

## New books on physics and related sciences

DOI: 10.3367/UFNe.0182.201203k.0343

**Zasov A V, Postnov K A** *General Astrophysics* 2nd ed., revised and enlarged (Fryazino: Vek 2, 2011) 576 pp. ISBN 978-5-85099-188-3.

The book is based on the courses of lectures on general astrophysics delivered by the authors for many years to students in the Moscow State University (MGU) Department of Physics. The book treats the basic mechanisms of the interaction of radiation with matter, modern methods of astronomical observation, solar physics, and the physics of the Solar System, physical processes in the interstellar medium, the formation of stars and their structure, the evolution of stars and their transformation into compact objects, processes observed in galaxies, and elements of modern cosmology. On the whole, the authors give the general physical picture of the structure and evolution of our Universe. The 2nd edition of the book (the 1st was published in 2006) reflects some of the most important new achievements of astrophysics, without which the course would be sorely incomplete. The authors attempted to correct the misprints and imprecise definitions that crept into the first edition. Chapters 2, 3, 5, 8, 9, 11 were substantially reworked. The book can be used as a modern textbook on general astrophysics, primarily for university undergraduates in physics and astronomy. (Vek 2 Publishing: 141195 Fryazino, Moscow region, ul. Barskie prudy 5-232; tel./fax: +7 (496) 567 82 35; e-mail: vek2@vek2.ru; URL: <http://www.vek2.ru/>)

**Bulatov V V, Vladimirov Yu V** *Dynamics of Nonharmonic Wave Packets in Stratified Media* (Moscow: Nauka, 2010) 470 pp. ISBN 978-5-02-036981-8.

The monograph is devoted to studying the processes of excitation and propagation of nonharmonic wave packets of internal gravity waves in vertically stratified, horizontally nonuniform, and nonstationary media; to developing asymptotic methods which generalize the spacetime ray method (the geometric optics method); to exploring critical phenomena in the generation and evolution of internal gravity waves, and to devising nonspectral methods of analysis of full-scale measurements of hydrophysical fields in the ocean. The book is intended for experts in mathematical modeling, hydrodynamics, and oceanology. (Akademizdatsentr ‘Nauka’ RAN: 117997 Moscow, ul. Profsoyuznaya 90; tel. +7 (495) 334 98 59; fax +7 (495) 420 22 20; e-mail: initsiat@naukaran.ru; URL: <http://www.naukaran.ru/>)

**Kapitonov I M** *Introduction to the Physics of Nuclei and Elementary Particles* 4th ed. (Moscow: Fizmatlit, 2010) 512 pp. ISBN 978-5-9221-1250-5.

This book presents the final volume of the course of general physics covering atomic nuclei and elementary particles. The material has grown out of fifteen lectures delivered by the author to students in the Moscow State University Department of Physics. The concluding lectures deal with cosmological aspects of the physics of elementary particles and nuclei. The book contains the latest information and includes appendices. This volume is intended for students majoring in physics as their first systematic introduction to the physics of the nucleus and elementary particles. It will also be useful for teachers and postgraduates of physics departments in higher education institutions. Refereed by Professor V G Nedorezov (RAS Institute for Nuclear Research), Professor E A Romanovskii (D V Skobeltsyn Institute of Nuclear Physics of MGU). (Izdatel'stvo ‘Fizmatlit’: 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/>)

**Shchelkachev N M, Lesovik G B** *One-Dimensional Scattering in Quantum Mechanics and Its Applications* Textbook (Moscow: MFTI, 2011) 79 pp. ISBN 978-5-7417-0363-2.

The book treats the fundamentals of the theory of one-dimensional scattering in quantum mechanics and its applications to the theory of electron transport in nanostructures. It is intended for students studying the physics of quantum low-dimensional structures, and for postgraduate students who major in fields linked to the theory of the condensed state. (MFTI: 141700 Moscow region, Dolgoprudnyi, Institutskii per. 9; tel. +7 (495) 408 45 54; fax +7 (495) 408 42 54; URL: <http://mipt.ru/>)

**Filachev A M, Trishenkov M A, Taubkin I I** *Solid State Photoelectronics. Photodiodes* (Moscow: Fizmatkniga, 2011) 448 pp. ISBN 978-5-89155-203-6.

The textbook *Solid State Photoelectronics. Photodiodes* offered to the reader presents, in detail and with a minimum of references to other sources, a host of physical phenomena proceeding in the most widespread solid-state photoelectronic devices, namely semiconductor photodiodes, including avalanche and matrix photodiodes, photodiodes with internal photoemission, and photodiodes based on heterojunctions and quantum-dimensional structures. Descriptions are given of the structure and characteristics of industrial and recently developed photodiodes based on silicon, germanium, and the InGaAs, InSn, CdHgTe, SiC, AlGaIn compounds, quantum-dimensional InAs/GaSb superlattices, and other materials that are photosensitive in various spectral bands of optical radiation from UV to IR. The manual is intended

for students majoring in the following fields: ‘Optical technologies’, ‘Photonics and optoinformatics’, ‘Electronics and nanoelectronics’, ‘Design and technology of electronic facilities’, ‘Nanoengineering’, ‘Applied mathematics and physics’, ‘Technical physics’, ‘Information systems and technologies’, and ‘Instrument making’. The book is also intended for postgraduate students preparing theses in such fields as ‘Physics of semiconductors’, ‘Physical electronics’, ‘Solid-state electronics’, ‘Quantum electronics’, ‘Technology of electronic devices’, ‘Optical and optoelectronic devices and integrated systems’, and ‘Devices and methods of transformation of images and sound’. Finally, it will be a valuable reference for engineers, research workers, and university teachers specializing in the development and application of photoelectronic devices and optoelectronic systems. (Izdatel’stvo ‘Fizmatkniga’: URL: <http://www.fizmatkniga.ru>)

**Anishchenko V S, Vadivasova T E** *Lectures on Nonlinear Dynamics* (Moscow–Izhevsk: RKhD, 2011) 516 pp. ISBN 978-5-93972-920-8.

This course of lectures on fundamental aspects of nonlinear dynamics of deterministic and stochastic systems presents the basics of the theory of dynamical systems, the theory of stability and bifurcations, and the theory of fractals and dimensions. It also analyzes basic nonlinear effects such as the generation of regular and chaotic oscillations and synchronization, and discusses problems caused by fluctuations in nonlinear systems, including the effects of noise on self-excited oscillators of regular and chaotic oscillations, stochastic resonance, and stochastic synchronization. The book is intended for masters, other postgraduate students and young researchers working in radiophysics, statistical radiophysics, and the theory of oscillations and waves, and also for undergraduate students choosing natural sciences in classical universities. (Scientific Publications Centre ‘Regular and Chaotic Dynamics’: 426034 Izhevsk, ul. Universitetskaya 1, Udmurtia State University, RKhD; tel. +7 (3412) 50 02 95; e-mail: [subscribe@rcd.ru](mailto:subscribe@rcd.ru), URL: <http://shop.rcd.ru/>)

**Sergei Ivanovich Vavilov: Album of Photographs** (Compilation by A A Komar, V M Berezanskaya, M A Lukichev) (Moscow: RMP, 2011) 208 pp. ISBN 978-5-91597-020-4.

The album was compiled by the staff of the P N Lebedev Physical Institute (FIAN) for celebrating the 120th anniversary of the birthday of Academician S I Vavilov, the founder and first director of FIAN (1934–1951), and President of the USSR Academy of Sciences (1945–1951). The album shows a large collection of photographs, many of them very rare, illustrating every stage in S I Vavilov’s life, beginning with his youth (as a pupil at a school of commerce), then as a student at Moscow State University and his travels abroad during these years, his army service years during WWI (1914–1918), and finally his work as a physicist, first at the Institute of Physics and Biophysics and then at FIAN. The photos are arranged in chronological order, helping the reader to form a clear and complete picture of the flow of events in S I Vavilov’s life. Furthermore, throughout the album photographs are interspersed with bits of text which are quotations from Vavilov’s diaries, synchronized in time with the events displayed in the photos. In these quotations, Vavilov either characterizes these events or, as often happens, muses philosophically on his life and his work. In this way, the

reader, browsing through the volume, imagines hearing S I Vavilov speaking from the past. This imparts unique charm to the album. (P N Lebedev Physical Institute, RAS: 119991 Moscow, Leninskii prosp. 53; tel. +7 (499) 135 42 64; URL: <http://www.lebedev.ru/>)

**Larkin A I** *Collected Works* Vol. 1 (Moscow: MTsNMO, 2009) 715 pp. ISBN 978-5-94057-460-6.

**Larkin A I** *Collected Works* Vol. 2 (Moscow: MTsNMO, 2011) 840 pp. ISBN 978-5-94057-811-6.

The collected works of Academician Anatoly Ivanovich Larkin (1932–2005) belong to a number of fields of theoretical physics: the theory of plasma, nuclear physics, quantum field theory, the theory of phase transitions and superconductivity, and other areas of the condensed matter theory. Volume 1 is a collection of papers published between 1959 and 1976. Volume 2 is a collection of papers published between 1977 and 1992. The book is intended for research workers, postgraduates, and undergraduate students who major in theoretical physics. (Izdatel’stvo Moskovskogo Tsentra Nepreryvnogo Matematicheskogo Obrazovaniya: 121002 Moscow, Bol’shoi Vlas’evskii per. 11; tel. +7 (499) 241 05 00; fax +7 (499) 795 10 15; e-mail: [publ@mccme.ru](mailto:publ@mccme.ru); URL: <http://biblio.mccme.ru/books>)

**Zwiebach B A** *First Course in String Theory* (Translated into Russian by A V Berkov, K B Alkalaev, editing and preface to Russian edition by I Ya Aref’eva, V I Sanyuk) Foreword by D Gross (Moscow: Editorial URSS, 2011) 784 pp. ISBN 978-5-354-01367-8. RFBR Project 09-02-07036.

Barton Zwiebach’s *First Course in String Theory* is unique in style and in form of presentation. It is meant to help a novice researcher to avoid the feelings of frustration and despair which not infrequently accompany attempts to digest traditional tomes—indeed, it is no secret that string theory has a reputation as an incredibly complicated science. On every page of the book the author proceeds firmly toward the stated goal: to make string theory accessible to any physicist who wishes to expand his or her knowledge of this discipline. The book covers practically the entire spectrum of string theory. The presentation is made in a self-contained format: for understanding the material, the reader just needs to be strong on the fundamentals of mechanics and know some elements of quantum mechanics. The author tries to stimulate the reader to exercise intuition and supports the formal text with numerous illustrative examples. The monograph reflects the current status of the theory. With this in view, some relevant topics were added to the second edition, e.g., AdS/CFT correspondence, strings on orbifolds, stabilization of modules, string theory landscape, and some others. A brilliant distinctive feature of this book is the presence of a large number of problems and warm-up exercises (about 300 in all), some just for training but some requiring reflection and a creative approach. The book has no peers among monographs in string theory, whether in completeness of the material presented or in the art of presentation. It will undoubtedly be of great help to final year degree students, postgraduates, and lecturers in the relevant disciplines, as well as to specialists in theoretical and mathematical physics. Translation of: Zwiebach B A *First Course in String Theory* 2nd ed. (Cambridge: Cambridge Univ. Press, 2009). (Izdatel’skaya gruppya URSS: 117335 Moscow, Nakhimovskii

prosp. 56; tel./fax +7 (499) 724 25 45; e-mail: orders@URSS.ru; URL: <http://urss.ru/>)

**Greene B** *The Fabric of the Cosmos: Space, Time and the Texture of Reality* (Translated from English by Yu Artamonov, general supervision by B S Ishkhanov, Eds V O Malyshenko, A D Panov) 2nd ed., revised (Moscow: URSS, 2011) 601 pp. ISBN 978-5-397-01966-8.

The author invites his readers to another breathtaking journey into the depths of the Universe; the trip will help us look at the reality surrounding us from a very different angle. The book addresses fundamental questions asked in classical physics, quantum mechanics and cosmology: What is space? Why does time have direction? Is it possible to travel back in time? What is the role played by symmetry and entropy in the evolution of the cosmos? What is lurking behind dark matter? Can the Universe exist without space and time? Greene examines in detail Newton's picture of the world, Mach's ideas, and Einstein's theory of relativity and analyzes where this theory contradicts quantum mechanics. The author discusses problems of decoherence and teleportation in quantum mechanics. A number of features of inflationary models of the Universe are analyzed, together with the first fractions of the first second after the Big Bang, the horizon problem, and the formation of galaxies. Much attention is devoted to a novel modern approach to explaining the world in terms of string theory/M theory. Greene shows that our world is very different from the one to which we are inured by common sense. The author makes it exciting for us all, regardless of our educational level or scientific training and leads us into an informative journey to new strata of reality that today's physics unravels under the familiar layer of the world we see every day. Translation of: Greene B *The Fabric of the Cosmos: Space, Time and the Texture of Reality* (New York: Knopf, 2004). (Izdatel'skaya gruppа URSS: 117335 Moscow, Nakhimovskii prosp. 56, tel./fax +7 (499) 724-25-45; e-mail: orders@URSS.ru; URL: <http://urss.ru/>)

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