

New books on physics and related sciences

DOI: 10.3367/UFNe.0181.201110i.1125

Vitaly Ginzburg Remembered by His Friends and Contemporaries (Chairman of Editorial Board G A Mesyats, compiled by Yu M Bruk) (Moscow: Physics and Mathematics Literature Publ., 2011) 634 pp. ISBN 978-5-94052-213-3.

This book is a collection of memoirs of friends, colleagues, and students of Vitaly Lazarevich Ginzburg (1916–2009)—a remarkable man, outstanding theoretical physicist, winner of the Nobel Prize in Physics 2002, the State and the Lenin Prizes, Academician of the Russian Academy of Sciences (RAS). His entire life in science was associated with the P N Lebedev Physical Institute of the USSR AS (RAS as of 1992). V L Ginzburg's research papers covered very nearly the entire spectrum of fields of theoretical physics—he was one of the very few universal physicists. His classified paper connected with the creation of thermonuclear weapons in this country has now become well known, too. V L Ginzburg obtained fundamental results in the theory of superconductivity and the theory of phase transitions, which found applications in the most diverse fields of physics. He established large scientific schools in radiophysics, in the theory of propagation of electromagnetic waves, in condensed matter physics, and in astrophysics. He played a very important role in educating new generations of physicists and in promoting science. He was an influential unofficial personality in society, and his ideas and speeches made people pay attention, not only within the Academy of Sciences, but also in the upper rungs of power. This book presents more than sixty articles; among the authors we find 18 Full Members of the Academy and more than 40 DSc and PhD scientists. The book is intended for a wide circle of readers—physicists, mathematicians, people in the humanities, postgraduates, undergraduates, teachers and their students, people who are deeply interested in the history and the fate of our science, and people who are selecting their path in life. (Izdatel'stvo Fiziko-Matematicheskoi Literatury: 123182 Moscow, ul. Shchukinskaya 12, korp. 1; tel. (7-499) 720-41-53; e-mail: fizmatlit@narod.ru)

Mesyats G A Explosive Electron Emission (Moscow: Physics and Mathematics Literature Publ., 2011) 280 pp. ISBN 978-5-94052-207-2. RFBR Project 11-02-07001.

The book presents the results of comprehensive studies of explosive electron emission (EEE), which the author and his team discovered in the 1960s. In addition to characterizing EEE, the book analyzes in detail the physical processes that lead to EEE initiation in different configurations and with different cathode materials: tip and planar cathodes, 'triple points', liquid-metal cathodes, etc. The mechanisms of self-sustaining explosive emission processes have also been

addressed. The experimentally established cyclical nature of the processes in the cathode spot of vacuum discharge justified the introduction of the concept of 'ecton' as an elementary cell of the cathode spot. Plasma processes in the vacuum diode and various stages of the EEE are discussed in detail, and the physical basis for the development and construction of high-current pulsed electron accelerators are presented. An important advantage of this monograph lies in the physical exposition based on simple models and computer simulations of the experimental results presented. The book is intended for specialists in electric discharge research and plasma physics, for electrical engineers involved in designing vacuum-employing electrophysical equipment, and for undergraduate and postgraduate students in electrophysics and high-current electronics. (Izdatel'stvo Fiziko-Matematicheskoi Literatury: 123182 Moscow, ul. Shchukinskaya 12, korp. 1; tel. (7-499) 720-41-53; e-mail: fizmatlit@narod.ru)

Rozanov N N Dissipative Optical Solitons: from Micro- to Nano- and to Atto-Scales (Moscow: Fizmatlit Publ., 2011) 536 pp. ISBN 978-5-922113-07-6.

The book discusses the general properties of dissipative optical solitons of localized structures of light in dissipative nonlinear-optics and laser media and systems with substantial inflow and outflow of energy. The theory of different types of one-, two-, and three-dimensional solitons in passive media and in active media with amplification, with coherent or non-coherent supporting emission of radiation, and in circuits with and without resonators is systematically presented. The notions of the inner structure of dissipative solitons, their weak and strong interactions, and internal and external symmetries and their connection to the motion of solitons and soliton complexes (Galilean, Aristotelian, and Euler mechanics) are introduced. The theory of dissipative nanosolitons (nano-sized solitons) and attosolitons (solitons of sub-femtosecond lengths) is included. The conclusions of the theory are compared with experimental results. Possible applications to the problem of optical processing of information are discussed. The book is intended for researchers, postgraduate and undergraduate students interested in modern problems of photonics, nonlinear optics, laser physics, nanotechnology, and information processing. (Fiziko-Matematicheskaya Literatura MAIK 'Nauka/Interperiodika' Publ. : 117997 Moskva, 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/>)

Delone N B Fundamentals of the Physics of Condensed Matter Textbook (Moscow: Fizmatlit Publ., 2010) 236 pp. ISBN 978-5-9221-1261-1.

The book outlines the fundamentals of condensed matter physics and surface physics, which constitute cornerstones of the nanotechnologies that are so fashionable today. The

balance of experimental material and theory is very successfully drawn. Quantum physics is widely used for the theoretical explanation of experimental data. General properties of various forms of existence of condensed matter are carefully emphasized. The book discusses transient states between different forms, plus the basic physical laws obeyed by all forms of matter. The book is intended for senior year university students, as well as postgraduates, young researchers, and practising engineers. (Fiziko-Matematicheskaya Literatura MAIK ‘Nauka/Interperiodika’ 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/>)

Dolzanskii F V *Fundamentals of Geophysical Fluid Dynamics* (Editor-in-Chief E B Gledzer) (Moscow: Fizmatlit Publ., 2011) 264 pp. ISBN 978-5-9221-1336-6.

This monograph is devoted to theoretical aspects of geophysical fluid dynamics. The basic assumptions have been formulated as a foundation for describing large-scale atmospheric dynamics. The main focus in constructing the approximations is kept on the conservation laws. The barotropic and baroclinic instabilities of the atmosphere and their relation to spatial and temporal scales of motions are discussed, as is the friction mechanisms in geophysical flows. The main properties of the approximations in geophysical fluid dynamics are illustrated using the simple dynamic model of the atmospheric circulation built in terms of the concept of the generalized heavy top. The book is intended for specialists in geophysical fluid dynamics. (Fiziko-Matematicheskaya Literatura MAIK ‘Nauka/Interperiodika’ 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/>)

De Broglie L *Selected Research Works* Vol. 2. *Quantum Mechanics and The Theory of Light: Papers of 1934–1951* (Ed.-in-Chief G Lochak) (Moscow: MGUP Publ., 2011) (in Russian) 618 pp. ISBN 978-5-8122-1133-2.

Papers written by Louis de Broglie, the brilliant French scientist, one of the founders of quantum mechanics, are presented here. Two papers devoted to the theoretical description of light are published in Russian for the first time. This volume also includes the books: *Electromagnetic Waves in Waveguides and Hollow Cavities*, and *Waves and Quanta* (the widely known book translated into English under the title *The Revolution in Physics*). *Heisenberg’s Uncertainty Relation and Probabilistic Interpretation of Wave Mechanics* is a course of lectures given in 1951 in which Louis de Broglie first presented his criticism of the probabilistic interpretation of quantum mechanics. The book is intended for physicists, philosophers, and all readers interested in the history of science. (Ivan Fedorov Moscow State University of the Media (MGUP): 127550 Moscow, ul. Pryanishnikova 2A; tel. (7-499) 976-40-77; e-mail: info@mgup.ru; URL: <http://www.mgup.ru>)

Bolotovskiy B M *Oliver Heaviside: 1850–1925*. 2nd ed., expanded [Series Heritage in Physics and Mathematics: Physics (History of Physics)] (Moscow: URSS Publ., 2012) 256 pp. ISBN 978-5-397-02251-4.

This book describes the life and research work of the outstanding English physicist and mathematician Oliver Heaviside, who played a very important role in the development of the post-Maxwell classical electromagnetic theory and created two large fields of mathematical physics—the vector calculus, and the operational calculus—and who also became one of the founders of the modern theory of communications. The author examines the fate of Heaviside’s scientific achievement in close connection with his personal life, the specifics of his personality, and the life of a hermit, full of labor and poverty, that he led. The book begins with V L Ginzburg’s foreword “From the Editor” written for the first edition (Moscow: Nauka, 1985), and ends with a list of important dates in Heaviside’s life and a scientific biography. The book is intended for a broad range of readers—physicists, mathematicians, and everyone interested in the development of world-wide science; it can also be useful to undergraduate students and postgraduates attending university courses in physics and mathematics. (Izdatel’skaya Gruppya URSS: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the Institute of Systems Analysis, RAS; tel./fax +7 (499) 135-44-23; e-mail: urss@URSS.ru; URL: <http://urss.ru/>)

Mensky M B *Consciousness and Quantum Mechanics: Life in Parallel Worlds* (Authorized translation from English by V M Vaksman) (Fryazino: Vek 2 Publ., 2011) 320 pp. ISBN 978-5-85099-187-6.

This book is a result of the author’s many years of work on the quantum concept of consciousness. This work began with a paper in *Usp. Fiz. Nauk* 170 631 (2000) [*Phys. Usp.* 43 585 (2000)] with a preface written by the future Nobel Prize winner V L Ginzburg; this was followed by a number of papers and a book *Humans and the Quantum World* (Fryazino: Vek 2 Publ., 2005), and finally by the English edition of this book (Mensky M B, *Consciousness and Quantum Mechanics: Life in Parallel Worlds* (Singapore: World Scientific Publ. Co., 2010)). The first publications on this subject were constrained to a rather narrow field, but in this book it was possible to consider the issue in its entirety. Some details still not entirely clear or accurate in the English edition were revised in the Russian edition. A glossary of terms has been added to offer significant help to readers. The book presents the quantum concept of consciousness suggested by the author in 2000; it is based on Everett’s multiple-world interpretation and explains the nature of consciousness in terms of the specifics of the interpretation of reality, which was one of the contributions from quantum mechanics. It is shown that, as a result of the counterintuitive properties of quantum reality, the consciousness possesses abilities habitually regarded as mystical. The emerging theory of consciousness is compared with the provisions of various spiritual doctrines (including religion) and psychological practices admitting mysticism. The main aspects of the theory are presented at different levels: accompanied by a large number of examples and illustrations—for general audience, and in the language of physical formulas—for a professional physicists. (Izdatel’svo Vek 2: 141195 Fryazino, Moskovskaya obl., pl. Vvedenskogo 1; tel./fax: (7-496) 567-82-35; e-mail: vek2@vek2.ru; URL: <http://www.vek2.ru/>)

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