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HIGHLIGHTED ARTICLES

FEATURED IN PHYSICS · EDITORS' SUGGESTION

Niobium air bridges as low-loss components for superconducting quantum hardware

N. Bruckmoser, L. Koch, I. Tsitsilin, M. Grammer, D. Bunch, L. Richard, J. Schirk, F. Wallner, J. Feigl, C.M.F. Schneider, S. Geprägs, V.P. Bader, M. Althammer, L. Södergren, and S. Filipp

Phys. Rev. Applied **25**, 024007 (2026) - Published 3 February, 2026

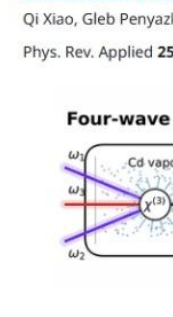
Air bridges rise above the plane of a circuit and are essential elements for dense, low-crosstalk signal routing in superconducting quantum circuits, but the microwave loss that they typically introduce has limited their scalability and functionality. This work presents a subtractive hard-mask fabrication process for niobium air bridges with no measurable extra loss. Beyond routing, the authors use these structures to form low-loss vacuum-gap capacitors, and incorporate those into transmon qubits with lifetimes above 50 μs. These results establish niobium air bridges as scalable, low-loss building blocks for superconducting quantum hardware.

FEATURED IN PHYSICS · EDITORS' SUGGESTION

Proposal for the generation of continuous-wave vacuum-ultraviolet laser light for Th-229 isomer precision spectroscopy

Qi Xiao, Gleb Penyazkov, Ruihan Yu, Beichen Huang, Jiatong Li, Junsheng Shi, Yanmei Yu, Yunlong Wu, and Shiqian Ding

Phys. Rev. Applied **25**, 024034 (2026) - Published 11 February, 2026



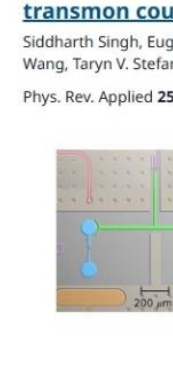
Laser spectroscopy of the Th-229 nuclear isomer promises a fresh class of optical clocks, and precision tests of fundamental physics, but progress has been limited by the lack of an intense, narrow-linewidth continuous-wave laser near 148 nm. This work proposes a resonance-enhanced four-wave-mixing scheme to generate coherent continuous-wave light at 148 nm in cadmium vapor, using readily available pump lasers. The approach predicts tens of microwatts of output power with high coherence, potentially enabling coherent driving of the extremely weak nuclear transition, and thus overcoming a key technical bottleneck for nuclear-clock development and vacuum-ultraviolet precision spectroscopy.

EDITORS' SUGGESTION

Fast microwave-driven two-qubit gates between fluxonium qubits with a transmon coupler

Siddharth Singh, Eugene Y. Huang, Jinlun Hu, Figen Yilmaz, Martijn F. S. Zwanenburg, Piranavan Kumaravadivel, Siyu Wang, Taryn V. Stefanski, and Christian Kraglund Andersen

Phys. Rev. Applied **25**, 024020 (2026) - Published 5 February, 2026



The scalability of high-fidelity superconducting two-qubit gates is being held back by the struggle to balance high gate speed with low crosstalk and minimal calibration complexity. This study uses a transmon coupler, driven by analytically derived microwave pulses, between two fluxonium qubits to implement a fast conditional phase gate. Careful pulse shaping can suppress unwanted excitations sufficiently to allow gate times below 60 ns. This insight into optimized control pulses for frequency-selective two-qubit gates offers a robust pathway to tomorrow's lower-error, easier-to-calibrate superconducting quantum processors.

EDITORS' SUGGESTION

Global quantum network with ground-based single-atom memories in optical cavities and satellite links

Jia-Wei Ji, Shinichi Sunami, Sergio Kikura, Akihisa Goban, and Christoph Simon

Phys. Rev. Applied **25**, 024050 (2026) - Published 17 February, 2026

Global quantum networking will be needed for quantum secured communication, and for linking distant quantum computers. Its terrestrial realization is held back by exponential photon loss in optical fibers, though, so we turn to space. The authors propose a quantum repeater architecture based on low-earth-orbit satellites that transmit entangled photons to single-atom quantum memories. They quantify the system's expected performance, in terms of entanglement distribution rates and fidelities, and suggest a multiplexing approach to enable entanglement creation across distances of 10,000–20,000 km, bringing a global quantum Internet within reach.

EDITORS' SUGGESTION

Terahertz time-domain signatures of the inverse Edelstein effect in topological-insulator/ferromagnet heterostructures

G. Bierhance, C. In, E. Rongione, R. Rouzegar, O. Gueckstock, E. Longo, L. Baringthon, N. Reyren, R. Lebrun, J.-M. George, P. Tuppas, M. Wolf, T.S. Seifert, R. Mantovan, H. Jaffrès, A. Dimoulas, and T. Kampfrath

Phys. Rev. Applied **25**, 024054 (2026) - Published 18 February, 2026

Probing the interface of topological insulators and ferromagnets has proven persistently challenging, despite its relevance for spintronic applications such as spin-charge interconversion. This work provides a powerful methodology to separate bulk and interfacial spin processes based on their different dynamics. The authors optically inject femtosecond spin currents from a ferromagnetic metal into an adjacent thin film of the topological insulator BiTe. The twofold dynamics of the resulting femtosecond charge current contain signatures of spin-charge interconversion by the bulk inverse spin Hall effect and the interfacial inverse Edelstein effect.

EDITORS' SUGGESTION

Low-crosstalk silicon-fabricated optical waveguides for laser delivery to matter qubits

Clayton L. Craft et al.

Phys. Rev. Applied **25**, 024055 (2026) - Published 18 February, 2026

Efficient, precise control of trapped-ion qubits is essential to scaling up quantum computing technology using that platform, and one approach utilizes integrated photonic waveguides to individually address the qubits. However, crosstalk is typically mitigated by spacing the waveguides far beyond the scale of the qubits, which hinders mode matching and efficiency. The authors identify relatively simple and easily implemented design choices that yield low crosstalk with such systems while keeping the waveguide pitch close to the qubit pitch, to facilitate light delivery and collection.

EDITORS' SUGGESTION

Computational discovery of metastable polymorphs as high-performance cathodes with ultralow migration barriers

Fukuan Wang, Chen Zhou, Busheng Wang, and Yong Liu

Phys. Rev. Applied **25**, 024060 (2026) - Published 19 February, 2026

Fast transport of Na limits the rate capability of next-generation sodium-ion batteries, and remains a longstanding challenge for high-energy cathode materials. Using an *ab initio* evolutionary search combined with first-principles calculations, this study identifies two metastable NaMnO polymorphs that host unusually open Na coordination environments, stabilized by high-pressure synthesis. These phases exhibit extremely low Na migration barriers, while maintaining competitive operating voltages and robust structures during (de)sodiation. The results highlight metastability as a powerful design principle for fast-ion-conducting cathodes beyond conventional layered frameworks.

EDITORS' SUGGESTION

Runaway electrons during a coil quench in stellarators

Pavel Aleynikov, Per Helander, and Håkan M. Smith

Phys. Rev. Applied **25**, 024065 (2026) - Published 20 February, 2026

The stellarator concept for future fusion reactors has a key advantage over the tokamak, being practically immune to large-scale disruptions. The authors show, however, that a rapid shutdown of stellarator coil currents (with fast dissipation of poloidal magnetic flux) can nonetheless drive an avalanche of runaway electrons, even without any interruption of the net toroidal plasma current. The problem is far less serious than in a tokamak, but some runaways are inevitably present in an activated fusion device, so an accidental rapid coil ramp-down could produce a dangerous runaway current. Some form of dedicated intervention is likely necessary.

EDITORS' SUGGESTION

Interradical motion can push magnetosensing precision toward quantum limits

Luke D. Smith, Farhan T. Chowdhury, Jonas Glatthard, and Daniel R. Kattnig

Phys. Rev. Applied **25**, 024074 (2026) - Published 24 February, 2026

While spin-correlated radical pairs have shown promise for molecular-scale quantum technologies, core questions remain about how they function as a chemical compass for magnetosensing. Conventional thinking suggests that unavoidable interradical interactions and uncontrolled dissipation should degrade magnetic field sensitivity. However, this theory work shows that interradical motion in biophysical settings can push magnetometry close to the Cramér-Rao bound and increase precision to subdegree levels. Even more remarkably, environmental complexity and spin-spin interactions can *increase* the fraction of usable information encoded in the spin dynamics, rather than degrading coherence.

LETTERS

LETTER

Observation of tunable discrete-time-crystalline phases

Arnab Sarkar, Anurag, Javed A. Mondal, Rajan Singh, Aamir A. Makki, Akash K. Rathi, Ryan J.T. Nicholl, Sagar Chakraborty, Kirill I. Bolotin, and Saikat Ghosh

Phys. Rev. Applied **25**, L021001 (2026) - Published 6 February, 2026

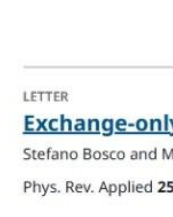
Discrete-time-crystalline (DTC) order is attractive for quantum information, sensing, and precision metrology because its subharmonic rigidity offers a route to noise-resilient operation. Its broader utility has been limited, though, by incomplete understanding of the mechanisms that stabilize DTC phases in realistic many-body systems, and by the difficulty of engineering platforms where such phases are tunable and robust. This work uses a periodically driven nanoelectromechanical system to realize and control multiple, distinct DTC regimes, revealing a richer dynamical landscape than was previously recognized.

LETTER

Exchange-only spin-orbit qubits in silicon and germanium

Stefano Bosco and Maximilian Rimbach-Russ

Phys. Rev. Applied **25**, L021002 (2026) - Published 10 February, 2026



In quantum information processing, spin-orbit interactions enable all-electric spin control but are often seen as incompatible with scalable exchange-only gates designed to reduce crosstalk, heating, and control overhead. The authors show that this conflict is not fundamental: An exchange-only spin-orbit qubit can exploit spin-orbit interactions while preserving exchange-only scalability. A degenerate two-state encoding removes the need for fast clocks, and even enables more efficient simple, low-leakage two-qubit gates in a single step. More broadly, this work positions spin-orbit interactions as a resource, not a barrier, in scalable solid-state quantum architectures.

LETTER

Controlling coherence between waveguide-coupled quantum dots

D. Hallett, J. Wiercinski, L. Hallacy, S. Sheldon, R. Dost, N. Martin, A. Fenzl, A. Farrer, A.K. Verma, M. Cygorek, E.M. Gauger, M.S. Skolnick, and L.R. Wilson

Phys. Rev. Applied **25**, L021003 (2026) - Published 17 February, 2026

Coherence between spatially distant quantum systems is a prerequisite for many quantum technologies. Collective emission effects of multiple indistinguishable quantum emitters provide a demonstration of spatial coherence. The authors present a scalable waveguide device that enables the control of superradiance from spatially separated InAs quantum dots via independent electric tuning. Superradiance is confirmed by measuring both the quantum dot decay dynamics and the photon statistics of the emitted light, and coherence is present even at large energetic detuning of the dots.

ARTICLES

Acoustic vortex tunneling through subwavelength channels with topological-pair metasurfaces

Lidong Wang, Chuanjie Hu, Xiao Li, Yuxin Lu, Yaoyao Shi, Youwen Liu, Hongli Ji, Yadong Xu, and Yangyang Fu

Phys. Rev. Applied **25**, 024001 (2026) - Published 2 February, 2026

Resource-state generation for a multispin register in a hybrid matter-photon quantum information processor

Yu Liu and Martin B. Plenio

Phys. Rev. Applied **25**, 024002 (2026) - Published 2 February, 2026

Linear-time classical approximate optimization of cubic-lattice classical spin glasses

Adil A. Gangat

Phys. Rev. Applied **25**, 024003 (2026) - Published 2 February, 2026

Long-range coupling and topological edge states in thermal diffusion lattices

Yun-Kai Liu, Haoran Yan, Yu-Gui Peng, Xue-Feng Zhu, and Ying Li

Phys. Rev. Applied **25**, 024004 (2026) - Published 2 February, 2026

Correlated dephasing in a piezoelectrically transduced silicon phononic waveguide

Oliver A. Hitchcock, Felix M. Mayor, Wentao Jiang, Matthew P. Maksymowych, Sultan Malik, and Amir H. Safavi-Naeini

Phys. Rev. Applied **25**, 024005 (2026) - Published 2 February, 2026

Nanomechanical waveguides are desirable components in quantum acoustics, but their applications are limited by the ability to prevent phonon loss and decoherence while coupling to electromagnetic circuits. This study solves both problems by introducing a nanomechanical waveguide that combines piezoelectric coupling to circuits with confined phonons in a silicon waveguide metamaterial. The authors discover correlated dephasing, which is relevant to quantum device applications and suggests a common source of frequency noise. These results introduce a device to the toolbox of phononic circuit elements for quantum acoustodynamics, with potential uses in information processing and sensing.

Modulation instability-induced multimode squeezing in quadratic frequency combs

Haodong Xu, Nianqin Li, Ziyun Shu, Yang Shen, Bo Ji, Aiping Xie, Feng Yang, Dengcai Yang, Jing Peng, Hong Gong, Guoxiang Huang, Chunbo Zhao, Wei Li, Tengfei Wu, and Guangqiang He

Phys. Rev. Applied **25**, 024006 (2026) - Published 3 February, 2026

FEATURED IN PHYSICS · EDITORS' SUGGESTION

Niobium air bridges as low-loss components for superconducting quantum hardware

N. Bruckmoser, L. Koch, I. Tsitsilin, M. Grammer, D. Bunch, L. Richard, J. Schirk, F. Wallner, J. Feigl, C.M.F. Schneider, S. Geprägs, V.P. Bader, M. Althammer, L. Södergren, and S. Filipp

Phys. Rev. Applied **25**, 024007 (2026) - Published 3 February, 2026

Air bridges rise above the plane of a circuit and are essential elements for dense, low-crosstalk signal routing in superconducting quantum circuits, but the microwave loss that they typically introduce has limited their scalability and functionality. This work presents a subtractive hard-mask fabrication process for niobium air bridges with no measurable extra loss. Beyond routing, the authors use these structures to form low-loss vacuum-gap capacitors, and incorporate those into transmon qubits with lifetimes above 50 μs. These results establish niobium air bridges as scalable, low-loss building blocks for superconducting quantum hardware.

High-precision phase control of an optical lattice with up to 50 dB noise suppression

Kendall Mehling, Murray Holland, and Catie LeDesma

Phys. Rev. Applied **25**, 024008 (2026) - Published 3 February, 2026

Quantum sensitivity limits and dynamical correlations in alkali-vapor sensors

K. Mouloudakis, V. Koutrouli, I.K. Kominis, M.W. Mitchell, and G. Vasilakis

Phys. Rev. Applied **25**, 024009 (2026) - Published 3 February, 2026

Capacitive tuning of thyristor oscillators enables neuron-like signal amplification

Si En Ng, Nripan Mathews, Roberto Fenollosa, Jenifer Rubio-Magnieto, and Juan Bisquert

Phys. Rev. Applied **25**, 024010 (2026) - Published 3 February, 2026

-- nanowire resonators and prospects for spin-photon coupling with electrons on solid neon

Y. Tian, I. Grytsenko, A. Jennings, J. Wang, H. Ikegami, X. Zhou, S. Tamate, H. Terai, H. Kutsuma, D. Jin, M. Benito, and E. Kawakami

Phys. Rev. Applied **25**, 024011 (2026) - Published 4 February, 2026

Point-to-multipoint network for continuous-variable quantum key distribution with passive-state preparation

Jiale Mi, Yiming Bian, Song Yu, and Yichen Zhang

Phys. Rev. Applied **25**, 024012 (2026) - Published 4 February, 2026

Security analysis of free-space discrete modulated continuous-variable quantum key distribution with precise channel characterization and postselection strategies

Ming Li, Zhigeng Wu, Yuxin Shen, Shengzhi Xu, Nuerbiye Taiwaikuli, Tianyi Wang, Milorad Cvijetic, and Ziwen Pan

Phys. Rev. Applied **25**, 024013 (2026) - Published 4 February, 2026

Globally guided simulated bifurcation for enhanced optimization

Zhijiao Xiao, Zujia Huang, Qijie Qiu, Yong-Qing Liu, Jia-Pei Zhuang, and Man-Hong Yung

Phys. Rev. Applied **25**, 024014 (2026) - Published 4 February, 2026

Phased-array beaming of laser power from cislunar space to the lunar surface

Slava G. Turyshev

Phys. Rev. Applied **25**, 024015 (2026) - Published 4 February, 2026

Torsion-balance-based method for calibrating angle encoders in gravitational experiments

Ren-Peng Li, Hui-Hui Zhao, Chen Jin, Qi-Long Gong, Qing Li, Shan-Qing Yang, Qi Liu, Cheng-Gang Shao, and Lin Zhu

Phys. Rev. Applied **25**, 024016 (2026) - Published 5 February, 2026

Microfabricated alkali-vapor cells with tunable - buffer-gas mixture using reservoirs with laser-actuated break seals

Clément Carlé, Andrei Mursa, Gabriel Faure, Shervin Keshavarzi, Quentin Tanguy, Emmanuel Klinger, Vincent Maurice, Rodolphe Boudot, and Nicolas Passilly

Phys. Rev. Applied **25**, 024017 (2026) - Published 5 February, 2026

Wavelength-multiplexed decoy-state quantum key distribution with advantage distillation

Chenpeng Hao, Li Gong, Qifa Zhang, Bin Xu, Yun Liu, Liangyuan Zhao, Chunmei Zhang, Yang Wang, Qingyu Cai, and Hongwei Li

Phys. Rev. Applied **25**, 024018 (2026) - Published 5 February, 2026

Atom-molecule superradiance and entanglement with cavity-mediated three-body interactions

Yun Chen, Yuqi Wang, Jingjun You, Yingqi Liu, Su Yi, and Yuangang Deng

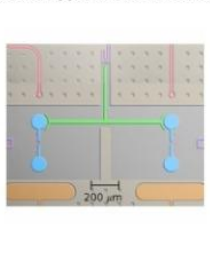
Phys. Rev. Applied **25**, 024019 (2026) - Published 5 February, 2026

EDITORS' SUGGESTION

Fast microwave-driven two-qubit gates between fluxonium qubits with a transmon coupler

Siddharth Singh, Eugene Y. Huang, Jinlun Hu, Figen Yilmaz, Martijn F. S. Zwanenburg, Piranavan Kumaravadivel, Siyu Wang, Taryn V. Stefanski, and Christian Kraglund Andersen

Phys. Rev. Applied **25**, 024020 (2026) - Published 5 February, 2026



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Morphoelastic ribbons: Differential-growth-induced curvature and torsion

Hao Liu, Mingwu Li, and Dabiao Liu

Phys. Rev. Applied **25**, 024021 (2026) - Published 6 February, 2026

Phononic frequency combs with tunable frequency spacing for ultrasensitive temperature-sensing applications

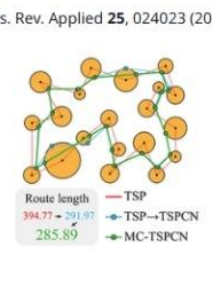
Yue Zheng, Seyyed Mojtaba Hassani Gangaraj, Mingyo Park, Jialin Wang, and Azadeh Ansari

Phys. Rev. Applied **25**, 024022 (2026) - Published 6 February, 2026

Constrained parallel tempering in traveling-salesman problems with circular neighborhoods

Andrea Grimaldi, Davi R. Rodrigues, Eleonora Raimondo, Vito Puliafito, Vincenza Crupi, Vitoantonio Bevilacqua, Mario Carpentieri, Francesca Garesci, and Giovanni Finocchio

Phys. Rev. Applied **25**, 024023 (2026) - Published 6 February, 2026



The traveling-salesman problem has important applications in logistics and path optimization. For autonomous devices like drones, edge computing provides key advantages compared to cloud computing, but has strict energy-consumption and memory limitations. Ising machines would be suitable here, but they lack compatibility with generalized variants of route-optimization problems and struggle with constraint-based problems. The authors present strategies to overcome these limitations, impacting future engineering solutions that employ Ising machines for edge-computing applications.

Enhanced THz third-harmonic generation in graphene via hot-carrier effects in a hybrid topological plasmonic cavity

Spyros Doukas, Ioannis Katsantonis, Thomas Koschny, Elefterios Lidorikis, and Anna C. Tasolamprou

Phys. Rev. Applied **25**, 024024 (2026) - Published 6 February, 2026

Crosstalk-mitigated microelectronic control for optically active spins

Hao-Cheng Weng, John G. Rarity, Krishna C. Balram, and Joe A. Smith

Phys. Rev. Applied **25**, 024025 (2026) - Published 9 February, 2026

Unidirectional acoustic spoof surface plasmon polaritons

Yifei Xu, Yuhang Yin, Linkang Han, Weibin Li, Shan Zhu, and Huanyang Chen

Phys. Rev. Applied **25**, 024026 (2026) - Published 9 February, 2026

Resolving the resolution-contrast conflict in x-ray phase-contrast tomography via physics-constrained wavelet fusion

Penghui Geng, Weili Qi, Yang Zhu, Detian Li, Benxue Liu, and Shengkun Yao

Phys. Rev. Applied **25**, 024027 (2026) - Published 9 February, 2026

Thermal analysis of -based photonic membranes for optoelectronics

Willem Siemonsen, Mahmoud Elhajhasan, Julian Themann, Katharina Dudde, Guillaume Würsch, Jana Lierath, Gordon Callsen, Joachim Ciers, Åsa Haglund, Nakib H. Protik, Giuseppe Romano, Raphaël Butté, Jean-François Carlin, and Nicolas Grandjean

Phys. Rev. Applied **25**, 024028 (2026) - Published 9 February, 2026

Foldable acoustic metamaterial for underwater broadband low-frequency noise mitigation

Yijie Zhang, Shaocheng Wu, Ruixin Lin, Haijin Oh, Yongbin Liu, and Junfei Li

Phys. Rev. Applied **25**, 024029 (2026) - Published 9 February, 2026

Underwater noise significantly impacts marine ecosystems, so its control becomes increasingly important. Existing solutions are often limited by insufficient low-frequency bandwidth, bulky structures, and deployment inconvenience. This work presents a foldable acoustic metamaterial that employs air-entrained panels to realize soft boundary waveguides, suppressing wave propagation below a designed cutoff frequency. This lightweight, deep-subwavelength structure enables low-frequency noise attenuation over more than three octaves, demonstrating strong potential for large-scale offshore engineering applications, such as bridge pilings and wind farms.

Proximity-effect engineering in aluminum-based planar Josephson junctions with intrinsic superconductivity

K.B. Polevoy, S.V. Bakurskiy, V.I. Ruzhickiy, S.V. Egorov, A.G. Shishkin, A.S. Frolov, M.A. Kirsanova, I.N. Krupatkin, A.V. Vasenko, N.V. Klenov, I.I. Soloviev, A.A. Golubov, M.Yu. Kupriyanov, and V.S. Stolyarov

Phys. Rev. Applied **25**, 024030 (2026) - Published 10 February, 2026

Rydberg atom reception of a handheld UHF frequency-modulated two-way radio

Noah Schlossberger, Tate McDonald, Nikunjkumar Prajapati, and Christopher L. Holloway

Phys. Rev. Applied **25**, 024031 (2026) - Published 10 February, 2026

Subhertz band gaps in ultralightweight inerter-based metamaterials

Rui Chen, Xing Yang, Xiaozhao Li, Jack R. Platt, Michael Anthony Yung, Jun Lazo Lai, Tyler S. Silva, Chad Thomas Hickey, Jack Elliott Godfrey, Pei Wang, Xuan Zhu, and Bolei Deng

Phys. Rev. Applied **25**, 024032 (2026) - Published 10 February, 2026

Unified admittance model for resonant tunneling diodes: Incorporating the space-charge dynamics of the quantum well and collector

Petr Ourednik and Michael Feiginov

Phys. Rev. Applied **25**, 024033 (2026) - Published 10 February, 2026

FEATURED IN PHYSICS · EDITORS' SUGGESTION

Proposal for the generation of continuous-wave vacuum-ultraviolet laser light for Th-229 isomer precision spectroscopy

Qi Xiao, Gleb Penyazkov, Ruihan Yu, Beichen Huang, Jiatong Li, Junsheng Shi, Yanmei Yu, Yunlong Wu, and Shiqian Ding

Phys. Rev. Applied **25**, 024034 (2026) - Published 11 February, 2026

Four-wave mixing
Cd vapor

Laser spectroscopy of the Th-229 nuclear isomer promises a fresh class of optical clocks, and precision tests of fundamental physics, but progress has been limited by the lack of an intense, narrow-linewidth continuous-wave laser near 148 nm. This work proposes a resonance-enhanced four-wave-mixing scheme to generate coherent continuous-wave light at 148 nm in cadmium vapor, using readily available pump lasers. The approach predicts tens of microwatts of output power with high coherence, potentially enabling coherent driving of the extremely weak nuclear transition, and thus overcoming a key technical bottleneck for nuclear-clock development and vacuum-ultraviolet precision spectroscopy.

Improving robustness and reducing required measurement duration of NMR measurements with a single nitrogen-vacancy center in diamond via online maximum-likelihood-estimation data processing

Akkadhai Charunkiatkorn, Tomoki Ota, Yuka Kobayashi, Ken Sekiguchi, and Takaaki Tani

Phys. Rev. Applied **25**, 024035 (2026) - Published 11 February, 2026

Magnon-magnon coupling in an all-oxide insulator garnet heterostructure

Kshitij Singh Rathore, Anupama Swain, Jinho Lim, Abhisek Mishra, Pushpendra Gupta, Lee Yong Heng, Jiang Luwen, Ramanathan Mahendiran, Axel Hoffmann, and Subhankar Bedanta

Phys. Rev. Applied **25**, 024036 (2026) - Published 11 February, 2026

Entropy-mode-driven gas optics

P. Michel, A. Oudin, H. Rajesh, K. Ou, D. Chakraborty, S. Cao, E. Kur, L. Lancia, D. Ghosh, C. Riconda, J.S. Wurtele, and M.R. Edwards

Phys. Rev. Applied **25**, 024037 (2026) - Published 11 February, 2026

Broadband homogeneous absorbers under visible light

Dimitrios Neroulias and Constantinos Valagiannopoulos

Phys. Rev. Applied **25**, 024038 (2026) - Published 11 February, 2026

Decoupling thermoelectric coefficients of multilayer graphene by nanomeshing

M. Rahimi, N. Lubenkov, R. Bellelli, L. Chen, P. Lafarge, C. Barraud, F. Mallet, P. Martin, J. Chaste, D. Fournier, and M.L. Della Rocca

Phys. Rev. Applied **25**, 024039 (2026) - Published 12 February, 2026

Hopping-transport regimes and dimensionality transition: A unified Monte Carlo random-resistor-network approach

Alejandro Toral-Lopez, Gianluca Fiori, and Damiano Marian

Phys. Rev. Applied **25**, 024040 (2026) - Published 12 February, 2026

Phase-controlled non-Markovian hysteresis in a nonlinear, non-Hermitian silicon microresonator

Stefano Biasi, Stefano Gretter, Robert Aslan, Davide Olivieri, Riccardo Franchi, and Lorenzo Pavesi

Phys. Rev. Applied **25**, 024041 (2026) - Published 12 February, 2026

Broadband enhanced-resolution imaging based on a solid-immersion square Maxwell's fish-eye lens

Zixiang Xiong, Tao Liu, Liuxian Zhao, and Chuanning Bi

Phys. Rev. Applied **25**, 024042 (2026) - Published 12 February, 2026

Controlling flow fields with continuously graded hydraulic conductivity

Yuhong Zhou, Yiguan Li, Peng Jin, and Jiping Huang

Phys. Rev. Applied **25**, 024043 (2026) - Published 12 February, 2026

Design methodology for amplitude and phase low-coupling response in reconfigurable metasurfaces with enhanced energy focusing

Jianghao Tian, Zhiyun Zhong, Jiangfeng Han, Haitao Wang, and Yongdan Zang

Phys. Rev. Applied **25**, 024044 (2026) - Published 13 February, 2026

Measuring pulse heating in quantum dots with individual two-level fluctuators

Feiyang Ye, Lokendra S. Dhami, and John M. Nichol

Phys. Rev. Applied **25**, 024045 (2026) - Published 13 February, 2026

Efficient generation of optical cat states using squeezed few-photon superposition states

Haoyuan Luo and Sahand Mahmoodian

Phys. Rev. Applied **25**, 024046 (2026) - Published 13 February, 2026

Acoustic leaky-wave metasurface by an inverse design method

Xiao Hao and Zhilin Hou

Phys. Rev. Applied **25**, 024047 (2026) - Published 13 February, 2026

Generalized epsilon-near-zero polaritons on uniaxial metasurfaces

Francisco Javier Alfaro-Mozaz and Iñigo Liberal

Phys. Rev. Applied **25**, 024048 (2026) - Published 17 February, 2026

Dark-triplet-induced instability and efficiency roll-off in blue phosphorescent organic light-emitting devices

Jun Taejeon, Jaekyung Song, Aden Seegler, Christopher Picart, Rebecca Hanscam, Oliver Nix, Alexandra Boelter, Ting-An Lin, Wenbo Ye, Peter F. Satterthwaite, Jeong Hyun Park, Farnaz Niroui, Troy Van Voorhis, Jun Li, and Marc Baldo

Phys. Rev. Applied **25**, 024049 (2026) - Published 17 February, 2026

EDITORS' SUGGESTION

Global quantum network with ground-based single-atom memories in optical cavities and satellite links

Jia-Wei Ji, Shinichi Sunami, Sergio Kikura, Akihisa Goban, and Christoph Simon

Phys. Rev. Applied **25**, 024050 (2026) - Published 17 February, 2026

Global quantum networking will be needed for quantum secured communication, and for linking distant quantum computers. Its terrestrial realization is held back by exponential photon loss in optical fibers, though, so we turn to space. The authors propose a quantum repeater architecture based on low-earth-orbit satellites that transmit entangled photons to single-atom quantum memories. They quantify the system's expected performance, in terms of entanglement distribution rates and fidelities, and suggest a multiplexing approach to enable entanglement creation across distances of 10,000–20,000 km, bringing a global quantum Internet within reach.

Magnon-driven stochastic spin Hall nano-oscillators

Ayush K. Gupta, Mohd S. Sahir, Sourabh Manna, Sagar Chakraborty, John Rex Mohan, Yasuhiro Fukuma, and Rohit Medwal

Phys. Rev. Applied **25**, 024051 (2026) - Published 17 February, 2026

Topological edge states and amplitude-dependent delocalization in quasiperiodic elliptically geared lattices

Shuaifeng Li, Di Zhou, Feng Li, Panayotis G. Kevrekidis, and Jinkyu Yang

Phys. Rev. Applied **25**, 024052 (2026) - Published 18 February, 2026

Hacking high-speed quantum-key-distribution systems by tailoring the blinding pulse

Xiang Kang, Jia-Lin Chen, Ze-Hao Wang, Shuang Wang, Zhen-Qiang Yin, De-Yong He, Wei Chen, Guan-Jie Fan-Yuan, Guang-Can Guo, and Zheng-Fu Han

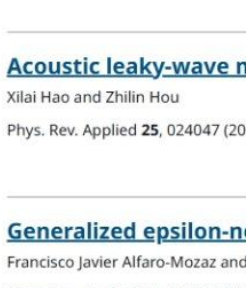
Phys. Rev. Applied **25**, 024053 (2026) - Published 18 February, 2026

EDITORS' SUGGESTION

Terahertz time-domain signatures of the inverse Edelstein effect in topological-insulator/ferromagnet heterostructures

G. Bierhance, C. In, E. Rongione, R. Rouzegar, O. Gueckstock, E. Longo, L. Baringthon, N. Reyren, R. Lebrun, J.-M. George, P. Tuppas, M. Wolf, T.S. Seifert, R. Mantovan, H. Jaffrès, A. Dimoulas, and T. Kampfrath

Phys. Rev. Applied **25**, 024054 (2026) - Published 18 February, 2026



Probing the interface of topological insulators and ferromagnets has proven persistently challenging, despite its relevance for spintronic applications such as spin-charge interconversion. This work provides a powerful methodology to separate bulk and interfacial spin processes based on their different dynamics. The authors optically inject femtosecond spin currents from a ferromagnetic metal into an adjacent thin film of the topological insulator BiTe. The twofold dynamics of the resulting femtosecond charge current contain signatures of spin-charge interconversion by the bulk inverse spin Hall effect and the interfacial inverse Edelstein effect.

EDITORS' SUGGESTION

Low-crosstalk silicon-fabricated optical waveguides for laser delivery to matter qubits

Clayton L. Craft et al.

Phys. Rev. Applied **25**, 024055 (2026) - Published 18 February, 2026

Efficient, precise control of trapped-ion qubits is essential to scaling up quantum computing technology using that platform, and one approach utilizes integrated photonic waveguides to individually address the qubits. However, crosstalk is typically mitigated by spacing the waveguides far beyond the scale of the qubits, which hinders mode matching and efficiency. The authors identify relatively simple and easily implemented design choices that yield low crosstalk with such systems while keeping the waveguide pitch close to the qubit pitch, to facilitate light delivery and collection.

Temporal pulse origins in atom-interferometric quantum sensors

Jack Saywell, Nikolaos Dedes, Max Carey, Brynle Barrett, and Tim Freegarde

Phys. Rev. Applied **25**, 024056 (2026) - Published 18 February, 2026

Directional sound transport via coupled topological states in heterostructure sonic crystals with mirrored interfaces

Ting-Ting Yu, Zhi-Guo Geng, Ya-Xi Shen, Zhuoqiang Chen, and Xue-Feng Zhu

Phys. Rev. Applied **25**, 024057 (2026) - Published 19 February, 2026

Real-time phase control methods for cold-atom interferometry

Mohamed Guessoum, Nathan Marlière, Charbel Cherfan, Remi Geiger, and Arnaud Landragin

Phys. Rev. Applied **25**, 024058 (2026) - Published 19 February, 2026

Digital closed-loop thermal atomic beam interferometer for high-bandwidth, wide-dynamic-range, and simultaneous absolute sensing of acceleration and rotation

Tomoya Sato, Toshiyuki Hosoya, Martin Miranda, Hiroki Matsui, Yuki Miyazawa, and Mikio Kozuma

Phys. Rev. Applied **25**, 024059 (2026) - Published 19 February, 2026

EDITORS' SUGGESTION

Computational discovery of metastable polymorphs as high-performance cathodes with ultralow migration barriers

Fukuan Wang, Chen Zhou, Busheng Wang, and Yong Liu

Phys. Rev. Applied **25**, 024060 (2026) - Published 19 February, 2026

Fast transport of Na limits the rate capability of next-generation sodium-ion batteries, and remains a longstanding challenge for high-energy cathode materials. Using an *ab initio* evolutionary search combined with first-principles calculations, this study identifies two metastable NaMnO polymorphs that host unusually open Na coordination environments, stabilized by high-pressure synthesis. These phases exhibit extremely low Na migration barriers, while maintaining competitive operating voltages and robust structures during (de)sodiation. The results highlight metastability as a powerful design principle for fast-ion-conducting cathodes beyond conventional layered frameworks.

Impact of defects, buffer-layer thickness, and substrate orientation on the optical properties of epitaxial germanium

Muneer Mahdi, Nina Heng, Neha Singh, and Mantu K. Hudait

Phys. Rev. Applied **25**, 024061 (2026) - Published 19 February, 2026

Noise dynamics in large-mode-volume Brillouin lasers

Andrew J. Shepherd, Daniel J. Blumenthal, and Ryan O. Behunin

Phys. Rev. Applied **25**, 024062 (2026) - Published 20 February, 2026

Near-field thermal switching via nonreciprocal twisted axion plasmons

Yingjie Xi, Jiebin Peng, Xiaoming Li, Quanquan Shi, Li Luo, Yingqi Huang, Yuanwei Yao, Xin Zhang, and Degang Zhao

Phys. Rev. Applied **25**, 024063 (2026) - Published 20 February, 2026

Passive acoustic non-line-of-sight localization without a relay surface

Tal I. Sommer and Ori Katz

Phys. Rev. Applied **25**, 024064 (2026) - Published 20 February, 2026

EDITORS' SUGGESTION

Runaway electrons during a coil quench in stellarators

Pavel Aleynikov, Per Helander, and Håkan M. Smith

Phys. Rev. Applied **25**, 024065 (2026) - Published 20 February, 2026

The stellarator concept for future fusion reactors has a key advantage over the tokamak, being practically immune to large-scale disruptions. The authors show, however, that a rapid shutdown of stellarator coil currents (with fast dissipation of poloidal magnetic flux) can nonetheless drive an avalanche of runaway electrons, even without any interruption of the net toroidal plasma current. The problem is far less serious than in a tokamak, but some runaways are inevitably present in an activated fusion device, so an accidental rapid coil ramp-down could produce a dangerous runaway current. Some form of dedicated intervention is likely necessary.

Modeling and analysis of second-harmonic magnetoresistance with arbitrary spin polarization and unconventional spin-orbit torques

Fangye Lin, Tianyi Zhang, Xinjian Zhou, Guoyi Shi, Zhifeng Zhu, Zichen Zhang, Yue Zhang, Caihua Wan, Hyunsoo Yang, Weisheng Zhao, and Shuyuan Shi

Phys. Rev. Applied **25**, 024066 (2026) - Published 20 February, 2026

Optically trapping nanospheres at micrometer range from a tilted mirror

Alexey Grinin, Andrew Dana, Mark Nguyen, Eduardo Alejandro, and Andrew A. Geraci

Phys. Rev. Applied **25**, 024067 (2026) - Published 23 February, 2026

Optimization of ultraintense laser focus utilizing far-field patterns of second-order harmonics from laser-foil interaction

Shirui Xu, Zhuo Pan, Yulan Liang, Tianqi Xu, Qingfan Wu, Tan Song, Yujia Zhang, Haoran Chen, Qihang Han, Chenghao Hua, Zhangyi Wu, Ke Chen, Jundong Shen, Ziyang Peng, Xuan Liu, Zihao Zhang, Shiyou Chen, Yanying Zhao, Ying Gao, Jiarui Zhao, Zi-Yu Chen, Xueqing Yan, and Wenjun Ma

Phys. Rev. Applied **25**, 024068 (2026) - Published 23 February, 2026

High-order optical orbital angular momentum modes coupling with atoms in a degenerate cavity

Gui-Yu Shan, Mu Yang, Jia-He Cao, Yu-Wei Liao, Yue Li, Jian Wang, Jin-Shi Xu, Chuan-Feng Li, and Guang-Can Guo

Phys. Rev. Applied **25**, 024069 (2026) - Published 23 February, 2026

All-optical inference using structured light beams

Oded Katz, Keren Zhalenchuck, Ofer Mittelman, and Alon Bahabad

Phys. Rev. Applied **25**, 024070 (2026) - Published 23 February, 2026

Antidisturbance near-infrared-imaging detection based on an arrayed -based nanotip optical antenna

Taige Liu, Zhe Wang, Xuan Shao, Fangchen You, Zongtao Chen, Kewei Liu, Mao Ye, Haiwei Wang, and Xinyu Zhang

Phys. Rev. Applied **25**, 024071 (2026) - Published 23 February, 2026

Coherent resonant transport of magnons through a ferromagnetic chain: A possible way to establish quantum communication between nanomagnets embedded in microwave cavities

Elmar G. Petrov, Sergii M. Tunyk, and Victor V. Gorbach

Phys. Rev. Applied **25**, 024072 (2026) - Published 24 February, 2026

Spiral tuning of wire-metamaterial cavity for a plasma haloscope

Jacob Lindahl, Rustam Balafendiev, Gagandeep Kaur, Gaganpreet Singh, Andrea Gallo Rosso, Jan Conrad, Jon E. Gudmundsson, and Junu Jeong

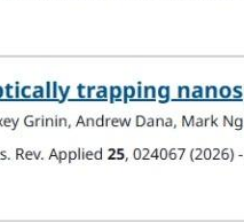
Phys. Rev. Applied **25**, 024073 (2026) - Published 24 February, 2026

EDITORS' SUGGESTION

Interradical motion can push magnetosensing precision toward quantum limits

Luke D. Smith, Farhan T. Chowdhury, Jonas Glatthard, and Daniel R. Kattnig

Phys. Rev. Applied **25**, 024074 (2026) - Published 24 February, 2026



While spin-correlated radical pairs have shown promise for molecular-scale quantum technologies, core questions remain about how they function as a chemical compass for magnetosensing. Conventional thinking suggests that unavoidable interradical interactions and uncontrolled dissipation should degrade magnetic field sensitivity. However, this theory work shows that interradical motion in biophysical settings can push magnetometry close to the Cramér-Rao bound and increase precision to subdegree levels. Even more remarkably, environmental complexity and spin-spin interactions can *increase* the fraction of usable information encoded in the spin dynamics, rather than degrading coherence.

Fracture toughness and auxeticity in disordered metamaterials

Hannes Holey, Andrea Lorenzo Henri Sergio Detry, Silvia Bonfanti, Roberto Guerra, Anshul D.S. Parmar, Jacopo Fiocchi, Ausonio Tuissi, Michael Zaiser, and Stefano Zapperi

Phys. Rev. Applied **25**, 024075 (2026) - Published 24 February, 2026

Robust composite two-qubit gates for silicon-based spin qubits

Yang-Yang Yu, Guang-Hui Zhang, Yan-Jie He, Jun Wu, Xue-Ke Song, and Dong Wang

Phys. Rev. Applied **25**, 024076 (2026) - Published 24 February, 2026

Simulating plasma wave propagation on a superconducting quantum chip

Bhuvanesh Sundar, Bram Evert, Vasily Geyko, Andrew Patterson, Ilon Joseph, and Yuan Shi

Phys. Rev. Applied **25**, 024077 (2026) - Published 25 February, 2026

Scaling behavior in a sub-5-nm *n*-type monolayer transistor

Weiwei Ju, Mengshuo Kang, Pan Gao, Tongwei Li, Qingxiao Zhou, Xinxin Wang, Yanan Tang, Xiaotian Sun, Ruge Quhe, and Jing Lu

Phys. Rev. Applied **25**, 024078 (2026) - Published 25 February, 2026

Mitigating errors in state preparation and measurement with noncomputational states

Conrad J. Haupt, Almudena Carrera Vazquez, Laurin E. Fischer, Stefan Woerner, and Daniel J. Egger

Phys. Rev. Applied **25**, 024079 (2026) - Published 25 February, 2026

Embedding one-dimensional BDI-class topological dynamics into continuous elastic plates

Mohit Kumar and Fabio Semperlotti

Phys. Rev. Applied **25**, 024080 (2026) - Published 25 February, 2026

Phase coexistence in - and -doped thin films and its effect on the electrical properties in functional capacitors

Anna G. Chernikova, Aleksei S. Konashuk, Leonid L. Lev, Roman R. Khakimov, Ratibor G. Chumakov, Aleksey M. Lebedev, Elena O. Filatova, Maxim G. Kozodaev, Sergei S. Zarubin, Evgeny V. Korostylev, Andrei M. Markeev, and Andrei V. Zenkevich

Phys. Rev. Applied **25**, 024081 (2026) - Published 25 February, 2026

Direct dispersive signature of Pauli spin blockade with voltage bias

Simon Svab, Rafael S. Eggli, Taras Patlatiuk, Miguel J. Carballido, Pierre Chevalier Kwon, Dominique A. Trüssel, Ang Li, Erik P.A.M. Bakkers, Andreas V. Kuhlmann, and Dominik M. Zumbühl

Phys. Rev. Applied **25**, 024082 (2026) - Published 26 February, 2026

High-fidelity control of cat-state qubits by polychromatic pulses

Ke-Xin Hu, Bi-Hua Huang, Shao-Wei Xu, Zhi-Cheng Shi, Yan Xia, and Ye-Hong Chen

Phys. Rev. Applied **25**, 024083 (2026) - Published 26 February, 2026

Interacting magnetic nanoparticles as building blocks for miniaturized magnetic tags in anticounterfeiting strategies

Gabriele Barrera, Paolo Allia, Sara Nocentini, and Paola Tiberto

Phys. Rev. Applied **25**, 024084 (2026) - Published 26 February, 2026

Predicting sampling advantage of stochastic Ising machines for quantum simulations

Rutger J.L.F. Berns, Davi R. Rodrigues, Giovanni Finocchio, and Johan H. Mentink

Phys. Rev. Applied **25**, 024085 (2026) - Published 26 February, 2026

$\hat{H} = J_{ex}\sum_{\langle ij\rangle} \hat{S}_i \cdot \hat{S}_j$
CPU
100 - 10000x
Ising Machines
Time per sample
Problem size

Stochastic Ising machines (sIMs) are promising accelerators for optimization and sampling in computational problems that can be formulated as an Ising model. The authors investigate the computational advantage of sIMs for simulating quantum magnets with *neural-network quantum states*, a very powerful method for probabilistic quantum simulation. Based on the autocorrelation time, the team predicts sampling advantage without requiring deployment on hardware. For massively parallel hardware sIMs a speed-up factor of 100 to 10000 is projected, suggesting that sIMs may drastically increase the scale at which probabilistic quantum simulation is possible.

Engineering unidirectional photocurrent in isotype-Ga_2O_3/GaN-based light-activated diodes

Arnab Mondal, Indraneel Sanyal, Satinder Sharma, Jen-Inn Chyi, and Ankush Bag

Phys. Rev. Applied **25**, 024086 (2026) - Published 26 February, 2026

All-in-one modular metasurfaces enabling multiparameter manipulation and function switching

Kun Song, Hao Yuan, Yidan Zhao, Yuan Wang, Qiang Chen, Zhenfei Li, Yahong Liu, Min Wang, Xiaopeng Zhao, Ruonan Ji, and Qian Zhao

Phys. Rev. Applied **25**, 024087 (2026) - Published 27 February, 2026

Enhancing the speed of direct volumetric imaging through annular illumination and spatial coherence of light

Gianlorenzo Massaro, Adalberto Brunetti, Francesco V. Pepe, and Milena D'Angelo

Phys. Rev. Applied **25**, 024088 (2026) - Published 27 February, 2026

Topological dislocation modes in a sectored translated photonic lattice

Jia-Yu Chen, Xin-Tao He, Jian-Wen Dong, and Wen-Jie Chen

Phys. Rev. Applied **25**, 024089 (2026) - Published 27 February, 2026

Levitated milligram-scale ferromagnetic magnetometer at room temperature

Yuanji Sheng, Yingchun Leng, Kenan Tian, Rui Li, Yiming Chen, Dingjiang Long, Siwen Chen, Xuan He, and Peiran Yin

Phys. Rev. Applied **25**, 024090 (2026) - Published 27 February, 2026

Three-wave-mixing element with quantum paraelectric materials

Eric I. Rosenthal, Christopher S. Wang, Jamison Sloan, Giovanni Scuri, Yueheng Shi, Kaveh Pezeshki, Peter Mugaba Noertoft, Jelena Vučković, and Christopher P. Anderson

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