22nd International Conference on Atomic Physics 2010

(ICAP 2010)

Journal of Physics: Conference Series Volume 264

Cairns, Australia
25 – 30 July 2010

Editors:

Hans Bachor **Peter Hannaford**
Peter Drummond

ISBN: 978-1-61782-299-5
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© (2010) by the Institute of Physics
All rights reserved.

Printed by Curran Associates, Inc. (2011)

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: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

From Optical Pumping To Quantum Gases 1
Claude Cohen-Tannoudji

Synthetic Electric and Magnetic Fields For Ultracold Neutral Atoms 2
W D Phillips, Y-J Lin, R L Compton, K Jiménez-Garcia, A R Perry, J V Porto, I B Spielman

Non-abelian Josephson Effect In Spinor Bose-einstein Condensates 5
Ran Qi, Xiao-Lu Yu, W M Liu

Turbulence In A Trapped Bose-einstein Condensate 12
J A Seman, R F Shiozaki, F J Poveda-Cuevas, E A L Henn, K M F Magalhães, G Roati, G D Telles, V S Bagnato

Bose-einstein Condensation Of Photons In A 'white-wall' Photon Box 17
Jan Klärs, Julian Schmitt, Frank Vewinger, Martin Weitz

Precision Experiments With Antihydrogen: An Outlook 25
Michael Doser

Helium Fine Structure Theory For Determination Of α 32
Krzysztof Pachucki, Vladimir A Yerokhin

The Size Of The Proton and The Deuteron 40
Randolf Pohl, Fernando D Amaro, Aldo Antognini, François Biraben, João M R Cardoso, Daniel S Covita, Andreas Dax, Satish Dhawan, Luis M P Fernandes, Adolf Giesen, Thomas Graf, Theodor W Hänsch, Paul Indelicato, Lucile Julien, Cheng-Yang Kao, Paul Knowles, Eric-Olivier Le Bigot, Yi-Wei Liu, José A M Lopes, Livia Ludhova, Cristina M B Monteiro, Françoise Mulhauser, Tobias Nebel, François Nez, Paul Rabinowitz, Joaquim M F dos Santos, Lukas A Schaller, Karsten Schuhmann, Catherine Schwob, David Taqqu, João F C A Veloso, Franz Kottmann

Gravitational Redshift, Equivalence Principle, and Matter Waves 49
Michael A Hohensee, Brian Estey, Francisco Monsalve, Geena Kim, Pei-Chen Kuan, Shau-Yu Lan, Holger Müller

Astronomical and Laboratory Searches For Space-time Variation Of Fundamental Constants 59
J C Berengut, V V Flambaum

Optical Lattice Clocks and Frequency Comparison 68
Hidetoshi Katori, Tetsushi Takano, Masao Takamoto

Thermodynamics Of The Unitary Fermi Gas 76
F Chevy, S Nascimbène, N Navon, K Jiang, C Lobo, C Salomon

Universal Structure Of A Strongly Interacting Fermi Gas 84
Eva Kuhnle, Paul Dyke, Sascha Hoinka, Michael Mark, Hui Hu, Xia-Ji Liu, Peter Drummond, Peter Hannaford, Chris Vale

Dipolar Effects and Collisions In An Ultracold Gas Of Lics Molecules 92
J Deiglmayr, M Repp, A Grochola, O Dulieu, R Wester, M Weidemüller

Ultracold and Dense Samples Of Ground-state Molecules In Lattice Potentials 101
Hanns-Christoph Nägerl, Manfred J Mark, Elmar Haller, Mattias Gustavsson, Russell Hart, Johann G Danzl

Bose-bose Mixtures In Reduced Dimensions 111
F Minardi, G Barontini, J Catani, G Lamporesi, Y Nishida, M Inguscio

Towards Quantum Magnetism With Ultracold Atoms 121
David M Weld, Wolfgang Ketterle

Inelastic Light Scattering To Probe Strongly Correlated Bosons In Optical Lattices 129
Chiara Fort, Nicole Fabbri, Leonardo Fallani, David Clément, Massimo Inguscio

Hybrid Quantum Systems Of Atoms and Ions 136
Christoph Zipkes, Lothar Ratschbacher, Stefan Palzer, Carlo Sias, Michael Köhl

Quantum Simulation Of Relativistic Quantum Physics With Trapped Ions 143
C F Roos, R Gerritsma, G Kirchmair, F Zähringer, E Solano, R Blatt

Coherently Walking, Rocking and Blinding Single Neutral Atoms 149
Artur Widera, Wolfgang Alt, Dieter Meschede

Quantum Memory, Entanglement and Sensing With Room Temperature Atoms 156
K Jensen, W Wasilewski, H Krauter, T Fernholz, B M Nielsen, J M Petersen, J J Renema, M V Balabas, M Owari, M B Plenio, A Serafini, M M Wolf, C A Muschik, J I Cirac, J H Müller, E S Polzik

Rydberg State Mediated Quantum Gates and Entanglement Of Pairs Of Neutral Atoms 164
M Saffman, X L Zhang, A T Gill, L Isenhower, T G Walker

Correlation Measurements Of Individual Microwave Photons Emitted From A Symmetric Cavity 172
D Bozyigit, C Lang, L Steffen, J M Fink, C Eichler, M Baur, R Bianchetti, P J Leek, S Filipp, A Wallraff, M P Da Silva, A Blais

From Cavity Electromechanics To Cavity Optomechanics..... 180
C A Regal, K W Lehnert
Author Index