**COVER IMAGE**

Chemical substitution often mimics the effects of applied pressure on a compound, and 'doping' is a standard way to reach a quantum critical point from a given phase.

However, CeCoIn₅ is a natural quantum critical superconductor, and Cd-doping tunes the system away from criticality. Applied pressure reverses the effect of doping, but although superconductivity is restored, quantum criticality is not.

Letter p120; News & Views p94

IMAGE: NICHOLAS CURRO

COVER DESIGN: ALLEN BEATTIE

ON THE COVER

Magnetic monopoles in spin ice
Flash-freezing makes more
Letter p135; News & Views p88

Carbon nanotubes
Electron-phonon coupling controlled
Article p151

Quantum correlations
Betrayed by local measurements
Letter p105

EDITORIAL

81 Rosetta awakes

COMMENTARY

82 Timekeepers of the future
Helen Margolis

THESIS

84 A helping hand
Mark Buchanan

BOOKS & ARTS

85 The Oxford Handbook of the History of Physics
Edited by Jed Buchwald and Robert Fox
Reviewed by Andreas Trabesinger

RESEARCH HIGHLIGHTS

86 Our choice from the recent literature

NEWS & VIEWS

87 **Microfluidics: For a few drops more**
Howard A. Stone and Shashi Thutupalli

88 **Magnetic monopoles: Quenching the fire in spin ice**
Hans-Benjamin Braun

90 **Ultracold atoms: Pairing with a twist**
Waseem Bakr

91 **Quantum information: The occasional super clock-cloner**
John Calsamiglia

92 **Galactic centre: The final countdown**
May Chiao

93 **Optical materials: Silicon carbide goes quantum**
Igor Aharonovich and Milos Toth

94 **Quantum phase transitions: Magnetic islands**
F. Malte Grosche

95 **Surface science: Bend setters**
Bart Verberck

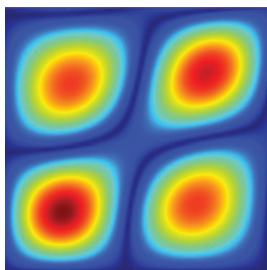
REVIEW ARTICLE

97 **What drives nematic order in iron-based superconductors?**
R. M. Fernandes, A. V. Chubukov and J. Schmalian

LETTERS

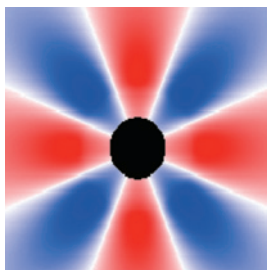
105 **Local detection of quantum correlations with a single trapped ion**
M. Gessner, M. Ramm, T. Pruttivarasin, A. Buchleitner, H-P. Breuer and H. Häffner

110 **Production of Feshbach molecules induced by spin-orbit coupling in Fermi gases**
Zhengkun Fu, Lianghai Huang, Zengming Meng, Pengjun Wang, Long Zhang, Shizhong Zhang, Hui Zhai, Peng Zhang and Jing Zhang
→N&V p90



In open quantum systems the correlations between the system and its environment play an important role. A trapped-ion experiment demonstrates that these correlations can be detected without accessing or knowing anything about the environment or its interactions.

Letter p105



Ensembles of micrometre-sized water droplets in a laminar oil flow are ideal systems for studying non-equilibrium dynamics. In the case of two-dimensional confinement, the interactions between the droplets' flow-induced dipole moments lead to long-range velocity correlations and four-fold angular symmetry — behaviour that can be understood from first-principle hydrodynamics calculations.

Letter p140; News & Views p87

- 116 Universal dynamics of a degenerate unitary Bose gas**
P. Makotyn, C. E. Klauss, D. L. Goldberger, E. A. Cornell and D. S. Jin
- 120 Disorder in quantum critical superconductors**
S. Seo, Xin Lu, J-X. Zhu, R. R. Urbano, N. Curro, E. D. Bauer, V. A. Sidorov, L. D. Pham, Tuson Park, Z. Fisk and J. D. Thompson
→N&V p94
- 126 Switching of magnetic domains reveals spatially inhomogeneous superconductivity**
Simon Gerber, Marek Bartkowiak, Jorge L. Gavilano, Eric Ressouche, Nikola Egetenmeyer, Christof Niedermayer, Andrea D. Bianchi, Roman Movshovich, Eric D. Bauer, Joe D. Thompson and Michel Kenzelmann
- 130 Spin-layer locking effects in optical orientation of exciton spin in bilayer WSe₂**
Aaron M. Jones, Hongyi Yu, Jason S. Ross, Philip Klement, Nirmal J. Ghimire, Jiaqiang Yan, David G. Mandrus, Wang Yao and Xiaodong Xu
- 135 Far-from-equilibrium monopole dynamics in spin ice**
C. Paulsen, M. J. Jackson, E. Lhotel, B. Canals, D. Prabhakaran, K. Matsuhira, S. R. Giblin and S. T. Bramwell
→N&V p88
- 140 Long-range orientational order in two-dimensional microfluidic dipoles**
Itamar Shani, Tsevi Beatus, Roy H. Bar-Ziv and Tsvi Tlusty
→N&V p87

ARTICLES

- 145 Emergent SU(4) Kondo physics in a spin-charge-entangled double quantum dot**
A. J. Keller, S. Amasha, I. Weymann, C. P. Moca, I. G. Rau, J. A. Katine, Hadas Shtrikman, G. Zaránd and D. Goldhaber-Gordon
- 151 Real-space tailoring of the electron-phonon coupling in ultraclean nanotube mechanical resonators**
A. Benyamini, A. Hamo, S. Viola Kusminskiy, F. von Oppen and S. Ilani
- 157 Room-temperature quantum microwave emitters based on spin defects in silicon carbide**
H. Kraus, V. A. Soltamov, D. Riedel, S. Văth, F. Fuchs, A. Sperlich, P. G. Baranov, V. Dyakonov and G. V. Astakhov
→N&V p93
- 163 Liposome adhesion generates traction stress**
Michael P. Murrell, Raphaël Voituriez, Jean-François Joanny, Pierre Nassoy, Cécile Sykes and Margaret L. Gardel
- 170 Corrigendum**

FUTURES

- 172 How to lose the one you love**
Gary Cuba



nature publishing group

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. © 2014 Macmillan Publishers Limited. All rights reserved. Printed in United Kingdom