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New books on physics and related sciences

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Bogoliubov N N Collected scientific works in 12 volumes (Series 'The Classics of Science', Ed.-in-Chief A D Sukhanov) ***Statistical Mechanics*** in 4 volumes**: Vol. 5.** ***Nonequilibrium Statistical Mechanics*****: *1939–1980*** (Eds N M Plakida, A D Sukhanov) (Moscow: Izd-vo Nauka, 2006) 804 pp. ISBN 5-02-034142-8. RFBR project 06-01-14063.

The publication of such an extensive collection of the scientific works by that classic of mathematics and natural science N N Bogoliubov is undertaken here for the first time. The edition will consist of twelve volumes. The edition is unique in that it embraces papers which have never been published together. The fifth volume comprises the fundamental monograph *Problems of Dynamic Theory in Statistical Physics* which opened new vistas in this area of physics. It also includes the most important papers which turned nonequilibrium mechanics into a branch of modern mathematical physics. Published for the first time are the papers on plasma theory. Many ideas in these works have been reflected in other branches of theoretical physics. The book is intended for students, postgraduates, research workers, and lecturers specializing in the area of mathematical physics, statistical mechanics, plasma theory, and the history of physics. (Academic Publishing Center 'Nauka' RAS: Profsoyuznaya ul. 90, P.O. V-485, 117997 GSP-7 Moscow; tel. (7-495) 334-71-51; fax (7-495) 420-22-20; e-mail: secret@naukaran.ru; URL: http://www.naukaran.ru/)

Tomilin K A ***Fundamental Physical Constants from the Historical and Methodological Aspects*** (Moscow: Izd-vo Fizmatlit, 2006) 368 pp. ISBN 5-9221-0728-3. RFBR project 05-06-87036d.

The monograph is dedicated to the history of the emergence and development of the conception of fundamental physical constants, which plays a central role in modern physics. The first part outlines the history of the advent of such constants as the speed of light in vacuum, the Planck constant, and the elementary charge. Considered in the second part is the history of interaction constants — the Newtonian constant of gravitation, the Fermi coupling constant, and the fine-structure and strong interaction constants. The origin of the terminology, the main properties of the fundamental constants, the evolution models of physical theories from the viewpoint of the fundamental constants, and the natural systems of units based on the fundamental constants are analyzed in the third part. The fourth part of the book is concerned with the main 20th-century research programs with different approaches to the fundamental constants: attempts to introduce new fundamental constants, 'Pythagorean' attempts to substantiate their numerical values, attempts to reveal the possible dependence of some of the physical constants on cosmological time, and the anthropic program. The book is intended for a wide circle of readers interested in the emergence of the contemporary physical picture of the world. (Fiziko-Matematicheskaya Literatura MAIK Nauka/Interperiodika Publ.: Profsoyuznaya ul. 90, 117997 GSP-7 Moscow; tel. (7-495) 334-74-21; fax (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: http://www.fml.ru/)

Kotkin G L ***Lectures on Statistical Physics*** (Moscow – Izhevsk: Izd-vo IKI, 2006) 190 pp. ISBN 5-93972-257-1.

This lecture course is intended to expound on a systematic basis the principles of statistical physics and its application to the main problems of equilibrium and nonequilibrium systems. A rather broad spectrum of problems is considered in a lucid and absorbing form: the thermodynamics of chemical processes, the behavior of degenerate Bose and Fermi gases at low temperatures, the quantum nature of semiconductors, the electric and heat conduction of electron gases in metals, thermal fluctuations in electric circuits, and the basic principles of the kinetic theory of collisionless plasma. A virtue of this book is the brevity of presentation and a good structuration of the material. The author gives unconventional derivations which are, as a rule, more compact and simple (for instance, the derivations of Fermi – Dirac and Bose – Einstein distributions, a qualitative substantiation of the peak in the temperature dependence of rotational heat capacity, etc.). The textbook includes a section related to computer simulation. The material for conducting seminars and practical works is also given. The book is especially useful for students, postgraduates, and faculty. (Institute for Computer Studies: ul. Universitetskaya 1, 426034 Izhevsk; tel./fax (7-3412) 50-02-95; e-mail: borisov@ics.org.ru; URL: http://ics.org.ru/)

Ignatovich V K ***Neutron Optics*** (Moscow: Izd-do Fizmatlit, 2006) 336 pp. ISBN 5-9221-0722-4.

This book is concerned with elastic neutron reflection and transmission by plane mirrors and their related problems of quantum mechanics and scattering theory. A common algebraic approach to the description of neutron interaction with one-dimensional layered magnetic and nonmagnetic systems, as well as with three-dimensional periodic media is elaborated. The author analyzes the variation in the quantum states of a polarized neutron interacting with radio frequency fields, the resultant spin precession waves, and the density modulation of neutron beams. Also considered are the elastic wave scattering of neutrons in disordered and inhomogeneous media, with the inclusion of the interface, and the diffusion of neutrons as corpuscles in fine-dispersed media as applied to the calculations of moderators and reflectors for reactors. An investigation of the standard quantum scattering theory at low energies occupies a special place in the book. The theory is shown to contain a multitude of contradictions.

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The author discusses ways of resolving them and experiments aimed at discovering effects not described by the standard theory. The uncertainty relations and the interrelation between quantum and classical mechanics are critically considered in the course of this investigation. This book will serve as an invaluable reference source for students and experts in the area of neutron optics, optics, and solid-state physics, as well as for all concerned with the basic questions of quantum theory. (Fiziko-Matematicheskaya Literatura MAIK Nauka/Interperiodika Publ.: Profsoyuznaya ul. 90, 117997 GSP-7 Moscow; tel. (7-495) 334-74-21; fax (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: http://www.fml.ru/)

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