PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Remote Hamiltonian interactions mediated by light *(16 pages)* 063829
Thomas M. Karg, Baptiste Gouraud, Philipp Treutlein, and Klemens Hammerer

Microwave to optical photon conversion via fully concentrated rare-earth-ion crystals *(9 pages)* 063830
Jonathan R. Everts, Matthew C. Berrington, Rose L. Ahlefeldt, and Jevon J. Longdell

Distinct outcomes by dynamically encircling an exceptional point along homotopic loops *(9 pages)* 063831
Xu-Lin Zhang, Jun-Feng Song, C. T. Chan, and Hong-Bo Sun

Anomalous geometric spin Hall effect of light *(6 pages)* 063832
Zhen-Lai Wang and Xiang-Song Chen

On-chip engineering of high-dimensional path-entangled states in a quadratic coupled-waveguide system *(9 pages)* 063833
Xiang-Wen Luo, Qun-Yong Zhang, Ping Xu, Rong Zhang, Hua-Ying Liu, Chang-Wei Sun, Yan-Xiao Gong, Zhen-Da Xie, and Shi-Ning Zhu

Non-Hermitian dynamics without dissipation in quantum systems *(24 pages)* 063834
Yu-Xin Wang and A. A. Clerk

Single magneto-optical resonance in a modulated RF field *(7 pages)* 063835
E. A. Tsygankov, S. A. Zibrov, A. S. Zibrov, M. I. Vaskovskaya, D. S. Chuchelov, V. V. Vassiliev, V. L. Velichansky, S. V. Petropavlovsky, and V. P. Yakovlev

Superdiffusive random laser *(9 pages)* 063836
Federico Tommasi, Lorenzo Fini, Fabrizio Martelli, and Stefano Cavalieri

Combining isolated scatterers into a dimer by strong optical coupling *(10 pages)* 063837
Alexey A. Dmitriev and Mikhail V. Rybin

Mesoscopic Hamiltonian for Josephson traveling-wave parametric amplifiers *(15 pages)* 063838
T. H. A. van der Reep

Engineering quantum correlations for $m \times n$ spatially encoded two-photons states *(9 pages)* 063839
P. Machado, A. A. Matoso, M. R. Barros, L. Neves, and S. Pádua

ERRATA

Erratum: Explicitly correlated wave functions of the ground state and the lowest quintuplet state of the carbon atom [Phys. Rev. A **99**, 052512 (2019)] *(1 page)* . . . . . 069901(E)
Krzysztof Strasburger

Publisher's Note: Probing weak dipole-dipole interaction using phase-modulated nonlinear spectroscopy [Phys. Rev. A **95**, 052509 (2017)] *(1 page)* . . . . . 069902(E)
Zeng-Zhao Li, Lukas Bruder, Frank Stienkemeier, and Alexander Eisfeld

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Adiabatic population transfer of dressed spin states with quantum optimal control *(6 pages)* 063812
Shu-Hao Wu, Mayra Amezcua, and Hailin Wang

Quantum tetrachotomous states: Superposition of four coherent states on a line in phase space *(14 pages)* 063813
Namrata Shukla, Naeem Akhtar, and Barry C. Sanders

Quantum correlations in optomechanical crystals *(10 pages)* 063814
F. Bemani, R. Roknizadeh, A. Motazedifard, M. H. Naderi, and D. Vitali

Single-photon quantum router in the microwave regime utilizing double superconducting resonators with tunable coupling *(9 pages)* 063815
Y. T. Zhu and W. Z. Jia

Accessing the non-equal-time commutators of a trapped ion *(6 pages)* 063816
F. Krumm and W. Vogel

Spiraling anomalous vortex beam arrays in strongly nonlocal nonlinear media *(12 pages)* 063817
Limin Song, Zhenjun Yang, Shumin Zhang, and Xingliang Li

Indirect link between resonant and guided modes on uniform and periodic slabs *(9 pages)* 063818
Amgad Abdrabou and Ya Yan Lu

Capturing vacuum fluctuations and photon correlations in cavity quantum electrodynamics with multitrajectory Ehrenfest dynamics *(9 pages)* 063819
Norah M. Hoffmann, Christian Schäfer, Angel Rubio, Aaron Kelly, and Heiko Appel

Vectorial vortex generation and phase singularities upon Brewster reflection *(8 pages)* 063820
René Barczyk, Sergey Nechayev, Muhammad Abdullah Butt, Gerd Leuchs, and Peter Banzer

Fluctuations and photon statistics in a quantum metamaterial near a superradiant transition *(15 pages)* 063821
D. S. Shapiro, A. N. Rubtsov, S. V. Remizov, W. V. Pogosov, and Yu. E. Lozovik

Spectrum of the Dicke model in a superconducting qubit-oscillator system *(11 pages)* 063822
S. Ashhab, Y. Matsuzaki, K. Kakuyanagi, S. Saito, F. Yoshihara, T. Fuse, and K. Semba

Quantum state engineering by nondeterministic noiseless linear amplification *(10 pages)* 063823
Hamza Adnane, Matteo Bina, Francesco Albarelli, Abdelhakim Gharbi, and Matteo G. A. Paris

Dynamics of distorted and undistorted soliton molecules in a mode-locked fiber laser *(10 pages)* 063824
J. Igbonacho, K. Nithyanandan, K. Krupa, P. Tchofo Dinda, P. Grelu, and A. B. Moubissi

Corrected perturbation theory for transverse-electric whispering-gallery modes in deformed microdisks *(11 pages)* 063825
Manuel Badel and Jan Wiersig

Spontaneous forward Brillouin scattering in carbon disulfide *(6 pages)* 063826
Ryan O. Behunin, Yi-Hsin Ou, and Khanh Kieu

Superbunching effect of classical light with a digitally designed spatially phase-correlated wave front *(6 pages)* 063827
Lu Zhang, Yiping Lu, Dongxu Zhou, Hongzhi Zhang, Liming Li, and Guoquan Zhang

Photon blockade and the quantum-to-classical transition in the driven-dissipative Josephson pendulum coupled to a resonator *(17 pages)* 063828
I. Pietikäinen, J. Tuorila, D. S. Golubev, and G. S. Paraoanu

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Supersolid phases of Rydberg-excited bosons on a triangular lattice *(13 pages)* 063625
Jaromir Panas, Mathieu Barbier, Andreas Geißler, and Walter Hofstetter

Stable knotted structure in spin-1 Bose-Einstein condensates with spin-orbit coupling *(5 pages)* 063626
Yong-Kai Liu, Yun Liu, and Shi-Jie Yang

Coupled superfluidity of binary Bose mixtures in two dimensions *(11 pages)* 063627
Volker Karle, Nicolò Defenu, and Tilman Enss

Mixture of two unequally charged superfluids in a magnetic field *(10 pages)* 063628
S. Seyyare Aksu, A. Levent Subaşı, and Nader Ghazanfari

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

Coupling of atomic quadrupole transitions with resonant surface plasmons *(7 pages)* 063801
Eng Aik Chan, Syed Abdullah Aljunid, Giorgio Adamo, Nikolay I. Zheludev, Martial Ducloy, and David Wilkowski

Statistics of work done in a degenerate parametric amplification process *(10 pages)* 063802
Hari Kumar Yadalam and Upendra Harbola

Manipulating photonic quantum states with long-range interactions *(11 pages)* 063803
Fan Yang, Yong-Chun Liu, and Li You

Resonance inversion in a superconducting cavity coupled to artificial atoms and a microwave background *(19 pages)* 063804
Juha Leppäkangas, Jan David Brehm, Ping Yang, Lingzhen Guo, Michael Marthaler, Alexey V. Ustinov, and Martin Weides

Coupled-wave formalism for bound states in the continuum in guided-mode resonant gratings *(9 pages)* 063805
Dmitry A. Bykov, Evgeni A. Bezus, and Leonid L. Doskolovich

Implications of exceptional points for few-photon transport in waveguide quantum electrodynamics *(10 pages)* 063806
Shanshan Xu and Shanhui Fan

Inducing maximal localization with fractal waveguide arrays *(9 pages)* 063807
Jonathan Guglielmon and Mikael C. Rechtsman

Transition between self-focusing and self-defocusing in a nonlocally nonlinear system *(6 pages)* 063808
Guo Liang, Weiyi Hong, Tao Luo, Jing Wang, Yingbing Li, Qi Guo, Wei Hu, and Demetrios N. Christodoulides

Reduced damage in electron microscopy by using interaction-free measurement and conditional reillumination *(15 pages)* 063809
Akshay Agarwal, Karl K. Berggren, Yuri J. van Staaden, and Vivek K. Goyal

Atom-assisted second-order sideband generation in an optomechanical system with atom-cavity-resonator coupling *(8 pages)* 063810
Bin Chen, Lei Shang, Xiao-Fang Wang, Jian-Bin Chen, Hai-Bin Xue, Xin Liu, and Jie Zhang

Quantum-correlation-enhanced weak-field detection in an optomechanical system *(8 pages)* 063811
Wen-Zhao Zhang, Li-Bo Chen, Jiong Cheng, and Yun-Feng Jiang

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Momentum correlations of a few ultracold bosons escaping from an open well *(10 pages)* 063608
Jacek Dobrzyniecki and Tomasz Sowiński

Layered chaos in mean-field and quantum many-body dynamics *(11 pages)* 063609
Marc Andrew Valdez, Gavriil Shchedrin, Fernando Sols, and Lincoln D. Carr

Realization of $\mathcal{PT}$-symmetric and $\mathcal{PT}$-symmetry-broken states in static optical-lattice potentials *(8 pages)* 063610
Felix Kogel, Sebastian Kotzur, Daniel Dizdarevic, Jörg Main, and Günter Wunner

Griffiths physics in an ultracold Bose gas *(7 pages)* 063611
M. E. W. Reed, Z. S. Smith, Aftaab Dewan, and S. L. Rolston

Total energy dynamics and asymptotics of the momentum distribution following an interaction quench in a two-component Fermi gas *(11 pages)* 063612
Chen-How Huang and Miguel A. Cazalilla

Linked and knotted synthetic magnetic fields *(7 pages)* 063613
Callum W. Duncan, Calum Ross, Niclas Westerberg, Manuel Valiente, Bernd J. Schroers, and Patrik Öhberg

Bloch oscillations of multimagnon excitations in a Heisenberg XXZ chain *(10 pages)* 063614
Wenjie Liu (柳文洁), Yongguan Ke (柯勇贯), Li Zhang (张莉), and Chaohong Lee (李朝红)

Decay rates and energies of free magnons and bound states in dissipative XXZ chains *(14 pages)* 063615
C. D. Parmee and N. R. Cooper

Interacting non-Hermitian ultracold atoms in a harmonic trap: Two-body exact solution and a high-order exceptional point *(13 pages)* 063616
Lei Pan, Shu Chen, and Xiaoling Cui

Threshold coupling strength for equilibration between small systems *(9 pages)* 063617
R. Bürkle and J. R. Anglin

Quantum solitons in spin-orbit-coupled Bose-Bose mixtures *(5 pages)* 063618
Andrea Tononi, Yueming Wang, and Luca Salasnich

Ground state of weakly repulsive soft-core bosons on a sphere *(17 pages)* 063619
Santi Prestipino and Paolo V. Giaquinta

Spin-energy correlation in degenerate weakly interacting Fermi gases *(14 pages)* 063620
S. Pegahan, J. Kangara, I. Arakelyan, and J. E. Thomas

Quantum hydrodynamics for supersolid crystals and quasicrystals *(16 pages)* 063621
Vili Heinonen, Keaton J. Burns, and Jörn Dunkel

Low-energy effective theory of nonthermal fixed points in a multicomponent Bose gas *(32 pages)* 063622
Aleksandr N. Mikheev, Christian-Marcel Schmied, and Thomas Gasenzer

Splitting of nonlinear-Schrödinger-equation breathers by linear and nonlinear localized potentials *(11 pages)* 063623
Oleksandr V. Marchukov, Boris A. Malomed, Vladimir A. Yurovsky, Maxim Olshanii, Vanja Dunjko, and Randall G. Hulet

Dynamics and density correlations in matter-wave jet emission of a driven condensate *(8 pages)* 063624
Zhigang Wu and Hui Zhai

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Time-dependent multiconfiguration self-consistent-field study on resonantly enhanced high-order harmonic generation from transition-metal elements *(7 pages)* 063420
Imam S. Wahyutama, Takeshi Sato, and Kenichi L. Ishikawa

Fast and dense magneto-optical traps for strontium *(9 pages)* 063421
S. Snigirev, A. J. Park, A. Heinz, I. Bloch, and S. Blatt

Magic polarization for cancellation of light shifts in two-photon optical clocks *(6 pages)* 063422
Shira Jackson and Amar C. Vutha

Propagation of ultrashort resonant ionizing laser pulses in rubidium vapor *(9 pages)* 063423
Gabor Demeter

Robust transverse structures in rescattered photoelectron wave packets and their observable consequences *(10 pages)* 063424
Timm Bredtmann and Serguei Patchkovskii

Extreme-ultraviolet coherent pulse amplification in argon *(11 pages)* 063425
C. Serrat, J. Seres, E. Seres, and S. Namba

Entangled pairs of $2p$ atoms produced in photodissociation of H_2 and D_2 *(13 pages)* 063426
Yutaro Torizuka, Kouichi Hosaka, Philipp Schmidt, Takeshi Odagiri, Andre Knie, Arno Ehresmann, Ryoko Kougo, Masashi Kitajima, and Noriyuki Kouchi

Electric-field noise from thermally activated fluctuators in a surface ion trap *(11 pages)* 063427
Crystal Noel, Maya Berlin-Udi, Clemens Matthiesen, Jessica Yu, Yi Zhou, Vincenzo Lordi, and Hartmut Häffner

Numerical attoclock on atomic and molecular hydrogen *(8 pages)* 063428
Vladislav V. Serov, Alexander W. Bray, and Anatoli S. Kheifets

Matter waves and collective properties of cold atoms and molecules

Entanglement between two spatially separated ultracold interacting Fermi gases *(11 pages)* 063601
P. Alexander Bouvrie, Eloisa Cuestas, Itzhak Roditi, and Ana P. Majtey

Superfluid vortex dynamics on planar sectors and cones *(9 pages)* 063602
Pietro Massignan and Alexander L. Fetter

Improving mean-field theory for bosons in optical lattices via degenerate perturbation theory *(14 pages)* 063603
M. Kübler, F. T. Sant'Ana, F. E. A. dos Santos, and A. Pelster

Quasistable quantum vortex knots and links in anisotropic harmonically trapped Bose-Einstein condensates *(8 pages)* 063604
Christopher Ticknor, Victor P. Ruban, and P. G. Kevrekidis

Quantum dynamics of impenetrable SU(N) fermions in one-dimensional lattices *(15 pages)* 063605
Yicheng Zhang, Lev Vidmar, and Marcos Rigol

Thermal crossover, transition, and coexistence in Fermi polaronic spectroscopies *(6 pages)* 063606
Hiroyuki Tajima and Shun Uchino

Analyzing a Bose polaron across resonant interactions *(8 pages)* 063607
L. A. Peña Ardila, N. B. Jørgensen, T. Pohl, S. Giorgini, G. M. Bruun, and J. J. Arlt

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Femtosecond wave-packet revivals in ozone *(9 pages)* 063405
T. Latka, V. Shirvanyan, M. Ossiander, O. Razskazovskaya, A. Guggenmos, M. Jobst, M. Fieß, S. Holzner, A. Sommer, M. Schultze, C. Jakubeit, J. Riemensberger, B. Bernhardt, W. Helml, F. Gatti, B. Lasorne, D. Lauvergnat, P. Decleva, G. J. Halász, Á. Vibók, and R. Kienberger

Photoelectron circular dichroism with Lissajous-type bichromatic fields: One-photon versus two-photon ionization of chiral molecules *(5 pages)* 063406
Philipp V. Demekhin

Observation of photon-nucleus angular-momentum transfer in the strong-field breaking of molecules *(7 pages)* 063407
Xiaochun Gong, Peilun He, Junyang Ma, Wenbin Zhang, Fenghao Sun, Qinying Ji, Kang Lin, Hanxiao Li, Junjie Qiang, Peifen Lu, Hui Li, Heping Zeng, Jian Wu, and Feng He

High-order harmonic generation in imperfect crystals *(8 pages)* 063408
Chuan Yu, Kenneth K. Hansen, and Lars Bojer Madsen

Photoelectron–Auger-electron angular-momentum transfer in core-ionized Ar: Beyond the standard post-collision-interaction model *(7 pages)* 063409
R. Guillemin, L. Gerchikov, S. Sheinerman, M. Zmerli, T. Marin, L. Journel, O. Travnikova, T. Marchenko, B. Lassalle-Kaiser, M. N. Piancastelli, and M. Simon

Stark effect in spherical quantum dots *(7 pages)* 063410
Thomas Garm Pedersen

Reduction of frequency-dependent light shifts in light-narrowing regimes: A study using effective master equations *(9 pages)* 063411
Yue Chang, Yu-Hao Guo, and Jie Qin

Detuning-induced robustness of a three-state Landau-Zener model against dissipation *(7 pages)* 063412
Benedetto Militello

Dominance of correlation and relativistic effects on photodetachment time delay well above threshold *(6 pages)* 063413
Soumyajit Saha, Pranawa C. Deshmukh, Anatoli S. Kheifets, and Steven T. Manson

Sawtooth-wave adiabatic-passage slowing of dysprosium *(7 pages)* 063414
N. Petersen, F. Mühlbauer, L. Bougas, A. Sharma, D. Budker, and P. Windpassinger

Strong-field ionization, rescattering, and target structure imaging with vortex electrons *(7 pages)* 063415
Oleg I. Tolstikhin and Toru Morishita

Two-photon photoassociation spectroscopy of the $^2\Sigma^+$ YbLi molecular ground state *(9 pages)* 063416
Alaina Green, Jun Hui See Toh, Richard Roy, Ming Li, Svetlana Kotochigova, and Subhadeep Gupta

Observation of a quasi-one-dimensional variation of the Stern-Gerlach effect *(5 pages)* 063417
K. S. Melin, P. I. Nagornykh, Y. Lu, L. E. Hillberry, Y. Xu, and M. G. Raizen

Determination of molecular contributions to the nonlinear refractive index of air for mid-infrared femtosecond laser-pulse excitation *(8 pages)* 063418
D. Langevin, J. M. Brown, M. B. Gaarde, and A. Couairon

Revisiting photon-statistics effects on multiphoton ionization. II. Connection to realistic systems *(5 pages)* 063419
G. Mouloudakis and P. Lambropoulos

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Charge deposition, redistribution, and decay properties of insulating surfaces obtained from guiding of low-energy ions through capillaries *(14 pages)* 062704
R. D. DuBois, K. Tőkési, and E. Giglio

Experimental and theoretical study of valence electronic structure of tetrabromomethane by (e, 2e) electron momentum spectroscopy *(7 pages)* 062705
Zhongfeng Xu, Pengfei Hu, Enliang Wang, Shenyue Xu, Xing Wang, Yongtao Zhao, Jingkang Deng, Chuangang Ning, and Xueguang Ren

Excitation-assisted nonadiabatic charge-transfer reaction in a mixed atom-ion system *(9 pages)* 062706
Ming Li, Michael Mills, Prateek Puri, Alexander Petrov, Eric R. Hudson, and Svetlana Kotochigova

Rotational cooling of molecules in a Bose-Einstein condensate *(9 pages)* 062707
Martin Will, Tobias Lausch, and Michael Fleischhauer

Vibrational effects on electron-impact valence excitations of SF_6 *(8 pages)* 062708
Noboru Watanabe, Tsukasa Hirayama, and Masahiko Takahashi

Experimental electron-detachment cross sections for collisions of O_2^- with N_2 molecules in the energy range 50–7000 eV *(8 pages)* 062709
M. Mendes, C. Guerra, A. I. Lozano, D. Rojo, J. C. Oller, P. Limão-Vieira, and G. García

Few-body dynamics underlying postcollision effects in the ionization of H_2 by 75-keV proton impact *(9 pages)* 062710
M. Dhital, S. Bastola, A. Silvus, A. Hasan, B. R. Lamichhane, E. Ali, M. F. Ciappina, R. A. Lomsadze, D. Cikota, B. Boggs, D. H. Madison, and M. Schulz

Single ionization of helium by fast proton impact in different kinematical regimes *(11 pages)* 062711
O. Chuluunbaatar, K. A. Kouzakov, S. A. Zaytsev, A. S. Zaytsev, V. L. Shablov, Yu. V. Popov, H. Gassert, M. Waitz, H.-K. Kim, T. Bauer, A. Laucke, Ch. Müller, J. Voigtsberger, M. Weller, J. Rist, K. Pahl, M. Honig, M. Pitzer, S. Zeller, T. Jahnke, L. Ph. H. Schmidt, H. Schmidt-Böcking, R. Dörner, and M. S. Schöffler

Ultracold homonuclear and heteronuclear collisions in metastable helium *(14 pages)* 062712
Daniel G. Cocks, Ian B. Whittingham, and Gillian Peach

PART B

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

Photoionization and photofragmentation of singly charged positive and negative $Sc_3N@C_{80}$ endohedral fullerene ions *(16 pages)* 063401
A. Müller, M. Martins, A. L. D. Kilcoyne, R. A. Phaneuf, J. Hellhund, A. Borovik, Jr., K. Holste, S. Bari, T. Buhr, S. Klumpp, A. Perry-Sassmannshausen, S. Reinwardt, S. Ricz, K. Schubert, and S. Schippers

Ion-crystal demonstration of a temperature-driven structural phase transition *(9 pages)* 063402
J. Li, L. L. Yan, L. Chen, Z. C. Liu, F. Zhou, J. Q. Zhang, W. L. Yang, and M. Feng

Ultrafast Rydberg-state dissociation in oxygen: Identifying the role of multielectron excitations *(9 pages)* 063403
Alexander Plunkett, Nathan Harkema, Robert R. Lucchese, C. William McCurdy, and Arvinder Sandhu

Classical theory of laser-assisted spontaneous bremsstrahlung *(13 pages)* 063404
H. B. Ambalampitiya and I. I. Fabrikant

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Enhanced sensitivity of the electron electric dipole moment from YbOH: The role of theory *(5 pages)* 062502
V. S. Prasannaa, N. Shitara, A. Sakurai, M. Abe, and B. P. Das

Ground-state hyperfine splitting of B-like ions in the high-Z region *(6 pages)* 062503
D. A. Glazov, A. V. Volotka, O. V. Andreev, V. P. Kosheleva, S. Fritzsche, V. M. Shabaev, G. Plunien, and Th. Stöhlker

Casimir force variability in one-dimensional QED systems *(22 pages)* 062504
Yu. Voronina, I. Komissarov, and K. Sveshnikov

Which-way interference within ringlike unit cells for efficient energy transfer *(9 pages)* 062505
Davide Ferracin, Andrea Mattioni, Stefano Olivares, Felipe Caycedo-Soler, and Dario Tamascelli

Merits of heavy-heavy diatomic molecules for electron electric-dipole-moment searches *(7 pages)* 062506
A. Sunaga, M. Abe, M. Hada, and B. P. Das

Measurement of the electron affinity of the lanthanum atom *(5 pages)* 062507
Yuzhu Lu, Rulin Tang, Xiaoxi Fu, and Chuangang Ning

Dual-frequency sub-Doppler spectroscopy: Extended theoretical model and microcell-based experiments *(13 pages)* 062508
Denis Brazhnikov, Michael Petersen, Grégoire Coget, Nicolas Passilly, Vincent Maurice, Christophe Gorecki, and Rodolphe Boudot

Magnetically activated rotational vacuum friction *(8 pages)* 062509
Deng Pan, Hongxing Xu, and F. Javier García de Abajo

Measurement of the radial matrix elements for the $6s\,^2S_{1/2} \rightarrow 7p\,^2P_J$ transitions in cesium *(11 pages)* 062510
Amy Damitz, George Toh, Eric Putney, Carol E. Tanner, and D. S. Elliott

High-precision calculations of the $1s^2 2s2p\ ^1P_1 \rightarrow 1s^2 2s^2\ ^1S_0$ spin-allowed $E1$ transition in C III *(10 pages)* 062511
M. Bilal, A. V. Volotka, R. Beerwerth, J. Rothhardt, V. Hilbert, and S. Fritzsche

Dispersion forces in inhomogeneous planarly layered media: A one-dimensional model for effective polarizabilities *(10 pages)* 062512
Johannes Fiedler, Fabian Spallek, Priyadarshini Thiyam, Clas Persson, Mathias Boström, Michael Walter, and Stefan Yoshi Buhmann

Atomic transitions and the first ionization potential of promethium determined by laser spectroscopy *(8 pages)* . . . 062513
Dominik Studer, Stephan Heinitz, Reinhard Heinke, Pascal Naubereit, Rugard Dressler, Carlos Guerrero, Ulli Köster, Dorothea Schumann, and Klaus Wendt

Atomic and molecular collisions and interactions

Classical-trajectory Monte Carlo calculations of differential electron-emission cross sections in fast heavy-ion collisions with water molecules *(13 pages)* 062701
Alba Jorge, Marko Horbatsch, Clara Illescas, and Tom Kirchner

Experimental and theoretical cross sections for elastic electron scattering from zinc *(10 pages)* 062702
B. P. Marinković, R. Panajotović, D. Šević, R. P. McEachran, G. García, F. Blanco, and M. J. Brunger

Static nonlinear Schrödinger equations for the achiral-chiral transitions of polar chiral molecules *(6 pages)* 062703
Chong Ye, Quansheng Zhang, and Yong Li

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Information backflow as a resource for entanglement *(9 pages)* 062327
Nicolás Mirkin, Pablo Poggi, and Diego Wisniacki

Wideband microwave magnetometry using a nitrogen-vacancy center in diamond *(10 pages)* 062328
Rui Li, Cheng-Jie Wang, Zhi Cheng, Pengfei Wang, Ya Wang, Changkui Duan, Hangyu Liu, Fazhan Shi, and Jiangfeng Du

Family of bound entangled states on the boundary of the Peres set *(10 pages)* 062329
Saronath Halder, Manik Banik, and Sibasish Ghosh

Lattice quantum magnetometry *(9 pages)* 062330
Luca Razzoli, Luca Ghirardi, Ilaria Siloi, Paolo Bordone, and Matteo G. A. Paris

Quantum sketching protocols for Hamming distance and beyond *(11 pages)* 062331
João Fernando Doriguello and Ashley Montanaro

Versatile security analysis of measurement-device-independent quantum key distribution *(12 pages)* 062332
Ignatius William Primaatmaja, Emilien Lavie, Koon Tong Goh, Chao Wang, and Charles Ci Wen Lim

Parallel-in-time optical simulation of history states *(8 pages)* 062333
D. Pabón, L. Rebón, S. Bordakevich, N. Gigena, A. Boette, C. Iemmi, R. Rossignoli, and S. Ledesma

Scrambling and complexity in phase space *(28 pages)* 062334
Quntao Zhuang, Thomas Schuster, Beni Yoshida, and Norman Y. Yao

Quantum computation from fermionic anyons on a one-dimensional lattice *(9 pages)* 062335
Allan D. C. Tosta, Daniel J. Brod, and Ernesto F. Galvão

Classical algorithm for quantum SU(2) Schur sampling *(12 pages)* 062336
Vojtěch Havlíček, Sergii Strelchuk, and Kristan Temme

Simulation of qubit quantum circuits via Pauli propagation *(10 pages)* 062337
Patrick Rall, Daniel Liang, Jeremy Cook, and William Kretschmer

Exploring Bell inequalities for the device-independent certification of multipartite entanglement depth *(15 pages)* 062338
Pei-Sheng Lin, Jui-Chen Hung, Ching-Hsu Chen, and Yeong-Cherng Liang

Entanglement detection with scrambled data *(9 pages)* 062339
Timo Simnacher, Nikolai Wyderka, René Schwonnek, and Otfried Gühne

Dynamical fidelity susceptibility of decoherence-free subspaces *(8 pages)* 062340
Joris Kattemölle and Jasper van Wezel

Digitizing gauge fields: Lattice Monte Carlo results for future quantum computers *(13 pages)* 062341
Daniel C. Hackett, Kiel Howe, Ciaran Hughes, William Jay, Ethan T. Neil, and James N. Simone

Implementation of generalized measurements on a qudit via quantum walks *(10 pages)* 062342
Zihao Li, Haoyu Zhang, and Huangjun Zhu

Atomic and molecular structure and dynamics; high-precision measurements

Effects of the molecular potential on coexcitations of valence electrons in the *K*-shell photoeffect of 3*p* and 4*p* elements *(10 pages)* 062501
R. Hauko, J. Padežnik Gomilšek, A. Kodre, I. Arčon, and G. Aquilanti

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Detecting coherence via spectrum estimation *(12 pages)* 062310
Xiao-Dong Yu and Otfried Gühne

Quantum secret sharing with polarization-entangled photon pairs *(6 pages)* 062311
Brian P. Williams, Joseph M. Lukens, Nicholas A. Peters, Bing Qi, and Warren P. Grice

Bounds on the entanglement of two-qutrit systems from fixed marginals *(10 pages)* 062312
Giuseppe Baio, Dariusz Chruściński, Paweł Horodecki, Antonino Messina, and Gniewomir Sarbicki

Measure of quantum correlations that lies approximately between entanglement and discord *(12 pages)* 062313
Aaron Szasz

Local-hidden-state models for Bell diagonal states and beyond *(6 pages)* 062314
Fu-Lin Zhang and Yuan-Yuan Zhang

Eavesdropper's ability to attack a free-space quantum-key-distribution receiver in atmospheric turbulence *(10 pages)* 062315
Poompong Chaiwongkhot, Katanya B. Kuntz, Yanbao Zhang, Anqi Huang, Jean-Philippe Bourgoin, Shihan Sajeed, Norbert Lütkenhaus, Thomas Jennewein, and Vadim Makarov

Asymmetric sending or not sending twin-field quantum key distribution in practice *(6 pages)* 062316
Xing-Yu Zhou, Chun-Hui Zhang, Chun-Mei Zhang, and Qin Wang

Communication through quantum-controlled noise *(6 pages)* 062317
Philippe Allard Guérin, Giulia Rubino, and Časlav Brukner

Effect of long-range interactions on multipartite entanglement in Heisenberg chains *(8 pages)* 062318
Sudipto Singha Roy and Himadri Shekhar Dhar

Certifying quantum memories with coherence *(9 pages)* 062319
Timo Simnacher, Nikolai Wyderka, Cornelia Spee, Xiao-Dong Yu, and Otfried Gühne

Adiabatic quantum dynamics under decoherence in a controllable trapped-ion setup *(9 pages)* 062320
Chang-Kang Hu, Alan C. Santos, Jin-Ming Cui, Yun-Feng Huang, Marcelo S. Sarandy, Chuan-Feng Li, and Guang-Can Guo

Covert sensing using floodlight illumination *(15 pages)* 062321
Christos N. Gagatsos, Boulat A. Bash, Animesh Datta, Zheshen Zhang, and Saikat Guha

Activating remote entanglement in a quantum network by local counting of identical particles *(8 pages)* 062322
Alessia Castellini, Bruno Bellomo, Giuseppe Compagno, and Rosario Lo Franco

Generative model benchmarks for superconducting qubits *(9 pages)* 062323
Kathleen E. Hamilton, Eugene F. Dumitrescu, and Raphael C. Pooser

Implementing positive-operator-valued-measurement elements in photonic circuits for performing minimum quantum state tomography of path qudits *(10 pages)* 062324
W. R. Cardoso, D. F. Barros, M. R. Barros, and S. Pádua

Operational interpretation of coherence in quantum key distribution *(14 pages)* 062325
Jiajun Ma, You Zhou, Xiao Yuan, and Xiongfeng Ma

Simple source device-independent continuous-variable quantum random number generator *(8 pages)* 062326
P. R. Smith, D. G. Marangon, M. Lucamarini, Z. L. Yuan, and A. J. Shields

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Detection of Bell correlations at finite temperature from matter-wave interference fringes *(7 pages)* 062115
A. Niezgoda, J. Chwedeńczuk, L. Pezzé, and A. Smerzi

Fast-forward approach to adiabatic quantum dynamics of regular spin clusters: Nature of geometry-dependent driving interactions *(14 pages)* 062116
Iwan Setiawan, Bobby Eka Gunara, Sanat Avazbaev, and Katsuhiro Nakamura

Relativistic $\mathcal{PT}$-symmetric fermionic theories in $1+1$ and $3+1$ dimensions *(15 pages)* 062117
Alireza Beygi, S. P. Klevansky, and Carl M. Bender

Stochastic Hamiltonians for correlated electron models *(14 pages)* 062118
Frederick Green

Conditional states and entropy in qudit-qubit systems *(11 pages)* 062119
M. Bilkis, N. Canosa, R. Rossignoli, and N. Gigena

Revealing the nature of nonequilibrium phase transitions with quantum trajectories *(7 pages)* 062120
Valentin Link, Kimmo Luoma, and Walter T. Strunz

Qubit positive-operator-valued measurements by destructive weak measurements *(9 pages)* 062121
Yi-Hsiang Chen and Todd A. Brun

Experimental demonstration of a digital quantum simulation of a general $\mathcal{PT}$-symmetric system *(8 pages)* 062122
Jingwei Wen, Chao Zheng, Xiangyu Kong, Shijie Wei, Tao Xin, and Guilu Long

Quantum information

Hybrid spatiotemporal architectures for universal linear optics *(7 pages)* 062301
Daiqin Su, Ish Dhand, Lukas G. Helt, Zachary Vernon, and Kamil Brádler

Preserving measurements for optimal state discrimination over quantum channels *(6 pages)* 062302
Spiros Kechrimparis, Tanmay Singal, Chahan M. Kropf, and Joonwoo Bae

Necessity for quantum coherence of nondegeneracy in energy flow *(8 pages)* 062303
Teng Ma, Ming-Jing Zhao, Shao-Ming Fei, and Man-Hong Yung

Variational quantum algorithms for discovering Hamiltonian spectra *(9 pages)* 062304
Tyson Jones, Suguru Endo, Sam McArdle, Xiao Yuan, and Simon C. Benjamin

Tensor-network approach to compute genuine multisite entanglement in infinite quantum spin chains *(7 pages)* 062305
Sudipto Singha Roy, Himadri Shekhar Dhar, Aditi Sen(De), and Ujjwal Sen

Robust quantum control for adiabatic quantum computation *(8 pages)* 062306
Gregory Quiroz

Nested quantum annealing correction at finite temperature: p-spin models *(27 pages)* 062307
Shunji Matsuura, Hidetoshi Nishimori, Walter Vinci, and Daniel A. Lidar

Efficiencies of logical Bell measurements on Calderbank-Shor-Steane codes with static linear optics *(19 pages)* 062308
Frank Schmidt and Peter van Loock

Measuring fermionic entanglement: Entropy, negativity, and spin structure *(9 pages)* 062309
Eyal Cornfeld, Eran Sela, and Moshe Goldstein

(Continued)

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

PHYSICAL REVIEW A **THIRD SERIES, VOLUME 99, NUMBER 6** **JUNE 2019**

Observation of vector solitons supported by third-order dispersion *(6 pages)* . . . . . 061802(R)
J. Guo, X. Hu, Y. F. Song, G. D. Shao, L. M. Zhao, and D. Y. Tang

Impact of high-order effects on soliton explosions in the complex cubic-quintic Ginzburg-Landau equation *(5 pages)* . . . . . 061803(R)
S. V. Gurevich, C. Schelte, and J. Javaloyes

ARTICLES

Fundamental concepts

Einstein-Podolsky-Rosen steering and entanglement based on two-photon correlation for bipartite Gaussian states *(12 pages)* 062101
Ben-yuan Zhou, Guo-qing Yang, and Gao-xiang Li

Pure Coulomb tensor interaction in the Dirac equation *(6 pages)* 062102
M. G. Garcia, S. Pratapsi, P. Alberto, and A. S. de Castro

Coherence effects in the performance of the quantum Otto heat engine *(15 pages)* 062103
Patrice A. Camati, Jonas F. G. Santos, and Roberto M. Serra

Uniquely determined pure quantum states need not be unique ground states of quasi-local Hamiltonians *(16 pages)* 062104
Salini Karuvade, Peter D. Johnson, Francesco Ticozzi, and Lorenza Viola

Exact nonequilibrium quantum observable statistics: A large-deviation approach *(9 pages)* 062105
Stefano Gherardini

Optimal estimation of matter-field coupling strength in the dipole approximation *(16 pages)* 062106
József Zsolt Bernád, Claudio Sanavio, and André Xuereb

Symmetry-protected localized states at defects in non-Hermitian systems *(7 pages)* 062107
Ya-Jie Wu and Junpeng Hou

Strong quantum nonlocality in multipartite quantum systems *(6 pages)* 062108
Zhi-Chao Zhang and Xiangdong Zhang

Angular momentum of open quantum systems in external magnetic field *(6 pages)* 062109
Sh. A. Kalandarov, I. B. Abdurakhmanov, Z. Kanokov, G. G. Adamian, and N. V. Antonenko

Optimal stochastic modeling with unitary quantum dynamics *(8 pages)* 062110
Qing Liu, Thomas J. Elliott, Felix C. Binder, Carlo Di Franco, and Mile Gu

Optimal work-to-work conversion of a nonlinear quantum Brownian duet *(9 pages)* 062111
Matteo Carrega, Maura Sassetti, and Ulrich Weiss

Non-Hermitian phase transition and eigenstate localization induced by asymmetric coupling *(9 pages)* 062112
P. Wang, L. Jin, and Z. Song

Characterization of a quasistatic environment with a qubit *(16 pages)* 062113
Fattah Sakuldee and Łukasz Cywiński

Dynamical role of quantum signatures in quantum thermometry *(7 pages)* 062114
Michele M. Feyles, Luca Mancino, Marco Sbroscia, Ilaria Gianani, and Marco Barbieri

(Continued)

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

PHYSICAL REVIEW A™

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 99, NUMBER 6 *CONTENTS* **JUNE 2019**
PARTS A AND B

The Table of Contents is a total listing of Parts A and B.
Part A consists of pages 060101(R)–062712, and Part B pages 063401–069902(E).

PART A

RAPID COMMUNICATIONS

Fundamental concepts

Localization in spin chains with facilitation constraints and disordered interactions *(7 pages)* . . . . . 060101(R)
Maike Ostmann, Matteo Marcuzzi, Juan P. Garrahan, and Igor Lesanovsky

Postselection and counterfactual communication *(4 pages)* . . . . . 060102(R)
David R. M. Arvidsson-Shukur and Crispin H. W. Barnes

Decoherence of nonrelativistic bosonic quantum fields *(6 pages)* . . . . . 060103(R)
Marduk Bolaños, Benjamin A. Stickler, and Klaus Hornberger

Quantum information

Forecasting financial crashes with quantum computing *(6 pages)* . . . . . 060301(R)
Román Orús, Samuel Mugel, and Enrique Lizaso

Atomic and molecular structure and dynamics; high-precision measurements

Calculation of scalar nuclear spin-spin coupling in a noble-gas mixture *(5 pages)* . . . . . 060501(R)
Juha Vaara and Michael V. Romalis

Atomic and molecular collisions and interactions

Efimov physics in the presence of a Fermi sea *(6 pages)* . . . . . 060701(R)
Mingyuan Sun and Xiaoling Cui

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

Ab initio calculations of laser-atom interactions revealing harmonics feedback during macroscopic propagation *(7 pages)* . . . . . 061401(R)
N. Berti, P. Béjot, E. Cormier, J. Kasparian, O. Faucher, and J.-P. Wolf

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

Thermorefractive noise in silicon-nitride microresonators *(5 pages)* . . . . . 061801(R)
Guanhao Huang, Erwan Lucas, Junqiu Liu, Arslan S. Raja, Grigory Lihachev,
Michael L. Gorodetsky, Nils J. Engelsen, and Tobias J. Kippenberg

Copyright 2019 by American Physical Society

(Continued)

2469-9926(201906)99:6:B;1-5

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).