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前沿科学奖

2025 Frontiers of Science Award

Physics

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Astrophysics and Cosmology - Theory

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Strong-field gravity tests with the Double Pulsar

Physical Review X 2021

Michael Kramer (University of Manchester, MPI for Radio Astronomy), Ingrid H. Stairs (University of British Columbia), Richard N. Manchester (Australia Telescope National Facility), Norbert Wex (MPI for Radio Astronomy), Adam T. Deller (Swinburne University of Technology), William A. Coles (UC San Diego), Masooma Ali (Thomson Reuters), **Marta Burgay** (Cagliari Observatory), Fernando Camilo (South African Radio Astronomy Observatory), Ismaël Cognard (Laboratory of Physics and Chemistry of the Environment and Space (LPC2E), and the Nançay Radio Observatory), Thibault Damour (Institute of Advanced Scientific Studies (IHES)), Gregory Desvignes (MPI for Radio Astronomy), Robert D. Ferdman (University of East Anglia), Paulo C. C. Freire (Max Planck Institute for Radio Astronomy), Steffani Grondin (University of Toronto), Lucas Guillemot (Laboratory of Physics and Chemistry of the Environment and Space (LPC2E), and the Nançay Radio Observatory), George B. Hobbs (Australia Telescope National Facility), Gemma H. Janssen (Radboud University and the Netherlands Institute for Radio Astronomy), Ramesh Karuppusamy (MPI for Radio Astronomy), Duncan R. Lorimer (West Virginia University), Andrew G. Lyne (University of Manchester), James W. McKee (Union College), Maura McLaughlin (West Virginia University), Linus Elias Muench (University of Bonn), Benetge Perera (University of Central Florida), Nihan Pol (Texas Tech University), Andrea Possenti (University of Cagliari and the Cagliari Observatory), John M. Sarkissian (CSIRO Parkes Radio Observatory), Benjamin W. Stappers (University of Manchester), Gilles Theureau (LPC2E)



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Implications of the neutron star merger GW170817 for cosmological scalar-tensor theories

Physical Review Letters 2017

Jeremy Sakstein (University of Hawaii)
Bhuvnesh Jain (University of Pennsylvania)



Are merging black holes born from stellar collapse or previous mergers?

Physical Review D 2017

Davide Gerosa (University of Milano-Bicocca)
Emanuele Berti (John Hopkins)



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Condensed Matter Physics

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Current Correlations from a Mesoscopic Anyon Collider

Physical Review Letters 2016

Bernd Rosenow (University of Leipzig)

Ivan P. Levkivsky (Dropbox Inc.)

Bertrand I. Halperin (Harvard)



Emergent hydrodynamics in integrable quantum systems out of equilibrium

Physical Review X 2016

Olalla A. Castro-Alvaredo (City St. George's,
University of London)
Benjamin Doyon (King's College London)
Takato Yoshimura (Oxford)

Transport in Out-of-Equilibrium XXZ Chains: Exact Profiles of Charges and Currents

Physical Review Letters 2016

Bruno Bertini (University of Birmingham)
Mario Collura (SISSA)
Jacopo De Nardis (CY Cergy Paris)
Maurizio Fagotti (Paris-Saclay)



Predicting many properties of a quantum system from very few measurements

Nature Physics 2020

Hsin Yuan Huang (Google Quantum AI)

Richard Kueng (Johannes Kepler University Linz)

John Preskill (Caltech)



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Formal Quantum Field Theory

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Theta, Time Reversal, and Temperature

Journal of High Energy Physics 2017

Davide Gaiotto (Perimeter), Anton Kapustin (Caltech)
Zohar Komargodski (Stony Brook), Nathan Seiberg (IAS)



Particle-Vortex Duality from 3d Bosonization

Physical Review X 2016

Andreas Karch (University of Texas, Austin)
David Tong (Cambridge)

A Duality Web in 2+1 Dimensions and Condensed Matter Physics

Annals of Physics 2016

Nathan Seiberg (IAS)
Todadri Senthil (MIT)
Chong Wang (Perimeter)
Edward Witten (IAS)



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On space of integrable quantum field theories

Nuclear Physics B 2017

Fedor A. Smirnov (CNRS and Sorbonne University)

Alexander B. Zamolodchikov (Stony Brook)



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Particle Physics Phenomenology

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ForwArd Search ExpeRiment at the LHC

Physical Review D 2018

Jonathan L. Feng (UC Irvine), **Iftah Galon** (KLA Inc.)

Felix Kling (DESY, Hamburg)

Sebastian Trojanowski (National Center for Nuclear Research, Warsaw)



Five-Loop Running of the QCD coupling constant

Physical Review Letters 2017

Pavel. A. Baikov (Moscow State University)
Konstantin G. Chetyrkin (Karlsruhe Institute of Technology)
Johann H. Kühn (Karlsruhe Institute of Technology)

The five-loop beta function of Yang-Mills theory with fermions

Journal of High Energy Physics 2017

Franz Herzog (University of Edinburgh)
Ben Ruijl (Ruijl Research Inc.)
Takahiro Ueda (Juntendo University)
Jos A.M. Vermaseren (National Institute for Nuclear and High-Energy Physics (NIKHEF), Amsterdam)
Andreas Vogt (University of Liverpool)



Noninvertible Global Symmetries in the Standard Model

Physical Review Letters 2022

Yichul Choi (IAS)
Ho Tat Lam (MIT)
Shu-Heng Shao (MIT)

Noninvertible Chiral Symmetry and Exponential Hierarchies

Physical Review X 2023

Clay Cordova (University of Chicago)
Kantaro Ohmori (University of Tokyo)



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String Theory and Quantum Gravity

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**Conformal symmetry and its
breaking in two dimensional
Nearly Anti-de-Sitter space**

Progress of Theoretical and
Experimental Physics 2016

Juan Maldacena (IAS)
Douglas Stanford (Stanford)
Zhenbin Yang (Tsinghua University)

Chaos in AdS2 holography

Physical Review Letters 2016

Kristan Jensen (University of Victoria)

**An investigation of AdS2
backreaction and holography**

Journal of High Energy Physics 2016

Julius Engelsöy (Autobrain
Technologies)
Thomas G. Mertens (Ghent University)
Herman Verlinde (Princeton)



Black holes in 4d $N=4$ Super-
Yang-Mills

Physical Review X 2020

Francesco Benini (SISSA)
Elisa Milan (Israel Institute of
Technology)

Microscopic origin of the
Bekenstein-Hawking entropy of
supersymmetric AdS5 black holes

Journal of High Energy Physics 2019

Alejandro Cabo-Bizet (University of
Salento and National Institute of Nuclear
Physics (INFN), Lecce Division)
Davide Cassani (National Institute of
Nuclear Physics (INFN), Padua Division)
Dario Martelli (University of Turin)
Sameer Murthy (King's College London)

Large AdS black holes from
QFT

arXiv 1810.12067

Sunjin Choi (Kavli IPMU, University
of Tokyo)
Joonho Kim (Atomic Industries Inc.)
Seok Kim (Seoul National University)
June Nahmgoong (OpenAlpha Inc.)



Relative entropy equals bulk relative entropy

Journal of High Energy Physics 2016

Daniel L. Jafferis (Harvard), **Aitor Lewkowycz** (Google Inc.)
Juan Maldacena (IAS), **S. Josephine Suh** (KAIST)



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Gravitational Memory, BMS Supertranslations and Soft Theorems

Journal of High Energy Physics 2016

Andrew Strominger (Harvard)
Alexander Zhiboedov (CERN)