

New books on physics and related sciences

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Gorskaya N V, Mityakova E E, Berent T A (Compilers) *Personality in Science: V.L. Ginzburg. Documents of a Life* (N. Novgorod: Nizhegorodskii Gosudarstvennyi Universitet, 2009) 158 pp.

The catalog is devoted to Vitaly Lazarevich Ginzburg — Academician of RAS, Nobel Prize Winner, and one of the founders of radiophysics education at Gorky (Nizhny Novgorod) State University. The catalog presents material on his teaching and research activities, his influence on the research careers of his Nizhny Novgorod students, his participation in the coming of age of the Gorky school of radiophysics, and his public education activities. (Editing and Publishing Directorate of the N I Lobachevsky Nizhny Novgorod State University: 603950 N. Novgorod, pr. Gagarina 23; tel. (7-831) 465-78-25; fax (7-831) 434-50-56; e-mail: unn_press@unn.ru)

Kirzhnits D A *Field Methods in Many-Particle Theory* (Fiziko-Matematicheskoe Nasledie: Fizika (Quantum Field Theory and Elementary Particle Physics) Series. 2nd ed., rev. (Moscow: LIBROKOM, 2010) 344 pp. ISBN 978-5-397-01181-5.

The book offered to the reader describes the main concepts and methods of the current microscopic theory of many-particle systems. It was written by the outstanding Soviet and Russian theoretical physicist, RAS Corresponding Member D A Kirzhnits (1926–1998) and was first published in 1963. This book happened to be one of the first and best monographs on the field-theoretical and diagram techniques of the many-particle theory. A large number of problems in nuclear physics, condensed matter theory, quantum mechanics, and quantum statistics have been solved by applying the theoretical tools developed in this volume. The book still retains its importance for scientists and is used both for solving new problems and to train new generations of physical theorists. The methodological and pedagogical merits of the book are obvious. Its new edition will be useful for research workers, teachers, postgraduates, and students of physics departments, and can be used as a textbook for studying diagram techniques, the Green's functions method in quantum mechanics and statistical physics, the theory of atomic and nuclear processes, the physics of condensed matter, and extreme states of matter. (Publishing House URSS: 117312 Moscow, prosp. 60-letiya Oktyabrya, d. 9, k. 203, RAS Institute of Systems Analysis; tel./fax (7-499) 135-42-16; e-mail: urss@urss.ru; URL: <http://www.urss.ru/>)

Bogoliubov N N *Selected University Lectures* (Edited and compiled by A D Sukhanov) (Moscow: Moscow State University Publ., 2009) 776 pp. ISBN 978-5-211-05692-3.

The book is a specially prepared publication for Moscow State University students and teachers of a collection of selected lectures presented by N N Bogoliubov for university students,

appended with several of his famous talks, most of which were presented in or published by Moscow State University. The material in this volume is sorted into three parts: I. Mathematical problems of nonlinear and statistical mechanics; II. General problems of the theory of condensed matter; III. New methods of quantum many-body theory and quantum field theory. The lectures and talks in these sections are meant for a wide audience of students, postgraduates, researchers, and teachers in mathematics, mechanics, and physics. Appendices also give the most important dates in the life and work of N N Bogoliubov, and list all his scientific heritage published by the Nauka Publishing House in 2005–2009 in the most complete collection of his scientific works, comprising 12 volumes (the 'Classics of Science' Series). The book is intended for students, postgraduates, researchers, and teachers who specialize in theoretical and mathematical physics, as well as in the history of mechanics and physics. (Moscow State University Publ.: 125009 Moscow, ul. Bolshaya Nikitskaya 5/7; tel. (7-495) 629-50-91; fax (7-495) 697-66-71; e-mail: secretary_msu_press@yandex.ru; URL: <http://www.universitybooks.ru/>)

Solar and Terrestrial Physics: Results of Experiments Using the CORONAS-F Satellite (Ed. by V D Kuznetsov) (Moscow: FIZMATLIT, 2009) 488 pp. ISBN 978-5-9221-1175-1.

The results of experiments involving observations of solar activity and its manifestations in near-terrestrial space carried out using the CORONAS-F satellite on the interval from July 2001 to December 2005 are described. The general characteristics of the integrated system of instruments of the CORONAS-F project are given, as are a brief description of experiments and the most important scientific results of observations of global oscillations of the Sun (the *p*-mode), the solar corona, flashes, solar cosmic rays, terrestrial radiation belts, and the upper atmosphere of Earth. The monograph is intended for researchers working on solar physics and solar-terrestrial physics, and astrophysicists, and students and postgraduates mastering skills in relevant areas. (Fiziko-Matematicheskaya Literatura Publishing Company MAIK Nauka/Interperiodika: 117997 Moscow, ul. Profsoyuznaya, d. 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: <http://www.fml.ru/>)

Datta S *Quantum Transport: Atom to Transistor* (Translated from English by D V Homitskii, CandSc, Ed. by Prof. V Ya Demihovskii) (Moscow–Izhevsk: RKhD, Institute of Computer Studies, 2009) 532 pp. ISBN 978-5-93972-744-0.

This book by the well-known American physicist Supriyo Datta, a specialist in the theory of the condensed state, nanophysics, and spintronics, treats problems related to a flow of electric current in low-dimensional structures and nanoelectronic devices. To analyze various kinetic processes in nano-scale objects that are connected to a macroscopic reservoir, the author uses the method of nonequilibrium Green's functions developed by L V Keldysh in 1964 and employed widely to solve various problems in physical kinetics. The main equations of the method of nonequili-

brium Green's functions are introduced using relatively simple arguments accessible to a broad range of researchers and engineers working both on solving fundamental problems and on developing nanoelectronic devices. The results of this theory are typically illustrated with numerical examples and problems. Correspondingly, the author gives a large number of programs written for calculations of quantum states in low-dimensional structures, for describing electronic spectra in ordinary semiconductors, and for modeling processes of current flow in nanoelectronic devices. Calculations involve using the MATLAB package. This book is aimed at a broad range of readers, including those taking their first steps into the realm of nanophysics: senior undergraduate and postgraduate students. It is also a must for any theoretician or experimenter dealing with the problems of nanostructures or nanodevices. Many aspects touched on in the book would be welcome in programs of university-level education. (Scientific Publishing Center 'Regular and Chaotic Dynamics', Institute of Computer Studies, 426034, Izhevsk, ul. Universitetskaya 1; tel. (7-3412) 50-02-95; e-mail: subscribe@rcd.ru; URL: <http://shop.rcd.ru/>)

Antipov O I, Neganov V A, Potapov A A *Deterministic Chaos and Fractals in Discretely Nonlinear Systems* (Ed. and foreword by Academician Yu V Gulyaev and RAS Corresponding Member S A Nikitov) (Moscow: Radiotekhnika, 2009) 235 pp. ISBN 978-5-88070-237-4.

The book treats chaos phenomena, fractality, and scaling in discretely nonlinear systems using as examples devices of pulsed high-power electronics. Since all manifestations of chaos in any stabilizer were initially treated as harmful factors and hence inadmissible, any study of them was carefully avoided. The authors are convinced, however, that investigation of chaos and fractality in such devices may prove useful not only from the point of view of studying the nature of chaos but also for shedding light behind the boundary of the stable operation of all similar discretely nonlinear systems and evaluating the degree of harm caused by manifestations of chaos. The phenomena of stochastic functioning described in the book are observed in a broad class of systems with variable structures whose work is described by systems of differential equations with variable coefficients changing magnitude jumpwise in time, depending on the state of the system. On the basis of programs and mathematical models developed by the authors, bifurcation diagrams were constructed which clearly show the behavior of the systems under discussion for different values of bifurcation parameters. It is described how attractors produced both on the secant surface of stroboscopic sections and on Poincaré sections for currents and voltages could be analyzed using programs, also written by the authors, for calculating fractal dimensions of the Rényi spectrum. A separate chapter of the monograph is devoted to the application of multifractal measures to attractors in the stochastic mode and gives numerical estimates of their scaling. A multifractal singular scaling spectrum is obtained and analyzed as a function of the Lipschitz–Hölder parameter. Numerous results of studying dynamic chaos are given, obtained using an experimental facility built by the authors, which simulated a pulsed upconverting voltage stabilizer operating in the current control mode with an additional output-voltage feedback. The book is intended for researchers and engineers who are interested in problems of deterministic chaos, the fractality of physical processes, and numerical modeling, and for postgraduates and under-

graduate students in the appropriate specialties. (Radio-tekhnika Publ.: 107031 Moscow, K-31, ul. Kuznetskii most 20/6; tel./fax (7-495) 621-48-37, 625-92-41, 625-78-72; e-mail: info@radiotec.ru; URL: <http://www.radiotec.ru/>)

Malykin G B, Pozdnyakova V I *Polarization Effects in Ring Interferometers* (N. Novgorod: IPF RAN, 2008) 208 pp.

The monograph is devoted to studying the linear interaction of polarization modes on random inhomogeneities in modern single-mode fiber lightguides (SMFLs), as well as the influence of spurious mode coupling on nonreciprocal effects in fiber ring interferometers (FRIs). The theory developed for the purpose made it possible to analyze the degree of polarization of nonmonochromatic radiation as a function of SMFL length and to calculate the deviation of the shift of the zero point in FRIs for an arbitrary magnitude and type of birefringence in the SMFL, and width and shape of the spectral line of the radiation source. The book may be useful for specialists in fiber optics and in randomly inhomogeneous media, as well as for teachers and senior-year students specializing in engineering physics. (Editing and Publishing Sector of the RAS Institute of Applied Physics: 603950 Nizhny Novgorod, ul. Ulyanova 46; tel. (7-831) 416-49-97; URL: <http://www.ipfran.ru/>)

Uchaikin V V *Method of Fractal Derivatives* (Ulyanovsk: ARTIShOK, 2009) 510 pp. ISBN 978-5-904198-01-5. RFBR Project 08-01-07080d.

The first derivative is velocity, the second derivative is acceleration, but what is the derivative of a nonintegral (fractal) order? When does it appear, how does it work, what does it lead to? Professor Uchaikin's new book is devoted to answering such questions. It is divided into three parts which clarify the physical foundations of the method and present the mathematical apparatus and examples of application of the method to various fields of physics: mechanics and hydrodynamics, viscoelasticity and thermodynamics, the physics of insulators and semiconductors, electrical engineering and plasma physics, and nanophysics and cosmic physics. The book ends with a reference mathematics appendix and copious bibliography which reflects the penetration of fractal-differential calculus into modern physics. The book is original not only in the form of presentation (the fractal operators are derived from the laws of physics) but in content also: such a wide panoramic view of the application of fractal-differential calculus to physical studies is presented for the first time in the literature in this country (and elsewhere). Reader will become acquainted with the concept of heredity (memory), non-Gaussian fractally stable stochastics, fractality as the antithesis of continuity, and clarification of the linkage of these concepts with fractal-differential calculus, which should open to the readers new prospects for implementing their creative plans. The book is intended for a wide range of readers: senior-year students of physics and engineering, postgraduates, experts in numerical methods and mathematical modeling, and well-established professors and scientists for whom fractal-differential calculus remains perhaps an exotic subject. (Chair of Theoretical Physics, Ulyanovsk State University: 432000 Ulyanovsk, ul. L Tolstogo 42; tel. (7-842) 232-06-12; fax (7-842) 232-01-05; e-mail: vuchaikin@gmail.com)

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