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 110, NUMBER 3
PARTS A AND B

CONTENTS

SEPTEMBER 2024

The Table of Contents is a total listing of Parts A and B.
Part A consists of pages 030101–032624, and Part B pages 032801–039902(E).

PART A

Perspectives

Interactions mediated by atoms, photons, electrons, and excitons *(21 pages)* 030101
Rosario Paredes, Georg Bruun, and Arturo Camacho-Guardian

LETTERS

Fundamental concepts

Angular momentum flow without anything carrying it *(6 pages)* L030201
Yakir Aharonov, Daniel Collins, and Sandu Popescu

Unitary collapse of Schrödinger's cat state *(6 pages)* L030202
Pavel Stránský, Pavel Cejnar, and Radim Filip

Quantum information science

First-principles construction of symmetry-informed quantum metrologies *(6 pages)* L030401
Jesús Rubio

Atomic and molecular structure and dynamics; high-precision experiments

Systematic-free limit on new light scalar bosons via isotope-shift spectroscopy in Ca^+ *(6 pages)* L030801
Timothy T. Chang, Bless Bah Awazi, Julian C. Berengut, Elina Fuchs, and S. Charles Doret

High-accuracy measurements of core-excited transitions in light Li-like ions *(7 pages)* L030802
Moto Togawa, Steffen Kühn, Chintan Shah, Vladimir A. Zaytsev, Natalia S. Oreshkina, Jens Buck, Sonja Bernitt, René Steinbrügge, Jörn Seltmann, Moritz Hoesch, Christoph H. Keitel, Thomas Pfeifer, Maurice A. Leutenegger, and José R. Crespo López-Urrutia

Exactly solvable model of light-scattering errors in quantum simulations with metastable trapped-ion qubits *(7 pages)* L030803
Phillip C. Lotshaw, Brian C. Sawyer, Creston D. Herold, and Gilles Buchs

Electric-field-dependent *g* factors of a YbOH molecule *(5 pages)* L030804
Alexander Petrov

(Continued)

2469-9926(202409)110:3:A;1-V

This paper was highlighted in the APS publication *Physics* (physics.aps.org).

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 110, NUMBER 3 SEPTEMBER 2024

Light-induced processes in atomic-scale systems

Generation of vortex electrons by atomic photoionization *(7 pages)* L031101
I. I. Pavlov, A. D. Chaikovskaia, and D. V. Karlovets

Ultracold systems and matter waves

Generalized cold-atom simulators for vacuum decay *(7 pages)* L031301
Alexander C. Jenkins, Ian G. Moss, Thomas P. Billam, Zoran Hadzibabic, Hiranya V. Peiris, and Andrew Pontzen

Quantum optics

Determining the absolute number density of a thermal vapor via photon correlations *(6 pages)* L031701
Sofia Ribeiro, Adrián Juan-Delgado, and Simon A. Gardiner

Nontrivial intensity correlation from a coherent continuous-wave laser beam *(6 pages)* L031702
Binod Joshi, Thomas A. Smith, and Yanhua Shih

Improving on-demand single-photon-source coherence and indistinguishability through a time-delayed coherent feedback *(7 pages)* L031703
Gavin Crowder, Lora Ramunno, and Stephen Hughes

ARTICLES

Fundamental concepts

Effects of topological boundary conditions on Bell nonlocality *(15 pages)* 032201
Patrick Emonts, Mengyao Hu, Albert Aloy, and Jordi Tura

Generation of γ photons with extremely large orbital angular momenta *(14 pages)* 032202
Ren-Tong Guo, Mamutjan Ababekri, Qian Zhao, Yousef I. Salamin, Liang-Liang Ji, Zhi-Gang Bu, Zhong-Feng Xu, Xiu-Feng Weng, and Jian-Xing Li

Magnetically induced Schrödinger cat states: The shadow of a quantum space *(15 pages)* 032204
Partha Nandi, Nandita Debnath, Subhajit Kala, and A. S. Majumdar

Stable collective charging of ultracold-atom quantum batteries *(6 pages)* 032205
Abel Rojo-Francàs, Felipe Isaule, Alan C. Santos, Bruno Juliá-Díaz, and Nikolaj Thomas Zinner

Krylov spread complexity of quantum walks *(7 pages)* 032206
Bhilahari Jeevanesan

Interplay of finite- and infinite-size stability in quadratic bosonic Lindbladians *(30 pages)* 032207
Mariam Ughrelidze, Vincent P. Flynn, Emilio Cobanera, and Lorenza Viola

Unifying uncertainties for rotorlike quantum systems *(13 pages)* 032208
Ladislav Mišta, Jr., Matouš Mišta, and Zdeněk Hradil

Future-input-dependent model for Greenberger-Horne-Zeilinger correlations *(7 pages)* 032209
Izhar Neder and Nathan Argaman

Quantum thermodynamics of the spin-boson model using the principle of minimal dissipation *(9 pages)* 032210
Salvatore Gatto, Alessandra Colla, Heinz-Peter Breuer, and Michael Thoss

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).
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 110, NUMBER 3** **SEPTEMBER 2024**

Quantum battery with interactive atomic collective charging *(8 pages)* 032211
Dayang Zhang, Shuangquan Ma, Yunxiu Jiang, Youbin Yu, Guangri Jin, and Aixi Chen

Creating dynamic leakage-free paths using coarse-graining techniques in the presence of decoherence *(12 pages)* 032212
S. L. Wu, W. Ma, and Lian-Ao Wu

Noise-induced coherent ergotropy of a quantum heat engine *(7 pages)* 032213
Manash Jyoti Sarmah and Himangshu Prabal Goswami

Quantum violations of joint reality *(8 pages)* 032214
R. A. Caetano and R. M. Angelo

Performance advantage of protective quantum measurements *(6 pages)* 032215
Maximilian Schlosshauer

Fundamental constants from photon-photon scattering in three-beam collisions *(16 pages)* 032216
A. J. MacLeod and B. King

Convexity of noncontextual wirings and how they order the set of correlations *(20 pages)* 032217
Tiago Santos, Rafael Wagner, and Bárbara Amaral

Optimal performance of a three-stroke heat engine in the microscopic regime *(15 pages)* 032218
Tanmoy Biswas and Chandan Datta

Nonadiabatic evolution and thermodynamics for a boundary-driven system with a weak intrasubsystem interaction *(18 pages)* 032219
Chao Jiang and Lei Shao

Ergodic and chaotic properties in a Tavis-Cummings dimer: Quantum and classical limit *(14 pages)* 032220
Tamoghna Ray and Manas Kulkarni

Quantum information science

Markovian-feedback-controlled entanglement and Einstein-Podolsky-Rosen steering in a nondegenerate optical parametric oscillator *(13 pages)* 032401
Ben-yuan Zhou, Ni Pan, Li Yu, and Gao-xiang Li

Flexible entangled-state generation in linear optics *(17 pages)* 032402
Brendan Pankovich, Alex Neville, Angus Kan, Srikrishna Omkar, Kwok Ho Wan, and Kamil Brádler

Conditions for separability in multiqubit systems with an accelerating qubit using a conditional entropy *(16 pages)* 032403
Harsha Miriam Reji, Hemant S. Hegde, and R. Prabhu

Coherent interaction-free detection of noise *(14 pages)* 032404
John J. McCord, Shruti Dogra, and Gheorghe Sorin Paraoanu

Number of bits returned by a quantum estimation *(10 pages)* 032405
Xi Lu, Wojciech Górecki, Chiara Macchiavello, and Lorenzo Maccone

Controllable and tunable topological multiport beam splitter in an extended Su-Schrieffer-Heeger array *(9 pages)* 032406
Ming-jie Liao, Mei-Song Wei, Yi-Qing Wang, Jingping Xu, and Yaping Yang

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).

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 110, NUMBER 3** **SEPTEMBER 2024**

Correspondence between quasiparticle dissipation and quantum information decay in open quantum systems *(14 pages)* 032407
Zihang Wang and Dirk Bouwmeester

Estimating correlations and entanglement in the two-dimensional Heisenberg model in the strong-rung-coupling limit *(17 pages)* 032408
Chandrima B. Pushpan, Harikrishnan K J, Prithvi Narayan, and Amit Kumar Pal

Tensor rank and other multipartite entanglement measures of graph states *(12 pages)* 032409
Louis Schatzki, Linjian Ma, Edgar Solomonik, and Eric Chitambar

Geometric quantum discord of an arbitrary two-qudit state: Exact value and general upper bounds *(10 pages)* 032410
Elena R. Loubenets and Louis Hanotel

Concatenated Steane code with single-flag syndrome checks *(13 pages)* 032411
Balint Pato, Theerapat Tansuwannont, and Kenneth R. Brown

Implementation of controlled-NOT quantum gate by nonlinear coupled electro-nano-optomechanical oscillators *(11 pages)* 032412
Reihaneh Alinaghipour and Hamidreza Mohammadi

Quantum resource theory of coding for error correction *(10 pages)* 032413
Dong-Sheng Wang, Yuan-Dong Liu, Yun-Jiang Wang, and Shunlong Luo

Bipartite representations and many-body entanglement of pure states of N indistinguishable particles *(18 pages)* 032414
J. A. Cianciulli, R. Rossignoli, M. Di Tullio, N. Gigena, and Federico Petrovich

Robust estimation of nonlinear properties of quantum processes *(20 pages)* 032415
Yuqing Wang, Guoding Liu, Zhenhuan Liu, Yifan Tang, Xiongfeng Ma, and Hao Dai

Error mitigation, optimization, and extrapolation on a trapped-ion testbed *(18 pages)* 032416
Oliver G. Maupin, Ashlyn D. Burch, Brandon Ruzic, Christopher G. Yale, Antonio Russo, Daniel S. Lobser, Melissa C. Revelle, Matthew N. Chow, Susan M. Clark, Andrew J. Landahl, and Peter J. Love

Phase entanglement negativity for bipartite fermionic systems *(12 pages)* 032417
Bing Xu, Xiaofei Qi, and Jinchuan Hou

Quantum Hopfield model with dilute memories *(10 pages)* 032418
Rongfeng Xie and Alex Kamenev

Dimensional advantage in secure information trading via the noisy dense-coding protocol *(12 pages)* 032419
Ayan Patra, Rivu Gupta, Tamoghna Das, and Aditi Sen(De)

Quantifying genuine tripartite entanglement by reshaping the state *(6 pages)* 032420
Dong-Dong Dong, Li-Juan Li, Xue-Ke Song, Liu Ye, and Dong Wang

Improving the performance of digitized counterdiabatic quantum optimization via algorithm-oriented qubit mapping *(26 pages)* 032421
Yanjun Ji, Kathrin F. Koenig, and Ilia Polian

Demonstration of superior communication through thermodynamically free channels in an optical quantum switch *(6 pages)* 032422
Hao Tang, Yu Guo, Xiao-Min Hu, Yun-Feng Huang, Bi-Heng Liu, Chuan-Feng Li, and Guang-Can Guo

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).

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 110, NUMBER 3** **SEPTEMBER 2024**

Reliable quantum memories with unreliable components *(13 pages)* 032423
Anuj K. Nayak, Eric Chitambar, and Lav R. Varshney

Shallow-depth variational quantum hypothesis testing *(9 pages)* 032424
Mahadevan Subramanian and Sai Vinjanampathy

Recursive expansion of Tanner graph: A method to construct stabilizer codes with high coding rate *(10 pages)* . . . 032425
Zhengzhong Yi, Zhipeng Liang, Zicheng Wang, Jiahan Chen, Chen Qiu, Yulin Wu, and Xuan Wang

Nonlocal growth of quantum conditional mutual information under decoherence *(17 pages)* 032426
Yifan Zhang and Sarang Gopalakrishnan

Self-testing of semisymmetric informationally complete measurements in a qubit prepare-and-measure scenario *(11 pages)* 032427
Gábor Drótos, Károly F. Pál, and Tamás Vértesi

Entanglement classification and non-k-separability certification via Greenberger-Horne-Zeilinger-class fidelity *(15 pages)* 032428
Marcin Płodzień, Jan Chwedeńczuk, Maciej Lewenstein, and Grzegorz Rajchel-Mieldzioć

Loss-tolerant and supersensitive angular rotation estimation based on quantum-enhanced interferometers *(12 pages)* 032429
Wenxiu Yao, Xiaoli Zhang, Long Tian, Xuan Liu, Shaoping Shi, and Yaohui Zheng

Encoding Majorana codes *(9 pages)* 032430
Maryam Mudassar, Riley W. Chien, and Daniel Gottesman

Spectrum-based shortcut method for topological systems *(7 pages)* 032431
Jian Xu, Feng Mei, and Yan-Qing Zhu

Memory effects in a sequence of measurements of noncommuting observables *(13 pages)* 032432
Sophia M. Walls and Ian J. Ford

Correlated source coding with quantum side information at two decoders *(9 pages)* 032433
Xiaomin Liu, Feiran Cheng, and Zhengjun Xi

Provable advantages of kernel-based quantum learners and quantum preprocessing based on Grover's algorithm *(9 pages)* 032434
T. Muser, E. Zapusek, V. Belis, and F. Reiter

Refined Tsirelson bounds on multipartite Bell inequalities *(8 pages)* 032435
Rain Lenny, Dana Ben Porath, and Eliahu Cohen

Fisher-information susceptibility for multiparameter quantum estimation *(11 pages)* 032436
Francesco Albarelli, Ilaria Gianani, Marco G. Genoni, and Marco Barbieri

Witnessing network topologies using quantum nonlocality *(10 pages)* 032437
Shu-Yuan Yang, Kan He, Jin-Chuan Hou, Zhi-Hao Ma, Shao-Ming Fei, and Ming-Xing Luo

Hong-Ou-Mandel interference in a temporal-average-inversion-symmetric chain *(10 pages)* 032438
Shi Hu, Meiqing Hu, Shihao Li, Zihui Zhong, and Zhoutao Lei

Toward optimal circuit size for sparse quantum state preparation *(9 pages)* 032439
Rui Mao, Guojing Tian, and Xiaoming Sun

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).
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 110, NUMBER 3 SEPTEMBER 2024

Quantum technologies

Experimental investigation of quantum discord in spin-orbit X states *(15 pages)* 032601
V. S. Lamego, D. G. Braga, W. F. Balthazar, and J. A. O. Huguenin

Atomic clock interferometry using optical tweezers *(10 pages)* 032602
Ilan Meltzer and Yoav Sagi

Quantum repeater node with free-space coupled trapped ions *(12 pages)* 032603
Max Bergerhoff, Omar Elshehy, Stephan Kucera, Matthias Kreis, and Jürgen Eschner

Tomography-assisted noisy quantum circuit simulator using matrix product density operators *(13 pages)* 032604
Wei-guo Ma, Yun-Hao Shi, Kai Xu, and Heng Fan

Harnessing coherence generation for precision single- and two-qubit quantum thermometry *(9 pages)* 032605
Y. Aiache, A. El Allati, and K. El Anouz

Simulating optically active spin defects with a quantum computer *(15 pages)* 032606
Jack S. Baker, Pablo A. M. Casares, Modjtaba Shokrian Zini, Jaydeep Thik, Debasish Banerjee, Chen Ling, Alain Delgado, and Juan Miguel Arrazola

Combining physics-informed neural networks with the freezing mechanism for general Hamiltonian learning *(8 pages)* 032607
Leonardo K. Castelano, Iann Cunha, Fabricio S. Luiz, Reginaldo de Jesus Napolitano, Marcelo V. de Souza Prado, and Felipe F. Fanchini

Information trapping in quantum communications *(10 pages)* 032608
Seyed Mohammad Hosseiny, Jamileh Seyed-Yazdi, and Milad Norouzi

Simple quantum algorithm to efficiently prepare sparse states *(10 pages)* 032609
Debora Ramacciotti, Andreea I. Lefterovici, and Antonio F. Rotundo

Quantum sensing of ultralow temperature in biwire ultracold polar molecules *(8 pages)* 032611
Abdelâali Boudjemâa, Karima Abbas, Asma Tahar Taiba, and Qing-Shou Tan

Long-lived coherences in strongly interacting spin ensembles *(8 pages)* 032612
William K. Schenken, Simon A. Meynell, Francisco Machado, Bingtian Ye, Claire A. McLellan, Maxime Joos, V. V. Dobrovitski, Norman Y. Yao, and Ania C. Bleszynski Jayich

Quantum aggregation with temporal delay *(9 pages)* 032613
Nicolò Lo Piparo, William J. Munro, and Kae Nemoto

Robust two-qubit gate with reinforcement learning and dropout *(12 pages)* 032614
Tian-Niu Xu, Yongcheng Ding, José D. Martín-Guerrero, and Xi Chen

Four-qubit photonic system for publicly verifiable quantum random numbers and generation of public and private key *(11 pages)* 032615
Mayalakshmi Kolangatt, Anirudh Verma, Sujai Matta, Kanad Sengupta, and C. M. Chandrashekar

Parallel two-qubit entangling gates via a quantum nondemolition interaction controlled by rotation *(14 pages)* . . . 032616
E. A. Vashukevich and T. Yu. Golubeva

Multipartite multiplexing strategies for quantum routers *(11 pages)* 032617
Julia A. Kunzelmann, Hermann Kampermann, and Dagmar Bruß

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).

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 110, NUMBER 3 SEPTEMBER 2024

Robustness and symmetry of deterministic quantum entanglement swapping *(11 pages)* 032618
Hao Zhao and Chuanjia Shan

High-fidelity and robust controlled-Z gates implemented with Rydberg atoms via echoing rapid adiabatic passage *(7 pages)* 032619
Ming Xue, Shijie Xu, Xinwei Li, and Xiangliang Li

Toward quantum simulation of non-Markovian open quantum dynamics: A universal and compact theory *(13 pages)* 032620
Xiang Li, Su-Xiang Lyu, Yao Wang, Rui-Xue Xu, Xiao Zheng, and YiJing Yan

Extended-Josephson-junction qubit system *(14 pages)* 032621
Andrey Grankin, Alicia J. Kollár, and Mohammad Hafezi

Improving continuous-variable quantum channels with unitary averaging *(10 pages)* 032622
S. Nibedita Swain, Ryan J. Marshman, Peter P. Rohde, Austin P. Lund, Alexander S. Solntsev, and Timothy C. Ralph

Communication cost in simulating unknown entangled states *(6 pages)* 032623
Kelvin Onggadinata, Paweł Kurzyński, and Dagomir Kaszlikowski

Occupation-number quantum-subspace-expansion approach to computing the single-particle Green function: An opportunity for noise filtering *(11 pages)* 032624
B. Gauthier, P. Rosenberg, A. Foley, and M. Charlebois

PART B

Atomic and molecular structure and dynamics; high-precision experiments

Hyperfine-induced frequency shifts for the candidate clock transitions in the $^{61}Ni^{12+}$ ion *(11 pages)* 032801
Ting-xian Zhang, Cheng-bin Li, and Ting-yun Shi

Time-dependent semiclassical scattering dynamics: Electronically elastic and charge-transfer study of $H^+ + O_2$ at keV collision energies *(11 pages)* 032802
Deboki Reja and Sanjay Kumar

Elucidating the roles of collision energy and photon momentum transfer in the formation of ultralong-range Rydberg molecules *(7 pages)* 032803
C. Wang, Y. Lu, S. K. Kanungo, F. B. Dunning, T. C. Killian, and S. Yoshida

Heavy-particle quantum electrodynamics *(7 pages)* 032804
Krzysztof Pachucki and Vladimir A. Yerokhin

State-selective charge exchange in collisions of multiply charged ions with H_2 *(12 pages)* 032805
N. D. Cariatore and S. Otranto

Double electron capture in O^{6+} + He collisions *(9 pages)* 032806
M. X. Ma, T. Meng, B. Tu, P. Ma, Y. W. Zhang, L. Liu, J. Xiao, K. Yao, Y. Zou, Y. Wu, J. G. Wang, and B. Wei

Transition frequencies, isotope shifts, and hyperfine structure in $4s \rightarrow 4p$ transitions of stable Ti^+ ions *(9 pages)* 032807
Tim Ratajczyk, Kristian König, Philipp Bollinger, Tim Lellinger, Victor Varentsov, Wilfried Nörtershäuser, and Julien Spahn

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).

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 110, NUMBER 3** **SEPTEMBER 2024**

Motional Stark effect on bound-free spectra *(10 pages)* 032808
Thomas A. Gomez, Mark C. Zammit, Christopher J. Fontes, Igor Bray, and Jackson White

Isotope-shift measurement of the 423-nm transition in neutral Ca *(7 pages)* 032809
David Röser, Lukas Möller, Hans Keßler, and Simon Stellmer

Unified treatment of atomic excitation and ionization *(5 pages)* 032810
N. W. Antonio, I. Bray, and A. S. Kadyrov

Machine-learning models for atom-diatom reactions across isotopologues *(10 pages)* 032811
Daniel Julian, Rian Koots, and Jesús Pérez-Ríos

Direct measurement of isotope shifts in the barium $6s^2\ {}^1S_0 - 5d6p\ {}^3D_1^o$ transition *(8 pages)* 032812
Jungwoo Choi, Eunhwi Lee, Dahyun Yum, Kyungwon An, and Junki Kim

Cooperative atomic emission from a line of atoms interacting with a resonant plane surface *(9 pages)* 032813
M. O. Araújo, J. C. de Aquino Carvalho, Ph. W. Courteille, and A. Laliotis

Separation of various higher-order effects in the ionization of helium by proton impact *(8 pages)* 032814
S. Majumdar, S. Bastola, A. Hasan, R. Lomsadze, and M. Schulz

Vacuum-polarization Wichmann-Kroll correction in the finite-basis-set approach *(11 pages)* 032815
V. K. Ivanov, S. S. Baturin, D. A. Glazov, and A. V. Volotka

Relativistic and recoil corrections to vacuum polarization in muonic systems: Three-photon exchange, gauge invariance, and numerical values *(14 pages)* 032816
Gregory S. Adkins and Ulrich D. Jentschura

Combined microwave and optical spectroscopy for hyperfine structure analysis in thulium atoms *(9 pages)* 032817
Denis Mishin, Dmitry Tregubov, Nikolay Kolachevsky, and Artem Golovizin

Precision measurement of the absolute energy of the $2s3s\ {}^1S_0$ state in neutral ^{9}Be *(6 pages)* 032818
K. J. Ahrendsen, T. Karani, and W. D. Williams

Differential polarizability of the strontium intercombination transition at 1064.7 nm *(8 pages)* 032819
Romaric Journet, Félix Faisant, Sanghyeop Lee, and Marc Cheneau

Reexamination of vacuum-polarization corrections to the self-energy in muonic bound systems *(10 pages)* 032820
B. Ohayon and U. D. Jentschura

Multiply differential study of vibrational dissociative capture in $p + D_2$ collisions *(8 pages)* 032821
S. Majumdar, A. Hasan, S. Bastola, B. R. Lamichhane, R. Lomsadze, and M. Schulz

Light-induced processes in atomic-scale systems

Role of spontaneously transferred coherence in laser cooling *(8 pages)* 033101
Rajnandan Choudhury Das, Thilagaraj Ravi, Samir Khan, and Kanhaiya Pandey

Laser-induced k-alignment echoes and 4π phase-space analysis *(7 pages)* 033102
Chenxu Lu, Long Xu, Lianrong Zhou, Menghang Shi, Peifen Lu, Kang Lin, and Jian Wu

Anisotropic polarizability of Dy at 532 nm on the intercombination transition *(10 pages)* 033103
Damien Bloch, Britton Hofer, Sam R. Cohen, Maxence Lepers, Antoine Browaeys, and Igor Ferrier-Barbut

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).

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 110, NUMBER 3** **SEPTEMBER 2024**

Gain-assisted control of the photonic spin Hall effect *(7 pages)* 033104
Muhammad Waseem, Muzamil Shah, and Gao Xianlong

Spin-noise-induced synchronization between non-overlapping laser beams *(11 pages)* 033105
Shiming Song, Min Jiang, Yushu Qin, Ze Wu, Haowen Su, Ren-bao Liu, Dieter Suter, and Xinhua Peng

Coulomb effects on strong-field ionization of stretched H_2^+ *(14 pages)* 033106
S. Q. Shen, Z. Y. Chen, S. Wang, J. Y. Che, and Y. J. Chen

Generation of vortex electrons in tunneling ionization of polyatomic molecules: Exact results in the zero-range potential model *(21 pages)* 033107
Kirill V. Bazarov and Oleg I. Tolstikhin

Relativistic and spin-orbit dynamics at nonrelativistic intensities in strong-field ionization *(20 pages)* 033108
Andrew S. Maxwell and Lars Bojer Madsen

Local-field corrections of the Green's tensor in chiral media *(11 pages)* 033109
Janine C. Franz, Stefan Yoshi Buhmann, and A. Salam

Generation of high-order harmonics with hybrid spin and transverse orbital angular momentum from a crystalline solid *(13 pages)* 033110
Jianing Zhang, Zijian Lyu, Lei Geng, Xiulan Liu, Yunquan Liu, and Liang-You Peng

Enhanced high-order harmonic generation by spatially-structured-light–induced topological-edge-state dynamics *(7 pages)* 033111
Jianghua Luo, Jiajun Xiao, Zhongwei Wu, Yang Li, Xiaosong Zhu, and Yueming Zhou

Spectral evidence of vibronic Rabi oscillations in the resonance-enhanced photodissociation of MgH^+ *(12 pages)* 033112
Dilfuza Umarova, Otabek Umarov, Attila Tóth, and András Csehi

High-order harmonic generation from Su-Schrieffer-Heeger chains with edge states: Three-step processes and their interference *(12 pages)* 033113
Chuan Yu

Multichannel photoionization of cold strontium atoms *(9 pages)* 033114
Shushu Ruan, Yongyan Han, Zhenjie Shen, Xinglong Yu, Yong-Kang Fang, Xincheng Wang, Ahai Chen, Jie Liu, Zhixian Wu, Kiyoshi Ueda, Matthias Weidemüller, Bing Zhu, Liang-You Peng, and Yuhai Jiang

Enhanced micromotion compensation using a phase-modulated light field *(7 pages)* 033115
K. J. Arnold, N. Jayjong, M. L. D. Kang, Qin Qichen, Zhao Zhang, Qi Zhao, and M. D. Barrett

Dressing trapped ions with integrated wires *(6 pages)* 033116
R. T. Sutherland

Quantum electrodynamics study of polarization effects on the properties of high harmonics of an intense ultrashort laser pulse interacting with relativistic electrons *(9 pages)* 033117
Ziqiang Shao, Quanli Dong, Dongning Yue, Hao Teng, Zhiyi Wei, Min Chen, and Jie Zhang

Long-lived electronic coherences in molecular wave packets probed with pulse-shape spectroscopy *(9 pages)* 033118
Brian Kaufman, Philipp Marquetand, Tamás Rozgonyi, and Thomas Weinacht

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).
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 110, NUMBER 3 SEPTEMBER 2024

Ballistic and delayed photodissociation channels in the $\tilde{B}\,2\,^1A_1$ state of water studied with resonant inelastic x-ray scattering *(9 pages)* 033119
Nina Ignatova, Victor Kimberg, Faris Gel'mukhanov, Annette Pietzsch, Sebastian Eckert, Mattis Fondell, Brian Kennedy, Marcus Dantz, Thorsten Schmitt, Michael Odelius, Alexander Föhlisch, and Vinícius Vaz da Cruz

Ultracold systems and matter waves

Loop current states and their stability in small fractal lattices of Bose-Einstein condensates *(17 pages)* 033301
Georg Koch and Anna Posazhennikova

Partial confinement in a quantum-link simulator *(11 pages)* 033302
Zheng Tang, Fei Zhu, Yi-Fan Luo, Wei Zheng, and Li Chen

Josephson dynamics and localization revivals in ultradilute quantum liquids *(9 pages)* 033303
Piotr Wysocki, Krzysztof Jachymski, Grigori E. Astrakharchik, and Marek Tylutki

Complex-valued in-medium potential between heavy impurities in ultracold atoms *(14 pages)* 033304
Yukinao Akamatsu, Shimpei Endo, Keisuke Fujii, and Masaru Hongo

Universality of Efimov states in highly mass-imbalanced cold-atom mixtures with van der Waals and dipole interactions *(19 pages)* 033305
Kazuki Oi, Pascal Naidon, and Shimpei Endo

Spectrum of density, spin, and pairing fluctuations of an attractive two-dimensional Fermi gas *(10 pages)* 033306
Christian Apostoli, Patrick Kelly, Annette Lopez, Kaelyn Dauer, Gianluca Bertaina, Davide Emilio Galli, and Ettore Vitali

Stabilizing period-doubled density waves by spin-orbit coupling in Bose-Einstein condensates in optical lattices *(8 pages)* 033307
Chenhui Wang and Yongping Zhang

General hydrodynamic approach for a cold Bose gas *(14 pages)* 033308
V. M. Pergamenshchik

Momentum-dependent quasiparticle properties of the Fermi polaron from the functional renormalization group *(18 pages)* 033309
Jonas von Milczewski and Richard Schmidt

Lattice-induced wave-function effects on trapped superfluids *(17 pages)* 033310
Yeyang Zhang

Coherent collisional decoherence *(11 pages)* 033311
Leonardo Badurina, Clara Murgui, and Ryan Plestid

Modification of the Bose-Hubbard model parameters in an optical lattice by two-particle Wannier functions *(10 pages)* 033312
Shou-Long Chen

Ytterbium atom interferometry for dark matter searches *(11 pages)* 033313
Yifan Zhou, Rowan Ranson, Michalis Panagiotou, and Chris Overstreet

One-dimensional Z_2 lattice gauge theory in periodic Gauss-law sectors *(10 pages)* 033314
Vaibhav Sharma and Erich J. Mueller

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).
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 110, NUMBER 3** **SEPTEMBER 2024**

Superfluid–Bose-glass transition in a system of disordered bosons with long-range hopping in one dimension *(9 pages)* 033315
Nicolas Dupuis

Anisotropy-induced Coulomb phase and quasiparticle zoo in the atomic monopole-spin hybrid system *(13 pages)* 033316
Shao-Jun Li, Xiang Gao, Xue-Ting Fang, Lushuai Cao, Peter Schmelcher, and Zhong-Kun Hu

Stability and dynamics of nonlinear excitations in a two-dimensional droplet-bearing environment *(13 pages)* 033317
G. Bougas, G. C. Katsimiga, P. G. Kevrekidis, and S. I. Mistakidis

Two ultracold atoms in a quasi-two-dimensional box confinement *(13 pages)* 033318
Fan Yang, Ruijie Du, Ran Qi, and Peng Zhang

Surface criticality in the mixed-field Ising model with sign-inverted next-nearest-neighbor interaction *(8 pages)* 033319
Yuki Nakamura, Ryui Kaneko, and Ippei Danshita

Swallow-tail dispersions of moving solitons in a two-dimensional fermionic superfluid *(11 pages)* 033320
Jan Major and Joachim Brand

Universality and two-body losses: Lessons from the effective non-Hermitian dynamics of two particles *(20 pages)* 033321
Alice Marché, Hironobu Yoshida, Alberto Nardin, Hosho Katsura, and Leonardo Mazza

Induced supersolidity and hypersonic flow of a dipolar Bose-Einstein condensate in a rotating bubble trap *(9 pages)* 033322
Hari Sadhan Ghosh, Soumyadeep Halder, Subrata Das, and Sonjoy Majumder

Rotational properties of two interacting cold polar molecules: Linear, symmetric, and asymmetric tops *(17 pages)* 033323
Felipe Isaule, Robert Bennett, and Jörg B. Götte

Two-band atomic superfluidity in the presence of an orbital Feshbach resonance *(10 pages)* 033324
Andrew Vincent and Theja N. De Silva

Sinusoidal-magnetic-field-induced topological excitations in a spin-orbit-coupled spinor condensate *(12 pages)* 033325
Arpana Saboo, Soumyadeep Halder, Subrata Das, and Sonjoy Majumder

Flattening a trapped atomic gas using a programmable optical potential in a feedback loop *(8 pages)* 033326
Sol Kim, Kyuhwan Lee, Jongmin Kim, and Y. Shin

Synthetic spin-orbit coupling for the multispin models in optical lattices *(9 pages)* 033327
Zhen Zheng, Yan-Qing Zhu, Shanchao Zhang, Shi-Liang Zhu, and Z. D. Wang

Phase separation and metastability in a mixture of spin-1 and spin-2 Bose-Einstein condensates *(8 pages)* 033328
Uyen Ngoc Le, Hieu Binh Le, and Hiroki Saito

Photonics, nonlinear optics, and optomechanics

Learning arbitrary complex matrices by interlacing amplitude and phase masks with fixed unitary operations *(10 pages)* 033501
Matthew Markowitz, Kevin Zelaya, and Mohammad-Ali Miri

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).
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 110, NUMBER 3** **SEPTEMBER 2024**

Area theorem for surface plasmons interacting with resonant atoms *(11 pages)* 033502
Sergey A. Moiseev and Ali A. Kamli

Quantum theory of loss-induced transparency in coupled waveguides *(6 pages)* 033503
I. Beder and P. A. Brandão

Experimental observation of coherent-perfect-absorber and laser points in anti-PT symmetry *(11 pages)* 033504
Minye Yang, Qi Zhong, Zhilu Ye, Şahin K. Özdemir, Mohamed Farhat, Ramy El-Ganainy, and Pai-Yen Chen

Quantum weak torque sensing with squeezed optomechanics *(8 pages)* 033505
Jie Wang, Qian Zhang, and Hui Jing

Cause of inaccuracies in the Padé approximant of the Born series for strong electromagnetic scattering problems *(8 pages)* 033506
J. B. P. de Graaff, T. A. van der Sijs, H. P. Urbach, and O. El Gawhary

Controlling the generation of elliptically polarized isolated attosecond pulses from mixed gases with a polarization-gating technique *(9 pages)* 033507
Chunyang Zhai, Yifan Liu, Xiang Li, Xi Liu, Fengrun Wu, Shuaijie Kang, Zhengfa Li, Xinzhe Dong, Yingbin Li, Qingbin Tang, Xiaosong Zhu, and Benhai Yu

Raman effects in quantum frequency conversion using Bragg scattering *(12 pages)* 033508
Mathias L. H. Korsgaard, Jacob G. Koefoed, and Karsten Rottwitt

Breakdown of temporal-coupled-mode theory under multiple excitations with destructive interference *(8 pages)* 033509
L. Simonson, S. Ozdemir, K. Busch, and R. El-Ganainy

Extending temporal-coupled-mode theory to the antiresonant regime *(5 pages)* 033510
Hanghang Li, Nuo Chen, Shiqi He, Zhuang Fan, Zihao Yang, Xiaolong Fan, Zijie Wang, and Jing Xu

Optimization of static potentials for large delocalization and non-Gaussian quantum dynamics of levitated nanoparticles under decoherence *(10 pages)* 033511
Silvia Casulleras, Piotr T. Grochowski, and Oriol Romero-Isart

Propagation and material-interface effects in the higher-order harmonic radiation from solid-state samples *(9 pages)* 033512
M. Kolesik

Local model for the optical energy and momentum transfer in dielectric media and the microscopic origin of Abraham's force density *(10 pages)* 033513
B. Anghinoni, M. Partanen, and N. G. C. Astrath

Bulk and surface modes in a one-dimensional gyro-uniaxial photonic crystal *(8 pages)* 033514
Daniele B. Provenzano and Giuseppe C. la Rocca

Modeling beam propagation in a moving nonlinear medium *(16 pages)* 033515
Ryan Hogan, Giulia Marcucci, Akbar Safari, A. Nicholas Black, Boris Braverman, Jeremy Upham, and Robert W. Boyd

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).
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 110, NUMBER 3** **SEPTEMBER 2024**

Dense and sharp resonance peaks in stretched Moiré waveguides *(8 pages)* 033516
G. Alagappan and C. E. Png

Microwave communication based on the cross-phase modulation in an inverted-Y-type Rydberg atomic system *(7 pages)* 033517
Y. C. Shi, C. J. Zhu, J. Y. Wu, J. Yang, and Y. F. Zhang

Exceptional points in perturbed dielectric spheres: A resonant-state expansion study *(24 pages)* 033518
K. S. Netherwood, H. K. Riley, and E. A. Muljarov

Effects of the chirp rate on single-shot coherent Rayleigh-Brillouin scattering *(12 pages)* 033519
S. Suzuki, A. Gerakis, and K. Hara

Probing the position-dependent optical energy fluence rate in three-dimensional scattering samples *(14 pages)* . . . 033520
Ozan Akdemir, Minh Duy Truong, Alfredo Rates, Ad Lagendijk, and Willem L. Vos

Unidirectional polarization beam splitter via an exceptional point and finite periodicity of non-Hermitian $\mathcal{PT}$ symmetry *(10 pages)* 033521
Jeng Yi Lee

Generalized fractional one-dimensional Hermite-Gaussian beams *(12 pages)* 033522
Ruben Aguilar-Marquez, Javier Alejandro Pérez-Garza, Arath Maldonado-Traconis, Pedro Oliva-Sanchez, and Servando López-Aguayo

Spatial-light-mode analogs of generalized quantum coherent states *(16 pages)* 033523
M. P. Morales Rodríguez, E. García Herrera, O. S. Magaña-Loaiza, B. Perez-Garcia, F. Marroquín Gutiérrez, and B. M. Rodríguez-Lara

Quantum optics

Statistics of tens-of-photons states scattered by optical cavities, two-level atoms, and Jaynes-Cummings emitters *(11 pages)* 033701
Jia-Nan Wu, Bingsuo Zou, and Yongyou Zhang

Magnon blockade in a QED system with a giant spin ensemble and a giant atom coupled to a waveguide *(10 pages)* 033702
Xin Wang, Kai-Wei Huang, and Hao Xiong

Optical coherence transfer in atom arrays *(7 pages)* 033703
P. R. Berman and A. Kuzmich

Heisenberg-limit spin squeezing with the spin Bogoliubov Hamiltonian *(6 pages)* 033704
Jun Zhang, Sheng Chang, and Wenxian Zhang

Effect of photon propagation on a near-zero-refractive-index medium *(13 pages)* 033705
Robert A. McCutcheon, Stefan Ostermann, and Susanne F. Yelin

Spatiospectral control of spontaneous emission *(11 pages)* 033706
Seyyed Hossein Asadpour, Muqaddar Abbas, Hamid R. Hamedi, Julius Ruseckas, Emmanuel Paspalakis, and Reza Asgari

Two-photon dynamics in non-Markovian waveguide QED with a giant atom *(13 pages)* 033707
Wenju Gu, Tao Li, Ye Tian, Zhen Yi, and Gao-xiang Li

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).
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 110, NUMBER 3** **SEPTEMBER 2024**

Limitations in fluorescence-detected entangled two-photon-absorption experiments: Exploring the low- to high-gain squeezing regimes *(13 pages)* 033708
Tiemo Landes, Brian J. Smith, and Michael G. Raymer

Highly squeezed states in ring resonators: Beyond the undepleted-pump approximation *(14 pages)* 033709
Colin Vendromin, Yan Liu, Zhenshan Yang, and J. E. Sipe

Geometric phase of a two-level atom near a dielectric nanosphere out of thermal equilibrium *(11 pages)* 033710
Ehsan Amooghorban, Sareh Shahidani, and Somaye Mohamadi Abdhvand

Magnomechanically controlled Goos-Hänchen shift in cavity QED *(7 pages)* 033711
Muhammad Waseem, Muhammad Irfan, and Shahid Qamar

Toward an optical-fiber-based temporally multiplexed single-photon source *(6 pages)* 033712
Agustina G. Magnoni, Laura T. Knoll, Lina Wölcken, Julián Defant, Julián Morales, and Miguel A. Larotonda

Einstein-Podolsky-Rosen correlations in spontaneous parametric down-conversion: Beyond the Gaussian approximation *(6 pages)* 033713
A. G. da Costa Moura and C. H. Monken

Temperature dependence of optical phase transitions in a system of two-level atoms and photons interacting inside a nonlinear cavity *(7 pages)* 033714
S. Samimi and M. M. Golshan

Quantum Fisher information and polaron picture for the identification of transition coupling in the quantum Rabi model *(15 pages)* 033715
Zu-Jian Ying, Wen-Long Wang, and Bo-Jian Li

Optimizing measurement tradeoffs in multiparameter spatial superresolution *(6 pages)* 033716
J. R. Hervas, L. L. Sánchez-Soto, A. Z. Goldberg, Z. Hradil, and J. Řeháček

Boosting the generation rate of squeezed single-photon states by generalized photon subtraction *(13 pages)* 033717
Hiroko Tomoda, Akihiro Machinaga, Kan Takase, Jun Harada, Takahiro Kashiwazaki, Takeshi Umeki, Shigehito Miki, Fumihiro China, Masahiro Yabuno, Hirotaka Terai, Daichi Okuno, and Shuntaro Takeda

High-dimensional maximally entangled photon pairs in parametric down-conversion *(12 pages)* 033718
Richard Bernecker, Baghdasar Baghdasaryan, and Stephan Fritzsche

Dissipative transfer of quantum correlations from light to atomic arrays *(10 pages)* 033719
Roni Ben-Maimon, Yakov Solomons, and Ephraim Shahmoon

Topology-empowered decoherence suppression of strong light-matter interaction in a one-dimensional atomic cavity *(15 pages)* 033720
Yu-Wei Lu

Interferometric sorting of temporal Hermite-Gauss modes via temporal Gouy phase *(17 pages)* 033721
Dmitri B. Horoshko and Mikhail I. Kolobov

Coherent perfect absorption accompanying subnatural narrowing by vacuum-induced coupling *(17 pages)* 033722
Zhiming Wu, Jiahua Li, and Ying Wu

(Continued)

This paper was highlighted in the APS publication *Physics* (physics.aps.org).

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 110, NUMBER 3** **SEPTEMBER 2024**

ERRATA

Erratum: Continuous-radiative-loss model for electron-spin dynamics in the radiation-dominated regime
[Phys. Rev. A **108**, 052206 (2023)] *(1 page)* . . . . . 039901(E)
I. I. Artemenko and I. Yu. Kostyukov

Erratum: Recycling of a quantum field and optimal states for single-qubit rotations
[Phys. Rev. A **109**, 022439 (2024)] *(1 page)* . . . . . 039902(E)
Shanon Vuglar and Julio Gea-Banacloche

This paper was highlighted in the APS publication *Physics* (physics.aps.org).
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).