FOCUS PHYSICS AND COMPUTING





COVER IMAGE

As a liquid relaxes towards the glass transition, its dynamics is thought to become more cooperative. Experiments using holographic optical tweezers support a contested thermodynamic picture, claiming this cooperation involves morphology changes.

Letter p403; News & Views p381

IMAGE: HIMA NAGAMANASA COVER DESIGN: ALLEN BEATTIE

EDITORIAL

365 Beautiful machines

COMMENTARY

- 367 Open science decoded Tony Hey and Mike C. Payne FOCUS
- 369 Programming revisited Thomas C. Schulthess FOCUS
- 373 Look to the clouds and beyond Sergey Panitkin FOCUS

THESIS

375 Model scientists Mark Buchanan

BOOKS & ARTS

376 Music: Soundtrack to the space race Reviewed by Nicky Dean

RESEARCH HIGHLIGHTS

377 Our choice from the recent literature

NEWS & VIEWS

- 379 Quantum information: Good causes Giulio Chiribella
- 380 Fluid dynamics: Sticky stitches Bart Verberck
- 381 Amorphous solids: Glasses pinned down Eric R. Weeks
- 382 Molecular physics: Tiny giant Iulia Georgescu
- 383 Ten years of *Nature Physics*: From spooky foundations Sebastian Deffner
- 384 EPR paradox: Nonlocal legacy Federico Levi

PROGRESS ARTICLE

385 Fractionalized topological insulators Joseph Maciejko and Gregory A. Fiete

LETTERS

- 389 Generation of a squeezed state of an oscillator by stroboscopic back-action-evading measurement
 - G. Vasilakis, H. Shen, K. Jensen, M. Balabas, D. Salart, B. Chen and E. S. Polzik

ON THE COVER Ouantum correlations

Cause and effect Article p414; News & Views p379

Plasma physics In the wake of magnetization Letter p409

> Hybrid perovskites Magnetic field effects Article p427



Nitrogen-vacancy centres offer significant promise as nanoscale magnetometers. A light-trapping diamond waveguide is demonstrated, enhancing the temperature and magnetic field sensitivity of such centres by three orders of magnitude. Letter p393



In laboratory experiments, strong magnetic fields at the boundary of a plasma can be generated by means of laser-wakefield acceleration, enabling the study of magnetization processes in scaled versions of astrophysical plasmas. Letter p409 **393** Broadband magnetometry and temperature sensing with a light-trapping diamond waveguide

Hannah Clevenson, Matthew E. Trusheim, Carson Teale, Tim Schröder, Danielle Braje and Dirk Englund

398 Surface electron perturbations and the collective behaviour of atoms adsorbed on a cylinder

Boris Dzyubenko, Hao-Chun Lee, Oscar E. Vilches and David H. Cobden

- 403 Direct measurements of growing amorphous order and non-monotonic dynamic correlations in a colloidal glass-former
 K. Hima Nagamanasa, Shreyas Gokhale, A. K. Sood and Rajesh Ganapathy
- **409 Persistence of magnetic field driven by relativistic electrons in a plasma** A. Flacco, J. Vieira, A. Lifschitz, F. Sylla, S. Kahaly, M. Veltcheva, L. O. Silva and V. Malka

ARTICLES

→N&V p381

414 A quantum advantage for inferring causal structure

Katja Ried, Megan Agnew, Lydia Vermeyden, Dominik Janzing, Robert W. Spekkens and Kevin J. Resch \rightarrow N&V p379

421 Snapshots of the retarded interaction of charge carriers with ultrafast fluctuations in cuprates

S. Dal Conte, L. Vidmar, D. Golež, M. Mierzejewski, G. Soavi, S. Peli, F. Banfi, G. Ferrini, R. Comin, B. M. Ludbrook, L. Chauviere, N. D. Zhigadlo, H. Eisaki, M. Greven, S. Lupi, A. Damascelli, D. Brida, M. Capone, J. Bonča, G. Cerullo and C. Giannetti

427 Magnetic field effects in hybrid perovskite devices C. Zhang, D. Sun, C-X. Sheng, Y. X. Zhai, K. Mielczarek, A. Zakhidov and Z. V. Vardeny

FUTURES

436 Daega's test Jeremy Szal



Nature Physics (ISSN 1745-2473, USPS 023176) is published monthly by Nature Publishing Group, a division of Macmillan Publishers Ltd, The Macmillan Building, 4 Crinan Street, London N1 9XW, UK. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form (electronic or otherwise) without prior permission from permissions@nature.com. US Periodicals postage paid at Jamaica, NY, and additional mailing post offices. US POSTMASTER: Send address changes to Nature Publishing Group, Air Business Ltd, c/o Worldnet Shipping Inc., 156-15, 146th Avenue, 2nd Floor, Jamaica, NY 11434, USA. © 2015 Macmillan Publishers Limited. All rights reserved. Printed in United Kingdom