

New books on physics and related sciences

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Heisenberg W *Selected Works* (Translated from the German by Yu A Danilov and A A Sazykin) (Moscow: Éditorial URSS, 2001) 616 pp. ISBN 5-8360-0210-X. RFBR project 98-02-30033.

The readers' attention is called to a collection of selected works of the eminent theoretical physicist and one of the founders of new physics, Werner Heisenberg (1901–1976). This book clearly demonstrates his contributions to quantum mechanics, quantum field theory, ferromagnetism, turbulence, the theory of the atomic nucleus, and the theory of cosmic showers. (Éditorial URSS Publ.: 113208 Moscow, ul. Chertanovskaya 2/11; tel./fax (7-095) 135-4423, e-mail: urss@urss.ru)

Kravchenko A F *Physical Principles of Functional Electronics* Textbook (Exec. ed. I G Neizvestnyi) (Novosibirsk: Novosibirsk State University Publ., 2000) 444 pp. Bibliography: 81 refs. ISBN 5-7615-0489-8.

This book examines various physical processes in solids, on the basis of which a wide variety of data conversion devices of modern electronic engineering are being created. It summarizes the latest advances in this field, made by workers in Russia and abroad. It also assesses the limiting physical parameters of functional devices, analyzes yet unsolved problems, and discusses the most promising lines of research in the field of functional electronics — a branch of electronics based on the excitation, control and detection of dynamical inhomogeneities in active media. For various functional devices (opto-electronic, magnetic, magneto-optic, superconducting, acousto-electric, etc.), some aspects of their operation and most effective fields of application are discussed. The book was supported by the Russian Federation's 1997–2000 special-purpose program 'State Support for Higher Education – Basic Science Integration'. The textbook is intended for senior undergraduate students in physics as well as for persons working for the degree of master and post-graduate students in informatics, electronic engineering, and the automation of physical and technological processes. Recommended by the RF Ministry of Education as a textbook for undergraduate courses in electronic engineering, radio engineering, and communication. (Novosibirsk State University Publ. regular mail address: 630058 Novosibirsk, ul. Russkaya 35)

Irodov I E *Quantum Physics: Basic Laws* University textbook (Moscow–St.-Petersburg: Fizmatlit, Laboratoriya Bazovykh Znaniy, Nevskii dialekt, 2001) 272 pp. ISBN 5-93208-055-8.

This textbook presents theoretical and experimental material related to the basic ideas of quantum physics. It includes numerous worked examples and features many study problems for all of which the author indicates what he believes is the best method of attack. The problems are closely related to the text material and often extend and supplement it. In presenting the material, care is taken whenever possible to avoid making the book too mathematical and to emphasize instead the physical aspect of the phenomena considered. For students specializing in physics and engineering disciplines. ('Laboratoriya Bazovykh Znaniy' Publ. : 103473 Moscow, P.O. box 9; tel. (7-095) 955-0398, e-mail: lbz@aha.ru; 'Dialekt' Publ.: St.-Petersburg; tel. (7-812) 247-9301, e-mail: dialect@sndlct.ioffe.rssi.ru)

Irodov I E *Study Problems in General Physics* A manual (Series 'College and University Textbooks. Special Literature') 3rd revised ed. (St.-Petersburg: Lan', 2001) 416 pp. ISBN 5-8114-0319-4.

This book features nearly 2,000 problems covering all parts of the course in general physics. The diversity and originality of the problems combined with a certain limited amount of background theoretical material and an abundance of tabulated reference data make this collection quite suitable for the course. While the format of the 1988 edition is retained, some errors, misprints, and inaccuracies have been removed. For students specializing in physics and engineering disciplines. (Lan' Publ.: 193012 St.-Petersburg, pr. Obukhovskoi oborony 277; tel. (7-812) 262-2495; e-mail: lan@lpbl.spb.ru; <http://www.lanpbl.spb.ru>)

Ivanov V I, Popov V Yu *Conformal Mappings and Their Applications* (Ed. by A G Sveshnikov) (Moscow: MSU Physics Department Publ., 2000) 324 pp. Bibliography: 23 refs.

This book is an extended synopsis of a special course dealing with conformal mappings, the application of the latter to problems in mathematical physics, and their computer visualization. An account is given of the numerous applications of conformal mappings to the calculation and visualization of plane harmonic vector fields in hydrodynamics and electromagnetism, as well as in the filtering theory. Included in the book is a detailed discussion of the mapping of polygonal regions using the Christoffel–Schwarz integral. The book contains an atlas of conformal mappings realizable with elementary functions. For the construction of the images presented in the book, the software package Maple V was employed. For undergraduate and post-graduate students and researchers in physics, mathematics, and engineering. (MSU Physics Department Publ. regular mail address: 119899 Moscow, Vorob'evy Gory, M V Lomonosov MSU)

Interaction of Ultrashort Laser Pulses with Matter (Trudy IOFAN, Vol. 57, Ed.-in-chief V V Korobkin) (Moscow: Nauka – Fizmatlit, 2000) 160 pp. ISBN 5-02-015320-6.

This collection presents the results of theoretical and experimental research into the interaction between laser radiation and matter. The possibility of exciting nuclear energy levels by laser radiation is discussed, and the orientation and focusing of molecules and molecular ions in a high-power light field are examined. The book analyzes the application of axicon-based focusing systems to the formation of wave beams with compensated diffraction (i.e. with a caustic length much larger than the Fresnel length) and discusses the application of such beams in science and technology for the purposes of creating homogeneous plasma channels. It also examines the propagation (and stability aspects) of relativistically intense electromagnetic waves in plasmas where the generation of harmonics and the Compton and SRS effects are important. Topics also include the influence of plasma microfields on many-particle processes in plasmas, the radiation characteristics of hydrogen plasma in the field of circularly polarized laser radiation, and electron motion in the high-power field of an ultrashort laser pulse of relativistic intensity. For researchers, engineers, and undergraduate and post-graduate students interested in the topical problems of laser physics.

Beleicheva T G Channel Optical Waveguides: Mathematical Modeling and Investigation Monograph (Vladivostok: Admiral G I Nevel'skiĭ Far-East State Marine Academy Publ., 2000) 183 pp. Bibliography: 189 refs. ISBN 5-8343-0011-1.

This monograph provides theoretical analysis of light propagation processes in channel optical waveguides used as basic elements in integrated-optical devices for information handling and transfer. Waveguide characteristics are studied using mathematical modeling and numerical simulation methods. The author is the first to develop mathematical and computational models and computer codes for examining the spectrum and electromagnetic fields of directed channel-waveguide modes with account for the anisotropy and two-dimensional inhomogeneity of the waveguide cross section. A new method for determining the full spectrum and electromagnetic fields for channel-waveguide modes is proposed and, mainly, for the waveguide structure of the $\text{LiNbO}_3:\text{Ti}$ Z-section, the dependence of the optical characteristics of a waveguide on its technological and geometrical parameters is discussed. The book is intended for specialists in integrated optics and computational mathematics and it is proved to be of interest for college teachers and undergraduate and post-graduate students in related subjects. (Admiral G I Nevel'skiĭ Far-East State Marine Academy Publ. regular mail address: 690059 Vladivostok, Verkhneportovaya ul. 50a)

Gavrilencov V A, Bocharov A M Optical Measuring Instruments: Schemes and Components (Diamond Processing Library, Issue 1, Series ed.-in-chief S I Zienko) (Smolensk: SGUP PO 'Kristall' Publ., 2000) 160 pp. Bibliography: 14 refs. ISBN 5-94006-001-3.

This book introduces the basic principles of designing the optical measuring instruments, describes the optical schemes of the devices, and presents information on their optical parts and components. The book is intended for engineers and technologists whose work concerns the design and exploitation of optical measuring instruments, and is also appropriate for students taking such courses as 'Optoelectronic devices and systems' and the 'Physics and technology of diamond processing'.

Parvulyusov Yu B, Rodionov S A, Soldatov V P, Shekhonin A A, Yakushenkov Yu G Design of Optoelectronic Devices Textbook. 2nd edition revised and enlarged (Ed. by Yu G Yakushenkov) (Moscow: Logos, 2000) 488 pp. Bibliography: 40 refs. ISBN 5-88439-144-7.

This book covers the general aspects, methodology and stages of the design of optoelectronic devices. It presents methodologies for calculating and selecting the basic parameters of such devices and discusses methods for calculating and designing their basic elements. Particular attention is given to the layout, testing, and metrological certification aspects. A large number of example calculations and designs are presented. The book was supported by the Russian Federation's 1997–2000 special-purpose program 'State Support for Higher Education – Basic Science Integration'. Recommended by the RF Ministry of Education as a textbook for undergraduate courses 'Optical engineering' and 'Optoelectronic devices and systems'. It is also a valuable resource for a wide range of specialists engaged in optical instrument making. (Logos Publ. Inc. regular mail address: 105318 Moscow, Izmailovskoe sh. 4)

Compiled by *E V Zakharova*