PHYSICAL REVIEW A **THIRD SERIES, VOLUME 109, NUMBER 4** **APRIL 2024**

Quantum interface for telecom frequency conversion based on diamond-type atomic ensembles *(21 pages)* 043716
Po-Han Tseng, Ling-Chun Chen, Jiun-Shiuan Shiu, and Yong-Fan Chen

ERRATA

Erratum: "Hyperbits": The information quasiparticles [Phys. Rev. A **85**, 022331 (2012)] *(1 page)* . . . . . 049901(E)
Marcin Pawłowski and Andreas Winter

Erratum: Microwave coherent spectroscopy of ultracold thulium atoms [Phys. Rev. A **102**, 043114 (2020)] *(1 page)* . . . . . 049902(E)
D. A. Pershin, V. V. Yaroshenko, V. V. Tsyganok, V. A. Khlebnikov, E. T. Davletov, D. V. Shaykin, E. R. Gadylshin, I. S. Cojocaru, E. L. Svechnikov, P. V. Kapitanova, and A. V. Akimov

Retraction: Non-Hermiticity of tunneling time in a spacetime-symmetric extension of nonrelativistic quantum mechanics [Phys. Rev. A **107**, 052220 (2023)] *(1 page)* . . . . . 049903(E)
Arlans J. S. de Lara and Marcus W. Beims

Erratum: High-precision measurement of the hyperfine splitting and ac Stark shift of the $7d\,^2D_{3/2}$ state in atomic cesium [Phys. Rev. A **106**, 042811 (2022)] *(1 page)* . . . . . 049904(E)
Bubai Rahaman and Sourav Dutta

Erratum: Exact results for polaron and molecule in one-dimensional spin-1/2 Fermi gas [Phys. Rev. A **94**, 043645 (2016)] *(1 page)* . . . . . 049905(E)
Runxin Mao (毛润欣), X. W. Guan (管习文), and Biao Wu (吴飙)

Erratum: Inner energy relaxation and growth of nanosize particles [Phys. Rev. A **108**, 032812 (2023)] *(1 page)* . . . 049906(E)
M. Bredice, M. G. Rozman, J. Smucker, E. Farmer, R. Côté, and V. Kharchenko

PHYSICAL REVIEW A THIRD SERIES, VOLUME 109, NUMBER 4 APRIL 2024

Quantum optics

Entanglement analysis and experimental proposal for measuring Bell-type correlations in an injected optical parametric oscillator with structured light *(11 pages)* 043701
L. G. S. Oliveira, L. J. Pereira, R. M. Pereira, G. B. Alves, J. A. O. Huguenin, A. Z. Khoury, K. Dechoum, and C. E. R. Souza

One-photon and two-photon blockades in a four-wave-mixing system embedded with an atom *(8 pages)* 043702
Yuanchuan Li, Zhihai Yao, and Hui Yang

Full characterization of biphotons with a generalized quantum interferometer *(12 pages)* 043703
Baihong Li (李百宏), Changhua Chen (陈昌花), Boxin Yuan (袁博欣), Xiaofei Zhang (张晓斐), Ruifang Dong (董瑞芳), Shougang Zhang (张首刚), and Rui-Bo Jin (金锐博)

Exploring the dynamics of the Kelvin-Helmholtz instability in paraxial fluids of light *(9 pages)* 043704
Tiago D. Ferreira, Jakub Garwoła, and Nuno A. Silva

Heating and cooling processes via phaseonium-driven dynamics of cascade systems *(11 pages)* 043705
Federico Amato, Claudio Pellitteri, G. Massimo Palma, Salvatore Lorenzo, and Rosario Lo Franco

Two-port quantum model of finite-length transmission lines coupled to lumped circuits *(13 pages)* 043706
Carlo Forestiere and Giovanni Miano

Optomechanics with cavity vacuum fluctuations: Self-alignment and collective rotation mediated by Casimir torque *(11 pages)* 043707
Denis Ilin, I. V. Tokatly, and Ivan Iorsh

Entangled atomic ensemble and an yttrium-iron-garnet sphere in coupled microwave cavities *(11 pages)* 043708
Dilawaiz, Shahid Qamar, and Muhammad Irfan

Thermal detuning of a bichromatic narrow linewidth optical cavity *(5 pages)* 043709
L. D. Bonavena, M. Lequime, M. Vardaro, Y. Zhao, M. Barsuglia, M. Bawaj, A. Bertolini, R. Bonnand, E. Capocasa, M. De Laurentis, J. Ding, S. Di Pace, R. Flaminio, B. Garaventa, A. Grimaldi, Y. Guo, P.-E. Jacquet, A. Masserot, M. Mehmet, R. Passaquieti, L. Pinard, E. Polini, V. Sequino, F. Sorrentino, M. Tacca, H. Vahlbruch, and J. P. Zendri

Phase-sensitivity enhancement based on a four-beam nonlinear interferometer *(11 pages)* 043710
Jiabin Wang, Shengshuai Liu, and Jietai Jing

Nonlocal Rydberg enhancement for four-wave-mixing biphoton generation *(11 pages)* 043711
Hui-Min Zhao, Xiao-Jun Zhang, M. Artoni, G. C. La Rocca, and Jin-Hui Wu

Magnon blockade induced by parametric amplification *(10 pages)* 043712
Wei Zhang, Shutian Liu, Shou Zhang, and Hong-Fu Wang

Photon-photon correlation of condensed light in a microcavity *(11 pages)* 043713
Yijun Tang, Himadri S. Dhar, Rupert F. Oulton, Robert A. Nyman, and Florian Mintert

Unconventional photon blockade with non-Markovian effects in driven dissipative coupled cavities *(23 pages)* . . . 043714
H. Z. Shen, J. F. Yang, and X. X. Yi

Multiple scattering of coherent light in a random medium containing optical turbulence and randomly distributed particles *(9 pages)* 043715
Mingyuan Ren, Ning Zhou, Yajing Qiao, Jianrui Gong, Yang Zhou, and Yu Zhang

(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 109, NUMBER 4** **APRIL 2024**

Generation of extreme-ultraviolet and x-ray light from a propagating nanometer electron layer in few-cycle laser interaction with solid targets *(7 pages)* 043519
Xinmeng Liu, Dongning Yue, Quanli Dong, Ziqiang Shao, Zhe Li, Hao Teng, Zhiyi Wei, Feng Liu, Boyuan Li, Xiaohui Yuan, Min Chen, Zhengming Sheng, and Jie Zhang

Development of a laser for chirp cooling of positronium to near the recoil limit using a chirped pulse-train generator *(12 pages)* 043520
Kenji Shu, Naoki Miyamoto, Yuto Motohashi, Ryosuke Uozumi, Yohei Tajima, and Kosuke Yoshioka

Self-healing high-order harmonic generation from curved relativistic plasma mirrors with Bessel-Gaussian beams *(6 pages)* 043521
Zeyue Pang, Peng Chen, and Zi-Yu Chen

Theoretical study of a passively mode-locked integrated laser based on transition-metal dichalcogenides and graphene *(7 pages)* 043522
Dimitrios Chatzidimitriou, Georgios Nousios, Thomas Christopoulos, and Emmanouil E. Kriezis

Probing microcavity resonance spectra with intracavity emitters *(8 pages)* 043523
C. Koks and M. P. van Exter

Exploiting separation-dependent coherence to boost optical resolution *(12 pages)* 043524
Ilya Karuseichyk, Giacomo Sorelli, Vyacheslav Shatokhin, Mattia Walschaers, and Nicolas Treps

Chirality-induced emergent spin-orbit coupling in topological atomic lattices *(12 pages)* 043525
Jonah S. Peter, Stefan Ostermann, and Susanne F. Yelin

Performance of a Sagnac interferometer to observe vacuum optical nonlinearity *(12 pages)* 043526
Aurélie Max Mailliet, Adrien E. Kraych, François Couchot, Xavier Sarazin, Elsa Baynard, Julien Demailly, Moana Pittman, Arache Djannati-Ataï, Sophie Kazamias, Scott Robertson, and Marcel Urban

Tunable transverse optical force via nonreciprocity *(9 pages)* 043527
Mengkai Che, Huimin Zhu, Xiaoxuan Shi, Yaxin Li, Xiao Li, Lei Zhang, and Jun Chen

Cauchy-Riemann beams *(6 pages)* 043528
H. M. Moya-Cessa, I. Ramos-Prieto, D. Sánchez-de-la-Llave, U. Ruíz, V. Arrizón, and F. Soto-Eguibar

Caustic analysis of partially coherent self-accelerating beams: Investigating self-healing properties *(8 pages)* 043529
Peiyu Zhang, Kaijian Chen, Chuanhou Zhang, Jiafang Liang, Shengyu Deng, Peilong Hong, Bingsuo Zou, and Yi Liang

Generation, manipulation, and detection of snake-state trajectories of a neutral atom in a ring cavity *(15 pages)* . . 043530
Poornima Shakya, Nishant Dogra, and Sankalpa Ghosh

Radiation damping of a Rayleigh scatterer illuminated by a linearly polarized plane wave *(7 pages)* 043531
Mohammad Ali Abbassi and Lukas Novotny

Dissipative and dispersive cavity optomechanics with a frequency-dependent mirror *(20 pages)* 043532
Juliette Monsel, Anastasiia Ciers, Sushanth Kini Manjeshwar, Witlef Wieczorek, and Janine Splettstoesser

Toward nanophotonic optical isolation via inverse design of energy transfer in nonreciprocal media *(14 pages)* . . . 043533
Claire M. Cisowski, Madeline C. Waller, and Robert Bennett

(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 109, NUMBER 4** **APRIL 2024**

Theory of nonlinear sub-Doppler spectroscopy taking into account atomic-motion-induced density-dependent effects in a gas *(16 pages)* 043504
V. I. Yudin, A. V. Taichenachev, M. Yu. Basalaev, O. N. Prudnikov, V. G. Pal'chikov, T. Zanon-Willette, and S. N. Bagayev

Proposal for observing nonclassicality in highly excited mechanical oscillators by single photon detection *(10 pages)* 043505
Kai Ryen Bush and Kjetil Børkje

Electromagnetic scalar product in spatially bounded domains *(11 pages)* 043506
Maxim Vavilin, Carsten Rockstuhl, and Ivan Fernandez-Corbaton

Tunable supermode converters based on J_x graphene waveguide arrays with transversely linear modulation *(6 pages)* 043507
Shuaifei Ren, Bing Wang, Chengzhi Qin, Weiwei Liu, Lingzhi Zheng, Zhuoxiong Liu, and Peixiang Lu

Supercontinuum amplification by Kerr instability *(7 pages)* 043508
Sagnik Ghosh, Nathan G. Drouillard, and T. J. Hammond

Optimization of Purcell-enhanced microcavities with the cylindrical finite-difference time-domain algorithm *(9 pages)* 043509
N. W. E. Seet, K. Dini, and T. C. H. Liew

Stability restoration by asymmetric nonlinear states in non-Hermitian double-well potentials *(9 pages)* 043510
Dmitry A. Zezyulin

Topologically protected spatial-phase mismatching for cavity-enhanced quantum memories *(6 pages)* 043511
Xia-Xia Li, Jia-Xin Wang, Yu-Hui Chen, and Xiangdong Zhang

Nonreciprocal photon-phonon entanglement in Kerr-modified spinning cavity magnomechanics *(9 pages)* 043512
Jiaojiao Chen, Xiao-Gang Fan, Wei Xiong, Dong Wang, and Liu Ye

Generation of high-temporal-quality sub-two-cycle pulses by self-cleaning of spatiotemporal solitons in air-plasma channels *(6 pages)* 043513
Litong Xu and Tingting Xi

Eigenmode decomposition method for full-wave modeling of microring resonators *(9 pages)* 043514
Yuriy Akimov, Aswin Alexander Eapen, Shiyang Zhu, Doris K. T. Ng, Nanxi Li, Woon Leng Loh, Lennon Y. T. Lee, Alagappan Gandhi, and Aravind P. Anthur

Traveling-wave electro-optics for microwave-to-optical quantum transduction *(8 pages)* 043515
Mohan Shen, Manuel C. C. Pace, and Hong X. Tang

Stokes scintillations for vector vortex beams with controllable spatial correlation *(9 pages)* 043516
Manisha, Hemant Kumar Singh, P. Senthilkumaran, and Bhaskar Kanseri

Geometric phase in plane-wave transmission by a dielectric structurally chiral slab with a central phase defect *(8 pages)* 043517
Akhlesh Lakhtakia

Frequency-dependent fundamental and dipole gap solitons in $\mathcal{PT}$-symmetric nonlinear metamaterials *(11 pages)* 043518
Juan Bai, Xiaoqin Bai, Zhipei Gao, and Rongcao Yang

(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 109, NUMBER 4** **APRIL 2024**

Universal energy functionals for trapped Fermi gases in low dimensions *(7 pages)* 043314
Jiansen Zhang and Shina Tan

Dynamic equation for evaporative cooling of trapped atoms in microgravity *(6 pages)* 043315
Xiao-long Yuan, Jiachen Yu, Hui Li, Biao Wu, Wei Xiong, Xiaoji Zhou, and Xuzong Chen

Breathing mode of a quantum droplet in a quasi-one-dimensional dipolar Bose gas *(10 pages)* 043316
E. Orignac, S. De Palo, L. Salasnich, and R. Citro

Splitting instability of a doubly quantized vortex in superfluid Fermi gases *(10 pages)* 043317
W. Van Alphen, H. Takeuchi, and J. Tempere

Phase retrieval of vortices in Bose-Einstein condensates *(12 pages)* 043318
Ron Ziv, Anatoly Patsyk, Yaakov Lumer, Yoav Sagi, Yonina C. Eldar, and Mordechai Segev

Energy-dependent dynamical quantum phase transitions in quasicrystals *(11 pages)* 043319
Shihao Ye, Ziheng Zhou, Niaz Ali Khan, and Gao Xianlong

Probing the interaction energy of two ^{85}Rb atoms in an optical tweezer via spin-motion coupling *(8 pages)* 043320
Jun Zhuang, Kun-Peng Wang, Peng-Xiang Wang, Ming-Rui Wei, Bahtiyar Mamat, Cheng Sheng, Peng Xu, Min Liu, Jin Wang, Xiao-Dong He, and Ming-Sheng Zhan

Generalized Josephson effect in an asymmetric double-well potential at finite temperatures *(14 pages)* 043321
Kateryna Korshynska and Sebastian Ulbricht

Universal *p*-wave tetramers in low-dimensional fermionic systems with three-body interaction *(6 pages)* 043322
V. Polkanov and V. Pastukhov

Three-body bound states of quantum particles: Higher stability through braiding *(9 pages)* 043323
Sophie Fisher, Olumakinde Ogunnaike, and Leonid Levitov

Miscibility of binary Bose-Einstein condensates with *p*-wave interaction *(12 pages)* 043324
Min Deng, Ming Xue, Jinghan Pang, Hui Luo, Zhiguo Wang, Jinbin Li, and Dayou Yang

Evolution of Efimov states *(13 pages)* 043325
Sebastian M. Dawid, Md Habib E. Islam, Raúl A. Briceño, and Andrew W. Jackura

Photonics, nonlinear optics, and optomechanics

Fast-speed algorithm to compute tight focusing of laser beams: Effectiveness of circularly polarized vortex beam series as a mathematical basis *(19 pages)* 043501
Stepan Boichenko

Inelastic scattering of transversely structured free electrons from nanophotonic targets: Theory and computation *(21 pages)* 043502
Austin G. Nixon, Matthieu Chalifour, Marc R. Bourgeois, Michael Sanchez, and David J. Masiello

Directional difference of the spin angular-momentum density and spin vectors in tightly focused bichromatic optical Lissajous beams *(7 pages)* 043503
Xinlu Zhu, Xiangyun Li, Zhen Dong, Fei Wang, Lin Liu, Andreas Norrman, Tero Setälä, Yangjian Cai, and Yahong Chen

(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 109, NUMBER 4** **APRIL 2024**

Effect of molecular alignment and orientation on elliptically polarized high-order harmonic generation *(8 pages)* 043118
Ru Zhang, Feng Wang, Hua Yuan, Shiju Chen, Chunhui Yang, Tianxin Ou, Jiahang Song, Qing Liao, and Peixiang Lu

First-principles study of charge-transfer-plasmon-enhanced photoemission from a gold-nanoparticle–sodium-atom emitter *(10 pages)* 043119
Zhexuan Wang, Fang Liu, Kaiyu Cui, Xue Feng, Wei Zhang, and Yidong Huang

Ultracold systems and matter waves

Four-boson first excited state near two-body unitarity *(13 pages)* 043301
Feng Wu, T. Frederico, R. Higa, and U. van Kolck

℘ Full counting statistics of charge in quenched quantum gases *(18 pages)* 043302
Dávid X. Horváth and Colin Rylands

Spontaneous symmetry breaking of vortex number in binary alternating current countersuperflow *(10 pages)* 043303
Wei-Can Yang, Makoto Tsubota, and Hua-Bi Zeng

Rotating quantum droplets confined in an anharmonic potential *(11 pages)* 043304
S. Nikolaou, G. M. Kavoulakis, and M. Ögren

Non-Abelian quantum geometric tensor in degenerate topological semimetals *(13 pages)* 043305
Hai-Tao Ding, Chang-Xiao Zhang, Jing-Xin Liu, Jian-Te Wang, Dan-Wei Zhang, and Shi-Liang Zhu

Emergence of unstable avoided crossing in the collective excitations of spin-1 spin-orbit-coupled Bose-Einstein condensates *(18 pages)* 043306
Sanu Kumar Gangwar, Rajamanickam Ravisankar, Henrique Fabrelli, Paulsamy Muruganandam, and Pankaj Kumar Mishra

Role of optical channeling in contrast enhancement of echo interferometers *(8 pages)* 043307
Gehrig Carlse, Jaskaran Randhawa, Eduardo Ramos, Thomas Vacheresse, Alex Pouliot, Adam C. Carew, and A. Kumarakrishnan

Flux-enhanced localization and reentrant delocalization in the quench dynamics of two interacting bosons on a Bose-Hubbard ladder *(10 pages)* 043308
Mrinal Kanti Giri, Biswajit Paul, and Tapan Mishra

Engineering dynamical phase diagrams with driven lattices in spinor gases *(9 pages)* 043309
J. O. Austin-Harris, Z. N. Hardesty-Shaw, Q. Guan, C. Binegar, D. Blume, R. J. Lewis-Swan, and Y. Liu

℘ Rotational-state dependence of interactions between polar molecules *(12 pages)* 043310
Etienne F. Walraven and Tijs Karman

Bose-enhanced relaxation of driven atom-molecule condensates *(13 pages)* 043311
Dimitri Pimenov and Erich J. Mueller

Superfluid oscillator circuit with a quantum current regulator *(7 pages)* 043312
Xue Yang, Wenkai Bai, Chen Jiao, Wu-Ming Liu, Jun-Hui Zheng, and Tao Yang

Temporal Talbot interferometer of a strongly interacting molecular Bose-Einstein condensate *(10 pages)* 043313
Fansu Wei, Zhengxi Zhang, Yuying Chen, Hongmian Shui, Yun Liang, Chen Li, and Xiaoji Zhou

(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 109, NUMBER 4** **APRIL 2024**

Circularly polarized RABBITT applied to a Rabi-cycling atom *(23 pages)* 043104
Yijie Liao, Edvin Olofsson, Jan Marcus Dahlström, Liang-Wen Pi, Yueming Zhou, and Peixiang Lu

Enhancing single-atom loading in tightly confined dipole traps with an ancillary dipole beam *(9 pages)* 043105
Guang-Jie Chen, Zhu-Bo Wang, Chenyue Gu, Dong Zhao, Ji-Zhe Zhang, Yan-Lei Zhang, Chun-Hua Dong, Kun Huang, Guang-Can Guo, and Chang-Ling Zou

Photoinduced charge-carrier dynamics in a semiconductor-based ion trap investigated via motion-sensitive qubit transitions *(25 pages)* 043106
Woojun Lee, Daun Chung, Honggi Jeon, Beomgeun Cho, KwangYeul Choi, SeungWoo Yoo, Changhyun Jung, Junho Jeong, Changsoon Kim, Dong-Il "Dan" Cho, and Taehyun Kim

Ultrafast formation dynamics of D_3^+ from bimolecular reaction of the D_2-D_2 dimer *(9 pages)* 043107
Hao Huang, Haomai Hou, Jin Wen, Hongcheng Ni, and Jian Wu

Asymmetric photoelectron momentum distribution of carbon monoxide *(7 pages)* 043108
H. B. Ambalampitiya and J. M. Ngoko Djiokap

Imprint of electron returning dynamics on ion momentum spectra in strong-field nonsequential double ionization *(7 pages)* 043109
Tongtong He, Zichao Liu, Jianying Liao, Yingbin Li, Benhai Yu, and Cheng Huang

Strong-field processes induced by an ultrashort linearly polarized pulse with two carrier frequencies *(14 pages)* 043110
D. Habibović and D. B. Milošević

Quantum dynamics of a fully blockaded Rydberg atom ensemble *(15 pages)* 043111
Dominik S. Wild, Sabina Drăgoi, Corbin McElhanney, Jonathan Wurtz, and Sheng-Tao Wang

Laser-induced Coulomb explosion of heteronuclear alkali-metal dimers on helium nanodroplets *(10 pages)* 043112
Simon H. Albrechtsen, Jeppe K. Christensen, Rico Mayro P. Tanyag, Henrik H. Kristensen, and Henrik Stapelfeldt

High-order harmonic generation in helium: A comparison study *(9 pages)* 043113
A. T. Bondy, S. Saha, J. C. del Valle, A. Harth, N. Douguet, K. R. Hamilton, and K. Bartschat

Modified saddle-point method applied to high-order above-threshold ionization and high-order harmonic generation: Slater-type versus asymptotic ground-state wave function *(13 pages)* 043114
A. S. Jašarević, E. Hasović, and D. B. Milošević

Controlling electron motion with attosecond precision by a shaped femtosecond intense laser pulse *(9 pages)* 043115
Xiaoyun Zhao, Mingqing Liu, Yizhang Yang, Zhou Chen, Xiaolei Hao, Chuncheng Wang, Weidong Li, and Jing Chen

Self-diffusion in a strongly coupled non-neutral plasma *(10 pages)* 043116
Marco Baldovin, Grégoire Vallet, Gaëtan Hagel, Emmanuel Trizac, and Caroline Champenois

High-order magnetic resonance in the presence of strong longitudinal radio-frequency magnetic field based on atomic alignment states *(7 pages)* 043117
Tao Shi, Ge Jin, and Sheng Zou

(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 109, NUMBER 4** **APRIL 2024**

Structural rearrangements and fragmentation pathways induced by a low-energy electron attachment to ethyl acetate *(9 pages)* 042818
Anirban Paul, Ian Carmichael, Dhananjay Nandi, Sylwia Ptasinska, and Dipayan Chakraborty

$\mathcal{CP}$-violation sensitivity of closed-shell radium-containing polyatomic molecular ions *(11 pages)* 042819
Konstantin Gaul, Nicholas R. Hutzler, Phelan Yu, Andrew M. Jayich, Miroslav Iliaš, and Anastasia Borschevsky

Observation of quantum interference of optical transition pathways in Doppler-free two-photon spectroscopy and implications for precision measurements *(8 pages)* 042820
Bubai Rahaman, Sid C. Wright, and Sourav Dutta

Axion-mediated electron-nucleus and electron-electron interactions in the barium monofluoride molecule *(7 pages)* 042821
Sergey D. Prosnyak and Leonid V. Skripnikov

Ground-state potential and dipole moment of carbon monoxide: Contributions from electronic correlation, relativistic effects, QED, adiabatic correction, and nonadiabatic correction *(11 pages)* 042822
D. P. Usov, Y. S. Kozhedub, V. V. Meshkov, A. V. Stolyarov, N. K. Dulaev, A. M. Ryzhkov, I. M. Savelyev, V. M. Shabaev, and I. I. Tupitsyn

Semiquantum versus quantum methods for grazing-incidence fast-atom diffraction: Influence of the wave-packet size *(12 pages)* 042823
A. S. Muzas, L. Frisco, G. A. Bocan, C. Díaz, and M. S. Gravielle

Refined nuclear magnetic octupole moment of ^{113}In and ^{115}In *(9 pages)* 042824
Fei-Chen Li and Yong-Bo Tang

Prospects for the determination of fundamental constants with beyond-state-of-the-art uncertainty using molecular hydrogen ion spectroscopy *(13 pages)* 042825
S. Schiller and J.-Ph. Karr

Relativistic corrections in the ground and excited states of positronic beryllium *(13 pages)* 042826
Dmitry Tumakov, Pavel Rzhevskii, Toreniyaz Shomenov, and Sergiy Bubin

Determining partial photoemission cross sections of methane with dedicated uncertainties *(8 pages)* 042827
Hans Kirschner, Alexander Gottwald, Hendrik Kaser, and Mathias Richter

PART B

Light-induced processes in atomic-scale systems

Comparative study of enhancement and suppression of N_2^+ lasing induced by coherent molecular rotational wave packets of N_2 and N_2^+ *(5 pages)* 043101
Hongqiang Xie, Shuting Wu, Yihong Huang, Junda Lv, Jiayi Cai, Chenrui Jing, Zaicheng Xiao, Zhiming Chen, Xinghao Wang, and Guihua Li

Angle-dependent high-order harmonic generation in a topological phase transition of monolayer black phosphorous *(6 pages)* 043102
Rui Qin and Zi-Yu Chen

Temporal nonreciprocity in gently modulated three-mode optomechanical systems *(14 pages)* 043103
Yi-Bing Qian, Zhen-Yu Zhang, Lei Tang, Deng-Gao Lai, and Bang-Pin Hou

(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 109, NUMBER 4** **APRIL 2024**

General analytical theory of three-photon decays for hydrogenic ions with Coulomb Sturmian basis functions *(15 pages)* 042803
Falone Fotsing and Moïse Godfroy Kwato Njock

Revisiting M-shell binding energies for elements with $72 \leqslant Z \leqslant 83$ *(7 pages)* 042804
Jorge Trincavelli, Gustavo Castellano, Silvina Segui, Silvina Limandri, María del Rosario Torres Deluigi, Claudia Montanari, Darío Mitnik, and Alejo Carreras

Quantum coherence in dissociative electron attachment: Isotope effect *(7 pages)* 042805
Suvasis Swain, Akshay Kumar, E. Krishnakumar, and Vaibhav S. Prabhudesai

Excitation of the ^{229}Th nucleus by a hole in the inner electronic shells *(6 pages)* 042806
M. G. Kozlov, A. V. Oleynichenko, D. Budker, D. A. Glazov, Y. V. Lomachuk, V. M. Shabaev, A. V. Titov, I. I. Tupitsyn, and A. V. Volotka

Orbital collapse and dual states of the 5g electrons in superheavy elements *(8 pages)* 042807
I. I. Tupitsyn, I. M. Savelyev, Y. S. Kozhedub, D. A. Telnov, N. K. Dulaev, A. V. Malyshev, E. A. Prokhorchuk, and V. M. Shabaev

Computation of relativistic and many-body effects in atomic systems using quantum annealing *(10 pages)* 042808
Vikrant Kumar, Nishanth Baskaran, V. S. Prasannaa, K. Sugisaki, D. Mukherjee, K. G. Dyall, and B. P. Das

Saturated absorption spectroscopy of $M1$ transitions of O_2 near 764 nm *(8 pages)* 042809
Y.-R. Xu, A.-W. Liu, Y. Tan, C.-L. Hu, and S.-M. Hu

Charge equilibration of laser-accelerated carbon ions in a porous-structure foam target *(6 pages)* 042810
Bubo Ma *et al.*

Full leading-order nuclear polarization in highly charged ions *(12 pages)* 042811
Igor A. Valuev and Natalia S. Oreshkina

Positron resonances in vibrational excitation *(5 pages)* 042812
Z. Cheong, D. Stevens, and J. P. Sullivan

Oscillator strengths for ^2P - ^2S transitions in neutral boron *(16 pages)* 042813
Saeed Nasiri, Sergiy Bubin, and Ludwik Adamowicz

Cold three-body recombination in helium-helium-silver-atom collisions using the hybrid slow-variable-discretization–adiabatic hyperspherical R-matrix approach *(8 pages)* 042814
Hiroya Suno

Nuclear magnetic dipole moments of ^{75}As, ^{121}Sb, and ^{123}Sb from *ab initio* calculations of NMR shielding constants and existing NMR experiments *(7 pages)* 042815
Andrej Hurajt, Dariusz Kędziera, Anna Kaczmarek-Kędziera, and Andrej Antušek

Simulating critical anion chemistry with indirect excitons *(8 pages)* 042816
Krzysztof Myśliwy and Krzysztof Jachymski

Determining the molecular Huang-Rhys factor via scanning-tunneling-microscopy–induced luminescence *(6 pages)* 042817
Fei Wen and Guohui Dong

(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 109, NUMBER 4** **APRIL 2024**

Quantum simulation of lattice gauge theories via deterministic duality transformations assisted by measurements *(27 pages)* 042611
Hiroki Sukeno and Tzu-Chieh Wei

Quantum fidelity kernel with a trapped-ion simulation platform *(9 pages)* 042612
Rodrigo Martínez-Peña, Miguel C. Soriano, and Roberta Zambrini

Hardware requirements for realizing a quantum advantage with deterministic single-photon sources *(15 pages)* 042613
Patrik I. Sund, Ravitej Uppu, Stefano Paesani, and Peter Lodahl

Quantum metrology enhanced by the XY spin interaction in a generalized Tavis-Cummings model *(8 pages)* 042614
Yuguo Su, Wangjun Lu, and Hai-Long Shi

Nonadiabatic geometric quantum gates by composite pulses based on superconducting qubits *(11 pages)* 042615
Zi-Yu Fang, Hai Xu, Tao Chen, Kejin Wei, and Chengxian Zhang

Collision-resolved pressure sensing *(11 pages)* 042616
Daniel S. Barker, Daniel Carney, Thomas W. LeBrun, David C. Moore, and Jacob M. Taylor

Fast remote spectral discrimination through ghost spectrometry *(10 pages)* 042617
A. Chiuri, M. Barbieri, Iole Venditti, Federico Angelini, Chiara Battocchio, Matteo G. A. Paris, and Ilaria Gianani

Quantum simulation of water-molecule bond angles using an NMR quantum computer *(8 pages)* 042618
Feng Xu, Fan Yang, Chao Wei, Xinyu Chen, Shijie Wei, Hefeng Wang, Jun Li, and Tao Xin

Extracting ergotropy from nonequilibrium steady states of an XXZ spin-chain quantum battery *(15 pages)* 042619
B. Mojaveri, R. Jafarzadeh Bahrbeig, and M. A. Fasihi

Benchmarking characterization methods for noisy quantum circuits *(17 pages)* 042620
Megan L. Dahlhauser and Travis S. Humble

Single-pulse two-qubit gates for Rydberg atoms with noncyclic geometric control *(8 pages)* 042621
Zi-Yuan Chen, Jia-Hao Liang, Zhao-Xin Fu, Hong-Zhi Liu, Ze-Rui He, Meng Wang, Zhi-Wei Han, Jia-Yi Huang, Qing-Xian Lv, and Yan-Xiong Du

Continuous dynamical decoupling of spin chains: Inducing two-qubit interactions to generate perfect entanglement *(11 pages)* 042622
Abdullah Irfan, Syed Furqan Abbas Hashmi, Syeda Neha Zaidi, Muhammad Usman Baig, Wahaj Ayub, and Adam Zaman Chaudhry

Quantum simulation of bound-state-enhanced quantum metrology *(9 pages)* 042623
Cheng-Ge Liu, Cong-Wei Lu, Na-Na Zhang, and Qing Ai

Atomic and molecular structure and dynamics; high-precision experiments

Confined variational calculation of low-energy Ps-Li^+ scattering *(11 pages)* 042801
D.-X. Zhao, M.-S. Wu, J.-Y. Zhang, Z.-C. Yan, and K. Varga

Multiparticle cumulant mapping for Coulomb explosion imaging: Calculations and algorithm *(17 pages)* 042802
Chuan Cheng, Leszek J. Frasinski, Gönenç Moğol, Felix Allum, Andrew J. Howard, Philip H. Bucksbaum, Ruaridh Forbes, and Thomas Weinacht

(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 109, NUMBER 4** **APRIL 2024**

Robustness of variational quantum algorithms against stochastic parameter perturbation *(9 pages)* 042426
Daniil Rabinovich, Ernesto Campos, Soumik Adhikary, Ekaterina Pankovets, Dmitry Vinichenko, and Jacob Biamonte

Error-corrected quantum repeaters with Gottesman-Kitaev-Preskill qudits *(20 pages)* 042427
Frank Schmidt, Daniel Miller, and Peter van Loock

Machine-learning-inspired quantum control in many-body dynamics *(13 pages)* 042428
Meng-Yun Mao, Zheng Cheng, Liangsheng Li, Ning Wu, and Wen-Long You

Asymmetric entanglement for quantum target sensing *(5 pages)* 042429
Su-Yong Lee, Jihwan Kim, Zaeill Kim, and Duk Y. Kim

Universal and robust quantum coherent control based on a chirped-pulse driving protocol *(6 pages)* 042430
Yue-Hao Yin, Jin-Xin Yang, and Li-Xiang Cen

Quantum technologies

Depth-optimized quantum circuit synthesis for diagonal unitary operators with asymptotically optimal gate count *(11 pages)* 042601
Shihao Zhang, Kai Huang, and Lvzhou Li

Polarization-based cyclic weak value metrology for angular-velocity measurement *(8 pages)* 042602
Zi-Rui Zhong, Yue Chen, Wei-Jun Tan, Xiang-Ming Hu, and Qing-Lin Wu

Experimental decoy-state asymmetric measurement-device-independent quantum key distribution over a turbulent high-loss channel *(9 pages)* 042603
Kazi Reaz, Md Mehdi Hassan, Adrien Green, Noah Crum, and George Siopsis

Generation of complete graph states in a spin-1/2 Heisenberg chain with a globally optimized magnetic field *(11 pages)* 042604
X. X. Li, D. X. Li, and X. Q. Shao

Quantifying high-order interdependencies in entangled quantum states *(8 pages)* 042605
Marco Alberto Javarone, Fernando E. Rosas, Paolo Facchi, Saverio Pascazio, and Sebastiano Stramaglia

Quantum annealing with error mitigation *(16 pages)* 042606
Yuta Shingu, Tetsuro Nikuni, Shiro Kawabata, and Yuichiro Matsuzaki

Quantum control and noise protection of a Floquet 0-π qubit *(13 pages)* 042607
Zhaoyou Wang and Amir H. Safavi-Naeini

Security analysis against the Trojan horse attack on practical polarization-encoding quantum key distribution systems *(11 pages)* 042608
Tingting Luo, Qiang Liu, Xiaoran Sun, Chunfeng Huang, Ye Chen, Zhenrong Zhang, and Kejin Wei

Asymmetry-enhanced phase sensing via asymmetric entangled coherent states *(10 pages)* 042609
Xiao-Tong Chen, Rui Zhang, Wang-Jun Lu, Yunlan Zuo, Ya-Feng Jiao, and Le-Man Kuang

*i*SWAP-type geometric gates induced by paths on the Schmidt sphere *(5 pages)* 042610
Max Johansson Saarijärvi and Erik Sjöqvist

(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 109, NUMBER 4** **APRIL 2024**

Robustness of chaotic behavior in iterated quantum protocols *(13 pages)* 042410
Attila Portik, Orsolya Kálmán, Igor Jex, and Tamás Kiss

Better performance of quantum batteries in different environments compared to closed batteries *(13 pages)* 042411
Shu-Qian Liu, Lu Wang, Hao Fan, Feng-Lin Wu, and Si-Yuan Liu

Adaptive Bayesian quantum algorithm for phase estimation *(8 pages)* 042412
Joseph G. Smith, Crispin H. W. Barnes, and David R. M. Arvidsson-Shukur

Layering and subpool exploration for adaptive variational quantum eigensolvers: Reducing circuit depth, runtime, and susceptibility to noise *(32 pages)* 042413
Christopher K. Long, Kieran Dalton, Crispin H. W. Barnes, David R. M. Arvidsson-Shukur, and Normann Mertig

Phase transitions in sampling and error correction in local Brownian circuits *(19 pages)* 042414
Subhayan Sahu and Shao-Kai Jian

Performance of randomized estimators of the Hafnian of a non-negative matrix *(10 pages)* 042415
Alexey Uvarov and Dmitry Vinichenko

Code conversion with the quantum Golay code for a universal transversal gate set *(9 pages)* 042416
Matthew Sullivan

Enhancement of sensitivity in low-temperature quantum thermometry via reinforcement learning *(9 pages)* 042417
Qing-Shou Tan, Xulin Liu, Lan Xu, Wei Wu, and Le-Man Kuang

Graph optimization perspective for low-depth Trotter-Suzuki decomposition *(18 pages)* 042418
Albert T. Schmitz, Nicolas P. D. Sawaya, Sonika Johri, and A. Y. Matsuura

Experimental realization of quantum non-Markovianity through the convex mixing of Pauli semigroups on an NMR quantum processor *(8 pages)* 042419
Vaishali Gulati, Vinayak Jagadish, R. Srikanth, and Kavita Dorai

Experimental evidence for the two-path description of neutron spin echo *(9 pages)* 042420
S. McKay, A. A. M. Irfan, Q. Le Thien, N. Geerits, S. R. Parnell, R. M. Dalgliesh, N. V. Lavrik, I. I. Kravchenko, G. Ortiz, and R. Pynn

Let quantum neural networks choose their own frequencies *(10 pages)* 042421
Ben Jaderberg, Antonio A. Gentile, Youssef Achari Berrada, Elvira Shishenina, and Vincent E. Elfving

Genuine multipartite entanglement from a thermodynamic perspective *(8 pages)* 042422
Wenlong Sun, Yuanfeng Jin, and Gang Lu

Error identification entanglement purification for stationary system using high-dimensional entanglement *(14 pages)* 042423
Ji Qi, Ke Li, Zhe Yang, Rui-Yang Yuan, and Bao-Cang Ren

Local-projective-measurement-enhanced quantum battery capacity *(6 pages)* 042424
Tinggui Zhang, Hong Yang, and Shao-Ming Fei

Evaluating the efficiency of ground-state-preparation algorithms *(7 pages)* 042425
Katerina Gratsea, Chong Sun, and Peter D. Johnson

(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 109, NUMBER 4** **APRIL 2024**

Many-body entanglement and spectral clusters in the extended hard-core bosonic Hatano-Nelson model *(7 pages)* 042208
Chao-Ze Lu and Gaoyong Sun

Geometric characterization for cyclic heat engines far from equilibrium *(10 pages)* 042209
Tan Van Vu and Keiji Saito

Using quantum walks to unitarily represent random walks on finite graphs *(8 pages)* 042210
Matheus Guedes de Andrade, Franklin de Lima Marquezino, and Daniel Ratton Figueiredo

Every nonsignaling channel is common-cause realizable *(17 pages)* 042211
Paulo J. Cavalcanti, John H. Selby, and Ana Belén Sainz

Theory of parametric resonance for discrete time crystals in fully connected spin-cavity systems *(15 pages)* 042212
Roy D. Jara, Jr., Dennis F. Salinel, and Jayson G. Cosme

Universal stability of coherently diffusive one-dimensional systems with respect to decoherence *(19 pages)* 042213
F. S. Lozano-Negro, E. Alvarez Navarro, N. C. Chávez, F. Mattiotti, F. Borgonovi, H. M. Pastawski, and G. L. Celardo

Identification of causal influences in quantum processes *(20 pages)* 042214
Isaac Friend and Aleks Kissinger

Quantum information science

Efficient quantum state preparation with Walsh series *(22 pages)* 042401
Julien Zylberman and Fabrice Debbasch

Certification of genuine multipartite entanglement in spin ensembles with measurements of total angular momentum *(22 pages)* 042402
Khoi-Nguyen Huynh-Vu, Lin Htoo Zaw, and Valerio Scarani

Robustness- and weight-based resource measures without convexity restriction: Multicopy witness and operational advantage in static and dynamical quantum resource theories *(27 pages)* 042403
Kohdai Kuroiwa, Ryuji Takagi, Gerardo Adesso, and Hayata Yamasaki

Bounds on Rényi entropy growth in many-body quantum systems *(14 pages)* 042404
Zhengyan Darius Shi

Shortest evolution path between two mixed states and its realization *(7 pages)* 042405
Jie-Hui Huang, Shan-Shan Dong, Guang-Long Chen, Nan-Run Zhou, Fu-Yao Liu, and Li-Guo Qin

Achieving metrological limits using ancilla-free quantum error-correcting codes *(33 pages)* 042406
Sisi Zhou, Argyris Giannisis Manes, and Liang Jiang

Quantum change point and entanglement distillation *(6 pages)* 042407
Abhishek Banerjee, Pratapaditya Bej, and Somshubhro Bandyopadhyay

Incorporating encoding into quantum system design *(9 pages)* 042408
Alastair Kay

Terahertz-mediated microwave-to-optical transduction *(12 pages)* 042409
Furkan Sahbaz, James N. Eckstein, Dale J. Van Harlingen, and Simeon I. Bogdanov

(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 109, NUMBER 4 APRIL 2024

Caustic effects on high-order harmonic generation in graphene *(6 pages)* L041102
Fulong Dong, Qinzhi Xia, and Jie Liu

Ultracold systems and matter waves

Energy-resolved spin correlation measurements: Decoding transverse spin dynamics in weakly interacting Fermi gases *(5 pages)* L041301
J. Huang and J. E. Thomas

Interaction quenches in nonzero-temperature fermionic condensates *(7 pages)* L041302
H. Kurkjian, V. E. Colussi, P. Dyke, C. Vale, and S. Musolino

Photonics, nonlinear optics, and optomechanics

Suppressing electromagnetic local density of states via slow light in lossy quasi-one-dimensional gratings *(6 pages)* L041501
Benjamin Strekha, Pengning Chao, Rodrick Kuate Defo, Sean Molesky, and Alejandro W. Rodriguez

Efficient general waveform catching by a cavity at an absorbing exceptional point *(7 pages)* L041502
Asaf Farhi, Wei Dai, Seunghwi Kim, Andrea Alù, and Douglas Stone

$\mathcal{PT}$-phase diagram with quantum jump in a non-Hermitian photonic structure *(6 pages)* L041503
Xinchen Zhang, Yun Ma, Qi Liu, Nuo Wang, Yali Jia, Qi Zhang, Zhanqiang Bai, Junxiang Zhang, Qihuang Gong, and Ying Gu

ARTICLES

Fundamental concepts

Quantum strategies for rendezvous and domination tasks on graphs with mobile agents *(15 pages)* 042201
Giuseppe Viola and Piotr Mironowicz

Effective Hamiltonian approach to the quantum phase transitions in the extended Jaynes-Cummings model *(12 pages)* 042202
H. T. Cui, Y. A. Yan, M. Qin, and X. X. Yi

Nonreciprocal non-Hermitian Su-Schrieffer-Heeger chain modulated by the influence of $\mathcal{PT}$-symmetric imaginary potentials *(12 pages)* 042203
Chen-Hao Zhao, Jia-Rui Li, Cui Jiang, Lian-Lian Zhang, and Wei-Jiang Gong

Theory of metastability in discrete-time open quantum dynamics *(13 pages)* 042204
Yuan-De Jin, Chu-Dan Qiu, and Wen-Long Ma

Experimental demonstration of enhanced violations of Leggett-Garg inequalities in a $\mathcal{PT}$-symmetric trapped-ion qubit *(9 pages)* 042205
Pengfei Lu, Xinxin Rao, Teng Liu, Yang Liu, Ji Bian, Feng Zhu, and Le Luo

Hardy-type paradoxes for an arbitrary symmetric bipartite Bell scenario *(9 pages)* 042206
Kai-Siang Chen, Shiladitya Mal, Gelo Noel M. Tabia, and Yeong-Cherng Liang

Quantum battery with non-Hermitian charging *(12 pages)* 042207
Tanoy Kanti Konar, Leela Ganesh Chandra Lakkaraju, and Aditi Sen (De)

(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: 2469-9926)

PERIODICALS
Postmaster send address changes to:

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

THIRD SERIES, VOLUME 109, NUMBER 4
PARTS A AND B

CONTENTS

APRIL 2024

The Table of Contents is a total listing of Parts A and B.
Part A consists of pages 040101–042827, and Part B pages 043101–049906(E).

PART A

Perspectives

Multipartite continuous-variable optical quantum entanglement: Generation and application *(25 pages)* 040101
Warit Asavanant and Akira Furusawa

LETTERS

Fundamental concepts

Transmission of vortex electrons through a solenoid *(5 pages)* L040201
G. K. Sizykh, A. D. Chaikovskaia, D. V. Grosman, I. I. Pavlov, and D. V. Karlovets

Causal links between operationally independent events in quantum theory *(5 pages)* L040202
Shubhayan Sarkar

Quantum information science

Quantifying nonstabilizerness through entanglement spectrum flatness *(6 pages)* L040401
Emanuele Tirrito, Poetri Sonya Tarabunga, Gugliemo Lami, Titas Chanda, Lorenzo Leone, Salvatore F. E. Oliviero, Marcello Dalmonte, Mario Collura, and Alioscia Hamma

Submicrosecond high-fidelity dispersive readout of a spin qubit with squeezed photons *(6 pages)* L040402
Chon-Fai Kam and Xuedong Hu

Atomic and molecular structure and dynamics; high-precision experiments

Many-body theory calculations of positron binding to halogenated hydrocarbons *(6 pages)* L040801
J. P. Cassidy, J. Hofierka, B. Cunningham, C. M. Rawlins, C. H. Patterson, and D. G. Green

Anomalous noise spectra in a spin-exchange-relaxation-free alkali-metal vapor *(5 pages)* L040802
K. Mouloudakis, J. Kong, A. Sierant, E. Arkin, M. Hernández Ruiz, R. Jiménez-Martínez, and M. W. Mitchell

Light-induced processes in atomic-scale systems

Nonlinear interference and electron dynamics: Probing photoelectron momentum distributions in strong-field ionization *(6 pages)* L041101
Danish Furekh Dar and Stephan Fritzsche

(Continued)

2469-9926(202404)109:4:A;1-T

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).