

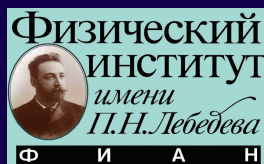
# Physics–Uspekhi

Advances in Physical Sciences



**September 2010**  
**Volume 53, Number 9**

Translation of the Russian journal  
**Успехи физических наук, Uspekhi Fizicheskikh Nauk**  
September 2010, Volume 180, No. 9



**Turpion**

**IOP Publishing**



# PHYSICS- USPEKHI

## Uspekhi Fizicheskikh Nauk

### Editor

LV Keldysh *PN Lebedev Physical Institute,  
Russian Academy of Sciences (RAS), Moscow*

### First Deputy Editor

VA Rubakov *Institute for Nuclear Research, RAS, Moscow*

### Associate Editors

LP Pitaevskii *PL Kapitza Institute for Physical Problems,  
RAS, Moscow*

OV Rudenko *M V Lomonosov Moscow State University,  
Moscow*

### Managing Editor

MS Aksent'eva *Uspekhi Fizicheskikh Nauk, RAS, Moscow*

### Editorial Board

EB Aleksandrov *All-Russian Research Center  
'SI Vavilov State Optical Institute'*

VS Beskin *PN Lebedev Physical Institute, RAS, Moscow*

VB Braginskii *M V Lomonosov Moscow State University,  
Moscow*

LP Grishchuk *PK Shternberg State Astronomical Institute,  
Moscow State University, Moscow*

Yu V Gulyaev *Institute of Radioengineering and Electronics,  
RAS, Moscow*

SP Denisov *Russian State Research Center  
'Institute for High Energy Physics'*

IM Dremin *PN Lebedev Physical Institute, RAS, Moscow*

GR Ivanitskii *Institute of Theoretical and Experimental  
Biology, RAS, Pushchino, Moscow Region*

AA Kaplyanskii *A F Ioffe Physico-Technical Institute,  
RAS, St.-Petersburg*

GN Kulipanov *GI Budker Institute of Nuclear Physics,  
RAS, Novosibirsk*

EG Maksimov *PN Lebedev Physical Institute, RAS, Moscow*

MB Menskii *PN Lebedev Physical Institute, RAS, Moscow*

GA Mesyats *PN Lebedev Physical Institute, RAS, Moscow*

LB Okun' *Russian State Research Center  
'Institute of Theoretical and Experimental  
Physics', Moscow*

VI Ritus *PN Lebedev Physical Institute, RAS, Moscow*

MV Sadvovskii *Institute of Electrophysics, Ural Branch of RAS,  
Ekaterinburg*

BM Smirnov *Institute for High Temperatures, RAS, Moscow*

VE Fortov *Institute for High Energy Density,  
RAS, Moscow*

### Scientific and Staff Editors

MS Aksent'eva, EA Frimer, TB Larionova, TP Romanova,  
TS Vaisberg, EV Zakharova

**Uspekhi Fizicheskikh Nauk** (Успехи Физических Наук, [www.ufn.ru](http://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.

© 2010 Uspekhi Fizicheskikh Nauk and P N Lebedev Physical Institute of the Russian Academy of Sciences

## Physics – Uspekhi

### Scientific Editors

MS Aksent'eva, A Radzig, A M Semikhatov

### English Language Editor

K Franchuk, *M.A., Carleton University, Ottawa, Canada*

### 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 53, 2010, monthly)  
For all countries, except the United States, Canada, Central and South America, the subscription rates are: Print + Online (2000 – 2010) £ 1505; Print + Online with historic archive (1958 – 2010) £ 1619; Online only (2000 – 2010) £ 1355; Online only with historic archive (1958 – 2010) £ 1469; Single issue £ 151. Delivery is by air-speeded mail from the UK.

**Orders, back issues, change of address to: Physics–Uspekhi**, Journals Subscription Fulfilment, Institute of Physics Publishing, Dirac House, Temple Back, Bristol BS1 6BE, United Kingdom

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

Print + Online (2000 – 2010) US \$2709; Print + Online with historic archive (1958 – 2010) US \$ 2915; Online only (2000 – 2010) US \$ 2438; Online only with historic archive (1958 – 2010) US \$ 2644; Single issue US \$ 271. Delivery is by transatlantic airfreight and onward mailing. **United States Postal Identification Statement** *Physics – Uspekhi*, volume 53, published monthly. Periodicals Postage Pending at Huntington Station, NY and at additional mailing offices. **POSTMASTER:** Send orders, address changes to *Physics – Uspekhi*, American Institute of Physics, Suite 1N01, 2 Huntington Quadrangle, Melville, NY 11747-4502, USA.

**Online services:** Since 2008 electronic access to the journal content is hosted by IOP Publishing. The electronic version of the journal is available at <http://www.iop.org/journals/phu>. All questions regarding online access should be sent to customer services at [custserv@iop.org](mailto:custserv@iop.org) or [custserv@turpion.ru](mailto: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

Leninskiĭ prospekt 15, 119071 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. E-mail: [ufn@ufn.ru](mailto:ufn@ufn.ru)

© 2010 Uspekhi Fizicheskikh Nauk and P N Lebedev Physical Institute of the Russian Academy of Sciences

## Contents

<b>Carbon nanotube-based electron field emitters</b> A V Eletsii	863
<b>Molecular energy transducers of the living cell.</b> <b>Proton ATP synthase: a rotating molecular motor</b> Yu M Romanovsky, A N Tikhonov	893
<b>Ice satellites of planets of the Solar System</b> <b>and the on-orbit radio detection of ultrahigh-energy particles</b> G A Gusev, B N Lomonosov, V A Ryabov, V A Chechin	915
<b>Noncommutative nature of the addition of noncollinear velocities</b> <b>in special relativity and the geometric phase method</b> (commemorating the publication centennial of A Sommerfeld's work) G B Malykin	923
<b>On the addition of velocities in the theory of relativity</b> A Sommerfeld	929
<b>Commemoration of the 85th birthday of S I Syrovatskii</b> (Scientific session of the Physical Sciences Division of the Russian Academy of Sciences, 26 May 2010): contribution by L M Zelenyi et al.; A G Frank; V D Kuznetsov; B V Somov; V S Ptuskin	933
<b>Aleksandr Viktorovich Gurevich (on his 80th birthday)</b>	963
<b>New books on physics and related sciences</b> E V Zakharova	967
<b>Physics news on the Internet</b> Yu N Eroshenko	969

◇                      ◇                      ◇

## In the next issue

*Small-angle neutron scattering in structure research of magnetic fluids*  
M V Avdeev, V L Aksenov

*Oxide nanostructures on a Nb surface and related systems:  
experiments and ab initio calculations*  
M V Kuznetsov, A S Razinkin, A L Ivanovskii

*Nanostructures in controlled thermonuclear fusion devices*  
V I Krauz, Yu V Martynenko, N Yu Svechnikov, V P Smirnov,  
V G Stankevich, L N Khimchenko

*Problems of automatic calculation for collider physics*  
E E Boos, M N Dubinin

*On melting criteria for complex plasma*  
B A Klumov

*Interaction of two charged conducting balls: theory and experiment*  
V A Saranin, V V Mayer

*Personalia*

*Physics news on the Internet*

