Special courses

- 1997**
 - *Reacciones nucleares*. J. Testoni y J. Fernández Niello. Instituto de Tecnología, UNSaM
 - *Introducción a los modelos de hadrones*. N. Scoccola. Instituto de Tecnología, UNSaM
 - *Uso del Programa LAPW (Linearized Augmented Plane Wave Method)*. O. Rodríguez, M. Weissmann, A.M. Llois. Instituto de Tecnología, UNSaM
- 1998**
 - *Estructura nuclear* D. Hojman Instituto de Tecnología, UNSaM
 - *Introducción a la física nuclear y de partículas vía teoría de campos*. A. Gattone Instituto de Tecnología, UNSaM
 - *Propiedades electrónicas y nucleares de sólidos mediante espectroscopía Mössbauer y resonancia paramagnética electrónica*. C. Saragovi - C. Fainstein Instituto de Tecnología, UNSaM
 - *Teoría de grupos y sus aplicaciones*. N. Scoccola-F. Parisi Instituto de Tecnología, UNSaM
 - *Cálculo de propiedades electrón. y dinámicas de materiales: métodos computacionales ab-initio*. M. Weissmann - A.M.Llois-C.Rodríguez. Instituto de Tecnología, UNSaM
 - *Reacciones Nucleares con Iones Pesados* O. Fernández Niello - J.E. Testoni. Instituto de Tecnología, UNSaM
- 1999**
 - *Transiciones de fase en sistemas infinitos y finitos*. V. Massidda. Instituto de Tecnología. UNSaM
 - *Métodos Computacionales en Física del Sólido*. Ruben Weht. Instituto de Tecnología. UNSaM.
 - *Aprovechamiento de la energía solar- Conversión Fotovoltaica*. C. Durán, A. Lamagna, C.J. Bruno. Instituto de Tecnología-UNSaM.

Personnel

Research Staff

Abriola, Daniel H.
Altmann, Ernesto
Baggio, Ricardo F.
Bonadeo, Hernán A. (*)
Bruno, Cristian J.
Burgos, Enrique M. (*)
Cambiaggio, M. C. (*) (Head of the Dept.)
Capurro, Oscar A.
Cardona, María A.
Ceva, Horacio
Debray, Mario E.
De Luca, Roberto
Di Gregorio, Daniel E. (*)
Di Tada, Mariana L. (*)
Durán, Julio C.
Etchegoyen, Alberto (*)
Fernández Niello, Jorge O. (*)
Ferrero, Armando M.
Filevich, Alberto (*)
Gamba, Zulema B.
García Bermúdez, Gerardo J. (*)
Gattone, Aníbal O. (*)
Godfrin, Elena M.
Halac, Emilia B.
Hernando, Jorge A.
Hojman, Daniel L. (*)
Huck, Hugo A.
König, Patricia V.
Kreiner, Andrés J. (*)

Lamagna, Alberto
Lanza, Hilda D.
Levy, Pablo E. (*)
Leyva, Ana G.
Maqueda L'Huillier, Ernesto (*)
Martí, Guillermo V.
Massidda, Víctor M.
Nemirovsky, Ignacio B.E.
Ozafrán, Mabel J.
Pacheco, Alberto J. (*)
Parisi, Francisco E.
Polla, Griselda I.
Remez, Luis A.
Rondissone, Mauro
Saraceno, Marcos
Saragovi, Celia
Scoccola, Norberto N. (*)
Sofía, Hugo M. (*)
Spina, María E.
Testoni, Jorge E. (*)
Vega, Daniel R.
Vergini, Eduardo G.
Weht, Ruben O

(*) Members of CONICET

Research staff associated to the Department of Physics

Achterberg, Erhard	Research Consultant
Benyacar, M.A.R. de	Research Consultant
Bernath, Martín	CONICET
Bes, Daniel R.	CONICET
Dragún, Olga M.	Research Consultant
Llois, Ana M.	CONICET
Perazzo, Roberto P.	Research Consultant
Szybisz, Leszek	CONICET
Weissmann, Mariana	CONICET

Administrative and Support Personnel

Cardozo, Bartolomé
Córdoba, Oscar S.
Francesia, Silvia
Gómez, Domingo B.
Gómez, Luis S.
Lires, Susana
Manavella, Angel M.

Marsans, María C.
Mastrogiacomo, Graciela
Meiszer, Nora B.
Piñeyro, Carlos
Ruíz, Oscar A.
Sironi, Néstor
Soler, Horacio

Graduate Students

Alvarez, Daniela E.
Arazi, Andrés
Barral, Andrea (FCEyN)
Bauleo, Pablo
Bonifazi, Carla
Burlón, Alejandro
Carlo, Gabriel
D'Atri, Ma. Fernanda
Fernández Salares, Andrés
Fu, Chu-Chun
Garrahan, Juan P. (CONICET)
Gómez Abal, Ricardo (CONICET)
Guevara, Javier A.
Kruczenski Gainza, Martín
Levinton, Gad
Lieberman, Rosa G.
Martínez Bogado, Mónica G. (ANPCyT)
Mesquida, Valeria
Mijovilovich, Ana E.
Milano, Julián
Monastra, Alejandro
Morales, Liliana B.
Naab, Fabián U.

Engineering Staff

Fazzini, Norberto A.
Giménez, Carlos R.
González, Hipólito
Nicolai, Julio A.

Technical Staff

Antonuccio, Francisco
Bergaglio, Jorge R.
Bolaños, Carlos A.
Bolzi, Claudio G.
Cabello, Basilio
Cabello, Néstor V.
Cagnato, Fernando F.
Caraballo, Ma. Esther
Carnero, Angel M.
Di Paolo, Hugo A.
Donaire, Juan C.
Fernández Vázquez, Javier
Fischer, Ernesto
Grahmann, Hugo H.
Ietri, Gustavo E.
Igarzábal, Marcelo A.
Kesque, José M.
Laffranchi, Julio A.
Lema, Norberto M.

Orsaria, Milva
Pasquini, Gabriela
Pastorino, Claudio
Plá, Juan C.
Ravignani Guerrero, Diego
Reguera, Alejandro
Reinoso, María Elba
Rey Ricardo L.
Rodríguez, Sebastián
Rodríguez Martino, Julio C.
Rodríguez Sierra, Daniel
Salfity, María Fernanda
Schat, Carlos
Schuff, Juan
Segura, Guillermo
Simeone, Claudio M.
Simonotti, Fernando
Spinella, María R. (CONICET)
Stoliar, Pablo A.
Tamasi, Mariana
Venier, Guillermo
Vildosola, Verónica (CONICET)

Nigro, Sergio L.
Ratcliffe, Juan L.
Simoncelli, Domingo A.

Marcora, Guillermo
Meerapfel, Alejandro
Merino, Luis M.
Miguez, Carlos A.
Orecchia, Jorge D.
Palacio, Carlos E.
Petragalli, Alicia B.
Professi, Omar D.
Ramírez, Marcelo C.
Rodríguez, Hugo J.
Romanelli, Oscar A.
Ruffino, Juan C.
Schevenels, Luis F.¹
Torena, Alicia S.
Vázquez, Mónica E.
Verón, Alberto G.
Vidalle, Jorge A.²
Zárate, Hugo F.

¹ Deceased August 25th, 1997

² Deceased June 24th, 1999

List of abbreviations

ANU	Australian National University
ANPCyT	Agencia Nacional de Promoción Científica y Tecnológica
CAPES	Fundação Coordenação de Aperfeiçoamento de Pessoal de Nivel Superior
CBPF	Centro Brasileiro de Pesquisas Físicas
CENG	Centre d'Etudes Nucleaires Grenoble
CERN	European Laboratory for Particle Physics
CIC	Consejo de Investigaciones Científicas, Prov. de Buenos Aires
CITEFA	Centro de Investigaciones Científicas y Técnicas de las Fuerzas Armadas
CNPq	Centro Nacional de Pesquisas
CNR	Centro Nazionale della Ricerca
CNRS	Centre National de la Recherche Scientifique
CONAE	Comisión Nacional de Actividades Espaciales
CONICET	Consejo Nacional de Investigaciones Científicas y Tecnológicas
ICTP	International Centre for Theoretical Physics
IRAM	Instituto Argentino de Normalización
FCEyN	Facultad de Ciencias Exactas y Naturales
LAMEL	Istituto di Chimica e Tecnologia di Materiali e dei Componenti per l'Elettronica
PICT	Proyectos de Investigación en Ciencia y Tecnología
SeCyT	Secretaría de Ciencia y Tecnología
TRIL	Training and Research in Italian Labs
UBA	Universidad de Buenos Aires
UERJ	Univ. do Estado do Rio de Janeiro
UNSaM	Universidad Nacional de General San Martín