PHYSICAL REVIEW A **THIRD SERIES, VOLUME 108, NUMBER 2** **AUGUST 2023**

Vacuum-induced quantum-beat-enabled photon antibunching *(15 pages)* 023727
Zhiming Wu, Jiahua Li, and Ying Wu

Generation of two-giant-atom entanglement in waveguide-QED systems *(13 pages)* 023728
Xian-Li Yin and Jie-Qiao Liao

Experimental reconstruction of Wigner phase-space current *(8 pages)* 023729
Yi-Ru Chen, Hsien-Yi Hsieh, Jingyu Ning, Hsun-Chung Wu, Hua Li Chen, You-Lin Chuang, Popo Yang, Ole Steuernagel, Chien-Ming Wu, and Ray-Kuang Lee

Interferometric measurement of the quadrature coherence scale using two replicas of a quantum optical state *(11 pages)* 023730
Célia Griffet, Matthieu Arnhem, Stephan De Bièvre, and Nicolas J. Cerf

ERRATA

Erratum: Vibronic coherence and quantum beats of O_2^+ based on laser pump-probe dissociation dynamics [Phys. Rev. A **104**, 013101 (2021)] *(1 page)* . . . . . 029901(E)
Shan Xue, Shengjun Yue, Hongchuan Du, Bitao Hu, and Anh-Thu Le

Erratum: Local approximation for perfect discrimination of quantum states [Phys. Rev. A **107**, 012401 (2023)] *(1 page)* . . . . . 029902(E)
Scott M. Cohen

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 108, NUMBER 2** **AUGUST 2023**

Controlling purity, indistinguishability, and quantum yield of an incoherently pumped two-level system by spectral filters *(12 pages)* 023711
Ivan V. Panyukov, Vladislav Yu. Shishkov, and Evgeny S. Andrianov

Tight information bounds for spontaneous-emission-lifetime resolution of quantum sources with varied spectral purity *(9 pages)* 023712
Cheyenne S. Mitchell and Mikael P. Backlund

Complete spectral characterization of biphotons by simultaneously determining their frequency sum and difference in a single quantum interferometer *(10 pages)* 023713
Baihong Li (李百宏), Changhua Chen (陈昌花), Xiao Xiang (项晓), Runai Quan (权润爱), Ruifang Dong (董瑞芳), Shougang Zhang (张首刚), Xiangying Hao (郝向英), and Rui-Bo Jin (金锐博)

Metrics and properties of optimal gauges in multimode cavity QED *(7 pages)* 023714
Geva Arwas, Vladimir E. Manucharyan, and Cristiano Ciuti

Resonant parametric photon generation in waveguide-coupled quantum emitter arrays *(9 pages)* 023715
Egor S. Vyatkin, Alexander V. Poshakinskiy, and Alexander N. Poddubny

Tunable nonreciprocal photon correlations induced by directional quantum squeezing *(11 pages)* 023716
Cai-Peng Shen, Jia-Qiang Chen, Xue-Feng Pan, Yu-Meng Ren, Xing-Liang Dong, Xin-Lei Hei, Yi-Fan Qiao, and Peng-Bo Li

Enhancing the purity of single photons in parametric down-conversion through simultaneous pump-beam and crystal-domain engineering *(8 pages)* 023718
Baghdasar Baghdasaryan, Fabian Steinlechner, and Stephan Fritzsche

Two-dimensional magneto-optical trap of dysprosium atoms as a compact source for efficient loading of a narrow-line three-dimensional magneto-optical trap *(13 pages)* 023719
Shuwei Jin, Jianshun Gao, Karthik Chandrashekara, Christian Gölzhäuser, Joschka Schöner, and Lauriane Chomaz

Solving and completing the Rabi-Stark model in the ultrastrong-coupling regime *(10 pages)* 023720
Gen Li, Hao Zhu, and Guo-Feng Zhang

Classical phase synchronization in dissipative non-Hermitian coupled systems *(11 pages)* 023721
Jonas Rohn, Kai Phillip Schmidt, and Claudiu Genes

Spin squeezing with arbitrary quadratic collective-spin interactions *(6 pages)* 023722
Zhiyao Hu, Qixian Li, Xuanchen Zhang, Long-Gang Huang, He-bin Zhang, and Yong-Chun Liu

Hopping-induced quantum phase transition in the Ising-Rabi lattice model *(12 pages)* 023723
Gaoke Hu, Zhiguo Lü, Haiqing Lin, and Hang Zheng

Single-photon optical bistability in a small nonlinear cavity *(8 pages)* 023724
Igor E. Protsenko and Alexander V. Uskov

Heisenberg-Langevin approach to driven superradiance *(9 pages)* 023725
Ori Somech, Yoav Shimshi, and Ephraim Shahmoon

Sub-μm axial precision depth imaging with entangled two-color Hong-Ou-Mandel microscopy *(7 pages)* 023726
Cyril Torre, Alex McMillan, Jorge Monroy-Ruz, and Jonathan C. F. Matthews

(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 108, NUMBER 2 AUGUST 2023

Tunable Aharonov-Bohm cages through anti-$\mathcal{PT}$-symmetric imaginary couplings *(10 pages)* 023518
S. M. Zhang, H. S. Xu, and L. Jin

Optical rogue-wave patterns in coupled defocusing systems *(8 pages)* 023519
Yan-Hong Qin, Liming Ling, and Li-Chen Zhao

Non-Rayleigh signal of interacting quantum particles *(6 pages)* 023520
M. F. V. Oliveira, F. A. B. F. de Moura, A. M. C. Souza, M. L. Lyra, and G. M. A. Almeida

Unconventional gap dependence of high-order harmonic generation in the extremely strong light-matter-coupling regime *(11 pages)* 023521
Akira Kofuji and Robert Peters

Ability of loss to increase the spatial coherence of guided waves *(6 pages)* 023522
P. A. Brandão

Stable magnetic levitation of soft ferromagnets for macroscopic quantum mechanics *(12 pages)* 023523
Maria Fuwa

Laser energy deposition with ring-Airy beams beyond kilometer range in the atmosphere *(8 pages)* 023524
Long Zou, Chen Sun, Jin Yu, and Arnaud Couairon

Quantum optics

Degenerate photons from a cryogenic spontaneous parametric down-conversion source *(7 pages)* 023701
Nina Amelie Lange, Timon Schapeler, Jan Philipp Höpker, Maximilian Protte, and Tim J. Bartley

Photon-induced dropletlike bound states in a one-dimensional qubit array *(14 pages)* 023702
J. Talukdar and D. Blume

Finite Su-Schrieffer-Heeger chains coupled to a two-level emitter: Hybridization of edge and emitter states *(14 pages)* 023703
C. I. Kvande, D. B. Hill, and D. Blume

Coherent-cluster-state generation in networks of degenerate optical parametric oscillators *(12 pages)* 023704
Zheng-Yang Zhou, Clemens Gneiting, J. Q. You, and Franco Nori

Distance-dependent emission spectrum from two qubits in a strong-coupling regime *(14 pages)* 023706
Rongzhen Hu, JunYan Luo, and Yiying Yan

Bound state of distant photons in waveguide quantum electrodynamics *(7 pages)* 023707
Alexander V. Poshakinskiy and Alexander N. Poddubny

Interplay between disorder, local relaxation, and collective behavior for an ensemble of emitters outside versus inside a cavity *(16 pages)* 023708
Zeyu Zhou, Hsing-Ta Chen, Joseph E. Subotnik, and Abraham Nitzan

Multiple measurements on an uncollapsed entangled two-photon state *(15 pages)* 023709
Dalibor Javůrek

Exceptional-point-enhanced coupled microcavities for ultrasensitive particle sensing *(5 pages)* 023710
M. Khanbekyan

(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 108, NUMBER 2** **AUGUST 2023**

Mechanical cooling in the bistable regime of a dissipative optomechanical cavity with a Kerr medium *(10 pages)* 023503
Ye Liu, Yang Liu, Chang-Sheng Hu, Yun-Kun Jiang, Huaizhi Wu, and Yong Li

Tractor beams with optimal pulling force using structured waves *(7 pages)* 023504
Michael Horodynski, Tobias Reiter, Matthias Kühmayer, and Stefan Rotter

Bandwidth and conversion-efficiency analysis of Kerr soliton combs in dual-pumped resonators with anomalous dispersion *(10 pages)* 023505
E. Gasmi, H. Peng, C. Koos, and W. Reichel

Area theorem in a ring laser cavity *(13 pages)* 023506
Anton Pakhomov, Mikhail Arkhipov, Nikolay Rosanov, and Rostislav Arkhipov

Interface entangled plasmon-plasmariton modes *(20 pages)* 023507
Jesper Jung and Ole Keller

Exploring anomalous light dynamics around higher-order conjugate exceptional points with local nonlinearity *(12 pages)* 023508
Sibnath Dey and Somnath Ghosh

Quantized optical vortex-array eigenstates in a rotating frame *(6 pages)* 023509
Mark T. Lusk, Andrew A. Voitiv, and Mark E. Siemens

Modulational instability in randomly dispersion-managed optical fiber links *(5 pages)* 023510
Andrea Armaroli, Guillaume Dujardin, Alexandre Kudlinski, Arnaud Mussot, Stephan De Bièvre, and Matteo Conforti

Defect in photonic time crystals *(6 pages)* 023511
Snehashis Sadhukhan and Somnath Ghosh

Impact of coherent coupling of plasmonic dipole modes in far-field scattering of templated metallic nanoislands *(13 pages)* 023512
Seyed M. Sadeghi and Dustin T. Roberts

Reconfigurable valley topological QED platform for qubit operation *(10 pages)* 023513
Junhua Dong, Bingsuo Zou, and Yongyou Zhang

Controlling the symmetry of the photonic spin Hall effect by an optical vortex pair *(10 pages)* 023514
Weiming Zhen (甄蔚铭), Xi-Lin Wang (汪喜林), Jianping Ding (丁剑平), and Hui-Tian Wang (王慧田)

Optimal generation and systematic analysis of tunable terahertz emissions from single-layer graphene using two-color laser pulses with different durations *(12 pages)* 023515
Zhong Guan, Zhiming Yin, Jiahao You, Bincheng Wang, Xiaoyong Li, Guo-Li Wang, Xiao-Xin Zhou, and Cheng Jin

Nonequilibrium thermodynamics and power generation in open quantum optomechanical systems *(10 pages)* 023516
Paulo J. Paulino, Igor Lesanovsky, and Federico Carollo

Controllable optical-sideband generation and synchronization in a mechanical gain-loss optomechanical system *(11 pages)* 023517
Souvik Mondal and Kapil Debnath

(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 108, NUMBER 2** **AUGUST 2023**

Controlled flow of excitations in a ring-shaped network of Rydberg atoms *(10 pages)* 023305
Francesco Perciavalle, Davide Rossini, Tobias Haug, Oliver Morsch, and Luigi Amico

Monolithic atom interferometry *(8 pages)* 023306
Johannes Fiedler, Kim Lefmann, Wolf von Klitzing, and Bodil Holst

Momentum-resolved Floquet-engineered pair and single-particle filter in the Fermi-Hubbard model *(10 pages)* . . . 023307
Friedrich Hübner, Christoph Dauer, Sebastian Eggert, Corinna Kollath, and Ameneh Sheikhan

Patterns, spin-spin correlations, and competing instabilities in driven quasi-two-dimensional spin-1 Bose-Einstein condensates *(11 pages)* 023308
Sandra M. Jose, Komal Sah, and Rejish Nath

Ab initio calculation of the spectrum of Feshbach resonances in NaLi + Na collisions *(19 pages)* 023309
Tijs Karman, Marcin Gronowski, Michał Tomza, Juliana J. Park, Hyungmok Son, Yu-Kun Lu, Alan O. Jamison, and Wolfgang Ketterle

Vortex nucleation processes in rotating lattices of Bose-Einstein condensates ruled by the on-site phases *(13 pages)* 023310
D. M. Jezek and P. Capuzzi

Impurities in quasi-one-dimensional droplets of binary Bose mixtures *(10 pages)* 023311
Sudip Sinha, Sayak Biswas, L. Santos, and S. Sinha

Kibble-Zurek scaling in one-dimensional localization transitions *(11 pages)* 023312
Xuan Bu, Liang-Jun Zhai, and Shuai Yin

Superfluid-droplet crossover in a binary boson mixture on a ring: Exact diagonalization solutions for few-particle systems in one dimension *(13 pages)* 023313
L. Chergui, J. Bengtsson, J. Bjerlin, P. Stürmer, G. M. Kavoulakis, and S. M. Reimann

Quantum scattering states in a nonlinear coherent medium *(20 pages)* 023314
Allison Brattley, Hongyi Huang, and Kunal K. Das

Variations of the Kibble-Zurek scaling exponents of trapped Bose gases *(8 pages)* 023315
Tenzin Rabga, Yangheon Lee, Dalmin Bae, Myeonghyeon Kim, and Y. Shin

Measurement of non-Abelian gauge fields using multiloop amplification *(10 pages)* 023316
Qing-Xian Lv, Hong-Zhi Liu, Yan-Xiong Du, Lin-Qing Chen, Meng Wang, Jia-Hao Liang, Zhao-Xin Fu, Zi-Yuan Chen, Hui Yan, and Shi-Liang Zhu

Bosonic orbital Su-Schrieffer-Heeger model in a lattice of rings *(11 pages)* 023317
Eulàlia Nicolau, Anselmo M. Marques, Jordi Mompart, Ricardo G. Dias, and Verònica Ahufinger

Photonics, nonlinear optics, and optomechanics

Entangling ferrimagnetic magnons with an atomic ensemble via optomagnomechanics *(6 pages)* 023501
Zhi-Yuan Fan, Hang Qian, Xuan Zuo, and Jie Li

Exponentially enhanced gravitationally induced entanglement between quantum systems with a two-phonon drive *(10 pages)* 023502
Dianzhen Cui and X. X. Yi

(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 108, NUMBER 2** **AUGUST 2023**

Determination of ionic polarizability by nonsequential double ionization *(7 pages)* 023111
MingZheng Wei, HuiPeng Kang, YanLan Wang, Wei Quan, Jing Chen, ChuanXi Duan, and XiaoJun Liu

Energy- and angle-resolved spectral phases via semirelativistic *ab initio* RABBITT simulations *(7 pages)* 023112
Luke Roantree, Jack Wragg, Hugo van der Hart, and Andrew Brown

Effect of spin-orbit coupling in laser-induced ionization of atoms *(12 pages)* 023113
Yibo Hu, Kunlong Liu, Klaus Renziehausen, Yidian Tian, Qingbin Zhang, Min Li, Yueming Zhou, and Peixiang Lu

Visualizing vibrationally resolved attosecond time delay in resonance-enhanced multiphoton ionization of NO molecules *(8 pages)* 023114
Xing Li, Yong Liu, Dongdong Zhang, Lanhai He, Sizuo Luo, Chuan-Cun Shu, and Dajun Ding

Zr^{3+} ion as a prospective terahertz atomic clock *(10 pages)* 023115
Jyoti, A. Chakraborty, Yan-mei Yu, Jingbiao Chen, Bindiya Arora, and B. K. Sahoo

Optical control of collective states in one-dimensional ordered atomic chains beyond the linear regime *(12 pages)* 023116
N. Fayard, I. Ferrier-Barbut, A. Browaeys, and J.-J. Greffet

Angular distribution of photoelectrons generated in atomic ionization by twisted radiation *(13 pages)* 023117
Maksim D. Kiselev, Elena V. Gryzlova, and Alexei N. Grum-Grzhimailo

Multiscale simulation of high-order harmonic generation: From microscopic to macroscopic *(9 pages)* 023118
Xiao-Min Tong

Field-induced time modulation and bunching effects in photodetachment microscopy *(15 pages)* 023119
B. C. Yang and M. L. Du

Nanophotonic cavity cooling of a single atom *(14 pages)* 023120
Chenwei Lv, Ming Zhu, Sambit Banerjee, and Chen-Lung Hung

Theoretical investigation of electric-field noise emanating from vibrational adatoms *(12 pages)* 023121
Jiarui Zeng, Xiao-Tong Yan, Yao Yao, Yu-Jun Zhao, Liang Chen, and Mang Feng

Recapture probability for antitrapped Rydberg states in optical tweezers *(11 pages)* 023122
R. J. P. T. de Keijzer, O. Tse, and S. J. J. M. F. Kokkelmans

Coherence from multiorbital tunneling ionization of molecules *(10 pages)* 023123
C. H. Yuen and C. D. Lin

Ultracold systems and matter waves

Dynamics of correlation spreading in low-dimensional transverse-field Ising models *(20 pages)* 023301
Ryui Kaneko and Ippei Danshita

Supersolid stacks in antidipolar Bose-Einstein condensates *(13 pages)* 023302
K. Mukherjee, M. Nilsson Tengstrand, T. Arnone Cardinale, and S. M. Reimann

Quantized reflection of a soliton by a vibrating atomic mirror *(9 pages)* 023303
Wei Xiong, Peng Gao, Zhan-Ying Yang, and Wen-Li Yang

BCS-BCS crossover between atomic and molecular superfluids in a Bose-Fermi mixture *(13 pages)* 023304
Yixin Guo (郭一昕), Hiroyuki Tajima (田島裕之), Tetsuo Hatsuda (初田哲男), and Haozhao Liang (梁豪兆)

(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 108, NUMBER 2 AUGUST 2023

Electronic excited states from a variance-based contracted quantum eigensolver *(8 pages)* 022814
Yuchen Wang and David A. Mazziotti

Microwave spectroscopy of low-l singlet strontium Rydberg states at intermediate n, $50 \lesssim n \lesssim 70$ *(8 pages)* 022815
R. A. Brienza, Y. Lu, C. Wang, S. K. Kanungo, T. C. Killian, F. B. Dunning, J. Burgdörfer, and S. Yoshida

Vibronic fine structure in the nitrogen 1s photoelectron spectra from Franck-Condon simulation. II. Indoles *(14 pages)* 022816
Minrui Wei, Lu Zhang, Guangjun Tian, and Weijie Hua

PART B

Light-induced processes in atomic-scale systems

Generation of a quasi-chirp-free short isolated attosecond pulse from high-order harmonics by optimized multicolor laser fields *(9 pages)* 023101
Jin-Xu Du, Guo-Li Wang, Xiao-Yong Li, Zhi-Hong Jiao, Song-Feng Zhao, and Xiao-Xin Zhou

Multiphoton double ionization of helium by ultrashort XUV pulses: Probing the role of electron correlations *(14 pages)* 023102
Wei-Chao Jiang, Manuel Ederer, Stefan Donsa, Johannes Feist, Iva Březinová, Christoph Lemell, and Joachim Burgdörfer

Simulating fluorine K-edge resonant inelastic x-ray scattering of sulfur hexafluoride and the effect of dissociative dynamics *(18 pages)* 023103
Ambar Banerjee, Vinícius Vaz da Cruz, Victor Ekholm, Conny Såthe, Jan-Erik Rubensson, Nina Ignatova, Faris Gel'mukhanov, and Michael Odelius

Laser-field-strength dependence of solid high-order harmonic generation from doped systems *(12 pages)* 023105
Tian-Jiao Shao

Signatures of the phase structure in multiphoton ionization of aligned N_2 molecules *(9 pages)* 023106
Zhenning Guo, Peipei Ge, Yankun Dou, Mingming Liu, Xiaoxiao Long, Jiguo Wang, Qihuang Gong, and Yunquan Liu

Efficient algorithms to solve atom reconfiguration problems. I. Redistribution-reconfiguration algorithm *(14 pages)* 023107
Barry Cimring, Remy El Sabeh, Marc Bacvanski, Stephanie Maaz, Izzat El Hajj, Naomi Nishimura, Amer E. Mouawad, and Alexandre Cooper

Efficient algorithms to solve atom reconfiguration problems. II. Assignment-rerouting-ordering algorithm *(24 pages)* 023108
Remy El Sabeh, Jessica Bohm, Zhiqian Ding, Stephanie Maaz, Naomi Nishimura, Izzat El Hajj, Amer E. Mouawad, and Alexandre Cooper

Universality in odd-even harmonic generation and application in terahertz waveform sampling *(10 pages)* 023109
Doan-An Trieu, Ngoc-Loan Phan, Quan-Hao Truong, Hien T. Nguyen, Cam-Tu Le, DinhDuy Vu, and Van-Hoang Le

Direct visualization of the transverse photoemission position within molecules via strong-field photoelectron holography *(11 pages)* 023110
Jia Tan, Qinghua Ke, Dian Wang, Xiang Hao, Jialing Xie, Guo Yu, Xue Xu, and Quanying Wu

(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 108, NUMBER 2 AUGUST 2023

Leakage in restless quantum gate calibration *(12 pages)* 022614
Conrad J. Haupt and Daniel J. Egger

Quantum channel decomposition with preselection and postselection *(10 pages)* 022615
Ryo Nagai, Shu Kanno, Yuki Sato, and Naoki Yamamoto

Atomic and molecular structure and dynamics; high-precision experiments

Effect of electron correlation on trielectronic-recombination rate coefficients for Be-like argon *(13 pages)* 022801
Chun Yu Zhang, Si Jie Wu, Kai Wang, Ran Si, Ke Yao, Zhong Kui Huang, Wei Qiang Wen, Xin Wen Ma, Chong Yang Chen, and N. R. Badnell

Calculation of isotope shifts and King-plot nonlinearities in Ca^+ *(12 pages)* 022802
A. V. Viatkina, V. A. Yerokhin, and A. Surzhykov

Doubly differential ionization in proton-helium collisions at intermediate energies: Energy distribution of emitted electrons as a function of scattered-projectile angle *(9 pages)* 022803
K. H. Spicer, C. T. Plowman, M. Schulz, and A. S. Kadyrov

Quantum defects of nF_J levels of Cs Rydberg atoms *(9 pages)* 022804
Jingxu Bai, Rong Song, Jiabei Fan, Yuechun Jiao, Jianming Zhao, Suotang Jia, and Georg Raithel

Reducing Rydberg-state dc polarizability by microwave dressing *(16 pages)* 022805
J. C. Bohorquez, R. Chinnarasu, J. Isaacs, D. Booth, M. Beck, R. McDermott, and M. Saffman

Exploring synchrony and chaos of parahydrogen-pumped two-compartment radio-frequency amplification by stimulated emission of radiation *(14 pages)* 022806
Lars Lohmann, Sören Lehmkuhl, Simon Fleischer, Matthew S. Rosen, Eduard Y. Chekmenev, Thomas Theis, Alina Adams, and Stephan Appelt

Limits to the observation of Unruh radiation via first-quantized hydrogenlike atoms *(9 pages)* 022807
Riccardo Falcone and Claudio Conti

Reevaluation of Stark-induced transition polarizabilities in cesium *(8 pages)* 022808
H. B. Tran Tan, D. Xiao, and A. Derevianko

Vacuum torque, propulsive forces, and anomalous tangential forces: Effects of nonreciprocal media out of thermal equilibrium *(15 pages)* 022809
Kimball A. Milton, Xin Guo, Gerard Kennedy, Nima Pourtolami, and Dylan M. DelCol

Time evolution of the Auger cascade for Kr $3d^9 5p$ *(6 pages)* 022810
Sigitas Kučas and Valdas Jonauskas

Ionization and dissociation energies of HD and dipole-induced g/u-symmetry breaking *(12 pages)* 022811
N. Hölsch, I. Doran, F. Merkt, J. Hussels, C.-F. Cheng, E. J. Salumbides, H. L. Bethlem, K. S. E. Eikema, M. Beyer, W. Ubachs, and Ch. Jungen

Information-theoretical analysis of Dirac and nonrelativistic quantum oscillators *(13 pages)* 022812
I. López-García, A. J. Macías, S. López-Rosa, and J. C. Angulo

Impact of spatially periodic inhomogeneities on the photon-induced pair creation *(15 pages)* 022813
M. Jiang, R. Grobe, and Q. Su

(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 108, NUMBER 2** **AUGUST 2023**

Variational quantum algorithm for generalized eigenvalue problems and its application to the finite-element method *(16 pages)* 022429
Yuki Sato, Hiroshi C. Watanabe, Rudy Raymond, Ruho Kondo, Kaito Wada, Katsuhiro Endo, Michihiko Sugawara, and Naoki Yamamoto

Quantum technologies

Optimal control with a multidimensional quantum invariant *(9 pages)* 022601
Modesto Orozco-Ruiz, Selwyn Simsek, Sahra A. Kulmiya, Samuel J. Hile, Winfried K. Hensinger, and Florian Mintert

Principles of quantum functional testing *(13 pages)* 022602
Nadia Milazzo, Olivier Giraud, Giovanni Gramegna, and Daniel Braun

Characterization, synthesis, and optimization of quantum circuits over multiple-control Z-rotation gates: A systematic study *(13 pages)* 022603
Shihao Zhang, Junda Wu, and Lvzhou Li

Fragility of gate-error metrics in simulation models of flux-tunable transmon quantum computers *(25 pages)* 022604
H. Lagemann, D. Willsch, M. Willsch, F. Jin, H. De Raedt, and K. Michielsen

Experimental demonstration of five-intensity measurement-device-independent quantum key distribution over 442 km *(7 pages)* 022605
Jing-Yang Liu, Xiao Ma, Hua-Jian Ding, Chun-Hui Zhang, Xing-Yu Zhou, and Qin Wang

High-fidelity control of a nitrogen-vacancy-center spin qubit at room temperature using the sinusoidally modulated, always rotating, and tailored protocol *(7 pages)* 022606
Hyma H. Vallabhapurapu, Ingvild Hansen, Chris Adambukulam, Rainer Stöhr, Andrej Denisenko, Chih Hwan Yang, and Arne Laucht

Hybrid noise protection of logical qubits for universal quantum computation *(6 pages)* 022607
Zhao-Ming Wang, Feng-Hua Ren, Mark S. Byrd, and Lian-Ao Wu

Non-Markovian enhanced temperature sensing in a dipolar Bose-Einstein condensate *(8 pages)* 022608
Lan Xu, Ji-Bing Yuan, Shi-Qing Tang, Wei Wu, Qing-Shou Tan, and Le-Man Kuang

Protocol for suppression of noise from stimulated multiphoton emissions in concatenated entanglement swapping links and quantum repeaters *(13 pages)* 022609
Yousef K. Chahine, Ian R. Nemitz, and John D. Lekki

Optimizing quantum algorithms on bipotent architectures *(17 pages)* 022610
Yanjun Ji, Kathrin F. Koenig, and Ilia Polian

Improving the speed of variational quantum algorithms for quantum error correction *(11 pages)* 022611
Fabio Zoratti, Giacomo De Palma, Bobak Kiani, Quynh T. Nguyen, Milad Marvian, Seth Lloyd, and Vittorio Giovannetti

Critical behavior of the Ising model by preparing the thermal state on a quantum computer *(12 pages)* 022612
Xiaoyang Wang, Xu Feng, Tobias Hartung, Karl Jansen, and Paolo Stornati

Orbital-angular-momentum-enhanced phase estimation using non-Gaussian states with photon loss *(12 pages)* . . . 022613
Yong-Jian Chen, Jin-Wei Gao, Jin-Xuan Han, Zhong-Hui Yuan, Ruo-Qi Li, Yong-Yuan Jiang, and Jie Song

(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 108, NUMBER 2** **AUGUST 2023**

Topologically protected Grover's oracle for the partition problem *(11 pages)* 022412
Nikolai A. Sinitsyn and Bin Yan

Optimal time for sensing in open quantum systems *(10 pages)* 022413
Zain H. Saleem, Anil Shaji, and Stephen K. Gray

Trace distance between fermionic Gaussian states from a truncation method *(18 pages)* 022414
Jiaju Zhang and M. A. Rajabpour

Exact entanglement dynamics of two spins in finite baths *(11 pages)* 022415
Mei Yu, Otfried Gühne, and Stefan Nimmrichter

Shallow quantum circuits for efficient preparation of Slater determinants and correlated states on a quantum computer *(10 pages)* 022416
Chong Hian Chee, Daniel Leykam, Adrian M. Mak, and Dimitris G. Angelakis

Optimization of a probabilistic quantum search algorithm with *a priori* information *(16 pages)* 022417
Yutong Huang and Shengshi Pang

Minimization of the estimation error for entanglement distribution networks with arbitrary noise *(15 pages)* 022418
Liangzhong Ruan

Entangling optical and mechanical cavity modes in an optomechanical crystal nanobeam *(6 pages)* 022419
Qizhi Cai, Boyu Fan, Yunru Fan, Guangwei Deng, You Wang, Haizhi Song, Guangcan Guo, and Qiang Zhou

Protective measurements of photon polarization using a temporal pointer *(8 pages)* 022420
Meng-Wei Chen, Owen Young, M. Schlosshauer, and M. Beck

Accessing continuous-variable entanglement witnesses with multimode spin observables *(15 pages)* 022421
Célia Griffet, Tobias Haas, and Nicolas J. Cerf

Near-term quantum algorithm for computing molecular and materials properties based on recursive variational series methods *(11 pages)* 022422
Phillip W. K. Jensen, Peter D. Johnson, and Alexander A. Kunitsa

Robustness of controlled Hamiltonian approaches to unitary quantum gates *(10 pages)* 022423
Eoin Carolan, Barış Çakmak, and Steve Campbell

Multispin Clifford codes for angular momentum errors in spin systems *(12 pages)* 022424
Sivaprasad Omanakuttan and Jonathan A. Gross

Photon-varied quantum states: Unified characterization *(11 pages)* 022425
Stefano Guerrini, Moe Z. Win, and Andrea Conti

Multipartite entanglement and quantum error identification in *D*-dimensional cluster states *(11 pages)* 022426
Sowrabh Sudevan, Daniel Azses, Emanuele G. Dalla Torre, Eran Sela, and Sourin Das

Entanglement verification with deep semisupervised machine learning *(13 pages)* 022427
Lifeng Zhang, Zhihua Chen, and Shao-Ming Fei

Spin-squeezed Gottesman-Kitaev-Preskill codes for quantum error correction in atomic ensembles *(22 pages)* . . . 022428
Sivaprasad Omanakuttan and T. J. Volkoff

(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 108, NUMBER 2** **AUGUST 2023**

Exceptional point in self-consistent Markovian master equations *(8 pages)* 022219
Dong Xie and Chunling Xu

Correspondence between entangled states and entangled bases under local transformations *(9 pages)* 022220
Florian Pimpel, Martin J. Renner, and Armin Tavakoli

Superposition-state generation of nonorthogonal wavelike and particlelike states without ancillary qubits *(6 pages)* 022221
Jian Li, Xiao-Xiao Chen, Zhe Meng, Jia-Zhi Yang, Qing-Yuan Wu, An-Ning Zhang, and Qing Zhao

Quantifying quantum causal influences *(9 pages)* 022222
Lucas Hutter, Rafael Chaves, Ranieri Vieira Nery, George Moreno, and Daniel Jost Brod

Single- and two-photon wave-particle superpositions: Theory and experiment *(10 pages)* 022223
Qing-Feng Xue, Xu-Cai Zhuang, Nguyen Ba An, De-Yang Duan, Ren-De Ma, Wei-Wei Pan, Qin-Qin Wang, Yun-Jie Xia, and Zhong-Xiao Man

Quantum information science

Performance enhancement of surface codes via recursive minimum-weight perfect-match decoding *(10 pages)* . . . 022401
Antonio deMarti iOlius, Josu Etxezarreta Martinez, Patricio Fuentes, and Pedro M. Crespo

Individual addressing of ion qubits with counterpropagating optical frequency combs *(8 pages)* 022402
Evgeny Anikin, Lianna A. Akopyan, Mikhail Popov, Yelnury Suleimen, Olga Lakhmanskaya, and Kirill Lakhmanskiy

Hybrid quantum error correction in qubit architectures *(33 pages)* 022403
Lasse Bjørn Kristensen, Morten Kjaergaard, Christian Kraglund Andersen, and Nikolaj Thomas Zinner

Long-distance continuous-variable quantum key distribution with feasible physical noiseless linear amplifiers *(12 pages)* 022404
Michele N. Notarnicola and Stefano Olivares

Distinguishability-based genuine nonlocality with genuine multipartite entanglement *(14 pages)* 022405
Zong-Xing Xiong, Mao-Sheng Li, Zhu-Jun Zheng, and Lvzhou Li

Qumode fusion for continuous-variable cluster states *(8 pages)* 022406
Jun Xin

Flat-band quantum communication induced by disorder *(7 pages)* 022407
G. M. A. Almeida, R. F. Dutra, A. M. C. Souza, M. L. Lyra, and F. A. B. F. de Moura

Robustness of random-control quantum-state tomography *(10 pages)* 022408
Jingcheng Wang, Shaoliang Zhang, Jianming Cai, Zhenyu Liao, Christian Arenz, and Ralf Betzholz

Operation fidelity explored by numerical range of Kraus operators *(14 pages)* 022409
Igor Chełstowski, Grzegorz Rajchel-Mieldzioć, and Karol Życzkowski

Exclusion principle for nonlocal advantage of quantum coherence *(8 pages)* 022410
Priya Ghosh, Mahasweta Pandit, Chirag Srivastava, and Ujjwal Sen

Provably superior accuracy in quantum stochastic modeling *(17 pages)* 022411
Chengran Yang, Andrew J. P. Garner, Feiyang Liu, Nora Tischler, Jayne Thompson, Man-Hong Yung, Mile Gu, and Oscar Dahlsten

(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 108, NUMBER 2** **AUGUST 2023**

Bound states without potentials: Localization at singularities *(10 pages)* 022202
Eric He and R. Ganesh

Boosting entanglement growth of many-body localization by superpositions of disorder *(8 pages)* 022203
Jhen-Dong Lin and Yueh-Nan Chen

Path distance of a quantum unitary evolution *(8 pages)* 022204
Jie-Hui Huang, Shan-Shan Dong, Guang-Long Chen, Nan-Run Zhou, Fu-Yao Liu, and Li-Guo Qin

Finite-temperature quantum condensations in the space of states: A different perspective on quantum annealing *(10 pages)* 022205
Massimo Ostilli and Carlo Presilla

Formation of exceptional points in pseudo-Hermitian systems *(14 pages)* 022206
Grigory A. Starkov, Mikhail V. Fistul, and Ilya M. Eremin

Aspects of the phenomenology of interference that are genuinely nonclassical *(11 pages)* 022207
Lorenzo Catani, Matthew Leifer, Giovanni Scala, David Schmid, and Robert W. Spekkens

Measuring energy by measuring any other observable *(17 pages)* 022208
Dominik Šafránek and Dario Rosa

Gauge quantum thermodynamics of time-local non-Markovian evolutions *(16 pages)* 022209
Fernando Nicacio and Raphael N. P. Maia

Dynamics with autoregressive neural quantum states: Application to critical quench dynamics *(11 pages)* 022210
Kaelan Donatella, Zakari Denis, Alexandre Le Boité, and Cristiano Ciuti

Dynamics-based quantumness certification of continuous variables using time-independent Hamiltonians with one degree of freedom *(19 pages)* 022211
Lin Htoo Zaw and Valerio Scarani

Gauge dependence of the Aharonov-Bohm phase in a quantum electrodynamics framework *(7 pages)* 022212
A. Hayashi

Parametric hypersensitivity in many-body bath-mediated transport: The quantum Rabi model *(11 pages)* 022213
Chern Chuang, Arie Kapulkin, Arjendu K. Pattanayak, and Paul Brumer

Relaxed Bell inequality as a trade-off relation between measurement dependence and hiddenness *(9 pages)* 022214
Gen Kimura, Yugo Susuki, and Kei Morisue

Quantum parameter estimation of non-Hermitian systems with optimal measurements *(12 pages)* 022215
Xinglei Yu and Chengjie Zhang

Symmetries and synchronization blockade *(9 pages)* 022216
Parvinder Solanki, Faraz Mohd Mehdi, Michal Hajdušek, and Sai Vinjanampathy

Vacuum radiation versus shortcuts to adiabaticity *(6 pages)* 022217
Ricardo R. Ancheyta

Influence of spin on tunneling times in the super-relativistic regime *(8 pages)* 022218
Said Lantigua and Jonas Maziero

(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 108, NUMBER 2
PARTS A AND B

CONTENTS

AUGUST 2023

The Table of Contents is a total listing of Parts A and B.
Part A consists of pages L020401–022816, and Part B pages 023101–029902(E).

PART A

LETTERS

Quantum information science

Recurrent generation of maximally entangled single-particle states via quantum walks on cyclic graphs *(6 pages)* L020401
Dinesh Kumar Panda and Colin Benjamin

Quantum technologies

Energy-time entanglement coexisting with fiber-optical communication in the telecom *C* band *(5 pages)* L020601
Yun-Ru Fan, Yue Luo, Zi-Chang Zhang, Yun-Bo Li, Sheng Liu, Dong Wang, De-Chao Zhang, Guang-Wei Deng, You Wang, Hai-Zhi Song, Zhen Wang, Li-Xing You, Chen-Zhi Yuan, Guang-Can Guo, and Qiang Zhou

Ultracold systems and matter waves

Engineering long-range molecular potentials by external drive *(5 pages)* L021301
Tanita Klas, Jana Bender, Patrick Mischke, Thomas Niederprüm, and Herwig Ott

Chemical reactions of ultracold alkaline-earth-metal diatomic molecules *(7 pages)* L021302
Hela Ladjimi and Michał Tomza

Polaritons for testing the universality of an impurity in a Bose-Einstein condensate *(7 pages)* L021303
A. Camacho-Guardian

Photonics, nonlinear optics, and optomechanics

Nonlinear interference challenging topological protection of chiral edge states *(6 pages)* L021501
Benjamin Michen and Jan Carl Budich

Solid-state ^{229}Th nuclear laser with two-photon pumping *(6 pages)* L021502
Haowei Xu, Hao Tang, Guoqing Wang, Changhao Li, Boning Li, Paola Cappellaro, and Ju Li

ARTICLES

Fundamental concepts

Information measures of quantum tunneling *(10 pages)* 022201
A. M. Zheltikov

(Continued)

2469-9926(202308)108:2: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).