

XIX Chilean Physics Symposium

2014

Journal of Physics: Conference Series Volume 720

Concepcion, Chile
26 – 28 November 2014

Editors:

Gonzalo Gutierrez
Luis Roa

ISBN: 978-1-5108-2537-6
ISSN: 1742-6588

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2014) by the Institute of Physics
All rights reserved. The material featured in this book is subject to
IOP copyright protection, unless otherwise indicated.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact the Institute of Physics
at the address below.

Institute of Physics
Dirac House, Temple Back
Bristol BS1 6BE UK

Phone: 44 1 17 929 7481
Fax: 44 1 17 920 0979

techtracking@iop.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

Table of contents

Volume 720

XIX Chilean Physics Symposium 2014 26–28 November 2014, Concepción, Chile

Accepted papers received: 19 May 2016 Published online:

Preface

011001

OPEN ACCESS

[XIX Chilean Physics Symposium 2014](#)

Gonzalo Gutiérrez and Luis Roa

011002

OPEN ACCESS

[Peer review statement](#)

Papers

Statistical Mechanics and Complex systems

012001

OPEN ACCESS

[Forecasting of DST index from auroral electrojet indices using time-delay neural network + particle swarm optimization](#)

J A Lazzús, C H López-Caraballo, P Rojas, I Salfate, M Rivera and L Palma-Chilla.....1

012002

OPEN ACCESS

[Mackey-Glass noisy chaotic time series prediction by a swarm-optimized neural network](#)

C H López-Caraballo, I Salfate, J A Lazzús, P Rojas, M Rivera and L Palma-Chilla.....8

012003

OPEN ACCESS

[Temperature estimators in computer simulation](#)

César Jara, Felipe González-Cataldo, Sergio Davis and Gonzalo Gutiérrez.....18

012004

OPEN ACCESS

[Labyrinthine dissipative patterns](#)

I Bordeu.....23

012005

OPEN ACCESS

[Riemannian geometry of fluctuation theory: An introduction](#)

Luisberis Velazquez.....33

012006

OPEN ACCESS

[The Maximum Caliber principle applied to continuous systems](#)

Diego González and Sergio Davis.....43

012007

OPEN ACCESS

[Inverse temperature in Superstatistics](#)

Humberto Loguercio and Sergio Davis.....47

Gravitation and Cosmology

012008

OPEN ACCESS

[The Emergent Universe and the Anomalies in the Cosmic Microwave Background](#)

Carlos Ríos, Pedro Labraña and Antonella Cid.....52

012009

OPEN ACCESS

[Can one hear the Riemann zeros in black hole ringing?](#)

Rodrigo Aros, Fabrizzio Bugini and Danilo E Diaz.....61

012010

OPEN ACCESS

[Hybrid Expansion Law with Interacting Cosmic Fluids](#)

Luis Avilés, Patricio Mella and Fabián Orellana.....64

012011

OPEN ACCESS

[Exact solutions for the motion of spinning massive particles in conformally flat spacetimes](#)

Felipe A Asenjo and Sergio A Hojman.....68

012012

OPEN ACCESS

[Numerical simulations of Modified Newtonian Dynamics](#)

G N Candlish, R Smith and M Fellhauer.....76

012013

OPEN ACCESS

[Truncated \$\gamma\$ -exponential models for tidal stellar systems](#)

Y. J. Gomez-Leyton and L. Velazquez.....85

012014

OPEN ACCESS

[Generalized equations of state and regular universes](#)

F Contreras, N Cruz and E González.....95

012015

OPEN ACCESS

[5D EChS Cosmology with Perfect Fluid](#)

Luis Avilés, Patricio Mella and Patricio Salgado.....102

012016
OPEN ACCESS
[Emergent Universe Scenario and the Low CMB Multipoles](#)

Pedro Labraña.....106

Fields, particles and Nuclear Physics

012017
OPEN ACCESS
[Integrability properties of a coupled KdV system and its supersymmetric extension](#)

Adrián Sotomayor and Alvaro Restuccia.....114

012018
OPEN ACCESS
[Yang-Mills connections valued on the octonionic algebra](#)

A Restuccia and J P Veiro.....121

012019
OPEN ACCESS
[Arguments towards the construction of a matrix model groundstate](#)

L Boulton, M P Garcia del Moral and A Restuccia.....128

012020
OPEN ACCESS
[Setting the Renormalization Scale in QFT](#)

Carlos Contreras, Benjamin Koch and Paola Rioseco.....131

012021
OPEN ACCESS
[Structure and cooling of neutron stars: nuclear pairing and superfluid effects](#)

F Isaule and H F Arellano.....139

012022
OPEN ACCESS
[Effects of angular correlations on particle-particle propagation in infinite nuclear matter](#)

J Romero-Barrientos and H F Arellano.....146

012023
OPEN ACCESS
[Optical properties of Chern-Simons systems](#)

Luis Huerta.....154

012024
OPEN ACCESS
[Finite temperature effects and the validity of the Weinberg sum rules](#)

Alejandro Ayala, C. A. Dominguez, M Loewe and Y. Zhang.....161

012025
OPEN ACCESS
[Aspects of the T-duality construction for the Supermembrane theory](#)

M.P. Garcia del Moral, J.M. Pena and A. Restuccia.....170

012026
OPEN ACCESS
[Inverse magnetic catalysis in the linear sigma model](#)

A Ayala, M Loewe and R Zamora.....176

012027
OPEN ACCESS
[The pressure of hot QCD](#)

York Schröder.....184

Condensed Matter and material science

012028

OPEN ACCESS

[Stationary textures induced by spin-transfer torques: role of the angular dependence](#)

Alejandro O. León.....190

012029

OPEN ACCESS

[Synthesis and characterization of chemically deposited CdS thin films without toxic precursors.](#)

A. Fernández-Pérez and M. G. Sandoval-Paz.....200

012030

OPEN ACCESS

[Natural dyes as sensitizers to increase the efficiency in sensitized solar cells](#)

Bayron Cerda, R. Sivakumar and M. Paulraj.....208

012031

OPEN ACCESS

[Theoretical study of intrinsic defects in CdTe](#)

E. Menéndez-Proupin and W. Orellana.....212

012032

OPEN ACCESS

[Z method calculations to determine the melting curve of silica at high pressures](#)

F. González-Cataldo, S. Davis and G. Gutiérrez.....222

012033

OPEN ACCESS

[Sn doped CdTe as candidate for intermediate-band solar cells: A first principles DFT+GW study](#)

Mauricio A. Flores and Eduardo Menéndez-Proupin.....228

012034
OPEN ACCESS
[Spin-orbit coupling effects in gold clusters: The case of Au₁₃](#)

Mauricio A. Flores and Eduardo Menéndez-Proupin.....234

012035
OPEN ACCESS
[Synthesis of solar cells sensitized using natural photosynthetic pigments & study for the cell performance under different synthesis parameters](#)

Simon Roa, Sivakumar Radhakrishnan and Paulraj Manidurai.....238

012036
OPEN ACCESS
[Effect of TiO₂ blocking layer on TiO₂ nanorod arrays based dye sensitized solar cells](#)

R Sivakumar and M Paulraj.....245

Plasma physics

012037
OPEN ACCESS
[Dynamic Characteristics of X-pinch Experiments Conducted in a Small Capacitive Generator:Refractive Optical Observations.](#)

Adolfo Sepúlveda, Cristian Pavez, José Pedreros, Gonzalo Avaria, Patricio San Martín and Leopoldo Soto.....252

012038
OPEN ACCESS
[Development of plasma needle to be used for biomedical applications](#)

B Bora, J Jain, M J Inestrosa-Izurieta, G Avaria, J Moreno, C Pavez, K. Marcelain, R. Armisen and L Soto.....260

012039
OPEN ACCESS
[Plasma outflows from wire-based z-pinch experiments driven at currents of hundreds of kiloamperes.](#)

Felipe Veloso, Gonzalo Muñoz-Cordovez, Luis Donoso-Tapia, Vicente Valenzuela-Villaseca, Mario Favre and Edmund Wyndham.....266

012040

OPEN ACCESS

Analytic Approximate for the Plasma Sheath Potential

Pablo Martin, Fernando Maass-Artigas and Luis Cortés-Vega.....275

012041

OPEN ACCESS

Characterization of the ionization degree evolution of the PF-400J plasma sheath by means of time resolved optical spectroscopy

G. Avaria, O. Cuadrado, J. Moreno, C. Pavez and L. Soto.....280

012042

OPEN ACCESS

Ion beam measurement using Rogowski coils in a hundred of joules dense plasma focus device.

J. Jain, J. Moreno, C. Pavez, B. Bora, M. J. Inestrosa-Izurieta, G. Avaria and L. Soto.....285

012043

OPEN ACCESS

Characterization of x-rays pulses from a hundred joules plasma focus to study its effects on cancer cells.

J. Jain, J. Moreno, G. Avaria, C. Pavez, B. Bora, M. J. Inestrosa Izurieta, D. Diez, O. Alvarez, J. Tapia, K. Marcelain, R. Armisen and L. Soto.....290

012044

OPEN ACCESS

Collision dynamics of laser produced carbon plasma plumes

M. Favre, H. M. Ruiz, D. Cortés, F. Merello, H. Bhuyan, F. Veloso and E. Wyndham.....296

012045

OPEN ACCESS

Deposition of materials using a plasma focus of tens of joules

M. J. Inestrosa-Izurieta, P. Jauregui and L. Soto.....301

Applied Physics and experimental techniques

012046

OPEN ACCESS

[Parallel processing implementation for the coupled transport of photons and electrons using OpenMP](#)

Edgardo Doerner.....309

012047

OPEN ACCESS

[Characteristic variogram for land use in Multispectral Images](#)

E. Mera, A. Condal, C. Rios and L. Da Silva.....311

012048

OPEN ACCESS

[Numerical modeling of solar irradiance on earth's surface](#)

E. Mera, L. Gutierrez, L. Da Silva and E. Miranda.....320

012049

OPEN ACCESS

[Multi-V-type and Λ-type electromagnetically induced transparency experiments in rubidium atoms with low-power low-cost free running single mode diode lasers](#)

S. Lavín Varela, J. A. León Suazo, J. Gutierrez González, J. Vargas Roco, T. Buberl and J. G. Aguirre Gómez.....328

012050

OPEN ACCESS

[Generation of stable cnoidal waves in an erbium doped fiber laser system](#)

Mario Wilson, Andrés González-García and Vicente Aboites.....337

012051

OPEN ACCESS

[Design of a program in Matlab environment for gamma spectrum analysis of geological samples](#)

M Rojas and R Correa.....343

012052

OPEN ACCESS

[Theoretical prediction of gold vein location in deposits originated by a wall magma intrusion](#)

Pablo Martin, Fernando Maass-Artigas and Luis Cortés-Vega.....347

012053

OPEN ACCESS

[Background considerations in the analysis of PIXE spectra by Artificial Neural Systems.](#)

R. Correa, J.R. Morales, I. Requena, J. Miranda and V.A. Barrera.....353

General physics, Education and Society

012054

OPEN ACCESS

[Radiative effects and the missing energy paradox in the ideal two capacitors problem](#)

Gilberto A Urzúa, Omar Jiménez, Fernando Maass and Álvaro Restuccia.....362

012055

OPEN ACCESS

[Small oscillations of a 3D electric dipole in the presence of a uniform magnetic field](#)

L A del Pino, B Atenas and S Curilef.....367

012056

OPEN ACCESS

[Study of connectivity in student teams by observation of their learning processes](#)

Patricio H Pacheco and Rafael D. Correa.....375

012057

OPEN ACCESS

Non university sources of science in Chile

Leopoldo Soto.....386

012058

OPEN ACCESS

Hilda Cid: physicist, crystallographer, structural biologist

Gonzalo Gutiérrez.....391