PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Quantum optics, physics of lasers, nonlinear optics, classical optics

Using the eigenmode expansion for computing the supercontinuum spectral distribution from a slab of two-level atoms *(6 pages)* 065801
Jamal T. Manassah

ERRATA

Erratum: Coincidence landscapes for three-channel linear optical networks [Phys. Rev. A **89**, 063819 (2014)] *(1 page)* . . . . . 069901(E)
Hubert de Guise, Si-Hui Tan, Isaac P. Poulin, and Barry C. Sanders

Erratum: Compression, spectral broadening, and collimation in multiple, femtosecond pulse filamentation in atmosphere [Phys. Rev. A **86**, 033834 (2012)] *(1 page)* . . . . . 069902(E)
J. P. Palastro, T. M. Antonsen, Jr., and H. M. Milchberg

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Entangling two separate photonic ququarts using linear optical elements *(5 pages)* 063830
Osung Kwon, Young-Sik Ra, Hyang-Tag Lim, Yong-Su Kim, and Yoon-Ho Kim

Photon-number statistics from resonance fluorescence of a two-level atom near a plasmonic nanoparticle *(11 pages)* 063831
Vladimir M. Pastukhov, Yulia V. Vladimirova, and Victor N. Zadkov

Photon distribution function for propagation of two-photon pulses in waveguide-qubit systems *(10 pages)* 063832
Oleksandr O. Chumak and Evgeniy V. Stolyarov

Theory of high gain cavity-enhanced spontaneous parametric down-conversion *(6 pages)* 063833
Joanna A. Zielińska and Morgan W. Mitchell

Probing few-excitation eigenstates of interacting atoms on a lattice by observing their collective light emission in the far field *(27 pages)* 063834
Paolo Longo and Jörg Evers

Two-dimensional solitons in a quintic-septimal medium *(5 pages)* 063835
Albert S. Reyna, Kelly C. Jorge, and Cid B. de Araújo

Multiboson correlation interferometry with multimode thermal sources *(5 pages)* 063836
Vincenzo Tamma and Simon Laibacher

Many-body physics of slow light *(8 pages)* 063837
I. E. Mazets

Quantum metrology for simultaneously estimating the linear and nonlinear phase shifts *(5 pages)* 063838
Jing Cheng

Exceptional and regular spectra of a generalized Rabi model *(14 pages)* 063839
Michael Tomka, Omar El Araby, Mikhail Pletyukhov, and Vladimir Gritsev

Effects of time ordering in quantum nonlinear optics *(13 pages)* 063840
Nicolás Quesada and J. E. Sipe

Polarization-selective Kerr-phase-shift method for fast, all-optical polarization switching in a cold atomic medium *(5 pages)* 063841
Chengjie Zhu, L. Deng, and E. W. Hagley

BRIEF REPORTS

Atomic and molecular structure and dynamics

Search for parity- and time-and-parity–violation effects in lead monofluoride (PbF): *Ab initio* molecular study *(4 pages)* 064501
L. V. Skripnikov, A. D. Kudashov, A. N. Petrov, and A. V. Titov

Atomic and molecular collisions and interactions

Method for the production of highly charged ions with polarized nuclei and zero total electron angular momentum *(4 pages)* 064701
A. Bondarevskaya, E. A. Mistonova, K. N. Lyashchenko, O. Yu. Andreev, A. Surzhykov, L. N. Labzowsky, G. Plunien, D. Liesen, F. Bosch, and Th. Stöhlker

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Generation of entangled matter qubits in two opposing parabolic mirrors *(9 pages)* 063814
N. Trautmann, J. Z. Bernád, M. Sondermann, G. Alber, L. L. Sánchez-Soto, and G. Leuchs

Markovian evolution of strongly coupled harmonic oscillators *(9 pages)* 063815
Chaitanya Joshi, Patrik Öhberg, James D. Cresser, and Erika Andersson

Propagation of nanofiber-guided light through an array of atoms *(21 pages)* 063816
Fam Le Kien and A. Rauschenbeutel

Performance predictions for a laser-intensified thermal beam for use in high-resolution focused-ion-beam instruments *(8 pages)* 063817
S. H. W. Wouters, G. ten Haaf, R. P. M. J. W. Notermans, N. Debernardi, P. H. A. Mutsaers, O. J. Luiten, and E. J. D. Vredenbregt

Quantum optical master equation for solid-state quantum emitters *(12 pages)* 063818
Ralf Betzholz, Juan Mauricio Torres, and Marc Bienert

Quantum correlations and nonclassicality in a system of two coupled vertical external cavity surface emitting lasers *(12 pages)* 063819
D. Mogilevtsev, D. B. Horoshko, Yu. M. Golubev, and M. I. Kolobov

Thermally induced creation of quantum coherence *(8 pages)* 063820
Radim Filip and Petr Marek

Bose-Hubbard model: Relation between driven-dissipative steady states and equilibrium quantum phases *(9 pages)* 063821
Alexandre Le Boité, Giuliano Orso, and Cristiano Ciuti

Cooperative effects and disorder: A scaling analysis of the spectrum of the effective atomic Hamiltonian *(10 pages)* 063822
L. Bellando, A. Gero, E. Akkermans, and R. Kaiser

Analytical model for polarization-dependent light propagation in waveguide arrays and applications *(5 pages)* . . . 063823
S. Rojas-Rojas, L. Morales-Inostroza, U. Naether, G. B. Xavier, S. Nolte, A. Szameit, R. A. Vicencio, G. Lima, and A. Delgado

Antibunching and unconventional photon blockade with Gaussian squeezed states *(11 pages)* 063824
Marc-Antoine Lemonde, Nicolas Didier, and Aashish A. Clerk

Stability of polarizable materials against superradiant phase transition *(8 pages)* 063825
Motoaki Bamba and Tetsuo Ogawa

Quantum filtering of a thermal master equation with a purified reservoir *(6 pages)* 063826
Marco G. Genoni, Stefano Mancini, Howard M. Wiseman, and Alessio Serafini

Filtering of matter symmetry properties by circularly polarized nonlinear optics *(5 pages)* 063827
Julien Duboisset, Hervé Rigneault, and Sophie Brasselet

Transient-gain photoionization x-ray laser *(10 pages)* 063828
Clemens Weninger and Nina Rohringer

Decay of metastable excited states of two qubits in a waveguide *(12 pages)* 063829
E. S. Redchenko and V. I. Yudson

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Compacton matter waves in binary Bose gases under strong nonlinear management *(11 pages)* 063637
F. Kh. Abdullaev, M. S. A. Hadi, M. Salerno, and B. Umarov

Topological insulator and particle pumping in a one-dimensional shaken optical lattice *(8 pages)* 063638
Feng Mei, Jia-Bin You, Dan-Wei Zhang, X. C. Yang, R. Fazio, Shi-Liang Zhu, and L. C. Kwek

Anderson localization of matter waves in three-dimensional anisotropic disordered potentials *(6 pages)* 063639
Marie Piraud, Laurent Sanchez-Palencia, and Bart van Tiggelen

Quantum optics, physics of lasers, nonlinear optics, classical optics

Spatial coherence and the orbital angular momentum of light in astronomy *(5 pages)* 063801
D. Hetharia, M. P. van Exter, and W. Löffler

Three-dimensional atom localization by laser fields in a four-level tripod system *(5 pages)* 063802
Vladimir S. Ivanov, Yuri V. Rozhdestvensky, and Kalle-Antti Suominen

Self-induced mode mixing of ultraintense lasers in vacuum *(8 pages)* 063803
Ángel Paredes, David Novoa, and Daniele Tommasini

Unified position-dependent photon-number quantization in layered structures *(7 pages)* 063804
Mikko Partanen, Teppo Häyrynen, Jani Oksanen, and Jukka Tulkki

Triggered single-photon emitters based on stimulated parametric scattering in weakly nonlinear systems *(5 pages)* 063805
Oleksandr Kyriienko and Timothy C. H. Liew

Fast, all-optical logic gates and transistor functionalities using a room-temperature atomic controlled Kerr gate *(4 pages)* 063806
R. B. Li, L. Deng, and E. W. Hagley

Left-handed electromagnetic waves in materials with induced polarization and magnetization *(9 pages)* 063807
D. D. Yavuz and N. R. Brewer

Minimizing the angular divergence of high-order harmonics by truncating the truncated Bessel beam *(7 pages)* 063808
Peng Ye, Hao Teng, Xin-Kui He, Shi-Yang Zhong, Li-Feng Wang, Min-Jie Zhan, Wei Zhang, Chen-Xia Yun, and Zhi-Yi Wei

Classical non-Gaussian state preparation through squeezing in an optoelectromechanical resonator *(6 pages)* 063809
M. Poot, K. Y. Fong, and H. X. Tang

Detection of weak forces based on noise-activated switching in bistable optomechanical systems *(8 pages)* 063810
Samuel Aldana, Christoph Bruder, and Andreas Nunnenkamp

Optimizing the signal-to-noise ratio in the measurement of photon pairs with detector arrays *(8 pages)* 063811
Eric Lantz, Paul-Antoine Moreau, and Fabrice Devaux

Coherence properties of high-gain twin beams *(7 pages)* 063812
A. Allevi, O. Jedrkiewicz, E. Brambilla, A. Gatti, J. Peřina, Jr., O. Haderka, and M. Bondani

Ultrafast saturation of resonant optical processes *(8 pages)* 063813
Anil K. Patnaik, Sukesh Roy, and James R. Gord

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Superfluidity and solid order in a two-component Bose gas with dipolar interactions in an optical lattice *(10 pages)* 063620
Yoshihito Kuno, Keita Suzuki, and Ikuo Ichinose

Bose-Einstein condensates with localized spin-orbit coupling: Soliton complexes and spinor dynamics *(7 pages)* 063621
Yaroslav V. Kartashov, Vladimir V. Konotop, and Dmitry A. Zezyulin

Quantum correlations and entanglement in far-from-equilibrium spin systems *(21 pages)* 063622
Kaden R. A. Hazzard, Mauritz van den Worm, Michael Foss-Feig, Salvatore R. Manmana, Emanuele G. Dalla Torre, Tilman Pfau, Michael Kastner, and Ana Maria Rey

Thermodynamic properties of Rashba spin-orbit-coupled Fermi gas *(8 pages)* 063623
Zhen Zheng, Han Pu, Xubo Zou, and Guangcan Guo

Measurement of collective excitations in a spin-orbit-coupled Bose-Einstein condensate *(5 pages)* 063624
M. A. Khamehchi, Yongping Zhang, Chris Hamner, Thomas Busch, and Peter Engels

Self-consistent Hartree-Fock approach for interacting bosons in optical lattices *(11 pages)* 063625
Qin-Qin Lü, Kelly R. Patton, and Daniel E. Sheehy

Nonequilibrium states of a quenched Bose gas *(11 pages)* 063626
Ben Kain and Hong Y. Ling

Relaxation of superfluid turbulence in highly oblate Bose-Einstein condensates *(6 pages)* 063627
Woo Jin Kwon, Geol Moon, Jae-yoon Choi, Sang Won Seo, and Yong-il Shin

Critical quasienergy states in driven many-body systems *(9 pages)* 063628
V. M. Bastidas, G. Engelhardt, P. Pérez-Fernández, M. Vogl, and T. Brandes

Bose-Einstein condensation and density collapse in a weakly coupled boson-fermion mixture *(9 pages)* 063629
Kyoko Shirasaki, Eiji Nakano, and Hiroyuki Yabu

Squeezed-light-enhanced atom interferometry below the standard quantum limit *(18 pages)* 063630
Stuart S. Szigeti, Behnam Tonekaboni, Wing Yung S. Lau, Samantha N. Hood, and Simon A. Haine

Super Efimov effect for mass-imbalanced systems *(8 pages)* 063631
Sergej Moroz and Yusuke Nishida

Metastable spin textures and Nambu-Goldstone modes of a ferromagnetic spin-1 Bose-Einstein condensate confined in a ring trap *(8 pages)* 063632
Masaya Kunimi

Stability enhancement by joint phase measurements in a single cold atomic fountain *(5 pages)* 063633
M. Meunier, I. Dutta, R. Geiger, C. Guerlin, C. L. Garrido Alzar, and A. Landragin

Bose-Hubbard model with random impurities: Multiband and nonlinear hopping effects *(9 pages)* 063634
Julia Stasińska, Mateusz Łącki, Omjyoti Dutta, Jakub Zakrzewski, and Maciej Lewenstein

Improving observability of the Einstein–de Haas effect in a rubidium condensate *(6 pages)* 063635
Tomasz Świsłocki, Mariusz Gajda, and Mirosław Brewczyk

Bogoliubov theory of dipolar Bose gas in a weak random potential *(12 pages)* 063636
Mahmoud Ghabour and Axel Pelster

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Coherent forward scattering in two-dimensional disordered systems *(12 pages)* 063602
S. Ghosh, N. Cherroret, B. Grémaud, C. Miniatura, and D. Delande

Progress towards quantum simulating the classical O(2) model *(7 pages)* 063603
Haiyuan Zou, Yuzhi Liu, Chen-Yen Lai, J. Unmuth-Yockey, Li-Ping Yang, A. Bazavov, Z. Y. Xie, T. Xiang, S. Chandrasekharan, S.-W. Tsai, and Y. Meurice

Distinguishability, degeneracy, and correlations in three harmonically trapped bosons in one dimension *(13 pages)* 063605
M. A. García-March, B. Juliá-Díaz, G. E. Astrakharchik, J. Boronat, and A. Polls

Advances in precision contrast interferometry with Yb Bose-Einstein condensates *(7 pages)* 063606
Alan O. Jamison, Benjamin Plotkin-Swing, and Subhadeep Gupta

Bose-Einstein condensate of metastable helium for quantum correlation experiments *(9 pages)* 063607
Michael Keller, Mateusz Kotyrba, Florian Leupold, Mandip Singh, Maximilian Ebner, and Anton Zeilinger

Spontaneous Peierls dimerization and emergent bond order in one-dimensional dipolar gases *(7 pages)* 063608
M. Di Dio, L. Barbiero, A. Recati, and M. Dalmonte

Quantum N-boson states and quantized motion of solitonic droplets: Universal scaling properties in low dimensions *(14 pages)* 063609
Jeff Maki, Mohammadreza Mohammadi, and Fei Zhou

Bloch oscillations of bosonic lattice polarons *(23 pages)* 063610
F. Grusdt, A. Shashi, D. Abanin, and E. Demler

Quantum bright solitons in the Bose-Hubbard model with site-dependent repulsive interactions *(6 pages)* 063611
L. Barbiero, B. A. Malomed, and L. Salasnich

Mean-field analog of the Hong-Ou-Mandel experiment with bright solitons *(8 pages)* 063612
Zhi-Yuan Sun, Panayotis G. Kevrekidis, and Peter Krüger

Confinement-induced resonances in a cross-dimensional configuration *(5 pages)* 063613
Chen Zhang and Chris H. Greene

Calibration of the interaction energy between Bose and Fermi superfluids *(9 pages)* 063614
Ren Zhang, Wei Zhang, Hui Zhai, and Peng Zhang

Medium effects and the shear viscosity of the dilute Fermi gas away from the conformal limit *(8 pages)* 063615
M. Bluhm and T. Schäfer

Phase-space manipulations of many-body wave functions *(7 pages)* 063616
G. Condon, A. Fortun, J. Billy, and D. Guéry-Odelin

Critical exponents for an impurity in a bosonic Josephson junction: Position measurement as a phase transition *(8 pages)* 063617
J. Mumford and D. H. J. O'Dell

Quantum walks of two interacting anyons in one-dimensional optical lattices *(6 pages)* 063618
Limin Wang, Li Wang, and Yunbo Zhang

Parameter estimation in memory-assisted noisy quantum interferometry *(9 pages)* 063619
P. Szańkowski, M. Trippenbach, and J. Chwedeńczuk

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Spectral backbone of excitation transport in ultracold Rydberg gases *(20 pages)* 063415
Torsten Scholak, Thomas Wellens, and Andreas Buchleitner

Spin-asymmetric laser-driven relativistic tunneling from *p* states *(7 pages)* 063416
Michael Klaiber and Karen Z. Hatsagortsyan

Creation and manipulation of bound states in the continuum with lasers: Applications to cold atoms and molecules *(11 pages)* 063417
Bimalendu Deb and G. S. Agarwal

Relative phase control over tunneling ionization of H_2^+ with a synthesized ω-2ω laser pulse *(5 pages)* 063418
Hongbin Yao, Wei Guo, Mark R. Hoffmann, and Keli Han

Collisional trap losses of cold magnetically trapped Br atoms *(10 pages)* 063419
J. Lam, C. J. Rennick, and T. P. Softley

Trajectory-based analysis of low-energy electrons and photocurrents generated in strong-field ionization *(6 pages)* 063420
Jinlei Liu, Wenbo Chen, Bin Zhang, Jing Zhao, Jianhua Wu, Jianmin Yuan, and Zengxiu Zhao

Hybrid Gaussian–discrete-variable representation for one- and two-active-electron continuum calculations in molecules *(12 pages)* 063421
F. L. Yip, C. W. McCurdy, and T. N. Rescigno

Relativistic calculations of double *K*-shell-photoionization cross sections for neutral medium-*Z* atoms *(7 pages)* 063422
V. A. Yerokhin, A. Surzhykov, and S. Fritzsche

Low-frequency approximation for above-threshold ionization by a laser pulse: Low-energy forward rescattering *(9 pages)* 063423
D. B. Milošević

Formation of very-low-energy states crossing the ionization threshold of argon atoms in strong mid-infrared fields *(8 pages)* 063424
Benjamin Wolter, Christoph Lemell, Matthias Baudisch, Michael G. Pullen, Xiao-Min Tong, Michaël Hemmer, Arne Senftleben, Claus Dieter Schröter, Joachim Ullrich, Robert Moshammer, Jens Biegert, and Joachim Burgdörfer

Transport in a harmonic trap: Shortcuts to adiabaticity and robust protocols *(5 pages)* 063425
D. Guéry-Odelin and J. G. Muga

Wavelength-dependent ionization suppression of diatomic molecules in intense circularly polarized laser fields *(7 pages)* 063426
HuiPeng Kang, ZhiYang Lin, SongPo Xu, ChuanLiang Wang, Wei Quan, XuanYang Lai, XiaoJun Liu, XinYan Jia, XiaoLei Hao, Jing Chen, Wei Chu, JinPing Yao, Bin Zeng, Ya Cheng, and ZhiZhan Xu

Quantum optimal control theory applied to transitions in diatomic molecules *(13 pages)* 063427
Marius Lysebo and Leif Veseth

Configuration-interaction relativistic-many-body-perturbation-theory calculations of photoionization cross sections from quasicontinuum oscillator strengths *(4 pages)* 063428
I. M. Savukov and D. V. Filin

Matter waves and collective properties of cold atoms and molecules

Atom interferometer in a double-well potential *(8 pages)* 063601
Karol Gietka and Jan Chwedeńczuk

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Hydrodynamical interpretation of angular momentum and energy transfer in atomic processes *(8 pages)* 062713
S. Y. Ovchinnikov, J. H. Macek, and D. R. Schultz

Effect of the short-range interaction on low-energy collisions of ultracold dipoles *(9 pages)* 062714
Peng Zhang and Jianwen Jie

Mechanism for electron emission and exciton formation during collisions of neutral hydrogens with a LiF(001) surface *(6 pages)* 062715
J. E. Miraglia

PART B

Atomic and molecular processes in external fields, including interactions with strong fields and short pulses

Diabatic ion cooling by phonon swapping during controlled collision *(7 pages)* 063401
Hoi-Kwan Lau

Ionization and excitation of the excited hydrogen atom in strong circularly polarized laser fields *(6 pages)* 063402
Jarosław H. Bauer, Francisca Mota-Furtado, Patrick F. O'Mahony, Bernard Piraux, and Krzysztof Warda

Phase differences of near-threshold high-order harmonics generated in atoms and molecules *(10 pages)* 063403
Kosaku Kato, Shinichirou Minemoto, Yusuke Sakemi, and Hirofumi Sakai

Scaling behavior of a very large magneto-optical trap *(8 pages)* 063404
A. Camara, R. Kaiser, and G. Labeyrie

Three-dimensional laser cooling at the Doppler limit *(7 pages)* 063407
R. Chang, A. L. Hoendervanger, Q. Bouton, Y. Fang, T. Klafka, K. Audo, A. Aspect, C. I. Westbrook, and D. Clément

Dissociative ionization of H_2^+ using intense femtosecond XUV laser pulses *(9 pages)* 063408
Lun Yue and Lars Bojer Madsen

Photoionization cross sections of the aluminumlike Si^+ ion in the region of the $2p$ threshold (94–137 eV) *(13 pages)* 063409
E. T. Kennedy, J.-P. Mosnier, P. Van Kampen, D. Cubaynes, S. Guilbaud, C. Blancard, B. M. McLaughlin, and J.-M. Bizau

Photodetachment cross sections of the $C_{2n}H^-$ ($n = 1$–3) hydrocarbon-chain anions *(11 pages)* 063410
Nicolas Douguet, Viatcheslav Kokoouline, and Ann E. Orel

Sudden death of particle-pair Bloch oscillation and unidirectional propagation in a one-dimensional driven optical lattice *(8 pages)* 063411
S. Lin, X. Z. Zhang, and Z. Song

Effect of nuclear vibration on high-order-harmonic generation of aligned H_2^+ molecules *(7 pages)* 063412
Dmitry A. Telnov, John Heslar, and Shih-I Chu

Field-ionization threshold and its induced ionization-window phenomenon for Rydberg atoms in a short single-cycle pulse *(5 pages)* 063413
B. C. Yang and F. Robicheaux

Forward- and backward-scattering quantum orbits in above-threshold ionization *(11 pages)* 063414
D. B. Milošević

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A THIRD SERIES, VOLUME 90, NUMBER 6 DECEMBER 2014

One-loop vacuum polarization at $m\alpha^7$ order for the two-center problem *(4 pages)* 062516
J.-Ph. Karr, L. Hilico, and Vladimir I. Korobov

QED calculation of the ground-state energy of berylliumlike ions *(8 pages)* 062517
A. V. Malyshev, A. V. Volotka, D. A. Glazov, I. I. Tupitsyn, V. M. Shabaev, and G. Plunien

Angular-momentum couplings in long-range Rb_2 Rydberg molecules *(8 pages)* 062518
D. A. Anderson, S. A. Miller, and G. Raithel

Atomic and molecular collisions and interactions

Theoretical study of electronic excitation, ion-pair formation, and mutual neutralization in cesium-hydrogen collisions *(8 pages)* 062701
Andrey K. Belyaev, Bruno Lepetit, and Florent Xavier Gadéa

Atomic-number dependence of the magnetic-sublevel population in the autoionization state formed in dielectronic recombination *(7 pages)* 062702
Zhimin Hu, Yueming Li, Xiaoying Han, Daiji Kato, Xiaomin Tong, Hirofumi Watanabe, and Nobuyuki Nakamura

Quantum defect theory for cold chemistry with product-quantum-state resolution *(12 pages)* 062703
Jisha Hazra, Brandon P. Ruzic, John L. Bohn, and N. Balakrishnan

Electron collisions with ammonia and formamide in the low- and intermediate-energy ranges *(9 pages)* 062704
M. G. P. Homem, I. Iga, G. L. C. de Souza, A. I. Zanelato, L. E. Machado, J. R. Ferraz, A. S. dos Santos, L. M. Brescansin, R. R. Lucchese, and M.-T. Lee

Fragmentation of CO_2^{2+} in collisions with low-energy electrons *(5 pages)* 062705
X. Wang, Y. Zhang, D. Lu, G. C. Lu, B. Wei, B. H. Zhang, Y. J. Tang, R. Hutton, and Y. Zou

Time-dependent calculations of transfer ionization by fast proton-helium collision in one-dimensional kinematics *(10 pages)* 062706
Vladislav V. Serov and A. S. Kheifets

Theoretical and experimental $(e,2e)$ study of electron-impact ionization of laser-aligned Mg atoms *(9 pages)* 062707
Sadek Amami, Andrew Murray, Al Stauffer, Kate Nixon, Gregory Armstrong, James Colgan, and Don Madison

X-ray emission produced in charge-exchange collisions between highly charged ions and argon: Role of the multiple electron capture *(5 pages)* 062708
S. Otranto, N. D. Cariatore, and R. E. Olson

Effect of a vortex in the triply differential cross section for electron-impact K-shell ionization of carbon *(11 pages)* 062709
S. J. Ward and J. H. Macek

Differential cross sections for single ionization of Li in collisions with fast protons and O^{8+} ions *(10 pages)* 062710
L. Gulyás, S. Egri, and T. Kirchner

Correlation between multiple ionization and fragmentation of C_2H_6 in charge-changing collisions with 580-keV C^+ *(8 pages)* 062711
T. Majima, T. Murai, T. Kishimoto, Y. Adachi, S. O. Yoshida, H. Tsuchida, and A. Itoh

Analysis of density effects in plasmas and their influence on electron-impact cross sections *(12 pages)* 062712
M. Belkhiri and M. Poirier

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Protecting remote bipartite entanglement against amplitude damping by local unitary operations *(8 pages)* 062345
Xiao-Lan Zong, Chao-Qun Du, Ming Yang, Qing Yang, and Zhuo-Liang Cao

Atomic and molecular structure and dynamics

Relativistic equation-of-motion coupled-cluster method for the ionization problem: Application to molecules *(7 pages)* 062501
Himadri Pathak, Sudip Sasmal, Malaya K. Nayak, Nayana Vaval, and Sourav Pal

Collective effects in linear spectroscopy of dipole-coupled molecular arrays *(11 pages)* 062502
A. A. Kocherzhenko, J. Dawlaty, B. P. Abolins, F. Herrera, D. B. Abraham, and K. B. Whaley

Branching ratios and radiative lifetimes of the *U*, *L*, and *I* states of thorium oxide *(10 pages)* 062503
Damian L. Kokkin, Timothy C. Steimle, and David DeMille

Convergence of the Breit interaction in self-consistent and configuration-interaction approaches *(8 pages)* 062504
C. T. Chantler, T. V. B. Nguyen, J. A. Lowe, and I. P. Grant

Behavior of relative state selective photoionization cross sections of RbBr molecules in the valence region *(4 pages)* 062505
A. Karpenko, D. Iablonskyi, S. Urpelainen, and H. Aksela

Prediction of a weakly bound excited state of Efimov character in a $^{7}Li^{4}He_{2}$ system *(6 pages)* 062506
Meng-Shan Wu, Hui-Li Han, Cheng-Bin Li, and Ting-Yun Shi

Time-dependent generalized-active-space configuration-interaction approach to photoionization dynamics of atoms and molecules *(19 pages)* 062508
S. Bauch, L. K. Sørensen, and L. B. Madsen

Exact results for models of multichannel quantum nonadiabatic transitions *(14 pages)* 062509
N. A. Sinitsyn

Quantum beat spectroscopy: Stimulated emission probe of hyperfine quantum beats in the atomic Cs $8p\,^{2}P_{3/2}$ level *(6 pages)* 062510
S. B. Bayram, P. Arndt, O. I. Popov, C. Güney, W. P. Boyle, M. D. Havey, and J. McFarland

Approximate forms of the pair-density-functional kinetic energy on the basis of a rigorous expression with coupling-constant integration *(12 pages)* 062511
Katsuhiko Higuchi and Masahiko Higuchi

Relativistic calculations of the isotope shifts in highly charged Li-like ions *(12 pages)* 062512
N. A. Zubova, Y. S. Kozhedub, V. M. Shabaev, I. I. Tupitsyn, A. V. Volotka, G. Plunien, C. Brandau, and Th. Stöhlker

Formation of deeply bound ultracold LiRb molecules via photoassociation near the Li $2S_{1/2}$ + Rb $5P_{3/2}$ asymptote *(6 pages)* 062513
John Lorenz, Adeel Altaf, Sourav Dutta, Yong P. Chen, and D. S. Elliott

High-order nonlinear refractive indices for He, Ne, Kr, and Xe atoms *(10 pages)* 062514
M. Tarazkar, D. A. Romanov, and R. J. Levis

Cusp relation for the Pauli potential *(4 pages)* 062515
H. Levämäki, Á. Nagy, K. Kokko, and L. Vitos

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Feedback policies for measurement-based quantum state manipulation *(6 pages)* 062328
Shuangshuang Fu, Guodong Shi, Alexandre Proutiere, and Matthew R. James

Complete criterion for convex-Gaussian-state detection *(8 pages)* 062329
Anna Vershynina

Fast multiqubit phase gate in circuit QED beyond the rotating-wave approximation *(8 pages)* 062330
Xin Liu, Guang-Yu Fang, Qing-Hong Liao, and Shu-Tian Liu

Entanglement-based quantum communication secured by nonlocal dispersion cancellation *(6 pages)* 062331
Catherine Lee, Zheshen Zhang, Gregory R. Steinbrecher, Hongchao Zhou, Jacob Mower, Tian Zhong, Ligong Wang, Xiaolong Hu, Robert D. Horansky, Varun B. Verma, Adriana E. Lita, Richard P. Mirin, Francesco Marsili, Matthew D. Shaw, Sae Woo Nam, Gregory W. Wornell, Franco N. C. Wong, Jeffrey H. Shapiro, and Dirk Englund

Multiplexed readout of transmon qubits with Josephson bifurcation amplifiers *(5 pages)* 062333
V. Schmitt, X. Zhou, K. Juliusson, B. Royer, A. Blais, P. Bertet, D. Vion, and D. Esteve

Diabatic-ramping spectroscopy of many-body excited states *(13 pages)* 062334
Bryce Yoshimura, W. C. Campbell, and J. K. Freericks

Qubit fidelity of a single atom transferred among the sites of a ring optical lattice *(10 pages)* 062335
Shi Yu, Peng Xu, Min Liu, Xiaodong He, Jin Wang, and Mingsheng Zhan

Full-Bloch-sphere teleportation of spinor Bose-Einstein condensates and spin ensembles *(9 pages)* 062336
Alexey N. Pyrkov and Tim Byrnes

Criteria for genuine N-partite continuous-variable entanglement and Einstein-Podolsky-Rosen steering *(17 pages)* 062337
R. Y. Teh and M. D. Reid

True multipartite entanglement Hardy test *(5 pages)* 062338
Ramij Rahaman, Marcin Wieśniak, and Marek Żukowski

Quantum state tomography for strongly coupled nuclear spin systems *(10 pages)* 062339
Fatemeh Anvari Vind, A. M. Souza, R. S. Sarthour, and I. S. Oliveira

Separable operations and local operations with classical communication on triqubit pure states *(3 pages)* 062340
Yang Chen and Haibin Kan

Entanglement from dissipative dynamics into overlapping environments *(7 pages)* 062341
Riccardo Mengoni, Laleh Memarzadeh, and Stefano Mancini

Controllable generation of two-mode-entangled states in two-resonator circuit QED with a single gap-tunable superconducting qubit *(7 pages)* 062342
Sheng-Li Ma, Zhen Li, Ai-Ping Fang, Peng-Bo Li, Shao-Yan Gao, and Fu-Li Li

Hierarchical monogamy relations for the squared entanglement of formation in multipartite systems *(12 pages)* 062343
Yan-Kui Bai, Yuan-Fei Xu, and Z. D. Wang

Dissipation-induced continuous quantum error correction for superconducting circuits *(9 pages)* 062344
Joachim Cohen and Mazyar Mirrahimi

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Long-distance quantum communication over noisy networks without long-time quantum memory *(13 pages)* 062311
Paweł Mazurek, Andrzej Grudka, Michał Horodecki, Paweł Horodecki, Justyna Łodyga, Łukasz Pankowski, and Anna Przysiężna

Invariance in quantum walks with time-dependent coin operators *(6 pages)* 062312
Miquel Montero

Usefulness of an enhanced Kitaev phase-estimation algorithm in quantum metrology and computation *(6 pages)* 062313
Tomasz Kaftal and Rafał Demkowicz-Dobrzański

Phase-noise limitations on single-photon cross-phase modulation with differing group velocities *(7 pages)* 062314
Justin Dove, Christopher Chudzicki, and Jeffrey H. Shapiro

Quantum key distribution with the single-photon-added coherent source *(8 pages)* 062315
Dong Wang, Mo Li, Feng Zhu, Zhen-Qiang Yin, Wei Chen, Zheng-Fu Han, Guang-Can Guo, and Qin Wang

Gaussian-only regenerative stations cannot act as quantum repeaters *(11 pages)* 062316
Ryo Namiki, Oleg Gittsovich, Saikat Guha, and Norbert Lütkenhaus

Permutation-invariant quantum codes *(11 pages)* 062317
Yingkai Ouyang

Emulating quantum state transfer through a spin-1 chain on a one-dimensional lattice of superconducting qutrits *(6 pages)* 062318
Joydip Ghosh

Deterministic entanglement of Rydberg ensembles by engineered dissipation *(5 pages)* 062319
D. D. Bhaktavatsala Rao and Klaus Mølmer

Low-distance surface codes under realistic quantum noise *(15 pages)* 062320
Yu Tomita and Krysta M. Svore

Entanglement of several blocks in fermionic chains *(8 pages)* 062321
Filiberto Ares, José G. Esteve, and Fernando Falceto

Steady entanglement in bosonic dissipative networks *(6 pages)* 062322
G. D. de Moraes Neto, W. Rosado, F. O. Prado, and M. H. Y. Moussa

Entanglement properties of positive operators with ranges in completely entangled subspaces *(8 pages)* 062323
R. Sengupta, Arvind , and Ajit Iqbal Singh

Noise analysis of single-mode Gaussian operations using continuous-variable cluster states *(19 pages)* 062324
Rafael N. Alexander, Seiji C. Armstrong, Ryuji Ukai, and Nicolas C. Menicucci

Information-theoretical formulation of anyonic entanglement *(11 pages)* 062325
Kohtaro Kato, Fabian Furrer, and Mio Murao

Entanglement-based continuous-variable quantum key distribution with multimode states and detectors *(10 pages)* 062326
Vladyslav C. Usenko, Laszlo Ruppert, and Radim Filip

Entanglement of neutral-atom chains by spin-exchange Rydberg interaction *(12 pages)* 062327
Xiao-Feng Shi, F. Bariani, and T. A. B. Kennedy

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Quantum metrology with nonequilibrium steady states of quantum spin chains *(10 pages)* 062130
Ugo Marzolino and Tomaž Prosen

Quantum Zeno effect for a free-moving particle *(6 pages)* 062131
Miguel A. Porras, Alfredo Luis, and Isabel Gonzalo

Precision measurements using squeezed spin states via two-axis countertwisting interactions *(6 pages)* 062132
Emi Yukawa, G. J. Milburn, C. A. Holmes, Masahito Ueda, and Kae Nemoto

Non-Markovian dynamics of the mixed-state geometric phase of dissipative qubits *(8 pages)* 062133
Wei Guo, Jian Ma, Xiaolei Yin, Wei Zhong, and Xiaoguang Wang

Stationary and uniformly accelerated states in nonlinear quantum mechanics *(10 pages)* 062134
A. R. Plastino, A. M. C. Souza, F. D. Nobre, and C. Tsallis

Dissipative extension of the Ghirardi-Rimini-Weber model *(19 pages)* 062135
Andrea Smirne, Bassano Vacchini, and Angelo Bassi

Quantum information

Statistics-dependent quantum co-walking of two particles in one-dimensional lattices with nearest-neighbor interactions *(8 pages)* 062301
Xizhou Qin (秦锡洲), Yongguan Ke (柯勇贯), Xiwen Guan (管习文), Zhibing Li (李志兵), Natan Andrei, and Chaohong Lee (李朝红)

Geometric analysis of minimum-time trajectories for a two-level quantum system *(11 pages)* 062302
Raffaele Romano

Bipartite entanglement of quantum states in a pair basis *(8 pages)* 062303
Marco Roncaglia, Arianna Montorsi, and Marco Genovese

Ability of stabilizer quantum error correction to protect itself from its own imperfection *(8 pages)* 062304
Yuichiro Fujiwara

Steady-state entanglement of spatially separated qubits via quantum bath engineering *(5 pages)* 062305
Camille Aron, Manas Kulkarni, and Hakan E. Türeci

Strong monogamy of quantum entanglement for multiqubit W-class states *(6 pages)* 062306
Jeong San Kim

High-fidelity qubit measurement with a microwave-photon counter *(12 pages)* 062307
Luke C. G. Govia, Emily J. Pritchett, Canran Xu, B. L. T. Plourde, Maxim G. Vavilov, Frank K. Wilhelm, and R. McDermott

Unitarily inequivalent mutually unbiased bases for n qubits *(8 pages)* 062308
Arun Sehrawat and Andrei B. Klimov

Characterization of control noise effects in optimal quantum unitary dynamics *(9 pages)* 062309
David Hocker, Constantin Brif, Matthew D. Grace, Ashley Donovan, Tak-San Ho, Katharine Moore Tibbetts, Rebing Wu, and Herschel Rabitz

Long-distance continuous-variable quantum key distribution with efficient channel estimation *(9 pages)* 062310
László Ruppert, Vladyslav C. Usenko, and Radim Filip

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 90, NUMBER 6** **DECEMBER 2014**

Multiple phase estimation for arbitrary pure states under white noise *(6 pages)* 062113
Yao Yao, Li Ge, Xing Xiao, Xiaoguang Wang, and C. P. Sun

Appearance of Gibbs states in quantum-state tomography *(8 pages)* 062114
Jochen Rau

Kelvin probe force microscopy of metallic surfaces used in Casimir force measurements *(7 pages)* 062115
R. O. Behunin, D. A. R. Dalvit, R. S. Decca, C. Genet, I. W. Jung, A. Lambrecht, A. Liscio, D. López, S. Reynaud, G. Schnoering, G. Voisin, and Y. Zeng

Unitary evolution and the distinguishability of quantum states *(6 pages)* 062116
Sam Morley-Short, Lawrence Rosenfeld, and Pieter Kok

Quantum theory of angle and relative-phase measurement *(16 pages)* 062117
Scott Roger Shepard

Heisenberg uncertainty relation for three canonical observables *(5 pages)* 062118
Spiros Kechrimparis and Stefan Weigert

Uncertainty relation for mutual information *(5 pages)* 062119
James Schneeloch, Curtis J. Broadbent, and John C. Howell

Landau-Zener transitions in a two-level system coupled to a finite-temperature harmonic oscillator *(7 pages)* 062120
S. Ashhab

Bell inequalities from group actions of single-generator groups *(7 pages)* 062121
V. Uğur Güney and Mark Hillery

Macroscopicity of quantum superpositions on a one-parameter unitary path in Hilbert space *(13 pages)* 062122
T. J. Volkoff and K. B. Whaley

Optimal two-qubit tomography based on local and global measurements: Maximal robustness against errors as described by condition numbers *(12 pages)* 062123
Adam Miranowicz, Karol Bartkiewicz, Jan Peřina Jr., Masato Koashi, Nobuyuki Imoto, and Franco Nori

Bloch-sphere colorings and Bell inequalities *(13 pages)* 062124
Adrian Kent and Damián Pitalúa-García

Exclusivity principle and the quantum bound of the Bell inequality *(4 pages)* 062125
Adán Cabello

Uncertainty formulations for multislit interferometry *(10 pages)* 062126
Johannes C. G. Biniok

Entanglement-assisted guessing of complementary measurement outcomes *(10 pages)* 062127
Mario Berta, Patrick J. Coles, and Stephanie Wehner

Disturbance trade-off principle for quantum measurements *(8 pages)* 062128
Prabha Mandayam and M. D. Srinivas

Multipartite quantum nonlocality and Bell-type inequalities in an infinite-order quantum phase transition of the one-dimensional spin-1/2 XXZ chain *(7 pages)* 062129
Zhao-Yu Sun, Shuang Liu, Hai-Lin Huang, Duo Zhang, Yu-Yin Wu, Jian Xu, Bi-Fu Zhan, Hong-Guang Cheng, Cheng-Bo Duan, and Bo Wang

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A THIRD SERIES, VOLUME 90, NUMBER 6 DECEMBER 2014

Localization transition in weakly interacting Bose superfluids in one-dimensional quasiperdiodic lattices *(5 pages)* 061602(R)
Samuel Lellouch and Laurent Sanchez-Palencia

Quantum optics, physics of lasers, nonlinear optics, classical optics

Light storage in a room-temperature atomic vapor based on coherent population oscillations *(4 pages)* . . . . . 061801(R)
M.-A. Maynard, F. Bretenaker, and F. Goldfarb

Two-way optical frequency comparisons at 5×10^{-21} relative stability over 100-km telecommunication network fibers *(5 pages)* . . . . . 061802(R)
Anthony Bercy, Fabio Stefani, Olivier Lopez, Christian Chardonnet, Paul-Eric Pottie, and Anne Amy-Klein

ARTICLES

Fundamental concepts

Multibarrier-tunneling invisible systems *(7 pages)* 062101
Sergio Cordero and Gastón García-Calderón

Interference and which-state information for nonorthogonal states *(5 pages)* 062102
K. M. Fonseca-Romero, J. G. G. de Oliveira, Jr., J. G. Peixoto de Faria, and M. C. Nemes

Emergence of a metastable pointer-state basis in non-Markovian quantum dynamics *(5 pages)* 062103
F. Lastra, C. E. López, S. A. Reyes, and S. Wallentowitz

Non-Markovianity of a two-level system transversally coupled to multiple bosonic reservoirs *(8 pages)* 062104
Zhong-Xiao Man, Nguyen Ba An, and Yun-Jie Xia

Role of gravity in the collapse of a wave function: A probe into the Diósi-Penrose model *(8 pages)* 062105
M. Bahrami, A. Smirne, and A. Bassi

Derivation of the Dirac equation from principles of information processing *(18 pages)* 062106
Giacomo Mauro D'Ariano and Paolo Perinotti

Measuring motion through relativistic quantum effects *(7 pages)* 062107
Aida Ahmadzadegan, Robert B. Mann, and Eduardo Martín-Martínez

Maximum population transfer in a periodically driven quantum system *(7 pages)* 062108
P. M. Poggi, F. J. Arranz, R. M. Benito, F. Borondo, and D. A. Wisniacki

Nonlocal correlations in the star-network configuration *(12 pages)* 062109
Armin Tavakoli, Paul Skrzypczyk, Daniel Cavalcanti, and Antonio Acín

Modes of asymmetry: The application of harmonic analysis to symmetric quantum dynamics and quantum reference frames *(20 pages)* 062110
Iman Marvian and Robert W. Spekkens

Modified light-cone condition via vacuum polarization in a time-dependent field *(7 pages)* 062111
Huayu Hu and Jie Huang

High-energy e^+e^- photoproduction in the field of a heavy atom accompanied by bremsstrahlung *(7 pages)* 062112
P. A. Krachkov, R. N. Lee, and A. I. Milstein

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).

PHYSICAL REVIEW A™

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

PERIODICALS
Postmaster send address changes to:

APS Subscription Services
P.O. Box 41
Annapolis Junction, MD 20701

THIRD SERIES, VOLUME 90, NUMBER 6 **PARTS A AND B**

CONTENTS

DECEMBER 2014

The Table of Contents is a total listing of Parts A and B.
Part A consists of pages 060001–062715, and Part B pages 063401–069902(E).

PART A

EDITORIALS AND ANNOUNCEMENTS

Announcement: Increased Length Limit for Rapid Communications and Discontinuation of Brief Reports in *Physical Review A (1 page)* 060001

RAPID COMMUNICATIONS

Quantum information

Adiabatic tracking of quantum many-body dynamics *(5 pages)* . . . . . 060301(R)
Hamed Saberi, Tomáš Opatrný, Klaus Mølmer, and Adolfo del Campo

Experimental realization of a dynamic squeezing gate *(5 pages)* . . . . . 060302(R)
Kazunori Miyata, Hisashi Ogawa, Petr Marek, Radim Filip, Hidehiro Yonezawa, Jun-ichi Yoshikawa, and Akira Furusawa

Atomic and molecular structure and dynamics

Measurement of the branching fractions and lifetime of the $5D_{5/2}$ level of Ba^{+} *(4 pages)* . . . . . 060501(R)
Carolyn Auchter, Thomas W. Noel, Matthew R. Hoffman, Spencer R. Williams, and Boris B. Blinov

Atomic and molecular processes in external fields, including interactions with strong fields and short pulses

Laser-sub-cycle two-dimensional electron-momentum mapping using orthogonal two-color fields *(5 pages)* . . . . . 061401(R)
Li Zhang, Xinhua Xie, Stefan Roither, Daniil Kartashov, YanLan Wang, ChuanLiang Wang, Markus Schöffler, Dror Shafir, Paul B. Corkum, Andrius Baltuška, Igor Ivanov, Anatoli Kheifets, XiaoJun Liu, André Staudte, and Markus Kitzler

Zeeman-splitting-assisted quantum-logic spectroscopy of trapped ions *(5 pages)* . . . . . 061402(R)
Huanqian Loh, Shiqian Ding, Roland Hablutzel, Gleb Maslennikov, and Dzmitry Matsukevich

Matter waves and collective properties of cold atoms and molecules

Phase diagram of dipolar bosons in two dimensions with tilted polarization *(5 pages)* . . . . . 061601(R)
A. Macia, J. Boronat, and F. Mazzanti

Copyright 2014 by American Physical Society

(Continued)

1050-2947(201412)90:6:B;1-L

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).