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 104, NUMBER 3
PARTS A AND B

CONTENTS

SEPTEMBER 2021

The Table of Contents is a total listing of Parts A and B.
Part A consists of pages L030201–032827, and Part B pages 033101–039901(E).

PART A

LETTERS

Fundamental concepts

Generalized quantum-classical correspondence for random walks on graphs *(5 pages)* L030201
Massimo Frigerio, Claudia Benedetti, Stefano Olivares, and Matteo G. A. Paris

Adiabatic theorem for closed quantum systems initialized at finite temperature *(6 pages)* L030202
Nikolai Il'in, Anastasia Aristova, and Oleg Lychkovskiy

Quantum information science

Training saturation in layerwise quantum approximate optimization *(7 pages)* L030401
E. Campos, D. Rabinovich, V. Akshay, and J. Biamonte

Local passivity and entanglement in shared quantum batteries *(6 pages)* L030402
Kornikar Sen and Ujjwal Sen

Atomic and molecular structure and dynamics; high-precision experiments

Many-body energy density functional *(6 pages)* L030801
A. Kievsky, G. Orlandini, and M. Gattobigio

Light-induced processes in atomic-scale systems

Coherent control of atomic inner-shell x-ray lasing via perturbed valence-shell transitions *(6 pages)* L031101
Jianpeng Liu, Yongqiang Li, Li Wang, Jing Zhao, Jianmin Yuan, and Xiangjin Kong

Quantum interference in strong-field ionization by a linearly polarized laser pulse and its relevance to tunnel exit time and momentum *(6 pages)* L031102
Szabolcs Hack, Szilárd Majorosi, Mihály G. Benedict, Sándor Varró, and Attila Czirják

Steering of circular dichroism in biharmonic ionization of atoms *(6 pages)* L031103
A. V. Volotka, J. Hofbrucker, and S. Fritzsche

Ultracold systems and matter waves

Polarons and their induced interactions in highly imbalanced triple mixtures *(7 pages)* L031301
Kevin Keiler, Simeon I. Mistakidis, and Peter Schmelcher

Copyright 2021 by American Physical Society

(Continued)

2469-9926(202109)104:3:B;1-W

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 104, NUMBER 3 SEPTEMBER 2021

Electric-field dissociation of weakly bound molecular ions *(6 pages)* L031302
Jesús Pérez-Ríos

Emergent eigenstate solution for generalized thermalization *(6 pages)* L031303
Yicheng Zhang, Lev Vidmar, and Marcos Rigol

Losses in interacting quantum gases: Ultraviolet divergence and its regularization *(5 pages)* L031304
Isabelle Bouchoule, Léa Dubois, and Léo-Paul Barbier

Dynamical preparation of stripe states in spin-orbit-coupled gases *(7 pages)* L031305
J. Cabedo, J. Claramunt, and A. Celi

Quantum Lifshitz transitions generated by order from quantum disorder in strongly correlated Rashba spin-orbit-coupled systems *(6 pages)* L031306
Fadi Sun and Jinwu Ye

Photonics, nonlinear optics, and optomechanics

Improving force sensitivity by amplitude measurements of light reflected from a detuned optomechanical cavity *(5 pages)* L031501
Kentaro Komori, Takuya Kawasaki, Sotatsu Otabe, Yutaro Enomoto, Yuta Michimura, and Masaki Ando

Topological edge states of Kekulé-type photonic crystals induced by a synchronized rotation of unit cells *(6 pages)* L031502
Rui Zhou, Hai Lin, Y. Liu (刘泱杰), Xintong Shi, Rongxin Tang, Yanjie Wu, and Zihao Yu

Tunable anti–parity-time-symmetric chaos in optomechanics *(6 pages)* L031503
Feifan Huang, Lei Chen, Linwei Huang, Junhua Huang, Guishi Liu, Yaofei Chen, Yunhan Luo, and Zhe Chen

Probing the local density of states near the diffraction limit using nanowaveguide-collected cathode luminescence *(6 pages)* L031504
Yoshinori Uemura, Masaru Irita, Yoshikazu Homma, and Mark Sadgrove

Quest for vortices in photon condensates *(5 pages)* L031505
Himadri S. Dhar, Zai Zuo, João D. Rodrigues, Robert A. Nyman, and Florian Mintert

Quantum optics

Cavitylike strong coupling in macroscopic waveguide QED using three coupled qubits in the deep non-Markovian regime *(7 pages)* L031701
Sofia Arranz Regidor and Stephen Hughes

ARTICLES

Fundamental concepts

Nonadiabatic evolution and thermodynamics of a time-dependent open quantum system *(11 pages)* 032201
Dan Wang and Dazhi Xu

Weak-value amplification and the lifetime of a decaying particle *(9 pages)* 032202
Yuichiro Mori and Izumi Tsutsui

Unobservable causal loops as a way to explain both the quantum computational speedup and quantum nonlocality *(16 pages)* 032203
G. Castagnoli

(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 104, NUMBER 3** **SEPTEMBER 2021**

Boson sampling with random numbers of photons *(6 pages)* 032204
Vincenzo Tamma and Simon Laibacher

Parameter dependence and Bell nonlocality *(5 pages)* 032205
Moji Ghadimi

Solvable class of non-Markovian quantum multipartite dynamics *(12 pages)* 032206
Adrián A. Budini and Juan P. Garrahan

Fast charging of a quantum battery assisted by noise *(12 pages)* 032207
Srijon Ghosh, Titas Chanda, Shiladitya Mal, and Aditi Sen(De)

Dimension-dependent noncontextuality inequalities with large contexts *(6 pages)* 032208
Xiang Zhan and Linxi Hu

Geometrical dependence in Casimir-Polder repulsion *(5 pages)* 032209
John Joseph Marchetta, Prachi Parashar, and K. V. Shajesh

Noninterfering and simultaneous Stern-Gerlach and Heisenberg microscope experiments to measure the full electron coordinate in an entangled state *(4 pages)* 032210
O. V. Gritsenko

Alternative approach to the quantization of the damped harmonic oscillator *(7 pages)* 032211
Matthew J. Blacker and David L. Tilbrook

Quantifying non-Markovianity via conditional mutual information *(9 pages)* 032212
Zhiqiang Huang (黄志强) and Xiao-Kan Guo (郭肖侃)

Quantum state smoothing as an optimal Bayesian estimation problem with three different cost functions *(7 pages)* 032213
Kiarn T. Laverick, Ivonne Guevara, and Howard M. Wiseman

Quantum parameter estimation on coherently superposed noisy channels *(16 pages)* 032214
François Chapeau-Blondeau

Improved upper bounds for the hitting times of quantum walks *(13 pages)* 032215
Yosi Atia and Shantanav Chakraborty

Quantum-classical dynamical brackets *(10 pages)* 032216
M. Amin and M. A. Walton

Correlations breaking homogenization *(10 pages)* 032217
Naim Elias Comar and Gabriel T. Landi

Geometric interpretation of the Clauser-Horne-Shimony-Holt inequality of nonmaximally entangled states *(12 pages)* 032218
Johannes Seiler, Thomas Strohm, and Wolfgang P. Schleich

Aharonov-Casher and shielded Aharonov-Bohm effects with a quantum electromagnetic field *(5 pages)* 032219
Pablo L. Saldanha

Spacetime symmetries and the qubit Bloch ball: A physical derivation of finite-dimensional quantum theory and the number of spatial dimensions *(25 pages)* 032220
Damián Pitalúa-García

(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 104, NUMBER 3** **SEPTEMBER 2021**

Reconstructing the wave function through the momentum weak value *(8 pages)* 032221
Junfan Zhu, An Wang, Xiong Liu, Yurong Liu, Zhiyou Zhang, and Fuhua Gao

Fundamental transfer matrix and dynamical formulation of stationary scattering in two and three dimensions *(18 pages)* 032222
Farhang Loran and Ali Mostafazadeh

Testing complementarity on a transmon quantum processor *(17 pages)* 032223
Pedro M. Q. Cruz and J. Fernández-Rossier

Quantum corralling *(9 pages)* 032224
Rafael Vieira, Gustavo Rigolin, and Edgard P. M. Amorim

Information leak and incompatibility of physical context: A modified approach *(8 pages)* 032225
Arindam Mitra, Gautam Sharma, and Sibasish Ghosh

Maximum-power heat engines and refrigerators in the fast-driving regime *(22 pages)* 032226
Vasco Cavina, Paolo A. Erdman, Paolo Abiuso, Leonardo Tolomeo, and Vittorio Giovannetti

Identification of Poincaré-gauge and multipolar nonrelativistic theories of QED *(8 pages)* 032227
Adam Stokes and Ahsan Nazir

Testing incompatibility of quantum devices with few states *(18 pages)* 032228
Teiko Heinosaari, Takayuki Miyadera, and Ryo Takakura

Intrinsic spatial chirp of subcycle terahertz pulsed beams *(6 pages)* 032229
G. A. Hine and M. Doleans

Quantum information science

Progress toward favorable landscapes in quantum combinatorial optimization *(17 pages)* 032401
Juneseo Lee, Alicia B. Magann, Herschel A. Rabitz, and Christian Arenz

Analytical bounds for dynamic multichannel discrimination *(20 pages)* 032402
Cillian Harney and Stefano Pirandola

Quantifying entanglement preservability of experimental processes *(14 pages)* 032403
Shih-Hsuan Chen, Meng-Lok Ng, and Che-Ming Li

Quantum tomography with random diagonal unitary maps and statistical bounds on information generation using random matrix theory *(12 pages)* 032404
Sreeram PG and Vaibhav Madhok

Variational quantum eigensolver for dynamic correlation functions *(12 pages)* 032405
Hongxiang Chen (陈鸿翔), Max Nusspickel, Jules Tilly, and George H. Booth

Characterizing photon-number distribution of pulsed sources using non–photon-number-resolving detectors for quantum key distribution *(7 pages)* 032406
Yang-Guang Shan, Guan-Jie Fan-Yuan, Shuang Wang, Wei Chen, De-Yong He, Zhen-Qiang Yin, Guang-Can Guo, and Zheng-Fu Han

Preparing Dicke states in a spin ensemble using phase estimation *(13 pages)* 032407
Yang Wang and Barbara M. Terhal

(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 104, NUMBER 3** **SEPTEMBER 2021**

Renyi entropy of interacting thermal bosons in the large-N approximation *(12 pages)* 032408
Ahana Chakraborty and Rajdeep Sensarma

Fast high-fidelity spin readout in the singlet-triplet basis using a resonator and tailored pulses *(9 pages)* 032409
Xing-Yu Zhu, Tao Tu, Ao-Lin Guo, Guang-Can Guo, and Chuan-Feng Li

Efficient steady-state-entanglement generation in strongly driven coupled qubits *(11 pages)* 032410
Ana Laura Gramajo, Daniel Domínguez, and María José Sánchez

Quantum operations in an information theory for fermions *(23 pages)* 032411
Nicetu Tibau Vidal, Mohit Lal Bera, Arnau Riera, Maciej Lewenstein, and Manabendra Nath Bera

Construction of a qudit using Schrödinger cat states and generation of hybrid entanglement between a discrete-variable qudit and a continuous-variable qudit *(13 pages)* 032412
Qi-Ping Su, Tong Liu, Yu Zhang, and Chui-Ping Yang

Boltzmann machine learning with a variational quantum algorithm *(12 pages)* 032413
Yuta Shingu, Yuya Seki, Shohei Watabe, Suguru Endo, Yuichiro Matsuzaki, Shiro Kawabata, Tetsuro Nikuni, and Hideaki Hakoshima

Absolutely entangled sets of pure states for bipartitions and multipartitions *(10 pages)* 032414
Baichu Yu, Pooja Jayachandran, Adam Burchardt, Yu Cai, Nicolas Brunner, and Valerio Scarani

Quantifying non-Gaussianity of a quantum state by the negative entropy of quadrature distributions *(11 pages)* . . . 032415
Jiyong Park, Jaehak Lee, Kyunghyun Baek, and Hyunchul Nha

Quantum evolution kernel: Machine learning on graphs with programmable arrays of qubits *(16 pages)* 032416
Louis-Paul Henry, Slimane Thabet, Constantin Dalyac, and Loïc Henriet

Quantum speed limit and geometric measure of entanglement *(4 pages)* 032417
Łukasz Rudnicki

Symmetry-protected dissipative preparation of matrix product states *(19 pages)* 032418
Leo Zhou, Soonwon Choi, and Mikhail D. Lukin

Demonstration of $1 \rightarrow 3$ continuous-variable quantum telecloning *(6 pages)* 032419
Qingwei Wang, Wei Li, Yimiao Wu, Wenxiu Yao, Fan Li, Long Tian, Yajun Wang, and Yaohui Zheng

Teleportation with a cubic phase gate *(8 pages)* 032420
E. R. Zinatullin, S. B. Korolev, and T. Yu. Golubeva

Quantum annealing with trigger Hamiltonians: Application to 2-satisfiability and nonstoquastic problems *(15 pages)* 032421
Vrinda Mehta, Fengping Jin, Hans De Raedt, and Kristel Michielsen

Fast inversion, preconditioned quantum linear system solvers, fast Green's-function computation, and fast evaluation of matrix functions *(33 pages)* 032422
Yu Tong, Dong An, Nathan Wiebe, and Lin Lin

Gaussian continuous-variable isotropic state *(11 pages)* 032423
Maria Poxleitner and Haye Hinrichsen

Role of fine-grained uncertainty in determining the limit of preparation contextuality *(7 pages)* 032424
Gautam Sharma, Sk Sazim, and Shiladitya Mal

(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 104, NUMBER 3** **SEPTEMBER 2021**

How squeezed states both maximize and minimize the same notion of quantumness *(12 pages)* 032425
Aaron Z. Goldberg and Khabat Heshami

Hybrid classical-quantum approach to solve the heat equation using quantum annealers *(7 pages)* 032426
Giovani G. Pollachini, Juan P. L. C. Salazar, Caio B. D. Góes, Thiago O. Maciel, and Eduardo I. Duzzioni

Efficient nonlinear witnessing of non–absolutely separable states with lossy detectors *(8 pages)* 032427
Ayan Patra, Shiladitya Mal, and Aditi Sen(De)

Correlation energy and quantum correlations in a solvable model *(8 pages)* 032428
Javier Faba, Vicente Martín, and Luis Robledo

Entanglement cost of discriminating noisy Bell states by local operations and classical communication *(8 pages)* 032429
Somshubhro Bandyopadhyay and Vincent Russo

Quantum technologies

k-uniform quantum information masking *(8 pages)* 032601
Fei Shi, Mao-Sheng Li, Lin Chen, and Xiande Zhang

Quantum sampling algorithms, phase transitions, and computational complexity *(18 pages)* 032602
Dominik S. Wild, Dries Sels, Hannes Pichler, Cristian Zanoci, and Mikhail D. Lukin

Simulation of quantum computing on classical supercomputers with tensor-network edge cutting *(6 pages)* 032603
Ya-Qian Zhao, Ren-Gang Li, Jin-Zhe Jiang, Chen Li, Hong-Zhen Li, En-Dong Wang, Wei-Feng Gong, Xin Zhang, and Zhi-Qiang Wei

Optimal quantum channels *(8 pages)* 032604
Rocco Duvenhage

Constructing qudits from infinite-dimensional oscillators by coupling to qubits *(14 pages)* 032605
Yuan Liu, Jasmine Sinanan-Singh, Matthew T. Kearney, Gabriel Mintzer, and Isaac L. Chuang

Magnon-mediated quantum battery under systematic errors *(10 pages)* 032606
Shi-fan Qi and Jun Jing

Multimode metrology via scattershot sampling *(17 pages)* 032607
Joshua J. Guanzon, Austin P. Lund, and Timothy C. Ralph

Phase noise model for continuous-variable quantum key distribution using a local local oscillator *(9 pages)* 032608
Yun Shao, Heng Wang, Yaodi Pi, Wei Huang, Yang Li, Jinlu Liu, Jie Yang, Yichen Zhang, and Bingjie Xu

Universal hybrid quantum computing in trapped ions *(8 pages)* 032609
R. T. Sutherland and R. Srinivas

Probabilistic simulation of quantum circuits using a deep-learning architecture *(12 pages)* 032610
Juan Carrasquilla, Di Luo, Felipe Pérez, Ashley Milsted, Bryan K. Clark, Maksims Volkovs, and Leandro Aolita

Optical and spin-coherence properties of rubidium atoms trapped in solid neon *(7 pages)* 032611
Ugne Dargyte, David M. Lancaster, and Jonathan D. Weinstein

Long-range two-hybrid-qubit gates mediated by a microwave cavity with red sidebands *(14 pages)* 032612
J. C. Abadillo-Uriel, Cameron King, S. N. Coppersmith, and Mark Friesen

(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 104, NUMBER 3** **SEPTEMBER 2021**

Atomic and molecular structure and dynamics; high-precision experiments

First-principles study of semicore electron excitation in the electronic energy loss of ZnO for protons *(7 pages)* 032801
Xu-Dong Zhao, Fei Mao, Shi-Ming Li, Bing-Sheng Li, Hong Mao, Feng Wang, and Feng-Shou Zhang

Formation of $\overline{\mathrm{H}}^{+}$ via electron-assisted three-body attachment of e^{+} to $\overline{\mathrm{H}}$ *(7 pages)* 032802
A. Jacob, C. Müller, and A. B. Voitkiv

Exact expressions for the height of the interatomic step in the exchange-correlation potential from the derivative discontinuity of the energy *(8 pages)* 032803
M. J. P. Hodgson

Dimensionality reduction of the many-body problem using coupled-cluster subsystem flow equations: Classical and quantum computing perspective *(15 pages)* 032804
Karol Kowalski

Rovibrational spin-averaged transitions in the hydrogen molecular ions *(6 pages)* 032806
Vladimir I. Korobov and J.-Ph. Karr

Ultrafast ring-opening fragmentation dynamics of $C_6H_6{}^{3+}$ induced by electron-impact ionization *(8 pages)* 032807
Jiaqi Zhou, Yutian Li, Yingying Wang, Shaokui Jia, Xiaorui Xue, Tao Yang, Zhen Zhang, Alexander Dorn, and Xueguang Ren

Defect theory of positronium and nontrivial QED relations *(7 pages)* 032808
David M. Jacobs

^2S Rydberg spectrum of the boron atom *(12 pages)* 032809
István Hornyák, Saeed Nasiri, Sergiy Bubin, and Ludwik Adamowicz

Radiative double-electron capture by fully stripped and one-electron ions in gas and thin-foil targets *(12 pages)* 032810
J. A. Tanis, D. S. La Mantia, and P. N. S. Kumara

Metastable states of Si^{-} observed in a cryogenic storage ring *(13 pages)* 032811
D. Müll, F. Grussie, K. Blaum, S. George, J. Göck, M. Grieser, R. von Hahn, Z. Harman, Á. Kálosi, C. H. Keitel, C. Krantz, C. Lyu, O. Novotný, F. Nuesslein, D. Paul, V. C. Schmidt, S. Singh, S. Sunil Kumar, X. Urbain, A. Wolf, and H. Kreckel

Symmetry breaking in electron-impact dissociative ionization of linear symmetric molecules *(5 pages)* 032812
Noboru Watanabe and Masahiko Takahashi

Calculation of energy loss in antiproton collisions with many-electron systems using Ehrenfest's theorem *(12 pages)* 032813
Hans Jürgen Lüdde, Marko Horbatsch, and Tom Kirchner

Fragmentation of $CF_4{}^{q+}$ ($q = 2, 3$) induced by 1-keV electron collisions *(11 pages)* 032814
Lei Chen, Enliang Wang, Xu Shan, Zhenjie Shen, Xi Zhao, and Xiangjun Chen

State-selective nonradiative electron capture in collisions of 95–197-MeV/u Xe^{54+} with Kr and Xe *(7 pages)* 032815
Bian Yang, Deyang Yu, Caojie Shao, Xiaohong Cai, Zhongwen Wu, Luyou Xie, Konstantin N. Lyashchenko, Yury S. Kozhedub, Kun Ma, Yingli Xue, Wei Wang, Mingwu Zhang, Junliang Liu, Rongchun Lu, Zhangyong Song, Yehong Wu, Fangfang Ruan, Yuezhao Zhang, Chenzhong Dong, and Zhihu 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 104, NUMBER 3** **SEPTEMBER 2021**

Photodissociation of water induced by a long UV pulse and probed by high-energy-resolution x-ray-absorption spectroscopy *(7 pages)* 032816
Viktoriia Savchenko, Ji-Cai Liu, Michael Odelius, Nina Ignatova, Faris Gel'mukhanov, Sergey Polyutov, and Victor Kimberg

High-n limit of quantum defects for high-ℓ strontium Rydberg states *(9 pages)* 032817
G. Fields, R. Brienza, F. B. Dunning, S. Yoshida, and J. Burgdörfer

Differential study of proton-helium collisions at intermediate energies: Elastic scattering, excitation, and electron capture *(11 pages)* 032818
K. H. Spicer, C. T. Plowman, I. B. Abdurakhmanov, A. S. Kadyrov, I. Bray, and Sh. U. Alladustov

Neutral and charged thorium impurity in solid argon *(8 pages)* 032819
A. V. Nikolaev and E. V. Tkalya

Resonance-induced ionization enhancement and suppression of circular states of the hydrogen atom in strong laser fields *(8 pages)* 032820
Yong Zhao, Yueming Zhou, Qinghua Ke, Jingtai Liang, Yijie Liao, Min Li, and Peixiang Lu

Exact time-dependent density-functional theory for nonperturbative dynamics of the helium atom *(6 pages)* 032821
Davood Dar, Lionel Lacombe, Johannes Feist, and Neepa T. Maitra

Leading-order relativistic corrections to the g factor of H_2^+ *(7 pages)* 032822
Jean-Philippe Karr

Population inversion in N_2^+ by vibrationally mediated Rabi oscillation at 400 nm *(8 pages)* 032823
Siqi Wang, Erik Lötstedt, Jincheng Cao, Yao Fu, Hongwei Zang, Helong Li, Toshiaki Ando, Atsushi Iwasaki, Kaoru Yamanouchi, and Huailiang Xu

Continuous radio-frequency electric-field detection through adjacent Rydberg resonance tuning *(8 pages)* 032824
Matthew T. Simons, Alexandra B. Artusio-Glimpse, Christopher L. Holloway, Eric Imhof, Steven R. Jefferts, Robert Wyllie, Brian C. Sawyer, and Thad G. Walker

Radiative and photon-exchange corrections to new-physics contributions to energy levels in few-electron ions *(11 pages)* 032825
V. Debierre and N. S. Oreshkina

Single- and double-electron capture in intermediate-energy $H^+ + Mg$ collisions *(8 pages)* 032826
J. W. Gao, Y. Y. Qi, Z. H. Yang, Z. M. Hu, Y. W. Zhang, Y. Wu, J. G. Wang, A. Dubois, and N. Sisourat

Response dynamics of an alkali-metal–noble-gas hybrid trispin system *(5 pages)* 032827
Guobin Liu, Vera Guarrera, Sihong Gu, and Shougang Zhang

PART B

Light-induced processes in atomic-scale systems

Optimized pulses for population transfer via laser-induced continuum structures *(9 pages)* 033101
Dionisis Stefanatos and Emmanuel Paspalakis

Extended quantitative rescattering model for simulating high-order harmonic streaking spectra by synchronization of an intense IR laser and a time-delayed attosecond XUV pulse *(11 pages)* 033102
Kan Wang, Baochang Li, Xiangyu Tang, Chenhui Xu, C. D. Lin, and Cheng Jin

(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 104, NUMBER 3** **SEPTEMBER 2021**

Role of reflections in the generation of a time delay in strong-field ionization *(14 pages)* 033103
Daniel Bakucz Canário, Michael Klaiber, Karen Z. Hatsagortsyan, and Christoph H. Keitel

Photofragmentation of large dimers into singly charged ions via the knockout mechanism *(12 pages)* 033104
B. Najjari and A. B. Voitkiv

Role of L-shell single and double core-hole production and decay in m-fold ($1 \leqslant m \leqslant 6$) photoionization of the Ar^+ ion *(21 pages)* 033105
A. Müller, M. Martins, A. Borovik, Jr., T. Buhr, A. Perry-Sassmannshausen, S. Reinwardt, F. Trinter, S. Schippers, S. Fritzsche, and A. S. Kheifets

Measurement of the dynamic polarizability of Dy atoms near the 626-nm intercombination line *(8 pages)* 033106
Marian Kreyer, Jeong Ho Han, Cornelis Ravensbergen, Vincent Corre, Elisa Soave, Emil Kirilov, and Rudolf Grimm

Optimal control for suppressing wave-packet spreading with strong nonresonant laser pulses *(12 pages)* 033107
Yukiyoshi Ohtsuki, Tomotaro Namba, Hiroyuki Katsuki, and Kenji Ohmori

Angular anisotropy parameters for photoionization delays *(14 pages)* 033108
Soumyajit Saha, Jimmy Vinbladh, Johan Sörngård, Anton Ljungdahl, and Eva Lindroth

Adiabatic expressions for the wave function of an electron in a finite-range potential and an intense low-frequency laser pulse *(16 pages)* 033109
A. V. Flegel, N. L. Manakov, Ia. V. Breev, and M. V. Frolov

Orientation dependence of high-order harmonic generation in graphene *(7 pages)* 033110
Yuntian Zhang, Liang Li, Jiapeng Li, Tengfei Huang, Pengfei Lan, and Peixiang Lu

Structured photoelectron distributions in photodetachment induced by trains of laser pulses: Vortices versus spirals *(13 pages)* 033111
Lei Geng, F. Cajiao Vélez, J. Z. Kamiński, Liang-You Peng, and K. Krajewska

Laser-assisted electron-atom radiative recombination in short laser pulses *(14 pages)* 033112
Deeksha Kanti, J. Z. Kamiński, Liang-You Peng, and K. Krajewska

High-order harmonic generation from twisted bilayer graphene driven by a midinfrared laser field *(14 pages)* 033113
Meiwen Du, Candong Liu, Zhinan Zeng, and Ruxin Li

Orbital-resolved calculations of two-center interferences in linear triatomic molecules *(8 pages)* 033114
Kyle A. Hamer, Daniel R. Tuthill, Timothy D. Scarborough, Louis F. DiMauro, Kenneth Lopata, Kenneth J. Schafer, Mette B. Gaarde, and François Mauger

Simple model for sequential multiphoton ionization by ultraintense x rays *(6 pages)* 033115
Xiang Li, Rebecca Boll, Daniel Rolles, and Artem Rudenko

Synchronous coherent population trapping and its magnetic spectral response in rubidium vapor *(10 pages)* 033116
Gour S. Pati, Renu Tripathi, Raghwinder S. Grewal, Mauricio Pulido, and Robin A. Depto

Strong-field approximation for high-order harmonic generation in infrared laser pulses in the accelerated Kramers-Henneberger frame *(10 pages)* 033117
Lars Bojer Madsen

Two-pulse interference and correlation in an attoclock *(8 pages)* 033118
Anatoli S. Kheifets, Joshua Cesca, Vladislav V. Serov, Kyung Taec Kim, and Igor A. Ivanov

(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 104, NUMBER 3** **SEPTEMBER 2021**

Ellipticity of the harmonic emission from graphene irradiated by a linearly polarized laser *(10 pages)* 033119
Fulong Dong, Qinzhi Xia, and Jie Liu

Ultracold systems and matter waves

Quantum Monte Carlo studies of a trimer scaling function with microscopic two- and three-body interactions *(13 pages)* 033301
Lucas Madeira, Tobias Frederico, Stefano Gandolfi, Lauro Tomio, and Marcelo T. Yamashita

Overlapping Bose-Einstein condensates of ^{23}Na and ^{133}Cs *(10 pages)* 033302
Claire Warner, Aden Z. Lam, Niccolò Bigagli, Henry C. Liu, Ian Stevenson, and Sebastian Will

Three-body bound states of two bosons and one impurity in one dimension *(9 pages)* 033303
Yanxia Liu, Yi-Cong Yu, and Shu Chen

Dynamics of spin-polarized impurity in ultracold Fermi gas *(10 pages)* 033304
Piotr Magierski, Buğra Tüzemen, and Gabriel Wlazłowski

Matter-wave interferometry with helium atoms in low-l Rydberg states *(9 pages)* 033305
J. D. R. Tommey and S. D. Hogan

Enhanced transport of two interacting quantum walkers in a one-dimensional quasicrystal with power-law hopping *(10 pages)* 033306
G. A. Domínguez-Castro and R. Paredes

Decoherence-free radio-frequency-dressed subspaces *(14 pages)* 033307
G. A. Sinuco-Leon, H. Mas, S. Pandey, G. Vasilakis, B. M. Garraway, and W. von Klitzing

Emission of particles from a parametrically driven condensate in a one-dimensional lattice *(8 pages)* 033308
L. Q. Lai, Y. B. Yu, and Erich J. Mueller

Measuring densities of cold atomic clouds smaller than the resolution limit *(6 pages)* 033309
A. Litvinov, P. Bataille, E. Maréchal, P. Pedri, O. Gorceix, M. Robert-de-Saint-Vincent, and B. Laburthe-Tolra

Quenched magneto-association of ultracold Feshbach molecules *(10 pages)* 033310
Kirk Waiblinger, Jason R. Williams, and José P. D'Incao

Matter waves, single-mode excitations of the matter-wave field, and the atomtronic transistor oscillator *(14 pages)* 033311
Dana Z. Anderson

Toolbox for elementary fermions with a dipolar Fermi gas in a three-dimensional optical lattice *(10 pages)* 033312
Shuai Li, Maksims Arzamasovs, Hongrong Li, Fuli Li, and Bo Liu

Radio-frequency evaporation in an optical dipole trap *(7 pages)* 033313
Raphael Lopes

Focusing of Bragg-outcoupled paraxial atom lasers *(14 pages)* 033314
R. Richberg and A. M. Martin

Impurity-induced quantum chaos for an ultracold bosonic ensemble in a double well *(12 pages)* 033315
Jie Chen, Kevin Keiler, Gao Xianlong, and Peter Schmelcher

Statistical mechanics of one-dimensional quantum droplets *(11 pages)* 033316
T. Mithun, S. I. Mistakidis, P. Schmelcher, and P. G. Kevrekidis

(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 104, NUMBER 3** **SEPTEMBER 2021**

Close-coupled model of Feshbach resonances in ultracold ^{3}He* and ^{4}He* atomic collisions *(7 pages)* 033317
T. M. F. Hirsch, D. G. Cocks, and S. S. Hodgman

Stability of a Bose-condensed mixture on a bubble trap *(16 pages)* 033318
Alex Andriati, Leonardo Brito, Lauro Tomio, and Arnaldo Gammal

Dilute quantum liquid in a K-Rb Bose mixture *(10 pages)* 033319
V. Cikojević, E. Poli, F. Ancilotto, L. Vranješ-Markić, and J. Boronat

Analytic-normal-mode frequencies for *N* identical particles: The microscopic dynamics underlying the emergence and stability of excitation gaps from BCS to unitarity *(22 pages)* 033320
D. K. Watson

Gravity effect on quantum resonance ratchet transport of cold atoms *(6 pages)* 033321
Anatole Kenfack

Stabilizing topological superfluidity of lattice fermions *(8 pages)* 033322
Junhua Zhang, Sumanta Tewari, and V. W. Scarola

Thermal stability of a quantum rotation sensor *(5 pages)* 033323
Ehsan Arabahmadi, Daniel Schumayer, Mark Edwards, Ben Eller, and David A. W. Hutchinson

Hyperspherical approach to dipolar droplets beyond the mean-field limit *(10 pages)* 033324
Eli J. Halperin and John L. Bohn

Generation of matter waves in Bose-Bose mixtures with helicoidal spin-orbit coupling *(13 pages)* 033325
Conrad Bertrand Tabi, Saravana Veni, and Timoléon Crépin Kofané

Dominant scattering channel induced by two-body collision of *D*-band atoms in a triangular optical lattice *(9 pages)* 033326
Xinxin Guo, Zhongcheng Yu, Peng Peng, Guoling Yin, Shengjie Jin, Xuzong Chen, and Xiaoji Zhou

Photonics, nonlinear optics, and optomechanics

Comparative study of Hermitian and non-Hermitian topological dielectric photonic crystals *(6 pages)* 033501
Menglin L. N. Chen, Li Jun Jiang, Shuang Zhang, Ran Zhao, Zhihao Lan, and Wei E. I. Sha

Thin-shell approximation of Mie theory for a thin anisotropic layer spaced away from a spherical core: Application to dye-coated nanostructures *(10 pages)* 033502
Chhayly Tang, Baptiste Auguié, and Eric C. Le Ru

Conversion of a basis-dependent superposition of orbital-angular-momentum states using a *q* plate *(10 pages)* . . . 033503
Sarvesh Bansal, Sushanta Kumar Pal, and P. Senthilkumaran

Static synthetic gauge field control of double optomechanically induced transparency in a closed-contour interaction scheme *(13 pages)* 033504
Beyza Sütlüoğlu and Ceyhun Bulutay

Exceptional-surface-enhanced rotation sensing with robustness in a whispering-gallery-mode microresonator *(8 pages)* 033505
Wenxiu Li, Yang Zhou, Peng Han, Xiaoyang Chang, Shuo Jiang, Anping Huang, Hao Zhang, and Zhisong Xiao

(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 104, NUMBER 3** **SEPTEMBER 2021**

Long-range propagation of ultrafast ionizing laser pulses in a resonant nonlinear medium *(13 pages)* 033506
G. Demeter, J. T. Moody, M. Á. Kedves, B. Ráczkevi, M. Aladi, A.-M. Bachmann, F. Batsch, F. Braunmüller, G. P. Djotyan, V. Fedosseev, F. Friebel, S. Gessner, E. Granados, E. Guran, M. Hüther, V. Lee, M. Martyanov, P. Muggli, E. Öz, H. Panuganti, L. Verra, and G. Zevi Della Porta

Conservation of the half-integer topological charge on propagation of a superposition of two Bessel-Gaussian beams *(8 pages)* 033507
V. V. Kotlyar, A. A. Kovalev, and A. G. Nalimov

Quantum estimation of coupling strengths in driven-dissipative optomechanics *(11 pages)* 033508
Kamila Sala, Tib Doicin, Andrew D. Armour, and Tommaso Tufarelli

Frequency-tunable transient Cherenkov radiation from an inhomogeneous medium *(13 pages)* 033509
Anton Pakhomov and Rostislav Arkhipov

Generalized parametric space, parity symmetry of reflection, and systematic design approach for parity-time-symmetric photonic systems *(8 pages)* 033510
Jeng Yi Lee and Pai-Yen Chen

Magnomechanical phonon laser beyond the steady state *(9 pages)* 033511
Saeid Vashahri-Ghamsari, Qing Lin, Bing He, and Min Xiao

Morphology-dependent resonances in homogeneous and core-shell nonspherical particles *(16 pages)* 033512
Benjamin Vennes and Thomas C. Preston

Two-point polarization correlations of random paraxial and nonparaxial electromagnetic fields *(8 pages)* 033513
Mengwen Guo, Haidan Mao, Daomu Zhao, Ari T. Friberg, and Tero Setälä

Intracavity field dynamics near avoided mode crossing in a concentric silicon-nitride ring resonator *(11 pages)* . . . 033514
Maitrayee Saha, Samudra Roy, and Shailendra K. Varshney

Moment-based superresolution: Formalism and applications *(18 pages)* 033515
Giacomo Sorelli, Manuel Gessner, Mattia Walschaers, and Nicolas Treps

℘ Spin-orbit splitting of Ar^+, Kr^+, and Kr^{2+} determined by strong-field ultrahigh-resolution Fourier-transform spectroscopy *(10 pages)* 033516
Toshiaki Ando, Alex Liu, Naoki Negishi, Atsushi Iwasaki, and Kaoru Yamanouchi

Femtosecond laser-induced quantum-beat superfluorescence of atomic oxygen in a flame *(8 pages)* 033517
Pengji Ding, Christian Brackmann, Maria Ruchkina, Mingyang Zhuzou, Luojia Wang, Luqi Yuan, Yi Liu, Bitao Hu, and Joakim Bood

Ultrawide shifting of the laser pulse wavelength in a multicore tellurite fiber with two zero-dispersion wavelengths *(11 pages)* 033518
S. A. Skobelev, A. A. Balakin, E. A. Anashkina, A. V. Andrianov, and A. G. Litvak

℘ Diagrammatic approach to classical coherent two-dimensional infrared spectroscopy *(15 pages)* 033519
Mike Reppert and Deborah Reppert

Hydrodynamics of noncircular vortices in beams of light and other two-dimensional fluids *(13 pages)* 033520
Jasmine M. Andersen, Andrew A. Voitiv, Mark E. Siemens, and Mark T. Lusk

Precision limit for simultaneous phase and transmittance estimation with phase-shifting interferometry *(6 pages)* 033521
Ryo Okamoto and Tatsuki Tahara

(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 104, NUMBER 3** **SEPTEMBER 2021**

Nonreciprocal chaos in a spinning optomechanical resonator *(7 pages)* 033522
Deng-Wei Zhang, Li-Li Zheng, Cai You, Chang-Sheng Hu, Ying Wu, and Xin-You Lü

Longitudinal angular momentum in Mie scattering from a magneto-optically active sphere: QED correction to the Einstein–de Haas effect *(12 pages)* 033523
B. A. van Tiggelen

Bio-inspired method for generating self-trapped beams in the nonlinear Schrödinger equation *(11 pages)* 033524
Daniel Torres-Valladares, Felipe J. Villaseñor-Cavazos, and Servando Lopez-Aguayo

Delay-differential-equation model for mode-locked lasers based on nonlinear optical and amplifying loop mirrors *(8 pages)* 033525
A. G. Vladimirov, S. Suchkov, G. Huyet, and S. K. Turitsyn

Quantum optics

Nonequilibrium thermal transport and photon squeezing in a quadratic qubit-resonator system *(10 pages)* 033701
Chen Wang, Hua Chen, and Jie-Qiao Liao

Superradiance and anomalous hyperfine splitting in inhomogeneous ensembles *(14 pages)* 033702
Petar Andrejić and Adriana Pálffy

Quantum-optical description of photon statistics and cross correlations in high-order harmonic generation *(17 pages)* 033703
Ákos Gombkötő, Péter Földi, and Sándor Varró

Collective multipartite Einstein-Podolsky-Rosen steering via cascaded four-wave mixing of rubidium atoms *(14 pages)* 033704
Yang Liu, Yin Cai, Binshuo Luo, Jin Yan, Mengqi Niu, Feng Li, and Yanpeng Zhang

Nonreciprocal photon transmission with quantum noise reduction via cross-Kerr nonlinearity *(11 pages)* 033705
Yi-Bing Qian, Deng-Gao Lai, Mei-Ran Chen, and Bang-Pin Hou

Optical normal-mode-induced phonon-sideband splitting in the photon-blockade effect *(13 pages)* 033706
Hong Deng, Fen Zou, Jin-Feng Huang, and Jie-Qiao Liao

Nonreciprocal photon blockade and directional amplification in a spinning resonator coupled to a two-level atom *(9 pages)* 033707
Yu-Wei Jing, Hai-Quan Shi, and Xun-Wei Xu

Nonreciprocal high-order sidebands induced by magnon Kerr nonlinearity *(10 pages)* 033708
Mei Wang, Cui Kong, Zhao-Yu Sun, Duo Zhang, Yu-Ying Wu, and Li-Li Zheng

Quantum Rabi model with dissipation and qubit driving *(17 pages)* 033709
L. O. Castanos-Cervantes

Coherent single-photon scattering spectra for a giant-atom waveguide-QED system beyond the dipole approximation *(11 pages)* 033710
Q. Y. Cai and W. Z. Jia

Superradiant emission of a thermal atomic beam into an optical cavity *(20 pages)* 033711
Simon B. Jäger, Haonan Liu, John Cooper, Travis L. Nicholson, and Murray J. Holland

Generalized adiabatic approximation to the quantum Rabi model *(10 pages)* 033712
Zi-Min Li and Murray T. Batchelor

(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 104, NUMBER 3** **SEPTEMBER 2021**

Quantum-controlled cluster states *(8 pages)* 033713
R. F. Barros, G. B. Alves, O. Pfister, and A. Z. Khoury

Quantum memory of single-photon polarization qubits via double electromagnetically induced transparency *(13 pages)* 033714
Qi Zhang and Guoxiang Huang

Quantum state truncation using an optical parametric amplifier and a beam splitter *(9 pages)* 033715
E. P. Mattos and A. Vidiella-Barranco

Dipole-dipole-interaction–driven antiblockade of two Rydberg atoms *(13 pages)* 033716
Shi-Lei Su and Weibin Li

Heralding on the detection of zero photons *(8 pages)* 033717
C. M. Nunn, J. D. Franson, and T. B. Pittman

Exploiting the photonic nonlinearity of free-space subwavelength arrays of atoms *(22 pages)* 033718
Cosimo C. Rusconi, Tao Shi, and J. Ignacio Cirac

Tuning the universality class of phase transitions by feedback: Open quantum systems beyond dissipation *(13 pages)* 033719
D. A. Ivanov, T. Yu. Ivanova, S. F. Caballero-Benitez, and I. B. Mekhov

ERRATA

Erratum: Eigenstate clustering around exceptional points [Phys. Rev. A **102**, 032203 (2020)] *(1 page)* . . . . . 039901(E)
C. Yuce

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).