

*The Table of Contents is a total listing of Parts A and B.
Part A consists of pages L010201–012630, and Part B pages 012801–019901(E).*

PART A

LETTERS

Fundamental concepts

- Certification of unbounded randomness with arbitrary noise (6 pages) L010201
Shubhayan Sarkar
- Quasiperiodic Floquet-Gibbs states in Rydberg atomic systems (8 pages) L010202
Wilson S. Martins, Federico Carollo, Kay Brandner, and Igor Lesanovsky
- Experimental demonstration of single-spin Stirling engine cycles with enhanced efficiency (6 pages) L010203
P.-D. Li, G.-Y. Ding, J.-Q. Zhang, Q. Yuan, S.-Q. Dai, T.-H. Cui, F. Zhou, L. Chen, Q. Zhong,
H. Jing, Ş. K. Özdemir, and M. Feng

Quantum information science

- Ancilla-entangling Floquet kicks for accelerating quantum algorithms (6 pages) L010401
C.-C. Joseph Wang, Phillip C. Lotshaw, Titus Morris, Vicente Leyton-Ortega,
Daniel Claudino, and Travis S. Humble
- Entanglement transitions induced by quantum-data collection (6 pages) L010402
Shane P. Kelly and Jamir Marino

Atomic and molecular structure and dynamics; high-precision experiments

- On-the-fly *ab initio* Hagedorn wave-packet dynamics: Single vibronic level fluorescence spectra
of difluorocarbene (7 pages) L010801
Zhan Tong Zhang, Máté Visegrádi, and Jiří J. L. Vaníček
- One-body dynamical correlation function of the Lieb-Liniger model at finite temperature (7 pages) L010802
Song Cheng, Yang-Yang Chen, Xi-Wen Guan, Wen-Li Yang, and Hai-Qing Lin
- Theory for the Rydberg states of helium: Comparison with experiment for the $1s24p\ ^1P_1$
state ($n = 24$) (5 pages) L010803
Aaron T. Bondy, G. W. F. Drake, Cody McLeod, Evan M. R. Petrimoulx,
Xiao-Qiu Qi, and Zhen-Xiang Zhong



(Continued)



2469-9926(202501)111:1:B;1-1

Light-induced processes in atomic-scale systems

- Strong-field ionization with few-cycle, midinfrared laser pulses inducing a localized ionization followed by long-lasting charge migration in halogenated organic molecules (*6 pages*) L011101
 Kyle A. Hamer, François Mauger, Kenneth Lopata, Kenneth J. Schafer, and Mette B. Gaarde

Ultracold systems and matter waves

- Supersolidity of dipolar Bose-Einstein condensates induced by coupling to fermions (*6 pages*) L011301
 Maciej Lewkowicz, Tomasz Karpiuk, Mariusz Gajda, and Mirosław Brewczyk
- Superfluid fraction of interacting bosonic gases (*6 pages*) L011302
 Daniel Pérez-Cruz, Grigori E. Astrakharchik, and Pietro Massignan
- Floquet geometric squeezing in fast-rotating condensates (*6 pages*) L011303
 Li Chen, Fei Zhu, Yunbo Zhang, and Han Pu
- Realization of a period-3 coplanar state in one-dimensional spin-orbit-coupled optical lattices (*6 pages*) L011304
 Yida Chu, Shijie Hu, and Tao Wang
- Supersolidity in Rydberg tweezer arrays (*7 pages*) L011305
 Lukas Homeier, Simon Hollerith, Sebastian Geier, Neng-Chun Chiu, Antoine Browaeys, and Lode Pollet

Photonics, nonlinear optics, and optomechanics

- Quantum correlations, mixed states, and bistability at the onset of lasing (*6 pages*) L011501
 Francesco Papoff, Mark Anthony Carroll, Gian Luca Lippi, Gian-Luca Oppo, and Giampaolo D'Alessandro

Quantum optics

- Optimal cavity design for minimizing errors in cavity-QED-based atom-photon entangling gates with finite temporal duration (*6 pages*) L011701
 Takeru Utsugi, Rui Asaoka, Yuuki Tokunaga, and Takao Aoki

ARTICLES

Fundamental concepts

- Probability-based approach to hybrid classical-quantum systems of any size: Generalized Gleason and Kraus theorems (*16 pages*) 012201
 S. Camalet
- Lie-algebraic quantum phase reduction based on heterodyne detection (*14 pages*) 012202
 Wataru Setoyama and Yoshihiko Hasegawa
- Feedback-driven quantum Otto-like engines (*15 pages*) 012203
 Dehua Liu, Yingying Hong, Shaolin Luo, Xian He, Zhaoqi Wu, and Jianhui Wang
- Quantum work extraction efficiency for noisy quantum batteries: The role of coherence (*15 pages*) 012204
 Salvatore Tirone, Raffaele Salvia, Stefano Chessa, and Vittorio Giovannetti
- Certifying the activation of Bell nonlocality with finite data (*10 pages*) 012205
 Jonathan Steinberg, H. Chau Nguyen, and Matthias Kleinmann

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Local friendliness polytopes in multipartite scenarios (<i>15 pages</i>)	012206
Marwan Haddara and Eric G. Cavalcanti	
Generating multipartite nonlocality to benchmark quantum computers (<i>14 pages</i>)	012207
Jan Lennart Bönsel, Otfried Gühne, and Adán Cabello	
State swapping via semiclassical gravity (<i>9 pages</i>)	012208
Praveer K. Gollapudi, M. Kemal Döner, and André Großardt	
Transient effects in quantum refrigerators with finite environments (<i>18 pages</i>)	012209
Aparajita Bhattacharyya, Ahana Ghoshal, and Ujjwal Sen	
Stationary states of boundary-driven quantum systems: Some exact results (<i>7 pages</i>)	012210
Eric A. Carlen, David A. Huse, and Joel L. Lebowitz	
Quantum geometry in many-body systems with precursors of criticality (<i>18 pages</i>)	012211
Jan Štřeleček and Pavel Cejnar	
Parallel ergotropy: Maximum work extraction via parallel local unitary operations (<i>18 pages</i>)	012212
Riccardo Castellano, Ranieri Nery, Kyrylo Simonov, and Donato Farina	
Single-measurement Bell analysis (<i>5 pages</i>)	012213
Alfredo Luis	
Speed limits and thermodynamic uncertainty relations for quantum systems with the non-Hermitian Hamiltonian (<i>12 pages</i>)	012214
Tomohiro Nishiyama and Yoshihiko Hasegawa	
Nonadiabatic quantum optimization for crossing quantum phase transitions (<i>23 pages</i>)	012215
András Grabarits, Federico Balducci, Barry C. Sanders, and Adolfo del Campo	
Quantum entanglement as an extremal Kirkwood-Dirac nonreality (<i>13 pages</i>)	012216
Agung Budiyo	
Statistical model for quantum spin and photon number states (<i>19 pages</i>)	012217
Sam Powers, Guangpeng Xu, Herbert Fotso, Tim Thomay, and Dejan Stojkovic	
Robustness of perfect transmission resonances to asymmetric perturbation (<i>11 pages</i>)	012218
Ioannis Kiropelidis, Panayotis Kalozoumis, Georgios Theocharis, Vassos Achilleos, Fotios K. Diakonou, and Vincent Pagneux	
Quantum harvester enabling energy transfer without entropy transfer (<i>16 pages</i>)	012219
Fei Meng, Junhao Xu, Xiangjing Liu, and Oscar Dahlsten	
High-dimensional monitoring and the emergence of realism via multiple observers (<i>10 pages</i>)	012220
Alexandre C. Orthey, Jr., Pedro R. Dieguez, Owidiusz Makuta, and Remigiusz Augusiak	
Stronger sum uncertainty relations for non-Hermitian operators (<i>12 pages</i>)	012221
Xiao-Feng Song, Yi-Fang Ren, Shuang Liu, Xi-Hao Chen, and Yusuf Turek	
Relativistic quantum field theory approach to electron wave-packet tunneling: A fully causal process (<i>10 pages</i>)	012222
M. Alkhateeb, X. Gutierrez de la Cal, M. Pons, D. Sokolovski, and A. Matzkin	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Maximal non-Kochen-Specker sets and a lower bound on the size of Kochen-Specker sets (8 pages)	012223
Tom Williams and Andrei Constantin	
Cluster property and Bell inequalities (5 pages)	012224
F. Benatti, R. Floreanini, and H. Narnhofer	
Quantum information science	
Performance upper bound of a Grover-mixer quantum alternating operator ansatz (15 pages)	012401
Ningyi Xie, Jiahua Xu, Tiejin Chen, Xinwei Lee, Yoshiyuki Saito, Nobuyoshi Asai, and Dongsheng Cai	
Conditional acceleration of entanglement generation enabled by dissipation (6 pages)	012402
Xiao-Wei Zheng, Jun-Cong Zheng, Xue-Feng Pan, Li-Hua Lin, Pei-Rong Han, and Peng-Bo Li	
Coherence based on positive operator-valued measures for standard and concatenated quantum state discrimination with inconclusive results (11 pages)	012403
L. F. Melo, O. Jiménez, and L. Neves	
Finite-temperature detection of quantum critical points via internal quantum teleportation (16 pages)	012404
G. A. P. Ribeiro and Gustavo Rigolin	
Pauli spectrum of quantum channels and the related magic-channel distillation bounds (13 pages)	012405
Yiran Wang and Yongming Li	
Universal perspective on nonadiabatic quantum control (11 pages)	012406
Zhu-yao Jin and Jun Jing	
Entanglement degradation in the presence of Markovian noise: A statistical analysis (20 pages)	012407
Nunzia Cerrato, Giacomo De Palma, and Vittorio Giovannetti	
Curvature of quantum evolutions for qubits in time-dependent magnetic fields (12 pages)	012408
Carlo Cafaro, Leonardo Rossetti, and Paul M. Alsing	
Formal bounds of entanglement purification via entanglement swapping (12 pages)	012409
Run-Ze Cong and Shuang Xu	
Quantum synchronization and dissipative quantum sensing (12 pages)	012410
Gaurav M. Vaidya, Simon B. Jäger, and Athreya Shankar	
Quantum sensing from gravity as a universal dephasing channel for qubits (9 pages)	012411
Alexander V. Balatsky, Pedram Roushan, Joris Schaltegger, and Patrick J. Wong	
Enhancement in the temperature sensing of a reservoir by a Kerr-nonlinear resonator (9 pages)	012412
Naeem Akhtar, Jia-Xin Peng, Xiaosen Yang, and Yuanping Chen	
Unbounded recycling of genuine multiparty entanglement for any number of qubits (12 pages)	012413
Chirag Srivastava, Mahasweta Pandit, and Ujjwal Sen	
Exact quantum Fisher matrix results for distributed phases using multiphoton polarization Greenberger-Horne-Zeilinger states (9 pages)	012414
Jiaxuan Wang and Girish S. Agarwal	
Separability and lower bounds of quantum entanglement based on realignment (11 pages)	012415
Jiaxin Sun, Hongmei Yao, Shao-Ming Fei, and Zhaobing Fan	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Hybrid quantum-classical unsupervised data clustering based on the self-organizing feature map (<i>11 pages</i>)	012416
I. D. Lazarev, Marek Narożniak, Tim Byrnes, and A. N. Pyrkov	
Inherent quantum resources in stationary spin chains (<i>13 pages</i>)	012417
Marcin Płodzień, Jan Chwedeńczuk, and Maciej Lewenstein	
Quantum estimation bound of the Gaussian matrix permanent (<i>8 pages</i>)	012418
Joonsuk Huh	
Enhancing quantum memory lifetime with measurement-free local error correction and reinforcement learning (<i>22 pages</i>)	012419
Mincheol Park, Nishad Maskara, Marcin Kalinowski, and Mikhail D. Lukin	
Designing three-way-entangled and nonlocal two-way-entangled single-particle states via alternate quantum walks (<i>15 pages</i>)	012420
Dinesh Kumar Panda and Colin Benjamin	
Entanglement and coherence dynamics in photonic quantum memristors (<i>9 pages</i>)	012421
Alberto Ferrara and Rosario Lo Franco	
Classically simulating intermediate-scale instantaneous quantum polynomial circuits through a random graph approach (<i>8 pages</i>)	012422
Julien Codsì and John van de Wetering	
Creation and manipulation of surface code defects with quantum optimal control (<i>8 pages</i>)	012423
Omar Raii, Anirban Dey, Florian Mintert, and Daniel Burgarth	
Accelerating quantum imaginary-time evolution with random measurements (<i>17 pages</i>)	012424
Ioannis Kolotouros, David Joseph, and Anand Kumar Narayanan	
Generalizing measurement-induced phase transitions to information exchange symmetry breaking (<i>26 pages</i>)	012425
Shane P. Kelly and Jamir Marino	
Efficient ground-state-energy estimation and certification on early fault-tolerant quantum computers (<i>23 pages</i>)	012426
Guoming Wang, Daniel Stilck França, Gumaro Rendon, and Peter D. Johnson	
Multiscale quantum approximate optimization algorithm (<i>7 pages</i>)	012427
Ping Zou	
Three-parameter symmetric quantum joint measurement on two qubits (<i>8 pages</i>)	012429
Ying-Qiu He, Dong Ding, Ting Gao, Zan-Jia Li, and Feng-Li Yan	
Construction and classification of all equioverlapping measurements in qubit and qutrit systems (<i>14 pages</i>)	012430
Zhihua Guo, Yan Liu, Tsung-Lin Lee, and Shunlong Luo	
Hybrid nonlocality via atom-photon interactions with and without impurities (<i>14 pages</i>)	012431
Pritam Halder, Ratul Banerjee, Saptarshi Roy, and Aditi Sen(De)	
Hamiltonian forging of a thermofield double (<i>13 pages</i>)	012432
Daniel Fałde, Juan Santos-Suárez, David A. Herrera-Martí, and Javier Mas	
Circuit knitting facing exponential sampling-overhead scaling bounded by entanglement cost (<i>18 pages</i>)	012433
Mingrui Jing, Chengkai Zhu, and Xin Wang	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Improved quantum power method and numerical integration using a quantum singular-value transformation (<i>15 pages</i>)	012434
Nhat A. Nghiem, Hiroki Sukeno, Shuyu Zhang, and Tzu-Chieh Wei	
Scalable embedding of parity constraints in quantum annealing hardware (<i>17 pages</i>)	012435
Michele Cattelan, Jemma Bennett, Sheir Yarkoni, and Wolfgang Lechner	
Device-independent certification of multipartite distillable entanglement (<i>12 pages</i>)	012436
Aby Philip and Mark M. Wilde	
Hamiltonian-based graph-state ansatz for variational quantum algorithms (<i>8 pages</i>)	012437
Abhinav Anand and Kenneth R. Brown	
Quantum teleportation between a continuous-variable optical qumode and a discrete-variable solid-state qubit (<i>13 pages</i>)	012438
Di Wang, Lei Xie, Jinfeng Liu, Yiling Song, Wei Xiong, and Mingfeng Wang	
Investigating an approach of robustly self-testing two-qubit entangled states (<i>7 pages</i>)	012439
Chan-Ching Lien and Shin-Liang Chen	
Retrieving nonstabilizerness with neural networks (<i>6 pages</i>)	012440
Antonio Francesco Mello, Guglielmo Lami, and Mario Collura	
Barren plateaus swamped with traps (<i>13 pages</i>)	012441
Nikita A. Nemkov, Evgeniy O. Kiktenko, and Aleksey K. Fedorov	
Stochastic action for the entanglement of a noisy monitored two-qubit system (<i>12 pages</i>)	012442
Dominic Shea and Alessandro Romito	
Exploiting symmetry in variational quantum channel coding (<i>11 pages</i>)	012443
Jun Wu, Wei Xie, Hao Fu, Mingzheng Zhu, and Xiang-Yang Li	
Low-overhead quantum error-correction codes with a cyclic topology (<i>8 pages</i>)	012444
Ilya A. Simakov and Ilya S. Besedin	
Quantum eigenstate preparation assisted by a coherent link (<i>20 pages</i>)	012445
Benjamin F. Schiffer and Jordi Tura	
Quantum technologies	
Quantum metrology algorithms for dark matter searches with clocks (<i>10 pages</i>)	012601
M. H. Zaheer, N. J. Matjelo, D. B. Hume, M. S. Safronova, and D. R. Leibbrandt	
Memory-assisted measurement-device-independent quantum secret sharing (<i>12 pages</i>)	012602
Cheng Zhang, Qi Zhang, Wei Zhong, Ming-Ming Du, Shu-Ting Shen, Xi-Yun Li, An-Lei Zhang, Lan Zhou, and Yu-Bo Sheng	
Device-independent quantum secret sharing with advanced random key generation basis (<i>14 pages</i>)	012603
Qi Zhang, Jia-Wei Ying, Zhong-Jian Wang, Wei Zhong, Ming-Ming Du, Shu-Ting Shen, Xi-Yun Li, An-Lei Zhang, Shi-Pu Gu, Xing-Fu Wang, Lan Zhou, and Yu-Bo Sheng	
Quantum computation based on capture-and-release dynamics (<i>9 pages</i>)	012604
S.-Y. Zhang, J.-F. Wei, P.-Y. Song, L.-L. Yan, A. Kinos, Shi-Lei Su, and Gang Chen	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

General communication enhancement via the quantum switch (8 pages)	012605
Zhen Wu, James Fullwood, Zhihao Ma, Si-Qi Zhou, Qi Zhao, and Giulio Chiribella	
Generalized quantum parity codes for ultrafast long-distance quantum communication (11 pages)	012606
Yun-Jiang Wang, Zhuo-Yan Xiao, Xing-Yu Xiong, Sha Shi, and Dong-Sheng Wang	
Quantum estimation for improving optomechanical coupling strength (12 pages)	012607
Jia-Xin Peng, P. Djorwe, H. T. Cui, Naeem Akhtar, Inaam Ul Haq, Chongsong Zhao, and Dongke Li	
One-decoy-state quantum key distribution with advantage distillation based on planar-lightwave-circuit-integration modules (7 pages)	012608
Jiali Zhu, Xingyu Zhou, Huajian Ding, Jingyang Liu, Chunhui Zhang, Jian Li, Junming An, and Qin Wang	
Simultaneous information and energy transmission through quantum channels (15 pages)	012609
Bishal Kumar Das, Lav R. Varshney, and Vaibhav Madhok	
Probing electron-photon entanglement using a quantum eraser (10 pages)	012610
Jan-Wilke Henke, Hao Jeng, and Claus Ropers	
Randomized benchmarking protocol for dynamic circuits (12 pages)	012611
Liran Shirizly, Luke C. G. Govia, and David C. McKay	
Entanglement generation using single-photon pulse reflection in realistic networks (18 pages)	012612
Ferdinand Omlor, Benedikt Tissot, and Guido Burkard	
Continuous-variable measurement-device-independent multipartite quantum communication via a fast-fading channel (11 pages)	012613
Runbo Zhao, Jian Zhou, Ronghua Shi, Jinjing Shi, and Guangqiang He	
Proposal for superconducting quantum networks using multioctave transduction to lower frequencies (10 pages)	012614
Takuma Makihara, Wentao Jiang, and Amir H. Safavi-Naeini	
Decoherence of surface phonons in a quantum acoustic system (7 pages)	012615
Camryn Undershute, Joseph M. Kitzman, Camille A. Mikolas, and Johannes Pollanen	
Secure quantum-enhanced measurements on a network of sensors (12 pages)	012616
Sean William Moore and Jacob A. Dunningham	
Bit-flip errors in dissipative cat qubits: Second-order perturbation theory (12 pages)	012617
Kirill S. Dubovitskii	
Cascaded multiparameter quantum metrology (16 pages)	012618
Gregory Krueper, Lior Cohen, and Juliet T. Gopinath	
Efficient frequency allocation for superconducting quantum processors using improved optimization techniques (9 pages)	012619
Zewen Zhang, Pranav Gokhale, and Jeffrey M. Larson	
Shadow-based quantum subspace algorithm for the nuclear shell model (15 pages)	012620
Ruyun Yang, Tianren Wang, Bing-Nan Lu, Ying Li, and Xiaosi Xu	
Shortcuts to adiabatic transducers in a hybrid spin-superconducting system (14 pages)	012621
Xing-Yu Zhu, Le-Tian Zhu, Guang-Can Guo, Tao Tu, and Chuan-Feng Li	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Dissipation-induced quantum homogenization for temporal information processing (<i>7 pages</i>)	012622
Alexander Yosifov, Aditya Iyer, and Vlatko Vedral	
Quantum state engineering in three-level systems via Lewis-Riesenfeld invariants (<i>11 pages</i>)	012623
Xiang-Min Yu, Kun Zhou, Han-Yu Zhang, Shao-Xiong Li, Zhiguo Huang, Jingwei Wen, Runqing Zhang, and Yang Yu	
Detecting quantum steering in networks (<i>14 pages</i>)	012624
Ming-Xiao Li, Yuqi Li, Ya Xi, Chang-Yue Zhang, Ying-Zheng Wang, Rui-Bin Xu, Shao-Ming Fei, and Zhu-Jun Zheng	
Generic and scalable differential-equation solver for quantum scientific computing (<i>11 pages</i>)	012625
Jinhwan Sul and Yan Wang	
Probing the limits of variational quantum algorithms for nonlinear ground states on real quantum hardware: The effects of noise (<i>12 pages</i>)	012626
Muhammad Umer, Eleftherios Mastorakis, Sofia Evangelou, and Dimitris G. Angelakis	
Optimal scheduling of graph states via path decompositions (<i>4 pages</i>)	012627
Samuel J. Elman, Jason Gavriel, and Ryan L. Mann	
Surface-enhanced stimulated Raman spectroscopy with squeezed photonic states (<i>16 pages</i>)	012628
Frank Hagelberg and Ali Passian	
Simulating a quasiparticle on a quantum device (<i>16 pages</i>)	012629
Rimika Jaiswal, Izabella Lovas, and Leon Balents	
Image classification by combining quantum kernel learning and tensor networks (<i>14 pages</i>)	012630
Nathan X. Kodama, Alex Bocharov, and Marcus P. da Silva	

PART B

Atomic and molecular structure and dynamics; high-precision experiments

Polarizability of molecular hydrogen and gas metrology (<i>5 pages</i>)	012801
Zhong-Liang Nie (聂中梁), Jin Wang (王进), Chang-Le Hu (胡常乐), Yu R. Sun (孙羽), Cun-Feng Cheng (程存峰), Yan Tan (谈艳), and Shui-Ming Hu (胡水明)	
One-loop electron self-energy with accelerated partial-wave expansion in the Coulomb gauge (<i>16 pages</i>)	012802
V. A. Yerokhin, Z. Harman, and C. H. Keitel	
Changing the paradigm in <i>f</i> -containing cold molecules: The impact of spin-orbit coupling and <i>f-d</i> transitions (<i>10 pages</i>)	012803
Marta Gałyńska, Matheus M. F. de Moraes, Paweł Tecmer, and Katharina Boguslawski	
Observing Young-type double-slit interference in slow- and intermediate-velocity ion-molecule collisions (<i>9 pages</i>)	012804
Md Abul Kalam Azad Siddiki and Deepankar Misra	
☞ Competing ionization and dissociation: Extension of the energy-dependent frame transformation to the gerade symmetry of H ₂ (<i>15 pages</i>)	012805
Dávid Hvizdoš, Roman Čurík, and Chris H. Greene	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Neural networks for the prediction of electronic excitation dynamics (<i>10 pages</i>)	012806
Ethan P. Shapera and Cheng-Wei Lee	
Quasianalytical line shape for the 1S-2S laser spectroscopy of antihydrogen and hydrogen (<i>11 pages</i>)	012807
Levi O. A. Azevedo and Claudio Lenz Cesar	
Transmission spectroscopy of CF ₄ molecules in intense x-ray fields (<i>14 pages</i>)	012808
Rui Jin, Adam Fouda, Alexander Magunia, Yeonsig Nam, Marc Rebholz, Alberto De Fanis, Kai Li, Gilles Doumy, Thomas M. Baumann, Michael Straub, Sergey Usenko, Yevheniy Ovcharenko, Tommaso Mazza, Jacobo Montaña, Marcus Agåker, Maria Novella Piancastelli, Marc Simon, Jan-Erik Rubensson, Michael Meyer, Linda Young, Christian Ott, and Thomas Pfeifer	
Unveiling MgC ₂ reaction dynamics using a permutation-invariant-polynomial neural-network potential energy surface constructed via the trust region framework (<i>12 pages</i>)	012809
Guosen Wang, Xia Huang, Changmin Guo, Chuanyu Zhang, and Xinlu Cheng	
Measurement of the $1^3S_1 \rightarrow 2^3S_1$ interval in positronium using field ionization of Rydberg states (<i>21 pages</i>)	012810
Michael W. Heiss, Lucas de Sousa Borges, Artem Golovizin, and Paolo Crivelli	
Radiative decay of muonic molecules in resonance states (<i>17 pages</i>)	012811
Takuma Yamashita, Kazuhiro Yasuda, and Yasushi Kino	
Polarization tensor in spacetime of three dimensions and a quantum field-theoretical description of the nonequilibrium Casimir force in graphene systems (<i>12 pages</i>)	012812
G. L. Klimchitskaya, C. C. Korikov, and V. M. Mostepanenko	
Determination of the Landé g_J factor and Zeeman coefficients in ground-state $^{171}\text{Yb}^+$ and their applications to quantum frequency standards (<i>8 pages</i>)	012814
Jize Han, Benquan Lu, Yanmei Yu, Jiguang Li, Zhiguo Huang, Jingwei Wen, Ling Qian, and Lijun Wang	
Quantitative analysis of aligned-molecule photoelectron angular distributions (<i>15 pages</i>)	012815
Joanne L. Woodhouse, James O. F. Thompson, Jakub Benda, Richard T. Chapman, Paul Hockett, Varun Makhija, Zdeněk Mašín, Katharine L. Reid, Emma Springate, Adam S. Wyatt, Yu Zhang, and Russell S. Minns	
Casimir repulsion turned into attraction by the nonlocal response of salted water (<i>7 pages</i>)	012816
Larissa Inácio, Felipe S. S. Rosa, Serge Reynaud, and Paulo A. Maia Neto	
Metrology in a two-electron atom: The ionization energy of metastable triplet helium 2^3S_1 (<i>13 pages</i>)	012817
Gloria Clausen, Kai Gamlin, Josef A. Agner, Hansjürg Schmutz, and Frédéric Merkt	
Light-induced processes in atomic-scale systems	
Coherent nonlinear Thomson scattering of Laguerre-Gauss beams on an electron sheet (<i>14 pages</i>)	013101
Petru-Vlad Toma, Andrei Cristian Opinca, Virgil Baran, and Madalina Boca	
Observation of collective nonradiative coherence in potassium atoms with two-dimensional coherent spectroscopy (<i>11 pages</i>)	013102
YiFeng Geng, ShaoGang Yu, YanZuo Chen, SongPo Xu, YanLan Wang, LinQiang Hua, XuanYang Lai, and XiaoJun Liu	
Magnetic-resonance linewidth of alkali-metal vapor in the unresolved Zeeman-resonance regime (<i>11 pages</i>)	013103
Feng Tang and Nan Zhao	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Simulating feedback cooling of incoherent quantum mixtures (<i>9 pages</i>)	013104
Kaiwen K. Zhu (朱凯文), Zain Mehdi, Joseph J. Hope, and Simon A. Haine	
Photoionization of the CH molecule (<i>9 pages</i>)	013105
Conner Penson, Joshua Forer, Mehdi Ayouz, Nicolas Douguet, Samantha Fonseca dos Santos, Mikhail Guchkov, Jean-Christophe Loison, B��renger Gans, and Viatcheslav Kokoouline	
Chirp effects on photoelectron vortices in multiphoton ionization by chirped circularly polarized attosecond pulses (<i>9 pages</i>)	013106
Run Wang, Qingbin Zhang, and Yixian Qian	
Resonant enhancement of high-order harmonic generation by Ba and Cs atoms (<i>10 pages</i>)	013107
A. A. Romanov, A. A. Silaev, and N. V. Vvedenskii	
Fragmentation in Coulomb explosion of hydrocarbon molecules (<i>12 pages</i>)	013109
Samuel S. Taylor, K��lman Varga, K��roly Mogyor��si, Viktor Chik��n, and Cody Covington	
Angular momentum dependence in multiphoton ionization and attosecond time delays (<i>13 pages</i>)	013110
Jakub Benda, Zden��k Ma��n, Sreelakshmi Palakkal, Fran��ck L��pine, Saikat Nandi, and Vincent Loriot	
Nonadiabatic strong-field ionization of aligned N ₂ molecules (<i>7 pages</i>)	013111
Zichen Li, Peipei Ge, Jiaqing Yan, Wenhai Xie, Yang Liu, Yupeng Liu, Weibin Liu, Kunlong Liu, Yueming Zhou, Min Li, and Peixiang Lu	
Electronic-decay-process spectra including nuclear degrees of freedom (<i>20 pages</i>)	013112
Alexander V. Riegel and Elke Fasshauer	
Hierarchy of approximations for describing quantum light from high-harmonic generation: A Fermi-Hubbard-model study (<i>13 pages</i>)	013113
Christian Saugbjerg Lange and Lars Bojer Madsen	
Controlling nondipole effects with bicircular laser fields (<i>6 pages</i>)	013114
Yankun Dou, Xiaoxiao Long, Peizeng Li, Peipei Ge, Yongkai Deng, Qihuang Gong, and Yunquan Liu	
☞ Magic running- and standing-wave optical traps for Rydberg atoms (<i>10 pages</i>)	013115
Lukas Ahlheit, Chris Nill, Daniil Svirskiy, Jan de Haan, Simon Schroers, Wolfgang Alt, Nina Stiesdal, Igor Lesanovsky, and Sebastian Hofferberth	
Observation and origin of multi-THz quantum beats in superfluorescent emission from argon (<i>7 pages</i>)	013116
Noa Nambu, Zan Nie, Ken Marsh, C. Kumar N. Patel, Olga Smirnova, Misha Ivanov, and Chan Joshi	
All-electron molecular tunnel ionization based on the weak-field asymptotic theory in the integral representation (<i>19 pages</i>)	013117
Imam S. Wahyutama, Denawakage D. Jayasinghe, Fran��ois Mauger, Kenneth Lopata, and Kenneth J. Schafer	
Photodissociation dynamics of SiH ⁺ : Rovibrationally resolved Feshbach resonances mediated by coupled excited states in the ultraviolet region (<i>10 pages</i>)	013118
Yu Kun Yang, Xing Guang Su, Kun Wang, Yongjun Cheng, Quan Wei Nan, Zeqing Wang, Danny L. Yeager, Yong Wu, Jian Guo Wang, Ke Dong Wang, Yu Wang, and Song Bin Zhang	
Photoelectron-residual-ion interaction in angle-resolved streaked shake-up ionization of helium (<i>16 pages</i>)	013119
Hongyu Shi and Uwe Thumm	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Ion-kinetic-energy sampling in a 22-pole trap using ring-electrode evaporation (<i>11 pages</i>)	013120
Miguel Jiménez-Redondo, Dieter Gerlich, Paola Caselli, and Pavol Jusko	
On-shot, high-intensity laser aberration measurements via ponderomotive electron ejection (<i>5 pages</i>)	013121
A. E. Raymond, S. Ravichandran, S.-W. Bahk, A. Longman, L. Roso, R. Fedosejevs, C. Mileham, I. A. Begishev, S. Qin, N. Dauphin, J. Shamlian, W. T. Hill, III, and H. G. Rinderknecht	
Spin-orbit splitting on photodissociation in open-shell diatomics by intense UV pulses (<i>9 pages</i>)	013122
Yan Rong Liu, Victor Kimberg, Maomao Gong, Yongjun Cheng, Yong Wu, Jian Guo Wang, and Song Bin Zhang	
Formation of singly ionized oxygen atoms from O ₂ driven by XUV pulses: A toolkit for the breakup of free-electron-laser-driven diatomics (<i>13 pages</i>)	013123
M. Mountney, Z. Wang, S. Meister, F. Trost, H. Lindenblatt, A. Magunia, R. Moshhammer, T. Pfeifer, and A. Emmanouilidou	
Coherent postionization dynamics of molecules based on adiabatic strong-field approximation (<i>12 pages</i>)	013124
Shan Xue, Wenli Yang, Ping Li, Yuxuan Zhang, Pengji Ding, Song-Feng Zhao, Hongchuan Du, and Anh-Thu Le	
Ultracold systems and matter waves	
Spontaneous creation of skyrmions in a two-component Bose-Einstein condensate (<i>7 pages</i>)	013301
Rabeea Kiran and Hiroki Saito	
Analyzing the sensitivity of an atom interferometer with a phase-modulation readout scheme (<i>9 pages</i>)	013302
Takuya Kawasaki, Sotatsu Otabe, Tomoya Sato, Martin Miranda, Nobuyuki Takei, and Mikio Kozuma	
 Comparison of renormalized interactions using one-dimensional few-body systems as a testbed (<i>23 pages</i>)	013303
Fabian Brauneis, Hans-Werner Hammer, Stephanie M. Reimann, and Artem G. Volosniev	
Instability and particle-current control of a parametrically driven Bose-Einstein condensate in a ring-shaped lattice (<i>9 pages</i>)	013304
L. Q. Lai	
Yrast states of quantum droplets confined in a ring potential (<i>11 pages</i>)	013305
M. Ögren and G. M. Kavoulakis	
Effective approaches to the dynamical properties of two distinguishable Bose polarons (<i>17 pages</i>)	013306
F. Theel, S. I. Mistakidis, and P. Schmelcher	
Deceleration of heavy atoms with a continuous stimulated force (<i>10 pages</i>)	013307
Jin Wei, Di Wu, Taojing Dong, Chenyu Zu, Yong Xia, and Jianping Yin	
Spin hierarchy in van der Waals molecule formation via ultracold three-body recombination (<i>9 pages</i>)	013308
Jing-Lun Li, Paul S. Julienne, Johannes Hecker Denschlag, and José P. D’Incao	
Universal corrections to the superfluid gap in a cold Fermi gas (<i>15 pages</i>)	013309
Silas R. Beane, Zeno Capatti, and Roland C. Farrell	
Photonic bands and normal mode splitting in optical lattices interacting with cavities (<i>18 pages</i>)	013310
Ph. W. Courteille, D. Rivero, G. H. de França, C. A. Pessoa, Jr., A. Cipris, M. Núñez Portela, R. C. Teixeira, and S. Slama	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Exploring Thouless pumping in the generalized Creutz model: A graphical method and modulation schemes (9 pages)	013311
Yan-Jue Lv, Yang Peng, Yong-Kai Liu, and Yi Zheng	
Lieb excitations and topological flat mode of the spectral function of a Tonks-Girardeau gas in a Kronig-Penney potential (9 pages)	013312
Wen-Bin He, Giedrius Žlabys, Hoshu Hiyane, Sarika Sasidharan Nair, and Thomas Busch	
Quantum protocols in demixed dipolar Bose-Einstein-condensate mixtures in one dimension (10 pages)	013313
C. Madroñero and R. Paredes	
Measurement of p -wave contacts in an ultracold Fermi gas of ^6Li atoms (6 pages)	013314
Kenta Nagase, Soki Oshima, Hikaru Takahashi, and Takashi Mukaiyama	
One-dimensional quench dynamics in an optical lattice: Sine-Gordon and Bose-Hubbard descriptions (12 pages)	013315
Subhrajyoti Roy, Rhombik Roy, Andrea Trombettoni, Barnali Chakrabarti, and Arnaldo Gammal	
Global phase diagram of the cluster- XY spin chain with dissipation (12 pages)	013316
Wei-Lin Li, Ying-Ao Chen, Zheng-Xin Guo, Xue-Jia Yu, and Zhi Li	
Modeled vortex dynamics in a Bose-Einstein condensate in a rotating lattice (14 pages)	013317
P. Capuzzi and D. M. Jezek	
Two-component droplet phases and their spectral stability in one dimension (12 pages)	013318
E. G. Charalampidis and S. I. Mistakidis	
Density-dependent gauge field with Raman lattices (9 pages)	013319
Xiang-Can Cheng, Zong-Yao Wang, Jinyi Zhang, Shuai Chen, and Xiaotian Nie	
Photonics, nonlinear optics, and optomechanics	
Modulation of harmonics from solids by laser pulses with a small chirp (7 pages)	013501
Yue Qiao, Susu Zhang, Wenli Jiang, Fuming Guo, Jun Wang, Jigen Chen, and Yujun Yang	
Subcycle optical solitons in a medium with several resonances (12 pages)	013502
Anton Pakhomov	
Backaction suppression for levitated dipolar scatterers (10 pages)	013503
Y. Weiser, T. Faorlin, L. Panzl, T. Lafenthaler, L. Dania, D. S. Bykov, T. Monz, R. Blatt, and G. Cerchiari	
Shaping space-time wave packets beyond the paraxial limit using a dispersion magnifier (7 pages)	013504
Dongha Kim, Cheng Guo, Peter B. Catrysse, and Shanhui Fan	
Nonlinear spectral phase retardance induced in cylindrical vector-polarized, optical parametric chirped-pulse amplification (10 pages)	013505
Xinhao Ren, Xingjie Ren, Yifan Zhong, Junfeng Ye, Changwen Xu, Ying Li, Dianyuan Fan, and Haizhe Zhong	
Coherent feedback control for cavity optomechanical systems with a frequency-dependent mirror (17 pages)	013506
Lei Du, Juliette Monsel, Witlef Wieczorek, and Janine Splettstoesser	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Enhancement of the photon pair generation rate by spontaneous four-wave mixing in bent waveguides (<i>14 pages</i>)	013507
Maria Paszkiewicz and Carsten Rockstuhl	
Quantum correlations via vector soliton interactions (<i>11 pages</i>)	013508
Andrey Konyukhov	
Overcoming the standard quantum limit with an electro-optomechanical hybrid system for enhanced force sensing (<i>9 pages</i>)	013509
Alolika Roy and Amarendra K. Sarma	
Interactions of dark solitons in one-dimensional self-defocusing media with fourth-order diffraction (<i>7 pages</i>)	013510
Miaomiao Li and Ming Shen	
Interpreting Purcell enhancement of non-Hermitian metasurfaces with spectral parameters (<i>7 pages</i>)	013511
Joshua T. Y. Tse, Shunsuke Murai, and Katsuhisa Tanaka	
Polarization transformation of high-order harmonic radiation in an optically modulated plasma-based x-ray laser: Account of the nonlinearity and finite width of the harmonic spectral lines (<i>16 pages</i>)	013512
V. A. Antonov, I. R. Khairulin, and M. Yu. Ryabikin	
Period-4 modulation instability in ring fiber cavities (<i>5 pages</i>)	013513
Minji Shi, Matteo Conforti, Arnaud Mussot, and Auro M. Perego	
Nonlinear multistable potential traps (<i>10 pages</i>)	013514
S. Mirzaei-Ghormish, D. Smalley, and R. Camacho	
LiNbO ₃ and AlGaAs on-insulator platforms for second-harmonic generation: Comparison and perspectives (<i>12 pages</i>)	013515
Jack Haines, Pooja Uday Naik, Massimiliano Guasoni, and Marco Gandolfi	
Physical origin of the repelling gradient force on a dielectric sphere in an evanescent wave (<i>12 pages</i>)	013516
Yaxin Li, Xinning Yu, Tiantao Qu, Lei Zhang, and Jun Chen	
Nonreciprocal photonic transistor with a spinning polaritonic microcavity (<i>13 pages</i>)	013517
Zi-Fa Yu, Peng-Fei Yan, Ji-Ming Gao, Fang-Qi Hu, Zhengmei Zhang, Ai-Xia Zhang, and Ju-Kui Xue	
Dynamical phases of a Bose-Einstein condensate in a bad optical cavity at optomechanical resonance (<i>10 pages</i>)	013518
Gage W. Harmon, Giovanna Morigi, and Simon B. Jäger	
Mode competition of a phonon laser induced by ultrastrong cavity-magnon coupling (<i>14 pages</i>)	013519
Wenlin Li, Jiong Cheng, and Jie Li	
Optical forces on atoms subject to higher-order Poincaré vortex modes (<i>9 pages</i>)	013520
Smail Bougouffa and Mohamed Babiker	
Motional entanglement of remote optically levitated nanoparticles (<i>12 pages</i>)	013521
N. Carlon Zambon, M. Rossi, M. Frimmer, L. Novotny, C. Gonzalez-Ballester, O. Romero-Isart, and A. Militaru	
Half-cycle dissipative solitons in a multilevel resonant medium (<i>10 pages</i>)	013522
Anton Pakhomov	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Self-cleaning of nondiffracting speckle fields in second-harmonic generation (<i>6 pages</i>)	013523
José G. M. N. Neto, Eduardo J. S. Fonseca, and Alcenísio J. Jesus-Silva	
Effects of quadratic optomechanical coupling on bipartite entanglements, mechanical ground-state cooling, and mechanical quadrature squeezing in an electro-optomechanical system (<i>18 pages</i>)	013524
N. Ghorbani, Ali Motazedifard, and M. H. Naderi	
Two-membrane etalon (<i>8 pages</i>)	013525
F. Marzioni, R. Natali, N. Malossi, D. Vitali, G. Di Giuseppe, and P. Piergentili	
Long-range dipole-dipole interactions enabled with the guided plasmons of matched nanoparticle-on-mirror antenna pairs (<i>8 pages</i>)	013526
Bowen Kang, Huatian Hu, Huan Chen, and Zhenglong Zhang	
Relationship between total reflection and Fabry-Perot bound states in the continuum (<i>9 pages</i>)	013527
Zitao Mai and Ya Yan Lu	
Classical dipole radiation revisited (<i>13 pages</i>)	013528
P. R. Berman, A. Kuzmich, and P. W. Milonni	
Bound states in the continuum in a double whispering-gallery resonator (<i>13 pages</i>)	013529
Alexis R. Legón, M. Ahumada, J. P. Ramos-Andrade, Rafael A. Molina, and P. A. Orellana	
Laser filamentation: Insights from inverse-scattering analysis (<i>8 pages</i>)	013530
A. M. Zheltikov	
Phase-tunable inverse Hong-Ou-Mandel interference: Principles and demonstration in a photon pair source (<i>8 pages</i>)	013531
Csaba Tamás Holló, Tamás Sarkadi, Attila Barócsi, Pál Koppa, and Gábor Erdei	
Quantum optics	
Single-photon microwave switch with a recoverable control photon (<i>15 pages</i>)	013701
Davide Rinaldi, Davide Nigro, and Dario Gerace	
Quantum-noise-induced nonreciprocity for single-photon transport in parity-time-symmetric systems (<i>11 pages</i>)	013702
Dibyendu Roy and G. S. Agarwal	
Quantum and classical correlations in four-wave mixing from cold ensembles of two-level atoms (<i>12 pages</i>)	013703
Lucas S. Marinho, Michelle O. Araújo, and Daniel Felinto	
Nonreciprocal steering between optical and microwave waves by Bogoliubov cooling in a cavity optomagnonic system (<i>12 pages</i>)	013704
Deyi Kong and Fei Wang	
Self-ordering, cooling, and lasing in an ensemble of clock atoms (<i>8 pages</i>)	013705
Anna Bychek, Laurin Ostermann, and Helmut Ritsch	
Tunable ultrahigh broadband reflection via collective atom-atom interaction in a waveguide-QED system (<i>11 pages</i>)	013706
Xin Wang, Junjun He, Zeyang Liao, and M. Suhail Zubairy	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

Coherent control of spontaneous emission for a giant driven Λ -type three-level atom (<i>10 pages</i>)	013707
Ya Yang (杨亚), Ge Sun (孙葛), Jing Li (李静), Jing Lu (卢竞), and Lan Zhou (周兰)	
Kerr-magnon-assisted asymptotic stationary photon-phonon squeezing (<i>12 pages</i>)	013708
Shi-fan Qi and Jun Jing	
Enhancing tripartite photon-phonon-magnon entanglement by synergizing parametric amplifications (<i>11 pages</i>)	013709
Yan Wang, Jin-Lei Wu, Ya-Feng Jiao, Tian-Xiang Lu, Hui-Lai Zhang, Li-Ying Jiang, Le-Man Kuang, and Hui Jing	
Tripartite multiphoton Jaynes-Cummings model: Analytical solution and Wigner nonclassicalities (<i>19 pages</i>)	013710
Pradip Laha, P. A. Ameen Yasir, and Peter van Loock	
Spatial averaging for light reflection and transmission through cold-atom arrays (<i>9 pages</i>)	013711
F. Robicheaux	
Controllable on-chip generation and detection of path-entangled microwave photons (<i>10 pages</i>)	013712
Y. F. Li, D. He, S. R. He, and L. F. Wei	
Nonreciprocal entanglement in cavity magnomechanics via the Barnett effect (<i>10 pages</i>)	013713
Tian-Xiang Lu, Zi-Shan Li, Liu-Sha Chen, Yan Wang, Xing Xiao, and Hui Jing	
Superconducting quantum circuit to simulate the dynamical Casimir effect in a double cavity (<i>20 pages</i>)	013714
Jean Paul Louys Sansó, Nicolás F. Del Grosso, Fernando C. Lombardo, and Paula I. Villar	
Intracavity squeezing for a Kerr quantum nondemolition measurement scheme (<i>8 pages</i>)	013715
Dariya Salykina, Stepan Balybin, and Farid Ya. Khalili	
Coherent competition and control between three-wave mixing and four-wave mixing in superconducting circuits (<i>5 pages</i>)	013716
Miao-Xiang Liang, Yu-Xiang Qiu, Hai-Chao Li, and Wei Xiong	
Extended superradiance in two mechanically coupled Dicke models (<i>11 pages</i>)	013717
L. F. Quezada, Guo-Qing Zhang, and Shi-Hai Dong	

COMMENTS

Reply to “Comment on ‘Experimentally adjudicating between different causal accounts of Bell-inequality violations via statistical model selection’ ” (<i>4 pages</i>)	016201
Patrick J. Daley, Kevin J. Resch, and Robert W. Spekkens	
Comment on “Revisiting the divergent multipole expansion of atom-surface interactions: Hydrogen and positronium, α -quartz, and physisorption” (<i>3 pages</i>)	016801
G. L. Klimchitskaya	
Reply to “Comment on ‘Revisiting the divergent multipole expansion of atom-surface interactions: Hydrogen and positronium, α -quartz, and physisorption’ ” (<i>4 pages</i>)	016802
Ulrich D. Jentschura	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 111, NUMBER 1

JANUARY 2025

ERRATA

Erratum: Quantum advantage in batteries for Sachdev-Ye-Kitaev interactions [Phys. Rev. A 110 , 062209 (2024)] (<i>1 page</i>)	019901(E)
Gianluca Francica	