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 106, NUMBER 4
PARTS A AND B

CONTENTS

OCTOBER 2022

The Table of Contents is a total listing of Parts A and B.
Part A consists of pages 040001–042615, and Part B pages 042801–049901(E).

PART A

EDITORIALS AND ANNOUNCEMENTS

Editorial: A Welcoming Home for Applied Science *(2 pages)* 040001
Jessica Thomas and Michael Thoennessen

LETTERS

Fundamental concepts

Certifying beyond quantumness of locally quantum no-signaling theories through a quantum-input Bell test *(6 pages)* L040201
Edwin Peter Lobo, Sahil Gopalkrishna Naik, Samrat Sen, Ram Krishna Patra, Manik Banik, and Mir Alimuddin

Fractionality and $\mathcal{PT}$ symmetry in a square lattice *(6 pages)* L040202
Mario I. Molina

Quantum information science

Performance evaluation of invariant-based inverse engineering by quantum speed limits *(5 pages)* L040401
Takuya Hatomura

Certification of incompatible measurements using quantum steering *(5 pages)* L040402
Shubhayan Sarkar, Debashis Saha, and Remigiusz Augusiak

Light-induced processes in atomic-scale systems

Number-resolved detection of dark ions in Coulomb crystals *(7 pages)* L041101
Fabian Schmid, Johannes Weitenberg, Jorge Moreno, Theodor W. Hänsch, Thomas Udem, and Akira Ozawa

Ultracold systems and matter waves

Collisional losses of ultracold molecules due to intermediate complex formation *(7 pages)* L041301
Krzysztof Jachymski, Marcin Gronowski, and Michał Tomza

Route toward classical frustration and band flattening via optical lattice distortion *(5 pages)* L041302
Pil Saugmann, José Vargas, Yann Kiefer, Max Hachman, Raphael Eichberger, Andreas Hemmerich, and Jonas Larson

Copyright 2022 by American Physical Society

(Continued)

2469-9926(202210)106:4:A;1-Z

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 106, NUMBER 4 OCTOBER 2022

Photonics, nonlinear optics, and optomechanics

Twisting an optomechanical cavity *(7 pages)* L041501
Daigo Oue and Mamoru Matsuo

Quantum optics

Dynamics of multiphoton scattering in a two-level mixer *(6 pages)* L041701
A. V. Vasenin, A. Yu. Dmitriev, S. V. Kadyrmetov, A. N. Bolgar, and O. V. Astafiev

ARTICLES

Fundamental concepts

Einstein-Podolsky-Rosen steering in symmetrical Gaussian states *(8 pages)* 042201
E. Benech, A. Auyuanet, and A. Lezama

Nonlinear three-state quantum walks *(6 pages)* 042202
P. R. N. Falcão, J. P. Mendonça, A. R. C. Buarque, W. S. Dias, G. M. A. Almeida, and M. L. Lyra

Simulating spin measurement with a finite heat bath model for the environment *(14 pages)* 042203
Thomas Dittrich, Oscar Rodríguez, and Carlos Viviescas

Dynamics of quantum Fisher information from a time-local non-Markovian master equation with decoherence rates and operators depending on the estimated parameter *(16 pages)* 042204
Mihaela Vatasescu

Symmetric and antisymmetric constitutive tensors for bi-isotropic and bi-anisotropic media *(18 pages)* 042205
Pedro D. S. Silva, Rodolfo Casana, and Manoel M. Ferreira, Jr.

Detecting nontrilocal correlations in a triangle network *(14 pages)* 042206
Kaushiki Mukherjee

Optimal discrimination between real and complex quantum theories *(6 pages)* 042207
Adam Bednorz and Josep Batle

Threshold size for the emergence of classical-like behavior *(12 pages)* 042208
Alessandro Coppo, Nicola Pranzini, and Paola Verrucchi

Quantum master equations and steady states for the ultrastrong-coupling limit and the strong-decoherence limit *(20 pages)* 042209
Anton Trushechkin

Creating and controlling exceptional points of non-Hermitian Hamiltonians via homodyne Lindbladian invariance *(12 pages)* 042210
Fabrizio Minganti, Dolf Huybrechts, Cyril Elouard, Franco Nori, and Ievgen I. Arkhipov

Evolution of an accelerated charged vortex particle in an inhomogeneous magnetic lens *(13 pages)* 042211
S. S. Baturin, D. V. Grosman, G. K. Sizykh, and D. V. Karlovets

Entropic and trace-distance-based measures of non-Markovianity *(10 pages)* 042212
Federico Settimo, Heinz-Peter Breuer, and Bassano Vacchini

Absorbers as detectors for unbound quantum systems *(7 pages)* 042213
Sølve Selstø

(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 106, NUMBER 4** **OCTOBER 2022**

Causal games of work extraction with indefinite causal order *(6 pages)* 042214
Gianluca Francica

Boosting unstable particles *(10 pages)* 042215
L. Gavassino and F. Giacosa

Sphere on a plane: Two-dimensional scattering from a finite curved region *(14 pages)* 042216
James R. Anglin and Etienne Wamba

Possibility of detecting the gravity of an object frozen in a spatial superposition by the Zeno effect *(10 pages)* . . . 042217
Peter Sidajaya, Wan Cong, and Valerio Scarani

Sharing nonlocality in a quantum network by unbounded sequential observers *(11 pages)* 042218
Shyam Sundar Mahato and A. K. Pan

Preferred basis of states derived from the eigenstate thermalization hypothesis *(13 pages)* 042219
Hua Yan, Jiaozi Wang, and Wen-ge Wang

Detection-time distribution for several quantum particles *(7 pages)* 042220
Roderich Tumulka

Thermodynamics of quantum measurement and Maxwell's demon's arrow of time *(8 pages)* 042221
Kagan Yanik, Bibek Bhandari, Sreenath K. Manikandan, and Andrew N. Jordan

Trace expressions and associated limits for nonequilibrium Casimir torque *(19 pages)* 042222
Benjamin Strekha, Sean Molesky, Pengning Chao, Matthias Krüger, and Alejandro W. Rodriguez

Extracting bath information from open-quantum-system dynamics with the hierarchical equations-of-motion method *(13 pages)* 042223
Chang Woo Kim

Bell-inequality violation by dynamical Casimir photons in a superconducting microwave circuit *(9 pages)* 042224
Riddhi Chatterjee and A. S. Majumdar

Quantum information science

Improved quantum computing with higher-order Trotter decomposition *(9 pages)* 042401
Xiaodong Yang, Xinfang Nie, Yunlan Ji, Tao Xin, Dawei Lu, and Jun Li

Detecting Einstein-Podolsky-Rosen steering via correlation matrices *(13 pages)* 042402
Lemin Lai and Shunlong Luo

Explicit attacks on the Bennett-Brassard 1984 protocol with partially distinguishable photons *(9 pages)* 042403
D. Babukhin, D. Kronberg, and D. Sych

Unbounded and lossless compression of multiparameter quantum information *(9 pages)* 042404
Joe H. Jenne and David R. M. Arvidsson-Shukur

Limit theorems and localization of three-state quantum walks on a line defined by generalized Grover coins *(16 pages)* 042405
Amrita Mandal, Rohit Sarma Sarkar, Shantanav Chakraborty, and Bibhas Adhikari

Perturbation theory under the truncated Wigner approximation: How system-environment entanglement formation drives quantum decoherence *(20 pages)* 042406
Justin Provazza and Roel Tempelaar

(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 106, NUMBER 4** **OCTOBER 2022**

Importance of kernel bandwidth in quantum machine learning *(11 pages)* 042407
Ruslan Shaydulin and Stefan M. Wild

Enhancing entanglement with the generalized elephant quantum walk from localized and delocalized states *(13 pages)* 042408
Caio B. Naves, Marcelo A. Pires, Diogo O. Soares-Pinto, and Sílvio M. Duarte Queirós

Fast-forwarding quantum simulation with real-time quantum Krylov subspace algorithms *(9 pages)* 042409
Cristian L. Cortes, A. Eugene DePrince, III, and Stephen K. Gray

Coupled dynamics of spin qubits in optical dipole microtraps: Application to the error analysis of a Rydberg-blockade gate *(21 pages)* 042410
L. V. Gerasimov, R. R. Yusupov, A. D. Moiseevsky, I. Vybornyi, K. S. Tikhonov, S. P. Kulik, S. S. Straupe, C. I. Sukenik, and D. V. Kupriyanov

Calculating concentratable entanglement in graph states *(9 pages)* 042411
Alice R. Cullen and Pieter Kok

Classical and quantum parts of conditional mutual information for open quantum systems *(10 pages)* 042412
Zhiqiang Huang (黄志强) and Xiao-Kan Guo (郭肖侃)

Noise thresholds for classical simulability of nonlinear boson sampling *(9 pages)* 042413
Gabriele Bressanini, Hyukjoon Kwon, and M. S. Kim

Steering-based randomness certification with squeezed states and homodyne measurements *(9 pages)* 042414
Marie Ioannou, Bradley Longstaff, Mikkel V. Larsen, Jonas S. Neergaard-Nielsen, Ulrik L. Andersen, Daniel Cavalcanti, Nicolas Brunner, and Jonatan Bohr Brask

Unification of coherence and quantum correlations in tripartite systems *(12 pages)* 042415
Dong-Dong Dong, Geng-Biao Wei, Xue-Ke Song, Dong Wang, and Liu Ye

Manipulating the quantum steering direction with sequential unsharp measurements *(11 pages)* 042416
Xin-Hong Han, Hui-Chao Qu, Xuan Fan, Ya Xiao, and Yong-Jian Gu

Detection of long-range entanglement in gapped quantum spin liquids by local measurements *(10 pages)* 042417
Shi Feng, Yanjun He, and Nandini Trivedi

High-dimensional multi-input quantum random access codes and mutually unbiased bases *(8 pages)* 042418
Rui-Heng Miao, Zhao-Di Liu, Yong-Nan Sun, Chen-Xi Ning, Chuan-Feng Li, and Guang-Can Guo

Capacity of entanglement for a nonlocal Hamiltonian *(12 pages)* 042419
Divyansh Shrimali, Swapnil Bhowmick, Vivek Pandey, and Arun Kumar Pati

Efficient quantum state tomography with mode-assisted training *(11 pages)* 042420
Yuan-Hang Zhang and Massimiliano Di Ventra

Evaluating the resilience of variational quantum algorithms to leakage noise *(7 pages)* 042421
Chen Ding, Xiao-Yue Xu, Shuo Zhang, He-Liang Huang, and Wan-Su Bao

Quantifying multiqubit magic channels with completely stabilizer-preserving operations *(16 pages)* 042422
Gaurav Saxena and Gilad Gour

Loschmidt-echo approach to error estimation in Krylov-subspace approximation *(9 pages)* 042423
Julian M. Ruffinelli, Emiliano M. Fortes, Diego A. Wisniacki, and Martín Larocca

(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 106, NUMBER 4** **OCTOBER 2022**

Robust one-sided self-testing of two-qubit states via quantum steering *(16 pages)* 042424
Yukun Wang, Xinjian Liu, Shaoxuan Wang, Haoying Zhang, and Yunguang Han

Applications of the Hillery-Zubairy entanglement criteria to N-qubit systems: The Tavis-Cummings model *(12 pages)* 042425
Wanqing Cheng and Julio Gea-Banacloche

Magic-state resource theory for the ground state of the transverse-field Ising model *(6 pages)* 042426
Salvatore F. E. Oliviero, Lorenzo Leone, and Alioscia Hamma

Long-range multipartite quantum correlations and factorization in a one-dimensional spin-1/2 XY chain *(16 pages)* 042427
Lin-Lin Su, Jun Ren, Z. D. Wang, and Yan-Kui Bai

Universal method to estimate quantum coherence *(8 pages)* 042428
Liang-Liang Sun and Sixia Yu

Measuring out-of-time-ordered correlation functions without reversing time evolution *(11 pages)* 042429
Philip Daniel Blocher, Serwan Asaad, Vincent Mourik, Mark A. I. Johnson, Andrea Morello, and Klaus Mølmer

Generation of cat states by a weak parametric drive and a transitionless tracking algorithm *(11 pages)* 042430
Shuai Liu, Ye-Hong Chen, Yu Wang, Yi-Hao Kang, Zhi-Cheng Shi, Jie Song, and Yan Xia

Training quantum embedding kernels on near-term quantum computers *(18 pages)* 042431
Thomas Hubregtsen, David Wierichs, Elies Gil-Fuster, Peter-Jan H. S. Derks, Paul K. Faehrmann, and Johannes Jakob Meyer

Detection of a quantum phase transition in a spin-1 chain through multipartite high-order correlations *(8 pages)* 042432
Dongkeun Lee, Adel Sohbi, and Wonmin Son

Avoiding barren plateaus with classical deep neural networks *(10 pages)* 042433
Lucas Friedrich and Jonas Maziero

Optimizing continuous dynamical decoupling with machine learning *(10 pages)* 042434
Miao Cai and Keyu Xia (夏可宇)

Density matrix reconstruction using non-negative matrix product states *(7 pages)* 042435
Donghong Han, Chu Guo, and Xiaoting Wang

Quantum speed limits for observables *(12 pages)* 042436
Brij Mohan and Arun Kumar Pati

Quantum optical communication in the presence of strong attenuation noise *(33 pages)* 042437
Francesco Anna Mele, Ludovico Lami, and Vittorio Giovannetti

Circuit depth scaling for quantum approximate optimization *(6 pages)* 042438
V. Akshay, H. Philathong, E. Campos, D. Rabinovich, I. Zacharov, Xiao-Ming Zhang, and J. D. Biamonte

Role of nonclassical temporal correlation in powering quantum random access codes *(13 pages)* 042439
Subhankar Bera, Ananda G. Maity, Shiladitya Mal, and A. S. Majumdar

(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 106, NUMBER 4** **OCTOBER 2022**

Quantum error precompensation for quantum noisy channels *(9 pages)* 042440
Chengjie Zhang, Liangsheng Li, Guodong Lu, Haidong Yuan, and Runyao Duan

Entanglement between a trapped-ion qubit and a 780-nm photon via quantum frequency conversion *(9 pages)* . . . 042441
John Hannegan, James D. Siverns, and Qudsia Quraishi

Applications of universal parity quantum computation *(8 pages)* 042442
Michael Fellner, Anette Messinger, Kilian Ender, and Wolfgang Lechner

Optimization of variational-quantum-eigensolver measurement by partitioning Pauli operators using multiqubit Clifford gates on noisy intermediate-scale quantum hardware *(6 pages)* 042443
Andrew Jena, Scott N. Genin, and Michele Mosca

Quantum Fourier addition simplified to Toffoli addition *(6 pages)* 042444
Alexandru Paler

Security research on practical measurement-device-independent quantum key distribution *(15 pages)* 042445
Wei Li and Shengmei Zhao

Approximating the quantum approximate optimization algorithm with digital-analog interactions *(14 pages)* 042446
David Headley, Thorge Müller, Ana Martin, Enrique Solano, Mikel Sanz, and Frank K. Wilhelm

Success probability for postselective transformations of pure quantum states *(6 pages)* 042447
D. A. Kronberg

Quantum technologies

Experimental investigation of a quantum battery using star-topology NMR spin systems *(8 pages)* 042601
Jitendra Joshi and T. S. Mahesh

Linear-depth quantum circuits for multiqubit controlled gates *(6 pages)* 042602
Adenilton J. da Silva and Daniel K. Park

Coherent control of a local phonon in trapped ions using dynamical decoupling *(8 pages)* 042603
Ryutaro Ohira, Shota Kume, and Kenji Toyoda

Pauli component erasing quantum channels *(11 pages)* 042604
Jose Alfredo de Leon, Alejandro Fonseca, François Leyvraz, David Davalos, and Carlos Pineda

Dynamics of a dispersively coupled transmon qubit in the presence of a noise source embedded in the control line *(19 pages)* 042605
Antti Vaaranta, Marco Cattaneo, and Russell E. Lake

Data postprocessing for the one-way heterodyne protocol under composable finite-size security *(12 pages)* 042606
Alexander G. Mountogiannakis, Panagiotis Papanastasiou, and Stefano Pirandola

Quantum optimization of complex systems with a quantum annealer *(20 pages)* 042607
Steve Abel, Andrew Blance, and Michael Spannowsky

Robust self-testing of multipartite Greenberger-Horne-Zeilinger-state measurements in quantum networks *(10 pages)* 042608
Qing Zhou, Xin-Yu Xu, Shuai Zhao, Yi-Zheng Zhen, Li Li, Nai-Le Liu, and Kai Chen

Entanglement-assisted, noise-assisted, and monitoring-enhanced quantum bath tagging *(12 pages)* 042609
Donato Farina, Vasco Cavina, Marco G. Genoni, and Vittorio Giovannetti

(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 106, NUMBER 4 OCTOBER 2022

Localization and delocalization in networks with varied connectivity *(12 pages)* 042610
Tamoghna Ray, Amit Dey, and Manas Kulkarni

Quantum phase measurement of two-qubit states in an open waveguide *(9 pages)* 042611
Ya. S. Greenberg and A. A. Shtygashev

Effect of micromotion and local stress in quantum simulations with trapped ions in optical tweezers *(7 pages)* . . . 042612
Liam Bond, Lisa Lenstra, Rene Gerritsma, and Arghavan Safavi-Naini

General off-resonance-error-robust symmetric composite pulses with three elementary operations *(13 pages)* 042613
Shingo Kukita, Haruki Kiya, and Yasushi Kondo

Universal quantum computation with optical four-component cat qubits *(22 pages)* 042614
Daiqin Su, Ish Dhand, and Timothy C. Ralph

Guaranteed-accuracy quantum annealing *(12 pages)* 042615
Takashi Imoto, Yuya Seki, Yuichiro Matsuzaki, and Shiro Kawabata

PART B

Atomic and molecular structure and dynamics; high-precision experiments

Nuclear versus electronic ring currents in oriented torsional molecules induced by magnetic fields. I. Nuclear currents of toluene *(13 pages)* 042801
Dongming Jia, Maria Dimitrova, Yuan Man, Dage Sundholm, and Yonggang Yang

Nuclear versus electronic ring currents in oriented torsional molecules induced by magnetic fields. II. Electronic currents of toluene *(8 pages)* 042802
Maria Dimitrova, Dongming Jia, Jörn Manz, and Dage Sundholm

Triple-differential cross sections in three-dimensional kinematics for electron-impact-ionization dynamics of tetrahydrofuran at 250-eV projectile energy *(7 pages)* 042803
Xiaorui Xue, Deepthy Maria Mootheril, Esam Ali, Maomao Gong, Shaokui Jia, Jiaqi Zhou, Enliang Wang, Jian-Xing Li, Xiangjun Chen, Don Madison, Alexander Dorn, and Xueguang Ren

Quantum electrodynamics of two-body systems with arbitrary masses up to α^6 order *(15 pages)* 042804
Jacek Zatorski, Vojtěch Patkóš, and Krzysztof Pachucki

Hadronic vacuum polarization correction to atomic energy levels *(7 pages)* 042805
S. Breidenbach, E. Dizer, H. Cakir, and Z. Harman

General time-dependent configuration-interaction singles. II. Atomic case *(15 pages)* 042806
Stefanos Carlström, Mattias Bertolino, Jan Marcus Dahlström, and Serguei Patchkovskii

Levy-Lieb embedding of density-functional theory and its quantum kernel: Illustration for the Hubbard dimer using near-term quantum algorithms *(10 pages)* 042807
C. D. Pemmaraju and Amol Deshmukh

Determination of the $2s^2 2p^5 - 2s2p^6$ transition energy in fluorine-like nickel utilizing a low-lying dielectronic resonance *(11 pages)* 042808
S. X. Wang, Z. K. Huang, W. Q. Wen, W. L. Ma, H. B. Wang, S. Schippers, Z. W. Wu, Y. S. Kozhedub, M. Y. Kaygorodov, A. V. Volotka, K. Wang, C. Y. Zhang, C. Y. Chen, C. Liu, H. K. Huang, L. Shao, L. J. Mao, X. M. Ma, J. Li, M. T. Tang, K. M. Yan, Y. B. Zhou, Y. J. Yuan, J. C. Yang, S. F. Zhang, X. Ma, and L. F. Zhu

(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 106, NUMBER 4** **OCTOBER 2022**

Single- and double-electron capture in intermediate-energy Ar^{8+} + He collisions *(7 pages)* 042809
Y. W. Zhang, J. W. Gao, Y. Wu, J. G. Wang, N. Sisourat, and A. Dubois

Calculation of energies and hyperfine-structure constants of $^{233}U^{+}$ and ^{233}U *(7 pages)* 042810
S. G. Porsev, C. Cheung, and M. S. Safronova

High-precision measurement of the hyperfine splitting and ac Stark shift of the $7d\ ^2D_{3/2}$ state in atomic cesium *(9 pages)* 042811
Bubai Rahaman and Sourav Dutta

Nuclear cusps and singularities in the nonadditive kinetic potential bifunctional from analytical inversion *(12 pages)* 042812
Mojdeh Banafsheh, Tomasz A. Wesolowski, Tim Gould, Leeor Kronik, and David A. Strubbe

Determination of quadrupolar dispersion coefficients of the alkali-metal atoms interacting with different material media *(11 pages)* 042813
Harpreet Kaur, Vipul Badhan, Bindiya Arora, and B. K. Sahoo

Experimental and theoretical near-edge x-ray-absorption fine-structure studies of NO^{+} *(8 pages)* 042814
Rebecka Lindblad, Ludvig Kjellsson, Emiliano De Santis, Vicente Zamudio-Bayer, Bernd von Issendorff, Stacey L. Sorensen, J. Tobias Lau, Weijie Hua, Vincenzo Carravetta, Jan-Erik Rubensson, Hans Ågren, and Rafael C. Couto

Higher-order corrections to the spin-orbit and spin-spin tensor interactions in HD^{+} *(7 pages)* 042815
Mohammad Haidar, Vladimir I. Korobov, Laurent Hilico, and Jean-Philippe Karr

Tune-out wavelengths for the $2\ ^3S_1$ state of the Li^{+} ion *(6 pages)* 042816
Fang-Fei Wu, Ke Deng, and Ze-Huang Lu

QED corrections to the Abraham and Aharonov-Casher forces on Rydberg atoms *(9 pages)* 042817
R. Le Fournis, B. A. van Tiggelen, and M. Donaire

Convergent close-coupling calculations of electron scattering on HeH^{+} *(15 pages)* 042818
Liam H. Scarlett, Mark C. Zammit, Igor Bray, Barry I. Schneider, and Dmitry V. Fursa

Theory of rotationally resolved two-dimensional infrared spectroscopy including polarization dependence and rotational coherence dynamics *(19 pages)* 042819
Grzegorz Kowzan and Thomas K. Allison

Light-induced processes in atomic-scale systems

High-accuracy optical clocks based on group-16-like highly charged ions *(9 pages)* 043101
Saleh O. Allehabi, S. M. Brewer, V. A. Dzuba, V. V. Flambaum, and K. Beloy

Steering the longitudinal photoelectron momentum in the above-threshold ionization with two not-quite-collinear laser beams *(7 pages)* 043102
Birger Böning and Stephan Fritzsche

Knee structure in the laser-intensity dependence of harmonic generation for graphene *(12 pages)* 043103
Fulong Dong and Jie Liu

℘ General time-dependent configuration-interaction singles. I. Molecular case *(13 pages)* 043104
Stefanos Carlström, Michael Spanner, and Serguei Patchkovskii

(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 106, NUMBER 4** **OCTOBER 2022**

Laser-induced electron diffraction in the over-the-barrier-ionization regime *(10 pages)* 043105
B. Belsa, K. M. Ziems, A. Sanchez, K. Chirvi, X. Liu, S. Gräfe, and J. Biegert

Mapping the direction of electron ionization to phase delay between VUV and IR laser pulses *(10 pages)* 043106
M. Mountney, G. P. Katsoulis, S. H. Møller, K. Jana, P. Corkum, and A. Emmanouilidou

Environment-modified three-body energy transfer *(9 pages)* 043107
Madeline C. Waller and Robert Bennett

Thomas–Reiche–Kuhn correction for truncated configuration-interaction spaces: Case of laser-assisted dynamical interference *(11 pages)* 043108
Mattias Bertolino, Stefanos Carlström, Jasper Peschel, Felipe Zapata, Eva Lindroth, and Jan Marcus Dahlström

Momentum scalar triple product as a measure of chirality in electron ionization dynamics of strongly driven atoms *(5 pages)* 043109
G. P. Katsoulis, Z. Dube, P. B. Corkum, A. Staudte, and A. Emmanouilidou

Reversible electron spirals by chirped attopulses at zero time delay *(9 pages)* 043110
N. J. Strandquist, Jr. and J. M. Ngoko Djiokap

Probing van der Waals interactions and detecting polar molecules by Förster-resonance energy transfer with Rydberg atoms at temperatures below 100 mK *(6 pages)* 043111
J. Zou and S. D. Hogan

Twisted quantum interference in photoelectron holography with elliptically polarized fields *(20 pages)* 043112
G. Kim, C. Hofmann, A. S. Maxwell, and C. Figueira de Morisson Faria

Coherent control of the vibrational dynamics of aligned heteronuclear diatomic molecules *(12 pages)* 043113
László Biró and András Csehi

Rydberg atomic antenna in strongly driven multielectron atoms *(9 pages)* 043114
Stefanos Carlström, Jan Marcus Dahlström, Misha Yu Ivanov, and Serguei Patchkovskii

Elliptically polarized attosecond pulse generation by corotating bicircular laser fields *(9 pages)* 043115
Wenqing Li, Xiaosong Zhu, Pengfei Lan, and Peixiang Lu

Surface explosion and subsequent core expansion of laser-heated clusters probed by time-resolved photoelectron spectroscopy *(8 pages)* 043116
Akinobu Niozu, Hironobu Fukuzawa, Toru Hagiya, Akifumi Yamamoto, Daehyun You, Shu Saito, Yudai Ishimura, Tadashi Togashi, Shigeki Owada, Kensuke Tono, Makina Yabashi, Shin-ichi Wada, Kazuhiro Matsuda, Kiyoshi Ueda, and Kiyonobu Nagaya

Two-XUV-photon double ionization of neon *(8 pages)* 043117
I. Orfanos, E. Skantzakis, A. Nayak, M. Dumergue, S. Kühn, G. Sansone, M. F. Kling, H. Schröder, B. Bergues, Janos Csontos, Szabolics Toth, Ádám Börzönyi, S. Kahaly, K. Varjú, A. Forembski, L. A. A. Nikolopoulos, P. Tzallas, and D. Charalambidis

Disappearance and reappearance of above-threshold-ionization peaks *(6 pages)* 043118
Lars Bojer Madsen

Correlation-enhanced Goos-Hänchen shift in Rydberg atomic gases *(9 pages)* 043119
Di-Di Zheng, Hui-Min Zhao, Xiao-Jun Zhang, and Jin-Hui 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 106, NUMBER 4** **OCTOBER 2022**

Nonsequential double ionization of Ne with elliptically polarized laser pulses *(8 pages)* 043120
Fang Liu, Shuqi Li, Zhangjin Chen, Birger Böning, and Stephan Fritzsche

Laser-controlled electronic symmetry breaking in a phenylene ethynylene dimer: Simulation by the hierarchical equations of motion and optimal control *(15 pages)* 043121
Amine Jaouadi, Joachim Galiana, Etienne Mangaud, Benjamin Lasorne, Osman Atabek, and Michèle Desouter-Lecomte

Shift of the photoelectron momentum against the radiation pressure force in linearly polarized intense midinfrared laser fields *(7 pages)* 043122
Rešad Kahvedžić and Stefanie Gräfe

Ultracold systems and matter waves

Quantum phases of dipolar bosons in a multilayer optical lattice *(17 pages)* 043301
Soumik Bandyopadhyay, Hrushikesh Sable, Deepak Gaur, Rukmani Bai, Subroto Mukerjee, and D. Angom

Molecular state in a spin–orbital-angular-momentum coupled Fermi gas *(7 pages)* 043302
Yiwen Han, Shi-Guo Peng, Ke-Ji Chen, and Wei Yi

Floquet-engineered pair and single-particle filters in the Fermi-Hubbard model *(6 pages)* 043303
Friedrich Hübner, Christoph Dauer, Sebastian Eggert, Corinna Kollath, and Ameneh Sheikhan

Low-energy prethermal phase and crossover to thermalization in nonlinear kicked rotors *(12 pages)* 043304
Maxime Martinez, Pierre-Élie Larré, Dominique Delande, and Nicolas Cherroret

Generation of Josephson vortices in stacked toroidal Bose-Einstein condensates *(9 pages)* 043305
Nataliia Bazhan, Anton Svetlichnyi, Dominik Pfeiffer, Daniel Derr, Gerhard Birkl, and Alexander Yakimenko

Dynamics of spin helices in the one-dimensional XX model *(9 pages)* 043306
Darren Pereira and Erich J. Mueller

Dynamics of a pair of overlapping polar bright solitons in spin-1 Bose-Einstein condensates *(12 pages)* 043307
Gautam Hegde, Sandra M. Jose, and Rejish Nath

Role of the effective range in the density-induced BEC-BCS crossover *(12 pages)* 043308
Hiroyuki Tajima and Haozhao Liang

Phase-space stochastic quantum hydrodynamics for interacting Bose gases *(22 pages)* 043309
S. A. Simmons, J. C. Pillay, and K. V. Kheruntsyan

Stability against three-body clustering in one-dimensional spinless p-wave fermions *(10 pages)* 043310
Yixin Guo (郭一昕) and Hiroyuki Tajima (田島裕之)

Dipole modes of a trapped bosonic mixture: Fate of the sum-rule approach *(8 pages)* 043311
Chiara Fort and Michele Modugno

℘ Local phase shift due to interactions in an atom interferometer *(8 pages)* 043312
Zhibin Yao, Cyrille Solaro, Corentin Carrez, Pierre Cladé, and Saïda Guellati-Khelifa

Crossing the superfluid-supersolid transition of an elongated dipolar condensate *(8 pages)* 043313
Aitor Alaña, Nicolò Antolini, Giulio Biagioni, Iñigo L. Egusquiza, and Michele Modugno

(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 106, NUMBER 4** **OCTOBER 2022**

Observation of low-field Feshbach resonances between ^{161}Dy and ^{40}K *(14 pages)* 043314
Zhu-Xiong Ye, Alberto Canali, Elisa Soave, Marian Kreyer, Yaakov Yudkin, Cornelis Ravensbergen, Emil Kirilov, and Rudolf Grimm

Dimers, trimers, tetramers, and other multimers in a multiband Bose-Hubbard model *(10 pages)* 043315
M. Iskin and A. Keleş

Resonant superfluidity in the Rabi-coupled spin-dependent Fermi-Hubbard model *(10 pages)* 043316
Mathias Mikkelsen, Ryui Kaneko, Daichi Kagamihara, and Ippei Danshita

Light-pulse atom interferometric test of continuous spontaneous localization *(9 pages)* 043317
Sascha Vowe, Sandro Donadi, Vladimir Schkolnik, Achim Peters, Bastian Leykauf, and Markus Krutzik

Detecting topological phase transitions in a double kicked quantum rotor *(8 pages)* 043318
Nikolai Bolik, Caspar Groiseau, Jerry H. Clark, Gil S. Summy, Yingmei Liu, and Sandro Wimberger

Rotational pendulum dynamics of a vortex molecule in a channel geometry *(11 pages)* 043319
Sarthak Choudhury and Joachim Brand

Rapid generation of all-optical ^{39}K Bose-Einstein condensates using a low-field Feshbach resonance *(10 pages)* 043320
A. Herbst, H. Albers, K. Stolzenberg, S. Bode, and D. Schlippert

Classical route to ergodicity and scarring phenomena in a two-component Bose-Josephson junction *(10 pages)* . . . 043321
Debabrata Mondal, Sudip Sinha, Sayak Ray, Johann Kroha, and Subhasis Sinha

Spectral analysis for compressible quantum fluids *(15 pages)* 043322
Ashton S. Bradley, R. Kishor Kumar, Sukla Pal, and Xiaoquan Yu

Dynamical excitation processes and correlations of three-body two-dimensional mixtures *(17 pages)* 043323
G. Bougas, S. I. Mistakidis, P. Giannakeas, and P. Schmelcher

Two ultracold highly magnetic atoms in a one-dimensional harmonic trap *(13 pages)* 043324
Michał Suchorowski, Anna Dawid, and Michał Tomza

Meissner effect in Fock space *(7 pages)* 043325
J. Mumford

Photonics, nonlinear optics, and optomechanics

Significant optoelectrical entanglement and mechanical squeezing in a multimodulated optoelectromechanical system *(7 pages)* 043501
Sampreet Kalita, Saumya Shah, and Amarendra K. Sarma

Switching dynamics of femtosecond solitons in parity-time-symmetric coupled optical waveguides *(6 pages)* 043502
Ambaresh Sahoo, Dipti Kanika Mahato, A. Govindarajan, and Amarendra K. Sarma

Born-Padé approach to electromagnetic scattering in complex one-dimensional inhomogeneous slabs *(8 pages)* 043503
J. A. Rebouças and P. A. Brandão

Topological edge and interface states in phoxonic crystal cavity chains *(12 pages)* 043504
Tian-Xue Ma, Jing Liu, Chuanzeng Zhang, and Yue-Sheng 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 106, NUMBER 4 OCTOBER 2022

Valley-resolved interband excitation and emission in gapped graphene *(7 pages)* 043505
Hubin Cui, Liang Li, Tengfei Huang, Jiapeng Li, Pengfei Lan, and Peixiang Lu

Linear-polarization–gradient-phase coupling *(6 pages)* 043506
Shangdong Zhao, Yu Liu, Kai Niu, and Shaohua Tao

Counterpropagating light in ring resonators: Switching fronts, plateaus, and oscillations *(16 pages)* 043507
Graeme N. Campbell, Shuangyou Zhang, Leonardo Del Bino, Pascal Del'Haye, and Gian-Luca Oppo

Expanding the memory effect in scattering imaging by manipulating photon distributions *(12 pages)* 043508
Zhengjia Zhang, Zhengjun Liu, and Shutian Liu

Effect of external cavity length on the coherence properties in a multimode semiconductor laser *(5 pages)* 043509
Neethu K. and S. Sivaprakasam

Parametric conversion via second harmonic generation and two-hump solitons in phase-matched microresonators *(10 pages)* 043510
Vladislav V. Pankratov and Dmitry V. Skryabin

Optomechanical sideband asymmetry explained by stochastic electrodynamics *(11 pages)* 043511
L. Novotny, M. Frimmer, A. Militaru, A. Norrman, O. Romero-Isart, and P. Maurer

Geometric spin Hall effect of a laser beam beyond the paraxial approximation *(8 pages)* 043512
Mengdi Luo and Zhaoying Wang

Four-vector optical Dirac equation and spin-orbit interaction of structured light *(6 pages)* 043513
Longlong Feng and Qianfan Wu

Propagation effects of bichromatic laser pulses on the induced terahertz-radiation generation in a gaseous medium *(6 pages)* 043514
Xiaofang Shu, Zhifang Feng, Chengxin Yu, and Jie Liu

Nonlinear index of a two-level model: The essential role of the population inversion *(10 pages)* 043515
Hervé Leblond and Charles Ciret

Nonperturbative approach to the nonlinear photon echo of a V-type system *(14 pages)* 043516
Xue Zhang and Hui Dong

Harmonic generation in bent graphene with artificially enhanced spin-orbit coupling *(9 pages)* 043517
Arttu Nieminen and Marco Ornigotti

Dipole-forbidden transitions induced by the gradient of optical near fields *(9 pages)* 043518
Yongkun Chen, Yueming Zhou, Yijie Liao, Jintai Liang, Xu Zhang, Wei Cao, Min Li, Marcelo F. Ciappina, and Peixiang Lu

Helicity, chirality, and spin of optical fields without vector potentials *(13 pages)* 043519
Andrea Aiello

Quantum optics

Photon generation and entanglement in a double superconducting cavity *(16 pages)* 043701
Cruz I. Velasco, Nicolás F. Del Grosso, Fernando C. Lombardo, Alejandro Soba, and Paula I. Villar

Optimal control and selectivity of qubits in contact with a structured environment *(10 pages)* 043702
Quentin Ansel, Jonas Fischer, Dominique Sugny, and Bruno Bellomo

(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 106, NUMBER 4** **OCTOBER 2022**

Unconventional quantum electrodynamics with a Hofstadter-ladder waveguide *(12 pages)* 043703
Xin Wang, Zhao-Min Gao, Jia-Qi Li, Huai-Bing Zhu, and Hong-Rong Li

Sub-Planck phase-space structure and sensitivity for SU(1,1) compass states *(14 pages)* 043704
Naeem Akhtar, Barry C. Sanders, and Gao Xianlong

Multicopy observables for the detection of optically nonclassical states *(16 pages)* 043705
Matthieu Arnhem, Célia Griffet, and Nicolas J. Cerf

Two-photon-absorption measurements in the presence of single-photon losses *(17 pages)* 043706
Shahram Panahiyan, Carlos Sánchez Muñoz, Maria V. Chekhova, and Frank Schlawin

Two strategies for modeling nonlinear optics in lossy integrated photonic structures *(18 pages)* 043707
Milica Banic, Luca Zatti, Marco Liscidini, and J. E. Sipe

Dynamical stabilization by vacuum fluctuations in a cavity: Resonant electron scattering in the ultrastrong light-matter coupling regime *(6 pages)* 043708
D. A. Zezyulin, S. A. Kolodny, O. V. Kibis, I. V. Tokatly, and I. V. Iorsh

Atomic-coherence-assisted multipartite entanglement generation with dressing-energy-level-cascaded four-wave mixing *(12 pages)* 043709
Yuliang Liu, Jiajia Wei, Mengqi Niu, Yixin Lin, Zhili Chen, Jin Yan, Binshuo Luo, Feng Li, Yin Cai, and Yanpeng Zhang

Spatial-nonlocality-induced non-Markovian electromagnetically induced transparency in a single giant atom *(14 pages)* 043710
Y. T. Zhu, S. Xue, R. B. Wu, W. L. Li, Z. H. Peng, and M. Jiang

Beyond one-axis twisting: Simultaneous spin-momentum squeezing *(10 pages)* 043711
John Drew Wilson, Simon B. Jäger, Jarrod T. Reilly, Athreya Shankar, Maria Luisa Chiofalo, and Murray J. Holland

Threshold detection statistics of bosonic states *(14 pages)* 043712
J. F. F. Bulmer, S. Paesani, R. S. Chadwick, and N. Quesada

Complete positive operator-valued measure description of multichannel quantum electro-optic sampling with monochromatic field modes *(15 pages)* 043713
Emanuel Hubenschmid, Thiago L. M. Guedes, and Guido Burkard

Tunable frequency-bin multimode squeezed vacuum states of light *(10 pages)* 043714
Christian Drago and Agata M. Brańczyk

Loss-induced suppression, revival, and switch of photon blockade *(11 pages)* 043715
Yunlan Zuo, Ran Huang, Le-Man Kuang, Xun-Wei Xu, and Hui Jing

Theory of magnon polaritons in quantum Ising materials *(20 pages)* 043716
R. D. McKenzie, M. Libersky, D. M. Silevitch, and T. F. Rosenbaum

Concentrated subradiant modes in a one-dimensional atomic array coupled with chiral waveguides *(15 pages)* . . . 043717
Mengjie Yang, Luojia Wang, Xiaoxiong Wu, Han Xiao, Danying Yu, Luqi Yuan, and Xianfeng Chen

Correlated two-photon modulation based on nonlinear effects in a photonic synthetic lattice *(17 pages)* 043718
Chen-Xi Zhu, Xiang-Fa Zhou, and Zheng-Wei 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 106, NUMBER 4** **OCTOBER 2022**

Optimizing the coupling efficiency of spontaneous parametric down-conversion photon pairs into single-mode fibers *(8 pages)* 043719
Nicolas Schwaller, Geobae Park, Ryo Okamoto, and Shigeki Takeuchi

Macroscopic distinguishability and scalability of N-mode field states *(10 pages)* 043720
C. Muñoz, A. B. Klimov, and B. M. Garraway

All-optical generation of deterministic squeezed Schrödinger-cat states *(12 pages)* 043721
Zhucheng Zhang, Lei Shao, Wangjun Lu, and Xiaoguang Wang

Generation of nonreciprocal single photons in the chiral waveguide-cavity-emitter system *(10 pages)* 043722
Wen-ju Gu, Lei Wang, Zhen Yi, and Li-hui Sun

Chirality-driven delocalization in disordered waveguide-coupled quantum arrays *(11 pages)* 043723
Gleb Fedorovich, Danil Kornovan, Alexander Poddubny, and Mihail Petrov

COMMENTS

Comment on "Revisiting the phase transitions of the Dicke model" *(5 pages)* 047701
Ángel L. Corps and Armando Relaño

ERRATA

Erratum: Examining the correctness of anonymity for practical quantum networks
[Phys. Rev. A **101**, 062311 (2020)] *(1 page)* . . . . . 049901(E)
Yu-Guang Yang, Yong-Li Yang, Xin-Long Lv, Yi-Hua Zhou, and Wei-Min Shi