

*The Table of Contents is a total listing of Parts A and B.
Part A consists of pages 030101(R)–032519, and Part B pages 032701–039903(E).*

PART A

RAPID COMMUNICATIONS

Fundamental concepts

- Relativistic quantum-mechanical description of twisted paraxial electron and photon beams (8 pages) 030101(R)
Alexander J. Silenko, Pengming Zhang, and Liping Zou

Quantum information

- Experimentally feasible semi-device-independent certification of four-outcome positive-operator-valued measurements (6 pages) 030301(R)
Piotr Mironowicz and Marcin Pawłowski
- Quantum rebound capacity (6 pages) 030302(R)
Siddhartha Das and Mark M. Wilde
- Uncertain fate of fair sampling in quantum annealing (6 pages) 030303(R)
Mario S. Könz, Guglielmo Mazzola, Andrew J. Ochoa, Helmut G. Katzgraber, and Matthias Troyer
- Complete characterization of qubit masking (5 pages) 030304(R)
Xiao-Bin Liang, Bo Li, and Shao-Ming Fei

Atomic and molecular structure and dynamics; high-precision measurements

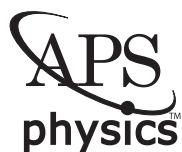
- Measurements of single-state and state-ensemble lifetimes of high-lying Rb Rydberg levels (6 pages) 030501(R)
M. Archimi, C. Simonelli, L. Di Virgilio, A. Greco, M. Ceccanti, E. Arimondo, D. Ciampini,
I. I. Ryabtsev, I. I. Beterov, and O. Morsch

Atomic and molecular collisions and interactions

- Nonlinear stopping effects of slow ions in a no-free-electron system: Titanium nitride (6 pages) 030701(R)
F. Matias, P. L. Grande, M. Vos, Peter Koval, Natalia E. Koval, and N. R. Arista

Atomic and molecular processes in external fields, including interactions with strong fields and short pulses

- X-ray harmonic generation by orthogonally polarized two-color fields: Spectral shape and polarization (7 pages) 031401(R)
D. B. Milošević and W. Becker



CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 100, NUMBER 3

SEPTEMBER 2019

Electronic-coherence-mediated molecular nitrogen-ion lasing in a strong laser field (<i>7 pages</i>)	031402(R)
Jinming Chen, Jinping Yao, Haisu Zhang, Zhaoxiang Liu, Bo Xu, Wei Chu, Lingling Qiao, Zhenhua Wang, Julien Fatome, Olivier Faucher, Chengyin Wu, and Ya Cheng	

Matter waves and collective properties of cold atoms and molecules

Dynamical quantum phase transitions in the random field Ising model (<i>5 pages</i>)	031601(R)
Victor Gurarie	
Spin-exchange-induced exotic superfluids in a Bose-Fermi spinor mixture (<i>6 pages</i>)	031602(R)
Chuanzhou Zhu, Li Chen, Hui Hu, Xia-Ji Liu, and Han Pu	

Quantum optics, physics of lasers, nonlinear optics, classical optics

Electro-optical sampling of quantum vacuum fluctuations in dispersive dielectrics (<i>5 pages</i>)	031801(R)
Simone De Liberato	

ARTICLES

Fundamental concepts

Non-Markovianity in experimentally simulated quantum channels: Role of counterrotating-wave terms (<i>7 pages</i>)	032101
Shao-Jie Xiong, Qiwu Hu, Zhe Sun, Li Yu, Qiping Su, Jin-Ming Liu, and Chui-Ping Yang	
Topological states in a non-Hermitian two-dimensional Su-Schrieffer-Heeger model (<i>5 pages</i>)	032102
C. Yuce and H. Ramezani	
Search for a preferred frame of the photon (<i>4 pages</i>)	032103
Jacek Ciborowski and Jakub Rembieliński	
Optimal measurements for quantum multiparameter estimation with general states (<i>14 pages</i>)	032104
Jing Yang, Shengshi Pang, Yiyu Zhou, and Andrew N. Jordan	
Assembly of $2N$ entangled fermions into multipartite composite bosons (<i>14 pages</i>)	032105
Zakarya Lasmar, P. Alexander Bouvrie, Adam S. Sajna, Malte C. Tichy, and Paweł Kurzyński	
Strict experimental test of macroscopic realism in a light-matter-interfaced system (<i>8 pages</i>)	032106
Xiao Liu, Zong-Quan Zhou, Yong-Jian Han, Zong-Feng Li, Jun Hu, Tian-Shu Yang, Pei-Yun Li, Chao Liu, Xue Li, Yu Ma, Peng-Jun Liang, Chuan-Feng Li, and Guang-Can Guo	
Product spectrum ansatz and the simplicity of thermal states (<i>10 pages</i>)	032107
John Martyn and Brian Swingle	
Readout of the spectral density of an environment from the dynamics of an open system (<i>8 pages</i>)	032108
Shuang Xu, H. Z. Shen, X. X. Yi, and W. Wang	
Spacelike character of the Minkowski four-momentum in analog gravity (<i>5 pages</i>)	032109
Iver Brevik	
Quantum phase transition with inhomogeneous driving in the Lechner-Hauke-Zoller model (<i>12 pages</i>)	032110
Andreas Hartmann and Wolfgang Lechner	
Macroscopicity of quantum mechanical superposition tests via hypothesis falsification (<i>18 pages</i>)	032111
Björn Schrinski, Stefan Nimmrichter, Benjamin A. Stickler, and Klaus Hornberger	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 100, NUMBER 3

SEPTEMBER 2019

<i>k</i> -uniform mixed states (9 pages)	032112
Waldemar Kłobus, Adam Burchardt, Adrian Kołodziejcki, Mahasweta Pandit, Tamás Vértesi, Karol Życzkowski, and Wiesław Laskowski	
Necessary and sufficient condition for joint measurability (8 pages)	032113
Jeongwoo Jae, Kyunghyun Baek, Junghee Ryu, and Jinhyoung Lee	
Enhancement of the metrological sensitivity limit through knowledge of the average energy (7 pages)	032114
Manuel Gessner	
Quantum Kibble-Zurek physics in long-range transverse-field Ising models (15 pages)	032115
Ricardo Puebla, Oliver Marty, and Martin B. Plenio	
Quantifying nonclassicality via Wigner-Yanase skew information (8 pages)	032116
Shunlong Luo and Yue Zhang	
Detecting macroscopic indefiniteness of cat states in bosonic interferometers (12 pages)	032117
Shane P. Kelly, Eddy Timmermans, and S.-W. Tsai	
Incompatibility of observables as state-independent bound of uncertainty relations (8 pages)	032118
Yunlong Xiao, Cheng Guo, Fei Meng, Naihuan Jing, and Man-Hong Yung	
Experimental simultaneous readout of the real and imaginary parts of the weak value (7 pages)	032119
A. Hariri, D. Curic, L. Giner, and J. S. Lundeen	
Quantum correlations from simple assumptions (14 pages)	032120
Adán Cabello	
Interference in the time domain of a decaying particle with itself as the physical mechanism for the exponential-nonexponential transition in quantum decay (7 pages)	032121
Gastón García-Calderón and Roberto Romo	
Multiple-copy state discrimination of noisy qubits (10 pages)	032122
Kieran Flatt, Stephen M. Barnett, and Sarah Croke	
Critical slowing down and entanglement protection (12 pages)	032123
Eliana Fiorelli, Alessandro Cuccoli, and Paola Verrucchi	
Unitarity corridors to exceptional points (9 pages)	032124
Miloslav Znojil	
Epistemically restricted phase-space representation, weak momentum value, and reconstruction of the quantum wave function (7 pages)	032125
Agung Budiyo	
Naimark extension for the single-photon canonical phase measurement (9 pages)	032126
Nicola Dalla Pozza and Matteo G. A. Paris	
Quantum information	
Optimality in quantum data compression using dynamical entropy (14 pages)	032301
George Androulakis and Duncan Wright	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 100, NUMBER 3

SEPTEMBER 2019

Preservation of quantum correlation between nitrogen-vacancy-center ensembles by squeezed-reservoir engineering (9 pages)	032302
Q. Z. Hou, C. J. Yang, C. Y. Chen, J. H. An, W. L. Yang, and M. Feng	
Information-theoretic meaning of quantum information flow and its applications to amplitude amplification algorithms (7 pages)	032303
Sudipto Singha Roy and Joonwoo Bae	
Multiqubit randomized benchmarking using few samples (31 pages)	032304
Jonas Helsen, Joel J. Wallman, Steven T. Flammia, and Stephanie Wehner	
Simulating the dynamics of single photons in boson sampling devices with matrix product states (7 pages)	032305
He-Liang Huang, Wan-Su Bao, and Chu Guo	
Quantum algorithm for nonhomogeneous linear partial differential equations (9 pages)	032306
Juan Miguel Arrazola, Timjan Kalajdzievski, Christian Weedbrook, and Seth Lloyd	
Optimization of device-independent witnesses of entanglement depth from two-body correlators (15 pages)	032307
J. Tura, A. Aloy, F. Baccari, A. Acín, M. Lewenstein, and R. Augusiak	
Automated distribution of quantum circuits via hypergraph partitioning (11 pages)	032308
Pablo Andrés-Martínez and Chris Heunen	
Quantum information scrambling through a high-complexity operator mapping (7 pages)	032309
Xiaopeng Li, Guanyu Zhu, Muxin Han, and Xin Wang	
High-fidelity Greenberger-Horne-Zeilinger state generation within nearby nodes (9 pages)	032310
Valentina Caprara Vivoli, Jérémy Ribeiro, and Stephanie Wehner	
Quantum-capacity bounds in spin-network communication channels (8 pages)	032311
Stefano Chessa, Marco Fanizza, and Vittorio Giovannetti	
Coherence manipulation under incoherent operations (7 pages)	032313
Shuanping Du, Zhaofang Bai, and Xiaofei Qi	
Authenticated teleportation with one-sided trust (12 pages)	032314
Anupama Unnikrishnan and Damian Markham	
Optimal verification of two-qubit pure states (7 pages)	032315
Kun Wang and Masahito Hayashi	
Efficient verification of bipartite pure states (5 pages)	032316
Zihao Li, Yun-Guang Han, and Huangjun Zhu	
Continuity of the quantum Fisher information (14 pages)	032317
A. T. Rezakhani, M. Hassani, and S. Alipour	
Quantum metrology with generalized cat states (10 pages)	032318
Mamiko Tatsuta, Yuichiro Matsuzaki, and Akira Shimizu	
Performance analysis of d -dimensional quantum cryptography under state-dependent diffraction (10 pages)	032319
Jiapeng Zhao, Mohammad Mirhosseini, Boris Braverman, Yiyu Zhou, Seyed Mohammad Hashemi Rafsanjani, Yongxiong Ren, Nicholas K. Steinhoff, Glenn A. Tyler, Alan E. Willner, and Robert W. Boyd	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 100, NUMBER 3

SEPTEMBER 2019

Practical designs for permutation-symmetric problem Hamiltonians on hypercubes (<i>8 pages</i>)	032320
A. Ben Dodds, Viv Kendon, Charles S. Adams, and Nicholas Chancellor	
Genuinely nonlocal product bases: Classification and entanglement-assisted discrimination (<i>13 pages</i>)	032321
Sumit Rout, Ananda G. Maity, Amit Mukherjee, Saronath Halder, and Manik Banik	
Waiting time in quantum repeaters with probabilistic entanglement swapping (<i>20 pages</i>)	032322
E. Shchukin, F. Schmidt, and P. van Loock	
Accelerated adiabatic quantum gates: Optimizing speed versus robustness (<i>12 pages</i>)	032323
Hugo Ribeiro and Aashish A. Clerk	
Quantum coherence fraction (<i>7 pages</i>)	032324
Yao Yao, Dong Li, and C. P. Sun	
Leakage mitigation for quantum error correction using a mixed qubit scheme (<i>9 pages</i>)	032325
Natalie C. Brown and Kenneth R. Brown	
Detailed study of Gaussian boson sampling (<i>15 pages</i>)	032326
Regina Kruse, Craig S. Hamilton, Linda Sansoni, Sonja Barkhofen, Christine Silberhorn, and Igor Jex	
Tsallis entropy, q -expectation value, and constraints on three-party quantum correlations (<i>7 pages</i>)	032327
Jeong San Kim	
Validating quantum computers using randomized model circuits (<i>11 pages</i>)	032328
Andrew W. Cross, Lev S. Bishop, Sarah Sheldon, Paul D. Nation, and Jay M. Gambetta	
Time-optimal implementations of quantum algorithms (<i>6 pages</i>)	032329
Alejandro Cros Carrillo de Albornoz, John Taylor, and Vlad Cărare	
Quantum teleportation of photonic qudits using linear optics (<i>6 pages</i>)	032330
Chenyu Zhang, J. F. Chen, Chaohan Cui, Jonathan P. Dowling, Z. Y. Ou, and Tim Byrnes	
Measurement-driven analog of adiabatic quantum computation for frustration-free Hamiltonians (<i>5 pages</i>)	032331
Liming Zhao, Carlos A. Pérez-Delgado, Simon C. Benjamin, and Joseph F. Fitzsimons	
Optimal choice of state tomography quorum formed by projection operators (<i>11 pages</i>)	032332
Violeta N. Ivanova-Rohling and Niklas Rohling	
Detuning-modulated composite pulses for high-fidelity robust quantum control (<i>6 pages</i>)	032333
Elica Kyoseva, Hadar Greener, and Haim Suchowski	
Characterizing quantum correlation with the correlated part of partial coherence (<i>7 pages</i>)	032334
Chunhe Xiong, Sunho Kim, and Daowen Qiu	
Correlation-coupling entropy as a measure of strong electron correlation and fragment-conditional density spin polarization as a measure of electron entanglement (<i>6 pages</i>)	032335
R. van Meer and O. V. Gritsenko	
Polynomial time algorithms for estimating spectra of adiabatic Hamiltonians (<i>11 pages</i>)	032336
Jacob Bringewatt, William Dorland, and Stephen P. Jordan	
Analysis of superfast encoding performance for electronic structure simulations (<i>8 pages</i>)	032337
Riley W. Chien, Sha Xue, Tarini S. Hardikar, Kanav Setia, and James D. Whitfield	

(Continued)

Atomic and molecular structure and dynamics; high-precision measurements

Probing the non-Planckian spectrum of thermal radiation in a micron-sized cavity with a spin-polarized atomic beam (<i>11 pages</i>)	032501
Giuseppe Bimonte	
Direct observation of a highly forbidden optical transition in Sm:SrF ₂ (<i>5 pages</i>)	032502
Mohit Verma, Luca Talamo, Hiromitsu Sawaoka, and Amar C. Vutha	
Measurements of the branching ratios for $6P_{1/2}$ decays in $^{138}\text{Ba}^+$ (<i>11 pages</i>)	032503
K. J. Arnold, S. R. Chanu, R. Kaewuam, T. R. Tan, L. Yeo, Zhiqiang Zhang, M. S. Safronova, and M. D. Barrett	
Ground and excited ^1S states of the beryllium atom (<i>9 pages</i>)	032504
István Hornyák, Ludwik Adamowicz, and Sergiy Bubin	
Transition frequencies between the $2S$ and $2P$ states of the lithiumlike ion O^{5+} (<i>7 pages</i>)	032505
L. M. Wang and Z.-C. Yan	
Direct observation of intramolecular atomic motion in H_2 and D_2 by using electron-atom Compton scattering (<i>5 pages</i>)	032506
Yuichi Tachibana, Masakazu Yamazaki, and Masahiko Takahashi	
Virtual Delbrück scattering and the Lamb shift in light hydrogenlike atoms (<i>7 pages</i>)	032507
Robert Szafron, Evgeny Yu. Korzinin, Valery A. Shelyuto, Vladimir G. Ivanov, and Savely G. Karshenboim	
Natural orbital functional for multiplets (<i>7 pages</i>)	032508
Mario Piris	
Orbital angular momentum constraints in the variational optimization of the two-electron reduced-density matrix (<i>10 pages</i>)	032509
Run R. Li and A. Eugene DePrince III	
Dynamical Casimir effect via four- and five-photon transitions using a strongly detuned atom (<i>9 pages</i>)	032510
A. V. Dodonov	
Sensitivity of the isotope shift to the distribution of nuclear charge density (<i>6 pages</i>)	032511
V. V. Flambaum and V. A. Dzuba	
Magic Rydberg-Rydberg transitions in electric fields (<i>6 pages</i>)	032512
Michael Peper, Johannes Deiglmayr, Frédéric Merkt, Carla Sanna, and H. B. van Linden van den Heuvell	
Three-loop radiative corrections to the $1s$ Lamb shift in hydrogen (<i>7 pages</i>)	032513
Savely G. Karshenboim and Valery A. Shelyuto	
Theoretical study of $^{173}\text{YbOH}$ to search for the nuclear magnetic quadrupole moment (<i>4 pages</i>)	032514
D. E. Maison, L. V. Skripnikov, and V. V. Flambaum	
Higher-order logarithmic corrections and the two-loop self-energy of a $1s$ electron in hydrogen (<i>14 pages</i>)	032515
Savely G. Karshenboim, Akira Ozawa, and Vladimir G. Ivanov	
Measurements and calculations of $2s$ - $2p$ transitions in neonlike germanium: Achieving agreement at the 10^{-4} level (<i>8 pages</i>)	032516
P. Beiersdorfer, G. V. Brown, N. Hell, T. Lockard, J. Nilsen, D. Panchenko, L. M. R. Hobbs, D. J. Hoarty, and M. F. Gu	

(Continued)

CONTENTS - Continued

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 100, NUMBER 3

SEPTEMBER 2019

Experimental and theoretical study of core-excited $3pnd$ Rydberg series of Mg (15 pages)	032517
Matthieu Génévriez, Dominik Wehrli, and Frédéric Merkt	
Relevance of effective bond orders in heterodiatom molecules and role of the spin-orbit coupling in the AtX ($X = \text{At} - \text{F}$) series (8 pages)	032518
Cecilia Gomez Pech, Pi A. B. Haase, Nicolas Galland, Anastasia Borschevsky, and Rémi Maurice	
Rovibrational energy levels of the hydrogen molecule through nonadiabatic perturbation theory (9 pages)	032519
Jacek Komasa, Mariusz Puchalski, Paweł Czachorowski, Grzegorz Łach, and Krzysztof Pachucki	

PART B

Atomic and molecular collisions and interactions

S-wave elastic scattering of o -Ps from H_2 at low energy (6 pages)	032701
J.-Y. Zhang, M.-S. Wu, Y. Qian, X. Gao, Y.-J. Yang, K. Varga, Z.-C. Yan, and U. Schwingenschlögl	
Two-center electron-impact ionization via collisional excitation-autoionization (8 pages)	032702
F. Grüll, A. B. Voitkiv, and C. Müller	
Accuracy of analytical theories for relativistic bremsstrahlung (11 pages)	032703
D. H. Jakubassa-Amundsen and A. Mangiarotti	
Interferometric measurement of interhyperfine scattering lengths in ^{87}Rb (9 pages)	032704
Pau Gomez, Chiara Mazzinghi, Ferran Martin, Simon Coop, Silvana Palacios, and Morgan W. Mitchell	
Electronic interaction of slow hydrogen and helium ions with nickel-silicon systems (8 pages)	032705
Tuan Thien Tran, Lukas Jablonka, Barbara Bruckner, Stefanie Rund, Dietmar Roth, Mauricio A. Sortica, Peter Bauer, Zhen Zhang, and Daniel Primetzhofer	
Observation of a threshold behavior in an ultracold endothermic atom-exchange process involving Feshbach molecules (7 pages)	032706
Ya-Xiong Liu, Jue Nan, De-Chao Zhang, Lan Liu, Huan Yang, Jun Rui, Bo Zhao, and Jian-Wei Pan	
Target dependence of postcollision interaction effects on fully differential ionization cross sections (10 pages)	032707
M. Dhital, S. Bastola, A. Silvas, B. R. Lamichhane, E. Ali, M. F. Ciappina, R. Lomsadze, A. Hasan, D. H. Madison, and M. Schulz	
Quasiclassical method for calculating the density of states of ultracold collision complexes (12 pages)	032708
Arthur Christianen, Tijs Karman, and Gerrit C. Groenenboom	
Resonance cross-section formula for low-energy elastic scattering (9 pages)	032709
J. Horáček	
Revisiting electron-correlation effects on valence shake-up satellites of neon (8 pages)	032710
Noboru Watanabe and Masahiko Takahashi	
Energy-loss straggling with higher-order effects and electron correlations taken into account (10 pages)	032711
V. A. Khodyrev	
Theoretical investigation of the ion-induced polarization-charge influence on resonant charge transfer (9 pages)	032712
I. K. Gainullin	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 100, NUMBER 3

SEPTEMBER 2019

Anion and cation emission from water molecules after collisions with 6.6-keV $^{16}\text{O}^+$ ions (11 pages)	032713
Z. Juhász, B. Sulik, E. Lattouf, E. Bene, B. A. Huber, P. Herczku, S. T. S. Kovács, A. Méry, J.-C. Pouilly, J. Rangama, J. A. Tanis, V. Vizcaino, and J.-Y. Chesnel	
Atomic and molecular processes in external fields, including interactions with strong fields and short pulses	
Attosecond electro-optic effect in zinc sulfide induced by a laser field (5 pages)	033401
T. Otobe	
Anisotropy control in photoelectron spectra: A coherent two-pulse interference strategy (10 pages)	033402
R. Chamakhi, M. Telmini, O. Atabek, and E. Charron	
Wavelength-dependent nonsequential double ionization of magnesium by intense femtosecond laser pulses (6 pages)	033403
HuiPeng Kang, Shi Chen, YanLan Wang, Wei Chu, JinPing Yao, Jing Chen, XiaoJun Liu, Ya Cheng, and ZhiZhan Xu	
Two-color XUV plus near-IR multiphoton near-threshold ionization of the helium ion by circularly polarized light in the vicinity of the $3p$ resonance (7 pages)	033404
A. N. Grum-Grzhimailo, N. Douguet, M. Meyer, and K. Bartschat	
Crystal-momentum-resolved contributions to high-order harmonic generation in solids (15 pages)	033405
Francisco Navarrete, Marcelo F. Ciappina, and Uwe Thumm	
 Floquet heating in interacting atomic gases with an oscillating force (13 pages)	033406
Jun-Ru Li, Boris Shteynas, and Wolfgang Ketterle	
Spin-polarization effects of an ultrarelativistic electron beam in an ultraintense two-color laser pulse (8 pages) . . .	033407
Huai-Hang Song, Wei-Min Wang, Jian-Xing Li, Yan-Fei Li, and Yu-Tong Li	
<i>In situ</i> Raman gain between hyperfine ground states in a potassium magneto-optical trap (6 pages)	033408
Graeme Harvie, Adam Butcher, and Jon Goldwin	
Anomalous Goos-Hänchen shift in the Floquet scattering of Dirac fermions (15 pages)	033409
A. Huamán and Gonzalo Usaj	
Controlling polarization of high-order harmonic generation by molecular alignment in a bicircular laser field (7 pages)	033410
Mu-Zi Li, Yan Xu, Guang-Rui Jia, and Xue-Bin Bian	
Determination of enantiomeric excess with chirality-dependent ac Stark effects in cyclic three-level models (7 pages)	033411
Chong Ye, Quansheng Zhang, Yu-Yuan Chen, and Yong Li	
Differential nuclear-spin-dependent light shifts and state mixing of Rydberg atoms (12 pages)	033412
H. Nguyen, J. Lampen, P. R. Berman, and A. Kuzmich	
Characterizing dissociative motion in time-resolved x-ray scattering from gas-phase diatomic molecules (7 pages)	033413
Matthew R. Ware, James M. Glowina, Noor Al-Sayyad, Jordan T. O'Neal, and Philip H. Bucksbaum	
Rovibronic spectra of molecules dressed by light fields (12 pages)	033414
Tamás Szidarovszky, Attila G. Császár, Gábor J. Halász, and Ágnes Vibók	

(Continued)

Atoms trapped by a spin-dependent optical lattice potential: Realization of a ground-state quantum rotor (<i>17 pages</i>)	033415
Igor Kuzmenko, Tetyana Kuzmenko, Y. Avishai, and Y. B. Band	
Holographic interferences in strong-field ionization beyond the dipole approximation: The influence of the peak and focal-volume-averaged laser intensities (<i>12 pages</i>)	033417
B. Willenberg, J. Maurer, U. Keller, J. Daněk, M. Klaiber, N. Teeny, K. Z. Hatsagortsyan, and C. H. Keitel	
Analytical investigation of one-dimensional Doppler cooling of trapped ions with Λ -type configuration (<i>10 pages</i>)	033418
L.-L. Yan, Shi-Lei Su, and Mang Feng	
Systematic uncertainty due to background-gas collisions in trapped-ion optical clocks (<i>12 pages</i>)	033419
A. M. Hankin, E. R. Clements, Y. Huang, S. M. Brewer, J.-S. Chen, C. W. Chou, D. B. Hume, and D. R. Leibbrandt	
Controlling circularly polarized high-order harmonic generation in molecules by intense tricircular laser pulses (<i>11 pages</i>)	033420
Kai-Jun Yuan and André D. Bandrauk	
Optimal population transfer in combined Feshbach resonances and stimulated-Raman-adiabatic-passage processes (<i>6 pages</i>)	033421
Phillip Price and S. F. Yelin	
Matter waves and collective properties of cold atoms and molecules	
Collective excitations and tunneling dynamics in long bosonic Josephson junctions (<i>10 pages</i>)	033601
M. R. Momme, Y. M. Bidasyuk, and M. Weyrauch	
Manipulating multimer propagation using lattice modulation (<i>10 pages</i>)	033602
Arya Dhar and Jami J. Kinnunen	
Violation of single-length-scaling dynamics via spin vortices in an isolated spin-1 Bose gas (<i>10 pages</i>)	033603
C.-M. Schmied, T. Gasenzer, and P. B. Blakie	
Engineering momentum profiles of cold-atom beams (<i>7 pages</i>)	033604
D. Hudson Smith and Artem G. Volosniev	
Tuning quantum reflection in graphene with an external magnetic field (<i>8 pages</i>)	033605
Marcius Silvestre, Tarik P. Cysne, Daniela Szilard, Felipe A. Pinheiro, and Carlos Farina	
Al'tshuler-Aronov-Spivak oscillations of bosonic matter-wave beams in the presence of interaction (<i>16 pages</i>)	033606
Renaud Chréten, Josef Rammensee, Julien Dujardin, Cyril Petitjean, and Peter Schlagheck	
Dynamics of interacting dark soliton stripes (<i>12 pages</i>)	033607
P. G. Kevrekidis, Wenlong Wang, G. Theocharis, D. J. Frantzeskakis, R. Carretero-González, and B. P. Anderson	
Two-photon Rabi-Hubbard and Jaynes-Cummings-Hubbard models: Photon-pair superradiance, Mott insulator, and normal phases (<i>13 pages</i>)	033608
Shifeng Cui, F. Hébert, B. Grémaud, V. G. Rousseau, Wenan Guo, and G. G. Batrouni	
 Dynamics of an itinerant spin-3 atomic dipolar gas in an optical lattice (<i>13 pages</i>)	033609
Petra Fersterer, Arghavan Safavi-Naini, Bihui Zhu, Lucas Gabardos, Steven Lepoutre, L. Vernac, B. Laburthe-Tolra, P. Blair Blakie, and Ana Maria Rey	

(Continued)

 M. Lacki, P. Zoller, and M. A. Baranov	033610
Tuning dissipation and excitations in superfluid Fermi gases with a moving impurity (6 pages) Dong-Chen Zheng, Yan-Qiang Yu, and Renyuan Liao	033611
Correlations generated from high-temperature states: Nonequilibrium dynamics in the Fermi-Hubbard model (10 pages) Ian G. White, Randall G. Hulet, and Kaden R. A. Hazzard	033612
Spin-polarized droplets in the unitary Fermi gas (11 pages) Piotr Magierski, Buğra Tüzemen, and Gabriel Włazłowski	033613
Supersolid and pair correlations of the extended Jaynes-Cummings-Hubbard model on triangular lattices (11 pages) Lijuan Guo, Sebastian Greschner, Siyu Zhu, and Wanzhou Zhang	033614
Splitting of singly and doubly quantized composite vortices in two-component Bose-Einstein condensates (16 pages) Pekko Kuopanportti, Soumik Bandyopadhyay, Arko Roy, and D. Angom	033615
Compound atom-ion Josephson junction: Effects of finite temperature and ion motion (16 pages) Mostafa R. Ebgha, Shahpoor Saeidian, Peter Schmelcher, and Antonio Negretti	033616
Nonlinear Floquet dynamics of spinor condensates in an optical cavity: Cavity-amplified parametric resonance (7 pages) Zheng-Chun Li, Qi-Hui Jiang, Zhihao Lan, Weiping Zhang, and Lu Zhou	033617
Quench dynamics of an ultracold two-dimensional Bose gas (10 pages) P. Comaron, F. Larcher, F. Dalfovo, and N. P. Proukakis	033618
Quantum optics, physics of lasers, nonlinear optics, classical optics	
Raman quantum memory with built-in suppression of four-wave-mixing noise (8 pages) S. E. Thomas, T. M. Hird, J. H. D. Munns, B. Brecht, D. J. Saunders, J. Nunn, I. A. Walmsley, and P. M. Ledingham	033801
Two-photon resonance fluorescence of a ladder-type atomic system (8 pages) Simone Gasparinetti, Jean-Claude Besse, Marek Pechal, Robin D. Buijs, Christopher Eichler, Howard J. Carmichael, and Andreas Wallraff	033802
Macroscopic superposition states of a mechanical oscillator in an optomechanical system with quadratic coupling (6 pages) Hong Xie, Xiao Shang, Chang-Geng Liao, Zhi-Hua Chen, and Xiu-Min Lin	033803
Strong spectrospatial correlations in Anderson-localized lasing in periodic-on-average random systems (6 pages) M. Balasubrahmaniam, Krishna Joshi, and Sushil Mujumdar	033804
Controlling Fano resonances using the geometrical phase of light in spatially tailored waveguided plasmonic crystals (7 pages) Subir K. Ray, Ankit K. Singh, Ajmal, Shubham Chandel, Partha Mitra, and Nirmalya Ghosh	033805
Quantum mechanics and Talbot revivals on a tetrahedron (8 pages) J. Bělin, S. A. R. Horsley, and T. Tyc	033806

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 100, NUMBER 3

SEPTEMBER 2019

Cavity-enhanced Raman heterodyne spectroscopy in $\text{Er}^{3+}:\text{Y}_2\text{SiO}_5$ for microwave to optical signal conversion (9 pages)	033807
Xavier Fernandez-Gonzalvo, Sebastian P. Horvath, Yu-Hui Chen, and Jevon J. Longdell	
Loss-induced localization in a periodically driven nonlinear system (7 pages)	033808
Liping Li, Xuehua Zhang, Lin Li, Qing He, Limin Zheng, Shiqiang Fu, and Bo Liu	
Surface-plasmon-polariton wave propagation supported by anisotropic materials: Multiple modes and mixed exponential and linear localization characteristics (12 pages)	033809
Chenzhang Zhou, Tom G. Mackay, and Akhlesh Lakhtakia	
Strong-coupling limit of the driven dissipative light-matter interaction (10 pages)	033810
Th. K. Mavrogordatos	
Compensation of polarization-dependent loss using noiseless amplification and attenuation (7 pages)	033811
R. A. Brewster, B. T. Kirby, J. D. Franson, and M. Brodsky	
Mechanical squeezing beyond resolved sideband and weak-coupling limits with frequency modulation (8 pages)	033812
Xue Han, Dong-Yang Wang, Cheng-Hua Bai, Wen-Xue Cui, Shou Zhang, and Hong-Fu Wang	
 Talbot-Lau effect beyond the point-particle approximation (12 pages)	033813
Alessio Belenchia, Giulio Gasbarri, Rainer Kaltenbaek, Hendrik Ulbricht, and Mauro Paternostro	
Enhanced photon antibunching via interference effects in a Δ configuration (10 pages)	033814
Jiahua Li, Chunling Ding, and Ying Wu	
Resonant frequency ratios for the dynamical Casimir effect (6 pages)	033815
B. E. Ordaz-Mendoza and S. F. Yelin	
Nonlinear quantum transport of light in a cold atomic cloud (31 pages)	033816
Tobias Binnering, Vyacheslav N. Shatokhin, Andreas Buchleitner, and Thomas Wellens	
Polarization effect on optical manipulation in a three-beam optical lattice (5 pages)	033817
Guangji Ha, Hongxia Zheng, Xinning Yu, and Zhifang Lin	
Stimulated measurement of spontaneous four-wave mixing from a warm atomic ensemble (6 pages)	033818
Taek Jeong, Jiho Park, and Han Seb Moon	
Bandwidth and conversion efficiency analysis of dissipative Kerr soliton frequency combs based on bifurcation theory (13 pages)	033819
J. Gärtner, P. Trocha, R. Mandel, C. Koos, T. Jahnke, and W. Reichel	
Nonlinear optical response of a two-dimensional quantum-dot supercrystal: Emerging multistability, periodic and aperiodic self-oscillations, chaos, and transient chaos (15 pages)	033820
Igor V. Ryzhov, Ramil F. Malikov, Andrey V. Malyshev, and Victor A. Malyshev	
Approach to fully decomposing an optical force into conservative and nonconservative components (13 pages)	033821
Xinning Yu, Yikun Jiang, Huajin Chen, Shiyang Liu, and Zhifang Lin	
Adiabatic Fock-state-generation scheme using Kerr nonlinearity (5 pages)	033822
Ryotatsu Yanagimoto, Edwin Ng, Tatsuhiko Onodera, and Hideo Mabuchi	
Switchable dynamic Rydberg-dressed excitation via a cascaded double electromagnetically induced transparency (11 pages)	033823
Yichun Gao, Yinghui Ren, Dongmin Yu, and Jing Qian	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 100, NUMBER 3

SEPTEMBER 2019

Sets of orthogonal three-dimensional polarization states and their physical interpretation (<i>11 pages</i>)	033824
José J. Gil, Ignacio San José, Andreas Norrman, Ari T. Friberg, and Tero Setälä	
Geometrical phase and Hall effect associated with the transverse spin of light (<i>9 pages</i>)	033825
Meng-Yun Lai, Yong-Long Wang, Guo-Hua Liang, and Hong-Shi Zong	
Attosecond helical pulses (<i>6 pages</i>)	033826
Miguel A. Porras	
Schrödinger cat states and steady states in subharmonic generation with Kerr nonlinearities (<i>9 pages</i>)	033827
Feng-Xiao Sun, Qiongyi He, Qihuang Gong, Run Yan Teh, Margaret D. Reid, and Peter D. Drummond	
Sculpting out quantum correlations with bosonic subtraction (<i>7 pages</i>)	033828
Marcin Karczewski, Su-Yong Lee, Junghee Ryu, Zakarya Lasmar, Dagomir Kaszlikowski, and Paweł Kurzyński	
Mechanism of formation of noiselike pulses in passively mode-locked fiber lasers (<i>7 pages</i>)	033829
Andrey Komarov, Konstantin Komarov, and Luming Zhao	
Q -factor optimization in dielectric oligomers (<i>10 pages</i>)	033830
Evgeny N. Bulgakov and Dmitrii N. Maksimov	
Absorption and gain saturable nonlinearities in erbium-doped optical microcavities (<i>8 pages</i>)	033831
Yong Hu, Yan Bai, Yang Liu, Shulin Ding, Shiyue Hua, Xiaoshun Jiang, and Min Xiao	
Reflectionless phenomenon in $\mathcal{PT}$ -symmetric periodic structures of one-dimensional two-material optical waveguide networks (<i>6 pages</i>)	033832
Huizhou Wu, Xiangbo Yang, Dongmei Deng, and Hongzhan Liu	
Robustness of Dicke subradiance against thermal decoherence (<i>6 pages</i>)	033833
P. Weiss, A. Cipris, M. O. Araújo, R. Kaiser, and W. Guerin	
Reconstructing ultrafast energy-time-entangled two-photon pulses (<i>9 pages</i>)	033834
Jean-Philippe W. MacLean, Sacha Schwarz, and Kevin J. Resch	
Regimes of two-color light bullet formation in a gradient waveguide (<i>14 pages</i>)	033835
Sergey V. Sazonov, Aleksey A. Kalinovich, Maria V. Komissarova, and Irina G. Zakharova	
Quantum networks for single photon detection (<i>19 pages</i>)	033836
Tzula B. Propp and S. J. van Enk	
Entropy- and purity-tailored broadband entanglement from vectorial four-wave mixing: Insights from pulse modes and classical-field dynamics (<i>7 pages</i>)	033837
N. L. Petrov, A. A. Voronin, A. B. Fedotov, and A. M. Zheltikov	
Multifaceted dynamics and gap solitons in $\mathcal{PT}$ -symmetric periodic structures (<i>16 pages</i>)	033838
S. Vignesh Raja, A. Govindarajan, A. Mahalingam, and M. Lakshmanan	
Counterpropagating continuous-variable entangled states in lossy coupled-cavity optical waveguides (<i>13 pages</i>)	033839
Hossein Seifoory, L. G. Helt, J. E. Sipe, and Marc M. Dignam	
Noninverse dynamics of a quantum emitter coupled to a fully anisotropic environment (<i>10 pages</i>)	033840
Danil Kornovan, Mihail Petrov, and Ivan Iorsh	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 100, NUMBER 3

SEPTEMBER 2019

ERRATA

Publisher's Note: Quantification of Einstein-Podolsky-Rosen steering for two-qubit states [Phys. Rev. A 93 , 020103(R) (2016)] (<i>1 page</i>).....	039901(E)
A. C. S. Costa and R. M. Angelo	
Erratum: Time-resolved Fourier-transform infrared emission spectroscopy of Ag in the (1300–3600)-cm ⁻¹ region: Transitions involving <i>f</i> and <i>g</i> states and oscillator strengths [Phys. Rev. A 82 , 022502 (2010)] (<i>4 pages</i>).....	039902(E)
S. Civiš, I. Matulková, J. Cihelka, P. Kubelík, K. Kawaguchi, and V. E. Chernov	
Erratum: Shot-noise-dominant regime for ellipsoidal nanoparticles in a linearly polarized beam [Phys. Rev. A 95 , 053421 (2017)] (<i>2 pages</i>).....	039903(E)
Changchun Zhong and F. Robicheaux	