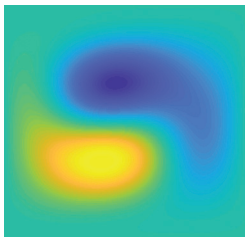

Off-diagonal components of the quantum metric for a synthesized tensor monopole in a 4D parameter space built in superconducting quantum circuits. Selected for an Editors' Suggestion. [X. Tan *et al.*, Phys. Rev. Lett. **126**, 017702 (2021)]

NEWSPAPER

PHYSICAL REVIEW LETTERS

Contents

Articles published 1 January–8 January 2021

VOLUME 126, NUMBER 1 8 January 2021

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

Knots and Non-Hermitian Bloch Bands 010401
Haiping Hu and Erhai Zhao
State Readout of a Trapped Ion Qubit Using a Trap-Integrated Superconducting Photon Detector 010501
S. L. Todaro, V. B. Verma, K. C. McCormick, D. T. C. Allcock, R. P. Mirin, D. J. Wineland, S. W. Nam, A. C. Wilson, D. Leibfried, and D. H. Slichter
Dynamic Framework for Criticality-Enhanced Quantum Sensing 010502
Yaoming Chu, Shaoliang Zhang, Baiyi Yu, and Jianming Cai
Long-Distance Entanglement Purification for Quantum Communication 010503
Xiao-Min Hu, Cen-Xiao Huang, Yu-Bo Sheng, Lan Zhou, Bi-Heng Liu, Yu Guo, Chao Zhang, Wen-Bo Xing, Yun-Feng Huang, Chuan-Feng Li, and Guang-Can Guo
Geometrical Bounds of the Irreversibility in Markovian Systems 010601
Tan Van Vu and Yoshihiko Hasegawa
Thermodynamic Uncertainty Relation for General Open Quantum Systems 010602
Yoshihiko Hasegawa

Gravitation and Astrophysics

Cosmological Advection Flows in the Presence of Primordial Black Holes as Dark Matter and Formation of First Sources 011101
A. Kashlinsky
Improved Limits for Violations of Local Position Invariance from Atomic Clock Comparisons 011102
R. Lange, N. Huntemann, J. M. Rahm, C. Sanner, H. Shao, B. Lipphardt, Chr. Tamm, S. Weyers, and E. Peik
Spin-Induced Scalarized Black Holes 011103
Carlos A. R. Herdeiro, Eugen Radu, Hector O. Silva, Thomas P. Sotiriou, and Nicolás Yunes
Spin-Induced Black Hole Scalarization in Einstein-Scalar-Gauss-Bonnet Theory 011104
Emanuele Berti, Lucas G. Collodel, Burkhard Kleihaus, and Jutta Kunz
Using the Marked Power Spectrum to Detect the Signature of Neutrinos in Large-Scale Structure 011301
Elena Massara, Francisco Villaescusa-Navarro, Shirley Ho, Neal Dalal, and David N. Spergel

Elementary Particles and Fields

Partial Wave Amplitude Basis and Selection Rules in Effective Field Theories 011601
Minyuan Jiang, Jing Shu, Ming-Lei Xiao, and Yu-Hui Zheng
Breaking up the Proton: An Affair with Dark Forces 011801
Graham D. Kribs, David McKeen, and Nirmal Raj

(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 2021 American Physical Society

0031-9007(20210108)126:1;1-D

Energy-Dependent $\pi^+\pi^+\pi^+$ Scattering Amplitude from QCD 012001
Maxwell T. Hansen, Raul A. Briceño, Robert G. Edwards, Christopher E. Thomas, and David J. Wilson (for the Hadron Spectrum Collaboration)

First Measurement of Coherent Elastic Neutrino-Nucleus Scattering on Argon 012002
D. Akimov *et al.* (COHERENT Collaboration)

Nuclear Physics

Deciphering the Nature of X(3872) in Heavy Ion Collisions 012301
Hui Zhang, Jinfeng Liao, Enke Wang, Qian Wang, and Hongxi Xing

Pion Condensation in the Early Universe at Nonvanishing Lepton Flavor Asymmetry and Its Gravitational Wave Signatures 012701
Volodymyr Vovchenko, Bastian B. Brandt, Francesca Cuteri, Gergely Endrődi, Fazlollah Hajkarim, and Jürgen Schaffner-Bielich

Atomic, Molecular, and Optical Physics

Heteronuclear Long-Range Rydberg Molecules 013001
Michael Peper and Johannes Deiglmayr

Metasurfaces with Bound States in the Continuum Enabled by Eliminating First Fourier Harmonic Component in Lattice Parameters 013601
Sun-Goo Lee, Seong-Han Kim, and Chul-Sik Kee

Coherent Spin-Photon Interface with Waveguide Induced Cycling Transitions 013602
Martin Hayhurst Appel, Alexey Tiranov, Alisa Javadi, Matthias C. Löbl, Ying Wang, Sven Scholz, Andreas D. Wieck, Arne Ludwig, Richard J. Warburton, and Peter Lodahl

Plasma and Beam Physics

Energy-Spread Preservation and High Efficiency in a Plasma-Wakefield Accelerator 014801
C. A. Lindstrøm, J. M. Garland, S. Schröder, L. Boulton, G. Boyle, J. Chappell, R. D'Arcy, P. Gonzalez, A. Knetsch, V. Libov, G. Loisch, A. Martinez de la Ossa, P. Niknejadi, K. Põder, L. Schaper, B. Schmidt, B. Sheeran, S. Wesch, J. Wood, and J. Osterhoff

Condensed Matter: Structure, etc.

Molecular Impurities as a Realization of Anyons on the Two-Sphere 015301
M. Brooks, M. Lemeshko, D. Lundholm, and E. Yakaboylu

Simple and Broadly Applicable Definition of Shear Transformation Zones 015501
David Richard, Geert Kapteijns, Julia A. Giannini, M. Lisa Manning, and Edan Lerner

Direct Electric-Field Induced Phase Transformation in Paraelectric Zirconia via Electrical Susceptibility Mismatch 015701
Alan Lai and Christopher A. Schuh

Ionic Phases of Ammonia-Rich Hydrate at High Densities 015702
Wan Xu, Victor Naden Robinson, Xiao Zhang, Hui-Chao Zhang, Mary-Ellen Donnelly, Philip Dalladay-Simpson, Andreas Hermann, Xiao-Di Liu, and Eugene Gregoryanz

Using Diffuse Scattering to Observe X-Ray-Driven Nonthermal Melting 015703
N. J. Hartley, J. Grenzer, L. Huang, Y. Inubushi, N. Kamimura, K. Katagiri, R. Kodama, A. Kon, W. Lu, M. Makita, T. Matsuoka, S. Nakajima, N. Ozaki, T. Pikuz, A. V. Rode, D. Sagae, A. K. Schuster, K. Tono, K. Voigt, J. Vorberger, T. Yabuuchi, E. E. McBride, and D. Kraus

Anomalous Behavior in the Nucleation of Ice at Negative Pressures 015704
Valentino Bianco, P. Montero de Hijes, Cintia P. Lamas, Eduardo Sanz, and Carlos Vega

Sizable Suppression of Thermal Hall Effect upon Isotopic Substitution in $SrTiO_3$ 015901
Sangwoo Sim, Heejun Yang, Ha-Leem Kim, Matthew J. Coak, Mitsuru Itoh, Yukio Noda, and Je-Geun Park

de Gennes Narrowing and Relationship between Structure and Dynamics in Self-Organized Ion-Beam Nanopatterning 016101
Peco Myint, Karl F. Ludwig, Lutz Wiegart, Yugang Zhang, Andrei Fluerasu, Xiaozhi Zhang, and Randall L. Headrick

(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)

Core-Level Binding Energy Reveals Hydrogen Bonding Configurations of Water Adsorbed on $TiO_2(110)$ Surface 016102
C. Kamal, Nader Stenberg, Lars Erik Walle, Davide Ragazzon, Anne Borg, Per Uvdal, Natalia V. Skorodumova, Michael Odelius, and Anders Sandell

Condensed Matter: Electronic Properties, etc.

Topological Phase Transition and Phonon-Space Dirac Topology Surfaces in $ZrTe_5$ 016401
Niraj Aryal, Xilian Jin, Q. Li, A. M. Tsvelik, and Weiguo Yin

Many-Body Invariants for Chern and Chiral Hinge Insulators 016402
Byungmin Kang, Wonjun Lee, and Gil Young Cho

Robust Fermi-Surface Morphology of $CeRhIn_5$ across the Putative Field-Induced Quantum Critical Point 016403
S. Mishra, J. Hornung, M. Raba, J. Klotz, T. Förster, H. Harima, D. Aoki, J. Wosnitza, A. McCollam, and I. Sheikin

WKB Estimate of Bilayer Graphene's Magic Twist Angles 016404
Yafei Ren, Qiang Gao, A. H. MacDonald, and Qian Niu

Charge Neutral Current Generation in a Spontaneous Quantum Hall Antiferromagnet 016801
Miuko Tanaka, Yuya Shimazaki, Ivan Valerievich Borzenets, Kenji Watanabe, Takashi Taniguchi, Seigo Tarucha, and Michihisa Yamamoto

Detecting Bulk Topology of Quadrupolar Phase from Quench Dynamics 016802
Tomonari Mizoguchi, Yoshihito Kuno, and Yasuhiro Hatsugai

Universality of Boundary Charge Fluctuations 016803
Clara S. Weber, Kiryl Piasotski, Mikhail Pletyukhov, Jelena Klinovaja, Daniel Loss, Herbert Schoeller, and Dante M. Kennes

Coupled Yu-Shiba-Rusinov States Induced by a Many-Body Molecular Spin on a Superconductor 017001
Carmen Rubio-Verdú, Javier Zaldívar, Rok Žitko, and Jose Ignacio Pascual

From One- to Two-Magnon Excitations in the $S = 3/2$ Magnet β-$CaCr_2O_4$ 017201
M. Songvilay, S. Petit, F. Damay, G. Roux, N. Qureshi, H. C. Walker, J. A. Rodriguez-Rivera, B. Gao, S.-W. Cheong, and C. Stock

Microwave Spectroscopy of the Low-Temperature Skyrmion State in Cu_2OSeO_3 017202
Aisha Aqeel, Jan Sahliger, Takuya Taniguchi, Stefan Mändl, Denis Mettus, Helmuth Berger, Andreas Bauer, Markus Garst, Christian Pfleiderer, and Christian H. Back

Configurable Artificial Spin Ice with Site-Specific Local Magnetic Fields 017203
Vineeth Mohanan Parakkat, Gavin M. Macauley, Robert L. Stamps, and Kannan M. Krishnan

Creation of a Chiral Bobber Lattice in Helimagnet-Multilayer Heterostructures 017204
Kejing Ran, Yizhou Liu, Yao Guang, David M. Burn, Gerrit van der Laan, Thorsten Hesjedal, Haifeng Du, Guoqiang Yu, and Shilei Zhang

Mediated Interactions and Photon Bound States in an Exciton-Polariton Mixture 017401
A. Camacho-Guardian, M. A. Bastarrachea-Magnani, and G. M. Bruun

Quantum Monte Carlo Simulations of the 2D Su-Schrieffer-Heeger Model 017601
Bo Xing, Wei-Ting Chiu, Dario Poletti, R. T. Scalettar, and George Batrouni

Long-Distance Superexchange between Semiconductor Quantum-Dot Electron Spins 017701
Haifeng Qiao, Yadav P. Kandel, Saeed Fallahi, Geoffrey C. Gardner, Michael J. Manfra, Xuedong Hu, and John M. Nichol

Experimental Observation of Tensor Monopoles with a Superconducting Qudit 017702
Xinsheng Tan, Dan-Wei Zhang, Wen Zheng, Xiaopei Yang, Shuqing Song, Zhikun Han, Yuqian Dong, Zhimin Wang, Dong Lan, Hui Yan, Shi-Liang Zhu, and Yang Yu

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

Target Search of Active Agents Crossing High Energy Barriers 018001
Luigi Zanovello, Michele Caraglio, Thomas Franosch, and Pietro Faccioli

Optimal Local Estimates of Visual Motion in a Natural Environment 018101
Shiva R. Sinha, William Bialek, and Rob R. de Ruyter van Steveninck

(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)

Continuum Theory of Active Phase Separation in Cellular Aggregates 018102
Hui-Shun Kuan, Wolfram Pönisch, Frank Jülicher, and Vasily Zaburdaev
Efficiency of Local Learning Rules in Threshold-Linear Associative Networks 018301
Francesca Schönsberg, Yasser Roudi, and Alessandro Treves

Comments

Comment on "Search for η' Bound Nuclei in the $^{12}C(\gamma, p)$ Reaction with Simultaneous Detection of Decay Products" 019201
H. Fujioka, K. Itahashi, V. Metag, M. Nanova, and Y. K. Tanaka
Comment on "Free-Electron–Bound-Electron Resonant Interaction" 019501
F. Javier García de Abajo
Gover and Yariv Reply 019502
Avraham Gover and Amnon Yariv

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.