

New books on physics and related sciences

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Zharkov G F *Selected Work in Theoretical Physics* (Series “Milestones of science in Russia. XXth century”, Editor-in-Chief V L Ginzburg) (Moscow: Nauka, 2007) 507 pp. ISBN 5-02-035317-5.

The book is a collection of selected papers of an outstanding theoretical physicist, DSc in physics and mathematics, Professor Gelii Frolovich Zharkov (1926–2004). He made an important contribution to progress in the theory of superconductivity and the electrodynamics of finite-sized superconducting systems. In the early stage of his research activities, G F Zharkov carried out a number of important studies in elementary particle physics. This book is a valuable aid to studying a wide range of topics in the physics of the superconducting state of matter. It shows at the same time the way many theoretical and applications-oriented fields in modern physics of condensed media evolved. The book includes a complete list of G F Zharkov's publications. It is aimed at research workers in theoretical and experimental physics, lecturers, postgraduates, and undergraduate students of physics departments at the universities and other higher education establishments. (Akademizdatcentr ‘Nauka’ RAN: 117997 GSP-7, Moscow V-485, ul. Profsoyuznaya 90; tel. (7-495) 334-71-51; fax (7-495) 420-22-20; e-mail: secret@naukaran.ru; URL: <http://www.naukaran.ru/>)

Pashkov P T *Beam Physics in Circular Accelerators* (Moscow: Fizmatlit, 2006) 264 pp. ISBN 5-9221-0731-3.

The book gives a systematic presentation of aspects involving charged particle beam dynamics in circular accelerators. A consistent description is given of physical processes in accelerated beams; the presentation gradually introduces more complex matters. The first part of the book is concerned with the physics of low-intensity beams, while the second deals with the influence of collective effects on beam dynamics in circular accelerators and analyzes the basic types of coherent instabilities in charged particle beams. The solutions of dispersion equations are given as diagrams in the complex impedance plane. Approximate analytical criteria of the stability of high-intensity beams are also given. The book is targeted as a textbook for senior-year students and postgraduates of technical physics and engineering physics of higher education establishments. It is recommended by the Educational Methodological Council on physics of the Educational Methodological Association (EMA) of Classical University Education of the Russian Federation as a textbook for undergraduates of higher education establishments specializing in subjects 010701 — physics, and 010705 — atomic nucleus and particle physics. The book has the stamp of approval of the EMA. (Fizmatlit Publ.: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495)

334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: <http://www.fml.ru/>)

Sukhanov A D, Golubeva O N *Lectures on Quantum Physics* (Moscow: Izd-vo Vysshaya shkola, 2006) 528 pp. ISBN 5-06-004775-X.

The first version of this book appeared in 1991 [Sukhanov A D *Lectures on Quantum Physics* (Moscow: Vysshaya shkola, 1991) 383 pp. ISBN 5-06-002061-4] and became a bibliographic rarity rather rapidly, despite the print run of 15,000 copies. This textbook, certified and given the stamp of approval by the RF Ministry of Education and Science, is an expanded and thoroughly reworked version of the same book. It fully meets the State Educational Standards and Outline of Curriculum for subjects 530000 and 540500, Physics of Higher Professional Education, certified by the RF Ministry of Education for 2000. The authors had read this one-term course of lectures a number of times to students of some educational institutions in Moscow as a component of the General Physics course. This textbook presents the fundamental laws of quantum physics without resorting to its cumbersome mathematical apparatus. The physical foundation of quantum mechanics is presented using the simplest models and aims at demonstrating the unusual nature, universality, and flexibility of the concept of the integral microscopic state that is formed by the macroscopic environment. The main purpose of this textbook is to show that quantum mechanics is not reducible to the so-called wave–corpuscle dualism but constitutes the basis of an outlook on nature that is more profound than that reigning in classical physics. The book discusses at greater length than is common practice certain aspects of the quantum dynamics of matter, including macroscopic quantum phenomena. For the first time in a general physics course a description of quantum properties of atomic nuclei and elementary particles is given from a unified standpoint. The book is included in the Dedicated Federal Program ‘The Culture of Russia’. It is aimed at students specializing in technical physics and technical fields, as well as at postgraduates, teachers, and students at retraining courses. (Vysshaya shkola Publ.: 127994 Moscow, Neglinnaya ul. 29/14, tel. (7-495) 694-04-56; e-mail: info_vshkola@mail.ru; URL: <http://www.vshkola.ru/>)

Abramov A I *History of Nuclear Physics: Textbook* 2nd revised ed. (Moscow: Editorial URSS, 2006) 232 pp. ISBN 5-484-00270-2.

This textbook briefly outlines the history of evolution of the concept of atoms, from antiquity to the end of the XXth century. The main emphasis is on the history of nuclear physics proper, which began with the French physicist A H Becquerel discovering of spontaneous radioactivity. Appendices provide brief biographical information on famous scientists, a chronological table, and a detailed

bibliography. It is written as a textbook for students reading the full course of nuclear physics and for any reader interested in this subject. (Editorial URSS Publ.: 117312 Moscow, pros. 60-letiya Oktyabrya 9, office 203 at the Institute for Systems Analysis, RAS; tel./fax (7-495) 135-44-23, 135-42-16; e-mail: urss@urss.ru; URL: <http://www.urss.ru/>)

Fetisov G V *Synchrotron Radiation: Techniques for Analyzing Materials Structure* (Moscow: Fizmatlit, 2007) 672 pp. ISBN 5-9221-0805-8.

What is synchrotron radiation (SR), how is it generated, and what unique properties does it possess? What are the new features, in comparison with X-rays emitted by X-ray tubes, that X-rays from SR sources offer us in studying the atomic structure of matter? What SR generators are currently available and what sources may be anticipated in the near future, how does one find them, and what are their main characteristics? What is the difference between conducting structural and spectroscopic X-ray studies using SR sources and using laboratory sources of X-rays, and what special devices are needed and are already available for such SR experiments? Which X-ray diffraction and spectral measurements became feasible recently only after affordable SR became available, how should they be conducted, and what principally new features of matter may be learnt from the results of these measurements? The six chapters of this book describe precisely this. The book has the stamp of approval of Educational Methodological Association (EMA). (Fizmatlit Publ.: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: <http://www.fml.ru/>)

Medvedev B V *Foundations of Theoretical Physics* (Series “Fundamental and applied physics,” edited by A D Sukhanov) 2nd ed. revised and enlarged (Moscow: Fizmatlit, 2007) 600 pp. ISBN 978-5-9221-0770-9.

The first edition of the book written by this outstanding Russian physics theoretician appeared in 1977 (Moscow: Nauka, Glavnaya redaktsiya fiz.-mat. literatury, 1977; 496 pp.). It became a bibliographic rarity very soon, despite the print run of 25,000 copies. The above textbook on the subject ‘Theoretical physics’, with the stamp of approval of the RF Ministry of Education and Science, is a revised and expanded version of the same book. It was brought in in correspondence with the requirements of the State Educational Standards of Higher Professional Education (VPO) in technical-physics and engineering-physics orientations and specializations. The book gives a modern brief exposition of the foundations of theoretical physics, aimed at a wide circle of potential readers. It is comprised of three parts: I. Classical mechanics; II. Field theory (Mechanics of relativity theory); III. Elements of quantum mechanics. The main goal of the author was to create an accessible but at the same time scientifically rigorous book. The author paid maximum attention to a logically impeccable consistent presentation of the fundamental issues that seem to be the key points to us today, and this allowed him to demonstrate the unity and integrity of our theoretical knowledge of physics. It was agreed with Fizmatlit Publ. that the second edition of this textbook should be in two volumes. Volume I should be based on the 1st edition, revised by the editor and expanded with a number of important items from the scientific heritage of the

author. Two more parts are planned to be added to volume II: IV. Elements of quantum field theory; V. Theory of scattering matrix. The book will be useful to all undergraduates studying theoretical physics but not necessarily majoring in it: students of technical physics departments and experimental physicists, as well as people concerned with studies in engineering, mathematics, chemistry, biology, etc., who are also interested in physics. It is also meant for teachers in higher education and students of retraining courses. (Fizmatlit Publ.: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; e-mail: fizmat@maik.ru; <http://www.fml.ru/>)

Sukhanov A D, Golubeva O N *Concepts of Modern Natural Science* (Ed. A F Khokhlov) 3rd stereotype ed. (Moscow: Drofa, 2006) 256 pp. ISBN 5-358-01300-8.

Sukhanov and Golubeva initiated in 1992 the introduction of a new curriculum subject, “Concepts of modern natural science” into State Educational Standards of all orientations and specializations of Higher Professional Education (VPO) of Russia; they also co-authored two generations of the Outline of Curriculum for this subject. Version 1 of this book won a prize at the All-Russia contest of new-generation textbooks in the nomination “State-of-the-art natural science for humanities” and was published in 2000 [Moscow: Agar Publ., 2000], 452 pp. ISBN 5-89218-110-3]. The second (revised) edition appeared in 2004 [Moscow: Drofa Publ., 2004] 256 pp. ISBN 5-7107-7995-4]. The book is classified as a textbook approved by the RF Ministry of Education and Science and complies completely with the current State Educational Standard of VPO and the Outline of Curriculum for this subject. The corresponding course of lectures was read for many years by the authors of the book to undergraduates of humanities at leading Russian universities, including Moscow State University, Russian Peoples Friendship University, Nizhny Novgorod State University, and St.-Petersburg State University. The textbook implements the initial idea of launching natural-science education for students of humanities. The text of the book is based on the results of original research by the authors in methodology, the history of natural science, and the theory of teaching natural sciences, supported by extensive and multifaceted teaching experience. The presentation is based on fundamental ideas of natural sciences, the concepts and models that are common to all natural sciences, and the results of application of classical and nonclassical strategies to nature studies. Much attention is given to modern concepts in physics that make it possible to paint a clear-cut and self-consistent picture of the world. The textbook was prepared for students specializing in humanities and in related fields of the VPO in Russia. It is also recommended for postgraduates and teachers of natural-science subjects in universities and specialized high schools, as well as for students of retraining courses. (Drofa Publ.: 127018 Moscow, Sushchevskii val 49; tel. (7-495) 795-05-50; fax (7-495) 795-05-52)

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