



General relativistic magnetohydrodynamic simulation of the supermassive black hole M87*. Selected for an Editors' Suggestion. [Y. Chen *et al.*, Phys. Rev. Lett. **135**, 121001 (2025)]

NEWSPAPER

PHYSICAL REVIEW LETTERS

Contents

Articles published 13 September–19 September 2025

VOLUME 135, NUMBER 12

19 September 2025

Quantum Information, Science, and Technology

Limitations of Gaussian Measurements in Quantum Imaging	120201
Yunkai Wang and Sisi Zhou	
Quantum Theory of the Josephson Junction between Finite Islands	120202
Thomas J. Maldonado, Alejandro W. Rodriguez, and Hakan E. Türeci	
Geometric Phase Transition of the Three-Dimensional $\mathbb{Z}_2$ Lattice Gauge Model	120601
Ramgopal Agrawal, Leticia F. Cugliandolo, Lara Faoro, Lev B. Ioffe, and Marco Picco	
Structural Dynamics and Strong Correlations in Dynamical Quantum Optical Lattices	120602
Adrián U. Ramírez-Barajas and Santiago F. Caballero-Benitez	
Thresholds for Postselected Quantum Error Correction from Statistical Mechanics	120603
Lucas H. English, Dominic J. Williamson, and Stephen D. Bartlett	
Designing a Nearly Optimal Quantum Algorithm for Linear Differential Equations via Lindbladians	120604
Zhong-Xia Shang, Naixu Guo, Dong An, and Qi Zhao	
Cavity-Enhanced Spin-Wave Solid-State Quantum Memory	120801
Leo Feldmann, Sören Wengerowsky, Antariksha Das, Stefano Duranti, Jonathan Hänni, Samuele Grandi, and Hugues de Riedmatten	
Quantum Stochastic Communication via High-Dimensional Entanglement	120802
Chao Zhang, Jia-Le Miao, Xiao-Min Hu, Jef Pauwels, Yu Guo, Chuan-Feng Li, Guang-Can Guo, Armin Tavakoli, and Bi-Heng Liu	
Enhanced Gravity Sensing by a Levitated Mesoscopic Nanoparticle	120803
L.-Y. Wang, J.-F. Wei, K.-F. Cui, S.-L. Su, L.-L. Yan, H.-Z. Guo, C.-X. Shan, and Gang Chen	

Cosmology, Astrophysics, and Gravitation

 Illuminating Black Hole Shadows with Dark Matter Annihilation	121001
Yifan Chen, Ran Ding, Yuxin Liu, Yosuke Mizuno, Jing Shu, Haiyue Yu, and Yanjie Zeng	
 Combined Annual Modulation Dark Matter Search with COSINE-100 and ANAIS-112	121002
N. Carlin <i>et al.</i> (COSINE-100 Collaboration)(ANAIS-112 Collaboration)	
 Ultrahigh-Energy Neutrinos from Primordial Black Holes	121003
Alexandra P. Klipfel and David I. Kaiser	

Particles and Fields

Universality Class of the First Levels in Low-Dimensional Gravity	121601
Alexander Altland, Jeremy van der Heijden, Tobias Micklitz, Moshe Rozali, and Joaquim Telles de Miranda	
Modular-Invariant Random Matrix Theory and AdS ₃ Wormholes	121602
Jan Boruch, Gabriele Di Ubaldo, Felix M. Haehl, Eric Perlmutter, and Moshe Rozali	

(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 2025 American Physical Society



	Measurement of Reactor Antineutrino Oscillation at SNO+ M. Abreu <i>et al.</i> (SNO + Collaboration)	121801
	Search for Millicharged Particles in Proton-Proton Collisions at $\sqrt{s} = 13.6$ TeV S. Alcott, Z. Bhatti, J. Brooke, C. Campagnari, M. Carrigan, M. Citron, R. De Los Santos, A. De Roeck, C. Dorofeev, T. Du, M. Gastal, J. Goldstein, F. Golf, N. Gonzalez, A. Haas, J. Heymann, C. S. Hill, D. Imani, M. Joyce, K. Larina, R. Loos, S. Lowette, H. Mei, D. W. Miller, B. Peng, S. N. Santpur, I. Reed, E. Schaffer, R. Schmitz, J. Steenis, D. Stuart, J. S. Tafoya Vargas, D. Vannerom, T. Wybouw, Z. Xiao, H. Zaraket, G. Zecchinelli, and C. Zheng	121802
✂	Inclusive Semileptonic Decays of the D_s Meson: Lattice QCD Confronts Experiments Alessandro De Santis, Antonio Evangelista, Roberto Frezzotti, Giuseppe Gagliardi, Paolo Gambino, Marco Garofalo, Christiane Franziska Groß, Bartosz Kostrzewa, Vittorio Lubicz, Francesca Margari, Marco Panero, Francesco Sanfilippo, Silvano Simula, Antonio Smecca, Nazario Tantalo, and Carsten Urbach	121901
	Study of $\chi_{bJ}(2P) \rightarrow \omega \Upsilon(1S)$ at Belle Z. S. Stottler <i>et al.</i> (The Belle Collaboration)	121902
	Atomic, Molecular, and Optical Physics	
✂	Host-Dependent Frequency Offsets in ^{229}Th Nuclear Clockwork U. C. Perera, H. W. T. Morgan, Eric R. Hudson, and Andrei Derevianko	123001
	Phase Transitions in Nonreciprocal Driven-Dissipative Condensates Ron Belyansky, Cheyne Weis, Ryo Hanai, Peter B. Littlewood, and Aashish A. Clerk	123401
	Efficiently Measuring d -Wave Pairing and Beyond in Quantum Gas Microscopes Daniel K. Mark, Hong-Ye Hu, Joyce Kwan, Christian Kokail, Soonwon Choi, and Susanne F. Yelin	123402
	Correlated Quasiparticle Poisoning from Phonon-Only Events in Superconducting Qubits E. Yelton, C. P. Larson, K. Dodge, K. Okubo, and B. L. T. Plourde	123601
	Genuine Quantum Effects in Dicke-Type Models at Large Atom Numbers Kai Müller and Walter T. Strunz	123602
	Physics of Fluids, Earth & Planetary Science, and Climate	
	Strong and Weak Dynamo Regimes in Taylor-Couette Flows Ashish Mishra, George Mamatsashvili, and Frank Stefani	124001
	Plasma and Solar Physics, Accelerators and Beams	
	Influence of Collisional Effects on Ion-Acoustic Wave Properties in Non-Maxwellian Laser-Driven Plasmas R. Capdessus, C. Ruyer, A. Debayle, P. Loiseau, and P. E. Masson-Laborde	125101
	TeV Solar Gamma Rays as a Probe for the Solar Internetwork Magnetic Fields Kenny C. Y. Ng, Andrew Hillier, and Shin'ichiro Ando	125201
	Condensed Matter and Materials	
✂	Probing Vortex Dynamics in 2D Superconductors with Scanning Quantum Microscope Sreehari Jayaram, Malik Lenger, Dong Zhao, Lucas Pupim, Takashi Taniguchi, Kenji Watanabe, Ruoming Peng, Marc Scheffler, Rainer Stöhr, Mathias S. Scheurer, Jurgen Smet, and Jörg Wrachtrup	126001
✂	Evidence for Multiband Gapless Superconductivity in the Topological Superconductor Candidate 4Hb-TaS ₂ Hanru Wang, Yihan Jiao, Fanyu Meng, Xu Zhang, Dongzhe Dai, Chengpeng Tu, Chengcheng Zhao, Lu Xin, Sicheng Huang, Hechang Lei, and Shiyang Li	126002
	Tensor Learning and Compression of N-Phonon Interactions Yao Luo, Dhruv Mangtani, Shiyu Peng, Jia Yao, Sergei Kliavinek, and Marco Bernardi	126101
	Internal Stresses as Origin of the Anomalous Low-Temperature Specific Heat in Glasses Walter Schirmacher and Giancarlo Ruocco	126102
	Negative and Positive Anisotropic Thermal Expansion in 2D Fullerene Networks Armaan Shaikh, Jiaqi Wu, and Bo Peng	126103
✂	Eliminating Defect States in Monolayer Tungsten Diselenide by Coupling with a c-Plane Sapphire Surface Chen Huang, Jinhuan Wang, Yilin Chen, Zuo Feng, Yuexing Xia, Guangjie Yao, Mengze Zhao, Guodong Xue, Si Zhou, Xiaozhi Xu, Xinfeng Liu, Enge Wang, Ji Chen, Kaihui Liu, and Hao Hong	126201

(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)

Entropy Spectroscopy of a Bilayer Graphene Quantum Dot	126202
C. Adam, H. Duprez, N. Lehmann, A. Yglesias, A. O. Denisov, S. Cances, M. J. Ruckriegel, M. Masseroni, C. Tong, W. Huang, D. Kealhofer, R. Garreis, K. Watanabe, T. Taniguchi, K. Ensslin, and T. Ihn	
Twist-on-Twist Moiré Elastic Metasurfaces	126301
Menghan Li, Kuan He, Zhiwen Ren, Li-Qun Chen, Hao-Wen Dong, Chenglin Han, Tianzhi Yang, and Cheng-Wei Qiu	
Accurate <i>Ab Initio</i> Method for Charged Defect Scattering	126302
Rongjing Guo, Kwangrae Kim, Zhongcan Xiao, and Yuanyue Liu	
Quantum Monte Carlo Pair Orbital Wave Functions for Periodic Systems	126401
Lubos Mitas	
Disorder-Induced Suppression of Superconductivity in Infinite-Layer Nickelates	126501
Abhishek Ranna, Romain Grasset, Martin Gonzalez, Kyuho Lee, Bai Yang Wang, Edgar Abarca Morales, Florian Theuss, Zuzanna H. Filipiak, Michal Moravec, Marcin Konczykowski, Harold Y. Hwang, Andrew P. Mackenzie, and Berit H. Goodge	
Spectral Properties of Fractionalized Shiba States	126502
Cătălin Pașcu Moca, Csanád Hajdú, Balázs Dóra, and Gergely Zaránd	
Phase Transitions and Remnants of Fractionalization at Finite Temperature in the Triangular Lattice Quantum Loop Model	126503
Xiaoxue Ran, Sylvain Capponi, Junchen Rong, Fabien Alet, and Zi Yang Meng	
Three-Dimensional Topological Valley Photonics	126601
Wenhao Li, Qiaolu Chen, Ning Han, Xinrui Li, Fujia Chen, Junyao Wu, Yuang Pan, Yudong Ren, Hongsheng Chen, Haoran Xue, and Yihao Yang	
Dimensional Hierarchy of Topological Bound States in the Continuum	126602
Shunda Yin, Zhenyu Wang, Liping Ye, Hailong He, Manzhu Ke, Weiyin Deng, Jiuyang Lu, and Zhengyou Liu	
 Topological Valley Transport in Bilayer Graphene Induced by Interlayer Sliding	126603
Jie Pan, Huanhuan Wang, Lin Zou, Xiaoyu Wang, Lihao Zhang, Xueyan Dong, Haibo Xie, Yi Ding, Yuze Zhang, Takashi Taniguchi, Kenji Watanabe, Shuxi Wang, and Zhe Wang	
Genuine Topological Anderson Insulator from Impurity Induced Chirality Reversal	126604
Avedis Neehus, Frank Pollmann, and Johannes Knolle	
Modified Interferometer to Measure Anyonic Braiding Statistics	126605
Steven A. Kivelson and Chaitanya Murthy	
Enhancing the Hyperpolarizability of Crystals with Quantum Geometry	126606
Wojciech J. Jankowski, Robert-Jan Slager, and Michele Pizzochero	
Coexistence of Topological Surface States and Superconductivity in Dirac Semimetal NiTe ₂	126607
Chen He, Jian-Zhou Zhao, Mei Du, Luo-Zhao Zhang, Jia-Ying Zhang, Kuo Yang, Noah F. Q. Yuan, Aleksandr Seliverstov, Ewald Janssens, Jun-Yi Ge, and Zhe Li	
Emergence of Chiral Phonons in Two-Dimensional Kagome Lattices Harboring Electronic Chirality	126608
Yanru Chen, Wei Qin, Shunhong Zhang, Ping Cui, Qian Niu, and Zhenyu Zhang	
Emerging (2 + 1)D Electrodynamics and Topological Instanton in Pseudo-Hermitian Two-Level Systems	126609
Kuangyin Deng and Ran Cheng	
Hopf Bifurcation of Nonlinear Non-Hermitian Skin Effect	126610
Kohei Kawabata and Daichi Nakamura	
Spin Demons in <i>d</i> -Wave Altermagnets	126701
Pieter M. Gunnink, Jairo Sinova, and Alexander Mook	
Strong Coupling of Chiral Magnons in Altermagnets	126702
Zhejunyu Jin, Tianci Gong, Jie Liu, Huanhuan Yang, Zhaozhuo Zeng, Yunshan Cao, and Peng Yan	
Vertical Soliton-Assisted Current Switching in Extremely Thick FeGd Ferrimagnets	126703
Teng Xu, Zhengde Xu, Yiqing Dong, Yang Cheng, Ledong Wang, Hongmei Feng, Hao Bai, Kun Xu, Xinyu Shu, Pu Yu, Heng-An Zhou, Enlong Liu, Shikun He, Chuanying Xi, Guoqiang Yu, Xuepeng Qiu, Se Kwon Kim, Jing Zhu, Zhifeng Zhu, and Wanjuan Jiang	

(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)

Nonvolatile Electric Control of Antiferromagnetic States on Nanosecond Timescales	126704
S. Ghara, M. Winkler, S. W. Schmid, L. Prodan, K. Geirhos, V. Tsurkan, Wenbo Ge, Weida Wu, A. Halbritter, S. Krohns, and I. Kézsmárki	
Light-Matter Correlation Energy Functional of the Cavity-Coupled Two-Dimensional Electron Gas via Quantum Monte Carlo Simulations	126901
Lukas Weber, Miguel A. Morales, Johannes Flick, Shiwei Zhang, and Angel Rubio	
Nonreciprocal Thermal Fizeau Drag Radiation around Asymmetric Exceptional Points	126902
Mengqi Liu, Shuihua Yang, Weijin Chen, Jiahao Zhou, Changying Zhao, and Cheng-Wei Qiu	
Direct Evidence of Interfacial Coherent Electron-Phonon Coupling in Single-Unit-Cell FeSe Film on Nb-Doped SrTiO ₃	126903
Mengdi Zhang, Ruochen Shi, Rui Wu, Xiaotong Jiao, Mingxia Shi, Jiabin Liu, Yubin Wang, Wenfeng Dong, Cui Ding, Tingxiao Qin, Haiyun Liu, Lili Wang, Zhenyu Zhang, Peng Gao, Qi-Kun Xue, and Qihua Xiong	
Femtosecond-Laser-Delamination Cavities for Resonant Acousto-Magneto-Plasmonics	126904
Pavel Varlamov, Akira Barros, Aditya Swaminathan, Jan Marx, Andreas Ostendorf, Anna Semisalova, Denys Makarov, Alexey M. Lomonosov, Paolo Vavassori, Yannis Laplace, Michele Raynaud, and Vasily V. Temnov	
Statistical Physics; Classical, Nonlinear, and Complex Systems	
Universal Scale-Free Decay of Tracer-Bath Correlations in d -Dimensional Interacting Particle Systems	127101
Davide Venturelli, Pierre Illien, Aurélien Grabsch, and Olivier Bénichou	
Velocity Trapping in the Lifted Totally Asymmetric Simple Exclusion Process and the True Self-Avoiding Random Walk	127102
Brune Massoulié, Clément Erignoux, Cristina Toninelli, and Werner Krauth	
Manipulating Phases in Many-Body Interacting Systems with Subsystem Resetting	127103
Anish Acharya, Rupak Majumder, and Shamik Gupta	
Polymers, Chemical Physics, Soft Matter, and Biological Physics	
 Activation Volume Facilitating Chemical Reaction under Mechanical Stress	128001
Yilong Jiang, Junyu Bin, Junhui Sun, Seong H. Kim, Linmao Qian, Lei Chen, and Yang Wang	
Topological Rigidity in Twisted, Elastic Ribbons	128201
Carlos E. Moguel-Lehmer and Christian D. Santangelo	
Motility Modulates the Partitioning of Bacteria in Aqueous Two-Phase Systems	128401
Jiyong Cheon, Kyu Hwan Choi, Kevin J. Modica, Robert J. Mitchell, Sho C. Takatori, and Joonwoo Jeong	
Strings, Branes and Twists: Topological Analysis of Phase Defects in Excitable Media Such as the Heart	128402
Louise Arno, Desmond Kabus, and Hans Dierckx	
Three-Dimensional Chiral Active Ornstein-Uhlenbeck Model for Helical Motion of Microorganisms	128403
Leon Lettermann, Falko Ziebert, Mirko Singer, Friedrich Frischknecht, and Ulrich S. Schwarz	
Shape Switching and Tunable Oscillations of Adaptive Droplets	128404
Tim Dullweber, Roman Belousov, Camilla Autorino, Nicoletta I. Petridou, and Anna Erzberger	



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.