



Evolution of the distribution of a two-dimensional time-multiplexed quantum walker in a photonic platform. [H. Chalabi *et al.*, Phys. Rev. Lett. **123**, 150503 (2019)]

NEWSPAPER

PHYSICAL REVIEW LETTERS

Contents

Articles published 5 October–11 October 2019

VOLUME 123, NUMBER 15

11 October 2019

General Physics: Statistical and Quantum Mechanics, Quantum Information, etc.

	How to Quantify a Dynamical Quantum Resource	150401
	Gilad Gour and Andreas Winter	
	Direct Measurement of a Nonlocal Entangled Quantum State	150402
	Wei-Wei Pan, Xiao-Ye Xu, Yaron Kedem, Qin-Qin Wang, Zhe Chen, Munsif Jan, Kai Sun, Jin-Shi Xu, Yong-Jian Han, Chuan-Feng Li, and Guang-Can Guo	
	<i>In Situ</i> Characterization of Qubit Control Lines: A Qubit as a Vector Network Analyzer	150501
	Markus Jerger, Anatoly Kulikov, Z��non Vassel��n, and Arkady Fedorov	
	Causal Limit on Quantum Communication	150502
	Robert Pisarczyk, Zhikuan Zhao, Yingkai Ouyang, Vlatko Vedral, and Joseph F. Fitzsimons	
	Synthetic Gauge Field for Two-Dimensional Time-Multiplexed Quantum Random Walks	150503
	Hamidreza Chalabi, Sabyasachi Barik, Sunil Mittal, Thomas E. Murphy, Mohammad Hafezi, and Edo Waks	
	Period- <i>n</i> Discrete Time Crystals and Quasicrystals with Ultracold Bosons	150601
	Andrea Pizzi, Johannes Knolle, and Andreas Nunnenkamp	
	Transmission Electron Microscope Using a Linear Accelerator	150801
	Takumi Sannomiya, Yoshihiro Arai, Kuniaki Nagayama, and Yukinori Nagatani	

Gravitation and Astrophysics

	Measuring Spin of the Remnant Black Hole from Maximum Amplitude	151101
	Deborah Ferguson, Sudarshan Ghonge, James A. Clark, Juan Calderon Bustillo, Pablo Laguna, and Deirdre Shoemaker	

Elementary Particles and Fields

	General Solution to the U(1) Anomaly Equations	151601
	Davi B. Costa, Bogdan A. Dobrescu, and Patrick J. Fox	
	Loop-Tree Duality for Multiloop Numerical Integration	151602
	Zeno Capatti, Valentin Hirschi, Dario Kermanschah, and Ben Ruijl	
	Hide and Seek with Massive Fields in Modulus Mediation	151801
	Ken-ichi Okumura	
	Detecting Sub-GeV Dark Matter with Superconducting Nanowires	151802
	Yonit Hochberg, Ilya Charaev, Sae-Woo Nam, Varun Verma, Marco Colangelo, and Karl K. Berggren	
	First measurement of neutrino oscillation parameters using neutrinos and antineutrinos by NOvA	151803
	M. A. Acero <i>et al.</i> (NOvA Collaboration)	
	Observation of New Resonances in the $\Lambda_b^0 \pi^+ \pi^-$ System	152001
	R. Aaij <i>et al.</i> (LHCb Collaboration)	

Atomic, Molecular, and Optical Physics

	Purcell-Enhanced Spontaneous Emission of Molecular Vibrations	153001
	Bernd Metzger, Eric Muller, Jun Nishida, Benjamin Pollard, Mario Hentschel, and Markus B. Raschke	

(Continued Inside)



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

By suggesting a few manuscripts each week, we hope to promote reading across fields. Please see our Announcement Phys. Rev. Lett. 98, 010001 (2007).

Copyright 2019 American Physical Society



Resolved-Sideband Cooling of a Levitated Nanoparticle in the Presence of Laser Phase Noise	153601
Nadine Meyer, Andrés de los Rios Sommer, Pau Mestres, Jan Gieseler, Vijay Jain, Lukas Novotny, and Romain Quidant	
Highly Polarizable Rydberg Ion in a Paul Trap	153602
Gerard Higgins, Fabian Pokorny, Chi Zhang, and Markus Hennrich	
Shuttling of Rydberg Ions for Fast Entangling Operations	153603
J. Vogel, W. Li, A. Mokhberi, I. Lesanovsky, and F. Schmidt-Kaler	
Accurate Detection of Arbitrary Photon Statistics	153604
Josef Hloušek, Michal Dudka, Ivo Straka, and Miroslav Ježek	
Nonlinear Dynamics, Fluid Dynamics, Classical Optics, etc.	
Observation of Arnold Tongues in Coupled Soliton Kerr Frequency Combs	153901
Jae K. Jang, Xingchen Ji, Chaitanya Joshi, Yoshitomo Okawachi, Michal Lipson, and Alexander L. Gaeta	
Time-Resolved sub-Ångström Metrology by Temporal Phase Interferometry near X-Ray Resonances of Nuclei	153902
Stephan Goerttler, Kilian Heeg, Andreas Kaldun, Patrick Reiser, Cornelius Strohm, Johann Haber, Christian Ott, Rajagopalan Subramanian, Ralf Röhlsberger, Jörg Evers, and Thomas Pfeifer	
Laminar Chaos in Experiments: Nonlinear Systems with Time-Varying Delays and Noise	154101
Joseph D. Hart, Rajarshi Roy, David Müller-Bender, Andreas Otto, and Günter Radons	
Lifetime of a Nanodroplet: Kinetic Effects and Regime Transitions	154501
A. S. Rana, D. A. Lockerby, and J. E. Sprittles	
Starting Flow Past an Airfoil and its Acquired Lift in a Superfluid	154502
Seth Musser, Davide Proment, Miguel Onorato, and William T. M. Irvine	
Condensed Matter: Structure, etc.	
Surface-Bulk Interplay in Vapor-Deposited Glasses: Crossover Length and the Origin of Front Transformation	155501
Cristian Rodríguez-Tinoco, Marta Gonzalez-Silveira, Joan Ràfols-Ribé, Ana Vila-Costa, Julio Cesar Martinez-Garcia, and Javier Rodríguez-Viejo	
Relation between Heterogeneous Frozen Regions in Supercooled Liquids and Non-Debye Spectrum in the Corresponding Glasses	155502
Matteo Paoluzzi, Luca Angelani, Giorgio Parisi, and Giancarlo Ruocco	
Supercompliant and Soft $(\text{CH}_3\text{NH}_3)_3\text{Bi}_2\text{I}_9$ Crystal with Ultralow Thermal Conductivity	155901
Hao Ma, Chen Li, Yunwei Ma, Heng Wang, Zachary W. Rouse, Zhuolei Zhang, Carla Slebodnick, Ahmet Alatas, Shefford P. Baker, Jeffrey J. Urban, and Zhiting Tian	
Vibrational Relaxation Lifetime of a Physisorbed Molecule at a Metal Surface	156101
Sumit Kumar, Hongyan Jiang, Michael Schwarzer, Alexander Kandratsenka, Dirk Schwarzer, and Alec M. Wodtke	
Condensed Matter: Electronic Properties, etc.	
Duality of Ring and Ladder Diagrams and Its Importance for Many-Electron Perturbation Theories	156401
Andreas Imler, Alejandro Gallo, Felix Hummel, and Andreas Grüneis	
Fractional Charge by Fixed-Node Diffusion Monte Carlo Method	156402
Matej Ditte and Matúš Dubecký	
Nonperturbative Matrix Mechanics Approach to Spin-Split Landau Levels and the g Factor in Spin-Orbit Coupled Solids	156403
Yuki Izaki and Yuki Fuseya	
Contrasting Pressure-Induced Metallization Processes in Layered Perovskites, $\alpha\text{-Sr}_2\text{MO}_4$ ($M = \text{V}, \text{Cr}$)	156601
Touzu Yamauchi, Taku Shimazu, Daisuke Nishio-Hamane, and Hiroya Sakurai	
Lattice-Symmetry-Assisted Second-Order Topological Superconductors and Majorana Patterns	156801
Xiao-Hong Pan, Kai-Jie Yang, Li Chen, Gang Xu, Chao-Xing Liu, and Xin Liu	
Quasinormal Modes and the Hawking-Unruh Effect in Quantum Hall Systems: Lessons from Black Hole Phenomena	156802
Suraj S. Hegde, Varsha Subramanyan, Barry Bradlyn, and Smitha Vishveshwara	

(Continued on Preceding Page)



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

By suggesting a few manuscripts each week, we hope to promote reading across fields. Please see our Announcement Phys. Rev. Lett. 98, 010001 (2007)

Tuning Magnetic Chirality by Dipolar Interactions	157201
Juriaan Lucassen, Mariëlle J. Meijer, Oleg Kurnosikov, Henk J. M. Swagten, Bert Koopmans, Reinoud Lavrijsen, Fabian Kloodt-Twesten, Robert Frömter, and Rembert A. Duine	
Terahertz Optomagnetism: Nonlinear THz Excitation of GHz Spin Waves in Antiferromagnetic FeBO ₃	157202
E. A. Mashkovich, K. A. Grishunin, R. V. Mikhaylovskiy, A. K. Zvezdin, R. V. Pisarev, M. B. Strugatsky, P. C. M. Christianen, Th. Rasing, and A. V. Kimel	
Valence Bond Orders at Charge Neutrality in a Possible Two-Orbital Extended Hubbard Model for Twisted Bilayer Graphene	157601
Yuan Da Liao, Zi Yang Meng, and Xiao Yan Xu	

Polymer, Soft Matter, Biological, Climate, and Interdisciplinary Physics

Threading the Spindle: A Geometric Study of Chiral Liquid Crystal Polymer Microparticles	157801
Helen S. Ansell, Dae Seok Kim, Randall D. Kamien, Eleni Katifori, and Teresa Lopez-Leon	
Shear-Jammed, Fragile, and Steady States in Homogeneously Strained Granular Materials	158001
Yiqiu Zhao (赵逸秋), Jonathan Barés, Hu Zheng (郑虎), Joshua E. S. Socolar, and Robert P. Behringer	
Environmental Nanoparticle-Induced Toughening and Pinning of a Growing Crack in a Biopolymer Hydrogel	158002
O. Ronsin, I. Naassaoui, A. Marcellan, and T. Baumberger	
Accelerated Local Dynamics in Matrix-Free Polymer Grafted Nanoparticles	158003
Mayank Jhalaria, Eileen Buening, Yucheng Huang, Madhusudan Tyagi, Reiner Zorn, Michaela Zamponi, Victoria García-Sakai, Jacques Jestin, Brian C. Benicewicz, and Sanat K. Kumar	
Scaling Law for Cracking in Shrinkable Granular Packings	158004
H. Jeremy Cho and Sujit S. Datta	
Self-Limited Accumulation of Colloids in Porous Media	158005
G. Gerber, M. Bensouda, D. A. Weitz, and P. Coussot	
Active Particles in Viscosity Gradients	158006
Charu Datt and Gwynn J. Elfring	
Light Control of Localized Photobioconvection	158101
Jorge Arrieta, Marco Polin, Ramón Saleta-Piersanti, and Idan Tuval	

Errata

Erratum: Directional Bistability and Nonreciprocal Lasing with Cold Atoms in a Ring Cavity [Phys. Rev. Lett. 121 , 163603 (2018)]	159901
B. Megyeri, G. Harvie, A. Lampis, and J. Goldwin	
Erratum: Experimental Measurement of the Quantum Metric Tensor and Related Topological Phase Transition with a Superconducting Qubit [Phys. Rev. Lett. 122 , 210401 (2019)]	159902
Xinsheng Tan, Dan-Wei Zhang, Zhen Yang, Ji Chu, Yan-Qing Zhu, Danyu Li, Xiaopei Yang, Shuqing Song, Zhikun Han, Zhiyuan Li, Yuqian Dong, Hai-Feng Yu, Hui Yan, Shi-Liang Zhu, and Yang Yu	



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

By suggesting a few manuscripts each week, we hope to promote reading across fields. Please see our Announcement Phys. Rev. Lett. 98, 010001 (2007).

Physics
spotlighting exceptional research

The American Physical Society's free online publication, *Physics* (physics.aps.org), provides thought-provoking analysis and spotlights exceptional research.