

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 98, NUMBER 6

DECEMBER 2018

COMMENTS

- Comment on “Inductive entanglement classification of four qubits under stochastic local operations and classical communication” (2 pages) 066301
Masoud Gharahi Ghahi and Stefano Mancini

ERRATA

- Erratum: Ionization spectra of highly Stark-shifted rubidium Rydberg states [Phys. Rev. A **96**, 013427 (2017)] (1 page) 069901(E)
Jens Grimm, Markus Stecker, Manuel Kaiser, Florian Karlewski, Lara Torralbo-Campo, Andreas Günther, and József Fortágh
- Erratum: On-chip microwave-to-optical quantum coherent converter based on a superconducting resonator coupled to an electro-optic microresonator [Phys. Rev. A **94**, 053815 (2016)] (1 page) 069902(E)
C. Javerzac-Galy, K. Plekhanov, N. R. Bernier, L. D. Toth, A. K. Feofanov, and T. J. Kippenberg

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 98, NUMBER 6

DECEMBER 2018

Interaction of photons with a coupled atom-cavity system through a bidirectional time-delayed feedback (<i>12 pages</i>)	063832
Hamidreza Chalabi and Edo Waks	
Operating a near-concentric cavity at the last stable resonance (<i>5 pages</i>)	063833
Chi Huan Nguyen, Adrian Nugraha Utama, Nick Lewty, and Christian Kurtsiefer	
High-order Laguerre-Gauss polychromatic beams from Bragg-Berry flat optics (<i>8 pages</i>)	063834
Mikaël Ghadimi Nassiri, Seong Yong Cho, Hiroyuki Yoshida, Masanori Ozaki, and Etienne Brasselet	
General modeling framework for quantum photodetectors (<i>15 pages</i>)	063835
Steve M. Young, Mohan Sarovar, and François Léonard	
Rephasing efficiency of sequences of phased pulses in spin-echo and light-storage experiments (<i>13 pages</i>)	063836
Genko T. Genov, Daniel Schraft, and Thomas Halfmann	
Lasing in the superradiant crossover regime (<i>6 pages</i>)	063837
Kamanasish Debnath, Yuan Zhang, and Klaus Mølmer	
Mirrorless optical parametric oscillator inside an all-optical waveguide (<i>8 pages</i>)	063838
Sushree S. Sahoo, Snigdha S. Pati, and Ashok K. Mohapatra	
Stable discrete soliton molecules in two-dimensional waveguide arrays (<i>13 pages</i>)	063839
P. S. Vinayagam, Amaria Javed, and U. Al Khawaja	
Enhanced generation of charge-dependent second-order sideband and high-sensitivity charge sensors in a gain-cavity-assisted optomechanical system (<i>9 pages</i>)	063840
Ling Li, Wen-Xing Yang, Yuxin Zhang, Tao Shui, Ai-Xi Chen, and Zhongming Jiang	
Solitons in a chain of charge-parity-symmetric dimers (<i>11 pages</i>)	063841
O. B. Kirikchi, Boris A. Malomed, N. Karjanto, R. Kusdiantara, and H. Susanto	
Optimal conditions for the Bell test using spontaneous parametric down-conversion sources (<i>9 pages</i>)	063842
Yoshiaki Tsujimoto, Kentaro Wakui, Mikio Fujiwara, Kazuhiro Hayasaka, Shigehito Miki, Hirotaka Terai, Masahide Sasaki, and Masahiro Takeoka	
Quadrature-squeezed light and optomechanical entanglement in a dissipative optomechanical system with a mechanical parametric drive (<i>9 pages</i>)	063843
Sumei Huang and Aixi Chen	
Generation of optical signal and terahertz idler photons by spontaneous parametric down-conversion (<i>12 pages</i>)	063844
G. Kh. Kitaeva, V. V. Kornienko, A. A. Leontyev, and A. V. Shepelev	
Optomechanically induced nonreciprocity in a three-mode optomechanical system (<i>7 pages</i>)	063845
Xun-Wei Xu, L. N. Song, Qiang Zheng, Z. H. Wang, and Yong Li	
Time-reversed and coherently enhanced memory: A single-mode quantum atom-optic memory without a cavity (<i>7 pages</i>)	063846
J. L. Everett, P. Vernaz-Gris, G. T. Campbell, A. D. Tranter, K. V. Paul, A. C. Leung, P. K. Lam, and B. C. Buchler	
Higher winding number in a nonunitary photonic quantum walk (<i>10 pages</i>)	063847
Lei Xiao, Xingze Qiu, Kunkun Wang, Zhihao Bian, Xiang Zhan, Hideaki Obuse, Barry C. Sanders, Wei Yi, and Peng Xue	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 98, NUMBER 6

DECEMBER 2018

Open quantum systems with local and collective incoherent processes: Efficient numerical simulations using permutational invariance (34 pages)	063815
Nathan Shammah, Shahnawaz Ahmed, Neill Lambert, Simone De Liberato, and Franco Nori	
Quantum secure ghost imaging (7 pages)	063816
Xin Yao, Xu Liu, Lixing You, Zhen Wang, Xue Feng, Fang Liu, Kaiyu Cui, Yidong Huang, and Wei Zhang	
Time ordering in the classically driven nonlinear Jaynes-Cummings model (12 pages)	063817
Tobias Lipfert, Fabian Krumm, Mikhail I. Kolobov, and Werner Vogel	
Improving the cooling of a mechanical oscillator in a dissipative optomechanical system with an optical parametric amplifier (7 pages)	063818
Sumei Huang and Aixi Chen	
Three-dimensional carrier-envelope-phase map of focused few-cycle pulsed Gaussian beams (10 pages)	063819
Miguel A. Porras, Zoltán L. Horváth, and Balázs Major	
Interfacing a two-photon NOON state with an atomic quantum memory (6 pages)	063820
Wei Zhang, Ming-Xin Dong, Dong-Sheng Ding, Shuai Shi, Kai Wang, Zhi-Yuan Zhou, Guang-Can Guo, and Bao-Sen Shi	
Standard quantum limit of sensitivity of an optical gyroscope (9 pages)	063821
Andrey B. Matsko and Sergey P. Vyatchanin	
Rotating solitons supported by a spiral waveguide (9 pages)	063822
Milan S. Petrović, Aleksandra I. Strinić, Najdan B. Aleksić, and Milivoj R. Belić	
Correlated photon emission by two excited atoms in a waveguide (9 pages)	063823
Paolo Facchi, Saverio Pascazio, Francesco V. Pepe, and Domenico Pomarico	
Highly directional photon superbunching from a few-atom chain of emitters (12 pages)	063824
Qurrat-ul-Ain Gulfam and Zbigniew Ficek	
Conditions for optical parametric oscillation with a structured light pump (10 pages)	063825
G. B. Alves, R. F. Barros, D. S. Tasca, C. E. R. Souza, and A. Z. Khoury	
Topological properties of bound states in the continuum in geometries with broken anisotropy symmetry (9 pages)	063826
Samyabrata Mukherjee, Jordi Gomis-Bresco, Pilar Pujol-Closa, David Artigas, and Lluís Torner	
Two-timescale stochastic Langevin propagation for classical and quantum optomechanics (10 pages)	063827
M. J. Akram, E. B. Aranas, N. P. Bullier, J. E. Lang, and T. S. Monteiro	
Perturbation approach for computing frequency- and time-resolved photon correlation functions (13 pages)	063828
David I. H. Holdaway, Valentina Notararigo, and Alexandra Olaya-Castro	
Wave-particle superposition of distinct atomic spin excitations (11 pages)	063829
Wei Zhang, Dong-Sheng Ding, Ming-Xin Dong, Shuai Shi, Kai Wang, Guang-Can Guo, and Bao-Sen Shi	
Detuning-induced stimulated Raman adiabatic passage in two-level systems with permanent dipole moments (9 pages)	063830
Li Deng, Yueping Niu, and Shangqing Gong	
Turbulence-induced optical loss and cross-talk in spatial-mode multiplexed or single-mode free-space communication channels (6 pages)	063831
K. S. Kravtsov, A. K. Zhutov, I. V. Radchenko, and S. P. Kulik	

(Continued)

Hydrodynamics with spacetime-dependent scattering length (<i>8 pages</i>)	063634
Keisuke Fujii and Yusuke Nishida	
Quasiparticle spectra of supersolid lattice gases at near-resonant Rydberg dressing (<i>8 pages</i>)	063635
Andreas Geißler, Ulf Bissbort, and Walter Hofstetter	
Quantum optics, physics of lasers, nonlinear optics, classical optics	
Unconditional preparation of nonclassical states via linear-and-quadratic optomechanics (<i>12 pages</i>)	063801
Matteo Brunelli, Oussama Houhou, Darren W. Moore, Andreas Nunnenkamp, Mauro Paternostro, and Alessandro Ferraro	
Geometrical optics and geodesics in thin layers (<i>8 pages</i>)	063802
Tomasz Radożycki	
Propagation of few-cycle pulses in a nonlinear medium and an integrable generalization of the sine-Gordon equation (<i>12 pages</i>)	063803
S. V. Sazonov and N. V. Ustinov	
Enhancing nanomechanical squeezing by atomic interactions in a hybrid atom-optomechanical system (<i>7 pages</i>)	063804
Niklas Mann and Michael Thorwart	
Fine characteristics of polarization singularities in a three-dimensional electromagnetic field and their properties in the near field of a metallic nanospheroid (<i>8 pages</i>)	063805
K. S. Grigoriev, N. Yu. Kuznetsov, Yu. V. Vladimirova, and V. A. Makarov	
Grating mirror for diffraction of electrons (<i>9 pages</i>)	063806
M. A. R. Krielaart and P. Kruit	
Quantum radiation from a shaken two-level atom in vacuum (<i>7 pages</i>)	063807
Lezhi Lo and C. K. Law	
Photon-recoil spectroscopy: Systematic shifts and nonclassical enhancements (<i>16 pages</i>)	063808
M. Schulte, N. Lörch, P. O. Schmidt, and K. Hammerer	
Phase-modulated single-photon router (<i>8 pages</i>)	063809
De-Chun Yang, Mu-Tian Cheng, Xiao-San Ma, Jingping Xu, Chengjie Zhu, and Xian-Shan Huang	
Scaling rules in optomechanical semiconductor micropillars (<i>8 pages</i>)	063810
S. Anguiano, P. Sesin, A. E. Bruchhausen, F. R. Lamberti, I. Favero, M. Esmann, I. Sagnes, A. Lemaître, N. D. Lanzillotti-Kimura, P. Senellart, and A. Fainstein	
Solitary waves in optical fibers governed by higher-order dispersion (<i>7 pages</i>)	063811
V. I. Kruglov and J. D. Harvey	
Floquet scattering of light and sound in Dirac optomechanics (<i>12 pages</i>)	063812
C. Wurl and H. Fehske	
Determinantal polynomial wave functions induced by random matrices (<i>24 pages</i>)	063813
Anthony Mays, Anita K. Ponsaing, and David M. Paganin	
Creation, storage, and retrieval of an optomechanical cat state (<i>18 pages</i>)	063814
R. Y. Teh, S. Kiesewetter, P. D. Drummond, and M. D. Reid	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 98, NUMBER 6

DECEMBER 2018

 Momentum distribution and coherence of a weakly interacting Bose gas after a quench (21 pages) Giovanni I. Martone, Pierre-Élie Larré, Alessandro Fabbri, and Nicolas Pavloff	063617
Dynamics of a quenched spin-1 antiferromagnetic condensate in a harmonic trap (8 pages) L. M. Symes, D. Baillie, and P. B. Blakie	063618
Universal noise in continuous transport measurements of interacting fermions (11 pages) Shun Uchino, Masahito Ueda, and Jean-Philippe Brantut	063619
Excitations of a vortex line in an elongated dipolar condensate (8 pages) Au-Chen Lee, D. Baillie, R. N. Bisset, and P. B. Blakie	063620
Creating, probing, and manipulating fractionally charged excitations of fractional Chern insulators in optical lattices (6 pages) Mantas Račiūnas, F. Nur Ünal, Egidijus Anisimovas, and André Eckardt	063621
Blocked populations in ring-shaped optical lattices (10 pages) M. Nigro, P. Capuzzi, and D. M. Jezek	063622
Composite quasiparticles in strongly correlated dipolar Fermi liquids (8 pages) Iran Seydi, Saeed H. Abedinpour, Reza Asgari, and B. Tanatar	063623
Production of a degenerate Fermi-Fermi mixture of dysprosium and potassium atoms (12 pages) Cornelis Ravensbergen, Vincent Corre, Elisa Soave, Marian Kreyer, Emil Kirilov, and Rudolf Grimm	063624
Simulation of two-boson bound states using arrays of driven-dissipative coupled linear optical resonators (11 pages) Maxim A. Gorlach, Marco Di Liberto, Alessio Recati, Iacopo Carusotto, Alexander N. Poddubny, and Chiara Menotti	063625
Noise-free generation of bright matter-wave solitons (7 pages) M. J. Edmonds, T. P. Billam, S. A. Gardiner, and Th. Busch	063626
Transition from supersonic to subsonic waves in superfluid Fermi gases (7 pages) Senne Van Loon, Wout Van Alphen, Jacques Tempere, and Hadrien Kurkjian	063627
Selective insulators and anomalous responses in three-component fermionic gases with broken SU(3) symmetry (10 pages) Lorenzo Del Re and Massimo Capone	063628
Real-space probe for lattice quasiholes (9 pages) R. O. Umucalılar	063629
Non-Markovian polaron dynamics in a trapped Bose-Einstein condensate (17 pages) Aniello Lampo, Christos Charalambous, Miguel Ángel García-March, and Maciej Lewenstein	063630
Ground-state properties of interacting Bose polarons (7 pages) Senne Van Loon, Wim Casteels, and Jacques Tempere	063631
Analytical pendulum model for a bosonic Josephson junction (12 pages) Marine Pigneur and Jörg Schmiedmayer	063632
Universal off-diagonal long-range-order behavior for a trapped Tonks-Girardeau gas (12 pages) A. Colcelli, J. Viti, G. Mussardo, and A. Trombettoni	063633

(Continued)

Matter waves and collective properties of cold atoms and molecules

☞ Kibble-Zurek scaling of the one-dimensional Bose-Hubbard model at finite temperatures (<i>12 pages</i>)	063601
Werner Weiss, Matthias Gerster, Daniel Jaschke, Pietro Silvi, and Simone Montangero	
Two-dimensional vortex quantum droplets (<i>12 pages</i>)	063602
Yongyao Li, Zhaopin Chen, Zhihuan Luo, Chunqing Huang, Haishu Tan, Wei Pang, and Boris A. Malomed	
Out-of-equilibrium dynamics of multiple second-order quantum phase transitions in an extended Bose-Hubbard model: Superfluid, supersolid, and density wave (<i>9 pages</i>)	063603
Keita Shimizu, Takahiro Hirano, Jonghoon Park, Yoshihito Kuno, and Ikuo Ichinose	
Quantum reflection of rare-gas atoms and clusters from a grating (<i>7 pages</i>)	063604
G. Rojas-Lorenzo, J. Rubayo-Soneira, S. Miret-Artés, and E. Pollak	
Quantum fluctuations of a resonantly interacting p -wave Fermi superfluid in two dimensions (<i>12 pages</i>)	063605
Hui Hu, Brendan C. Mulkerin, Lianyi He, Jia Wang, and Xia-Ji Liu	
Generating macroscopic superpositions with interacting Bose-Einstein condensates: Multimode speedups and speed limits (<i>13 pages</i>)	063606
Samuel P. Nolan and Simon A. Haine	
Gauge-potential-induced rotation of spin-orbit-coupled Bose-Einstein condensates (<i>7 pages</i>)	063607
Jingjing Jin, Wei Han, and Suying Zhang	
Nonequilibrium polariton dynamics in a Bose-Einstein condensate coupled to an optical cavity (<i>9 pages</i>)	063608
Gábor Kónya, Dávid Nagy, Gergely Szirmai, and Peter Domokos	
Relativistic motion of an Airy wave packet in a lattice potential (<i>8 pages</i>)	063609
C. E. Creffield	
Emergent interlayer nodal superfluidity of a dipolar Fermi gas in bilayer optical lattices (<i>6 pages</i>)	063610
Bo Liu, Peng Zhang, Ren Zhang, Hong Gao, and Fuli Li	
Center-line intensity of a supersonic helium beam (<i>15 pages</i>)	063611
Adrià Salvador Palau, Sabrina D. Eder, Truls Andersen, Anders Komár Ravn, Gianangelo Bracco, and Bodil Holst	
Two-leg-ladder Bose-Hubbard models with staggered fluxes (<i>8 pages</i>)	063612
Rashi Sachdeva, Friederike Metz, Manpreet Singh, Tapan Mishra, and Thomas Busch	
Thermalization and localization of an oscillating Bose-Einstein condensate in a disordered trap (<i>5 pages</i>)	063613
Che-Hsiu Hsueh, Russell Ong, Jing-Fu Tseng, Makoto Tsubota, and Wen-Chin Wu	
Measuring the local gravitational field using survival resonances in a dissipatively driven atom-optics system (<i>9 pages</i>)	063614
Shijie Chai, Julia Fekete, and Mikkel F. Andersen	
Characterization of stimulated excitations in a driven Bose-Einstein condensate (<i>6 pages</i>)	063615
Tao Chen and Bo Yan	
Dual-species Bose-Einstein condensate of ^{41}K and ^{87}Rb in a hybrid trap (<i>8 pages</i>)	063616
A. Burchianti, C. D'Errico, S. Rosi, A. Simoni, M. Modugno, C. Fort, and F. Minardi	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 98, NUMBER 6

DECEMBER 2018

Two-center interference effect in ionization of diatomic molecules subject to close-to-circularly-polarized femtosecond laser fields (<i>6 pages</i>)	063418
MingZheng Wei, Wei Quan, RenPing Sun, SongPo Xu, ZhiLei Xiao, Yu Zhou, Meng Zhao, XiaoLei Hao, ChuanXi Duan, and XiaoJun Liu	
Wavelength dependence of high-order harmonic yields in solids (<i>9 pages</i>)	063419
Xi Liu, Liang Li, Xiaosong Zhu, Tengfei Huang, Xiaofan Zhang, Dian Wang, Pengfei Lan, and Peixiang Lu	
Infrared-laser-pulse-enhanced ultrafast fragmentation of N_2^{2+} following Auger decay: Mixed quantum-classical simulations (<i>9 pages</i>)	063421
Murali Krishna Ganesa Subramanian, Robin Santra, and Ralph Welsch	
Spatiotemporal imaging of plasmonic fields near nanoparticles below the diffraction limit (<i>6 pages</i>)	063422
Erfan Saydanzad, Jianxiong Li, and Uwe Thumm	
Treating branch cuts in quantum trajectory models for photoelectron holography (<i>15 pages</i>)	063423
A. S. Maxwell, S. V. Popruzhenko, and C. Figueira de Morisson Faria	
Resonant inelastic scattering of two x-ray photons by a many-electron atom (<i>8 pages</i>)	063424
Alexey N. Hopersky, Alexey M. Nadolinsky, and Sergey A. Novikov	
Time-resolved harmonic emission from aligned molecules in orthogonal two-color fields (<i>8 pages</i>)	063425
C. Chen, D. X. Ren, X. Han, S. P. Yang, and Y. J. Chen	
Floquet-theoretical formulation and analysis of high-order harmonic generation in solids (<i>13 pages</i>)	063426
Tatsuhiko N. Ikeda, Koki Chinzei, and Hirokazu Tsunetsugu	
Polarizability effect in strong-field ionization: Quenching of the low-energy structure in C_{60} (<i>5 pages</i>)	063427
Yu Hang Lai, Cosmin I. Blaga, Junliang Xu, Harald Fuest, Philipp Rupp, Matthias F. Kling, Pierre Agostini, and Louis F. DiMauro	
Generalized perspective on chiral measurements without magnetic interactions (<i>20 pages</i>)	063428
Andres F. Ordonez and Olga Smirnova	
Strong-field-approximation model for coherent extreme-ultraviolet emission generated through frustrated tunneling ionization (<i>7 pages</i>)	063429
Je Hoi Mun, Igor A. Ivanov, Hyeok Yun, and Kyung Taec Kim	
Evidence for multiple mechanisms underlying surface electric-field noise in ion traps (<i>9 pages</i>)	063430
J. A. Sedlacek, J. Stuart, D. H. Slichter, C. D. Bruzewicz, R. McConnell, J. M. Sage, and J. Chiaverini	
Quantum dynamics, isotope effects, and power spectra of H_2^+ and HD^+ excited to the continuum by strong one-cycle laser pulses: Three-dimensional non-Born-Oppenheimer simulations (<i>16 pages</i>)	063431
Guennadi K. Paramonov, Tillmann Klamroth, H. Z. Lu, and André D. Bandrauk	
Phase-space-density limitation in laser cooling without spontaneous emission (<i>14 pages</i>)	063432
Thierry Chanelière, Daniel Comparat, and Hans Lignier	
XUV-assisted high-order-harmonic-generation spectroscopy (<i>11 pages</i>)	063433
T. S. Sarantseva, M. V. Frolov, N. L. Manakov, A. A. Silaev, N. V. Vvedenskii, and Anthony F. Starace	
Electronic and vibrational radiative cooling of the small carbon clusters C_4^- and C_6^- (<i>7 pages</i>)	063434
N. Kono, R. Suzuki, T. Furukawa, J. Matsumoto, H. Tanuma, H. Shiromaru, T. Azuma, and K. Hansen	

(Continued)

Scaling relations of the time-dependent Dirac equation describing multiphoton ionization of hydrogenlike ions (<i>8 pages</i>)	063402
I. V. Ivanova, V. M. Shabaev, Dmitry A. Telnov, and Alejandro Saenz	
Ultrafast nuclear dynamics in the doubly-core-ionized water molecule observed via Auger spectroscopy (<i>8 pages</i>)	063403
T. Marchenko, L. Inhester, G. Goldsztejn, O. Travnikova, L. Journal, R. Guillemin, I. Ismail, D. Koulentianos, D. Céolin, R. Püttner, M. N. Piancastelli, and M. Simon	
Improving the state selectivity of field ionization with quantum control (<i>7 pages</i>)	063404
Vincent C. Gregoric, Jason J. Bennett, Bianca R. Gualtieri, Ankitha Kannad, Zhimin Cheryl Liu, Zoe A. Rowley, Thomas J. Carroll, and Michael W. Noel	
Nuclear hyperpolarization of ^3He by magnetized plasmas (<i>12 pages</i>)	063405
A. Maul, P. Blümmler, P.-J. Nacher, E. Otten, G. Tastevin, and W. Heil	
Simultaneous control of harmonic yield and energy cutoff of high-order harmonic generation using seeded plasmonically enhanced fields (<i>10 pages</i>)	063406
Irfana N. Ansari, M. S. Mrudul, Marcelo F. Ciappina, Maciej Lewenstein, and Gopal Dixit	
Dynamical electron vortices in attosecond double photoionization of H_2 (<i>9 pages</i>)	063407
J. M. Ngoko Djiokap, A. V. Meremianin, N. L. Manakov, L. B. Madsen, S. X. Hu, and Anthony F. Starace	
Type-II Zeeman slowing: Characterization and comparison to conventional radiative beam-slowing schemes (<i>9 pages</i>)	063408
M. Petzold, P. Kaebert, P. Gersema, T. Poll, N. Reinhardt, M. Siercke, and S. Ospelkaus	
Central frequency of few-cycle laser pulses in strong-field processes (<i>8 pages</i>)	063409
J. Venzke, T. Joyce, Z. Xue, A. Becker, and A. Jaron-Becker	
Gauge invariance beyond the electric dipole approximation (<i>8 pages</i>)	063410
Ryoji Anzaki, Yasushi Shinohara, Takeshi Sato, and Kenichi L. Ishikawa	
Double Stern-Gerlach experiments on Mn@Sn_{12} : Refocusing of a paramagnetic superatom (<i>9 pages</i>)	063411
Thomas M. Fuchs and Rolf Schäfer	
Optical absorption properties of laser-driven matter (<i>15 pages</i>)	063412
Bing Gu and Ignacio Franco	
Photon-momentum transfer in diatomic molecules: An <i>ab initio</i> study (<i>7 pages</i>)	063413
Hao Liang, Mu-Xue Wang, Xiang-Ru Xiao, Qihuang Gong, and Liang-You Peng	
High-order above-threshold ionization beyond the electric dipole approximation: Dependence on the atomic and molecular structure (<i>13 pages</i>)	063414
Simon Brennecke and Manfred Lein	
Laser cooling and magneto-optical trapping of molecules analyzed using optical Bloch equations and the Fokker-Planck-Kramers equation (<i>14 pages</i>)	063415
J. A. Devlin and M. R. Tarbutt	
Subcycle interference in high-order harmonic generation from solids (<i>7 pages</i>)	063416
Tao-Yuan Du, Dong Tang, and Xue-Bin Bian	
Canonical tunneling time in ionization experiments (<i>11 pages</i>)	063417
Bekir Baytaş, Martin Bojowald, and Sean Crowe	

(Continued)

Low-energy electron scattering from molecular hydrogen: Excitation of the $X\ ^1\Sigma_g^+$ to $b\ ^3\Sigma_u^+$ transition (15 pages)	062704
M. Zawadzki, R. Wright, G. Dolmat, M. F. Martin, B. Diaz, L. Hargreaves, D. Coleman, D. V. Fursa, M. C. Zammit, L. H. Scarlett, J. K. Tapley, J. S. Savage, I. Bray, and M. A. Khakoo	
Few-body states of bosons interacting with a heavy quantum impurity (14 pages)	062705
Shuhei M. Yoshida, Zhe-Yu Shi, Jesper Levinsen, and Meera M. Parish	
Validity of the Born-Oppenheimer approximation in the indirect-dissociative-recombination process (10 pages)	062706
Roman Čurík, Dávid Hvizdoš, and Chris H. Greene	
Universal temperature dependence of the ion-neutral-neutral three-body recombination rate (4 pages)	062707
Jesús Pérez-Ríos and Chris H. Greene	
Power-law decay of doubly ionized ethylene (5 pages)	062708
K. Takahashi, K. Yokokawa, A. Mizumura, J. Matsumoto, H. Shiromaru, H. Kumar, P. Bhatt, and C. P. Safvan	
Electron-positron pair production in slow collisions of heavy nuclei beyond the monopole approximation (7 pages)	062709
I. A. Maltsev, V. M. Shabaev, R. V. Popov, Y. S. Kozhedub, G. Plunien, X. Ma, and Th. Stöhlker	
Ionization and electron capture in collisions of bare carbon ions with hydrogen (13 pages)	062710
I. B. Abdurakhmanov, K. Massen-Hane, Sh. U. Alladustov, J. J. Bailey, A. S. Kadyrov, and I. Bray	
Electron transfer plus double ionization in slow $\text{He}^{2+} + \text{Ar}$ collisions (9 pages)	062711
Y. Gao, M. Schulz, D. L. Guo, S. F. Zhang, X. L. Zhu, R. T. Zhang, W. T. Feng, D. M. Zhao, and X. Ma	
Feshbach resonances in potassium Bose-Bose mixtures (8 pages)	062712
L. Tanzi, C. R. Cabrera, J. Sanz, P. Cheiney, M. Tomza, and L. Tarruell	
Roton-induced trapping in strongly correlated Rydberg gases (6 pages)	062713
João D. Rodrigues, Luís F. Gonçalves, Hugo Terças, Luís G. Marcassa, and José T. Mendonça	
From coherent collective excitation to Rydberg blockade on an atom chip (6 pages)	062714
Julius de Hond, Rick van Bijnen, S. J. J. M. F. Kokkelmans, R. J. C. Spreeuw, H. B. van Linden van den Heuvell, and N. J. van Druten	
Electron-electron-photon polarization correlations in high-energy bremsstrahlung (7 pages)	062715
D. H. Jakubassa-Amundsen	
Stopping power of cluster ions in a free-electron gas from partial-wave analysis (10 pages)	062716
F. Matias, R. C. Fadanelli, P. L. Grande, N. R. Arista, N. E. Koval, and G. Schiwietz	

PART B

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

Real single-loop cyclic three-level configuration of chiral molecules (9 pages)	063401
Chong Ye, Quansheng Zhang, and Yong Li	

(Continued)

Isotope effect and gerade versus ungerade symmetry in HD predissociation revealed by the H(2s), H(2p), D(2s), and D(2p) fragments (7 pages)	062509
Jie Wang and Yuxiang Mo	
Efficient evaluation of electron correlation along the bond-dissociation coordinate in the ground and excited ionic states with dynamic correlation suppression and enhancement functions of the on-top pair density (8 pages)	062510
Oleg V. Gritsenko, Robert van Meer, and Katarzyna Pernal	
Relativistic coupled-cluster calculations of the polarizabilities of atomic thallium (9 pages)	062511
Yong-Bo Tang, Ning-Ning Gao, Bing-Qiong Lou, and Ting-Yun Shi	
$\alpha(Z\alpha)^5m$ finite-nuclear-size contribution to the energy levels in light muonic atoms (15 pages)	062512
Savely G. Karshenboim, Evgeny Yu. Korzinin, Valery A. Shelyuto, and Vladimir G. Ivanov	
Nuclear-structure corrections to the hyperfine splitting in muonic deuterium (10 pages)	062513
Marcin Kalinowski, Krzysztof Pachucki, and Vladimir A. Yerokhin	
Laboratory precision measurements of optical emissions from coronal iron (6 pages)	062514
H. Bekker, C. Hensel, A. Daniel, A. Windberger, T. Pfeifer, and J. R. Crespo López-Urrutia	
Resonant spectra of multipole-bound anions (9 pages)	062515
X. Mao (毛兴泽), K. Fosse, and W. Nazarewicz	
Characteristics of long-lived persistent spectral holes in $\text{Eu}^{3+}:\text{Y}_2\text{SiO}_5$ at 1.2 K (8 pages)	062516
René Oswald, Michael G. Hansen, Eugen Wiens, Alexander Yu. Nevsky, and Stephan Schiller	
Fourier-transform spectroscopy, direct potential fit, and electronic structure calculations on the entirely perturbed (4) $^1\Pi$ state of RbCs (10 pages)	062517
I. Klinkare, A. Kruzins, M. Tamanis, R. Ferber, E. A. Pazyuk, and A. V. Stolyarov	
Molecular-beam resonance method with Zeeman-decelerated samples: Application to metastable helium molecules (5 pages)	062518
Luca Semeria, Paul Jansen, Gloria Clausen, Josef A. Agner, Hansjürg Schmutz, and Frédéric Merkt	
Light-by-light-scattering contributions to the Lamb shift in light muonic atoms (7 pages)	062519
Evgeny Yu. Korzinin, Valery A. Shelyuto, Vladimir G. Ivanov, Robert Szafron, and Savely G. Karshenboim	
Collective effects in ^{229}Th -doped crystals (13 pages)	062520
Brenden S. Nickerson, Wen-Te Liao, and Adriana Pálffy	
Relativistic nuclear-recoil effect on the g factor of highly charged boronlike ions (7 pages)	062521
I. A. Aleksandrov, D. A. Glazov, A. V. Malyshev, V. M. Shabaev, and I. I. Tupitsyn	
Atomic and molecular collisions and interactions	
Irradiation of isolated collagen mimetic peptides by x rays and carbon ions at the Bragg-peak energy (6 pages)	062701
M. Lalande, M. Abdelmouleh, M. Ryszka, V. Vizcaino, J. Rangama, A. Méry, F. Durantel, T. Schlathölter, and J.-C. Pouilly	
Triply excited autodissociating resonant states in the positron-helium system (6 pages)	062702
Zong-Chao Yan and Yew Kam Ho	
Model for scattering with proliferating resonances: Many coupled square wells (15 pages)	062703
Nirav P. Mehta, Kaden R. A. Hazzard, and Christopher Ticknor	

(Continued)

Optimal quantum-walk search on Kronecker graphs with dominant or fixed regular initiators (<i>10 pages</i>)	062334
Adam Glos and Thomas G. Wong	
Entanglement robustness against particle loss in multiqubit systems (<i>6 pages</i>)	062335
A. Neven, J. Martin, and T. Bastin	
Quantum process tomography via completely positive and trace-preserving projection (<i>11 pages</i>)	062336
George C. Knee, Eliot Bolduc, Jonathan Leach, and Erik M. Gauger	
Experimental test of the trade-off relation for quantum coherence (<i>5 pages</i>)	062337
Wei-Min Lv, Chao Zhang, Xiao-Min Hu, Huan Cao, Jian Wang, Yun-Feng Huang, Bi-Heng Liu, Chuan-Feng Li, and Guang-Can Guo	
Unconventional Rydberg pumping and applications in quantum information processing (<i>10 pages</i>)	062338
D. X. Li and X. Q. Shao	
Low-cost error mitigation by symmetry verification (<i>10 pages</i>)	062339
X. Bonet-Monroig, R. Sagastizabal, M. Singh, and T. E. O'Brien	
Scalable star-shaped architecture for universal spin-based nonadiabatic holonomic quantum computation (<i>6 pages</i>)	062340
Vahid Azimi Mousolou	
Atomic and molecular structure and dynamics; high-precision measurements	
Stark quenching of rovibrational states of H_2^+ due to motion in a magnetic field (<i>14 pages</i>)	062501
Jean-Philippe Karr	
Near-threshold bound states of the dipole-dipole interaction (<i>9 pages</i>)	062502
Tijs Karman, Matthew D. Frye, John D. Reddel, and Jeremy M. Hutson	
Energy-level structure of Sn^{3+} ions (<i>12 pages</i>)	062503
J. Scheers, A. Ryabtsev, A. Borschevsky, J. C. Berengut, K. Haris, R. Schupp, D. Kurilovich, F. Torretti, A. Bayerle, E. Eliav, W. Ubachs, O. O. Versolato, and R. Hoekstra	
Multiconfiguration Dirac-Hartree-Fock and configuration-interaction study of $4d-3p$ x-ray transitions in Cu- and Ni-like tungsten ions (<i>7 pages</i>)	062504
Karol Koziol and Jacek Rządkiewicz	
Development of formalisms based on locally coupled open subsystems for calculations in molecular electronic structure and dynamics (<i>20 pages</i>)	062505
Martín A. Mosquera, Leighton O. Jones, Mark A. Ratner, and George C. Schatz	
Laser and microwave spectroscopy of even-parity Rydberg states of neutral ytterbium and multichannel-quantum-defect-theory analysis (<i>16 pages</i>)	062506
H. Lehec, A. Zuliani, W. Mainault, E. Luc-Koenig, P. Pillet, P. Cheinet, F. Niyaz, and T. F. Gallagher	
Correlation energies for many-electron atoms with explicitly correlated Slater functions (<i>9 pages</i>)	062507
Michał Przybytek and Michał Lesiuk	
Quantum Monte Carlo study on the structures and energetics of cyclic and linear carbon clusters C_n ($n = 1, \dots, 10$) (<i>8 pages</i>)	062508
B. G. A. Brito, G.-Q. Hai, and Ladir Cândido	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 98, NUMBER 6

DECEMBER 2018

Optimal quantum-programmable projective measurement with linear optics (<i>11 pages</i>)	062318
Ulysse Chabaud, Eleni Diamanti, Damian Markham, Elham Kashefi, and Antoine Joux	
Hacking Alice's box in continuous-variable quantum key distribution (<i>11 pages</i>)	062319
Jason Pereira and Stefano Pirandola	
Remote state preparation using correlations beyond discord (<i>7 pages</i>)	062320
Som Kanjilal, Aiman Khan, C. Jebarathinam, and Dipankar Home	
Quantum circulant preconditioner for a linear system of equations (<i>9 pages</i>)	062321
Changpeng Shao and Hua Xiang	
Gaussian boson sampling using threshold detectors (<i>9 pages</i>)	062322
Nicolás Quesada, Juan Miguel Arrazola, and Nathan Killoran	
Twin-field quantum key distribution with large misalignment error (<i>12 pages</i>)	062323
Xiang-Bin Wang, Zong-Wen Yu, and Xiao-Long Hu	
Differentiable learning of quantum circuit Born machines (<i>9 pages</i>)	062324
Jin-Guo Liu and Lei Wang	
Small imperfect randomness restricts security of quantum key distribution (<i>5 pages</i>)	062325
Hong-Wei Li, Zheng-Mao Xu, and Qing-Yu Cai	
Rydberg-atom-based creation of an N -particle Greenberger-Horne-Zeilinger state using stimulated Raman adiabatic passage (<i>7 pages</i>)	062326
Tanvi P. Gujarati	
Simple preparation of Bell and Greenberger-Horne-Zeilinger states using ultrastrong-coupling circuit QED (<i>14 pages</i>)	062327
Vincenzo Macrì, Franco Nori, and Anton Frisk Kockum	
Unitary entanglement construction in hierarchical networks (<i>19 pages</i>)	062328
Aniruddha Bapat, Zachary Eldredge, James R. Garrison, Abhinav Deshpande, Frederic T. Chong, and Alexey V. Gorshkov	
Quantum information or entanglement transfer between subsystems (<i>5 pages</i>)	062329
Steven B. Giddings and Massimiliano Rota	
Characterization and mitigation of information loss in a six-state quantum-key-distribution protocol with spatial modes of light through turbulence (<i>9 pages</i>)	062330
Bienvenu Ndagano and Andrew Forbes	
Security proof for single-photon round-robin differential-quadrature-phase-shift quantum key distribution (<i>6 pages</i>)	062331
Rong Wang, Zhen-Qiang Yin, Chao-han Cui, Shuang Wang, Wei Chen, Guang-Can Guo, and Zheng-Fu Han	
Unconstrained summoning for relativistic quantum information processing (<i>5 pages</i>)	062332
Adrian Kent	
Variational learning of Grover's quantum search algorithm (<i>6 pages</i>)	062333
Mauro E. S. Morales, Timur Tlyachev, and Jacob Biamonte	

(Continued)

Decoding schemes for foliated sparse quantum error-correcting codes (<i>22 pages</i>)	062302
A. Bolt, D. Poulin, and T. M. Stace	
Selective and efficient quantum process tomography in arbitrary finite dimension (<i>8 pages</i>)	062303
Ignacio Perito, Augusto J. Roncaglia, and Ariel Bendersky	
Witnessing bipartite entanglement sequentially by multiple observers (<i>7 pages</i>)	062304
Anindita Bera, Shiladitya Mal, Aditi Sen(De), and Ujjwal Sen	
Device-independent witness of arbitrary-dimensional quantum systems employing binary-outcome measurements (<i>7 pages</i>)	062305
Mikołaj Czechlewski, Debashis Saha, Armin Tavakoli, and Marcin Pawłowski	
Masking quantum information in multipartite scenario (<i>6 pages</i>)	062306
Mao-Sheng Li and Yan-Ling Wang	
Self-testing quantum states and measurements in the prepare-and-measure scenario (<i>13 pages</i>)	062307
Armin Tavakoli, Jędrzej Kaniewski, Tamás Vértesi, Denis Rosset, and Nicolas Brunner	
Complementary-multiphase quantum search for all numbers of target items (<i>11 pages</i>)	062308
Tan Li, Wan-Su Bao, He-Liang Huang, Feng-Guang Li, Xiang-Qun Fu, Shuo Zhang, Chu Guo, Yu-Tao Du, Xiang Wang, and Jie Lin	
Enhancing the efficiency of quantum annealing via reinforcement: A path-integral Monte Carlo simulation of the quantum reinforcement algorithm (<i>8 pages</i>)	062309
A. Ramezanpour	
Quantum communication improved by spectral entanglement and supplementary chromatic dispersion (<i>7 pages</i>)	062310
Mikołaj Lasota and Piotr Kolenderski	
Steering random spin systems to speed up the quantum adiabatic algorithm (<i>6 pages</i>)	062311
A. Barış Özgüler, Robert Joynt, and Maxim G. Vavilov	
Locally optimal control of continuous-variable entanglement (<i>10 pages</i>)	062312
Francesco Albarelli, Uther Shackerley-Bennett, and Alessio Serafini	
Two-photon self-Kerr nonlinearities for quantum computing and quantum optics (<i>12 pages</i>)	062313
Joshua Combes and Daniel J. Brod	
Simulating arbitrary Gaussian circuits with linear optics (<i>11 pages</i>)	062314
L. Chakhmakhchyan and N. J. Cerf	
Approximate quantum state reconstruction without a quantum channel (<i>6 pages</i>)	062315
Zichen Yang, Ze-Yang Fan, Liang-Zhu Mu, and Heng Fan	
Coherent manipulation of a three-dimensional maximally entangled state (<i>8 pages</i>)	062316
Shilong Liu, Zhiyuan Zhou, Shikai Liu, Yinhai Li, Yan Li, Chen Yang, Zhaohuai Xu, Zhaodi Liu, Guangcan Guo, and Baosen Shi	
Quantum control with measurements and quantum Zeno dynamics (<i>8 pages</i>)	062317
J. J. W. H. Sørensen, M. Dalggaard, A. H. Kiilerich, K. Mølmer, and J. F. Sherson	

(Continued)

CONTENTS - *Continued*

PHYSICAL REVIEW A

THIRD SERIES, VOLUME 98, NUMBER 6

DECEMBER 2018

Quantum master equations for entangled qubit environments (<i>13 pages</i>)	062104
Shakib Daryanoosh, Ben Q. Baragiola, Thomas Guff, and Alexei Gilchrist	
Dynamical stability of composite quantum particles: When entanglement is enough and when interaction is needed (<i>14 pages</i>)	062105
Zakarya Lasmar, Adam S. Sajna, Su-Yong Lee, and Paweł Kurzyński	
Controllable dissipation of a qubit coupled to an engineering reservoir (<i>12 pages</i>)	062106
H. Z. Shen, Shuang Xu, Su Yi, and X. X. Yi	
Unitary equivalence between the Green's function and Schrödinger approaches for quantum graphs (<i>5 pages</i>)	062107
Fabiano M. Andrade and Simone Severini	
Time-optimal control of independent spin-1/2 systems under simultaneous control (<i>15 pages</i>)	062108
Yunlan Ji, Ji Bian, Min Jiang, Domenico D'Alessandro, and Xinhua Peng	
Experimental evaluation of the nonclassical relation between measurement errors using entangled photon pairs as a probe (<i>7 pages</i>)	062109
Masataka Inuma, Masayuki Nakano, Holger F. Hofmann, and Yutaro Suzuki	
Partitioned density matrices and entanglement correlators (<i>23 pages</i>)	062110
T. Cox and P. C. E. Stamp	
Tight steering inequalities from generalized entropic uncertainty relations (<i>8 pages</i>)	062111
Tamás Kriváchy, Florian Fröwis, and Nicolas Brunner	
Pseudo-magnetic-field and effective spin-orbit interaction for a spin-1/2 particle confined to a curved surface (<i>9 pages</i>)	062112
Guo-Hua Liang, Yong-Long Wang, Meng-Yun Lai, Hui Liu, Hong-Shi Zong, and Shi-Ning Zhu	
Decomposing qubit positive-operator-valued measurements into continuous destructive weak measurements (<i>6 pages</i>)	062113
Yi-Hsiang Chen and Todd A. Brun	
Concentration phenomena in the geometry of Bell correlations (<i>11 pages</i>)	062114
Cristhiano Duarte, Samurá Brito, Barbara Amaral, and Rafael Chaves	
Quantum violation of variants of Leggett-Garg inequalities up to the algebraic maximum for a qubit system (<i>9 pages</i>)	062115
A. K. Pan, Md. Qutubuddin, and Swati Kumari	
Classical analog of quantum contextuality in spin-orbit laser modes (<i>8 pages</i>)	062116
M. H. M. Passos, W. F. Balthazar, J. Acacio de Barros, C. E. R. Souza, A. Z. Khoury, and J. A. O. Huguenin	
Phenomenology of first-order dark-state phase transitions (<i>20 pages</i>)	062117
Dietrich Roscher, Sebastian Diehl, and Michael Buchhold	
Adiabatic speedup in a non-Markovian quantum open system (<i>6 pages</i>)	062118
Zhao-Ming Wang, Da-Wei Luo, Mark S. Byrd, Lian-Ao Wu, Ting Yu, and Bin Shao	
Quantum information	
High-dimensional measurement-device-independent quantum key distribution on two-dimensional subspaces (<i>6 pages</i>)	062301
Luca Dellantonio, Anders S. Sørensen, and Davide Bacco	

(Continued)

PHYSICAL REVIEW ATM

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 98, NUMBER 6
PARTS A AND B

CONTENTS

DECEMBER 2018

The Table of Contents is a total listing of Parts A and B.
Part A consists of pages 060101(R)–062716, and Part B pages 063401–069902(E).

PART A

RAPID COMMUNICATIONS

Fundamental concepts

- Classically accelerating solenoidal wave packets in two dimensions (*5 pages*) 060101(R)
Argha Mondal, Yishuai Xu, L. Andrew Wray, and David G. Grier

Quantum information

- Quantum state engineering with twisted photons via adaptive shaping of the pump beam (*6 pages*) 060301(R)
E. V. Kovlakov, S. S. Straupe, and S. P. Kulik
- Tsirelson's bound and Landauer's principle in a single-system game (*6 pages*) 060302(R)
Luciana Henaut, Lorenzo Catani, Dan E. Browne, Shane Mansfield, and Anna Pappa

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

- Linear and nonlinear coherent coupling in a Bell-Bloom magnetometer (*5 pages*) 061401(R)
R. Gartman, V. Guarrera, G. Bevilacqua, and W. Chalupczak

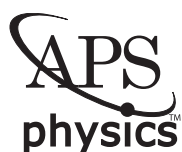
Matter waves and collective properties of cold atoms and molecules

- Topological edge states in Rashba-Dresselhaus spin-orbit-coupled atoms in a Zeeman lattice (*6 pages*) 061601(R)
C. Li, F. Ye, X. Chen, Y. V. Kartashov, L. Torner, and V. V. Konotop

ARTICLES

Fundamental concepts

- Violating Bell inequalities with entangled optical frequency combs and multipixel homodyne detection (*10 pages*) 062101
William N. Plick, Francesco Arzani, Nicolas Treps, Eleni Diamanti, and Damian Markham
- Proving genuine multiparticle entanglement from separable nearest-neighbor marginals (*8 pages*) 062102
Marius Paraschiv, Nikolai Miklin, Tobias Moroder, and Otfried Gühne
- Hardy's paradox for multisetting high-dimensional systems (*6 pages*) 062103
Hui-Xian Meng, Jie Zhou, Zhen-Peng Xu, Hong-Yi Su, Ting Gao, Feng-Li Yan, and Jing-Ling Chen



Copyright 2018 by American Physical Society



2469-9926(201812)98:6:A;1-L

(Continued)

The editors and referees of PRA find these papers to be of particular interest, importance, or clarity. Please see our Announcement Phys. Rev. A 88, 020001 (2013).