PHYSICAL REVIEW A

For editorial and subscription correspondence, please see inside front cover
(ISSN: 1050-2947)

PERIODICALS
Postmaster send address changes to:
American Institute of Physics
500 Sunnyside Boulevard
Woodbury, NY 11797-2999

THIRD SERIES, VOLUME 58, NUMBER 4 ***CONTENTS*** **OCTOBER 1998**

RAPID COMMUNICATIONS

Quantum information

Embedded Bell-state analysis R2623
Paul G. Kwiat and Harald Weinfurter

Entanglement engineering of one-photon wave packets using a single-atom source R2627
K. M. Gheri, C. Saavedra, P. Törmä, J. I. Cirac, and P. Zoller

Atomic and molecular structure and dynamics

Two-photon optical Ramsey spectroscopy of the $1S$-$2S$ transition in atomic hydrogen R2631
A. Huber, B. Gross, M. Weitz, and T. W. Hänsch

Atomic and molecular collisions and interactions

Photoionization experiments yielding ''complete'' information R2635
Valery K. Dolmatov and Steven T. Manson

Fine-structure effect in the relativistic $(e,2e)$ process R2638
K.-H. Besch, M. Sauter, and W. Nakel

Ab initio approach to multidimensional quantum scattering based on an infinite-order discrete-variable representation R2641
Nark Nyul Choi, Min-Ho Lee, and Sung-Ho Suck Salk

Feshbach resonances in ultracold atom-diatom scattering R2645
R. C. Forrey, N. Balakrishnan, V. Kharchenko, and A. Dalgarno

Atomic and molecular processes in external fields

Observation of Rabi oscillations between Bloch bands in an optical potential R2648
M. C. Fischer, K. W. Madison, Qian Niu, and M. G. Raizen

Stabilization with arbitrary laser polarizations R2652
A. Patel, M. Protopapas, D. G. Lappas, and P. L. Knight

Generation of circularly polarized multiple high-order harmonic emission from two-color crossed laser beams ... R2656
Xiao-Min Tong and Shih-I Chu

Magnetization and spin-flip dynamics of atoms in optical lattices R2660
G. Raithel, W. D. Phillips, and S. L. Rolston

Copyright 1998 by The American Physical Society

(Continued)

1050-2947(199810)58:4;1-W

PHYSICAL REVIEW A THIRD SERIES, VOLUME 58, NUMBER 4 OCTOBER 1998

Matter waves

Bose-Einstein condensation in a quadrupole-Ioffe-configuration trap R2664
Tilman Esslinger, Immanuel Bloch, and Theodor W. Hänsch

Quantum optics, physics of lasers, nonlinear optics

Wavelengths of the Ni-like $4d\ ^1S_0-4p\ ^1P_1$ x-ray laser line R2668
Yuelin Li, Joseph Nilsen, James Dunn, Albert L. Osterheld, Alexander Ryabtsev, and Sergey Churilov
Coexistence of low-frequency fluctuations and stable emission on a single high-gain mode in semiconductor lasers with external optical feedback R2672
T. Heil, I. Fischer, and W. Elsäßer
Multidimensional parametric quantum solitons R2676
K. V. Kheruntsyan and P. D. Drummond
Photon trains and lasing: The periodically pumped quantum dot R2680
Christian Wiele, Fritz Haake, Carsten Rocke, and Achim Wixforth

ARTICLES

Fundamental concepts

Kinematical bounds on optimization of observables for quantum systems 2684
M. D. Girardeau, S. G. Schirmer, J. V. Leahy, and R. M. Koch
Stochastic Schrödinger equations for optical fields based on atom detection 2690
John A. Vaccaro and Derek Richards
Matter-field theory of the Casimir force 2699
Masato Koashi and Masahito Ueda
Iterative solutions to quantum-mechanical problems 2708
C. J. Tymczak, G. S. Japaridze, C. R. Handy, and Xiao-Qian Wang
Quantum Fokker-Planck theory in a non-Gaussian-Markovian medium 2721
YiJing Yan

Quantum information

Dynamical suppression of decoherence in two-state quantum systems 2733
Lorenza Viola and Seth Lloyd
Error-free quantum communication through noisy channels 2745
Anders Sørensen and Klaus Mølmer
Simple experimental methods for trapped-ion quantum processors 2750
D. Stevens, J. Brochard, and A. M. Steane

Atomic and molecular structure and dynamics

Existence and transition properties of the three-deuteron muonic molecule $3d2e^-\mu^-$ 2760
V. B. Belyaev, D. E. Monakhov, S. A. Sofianos, and W. Sandhas
Classical momentum distributions of Rydberg states 2767
Inés Samengo
Channel coupling and exchange interaction in negative ions 2777
Kwong T. Chung

(Continued)

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 58, NUMBER 4** **OCTOBER 1998**

Properties of the ground state of the hydrogen molecular ion 2787
A. K. Bhatia

Atomic and molecular collisions and interactions

Levinson's theorem for the Schrödinger equation in two dimensions 2790
Shi-Hai Dong, Xi-Wen Hou, and Zhong-Qi Ma
High-resolution study of ion-induced $K\alpha_{1,2}$ x-ray spectra from high-Z elements 2797
D. F. Anagnostopoulos, G. Borchert, D. Gotta, K. Rashid, D. H. Jakubassa-Amundsen, and P. A. Amundsen
Absence of interchannel coupling in electron momentum spectroscopy 2815
A. S. Kheifets, M. Vos, E. Weigold, M. Brunger, and I. E. McCarthy
Electron-impact detachment from B^- 2819
L. H. Andersen, M. J. Jensen, H. B. Pedersen, L. Vejby-Christensen, and N. Djurić
Effect of core-valence electron correlation in low-energy electron scattering with Ca atoms 2824
Jianmin Yuan and C. D. Lin
Auger-resonance-decay process in Ar $2p$-shell excitation and ionization 2828
Y. Lu, W. C. Stolte, and James A. R. Samson
Collision-induced dissociation of CO_2^+ ions 2834
V. R. Bhardwaj, D. Mathur, K. Vijayalakshmi, P. Hvelplund, M. O. Larsson, and C. P. Safvan
Systematic study of the stable states of C^-, Si^-, Ge^-, and Sn^- via infrared laser spectroscopy 2844
Michael Scheer, René C. Bilodeau, Cicely A. Brodie, and Harold K. Haugen
Transitions between excited electronic states of H_2 molecules by electron impact 2857
Cláudio S. Sartori, Fernando J. da Paixão, and Marco A. P. Lima
Electron–positive-ion scattering near reaction thresholds: Effect of long-range polarization forces 2864
Leonard Rosenberg
Excitation and charge transfer in proton-hydrogen collisions 2872
A. Kołakowska, M. S. Pindzola, F. Robicheaux, D. R. Schultz, and J. C. Wells
Low-energy electron scattering from BCl_3 2881
W. A. Isaacs, C. W. McCurdy, and T. N. Rescigno
Method for determining absolute partial cross sections for radiative and nonradiative deexcitation of metastable hydrogenlike ions 2887
H. T. Schmidt, S. H. Schwartz, A. Fardi, K. Haghighat, H. Cederquist, L. Liljeby, A. Langereis, J. C. Levin, and I. A. Sellin
Ionization of one-electron ions penetrating a target at relativistic energies 2895
Allan H. Sørensen
Measurements of electron-impact ionization cross sections of neon by comparison with photoionization 2900
A. A. Sorokin, L. A. Shmaenok, S. V. Bobashev, B. Möbus, and G. Ulm
Single and double electron capture from He by Ar^{16+} studied using cold-target recoil-ion momentum spectroscopy 2911
M. A. Abdallah, W. Wolff, H. E. Wolf, E. Y. Kamber, M. Stöckli, and C. L. Cocke
Electron-impact excitation of Co^{2+} 2920
J. A. Shaw, M. S. Pindzola, N. R. Badnell, and D. C. Griffin
Final-state Φ_2 wave function in ion-helium collisions 2926
F. D. Colavecchia, G. Gasaneo, and C. R. Garibotti
Radiative stabilization following double-electron capture in slow Ne^{10+}+He collisions 2935
J.-Y. Chesnel, H. Merabet, B. Sulik, F. Frémont, C. Bedouet, X. Husson, M. Grether, and N. Stolterfoht
Semiclassical Moyal quantum mechanics for atomic systems 2944
B. R. McQuarrie, T. A. Osborn, and G. C. Tabisz

PHYSICAL REVIEW A THIRD SERIES, VOLUME 58, NUMBER 4 OCTOBER 1998

Photon, electron, atom, and molecule interactions with solids and surfaces

Energy loss in large-angle scattering of slow, highly charged Ar ions from a Au surface 2962
W. Huang, H. Lebius, R. Schuch, M. Grether, and N. Stolterfoht
Collisional stopping considering the induced potential created by ions in a free-electron gas 2970
D. G. Arbó and J. E. Miraglia
Kinetic electron emission from Al, Cu, and Au surfaces exposed to oxygen 2978
O. Benka, J. Pürstinger, and A. Koyama

Clusters (including fullerenes)

Radiative electron attachment in sodium clusters 2985
M. R. Spinella, M. Bernath, and O. Dragún

Atomic and molecular processes in external fields

Importance of excited bound states in harmonic generation 2990
Carla Figueira de Morisson Faria, Martin Dörr, and Wolfgang Sandner
Polarization dependence and interference in four-wave mixing with Rydberg levels in rubidium vapor 3000
S. S. Vianna, P. Nussenzveig, W. C. Magno, and J. W. R. Tabosa
Accurate ^{3}He polarimetry using the Rb Zeeman frequency shift due to the Rb-^{3}He spin-exchange collisions 3004
M. V. Romalis and G. D. Cates
Strong saturation of Doppler-broadened spectra in the presence of weak collisions 3012
A. G. Kofman
Cooling an atom in a weakly driven high-Q cavity 3030
Gerald Hechenblaikner, Markus Gangl, Peter Horak, and Helmut Ritsch
Scaled-energy spectroscopy of helium $|M|=1$ Rydberg atoms in a static electric field 3043
Annemieke Kips, Wim Vassen, Wim Hogervorst, and Paul A. Dando
Interference stabilization of Rydberg atoms enhanced by multiple V-type resonances 3051
R. Parzyński and S. Wieczorek
Multiphoton ionization dynamics of barium Rydberg states in intense femtosecond pulses 3058
D. A. Tate and T. F. Gallagher
Polarization-gradient cooling in a strong doughnut-mode dipole potential 3068
S. Kuppens, M. Rauner, M. Schiffer, K. Sengstock, W. Ertmer, F. E. van Dorsselaer, and G. Nienhuis
Ultrafast laser-molecule interaction in nonlinear processes 3080
C. Mainos
Degenerate phase-conjugate four-wave mixing in a nearly-Doppler-free two-level atomic medium 3089
Binh Do, Jongwhan Cha, D. S. Elliott, and S. J. Smith
Phase-noise influence on coherent transients and hole burning 3099
R. N. Shakhmuratov and Alex Szabo
Cavity-ring-down spectroscopy on the oxygen A band in magnetic fields up to 20 T 3114
Giel Berden, Richard Engeln, Peter C. M. Christianen, Jan C. Maan, and Gerard Meijer
Coulomb and rescattering effects in above-threshold ionization 3124
Dejan B. Milošević and Fritz Ehlotzky

Matter waves

Temporal dark solitons in nonuniform Bose-Einstein condensates 3128
T. Hong, Y. Z. Wang, and Y. S. Huo
Bose-Einstein condensation in a two-dimensional, trapped, interacting gas 3134
M. Bayindir and B. Tanatar

(Continued)

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 58, NUMBER 4** **OCTOBER 1998**

Time-orbiting-potential quadrupole magnetic trap for cold atoms 3138
Vladimir G. Minogin, James A. Richmond, and Geoffrey I. Opat
Finite-temperature perturbation theory for a spatially inhomogeneous Bose-condensed gas 3146
P. O. Fedichev and G. V. Shlyapnikov
Quantum corrections to the thermodynamic potential of trapped bosons 3159
Subhasis Sinha
Normal modes of a vortex in a trapped Bose-Einstein condensate 3168
Anatoly A. Svidzinsky and Alexander L. Fetter
Momentum distribution of confined bosons: Temperature dependence 3180
J. Tempere, F. Brosens, L. F. Lemmens, and J. T. Devreese
Beyond the Thomas-Fermi approximation for a trapped condensed Bose-Einstein gas 3185
Alexander L. Fetter and David L. Feder

Quantum optics, physics of lasers, nonlinear optics

Coherent evolution equations for laser resonators 3195
Erik J. Bochove
Decoherence of mesoscopic states of cavity fields 3205
K. M. Fonseca Romero, M. C. Nemes, J. G. Peixoto de Faria, A. N. Salgueiro, and A. F. R. de Toledo Piza
Pump-operator treatment of the ion-trap laser 3210
Georg M. Meyer and Hans-Jürgen Briegel
Relativistic free-electron dynamics and light-emission spectra in the simultaneous presence of a superintense laser field and a strong uniform magnetic field 3221
Yousef I. Salamin and Farhad H. M. Faisal
Resonance interaction between two atomic dipoles separated by the surface of a dielectric nanosphere 3235
V. V. Klimov and V. S. Letokhov
Effects of atomic diffraction on the collective atomic recoil laser 3248
M. G. Moore and P. Meystre
Optical measurements as projection synthesis 3259
Lee S. Phillips, Stephen M. Barnett, and David T. Pegg
Quantum noise reduction and generalized two-mode squeezing in a cavity Raman laser 3268
Kai Drühl and Claude Windenberger
Modeling the interplay of thermal effects and transverse mode behavior in native-oxide-confined vertical-cavity surface-emitting lasers 3279
T. Rössler, R. A. Indik, G. K. Harkness, J. V. Moloney, and C. Z. Ning
Jaynes-Cummings model under continuous measurement: Weak chaos in a quantum system induced by unitarity collapse 3293
Tsuyoshi Fukuo, Tetsuo Ogawa, and Katsuhiro Nakamura
Investigations of nonlinear femtosecond pulse propagation with the inclusion of Raman, shock, and third-order phase effects 3303
Alex A. Zozulya, Scott A. Diddams, and Tracy S. Clement
Attosecond pulse generation using high harmonics in the multicycle regime of the driver pulse 3311
Fam Le Kien, Katsumi Midorikawa, and Akira Suda
Intracavity second-harmonic generation: The steady-state solutions 3320
A. G. Vladimirov and Paul Mandel

(Continued)

PHYSICAL REVIEW A THIRD SERIES, VOLUME 58, NUMBER 4 OCTOBER 1998

BRIEF REPORTS

Fundamental concepts

Exact solution of the L-S coupled system in a time-dependent magnetic field 3328
Shun-Jin Wang and Li-Xiang Cen

Quantum information

Quantum communications: Tetrat coding 3332
G. A. Barbosa

Atomic and molecular structure and dynamics

$2s^2 2p\ {}^2P^o$ triply excited state of He^- 3336
Ying Zhang and Kwong T. Chung

Atomic and molecular collisions and interactions

Photoionization of atomic copper in the region of the $3p$ inner-shell thresholds 3338
A. Verweyen, D. Donnelly, A. Hibbert, and K. L. Bell

Atomic and molecular processes in external fields

Time reversal of atomic wave-packet dynamics by a phase-modulated standing wave 3342
Chang Jae Lee and Wonho Jhe

Quantum optics, physics of lasers, nonlinear optics

Nonclassical phase of the electromagnetic field in a nonstationary dielectric 3345
M. Artoni, A. Bulatov, and B. D. Seery

Quantum state engineering via unitary transformations 3349
A. Vidiella-Barranco and J. A. Roversi

COMMENTS

Comment on ''Consistent histories and quantum reasoning'' 3353
R. L. Schafir

Reply to ''Comment on 'Consistent histories and quantum reasoning''' 3356
Robert B. Griffiths

Comment on ''Eigenvalue spectrum of the independent-fermion kinetic-energy kernel'' 3358
Jorge Garza and Alberto Vela

Comment on ''Anisotropy in the transient absorption change of a molecular system with two-dimensionally degenerate transitions'' 3360
K. Razi Naqvi and R. S. Knox

ERRATA

Erratum: Ionization of muonic atoms by nonrelativistic electrons [Phys. Rev. A **49**, 338 (1994)] 3362
J. A. Kunc

Cumulative Author Index 3363