

## New books on physics and related sciences

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**Rosanov N N** *Dissipative Optical and Related Solitons* (Moscow: Fizmatlit, 2020) 640 pp. ISBN 978-5-9221-1892-7.

The theory of dissipative optical and related solitons, i.e., radiation structures in a nonlinear medium or configuration, which are localized due to the balance of energy in- and outflow, is systematically laid out. Such solitons differ radically in their properties from conservative solitons in systems with a negligibly low dissipation and show a heightened stability indicative of their potential in applications. Although the focal point is the optical range of the radiation spectrum, in some schemes it can also be the microwave range or be replaced by other excitation sources of the medium. Displayed for one-, two-, and three-dimensional solitons is their internal structure determined by energy fluxes, the topology of these fluxes, and the symmetry and its relation to solitons and their complexes. Significant emphasis is placed on dissipative solitons of exceedingly short duration, whose analysis needs the use of strict Maxwell equations, and on manifestations of quantum fluctuations. Experimental results in these fields are reviewed. References are given to animation series illustrating the nonlinear dynamics of the processes described in the main text. The book is intended for research workers, postgraduates, and students interested in current problems in nonlinear physics, nonlinear optics and photonics, laser physics, extreme and topological optics, and information processing. (Fizmatlit Publishers: tel. +7 (495) 005-32-79; URL: <http://www.fml.ru/>, <https://www.fmlib.ru/>)

**Kvasnikov I A** *Thermodynamics and Statistical Physics: Theory of Equilibrium Systems* Vol. 2 *Statistical Physics* (Series: Classical University Textbook) 6th ed. rev. and suppl. (Moscow: URSS, 2021) 584 pp. ISBN 978-5-9710-8720-5.

This textbook, written in accordance with the program on theoretical physics, is based on the lecture course delivered by the author at the physical department of Moscow State University (MSU). The second volume includes material devoted to the basic points of Gibbs equilibrium statistical mechanics and applications, the theory of ideal systems, classical nonideal gases, and others. The textbook is divided into two parts: the main one, mainly containing the material included in the lecture course, and an auxiliary part, consisting of problems on the main material and additional questions formulated as problems not overstepping the limits of the program. The author of the textbook — Iridii Aleksandrovich Kvasnikov — is an authoritative specialist in the field

of statistical physics, an experienced methodologist and teacher who has been loved deservedly by many generations of students at the physical department of MSU. Since 1962, he has been a leading tutor and lecturer delivering the course Thermodynamics and Statistical Physics for fourth-year students in the Physical Department of Lomonosov MSU and the course of quantum statistics for fifth-year students-theoreticians. In 1992, I A Kvasnikov became a laureate of the Lomonosov Prize “For creating a unique lecture course and a textbook on statistical physics and thermodynamics,” which was awarded for the first time. The book is meant for institute students of physical specialties, postgraduates, as well as specialists interested in problems of statistical mechanics. (URSS Publishing Group: tel./fax: +7(499) 724-25-45, e-mail: [orders@URSS.ru](mailto:orders@URSS.ru), URL: <http://urss.ru/>)

**Bazarov I P** *Aberrations and Mistakes in Thermodynamics* Stereotyp. ed. (Moscow: URSS, 2021) 120 pp. ISBN 978-5-9710-9075-5.

Ivan Pavlovich Bazarov is doctor of phys.-mat. sciences, professor in the Department of Quantum Statistics (later, quantum statistics and field theory) of the Physical Department of Lomonosov MSU, a USSR State Prize laureate for the textbook *Thermodynamics* (1985); the textbook was widespread, repeatedly republished, and translated into several languages. It is devoted to a discussion of the wrong belief of the founders of thermodynamics (Clausius, Thomson, Planck, Nernst, Wien, Helmholtz) and an analysis of characteristic errors in the understanding of the basic concepts and initial principles of thermodynamics, its laws, and methods encountered in educational and scientific literature. Wrong conclusions in the application of thermodynamics to different macroscopic systems are considered. The book will be interesting to specialists in thermodynamics, postgraduates, and university students. (URSS Publishing Group: tel./fax: +7(499) 724-25-45, e-mail: [orders@URSS.ru](mailto:orders@URSS.ru), URL: <http://urss.ru/>)

**Shifrin K S** *Introduction to Ocean Optics* Stereotyp. ed. (Moscow: URSS, 2021) 280 pp. ISBN 978-5-9519-2118-5.

This book is devoted to analyzing the current state of ocean optics, mostly to the central problem of this science — the study of the optical properties of oceanic waters in connection with the weighted and dissolved substances responsible for these properties. Considered are the optical properties of successive oceanic water models, namely, pure water, pure sea water, dissolved organic substances, and suspended particles. Inverse problems, namely, determination of suspension composition by specific features of light scattering, are examined. Reference data on the ocean’s optical characteristics are given. The author of the book — doctor of phys.-

mat. sciences, one of the founders of semiconductor theory, and head of the world-renowned scientific school of atmosphere and ocean optics — made a fundamental contribution to the theory of direct and inverse problems of light scattering by regular- and random-shaped particles. He is founder of radio heat location (passive super high frequency (SHF) radiometry) and the author of over 400 scientific papers. The book is intended for research and practical workers in oceanology and related fields; it may serve as a textbook for engineers and constructors engaged in designing facilities to be used in the ocean or atmosphere above the ocean, and also for students and postgraduates (URSS Publishing Group: tel./fax: +7(499) 724-25-45, e-mail: orders@URSS.ru, URL: http://urss.ru/)

**Vysokomornaya O V** *Coagulation and Fragmentation of Liquid Drops in Multiphase and Multicomponent Gas–Vapor Drop Media* (Novosibirsk: SB RAS, 2021) 532 pp. ISBN 978-5-6046428-0-1.

This monograph contains results — the most interesting ones, in the authors' opinion — of theoretical and experimental studies of the processes of coagulation and fragmentation of liquid drops in multiphase and multicomponent gas-vapor drop media. Well-known models and theoretical consequences, as well as achievements of today's experimental methods, are considered. Forward-looking approaches to the investigation of the interaction of liquid drops in gaseous media with different compositions and parameters are considered. Promising technologies of primary and secondary liquid drop fragmentation using setups with them colliding among themselves or with hard walls, accelerated motion in a gas medium, and a microexplosive decay under heating were subjected to a comparative analysis. The monograph will be useful for specialists in the mechanics of two-phase and multicomponent flows, research workers, postgraduates, and senior students. (Publishing House of Siberian Branch of the Russian Academy of Sciences: tel. +7 (383) 330-17-58, e-mail: sprice@sibran.ru, URL: https://www.sibran.ru/)

**Zel'dovich Ya B, Yaglom I M** *Higher Mathematics in Physics and Technology for Beginners* 3rd ed., stereotyp. (Moscow: URSS, 2020) 512 pp. ISBN 978-5-9710-7543-1.

Yakov Borisovich Zel'dovich was an outstanding Soviet theoretical physicist and academician of the USSR Academy of Sciences. His studies were devoted to chemical physics, combustion theory, the physics of shock waves and detonation, physical chemistry, the physics of the atomic nucleus, elementary particle physics, and astrophysics and cosmology. He wrote a textbook in mathematics, *Higher Mathematics for Beginners and Its Application to Physics*, which was many times reedited, revised, and supplemented. Isaak Moiseevich Yaglom was a doctor of physics and mathematics, professor, prominent Soviet mathematician and pedagogue, and author of popular pedagogical and educational books in mathematics. I M Yaglom was a brilliant scientist, pedagogue, and popularizer of science. He wrote over 40 books, of which many became classical, not only in our country, but also abroad. Along with popular mathematical problem books and manuals, I M Yaglom published a number of studies on

the history of mathematics investigating the links between mathematics and natural and humanitarian sciences, as well as its role in the life of society. The authors — a famous physicist and a famous mathematician — joined their efforts to create quite a new type of textbook that will actually teach future physicists, chemists, biologists, and engineers to employ efficiently the mathematical apparatus and to use higher mathematics in their work, considering it a part of natural science solving as many specific problems as possible and to translate 'general day-to-day' intuitive approaches to reality into the language of exact definitions and formulas. The book is an introduction to mathematical analysis. Along with the fundamentals of analytical geometry and mathematical analysis (differential and integral calculus), the book contains the concepts of power and trigonometric series and the simplest differential equations, and also deals with a number of subdisciplines and topics from physics (mechanics and the theory of oscillations, the theory of electric circuits, radioactive decay, lasers, etc.). The book is meant for readers interested in natural-science applications of higher mathematics, institute and technical-college teachers, and future physicists and engineers. (URSS Publishing Group: tel./fax: +7(499) 724-25-45, e-mail: orders@URSS.ru, URL: http://urss.ru/)

**Surdin V G** *Astronomy. Popular Lectures* 2nd ed., suppl. (Moscow: Izd. MTsNMO, 2019) 350 pp. ISBN 978-5-4439-2823-4.

This book contains detailed and edited lectures delivered in recent years to students in various majors. The lectures are based on the interdepartmental MSU course Basic Elements of Astronomy. They can be used as an introductory course for students of natural-science departments (physicists, chemists, biologists, geographers, and geologists), and also for mathematicians and engineers who have not learnt astronomy earlier, but may need it in their work. The lectures will not be useless for philologists, especially for translators and editors, for they acquaint them with modern astronomical terminology and the most important concepts of space science. The previous edition of the book appeared in 2018. The present edition has two additional chapters, concerning giant planets and small bodies in the solar system. The book was nominated for the 2019 Prosvetitel (educator) Prize (natural and exact sciences (shortlist)). (The book can be downloaded freely with respect to copyright at the page <https://vsenauka.ru/knigi/vsenauchnyie-knigi/book-details.html?id=52> in the framework of the Vsenauka project. Free books.)

**Altshuler B L, Vasil'ev M A, Gurvits L I, Dremine I M, Ritus V I, Fortov V E, Shabad A E** *Academician A D Sakharov. Scientific Work. On the 100th Anniversary of His Birth* (Moscow: Fizmatlit, 2021) 592 pp. ISBN 978-5-9221-1907-8.

This book is a collection of scientific papers by Academician Andrei Sakharov concerning a wide range of subjects, namely, thermonuclear weapons, controlled thermonuclear fusion, muon catalysis, explosive magnetic generators, induced gravity, 'Sakharov cosmological oscillations', baryon asymmetry of the Universe, and many other things. The

comments of leading specialists, including those written specially for this edition, provide insight into the various areas of Sakharov's scientific activity in the present-day context. The first edition was published in 1995. (Fizmatlit Publishers: tel. +7 (495) 005-32-79; URL: <http://www.fml.ru/>, <https://www.fmlib.ru/>)

**Andrei Dmitrievich Sakharov. On the 100th Anniversary of His Birth** (Authors-compilers: V M Berezanskaya, N M Shaul'skaya) (Series of photo-albums, Biographies of Scientists in Photographs and Documents) (Moscow: FIAN, RMP, 2021) 264 pp. ISBN 978-5-91597-121-8.

The Lebedev Physical Institute of RAS (FIAN) presented the next album book from the series of biographies of their outstanding scientists whose activity was of universal importance (seven Nobel Prize winners at the institute). Albums have already been published devoted to Sergei Ivanovich Vavilov (2011), Dmitry Vladimirovich Skobeltsin (2012), Petr Nikolaevich Lebedev (2016), Nikolai Gennadievich Basov (2017), Vitaly Lazarevich Ginzburg (2017), Ilya Mikhailovich Frank (2018), and Igor Evgenyevich Tamm (2020). A new album devoted to the 100th anniversary of the birth of Andrei Dmitrievich Sakharov—one of the most prominent figures of the 20th century, research worker at FIAN, and laureate of the Nobel Peace Prize “for fearless personal commitment in upholding the fundamental principles for peace between men, courageous fight against the abuse of power and all forms of violation of human dignity,” was presented on 21 May 2021 at the grand meeting of the Academic Council of FIAN and the Division of Physical Sciences of RAS. Andrei Sakharov was one of the outstanding scientists of our time, an extremely talented theoretical physicist, an inventor, one of the ‘fathers’ of the Soviet hydrogen bomb, a full member of the USSR Academy of Sciences, and at the same time a great citizen and public figure who left an ineffaceable mark on science, life, people's memory, and the history of all humankind. The new album (most of the photographs and documents appear for the first time), published (just like the previous albums) under FIAN's organizational and financial support, provides insight into the formation of Andrei Dmitrievich's inward life and makes it possible to assess the importance of his participation in solving the most important state problems, to perceive the value of his personality and his deeds for the sake of science and humanity. The album will be appreciated by a wide range of readers. (The electronic versions of the album books published earlier can be found under the rubric Media: <https://lebedev.ru/ru/site-media/knigi.html> at FIAN's site: tel. +7(499) 1354264, URL: <http://www.lebedev.ru/>; RMP (Real Modern Pictures) publishers: tel. +7 (4855) 28-37-80, e-mail: [rmposad@mail.ru](mailto:rmposad@mail.ru); URL: <http://izdatelstvo-rmp.ru/>)

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