

UNIVERSIDADE ESTADUAL PAULISTA  
INSTITUTO DE FÍSICA TEÓRICA  
Rua Pamplona, 145  
01405-900 – S. Paulo – Brasil  
Tel: 55 (11) 3177-9090/9011/9028  
Fax: 55 (11) 3177-9080  
<http://www.ift.unesp.br>

UNIVERSIDADE ESTADUAL PAULISTA  
INSTITUTO DE FÍSICA TEÓRICA

ANNUAL REPORT  
2003

Reitor: *José Carlos Souza Trindade*

Vice-Reitor: *Paulo Cezar Razuk*

Diretor: *Gastão Inácio Krein*

Vice-Diretor: *Rogério Rosenfeld*

Coordenador de Pesquisa: *Lauro Tomio*

## 1 General Overview

### 1.1 Brief History

The **Instituto de Física Teórica** (IFT), or **Institute for Theoretical Physics**, was created in 1951 as a Foundation, under the leadership of José Hugo Leal Ferreira. It was a pioneer initiative in Theoretical Physics in South America, whose aim was to promote research activities and to train young researchers in the area. In order to implement the research activities, in its first decade, the institute received several foreign long term visitors. In 1952, from the Max Planck Institut für Physik (Göttingen, Germany), came his first Scientific Director, Prof. Carl Friedrich von Weizsäcker, indicated by Prof. Werner Heisenberg (at that time, the director of the Max Planck Institut). With Prof. Weizsäcker, came also Profs. Wilhelm Macke and Reinhard Oehme, from the same Institute. Next, in 1954, also from Germany, from the Tübingen University, came his second Scientific Director, Prof. Gert Molière. With Prof. Molière came the Profs. Hans Joos and Werner Güttinger, from Aachen. At the end of that decade, the scientific direction of the institution was undertaken by the well-known Japanese physicists, in 1958, Prof. Mituo Taketani, from Rikkyo University and in 1960 Prof. Tatouki Miyasima, from the Tokyo University. With Prof. Taketani came Prof. Yasuhisa Katayama, from Kyoto University, and with Miyasima, came Prof. Jun'ichi Osada, from the Institute for Technology of Tokyo, and Prof. Daisuki Itô, from the University of Hokkaido. In 1958, following a suggestion of Prof. Taketani, the Instituto de Física Teórica started to edit a local bulletin named “Boletim de Física Teórica e Experimental – Informação entre Físicos” (Bulletin of Theoretical and Experimental Physics – Information among Physicists”). From this bulletin originated the “Revista Brasileira de Física”, presently called “Brazilian Journal of Physics”. This journal was edit at IFT for its first 10 years.

In 1962, Prof. Paulo Leal Ferreira became the first Brazilian director of the institute. In 1969, the IFT was declared by the National Research Council (CNPq) a “Center of Excellence”. After that, in 1971, the Instituto de Física Teórica started offering Graduate courses in Physics, for Master and Doctor degrees. From 1971 until the end of 2003, 102 Ph.D. and 165 Master degrees were granted by IFT. In the nation-wide rankings of the Brazilian Ministry of

Education, the program of graduate studies at IFT has been distinguished as one of the best.

In 1987, after a period of severe economical crisis, and following a previous agreement, the Instituto de Física Teórica was incorporated to the State University, “Universidade Estadual Paulista (UNESP)”. The Foundation, that gives support to IFT, still remains as an autonomous entity and maintains the buildings and the library.

Nowadays, the Instituto de Física Teórica is one of the most productive Brazilian institutions dedicated to basic research. Members of the institute participate in many international collaborative programs. These include formal agreements through exchange programs CNPq – NSF (USA), CNPq – CNRS (France), CAPES – COFECUB (France), CNPq – Forschungszentrum Juelich (Germany), CNPq – CSIC (Spain) and CNPq – ICCTI (Portugal), IFT – Special Center for the Subatomic Structure of Matter of the University of Adelaide (Australia), UNESP – Joint Institute for Nuclear Research, UNESP – Fermilab (EUA). The research activities at IFT include subjects in Atomic and Molecular Physics, Condensed Matter Physics, Cosmology and Gravitation, Experimental High Energy Physics, Field Theory, Hadronic Physics, Mathematical Physics, Nonlinear Dynamics, Nuclear Physics, Particle Physics and Statistical Physics. The scientific staff is composed by 26 researchers and the Graduate Program has more than 60 students pursuing Master and Doctoral degrees.

Considering their scientific contributions in physics, members of the institution have been invited to participate in the organization of several relevant international conferences and workshops, within their expertise. They are also present in the organization of almost all the relevant national conferences. Some of the workshops and conferences are sponsored directly by IFT. During the academic year of 2003, in spite of the limited space, the institution sponsored one International School on String Theory (also sponsored by the International Centre for Theoretical Physics of Trieste, Italy), and one local workshop on Bose-Einstein condensation.

## 1.2 Research Facilities

### 1.2.1 Library

The Institute has one of the best Brazilian libraries in theoretical physics. It has around 15.692 books covering the areas of mathematics, the physics of elementary particle and fields, nuclear physics, mathematical physics, cosmology and gravitation,

statistical mechanics, condensed matter and atomic physics. It subscribes to 51 journal titles.

### 1.2.2 Computing Facilities

The Instituto de Física Teórica has a computer center with a processing capacity of around 500 Mflops. The computing facility includes 4 LINUX servers, 5 high performance workstations DEC, 22 medium performance workstations RS 6000 IBM, 1 high performance workstation Silicon Graphics, 1 high performance workstation Ultra Enterprise SUN, 2 workstations SUN SPARC, 1 workstation HP serie 700, 1 workstation DEC/AXP, 83 Intel microcomputers, 8 Macintosh microcomputers, 13 x-terminals, 3 scanners and 40 printers.

The local network is linked via TCP/IP and is connected with the international network via InterNet through a 2 Mbps line. Algebraic software (MathCad, Mathematica, Mapple) and mathematical libraries (CERN) besides printing facilities (HP Laser 8100DN, HP Laser 4500, HP Laserjet III Si, HP Laserjet II, Lexmark Optra Laser Print) are available for the whole network.

## 1.3 Main Lines of Research

### 1.3.1 Atomic and Molecular Physics

Positron-atom and positronium-atom scattering at low and medium energies, Bose-Einstein condensation with trapped atoms.

### 1.3.2 Condensed Matter Physics

Superconductivity at high temperatures.

### 1.3.3 Elementary Particle Physics

Standard model phenomenology, search for new particles and interactions, alternative models for electroweak interactions, neutrino physics, radiative corrections and precision electroweak measurements, vector boson anomalous couplings, astroparticles, relativistic hadronic models, phenomenology of quark-gluon plasma signatures, instantons and hadronic spectroscopy, two-body relativistic equations, quark models.

#### 1.3.4 Field Theory

Higher spin algebras in conformal field theory,  $W$  algebras, conformal field theory and integrable models in two dimensions, string field theory, Jacobi equations in field theory, symmetries of Toda models and soliton solutions, field theory in curved space, causal approach and field theory, constrained dynamics and applications, quantum field theory at finite temperature, electrodynamics with higher derivatives, supersymmetry, superstring theory, dynamical symmetry breaking, field theories in non-covariant gauges, light-cone gauge techniques in field theories, negative dimensional integration.

#### 1.3.5 Gravitation and Cosmology

Relativistic cosmology, quantum gravity, gauge theories for gravitation, gravitation with higher derivatives in (3+1) and (2+1) dimensions, teleparallel gravity, classical and quantum fields in curved space-time, Hawking radiation, Unruh effect, particle processes in curved space-times and accelerated frames.

#### 1.3.6 Hadron Physics

Nonperturbative QCD, lattice field theory, quark models.

#### 1.3.7 Mathematical Methods in Physics

Quantum phase spaces, non-commutative geometry in quantum mechanics and many-body systems, quantum groups and invariant forms, quantization structures, singular potentials in quantum mechanics, renormalization in quantum mechanics, representations of classical groups, plethysm, construction of  $q$ -deformed conformal algebraic structures within 2-dimensional field theories.

#### 1.3.8 Nonlinear Phenomena

Integrable models, soliton equations, chaotic dynamical models and perturbation theory, numerical solution of nonlinear Schrödinger equation, hydrodynamics, convective systems, renormalization group, ocean dynamics, multi-scale methods, study of Kac-Moody and Virasoro symmetries of integrable hierarchies.

### 1.3.9 Nuclear Physics

Nuclear fission, microscopic nuclear models, semiclassical many-body methods, few-body problems, nuclear structure, fusion of heavy ions, electron scattering, giant resonances, restrict dynamic models, nuclear matter at high temperature and densities, hadronic structure, extensions of RPA method, many neutrons nuclei, relativistic many-body methods, q-deformed algebras and many-body physics, nucleon-nucleon, nucleon-deuteron scattering.

### 1.3.10 Statistical Mechanics, Econophysics

Polymer conformation models, combinatorial methods, quantum groups and critical phenomena, fractals and fragmentation, complex system, modelling of nonlinear time series, stochastic models of price dynamics, probability density estimation, non gaussian processes.

### 1.3.11 Experimental High Energy Physics

Experiments in proton-antiproton and proton-proton accelerators; participation in the Fermilab DØ and CERN CMS collaborations; study of diffractive processes with the “Forward Proton Detector” (Roman Pots); Grid architecture and high performance computation.

## 2 Staff

### 2.1 Academic Staff

#### 2.1.1 Professors

---

Abraham H. Zimmerman (retired)

Adriano A. Natale

Helio V. Fagundes (retired)

Lauro Tomio

Ruben Aldrovandi

Sadhan K. Adhikari

Vicente Pleitez

---

#### 2.1.2 Associate Professors

---

Antonio J. Accioly

Alfredo T. Suzuki

Bruto M. Pimentel Escobar

Diógenes Galetti

Gastão I. Krein

George E. A. Matsas

Gerhard W. Bund (retired)

Gerson Francisco

José A. C. Alcarás

José F. Gomes

José G. Pereira

Juan C. Montero

Luiz A. Ferreira

Maria C. B. Abdalla

Nathan Jacob Berkovits

Roberto A. Kraenkel

Rogério Rosenfeld

Sérgio F. Novaes

---

### 2.1.3 Assistant Professors

---

Alfredo P. N. R. Galeão  
Sandra S. Padula

---

### 2.1.4 Collaborators

---

Eduardo M. Gregores  
Fernando Monti Steffens

---

Hiroshi Nunokawa

---

### 2.1.5 Postdoctoral Researchers

---

Alexandre Leite Gadelha  
Ana Lúcia Barbosa  
André Gusso  
André Taurines  
Cristiane Grala Roldão  
Érica Emilia Leite  
Evelise Gausmann  
Harold Sócrates Blas Achic  
Gabriel Flores Hidalgo  
German Ignacio Gomero Ferrer  
Ivan Pontual Costa e Silva  
João Pacheco B. Cabral de Melo  
Jorge Castiñeiras Rodriguez  
Jorge Henrique de Oliveira Sales  
José Francisco da Rocha Neto  
Luciano Barosi de Lemos  
Luis Carlos Torres Guillén  
Pablo Sebastián Mincez  
Paulo Barbosa Barros  
Paulo Sérgio Rodrigues da Silva  
Raquel Santos Marques de Carvalho  
Rodolfo Alván Casana Sifuentes  
Teófilo Vargas Aucalla  
Valery Shchesnovich  
Victo dos Santos Filho  
Vladimir Demyanovich Pershin

---

## 2.1.5 Visiting Scientists

---

A. Kamchatnov (Inst. of Spectroscopy, Russian)	February-August
F. Abdullaev (Uzbek Academy of Sciences, Uzbekistan)	February/02-January/03
G. Munardo (Sissa, Trieste, Italy)	March-June
H. Aratyn (Univ. Chicago, USA)	May-August
H. Forkel (Univ. Heidelberg, Germany)	March/03-March/04
J. Zapata (Universidad del Norte, Colombia)	December
J. Haidenbauer (Forsch. Jülich, Germany)	September
K. Tsushima (Univ. Georgia, USA)	December/03-November/04
K. Skenderis (Univ. Amsterdam, Germany)	March
M. A. C. Kneipp (CBPF, R. Janeiro, Brazil)	March-April
M. E. X. Guimarães (Univ. Brasilia, Brazil)	March/03-March/04
V. Riva (Sissa, Trieste, Italy)	February-April
W. Linch (Univ. Maryland, USA)	October/02-February/03

---

## 2.2 Administrative and Technical Staff

---

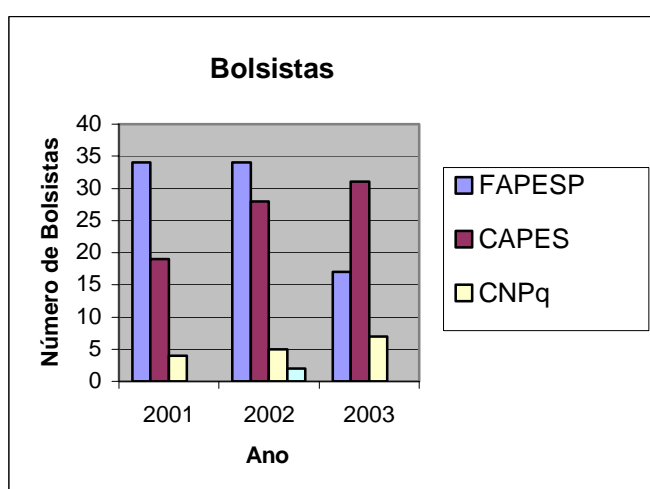
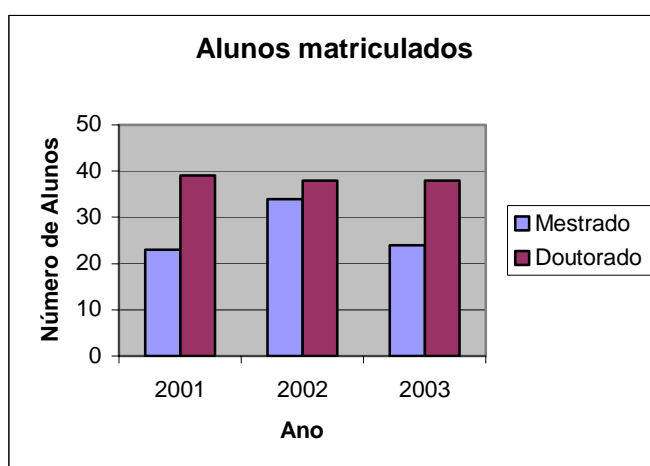
Brígida Maria Paula Francisco	Librarian
Edna Maria de Oliveira Lacerda	PBX Operator
Heitor Silva Dias	Computer Analyst
José Francisco Simões Matias	Administrative Assistant
Luis Carlos Aparecido Diotto	Driver
Luciana Macuco Quiles	Office Clerk
Luzinete Aparecida M. Thimóteo	Secretary of graduate studies
Marcela Hosne Ardito	Office Clerk
Marcelo Martins Iasniewski	Administrative Assistant
Maria José Trombini de Souza	Computer Manager
Meire Cristina Ferreira Passos	Secretary
Orides Jorge Pereira	General Services
Rosane Simões de Castro	Secretary of graduate studies
Vilma Nunes de Oliveira	Academic Assistant
Walter Matheos Jr.	Computer Analyst

---

### 3 Teaching Activities

#### 3.1 Students

The graduate program of the Institute had a total of 38 Ph.D. and 24 Master students during 2003. Most of them had fellowships of different Brazilian financial agencies, like Fundação de Amparo à Pesquisa do Estado de São Paulo – FAPESP (17), Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq (07) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES (31), Colômbia (1).



## 3.2 Courses

The following courses were offered during 2003:

### 3.2.1 First Semester

1. Quantum Mechanics I
2. Quantum Mechanics II
3. Elementary Particle I
4. Classical Field Theory
5. Mathematic Physics
6. Quantum Field Theory I
7. General Relativity
8. Algebras and Lie Group
9. Topics in Quantum Computation

### 3.2.2 Second Semester

1. Quantum Mechanics I
2. Quantum Mechanics II
3. Eletromagnetism
4. Quantum Field Theory I
5. Quantum Field Theory II
6. Statistical Mechanics
7. Introduction to Supersymmetry
8. Non-linear Dynamics
9. Non-linear differential equations - Computational Methods

## 3.3 Theses

### 1. Márcio de Menezes – Master

*“Detecção de neutrinos no Observatório Pierre Auger”*

Advisor: Prof. Rogério Rosenfeld

### 2. Gian Machado de Castro – Master

*“Algumas propriedades da hierarquia AKNS supersimétrica”*

Advisor: Prof. Abraham Hirsch Zimmerman

- 3. Wanderson Gonçalves Wanzeler – Master**  
*“Estudo de percolação de clusters e Monte Carlo para o modelo de ising bidimensional”*  
Advisor: Profa. Tereza Cristina da Rocha Mendes
- 4. Birajara Soares Machado – Master**  
*“Determinismo e estocasticidade em séries temporais empíricas”*  
Advisor: Prof. Gerson Francisco
- 5. Paulo Gustavo Serafim de Carvalho – Master**  
*“Equação reduzida para ondas curtas na superfície da água”*  
Advisor: Prof. Roberto André Kraenkel
- 7. Wiliam Santiago Hipólito Ricaldi – Master**  
*“Restrições Impostas à Radiação de fundo pela topologia do universo”*  
Advisor: Prof. Hélio Vasconcelos Fagundes
- 8. Eduardo De Carli da Silva – Master**  
*“Simetrias e correntes conservadas em teorias de campos integráveis em qualquer dimensão”*  
Advisor: Prof. Luiz Agostinho Ferreira
- 9. Pedro José Pompéia – Master**  
*“Estrutura de vínculos da gravitação via Hamilton-Jacobi: relatividade geral e teleparalelismo”*  
Advisor: Prof. Bruto Max Pimentel Escobar
- 10. Vagner Jeger Limeira de Castro – Master**  
*“Uma abordagem de Gauge para corpos deformáveis”*  
Advisor: Prof. Ruben Aldrovandi
- 11. Iraida Cabrera Carnero – PhD**  
*“Modelos integráveis multicarregados e integrabilidade no plano não-comutativo”*  
Advisor: Prof. José Francisco Gomes
- 12. Daniel Luiz Nedel – PhD**  
*“Derivação no super-espaço das equações efetivas da supercorda tipo II”*  
Advisor: Prof. Nathan Jacob Berkovits

**13. Esdras Santana dos Santos – PhD**

*“Cálculos de integrais de Feynman em teorias de campos”*

Advisor: Prof. Alfredo Takashi Suzuki

**14. Antonio Mihara – PhD**

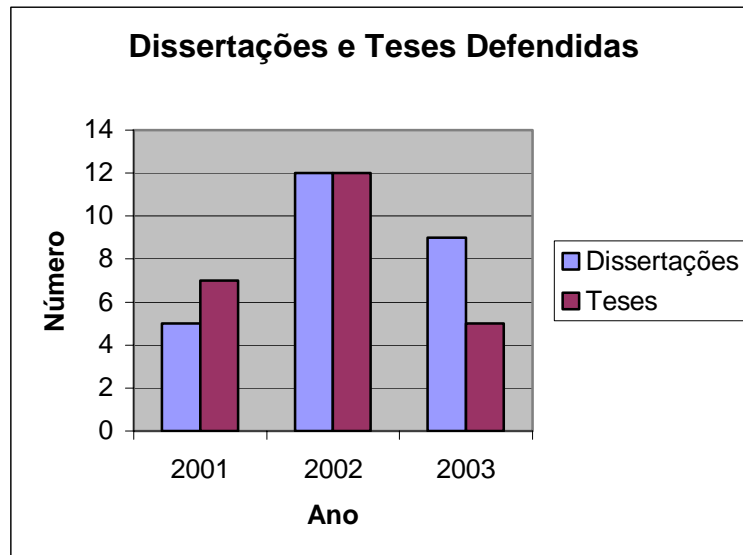
*“A fenomenologia hadrônica e as soluções das equações de Schwinger-Dyson”*

Advisor: Prof. Adriano Antonio Natale

**15. Luis Carlos Torres Guillén – PhD**

*“Teleparalelismo e as teorias de Kaluza-Klein”*

Advisor: Prof. José Geraldo Pereira



## 4 Research Activities

### 4.1 Colloquia and Seminars

We had a total of 30 colloquia and seminars during 2003.

1. “QCD instantons at low and high energies”  
Prof. Dr. Alexander E. Dorokhov – JINR, Dubna, Russia
2. “Generalizations of the ising model”  
Prof. Dr. Giuseppe Mussardo – ICTP, Trieste
3. “Quantum gravity, strings, Branes and holography”  
Prof. Dr. Kostas Skenderis – Univ. Amsterdam
4. “Física de neutrinos: status atual”  
Prof. Dr. Orlando L. G. Peres – Unicamp
5. “Variable cosmological constant as a planck scale effect”  
Prof. Dr. Joan Sola – Univ. Barcelona, Spain
6. “Teorias de campos integráveis e sólitons em qualquer dimensão”  
Prof. Dr. Luiz Agostinho Ferreira – IFT/UNESP
7. “Alguns resultados em teorias de campos não-comutativas”  
Prof. Dr. Adilson José da Silva – IFUSP
8. “Panorama das pesquisas em polímeros no Instituto do Milênio - IMMMP”  
Prof. Dr. Roberto M. Faria – USP, São Carlos
9. “The state of matter at high densities and the structure of neutron stars”  
Prof. Dr. German Lugones – IAG-USP
10. “A origem da vida: seriam os genes egoístas?”  
Prof. Dr. José Fernando Fontanari – USP, São Carlos
11. “Lessons from two-dimensional gravity”  
Prof. Dr. Dmitri Vassilevich – Univ. Leipzig, German
12. “A Nova Era da astronomia: estudando a Física do universo com observações”  
Prof. Dr. Reuven Opher – IAG/USP

13. “De volta ao princípio de equivalência”  
Prof. Dr. Ruben Aldrovandi – IFT/UNESP
14. “Charge symmetry breaking in pion production”  
Prof. Dr. Bira van Kolck – University of Arizona, USA
15. “What is a dynamical R-matrix?”  
Prof. Dr. Axel Winterhalder – IME/USP
16. “The mass of the graviton and the cosmological constant”  
Prof. Dr. Mario Novello – CBPF, RJ
17. “Supersymmetric solutions of supergravity and M-theory”  
Prof. Dr. Chris Hull – Queen Mary College, Univ. de Londres, UK
18. “QCD-Instantons and Glueballs”  
Prof. Dr. Hilmar Forkel – IFT/UNESP
19. “Explorando o código neural de um invertebrado”  
Prof. Dr. Roland Köberle – USP, São Carlos
20. “Simetrias  $SU(3)_W$ : física nova na escala dos TeVs?”  
Prof. Dr. Vicente Pleitez – IFT/UNESP
21. “Estabilização dinâmica”  
Prof. Dr. Roberto André Kraenkel – IFT/UNESP
22. “Paradoxo aparente com submarinos relativísticos”  
Prof. Dr. George Matsas – IFT/UNESP
23. “Estabilidade de órbitas de partículas ao redor de um centro de atração”  
Prof. Dr. Patricio Letelier – IME/UNICAMP
24. “Neutrinos at 1: The next generation of neutrino experiments”  
Prof. Dr. David Reyna – Argonne National Laboratory, USA
25. “Fuzzy physics”  
Prof. Dr. A.P. Balachandran – Syracuse University, USA
26. “Termodinâmica de não equilíbrio na QCD”  
Prof. Dr. Gastao Krein – IFT/UNESP
27. “Ciência, pseudociência e o papel da divulgação científica”  
Prof. Dr. Marcelo Knobel – UNICAMP

**28.** “Dirac, cerca de 100 anos depois”

Prof. Dr. Henrique Fleming – IFUSP

**29.** “A radioastronomia e o legado epistemológico no Brasil”

Prof. Dr. Ulisses Capozzoli – Editor da revista *Scientific American* Brasil

**30.** “Search for quark confinement in heavy ion collisions”

Prof. Dr. Tamas Csörge – KFKI Institute, Budapest

## 4.2 Research Publications

### 4.2.1 Published Papers

**1.** A.A. Natale, A.C. Aguilar and P.S. Rodrigues da Silva

“Relating a gluon mass scale to an infrared fixed point in pure gauge QCD”

Phys. Rev. Lett. 90, 152001-1 – 152001-4, 2003

**2.** A.A. Natale, D.N. Voskresensky and F. Arretche

“Medium effects in the pion-pole mechanism of neutron star cooling”

Phys. Rev. C 68, 035807-1 – 035807-10, 2003

**3.** A.A. Natale and A. Doff

“Limit on the fermion masses in technicolor models”

Phys. Rev. D 68, 077702-1 – 077702-4, 2003

**4.** A.A. Natale and C.G. Roldão

“Ultra peripheral heavy ion collisions and the energy dependence of the nuclear radius”

Phys. Lett. B, 581, 161 – 166, 2003

**5.** A.A. Natale and A. Doff

“The origin of the first and third generation fermion masses in a technicolor scenario”

Eur. Phys. J. C32, 417 – 426, 2003

**6.** A.P.N.R. Galeão, C. Barbero, C. De Conti and F. Krmpotic

“Kinematical and nonlocality effects on the nonmesonic weak hypernuclear decay”

Nucl. Phys. A, 726, 267 – 302, 2003

**7.** A.T. Suzuki, E.S. Santos, A.G.M. Schmidt

“One loop  $n$  point equivalence among negative dimensional, Mellin-Barnes and Feynman parametrization approaches to Feynman integrals”

J. Phys. A 36, 11859 – 11872, 2003

**8.** A.T. Suzuki, E.S. Santos and A.G.M. Schmidt

“General massive one-loop off-shell three-point functions”

J. Phys. A 36, 4465 – 4476, 2003

**9.** A.T. Suzuki and J.H.O. Sales

“Light-front propagator reexamined”

Nucl. Phys. A 725, 139 – 148, 2003

**10.** A.J. Accioly

“Quadratic gravity theories in 2+1 dimensions and the topological Chern-Simons term”

Phys. Rev. D67, 127502-1 – 127502-4, 2003

**11.** A.J. Accioly and H. Blas

“Conformal coupling and Foldy-Wouthuysen transformation”

Mod. Phys. Lett. A18, 867 – 873, 2003

**12.** A.J. Accioly and S. Ragusa

“Corrigendum-gravitational deflection of massive particles in classical and semiclassical general relativity”

Classical Quant. Grav. 20, 4963 – 4964, 2003

**13.** B.M. Pimentel, J.F. Rocha Neto, P.J. Pompéia and R.G. Teixeira

“The teleparallel lagrangian and Hamilton-Jacobi formalism”

Gen. Relat. Gravit. 35, 877 – 884, 2003

**14.** B.M. Pimentel, J.S. Valverde, R.A. Casana and V.I. Fainberg

“Bose-Einstein condensation and free DKP field”

Phys. Lett. A 316, 33 – 43, 2003

**15.** B.M. Pimentel, J.T. Lunardi, R.A. Casana, R.G. Teixeira and V.I. Fainberg

“Massless DKP fields in Riemann-Cartan spacetimes”

Classical Quant. Grav. 20, 2457 – 2465, 2003

**16.** D. Galetti

“A realization of the q-deformed harmonic oscillator: Rogers-Szegő and Stieltjes-Wigert polynomials”

Braz. J. Phys. 33, 148 – 157, 2003

**17.** E. Gregores, O.J.P. Éboli and J.K. Mizukoshi

“Testing color evaporation in photon photon production of  $J/\psi$  at CERN LEP-II”

Phys. Rev. D 68, 094009-1 – 094009-5, 2003

**18.** E. Gregores, O.J.P. Éboli and F. Halzen

“Color evaporation description of inelastic photoproduction of  $J/\psi$  at DESY HERA”

Phys. Rev. D 67, 054002-1 – 054002-5, 2003

**19.** J. Haidenbauer and G. Krein

“Influence of a  $Z^+(1540)$  resonance on KN scattering”

Phys. Rev. C 68, 052201-1 – 052201-3, 2003

**20.** S.S. Avancini, J.R. Marinelli and G. Krein

“Compositeness effects in the Bose-Einstein condensation”

J. Phys. A 36, 9045 – 9052, 2003

**21.** G. Krein

“Chiral-symmetry restoration in clustered hadronic matter”

Eur. Phys. J. A18, 511 – 513, 2003

**22.** O.A. Battistel and G. Krein

“Quark clustering and chiral symmetry breaking in nuclear matter”

Mod. Phys. Lett. A18, 2255 – 2264, 2003

- 23.** P.K. Panda, G. Krein, D.P. Menezes and C. Providencia  
“Warm asymmetric matter in the quark-meson coupling model”  
Phys. Rev. C 68, 015201-1 – 015201-9, 2003
- 24.** G.E.A. Matsas, I.P. Costa e Silva and J. Castiñeiras  
“Do static sources respond to massive particles from the Hawking radiation as uniformly accelerated ones do in the inertial vacuum?”  
Phys. Rev. D 67, 067502-1 – 067502-4, 2003
- 25.** G.E.A. Matsas, I.P. Costa e Silva and J. Castiñeiras  
“Interaction of Hawking radiation with static sources in deSitter and Schwarzschild-deSitter spacetimes”  
Phys. Rev. D 68, 084022-1 – 084022-9, 2003
- 26.** G.E.A. Matsas  
“Relativistic Archimedes law for fast moving bodies and the General-Relativistic resolution of the ‘submarine paradox’”  
Phys. Rev. D 68, 027701-1 – 027701-4, 2003
- 27.** B.S. Machado, F.F. Ferreira, G. Francisco and P. Muruganandam  
“Time series analysis for minority game simulations of financial markets”  
Physica A 321, 619 – 632, 2003
- 28.** G. Francisco and P. Muruganandam  
“Local dimension and finite time prediction in spatiotemporal chaotic systems”  
Phys. Rev. E 67, 2003
- 29.** J.A. Castilho Alcarás, J. Tambergs, T. Krasta, J. Ruza and O. Katkevicius  
“Classification of basis states for (p-f)-nuclei ( $41 \leq A \leq 80$ ) with minimal configuration energy”  
Braz. J. Phys. 33, 98 – 103, 2003
- 30.** J.A. Castilho Alcarás, J. Tambergs, T. Krasta, J. Ruza and O. Katkevicius

“Plethysms and interacting boson models”

J. Math. Phys. 44, 5296 – 5319, 2003

**31.** A.H. Zimerman, H. Aratyn and J.F. Gomes

“Integrable hierarchy for multidimensional Toda equations and topological-anti-topological fusion”

J. Geom. Phys. 46, 21 – 47, 2003

**32.** A.H. Zimerman, H. Aratyn and J.F. Gomes

“Darboux-Egoroff metrics, rational Landau-Ginzburg potentials and the Painleve VI equation”

J. Phys. A 36, 1013 – 1028, 2003

**33.** V.S. Filho, A. Gammal, L. Tomio and T. Frederico

“On the stability of atomic condensed systems with attractive two-body interactions”

Laser Phys. 13, 582 – 586, 2003

**34.** M.T. Yamashita, R.S. Marques de Carvalho, L. Tomio and T. Frederico

“Scaling predictions of radii of weakly bound triatomic molecules”

Phys. Rev. A 68, 012506-1 – 012506-6, 2003

**35.** M.T. Yamashita, A. Delfino, L. Tomio and T. Frederico

“Weakly bound atomic trimers in ultracold traps”

Phys. Rev. A 68, 033406-1 – 033406-5, 2003

**36.** F.Kh. Abdullaev, A. Gammal and L. Tomio

“Dynamics of bright matter wave solitons in Bose-Einstein condensate with inhomogeneous scattering length”

J. Phys. B 37, 635 – 651, 2003

**37.** L. Tomio, V.S. Filho, M.T. Yamashita, A. Gammal and T. Frederico

“Three-body recombination in ultra-cold systems: prediction of weakly bound atomic trimers energies”

Few-Body Syst., 178 –183, 2003

- 38.** L. Bonora, C.P. Constantinidis, L.A. Ferreira and E.E. Leite  
“Construction of exact Riemannian instanton solutions”  
J. Phys. A 36, 7193 – 7209, 2003
- 39.** A. Bytsenko, M.C.B. Abdalla and M.E.X. Guimarães  
“Black hole entropy associated with the sigma model”  
Phys. Rev. D 68, 104011-1 – 104011-5, 2003
- 40.** A.L. Gadelha, I.V. Vancea and M.C.B. Abdalla  
“TFD approach to bosonic strings and  $D_p$ -branes”  
Int.J. Mod. Phys. A 18, 2109 – 2118, 2003
- 41.** M. Schnabl and N. Berkovits  
“Yang-Mills action from open superstring field theory”  
J. High Energy Phys. 309, 22, 2003
- 42.** N. Berkovits and N. Seiberg  
“Superstrings in graviphoton background and  $N = 1/2 + 3/2$  supersymmetry”  
J. High Energy Phys. 307, 10, 2003
- 43.** F. Abdullaev, J.G. Caputo, R.A. Kraenkel and B. Malomed  
“Controlling collapse in Bose-Einstein condensates by temporal modulation of the scattering length”  
Phys. Rev. A 67, 013605, 2003
- 44.** S.B. Cavalcanti, J.M. Hickmann, A. Kamchatnov and R.A. Kraenkel  
“Soliton propagation in a medium with Kerr nonlinearity and resonant impurities: A variationa approach”  
Phys. Rev. E 67, 046615, 2003
- 45.** A. Kamchatnov, R.A. Kraenkel and B. Umarov  
“Asymptotic soliton train solutions of Kaup-Boussinesq equations”  
Wave Motion 38, 355 – 365, 2003

- 46.** F. Abdullaev, E. Tsoy, B. Malomed and R.A. Kraenkel  
“Array of Bose-Einstein condensates under time-periodic Feshbach-resonance management”  
Phys. Rev. A 68, 053606, 2003
- 47.** F. Abdullaev, A. Gammal, A. Kamchatnov and R.A. Kraenkel  
“Formation of soliton trains in Bose-Einstein condensates as a nonlinear Fresnel diffraction of matter waves”  
Phys. Lett. A 319, 406 – 412, 2003
- 48.** A.H. Campos, H.C. Reis and R. Rosenfeld  
“Preheating in quintessential inflation”  
Phys. Lett. B 575, 151 – 156, 2003
- 49.** A. Chalov, A. Likhoded and R. Rosenfeld  
“Measuring Higgs coupling to tau-leptons at future  $e+e-$  colliders”  
J. Phys. G 29, 337 – 348, 2003
- 50.** V. Braguta, A. Chalov, A. Likhoded and R. Rosenfeld  
“Future  $e+e-$  collider’s sensitivity to Hbb coupling and CP violation”  
Phys. Rev. Lett. 90, 241801-1 – 241801-3, 2003
- 51.** V. Braguta, A. Chalov, A. Likhoded and R. Rosenfeld  
“Analysis of the Hbb coupling constant and CP-violation effects at future  $e+e-$  colliders”  
JETP Lett. 78, 1 – 4, 2003
- 52.** A. Belyaev, T. Han and R. Rosenfeld  
“ $gg \rightarrow h \rightarrow \tau^+ \tau^-$  at the upgrade Fermilab Tevatron”  
J. High Energy Phys. 7, 021-1 – 021-9, 2003
- 53.** R. Aldrovandi, P.B. Barros and J.G. Pereira  
“The equivalence principle revisited”

Found. of Phys. 33, 545 – 575, 2003

**54.** R. Aldrovandi, P.B. Barros and J.G. Pereira

“Gravitation as anholonomy”

Gen. Relat. Gravit. 35, 991 – 1005, 2003

**55.** R. Aldrovandi, A.L. Barbosa, M. Calçada and J.G. Pereira

“Kinematics of a spacetime with an infinite cosmological constant”

Found. of Phys. 33, 613 – 624, 2003

**56.** R. Aldrovandi, V.C. de Andrade, A.L. Barbosa and J.G. Pereira

“Mass generation from Lie algebra extensions”

Int. J. Theor. Phys. 42, 2955 – 2970, 2003

**57.** R. Aldrovandi, J.G. Pereira and K.H. Vu

“Gravitation: global formulation and quantum effects”

Classical Quant. Grav. 21, 51 – 62, 2003

**58.** R. Aldrovandi, J.G. Pereira and K.H. Vu

“Gravitation without the equivalence principle”

Gen. Relat. Gravit. 36, 101 – 110, 2003

**59.** S.K. Adhikari

“Loss of superfluidity in a Bose-Einstein condensate on an optical lattice via a novel classical phase transition”

Phys. Lett. A 308, 302 – 307, 2003

**60.** S.K. Adhikari

“Resonance in Bose-Einstein condensate oscillation from a periodic variation in scattering length”

J. Phys. B 36, 1109 – 1120, 2003

**61.** S.K. Adhikari and P. Muruganandam

“Mean-field model for the interference of matter waves from a three-dimensional optical trap”

Phys. Lett. A 310, 229 – 235, 2003

**62.** S.K. Adhikari

“Mean-field model for Josephson oscillation in a Bose-Einstein condensate on an one-dimensional optical trap”

Eur. Phys. J. D. 25D, 161 – 166, 2003

**63.** S.K. Adhikari

“Loss of superfluidity in a Bose-Einstein condensate via forced resonant oscillations”

Phys. Lett. A 313, 211 – 217, 2003

**64.** P. Muruganandam and S.K. Adhikari

“Bose-Einstein condensation dynamics in three dimensions by the pseudospectral and finite-difference methods”

J. Phys. B 36, 2501 – 2513, 2003

**65.** S.K. Adhikari

“Dynamical classical superfluid-insulator transition in a Bose-Einstein condensate on an optical lattice”

J. Phys. B 36, 2725 – 2731, 2003

**66.** S.K. Adhikari

“Critical number of atoms in an attractive Bose-Einstein condensate on an optical plus harmonic traps”

J. Phys. B 36, 2943 – 2949, 2003

**67.** S.K. Adhikari

“Mean-field model of interaction between bright vortex solitons in Bose-Einstein condensates”

New J. Phys. 5, 137-1 – 137-13, 2003

**68.** S.K. Adhikari

“Expansion of a Bose-Einstein condensate formed on a joint harmonic and one-dimensional optical-lattice potential”

J. Phys. B 36, 3951 – 3959, 2003

**69.** A.G. Dias, M.D. Tonasse and V. Pleitez

“Naturally light invisible axion in models with large local discrete symmetries”

Phys. Rev. D 67, 055008-1 – 05508-7, 2003

**70.** D.L. Nedel

“Consistency of superspace low-energy equation of motion for 4-D type II superstring with type II sigma model at tree level”

Phys. Lett. 573B, 217 – 226, 2003

**71.** H. Blas

“Higher grading conformal affine Toda theory and (generalized) Sine-Gordon / massive Thirring duality”

J. High Energy Phys. 311, 2003

**72.** E.F. Suisso, J.P.B.C. de Melo and T. Frederico

“Ground state masses and binding energies of the nucleon, hyperon and heavy baryons in a light front model”

Braz. J. Phys. 33, 306 – 310, 2003

**73.** A.G. Dias, C.A. de S. Pires and P.S. Rodrigues da Silva

“Discrete symmetries, invisible axion and lepton number symmetry in an economic 3-3-1 Model”

Phys. Rev. D 68, 115009-1 – 115009-17, 2003

**74.** A. Gusso, C.A. de S. Pires and P.S. Rodrigues da Silva

“Neutrino mixing and the minimal 3-3-1 model”

Mod. Phys. Lett. A18, 1849 – 1859, 2003

**75.** G.I. Gomero

“Determining the shape of the universe using discrete sources”

Classical Quant. Grav. 20, 4775 – 4784, 2003

**76.** A. Alves, O.J.P. éboli and T. Plehn

“Stop-Lepton Associated Production at Hadron Colliders”

Phys. Lett. B 558, 165 – 172, 2003

**77.** J.L. Tomazelli and L.C. Costa

“Atomic radiative transition in thermo field dynamics”

Intern.J. Mod. Phys. A7, 1079 – 1089, 2003

**78.** J.L. Tomazelli and L.C. Costa

“Operator ordering in quantum radiative processes”

Physica A 323, 435 – 444, 2003

**79.** J.L. Tomazelli and L.C. Costa

“On the asymptotic behavior of effective QED at finite temperature”

European Phys. J. D. C31, 239 – 243, 2003

**80.** C.A.S. Maia and M.H.F. Bettega

“Elastic scattering of low-energy electrons by  $XH_3YH_3$  ( $X, Y = C, Si, Ge, Sn$ ) “

Phys. Rev. A 67, 042710-1 – 042710-6, 2003

**81.** P. Dorey, A. Pocklington and R. Tateo

“Integrable aspects of the scaling q-state Potts models I: bound states and bootstrap closure”

Nucl. Phys. B 661, 425 – 463, 2003

**82.** P. Dorey, A. Pocklington and R. Tateo

“Integrable aspects of the scaling q-state Potts models II: finite-size effects”

Nucl. Phys. B 661, 464 – 513, 2003

**83.** I. Cabrera-Carnero and M. Moriconi

“Noncommutative integrable field theories in 2d”

Nucl. Phys. B 673, 437 – 454, 2003

**84.** M.B. Cantcheff and P. Minces

“Duality between non-commutative Yang-Mills-Chern-Simons and non-Abelian self-dual models”

Phys. Lett. B 557, 283 – 289, 2003

**85.** Yu. N. Obukhov and J.G. Pereira

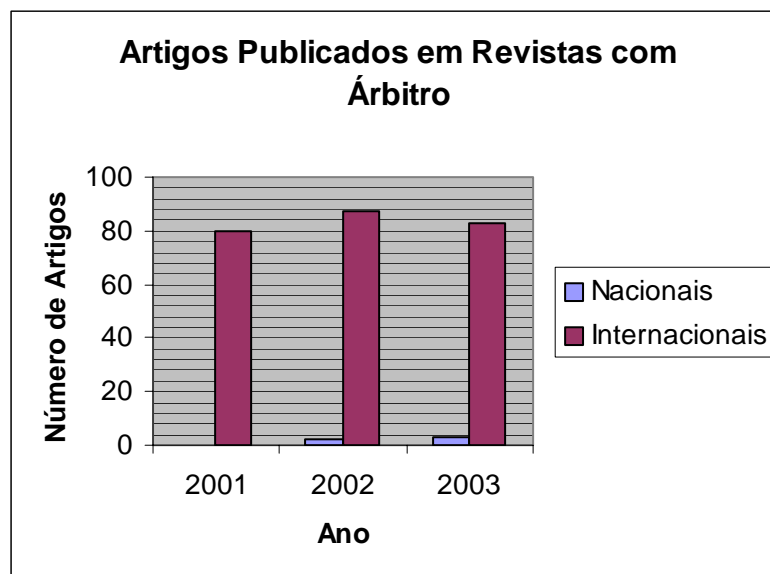
“Teleparallel origin of the Fierz picture for spin-2 particles”

Phys. Rev. D 67, 044008 – 044008-5, 2003

**86.** Yu. N. Obukhov and J.G. Pereira

“Metric-affine approach to teleparallel gravity”

Phys. Rev. D 67, 044016-1 – 044016-17, 2003



#### 4.2.2 Books

A.A. Natale

“O Universo sem mistério”

Vieira & Lent – Casa Editorial, 201p.

R. Rosenfeld

“Feynman & Gell-Mann: Luz, quarks, ação”

Editora Odysseus, 100p.

#### 4.2.3 Proceedings

1. A.T. Suzuki and J.H.O. Sales

“The light-front gauge propagator: the status quo”

Proceedings of the Workshop: Light-front physics: Hadrons and Beyond, 64 – 67

2. A.T. Suzuki and J.H.O. Sales

“Can two or more gauge bosons propagate in the light-front?”

XXIV Encontro Nacional de Física de Partículas e Campos, 1 – 8

3. B. Pimentel and C.A.M. Melo

“Princípio Variacional de Schwinger e Mecânica Estatística: cavidades ressonantes e átomos frios”

Tendências da Física Estatística no Brasil, 195-199

4. M. Ruzzi, S. Machado and D. Galetti

“Discrete and canonical quantum variables”

Special Issue: XXV Workshop on Nuclear Physics in Brazil, vol. 33, 259 – 262

5. A. Andrejevs, J. Tambergs, J. Ruza, J.A. Castilho Alcarás and O. Katkevicius

“Classification of Nuclear Physics States in Unitary Scheme Basis for Strictly Restricted Dynamics Model”

International Symposium on Capture Gamma-Ray Spectroscopy, 629 – 632

6. J.P.B. de Melo, L. Tomio and T. Frederico

“Light front model of the Kaon electromagnetic current”

Proceedings of the VIII International Workshop on Hadron Physics 2002, 215 – 218

7. L.A. Trevisan, B. Salvi and L. Tomio

“The nucleon structure function and the quark effective potential”

Proceedings of the VIII International Workshop on Hadron Physics 2002, 437 – 440

8. S.S. Padula

“Possible origin of RHIC  $R_{out}/R_{sid}$  HBT results”

Proceedings of the 16<sup>th</sup> Int. Conference on Ultra-Relat. Nucleus-Nucleus Collisions –  
Quark Matter 2002, 637 – 640

#### 4.2.4 Preprints

H. Nunokawa, W.J.C. Teves and R. Z. Funchal

“Determining the oscillation parameters by solar neutrinos and Kamland”

**IFT - P.001/03**

H. Minakata, H. Nunokawa and S. Parke

“The complementarity of eastern and western hemisphere long-baseline neutrino  
oscillation experiments”

**IFT - P.002/03**

G.E.A. Matsas and D.A.T. Vanzella

“Weak decay of swirling protons and other processes”

**IFT - P.003/03**

R. Aldrovandi, P.B. Barros and J.G. Pereira

“Gravitation as anholonomy”

**IFT - P.004/03**

M.C.B. Abdalla, A.L. Gadelha and I.V. Vancea

“TFD approach for bosonic strings and  $d_p$ -branes”

**IFT - P.005/03**

T. Frederico, J.H.O. Sales, B.V. Carlson and P.U.Sauer  
“Light-front time picture of the Bethe-Salpeter equation”

**IFT - P.006/03**

R. Casana  
“Renormalized versions of the massless Thirring mode”

**IFT - P.008/03**

W.B.B. Golli and G. Ripka  
“Solitons in nonlocal chiral quark models”

**IFT - P.009/03**

M.B. Cantcheff and P. Minces  
“Duality between noncommutative Yang-Mills-Chern-Simons and non-abelian self-dual model”

**IFT - P.010/03**

J.A.C. Alcarás, J. Tambergs, T. Krasta, J. Ruv{c}a and O. Katkeviv{c}ius  
“Plethysms and interacting boson models”

**IFT - P.011/03**

A.T. Suzuki, J.H.O. Sales  
“Light-front gauge propagator reexamined”

**IFT - P.012/03**

M. Caballero and G.W. Bund  
“Mapping the Wigner distribution function of the morse oscillator into a semi-classical distribution function”

**IFT - P.013/03**

M.E.X. Guimarães, V.C. de Andrade and Patrick Peter  
“Dilatonic current-carrying cosmic strings”

**IFT - P.014/03**

A.C. Aguilar, A.A. Natale and P.S.R. da Silva

“Relating a gluon mass scale to an infrared fixed point in pure gauge QCD”

**IFT - P.015/03**

A.T. Suzuki and J.H.O. Sales

“Light-front gauge propagator reexamined-II”

**IFT - P.016/03**

A.L.N. Oliveira and M.E.X. Guimarães

“Wakes in dilatonic current-carrying cosmic strings”

**IFT - P.017/03**

G.I. Gomero

“Determining the shape of the universe using discrete sources”

**IFT - P.018/03**

M.C. Abdalla, A.A. Bytsenko, M.E.X. Guimarães

“Asymptotics of elliptic general of symmetric products and the entropy formula”

**IFT - P.019/03**

A.C. Aguilar, A. Mihara, A.A. Natale

“Testing the infrared behavior of the QCD running coupling constant”

**IFT - P.020/03**

R. Casana, V.Ya. Faibnerg, B.M. Pimentel, J.S. Valverde

“Bose-Einstein condensation and free DKP field”

**IFT - P.021/03**

A. Accioly

“Quadratic gravity theories in (2+1)d and the topological Chern-Simons term”

**IFT - P.022/03**

A. Accioly

“Conformal compling and Foldy-Woutherysen transformation”

**IFT - P.023/03**

G.E.A. Matsas

“Relativistic Archimedes law for fast moving bodies and the general-relativistic resolution of the 'submarine paradox’”

**IFT - P.024/03**

H. Nunokawa

“CP and t violation in neutrino oscillations”

**IFT - P.025/03**

N. Berkovits and N. Seiberg

“Superstrings in graviphoton background and  $N = 1/2 + 3/2$  supersymmetry”

**IFT - P.026/03**

N. Berkovits and M. Schnabl

“Yang-Mills action from open superstring field theory”

**IFT - P.027/03**

D.L. Nedel

“Superspace low-energy equation of motion for 4D type II superstring”

**IFT - P.028/03**

B.C. Vallilo

“Flat Currents in the Classical  $AdS_5 \times S^5$  Pure spinors superstrings”

**IFT - P.029/03**

M.B. Cantcheff and P. Minces

“Duality in noncommutative topologically massive gauge field theory revisited”

**IFT - P.030/03**

G. Mussardo, V. Riva and G. Sotkov

“Finite-volume form factors in semiclassical approximation”

**IFT - P.031/03**

A.G. Dias and V. Pleitez

“Stabilizing the invisible axion in 3-3-1 models”

**IFT - P.032/03**

E.M. Gregores, O.J.P. éboli and J.K. Mizukoshi

“Testing color evaporation in photon-photon production of J/V at CERN LEP II”

**IFT - P.034/03**

M.C. Abdalla, A.A. Bytsenko and M.E.X. Guimarães

“Black hole entropy associated with supersymmetric sigma model”

**IFT - P.035/03**

V.Ya. Fainberg, B.M. Pimentel and J.S. Valverde

“Equivalent of many-photon green function in DKP and KGF statistical quantum field theories”

**IFT - P.036/03**

U. França and R. Rosenfeld

“Age constraints and fine tuning in vamp models”

**IFT - P.037/03**

A. Doff and A.A. Natale

“Limit on the fermion masses in technicolor models”

**IFT - P.038/03**

G. Flores Hidalgo and A.P.C. Malbuisson

“Time evolution of quantum systems in cavities and in free-space - a non perturbative approach”

**IFT - P.039/03**

J.T. Tomazelli and L.C. Costa

“On the asymptotic behaviour of effective Ged at finit temperature”

**IFT - P.040/03**

J. Sales, T. Frederico, B.V. Carlson and P.V. Sauer

“Light-front time picture of few-body systems”

**IFT - P.041/03**

A. Alves, O.J.P. éboli, T. Plehn and D. Rainwater

“Robust LHC Higgs search in weak boson fusion”

**IFT - P.042/03**

B. Mota, G.I. Gomero, M.J. Rebouças and R. Tavakol

“What do very nearly flat detectable cosmic topologies look like?”

**IFT - P.043/03**

N. Berkovits, H. Ooguri and C. Vafa

“On the worldsheet derivation of large N Dualities for THR superstring”

**IFT - P.044/03**

J.F. Gomes, A.H. Zimerman and H. Aratyn

“Supersymmetry and the KDV equations for integrable hierarchies with half-integer gradation”

**IFT - P.045/03**

A. Doff and A.A. Natale

“The origin of the first and third generation fermion masses in a technicolor scenario”

**IFT - P.046/03**

A. Gusso

“Resonant production of scalar diquarks at the next generation electron-positron colliders”

**IFT - P.047/03**

G.I. Gomero

“Circles in the sky' in Twisted Cylinders”

**IFT - P.048/03**

L.A.M. Salcedo, J.P.B.C. de Melo, D. Hadjmichef and T. Frederico

“Weak Decay Constant of Pseudoscalar Mesons in a QCD-Inspired Model”

**IFT - P.049/03**

E.F. Suisso, J.P.B.C. de Melo and T. Frederico

“Regularization of a Light-Front QQQ Model”

**IFT - P.050/03**

J.P.B.C. de Melo and T. Frederico

“Electromagnetic current of a composed vector particle in the light-front”

**IFT - P.051/03**

M.C.B. Abdalla, A.A. Bytsenko and M.E.X. Guimarães

“Entropy and thermodynamic limits in m-theory”

**IFT - P.052/03**

A.A. Bytsenko, M.E.X. Guimarães, J.A. Helayel-neto

“Forms on vector bundles over three-dimensional hyperbolic spaces and hole geometry”

**IFT - P.053/03**

R. Casana, B.M. Pimentel, J.T. Lunardi and R.G. Teixeira

“Conformal invariance in massless DKP theory”

**IFT - P.054/03**

A. Accioly and M. Dias

“Unavoidable conflict Between massive gravity models and massive topological terms”

**IFT - P.055/03**

A. Accioly and H. Blas

“Merging higher derivative gravity and quantum mechanics”

**IFT - P.056/03**

C.G. Roldão and A.A. Natale

“Ultra peripheral heavy ion collisions and the energy dependence of the nuclear radius”

**IFT - P.057/03**

J.P.B.C. de Melo, T. Frederico, E. Pace and G. Salm`e

“Electromagnetic form factor of the pion in the space- and time- like regions within the front-form dynamics”

**IFT - P.058/03**

M.C.B. Abdalla, A.A. Bytsenko and M.E.X. Guimarães

“Quantum States, thermodynamic limits and entropy in m-theory”

**IFT - P.059/03**

H. Forkel

“Direct instantons, topological charge screening and QCD glueball sum rules”

**IFT - P.060/03**

A.A. Bytsenko, V.S. Mendes and A.C. Tort

“Thermodynamics of Abelian gauge fields in rela hyperbolic spaces”

**IFT - P.061/03**

H.V. Fagundes and T. Vargas

“Quantum creation of a universe with quase-hyperbolic spatial sections”

**IFT - P.062/03**

A. Accioly and R. Paszko

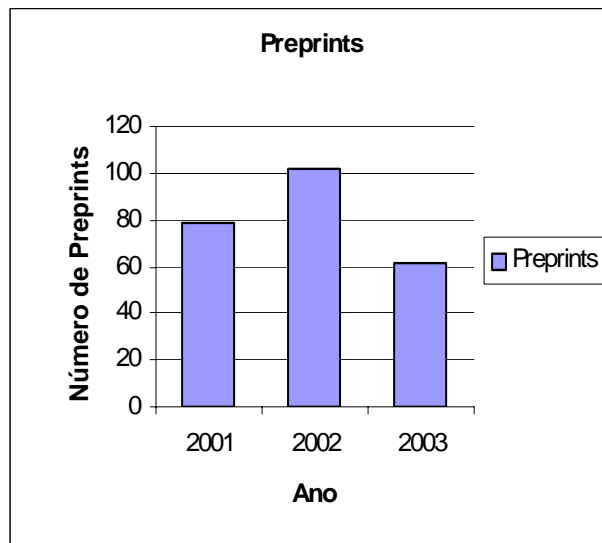
“Photon massand gravitation deffection”

**IFT - P.063/03**

G. Francisco and A. Fonseca

“Homoclinic orbits in Saddle-Center reversible Hamiltonian systems”

**IFT - P.064/03**



## 5 Organization of Conferences, Workshops and Schools

During the academic year of 2003, the institution sponsored the following activities:

1. Workshop on Bose-Einstein Condensation – April, 29 to 30
2. Curso de Extensão Universitária 2003 – July
3. XXVI Congresso Paulo Leal Ferreira de Física Teórica – October, 8 to 10
4. Física ao Entardecer – March to December
5. ICTP Latin American String School – December, 01 to 20

## 6 International Agreements and Collaborations

The institution has agreements and collaborations with several important world laboratories and research institutions around the world. Among the institutions that we have agreements and collaborations, we can mention the following:

- ICTP – International Centre for Theoretical Physics, Trieste, Italy (Formal agreement);
- JINR – Joint Institute for Nuclear Research, Dubna, Russia (Formal agreement);
- Special Center for the Subatomic Structure of Matter of the University of Adelaide, Australia;
- CNRS, France;
- COFECUB, France;
- Forschungszentrum Jülich, Germany;
- Fermilab, USA;
- ECT\*, Italy;
- CSIC, Spain;
- ICCTI, Portugal;
- National Science Foundation, USA