

## New books on physics and related sciences

DOI: 10.3367/UFNe.2016.08.037889

**Krasnikov N V, Matveev V A** *The Discovery of the Higgs Boson and a Search for New Physics at Large Hadron Collider at Energies of 7 and 8 TeV* (Moscow: Izd. URSS, 2015) 288 pp. ISBN 978-5-396-00645-4.

This book presents a review of the most important avenues in a search for new physics in 2010–2012 LHC (Large Hadron Collider) experiments for a total energy of colliding protons reaching 7 and 8 TeV. The LHC was designed by an international body of professionals—scientists, engineers, and technologists—from many countries on the basis of the European Organization for Nuclear Research in Geneva (CERN). The book gives a review of the discovery of the Higgs boson underlying the mechanism of spontaneous violation of gauge symmetry in electroweak interactions. It also reviews the search for supersymmetry and the related new family of heavy fundamental particles and a number of exotic phenomena predicted by various generalizations of the Standard Model of elementary particles. The book is intended for research workers, both theorists and experimentalists, postgraduates and undergraduate students specializing in elementary particle physics, high-energy physics, and quantum field theory, and also specialists in the modeling of physical processes in high-energy particle collisions at modern colliders. (URSS Publishers: Nakhimovskii prosp. 56, 117335 Moscow; tel./fax: +7 (499) 724-25-45; e-mail: [urss@URSS.ru](mailto:urss@URSS.ru); URL: <http://urss.ru/>)

**Gulyaev Yu, Kazaryan M, Mokrushin Yu, Shakin O** *Acousto-optical Laser Systems of TV Image Formation* (Moscow: Izd. Fizmatlit, 2015) 240 pp. ISBN 978-5-9221-1647-3.

This monograph presents the theory of acousto-optical interaction in anisotropic crystal media possessing gyrotropic properties, and a method based on it is elaborated for calculating the spatial distribution of light radiation intensity on a projection screen upon diffraction of pulsed laser radiation by an amplitude-modulated ultrasonic signal in a paratellurite (TeO<sub>2</sub>) crystal. The study of the characteristics of an acousto-optical system exploiting the pulsed method of line formation for displaying and recording the data, based on the use of copper vapor lasers, makes it possible to extend the results obtained by the authors to systems with full-color pulsed solid-state lasers that are now being rapidly developed. The book is addressed to specialists and practising engineers engaged in the field of laser technology and nonlinear optics. (Fizmatlit Publishers: ul. Butlerova 17B, 117342 Moscow; tel. +7 (499) 968-92-28; e-mail: [fizmat@maik.ru](mailto:fizmat@maik.ru); URL: <http://www.fml.ru/>)

**Abolmasov P K, Zhuravlev V V, Kochetkova A Yu, Lipunova G V et al.** *Accretion Processes in Astrophysics* (Ed. N I Shakura) (Moscow: Izd. Fizmatlit, 2015) 416 pp. ISBN 978-5-9221-1633-6.

This book is concerned with the most important and fundamental topics of the modern theory of disc and quasi-spherical accretion onto black holes and magnetized neutron stars. The calculations into the structure of the standard model of stationary disc accretion (the alpha model) are successively expounded. It is shown how the estimates of the basic model parameters are obtained from a comparison of the theory of nonstationary disc accretion with the observational data of nonstationary X-ray sources. The method of calculation of relativistic corrections near the inner disc radius is outlined. The dynamics of warped accretion discs formed around rotating black holes with angular momentum non-orthogonal to the orbital plane is considered. The structure of accretion discs around supermassive black holes in active galactic nuclei and quasars is examined through observation by the gravitational microlensing method. The theory of quasispherical accretion onto magnetized neutron stars and its application to observed slowly rotating X-ray pulsars is expounded. The theory of transient growth of abnormal perturbations in Kepler discs is considered. Some aspects are analyzed concerning the development of magneto-rotational instability in axially symmetric shear flows, both in general and in application to thin Kepler discs. The viscous convective instability in thin laminar Kepler discs, which can initiate the development of turbulence in these discs, is explored. The book is meant for senior university students, postgraduates, and specialists in the field of high-energy astrophysics. (Fizmatlit Publishers: ul. Butlerova 17B, 117342 Moscow; tel. +7 (499) 968-92-28; e-mail: [fizmat@maik.ru](mailto:fizmat@maik.ru); URL: <http://www.fml.ru/>)

**Damour T** *Einstein's World: From the Theory of Relativity to String Theory* (Translation from the French and scientific editing by V Belavin) (Moscow: Izd. Alpina non-fiction, 2016) 267 pp. ISBN 978-5-91671-485-2. ISBN 978-2-7491-2450-6.

This book enables the reader to penetrate through Einstein's world, to share those special moments when he managed to raise the edge of a large curtain a little and have insight into the hidden mechanisms of the Universe. Step by step, the author gives a thorough but captivating and accessible narration of the sources and formation of Einstein's ideas, shows their struggle with established notions, and points out their importance for our time. The author's unusual view of the life and scientific achievements of Albert Einstein is presented. This is an attempt to reproduce Einstein's path to his discoveries. The book covers the whole life and the creative scientific work of Einstein, displaying at the same time everyday applications of his ideas: from the laser to

global positioning systems. Thibault Damour is a Professor at the Institut des Hautes Études Scientifiques and a Member of the French Academy of Sciences. As a theoretical physicist, he became world renowned for his pioneering research work in the field of black holes, pulsars, gravitational waves, and cosmology. For his achievements, he has received a number of awards, including the prestigious Albert Einstein Medal. Translation of the edition Damour T, *Si Einstein m'était conté: De la relativité à la théorie des cordes*. (Le Cherche Midi, 2012). (Alpina Publisher, LLC: 4th Magistral'naya ul. 5, 123007 Moscow; tel. +7 (495) 980-80-77; e-mail: shop@alpina.ru; URL: <http://www.alpinabook.ru/>)

**Books and Monographs by Research Workers at JINR, 1956–2016: To 60th Anniversary of JINR: Bibliographic Index** (JINR, 2016-30, Compiled by E V Ivanova, V V Litsitis) (Dubna: JINR, 2016) 91 pp. ISBN 978-5-9530-0438-1.

This bibliographic index of books whose authors and co-authors are research workers at JINR was prepared on the occasion of the 60th anniversary of the Institute. The books included in the index testify to the significance of the research work carried out at JINR and the importance of the results obtained for the world community. The index consists of seven basic sections. It begins with a collection of transactions and selected works. Then come some scientific monographs, textbooks, and booklets. Dictionaries, reminiscences, memoirs, personalia, fiction, and poetry make up separate sections. Great attention is paid at JINR to teaching young scientists and specialists. For several years, the publishing department of JINR has issued whole series of textbooks: *Lectures for Young Scientists* and *Educational–Methodical Textbooks of ERC*. These series are presented in separate sections. In the sections themselves, the material is given in alphabetic order by the name of the first author, even if the first author does not work at JINR. First given are editions in foreign languages and then in Russian. At the end of the book come auxiliary alphabetic authors' indices for each section separately. Undoubtedly, the presented bibliographic list is incomplete, for it only includes the editions that were delivered to the scientific and technical library of JINR and will therefore be supplemented with both new and missing editions (URL: [http://inis.jinr.ru/sl/NTBLIB/Books\\_JINR.pdf](http://inis.jinr.ru/sl/NTBLIB/Books_JINR.pdf))

**JINR: Time, Events, and People** (Comp. L I Pirogova; Ed. B M Starchenko) (Dubna: Izd. Feniks +, 2016) 560 pp. ISBN 978-5-9279-0199-9.

This book compiles papers published in newspapers in the town of Dubna from 1992 to 2015. The authors are journalists and research workers at JINR. The book speaks about the history of JINR, about physicists and lyric poets, and about the town which became the motherland of many scientific discoveries. The book is intended for a wide circle of readers. The collection is led by a foreword from the Director of JINR, Academician V A Matveev, “JINR: initiator of future discoveries”, a unique resume of the 60-year history of the famous research center with mention of the leading scientists and organizers of science, scientific achievements, collaborations, and educational and innovational activity. (Moscow Book House: Internet-shop; tel.: +7 (495) 648-17-68; URL: [http://info.mdk-arbat.ru/bookcard?book\\_id=885010](http://info.mdk-arbat.ru/bookcard?book_id=885010))

**Zel'dovich Ya B Higher Mathematics for Beginners and Its Application to Physics** (Gen. ed. S S Gershtein) 7th ed. (Moscow: Izd. Fizmatlit, 2016) 520 pp. ISBN 978-5-9221-1667-1.

The basic concepts of differential and integral calculus are explained in this book in a very simple, demonstrative, and accessible form. Then, information necessary for the practical application of higher mathematics to physical and technical problems is given. A large number of physical problems, in particular, radioactive decay, nuclear chain reactions, the laws of mechanics, reactive motion and space velocity, molecular motion, electric phenomena, vibration theory, and the basic principles of radio engineering are considered on the basis of higher mathematics. Along with the mathematical analysis, the physical essence of the considered phenomena is presented in detail. The book is intended for senior pupils, technical schoolpupils, and those engaged in self-education. It may also be useful for first-year students of higher education institutions. It was approved by the USSR Ministry of Education as a manual for physical and mathematical secondary schools and for elective studies. With the participation of K A Semendyaev as editor. (Fizmatlit Publishers: ul. Butlerova 17B, 117342 Moscow; tel. +7 (499) 968-92-28; e-mail: fizmat@maik.ru; URL: <http://www.fml.ru/>)

**Aleshkevich V A General Physics Course: Molecular Physics** (Moscow: Izd. Fizmatlit, 2016) 312 pp. ISBN 978-5-9221-1696-1.

This textbook is the fourth edition in the series *University Course of General Physics* and is meant for students of physical specialties of institutions. It corresponds to new programs worked out at the Faculty of Physics of Lomonosov Moscow State University and reflects the modern tendencies in and technologies of physical education. The textbook is written in the form of 25 topical lectures, each of which contains material of the first (basic) level corresponding to the course program and is presented in corpora in a lecture hall and is consolidated in seminars and laboratory practical work. The material of the second level not only broadens the horizons of students by acquainting them with unique materials and composites, their applications, and prospects for exploiting new technologies, but also implicates a special ‘world outlook’, which is first of all acquainting students with the evolution-synergetic paradigm in the framework of which the occurrence of chaos from order and the inverse process of self-organization are discussed, as well as the thermal and entropic balances of Earth, the problem of rational use and reproduction of limited Earth's resources, and the evolutionary dynamics of the world system in the next century. (Fizmatlit Publishers: ul. Butlerova 17B, 117342 Moscow; tel. +7 (499) 968-92-28; e-mail: fizmat@maik.ru; URL: <http://www.fml.ru/>)

**Vintzenko I I Linear Induction Accelerators** (Moscow: Izd. Fizmatlit, 2015) 304 pp. ISBN 978-5-9221-1637-4.

This book presents the results of research performed at Tomsk Polytechnical University, and an analysis is given of the publications of Russian and foreign authors engaged in the elaboration and application of linear induction accelerators (LIAs). LIA constructions are considered, the

physical processes in elements of accelerators and in generators of high-voltage pulses of microsecond duration on the basis of LIA technology are described, and the computational methods of the elements and the modeling of facilities for determining output characteristics are presented. The book is intended for scientists and engineers in the field of high-current electronics, accelerators and high-voltage technology. (Fizmatlit Publishers: ul. Butlerova 17B, 117342 Moscow; tel. +7 (499) 968-92-28; e-mail: fizmat@maik.ru; URL: <http://www.fml.ru/>)

**Berezanskaya V M *Talks About Landau: The Man Beyond the Stereotype*** (Series: Science in the USSR: To the Stars Through Thorns, 41) (Moscow: Izd. URSS, 2016) 456 pp. ISBN 978-5-9710-2164-3.

This book, written by the historian of physics, author of many scientific-historical publications, and research worker at Lebedev Physical Institute of RAS, V M Berezanskaya, is an attempt to take a new look at the many sides of the personality and biography of a great scientist, Lev Davidovich Landau—the outstanding theoretical physicist, Nobel Prize winner in Physics 1962, and co-author and inspirer of the world-renowned *Course of Theoretical Physics*. The book is compiled from talks written in different years by the author of this book and also by the writer, physicist, and popularizer of science, A M Livanova. Along with the interviews, the book contains a number of appendices that can also be regarded as part of Landau's brilliance (including programs of Landau's theoretical minimum, favorite poems, letters from various times, and the famous 'testimonies'). The aim of the book is to help the reader to form his own opinion of Landau from the reminiscences about this man of very different people who knew him. It also presents lively and direct impressions of Landau's friends, colleagues, and disciples, most of which have never been published. Those who had close relationships with him and those who knew Landau only episodically tell us equally emotionally and sincerely about their contacts with the scientist, his views of the world, and the essence of his character and beliefs. (URSS Publishers: Nakhimovskii prosp. 56, 117335 Moscow; tel./fax: +7 (499) 724-25-45; e-mail: urss@URSS.ru; URL: <http://urss.ru/>)

Compiled by *E V Zakharova*  
(e-mail: zaharova@ufn.ru)