

XX INTERNATIONAL FALL WORKSHOP ON GEOMETRY AND PHYSICS

Madrid, Spain 31 August – 3 September 2011

EDITORS

María Barbero Liñán
*Universidad Carlos III de Madrid-Instituto
de Ciencias Matemáticas, Madrid, Spain*

Fernando Barbero
Instituto de Estructura de la Materia, CSIC, Spain

David Martín de Diego
Instituto de Ciencias Matemáticas, Madrid, Spain

SPONSORING ORGANIZATIONS

Instituto de Ciencias Matemáticas (CSIC-UAM-UC3M-UCM)
Centro Nacional de Física de Partículas, Astropartículas y Nuclear (CPAN)
Ingenio MATHEMATICA Consolider (i-MATH)
Geometry, Mechanics and Control Network (GMC Network)
Universidad Carlos III de Madrid (UC3M)
Universidad Autónoma de Madrid (UAM)
Spanish Ministry of Science and Innovation



Melville, New York, 2012
AIP | CONFERENCE PROCEEDINGS ■ 1460

Editors

María Barbero Liñán
Departamento de Matemáticas
Universidad Carlos III de Madrid
Avenida de la Universidad 30
28911 Leganés, Madrid
Spain

E-mail: mbarbero@math.uc3m.es

David Martín de Diego
Instituto de Ciencias Matemáticas
C/Nicolás Cabrera 15
Campus Cantoblanco – UAM
28049 Madrid
Spain

E-mail: david.martin@icmat.es

Fernando Barbero
Instituto de Estructura de la Materia
C/Serrano 123
28006 Madrid
Spain

E-mail: fbarbero@iem.cfmac.csic.es

Authorization to photocopy items for internal or personal use, beyond the free copying permitted under the 1978 U.S. Copyright Law (see statement below), is granted by the American Institute of Physics for users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of \$30.00 per copy is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923, USA: <http://www.copyright.com>. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Services is: 978-0-7354-1064-0/12/\$30.00.

© 2012 American Institute of Physics

No claim is made to original U.S. Government works.

Permission is granted to quote from the AIP Conference Proceedings with the customary acknowledgment of the source. Republication of an article or portions thereof (e.g., extensive excerpts, figures, tables, etc.) in original form or in translation, as well as other types of reuse (e.g., in course packs) require formal permission from AIP and may be subject to fees. As a courtesy, the author of the original proceedings article should be informed of any request for republication/reuse. Permission may be obtained online using RightsLink. Locate the article online at <http://proceedings.aip.org>, then simply click on the RightsLink icon/“Permissions/Reprints” link found in the article abstract. You may also address requests to: AIP Office of Rights and Permissions, Suite 1NO1, 2 Huntington Quadrangle, Melville, NY 11747-4502, USA; Fax: 516-576-2450; Tel.: 516-576-2268; E-mail: rights@aip.org.

L.C. Catalog Card No. 2012941991
ISBN 978-0-7354-1064-0 "Qtli kpcnRtkpv"
ISSN 0094-243X
Printed in the United States of America

AIP Conference Proceedings, Volume 1460
XX International Fall Workshop on Geometry and Physics

Table of Contents

Preface	1
Committees	3
Program	5
Sponsors	11

MINI COURSES

Three lectures on global boundary conditions and the theory of self-adjoint extensions of the covariant Laplace-Beltrami and Dirac operators on Riemannian manifolds with boundary	
A. Ibort	15
A short introduction to Frobenius manifolds	
Franco Magri	55

INVITED TALKS

Ricci flow and quantum field theory landscaping	
Mauro Carfora	75
What is the shape of a black hole?	
G. W. Gibbons	90
Aspects of group field theory	
Patrizia Vitale	101

CONTRIBUTED TALKS

Lotka-Volterra systems as Poisson-Lie dynamics on solvable groups A. Ballesteros, A. Blasco, and F. Musso	115
Height-2 Toda systems Pantelis A. Damianou, Herve Sabourin, and Pol Vanhaecke	120
Hypersymplectic geometry Andrew Dancer	130
Special phase functions and phase infinitesimal symmetries in classical general relativity Josef Janyška	135
Some remarks on cosymplectic 3-structures Beniamino Cappelletti Montano, Antonio De Nicola, and Ivan Yudin	141

POSTERS

Towards the Einstein-Λ-scalar field system in spherical symmetry Artur Alho, João L. Costa, and José Natário	149
Coisotropic submanifolds of linear Poisson manifolds and Lagrangian anchored vector subbundles of the symplectic cover M. Aymerich-Valls and J. C. Marrero	154
Integrable perturbations of Hénon-Heiles systems from Poisson coalgebras A. Blasco, A. Ballesteros, and F. Musso	159
A geometric framework for discrete Hamilton-Jacobi equation M. Barbero-Liñán, M. Delgado-Téllez, and David Martín de Diego	164
On an inhomogeneous isoparametric family of hypersurfaces with constant principal curvatures in the Cayley hyperbolic plane Miguel Domínguez-Vázquez	169
Quasi-Einstein metrics and plane waves M. Brozos-Vázquez, E. García-Río, and S. Gavino-Fernández	174

On global geodesic mappings of ellipsoids Irena Hinterleitner	180
Second order Euler-Lagrange equations for trivial principal bundles Leonardo Colombo, Fernando Jiménez, and David Martín de Diego	185
<i>SO(3)</i>, 8-manifolds & quaternionic geometry Oscar Macia	193
Black holes in higher dimensions and gravitational collapse Filipe C. Mena	198
Projective mappings and dimensions of vector spaces of three types of Killing-Yano tensors on pseudo Riemannian manifolds of constant curvature Josef Mikeš, Sergey Stepanov, and Irena Hinterleitner	202
Characterization of relative equilibria in the Kepler problem for a rigid body M. Muñoz-Lecanda and M. Teixidó-Román	206
Integrable systems from maps between Poisson manifolds F. Musso, A. Ballesteros, and A. Blasco	211
Skinner-Rusk unified formalism for higher-order systems Pedro Daniel Prieto-Martínez and Narciso Román-Roy	216
Seven invariant classes of the Einstein equations and projective mappings Sergey Stepanov and Josef Mikeš	221
Author Index	227