# Physics-Uspekhi

Advances in Physical Sciences

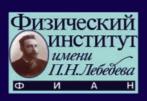


April 2016 Volume 59, Number 4

Translation of the Russian journal
Успехи физических наук, Uspekhi Fizicheskikh Nauk

April 2016, Volume 186, No. 4

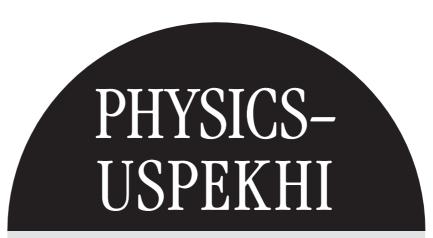




Turpion

**IOP** Publishing





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

CODEN: PHUSEY

#### Uspekhi Fizicheskikh Nauk

**Editor** First Deputy Editor Valery A Rubakov

**Associate Editors** 

**Managing Editor Advisory Board** 

Leonid V Keldvsh

Lev P Pitaevskii, Oleg V Rudenko Maria S Aksent'eva

Evgenii B Aleksandrov Fazly I Ataullakhanov Yurii V Gulyaev Sergei P Denisov Lev M Zelenvi

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

Petr I Arseev

**Editorial Board** 

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

Scientific and Staff Editors

MS Aksent'eva, EA Frimer, TB Larionova, 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.

Evgenii M Churazov

© 2016 Uspekhi Fizicheskikh Nauk and PN 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 **Desk Editors** 

AV Bobkov, N V 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 59, 2016, monthly) For all countries, except the United States, Canada, Central and South America, the subscription rates are: Print + Online (1958) 2016) £ 1840; Online only (1958 – 2016) £ 1656; Single issue £ 185. Delivery is by air-speeded 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 – 2016) US \$3311; Online only (1958 – 2016) US \$ 2980; Single issue US \$ 331. Delivery is by transatlantic airfreight and onward mailing. United States Postal Identification Statement Physics – Uspekhi, volume 59, 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-

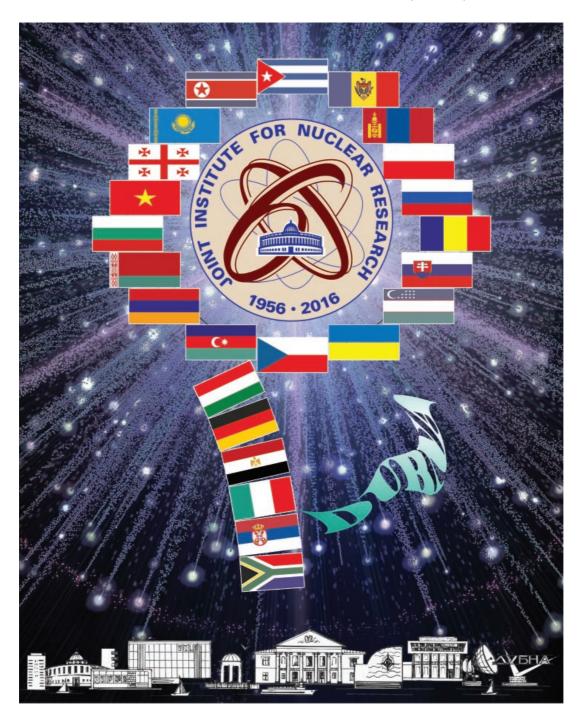
Online services: Since 2008 electronic access to the journal content is hosted by IOP Publishing. All subscriptions to the journal include electronic access dating from the first English translation volume. The electronic version of the journal is available at http:// iopscience.org/phu. All questions 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, Leninskiĭ 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. E-mail: ufn@ufn.ru

© 2016 Uspekhi Fizicheskikh Nauk and PN Lebedev Physical Institute of the Russian Academy of Sciences

## 60th ANNIVERSARY OF THE JOINT INSTITUTE FOR NUCLEAR RESEARCH (JINR)



The Joint Institute for Nuclear Research (JINR) celebrated the 60th anniversary of its founding on 26 March 2016. The current (April) and the previous (March) issues of the *Uspekhi Fizicheskikh Nauk* (*Physics–Uspekhi*) journal contain reviews and papers devoted to JINR's remarkable history, to advances and discoveries made in the past by research fellows at the Institute, and to the most relevant scientific research now being carried out at JINR. The editorial board and editing staff of *Uspekhi Fizicheskikh Nauk* journal heartily congratulate the JINR team on this distinguished jubilee, wish all the staff health and happiness, and hope that JINR reaches new scientific heights and achieves ever greater success!

Russian original reference **Contents** Usp. Fiz. Nauk Vol. **186**, pages

English translation reference Phys. Usp. Vol. 59, pages

60th anniversary of the Joint Institute for Nuclear Researh (JINR)

337	Studies of light exotic nuclei in the vicinity of neutron and proton drip lines at FLNR JINR L V Grigorenko, M S Golovkov, S A Krupko, S I Sidorchuk, G M Ter-Akopian, A S Fomichev, V Chudoba	321
387	Phase diagram of baryon matter in the SU(2) Nambu-Jona-Lasinio model with a Polyakov loop Yu L Kalinovsky, V D Toneev, A V Friesen	367
405	Relativistic nuclear physics at JINR: from the synchrophasotron to the NICA collider N N Agapov, V D Kekelidze, A D Kovalenko, R Lednitsky, V A Matveev, I N Meshkov, V A Nikitin, Yu K Potrebennikov, A S Sorin, G V Trubnikov	383
425	Anomalously interacting Z* bosons: an example of JIN'R contribution to physics at the LHC V A Bednyakov, I V Yeletskikh, M V Chizhov, I R Boyko	403
435	Radiobiological research at JINR's accelerators E A Krasavin	411
445	In memory of Dmitrii Vasil'evich Shirkov	419
447	In memory of Vadim Alekseevich Kuzmin	421
444	Physics news on the Internet Yu N Eroshenko	423

 $\Diamond$  $\Diamond$ 

### In the next issue

Attosecond electromagnetic pulses: generation, measurement, and application. Generation of high-order harmonics of intense laser field for attosecond pulse production

V V Strelkov, V T Platonenko, A F Sterzhantov, M Yu Ryabikin

Discrete breathers in crystals

S V Dmitriev, E A Korznikova, J A Baimova, M G Velarde

Blinking fluorescence of single semiconductor nanocrystals: basic experimental facts and the theoretical models of blinking

I S Osaďko

Another route to the Lorentz transformations E G Bessonov

Conferences and symposia

Physics news on the Internet



1063-7869(2016)59:4;1-3