Physics-Uspekhi

Advances in Physical Sciences



May 2017 Volume 60, Number 5

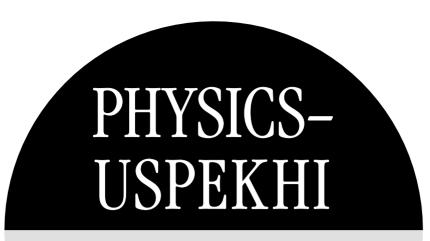
Translation of the Russian journal
Успехи физических наук, Uspekhi Fizicheskikh Nauk
Мау 2017, Volume 187, No. 5



Turpion

IOP Publishing





ISSN 1063-7869 (Print) ISSN 1468-4780 (Online)

CODEN: PHUSEY

Uspekhi Fizicheskikh Nauk

Editor Valery A Rubakov **Associate Editors**

Lev P Pitaevskii, Oleg V Rudenko

Managing Editor Advisory Board

Maria S Aksent'eva Evgenii B Aleksandrov Fazly I Ataullakhanov Yurii V Gulyaev

Sergei P Denisov Lev M Zelenyi Aleksandr A Kaplyanskii Olga A Kocharovskaya Gennadii N Kulipanov Aleksandr G Litvak Gennadii A Mesyats Rashid A Sunyaev

Vladimir E Fortov Aleksei R Khokhlov Anatolii M Cherepashchuk

Editorial Board

Petr I Arseev Vasily S Beskin Aleksandr E Bondar' Vadim V Brazhkin Sergei V Bulanov Mikhail A Vasil'ev Mikhail I Vysotskii Igor M Dremin Aleksei M Zheltikov Genrikh R Ivanitskii Dmitrii I Kazakov Vitalii V Kveder Nikolai N Kolachevskii Zakharii F Krasil'nik Evgenii A Kuznetsov Sergei A Nikitov Vladimir F Obraztsov Pavel N Pakhlov Konstantin A Postnov Vladimir I Ritus

Grigorii I Rubtsov Mikhail V Sadovskii Aleksandr M Sergeev Boris M Smirnov Robert A Suris Dmitrii R Khokhlov Maria V Chekhova Evgenii M Churazov

Scientific and Staff Editors

MS Aksent'eva, EA Frimer, TB Larionova, TG Orekhova, TP Romanova, EV Zakharova

Uspekhi Fizicheskikh Nauk (Успехи Физических Наук, www.ufn.ru) publishes reviews of the current state of the most topical problems in physics and in associated fields under the general headings: reviews of topical problems, physics of our days, instruments and methods of investigation, methodological notes, from the history of physics, conferences and symposia, personalia, physics news on the Internet, and bibliography. The journal was founded in 1918 and is published monthly.

Physics - Uspekhi

Scientific Editors

MS Aksent'eva, A Radzig, AM Semikhatov

English Language Editor

K Franchuk

Desk Editors

AV Bobkov, NV Gribkova, OV Morgunova

Physics-Uspekhi (Advances in Physical Sciences) is the English edition of the Russian monthly journal Uspekhi Fizicheskikh Nauk. Translation into English started with Russian volume 66. From 1958 until 1992 the journal was published by American Institute of Physics under the title Soviet Physics – Uspekhi and in 1993 under its current title Physics - Uspekhi. Since 1994 Physics - Uspekhi has been published jointly by Uspekhi Fizicheskikh Nauk and Turpion Ltd. From the beginning of 1996 *Physics – Uspekhi* is being translated, typeset and edited in Moscow by Uspekhi Fizicheskikh Nauk (UFN), from 2009 published by Uspekhi Fizicheskikh Nauk, Moscow, printed by Page Bros, Norwich, UK.

Institutional subscription information (volume 60, 2017, monthly) For all countries, except the United States, Canada, Central and South America, the subscription rates are: Print + Online (1958 -2017) £ 1877; Online only (1958 – 2017) £ 1689. Delivery is by airspeeded mail from the UK.

Orders, back issues, change of address to: Physics-Uspekhi, Journals Subscription Fulfilment, IOP Publishing, Temple Circus, Temple Way, Bristol BS16HG, United Kingdom

For the United States, Canada, Central and South America, the subscription rates are:

Print + Online (1958 – 2017) US \$3377; Online only (1958 – 2017) US \$3039. Delivery is by transatlantic airfreight and onward mailing. United States Postal Identification Statement Physics – Uspekhi, volume 60, published monthly. Periodicals Postage Paid at Continental Station, PA and additional mailing offices. POSTMASTER: Send orders, address changes to Physics – Uspekhi,

IOP Publishing, PO Box 320, Congers, NY 10920-0320, USA

Online services: Since 2008 electronic access to the journal content is hosted by IOP Publishing. All subscriptions to the journal include electronic access dating from the first English translation volume. The electronic version of the journal is available at http:// iopscience.org/phu. All questions regarding online access should be sent to customer services at custserv@iop.org or custserv@turpion.ru

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form, or by any means, electronic, mechanical, photographic, recording, or otherwise, without the prior permission of Uspekhi Fizicheskikh Nauk.

Editorial Office: P N Lebedev Physical Institute, RAS, Leninskii prospekt 53, 119991 Moscow, Russian Federation Tel. (7-499) 132 62 65, (7-499) 132 63 48, (7-499) 190 34 52 Tel./Fax (7-499) 190 42 44. É-mail: ufn@ufn.ru

© 2017 Uspekhi Fizicheskikh Nauk and PN Lebedev Physical Institute of the Russian Academy of Sciences

© 2017 Uspekhi Fizicheskikh Nauk and PN Lebedev Physical Institute of the Russian Academy of Sciences

Russian original reference Usp. Fiz. Nauk Vol. 187 , pages	Contents	English translatio reference Phys. Usp. Vol. 60 , pages
465	Nano- and microstructuring of solids by swift heavy ions F F Komarov	435
505	Scale invariance of shallow seismicity and the prognostic signatures of earthquakes I R Stakhovsky	472
525	Unusual plasticity and strength of metals at ultra-short load durations G I Kanel, E B Zaretsky, S V Razorenov, S I Ashitkov, V E Fortov	490
547	Gas dynamic trap: experimental results and future prospects A A Ivanov, V V Prikhodko	509
575	Igor Ivanovich Tkachev (on his 60th birthday)	534
546	Physics news on the Internet Yu N Eroshenko	536

 \diamond \diamond

In the next issue

Vacancy-impurity centers in diamond: perspectives of synthesis and applications E A Ekimov, M V Kondrin

Fluctuation-electromagnetic interaction under dynamic and thermal nonequilibrium conditions

G V Dedkov, A A Kyasov

Adaptive multicomponent nanocomposite coatings in surface engineering A D Pogrebnjak, A A Bagdasaryan, A Pshyk, K Dyadyura

Electrohydrodynamic flow for the active control of gas flows V Yu Khomich, V A Yamshchikov

On the spin-statistics theorem

E D Trifonov

On nondiagonal cross transport phenomena in a magnetic field L A Maksimov, A V Mikheyenkov, T V Khabarova

L A Maksimov, A v Mikneyenkov, I v Knabarov

Evolution in the optical detection of magnetization

V S Zapasskii, G G Kozlov

In memory of Aleksei Alekseevich Abrikosov

Physics news on the Internet



1063-7869(2017)60:5;1-5