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## Mixed-State Quantum Anomaly and Multipartite Entanglement

Leonardo A. Lessa, Meng Cheng, and Chong Wang

Phys. Rev. X **15**, 011069 (2025) - Published 24 March, 2025

't Hooft anomalies prevent mixed quantum states from separating into simpler subsystems, revealing a novel phase with robust long-range entanglement. This offers insights into exotic matter and potential quantum technologies.

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## Highly Entangled Stationary States from Strong Symmetries

Yahui Li, Frank Pollmann, Nicholas Read, and Pablo Sala

Phys. Rev. X **15**, 011068 (2025) - Published 21 March, 2025

Symmetries in quantum systems protect entanglement from environmental noise, even at high temperatures. Complex symmetries with interdependent constraints help preserve entanglement, aiding robust quantum technologies.

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## Topology and Nuclear Size Determine Cell Packing on Growing Lung Spheroids

Wenhui Tang, Jessie Huang, Adrian F. Pegoraro, James H. Zhang, Yiwen Tang, Darrell N. Kotton, Dapeng Bi, and Ming Guo

Phys. Rev. X **15**, 011067 (2025) - Published 21 March, 2025

Experiments suggest that cells pack in more ordered patterns as the relative sizes of their nuclei grow.

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## Strong Orbital-Lattice Coupling Induces Glassy Thermal Conductivity in High-Symmetry Single Crystal $BaTiS_3$

Yan Wang, Lin Xie, Haobo Yang, Mingyuan Hu, Xin Qian, Ronggui Yang, and Jiaqing He

Phys. Rev. X **15**, 011066 (2025) - Published 20 March, 2025

$BaTiS_3$ exhibits unique thermal conductivity where its in-plane conductivity behaves like glass, while its out-of-plane conductivity follows crystalline trends.

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## Network Reconstruction via the Minimum Description Length Principle

Tiago P. Peixoto

Phys. Rev. X **15**, 011065 (2025) - Published 20 March, 2025

A new information-theoretic approach to analyzing complex systems uncovers hidden networks by minimizing data complexity, a method that improves accuracy and efficiency.

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## Theory of Metastable States in Many-Body Quantum Systems

Chao Yin, Federica M. Surace, and Andrew Lucas

Phys. Rev. X **15**, 011064 (2025) - Published 19 March, 2025

A new theory of quantum metastability reveals that short-range entangled states exhibit slow thermalization, offering insights into quantum transitions and potential applications in quantum simulators.

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## Domain-Wall Enhanced Pyroelectricity

Ching-Che Lin, Yihao Hu, Jaegyu Kim, Djamila Lou, Ashwath Bhat, Pravin Kavle, Tae Yeon Kim, Chris Dames, Shi Liu, and Lane W. Martin

Phys. Rev. X **15**, 011063 (2025) - Published 18 March, 2025

Experiments and simulations reveal that high-densities of nanotwinned domain walls boost the pyroelectric effect, offering a new approach for energy-harvesting and sensing technologies.

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## Growth Rate of Self-Sustained QED Cascades Induced by Intense Lasers

A. Mercuri-Baron, A. A. Mironov, C. Riconda, A. Grassi, and M. Grech

Phys. Rev. X **15**, 011062 (2025) - Published 18 March, 2025

A general solution to the long-standing problem of electron-positron avalanche growth in high-intensity lasers can help optimize conditions for studying quantum electrodynamic plasmas in future experiments.

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## Rhythmic Soliton Interactions for Integrated Dual-Microcomb Spectroscopy

Zihao Wang, Yifei Wang, Baoqi Shi, Chen Shen, Wei Sun, Yulei Ding, Changxi Yang, Junqiu Liu, and Chengying Bao

Phys. Rev. X **15**, 011061 (2025) - Published 17 March, 2025

A new method for generating mutually coherent frequency combs simplifies integrated dual-comb spectroscopy. This approach enables compact, efficient spectroscopic devices and opens new avenues for exploring soliton physics.

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## Room-Temperature Magnetoelectric Switching and Magnetoelectric Memory Driven by Gate Voltage

Yang Cheng, Teng Xu, Di Tian, Xing He, Yiqing Dong, Hao Bai, Le Zhao, Haonan Jin, Shilei Zhang, Weibin Li, Manuel Valvidares, Pu Yu, and Wanjun Jiang

Phys. Rev. X **15**, 011060 (2025) - Published 14 March, 2025

A demonstration of electric-field-driven magnetization switching in ferrimagnets sets the stage for a low-power, reversible method for magnetoelectric memory.

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## Hydrodynamics and the Eigenstate Thermalization Hypothesis

Luca Capizzi, Jiaozi Wang, Xiansong Xu, Leonardo Mazza, and Dario Poletti

Phys. Rev. X **15**, 011059 (2025) - Published 14 March, 2025

New insights into the connections between the eigenstate thermalization hypothesis and hydrodynamics paves the way for a powerful theory of thermalization in quantum systems that could offer new ways to predict how they reach equilibrium.

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## Noninvertible Symmetry-Protected Topological Order in a Group-Based Cluster State

Christopher Fechisin, Nathanan Tantivasadakarn, and Victor V. Albert

Phys. Rev. X **15**, 011058 (2025) - Published 13 March, 2025

A lattice model with noninvertible symmetry belongs to a symmetry-protected topological phase of matter, providing a starting point for investigating the rich physics of topological phases with such symmetries.

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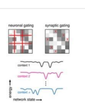

## High Capacity and Dynamic Accessibility in Associative Memory Networks with Context-Dependent Neuronal and Synaptic Gating

William F. Podlaski, Everton J. Agnes, and Tim P. Vogels

Phys. Rev. X **15**, 011057 (2025) - Published 13 March, 2025

A new associative memory model brings dynamic memory recall to the fore, offering a framework that is amenable to analysis while being much closer than existing models to how biological memory works.

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## Entanglement Witness for Indistinguishable Electrons Using Solid-State Spectroscopy

Tongtong Liu, Luogen Xu, Jiarui Liu, and Yao Wang

Phys. Rev. X **15**, 011056 (2025) - Published 12 March, 2025

The use of resonant inelastic x-ray scattering to quantify electron entanglement in quantum materials enables the detection of entanglement in a wide range of materials, advancing quantum technologies.

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## Experimental Realization of Discrete Time Quasicrystals

Guanghui He, Bingtian Ye, Ruotian Gong, Changyu Yao, Zhongyuan Liu, Kater W. Murch, Norman Y. Yao, and Chong Zu

Phys. Rev. X **15**, 011055 (2025) - Published 12 March, 2025

Time crystals realized in the so-called quasiperiodic regime hold promise for future applications in quantum computing and sensing.

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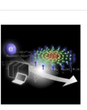

## Topological Hall Effect of Skyrmions from first Principles

Hsiao-Yi Chen, Takuya Nomoto, Max Hirschberger, and Ryotaro Arita

Phys. Rev. X **15**, 011054 (2025) - Published 11 March, 2025

A new density functional theory approach to accurately model skyrmions and the topological Hall effect could improve material predictions for energy-efficient data storage and next-generation computing.

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