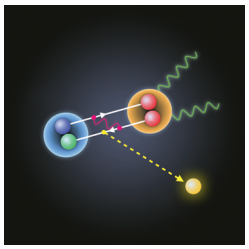

Proposed new-particle (yellow) interpretation for recently reported rare kaon (blue) decays to neutral pions (orange). Selected for an Editors' Suggestion and a Synopsis in *Physics*. [T. Kitahara *et al.*, Phys. Rev. Lett. **124**, 071801 (2020)]

NEWSPAPER

PHYSICAL REVIEW LETTERS

Contents

Articles published 15 February–21 February 2020

VOLUME 124, NUMBER 7 — 21 February 2020

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

Quantum Rifling: Protecting a Qubit from Measurement Back Action 070401
Daniel Szombati, Alejandro Gomez Frieiro, Clemens Müller, Tyler Jones, Markus Jerger, and Arkady Fedorov

Tunable Nonreciprocal Quantum Transport through a Dissipative Aharonov-Bohm Ring in Ultracold Atoms 070402
Wei Gou, Tao Chen, Dizhou Xie, Teng Xiao, Tian-Shu Deng, Bryce Gadway, Wei Yi, and Bo Yan

Sending-or-Not-Sending with Independent Lasers: Secure Twin-Field Quantum Key Distribution over 509 km 070501
Jiu-Peng Chen, Chi Zhang, Yang Liu, Cong Jiang, Weijun Zhang, Xiao-Long Hu, Jian-Yu Guan, Zong-Wen Yu, Hai Xu, Jin Lin, Ming-Jun Li, Hao Chen, Hao Li, Lixing You, Zhen Wang, Xiang-Bin Wang, Qiang Zhang, and Jian-Wei Pan

Tomography of a Feedback Measurement with Photon Detection 070502
Shuro Izumi, Jonas S. Neergaard-Nielsen, and Ulrik L. Andersen

Unitary and Nonunitary Quantum Cellular Automata with Rydberg Arrays 070503
T. M. Wintermantel, Y. Wang, G. Lochead, S. Shevate, G. K. Brennen, and S. Whitlock

Numerical Simulation of Finite-Temperature Field Theory for Interacting Bosons 070601
Kris T. Delaney, Henri Orland, and Glenn H. Fredrickson

Gravitation and Astrophysics

Great Impostors: Extremely Compact, Merging Binary Neutron Stars in the Mass Gap Posing as Binary Black Holes 071101
Antonios Tsokaros, Milton Ruiz, Stuart L. Shapiro, Lunan Sun, and Kōji Uryū

Critical Collapse of a Scalar Field in Semiclassical Loop Quantum Gravity 071301
Florencia Benítez, Rodolfo Gambini, Luis Lehner, Steve Liebling, and Jorge Pullin

Elementary Particles and Fields

New Physics Implications of Recent Search for $K_L \to \pi^0 \nu\bar{\nu}$ at KOTO 071801
Teppei Kitahara, Takemichi Okui, Gilad Perez, Yotam Soreq, and Kohsaku Tobioka

Search for Rare or Forbidden Decays of the D^0 Meson 071802
J. P. Lees *et al.* (*BaBar* Collaboration)

Gauge Coupling β Functions to Four-Loop Order in the Standard Model 071803
Joshua Davies, Florian Herren, Colin Poole, Matthias Steinhauser, and Anders Eller Thomsen

Interpretation of the LHCb P_c States as Hadronic Molecules and Hints of a Narrow $P_c(4380)$ 072001
Meng-Lin Du, Vadim Baru, Feng-Kun Guo, Christoph Hanhart, Ulf-G. Meißner, José A. Oller, and Qian Wang

Axial Vector Form Factors from Lattice QCD that Satisfy the PCAC Relation 072002
Yong-Chull Jang, Rajan Gupta, Boram Yoon, and Tanmoy Bhattacharya

(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 2020 American Physical Society

0031-9007(20200221)124:7;1-A

Atomic, Molecular, and Optical Physics

Direct Measurements of Collisional Dynamics in Cold Atom Triads 073401
L. A. Reynolds, E. Schwartz, U. Ebling, M. Weyland, J. Brand, and M. F. Andersen

Self-Bound Doubly Dipolar Bose-Einstein Condensates 073402
Chinmayee Mishra, Luis Santos, and Rejish Nath

Near-Resonant Light Scattering by a Subwavelength Ensemble of Identical Atoms 073403
N. J. Schilder, C. Sauvan, Y. R. P. Sortais, A. Browaeys, and J.-J. Greffet

Beyond Mean-Field Corrections to the Quasiparticle Spectrum of Superfluid Fermi Gases 073404
Senne Van Loon, Jacques Tempere, and Hadrien Kurkjian

Multiparticle Interactions for Ultracold Atoms in Optical Tweezers: Cyclic Ring-Exchange Terms 073601
Annabelle Bohrdt, Ahmed Omran, Eugene Demler, Snir Gazit, and Fabian Grusdt

Squeezed Light Induced Symmetry Breaking Superradiant Phase Transition 073602
C. J. Zhu, L. L. Ping, Y. P. Yang, and G. S. Agarwal

Topological Bands and Triply Degenerate Points in Non-Hermitian Hyperbolic Metamaterials 073603
Junpeng Hou, Zhitong Li, Xi-Wang Luo, Qing Gu, and Chuanwei Zhang

Nonlinear Dynamics, Fluid Dynamics, Classical Optics, etc.

Topological Boundary Modes from Translational Deformations 073901
Yosuke Nakata, Yoshitaka Ito, Yasunobu Nakamura, and Ryuichi Shindou

Three-Dimensional Acoustic Double-Zero-Index Medium with a Fourfold Degenerate Dirac-like Point 074501
Changqing Xu, Guancong Ma, Ze-Guo Chen, Jie Luo, Jinjie Shi, Yun Lai, and Ying Wu

Plasma and Beam Physics

Demonstration of Large Bandwidth Hard X-Ray Free-Electron Laser Pulses at SwissFEL 074801
Eduard Prat, Philipp Dijkstal, Eugenio Ferrari, and Sven Reiche

Experimental Demonstration of a Dusty Plasma Ratchet Rectification and Its Reversal 075001
Ya-feng He, Bao-quan Ai, Chao-xing Dai, Chao Song, Rui-qi Wang, Wen-tao Sun, Fu-cheng Liu, and Yan Feng

Condensed Matter: Structure, etc.

Deterministic Scheme for Two-Dimensional Type-II Dirac Points and Experimental Realization in Acoustics 075501
Xiaoxiao Wu, Xin Li, Ruo-Yang Zhang, Xiao Xiang, Jingxuan Tian, Yingzhou Huang, Shuxia Wang, Bo Hou, C. T. Chan, and Weijia Wen

Stress-Measure Dependence of Phase Transformation Criterion under Finite Strains: Hierarchy of Crystal Lattice Instabilities for Homogeneous and Heterogeneous Transformations 075701
Hamed Babaei and Valery I. Levitas

Effect of He on the Order-Disorder Transition in Ni_3Al under Irradiation 075901
Peyman Saidi, Pooyan Changizian, Eric Nicholson, He Ken Zhang, Yu Luo, Zhongwen Yao, Chandra Veer Singh, Mark R. Daymond, and Laurent Karim Béland

Why Phonon Scattering in Glasses is Universally Small at Low Temperatures 075902
Herve M. Carruzzo and Clare C. Yu

Theoretical Paradigm for Thermal Rectification via Phonon Filtering and Spectral Confinement 075903
Brian F. Donovan and Ronald J. Warzoha

Blessing and Curse: How a Supercapacitor's Large Capacitance Causes its Slow Charging 076001
Cheng Lian, Mathijs Janssen, Honglai Liu, and René van Roij

Nucleation and Growth of the Supercooled Liquid Phase Control Glass Transition in Bulk Ultrastable Glasses 076002
A. Vila-Costa, J. Ràfols-Ribé, M. González-Silveira, A. F. Lopeandia, Ll. Abad-Muñoz, and J. Rodríguez-Viejo

Condensed Matter: Electronic Properties, etc.

Low Energy Band Structure and Symmetries of UTe_2 from Angle-Resolved Photoemission Spectroscopy 076401
Lin Miao, Shouzheng Liu, Yishuai Xu, Erica C. Kotta, Chang-Jong Kang, Sheng Ran, Johnpierre Paglione, Gabriel Kotliar, Nicholas P. Butch, Jonathan D. Denlinger, and L. Andrew Wray

(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)

Detection of Hole Pockets in the Candidate Type-II Weyl Semimetal $MoTe_2$ from Shubnikov–de Haas Quantum Oscillations 076402
Y. J. Hu, W. C. Yu, Kwing To Lai, D. Sun, F. F. Balakirev, W. Zhang, J. Y. Xie, K. Y. Yip, E. I. Paredes Aulestia, Rajveer Jha, Ryuji Higashinaka, Tatsuma D. Matsuda, Y. Yanase, Yuji Aoki, and Swee K. Goh

Magnetic Semimetals and Quantized Anomalous Hall Effect in EuB_6 076403
Simin Nie, Yan Sun, Fritz B. Prinz, Zhijun Wang, Hongming Weng, Zhong Fang, and Xi Dai

Achieving the Scaling Limit for Nonequilibrium Green Functions Simulations 076601
Niclas Schlünzen, Jan-Philip Joost, and Michael Bonitz

Strange Metal in Magic-Angle Graphene with near Planckian Dissipation 076801
Yuan Cao, Debanjan Chowdhury, Daniel Rodan-Legrain, Oriol Rubies-Bigorda, Kenji Watanabe, Takashi Taniguchi, T. Senthil, and Pablo Jarillo-Herrero

Dynamical Separation of Bulk and Edge Transport in HgTe-Based 2D Topological Insulators 076802
Matthieu C. Dartiailh, Simon Hartinger, Alexandre Gourmelon, Kalle Bendias, Hugo Bartolomei, Hiroshi Kamata, Jean-Marc Berroir, Gwendal Fève, Bernard Plaçais, Lukas Lunczer, Raimund Schlereth, Hartmut Buhmann, Laurens W. Molenkamp, and Erwann Bocquillon

Ultrafast Hot Phonon Dynamics in MgB_2 Driven by Anisotropic Electron-Phonon Coupling 077001
Dino Novko, Fabio Caruso, Claudia Draxl, and Emmanuele Cappelluti

Magnon Spin Relaxation and Spin Hall Effect Due to the Dipolar Interaction in Antiferromagnetic Insulators 077201
Ka Shen

Exchange Interactions Mediated by Nonmagnetic Cations in Double Perovskites 077202
Vamshi M. Katukuri, P. Babkevich, O. Mustonen, H. C. Walker, B. Fåk, S. Vasala, M. Karppinen, H. M. Rønnow, and O. V. Yazyev

Element Specificity of Transient Extreme Ultraviolet Magnetic Dichroism 077203
J. K. Dewhurst, F. Willems, P. Elliott, Q. Z. Li, C. von Korff Schmising, C. Strüber, D. W. Engel, S. Eisebitt, and S. Sharma

Unconventional Spin Relaxation Involving Localized Vibrational Modes in Ho Single-Atom Magnets 077204
F. Donati, S. Rusponi, S. Stepanow, L. Persichetti, A. Singha, D. M. Juraschek, C. Wäckerlin, R. Baltic, M. Pivetta, K. Diller, C. Nistor, J. Dreiser, K. Kummer, E. Velez-Fort, N. A. Spaldin, H. Brune, and P. Gambardella

Tunable Layer Circular Photogalvanic Effect in Twisted Bilayers 077401
Yang Gao, Yinhan Zhang, and Di Xiao

Photonic Refrigeration from Time-Modulated Thermal Emission 077402
Siddharth Buddhiraju, Wei Li, and Shanhui Fan

Magnetization-Induced Band Shift in Ferromagnetic Weyl Semimetal $Co_3Sn_2S_2$ 077403
Run Yang, Tan Zhang, Liqin Zhou, Yaomin Dai, Zhiyu Liao, Hongming Weng, and Xianggang Qiu

Biexciton Condensation in Electron-Hole-Doped Hubbard Bilayers: A Sign-Problem-Free Quantum Monte Carlo Study 077601
Xu-Xin Huang, Martin Claassen, Edwin W. Huang, Brian Moritz, and Thomas P. Devereaux

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

Spontaneous Velocity Alignment in Motility-Induced Phase Separation 078001
L. Caprini, U. Marini Bettolo Marconi, and A. Puglisi

Jamming Energy Landscape is Hierarchical and Ultrametric 078002
R. C. Dennis and E. I. Corwin

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.