New books on physics and related sciences

Gorbunov D S, Rubakov V A *Introduction to the Theory of the Early Universe*: *Theory of a Hot Big Bang* 3rd edition revised and much enlarged (Moscow: Izd-vo URSS, 2016) 616 pp. ISBN 978-5-9710-1679-3

This book was written largely from the point of view of the relation between cosmology and the physics of microworld. It presents the results concerning a homogeneous isotropic Universe at the hot stage of its evolution and at subsequent cosmological stages. The main Sections consider the established concepts of the early and present-day Universe; these sections may serve as a modern introduction to this rapidly developing field of science. To facilitate the reading of the main sections, some necessary information from the General Relativity and the theory of elementary particles is presented in Appendices. Moreover, hypotheses are considered (often alternatives to each other) that refer to unsolved cosmological problems, such as dark matter, dark energy, the asymmetry between matter and antimatter, etc. The monograph has a continuation, *Introduction to the Theory of the Early Universe: Cosmological Perturbations. Inflation Theory* (Moscow: Izd-vo URSS, in press) presenting the results referring to the theory of the development of cosmological perturbations, inflation theory, and the theory of post-inflation heating. The book is intended for researchers, postgraduates, and undergraduate students specializing in elementary particle physics and cosmology. (Publishing group URSS: Nakhimovskii prospect 56, 117335 Moscow, Russian Federation; tel./fax: +7 (499) 724-25-45; e-mail: urss@URSS.ru; URL: http://urss.ru/)

Weinberg S *The Quantum Theory of Fields* Vol. 1. *Foundations* (Translated from English: Cambridge: Cambridge Univ. Press, 1995; ed. by V Ch Zhukovsky) (Moscow: Fizmatlit, 2015) 648 pp. ISBN 978-5-9221-1620-6.
Weinberg S *The Quantum Theory of Fields* Vol. 2 *Modern Applications* (Translated from English: Cambridge: Cambridge Univ. Press, 1996; ed. by V Ch Zhukovsky) (Moscow: Izd-vo Fizmatlit, 2015) 528 pp. ISBN 978-5-9221-1621-3.

This book, written by the outstanding American scientist and Nobel Prize winner in Physics 1979 Steven Weinberg, *The Quantum Theory of Fields*, presents a modern course in quantum field theory covering both the basic principles of this branch of theoretical physics and the numerous recently developed new ideas and up-to-date methods. The first volume presents the fundamentals of quantum field theory, including relativistic quantum mechanics and the scattering theory, the basic elements of canonical quantization of fields and the path integration method, the invariant perturbation

theory (in particular, its applications to quantum electrodynamics) and nonperturbative methods, as well as a successive recitation of renormalization theory and other topics. The second volume offers a modern presentation of the methods of quantum field theory and shows how the application of these methods provided insight into the weak, strong, and electromagnetic interactions of elementary particles. The up-to-date mathematical methods are given together with their applications to the elementary particle theory and the theory of condensed matter. Much attention is paid to such issues as generalized BRST symmetry, the background field method, the effective field technique as applied to the theory of spontaneous symmetry breaking, the operator expansion method, superconductivity, the theory of critical phenomena, etc. At the end of each chapter, numerous problems are given. The monograph is intended for research workers, postgraduates, and senior students engaged in quantum field theory and elementary particle physics (Fizmatlit Publ.: 117342 Moscow, ul. Butlerova 17B; tel. +7 (499) 968-92-28; e-mail: fizmat@maik.ru; URL: http://www.fml.ru/)

Kholin N N, Goloveshkin V A, Andrushchenko V A *Mathematical Modeling of Wave Phenomena in Condensed Media and Meteoroid Dynamics* (Moscow: Izd-vo URSS, 2016) 216 pp. ISBN 978-5-9710-2410-1.

This book is devoted to constructing the mathematical models of condensed medium dynamics. The problems of the effect of short-range pulsed loads on protective constructions are solved both analytically and numerically. The book is intended for students, postgraduates, engineers, and research workers engaged in the design of constructions of antimeteorite protection structures and protection of ground-based objects from shock and blast actions. (Publishing group URSS: Nakhimovskii prospect 56, 117335 Moscow, Russian Federation; tel./fax: +7(499) 724-25-45; e-mail: urss@URSS.ru; URL: http://urss.ru/)

Muratov R Z *Multipoles and Fields of the Ellipsoid* (Moscow: Izdatelskii Dom MISiS, 2015) 524 pp. ISBN 978-5-600-01057-4.

This monograph covers the theory of stationary and quasistationary fields of an ellipsoidal body — that is, problems in great demand for a variety of physical and technical applications. The material is presented exclusively with the use of Cartesian coordinates. A considerable part of the monograph contains information that has never appeared in books. Analyzed are the external and internal volume and surface (a simple layer and a bilayer) potentials of the ellipsoid, elliptic cylinder, and elliptic disc for a power-law charge distribution; multipolar representations of electrostatic and scalar magnetic potentials of ellipsoids with polynomial charge or current densities, respectively; problems of ellipsoids placed in different external inhomoge-

neous static fields; problems of equivalent sources, and low-frequency scattering of acoustic and electromagnetic fields on the ellipsoid and elliptic disc. The book is addressed to physicists specializing in acoustics, astrophysics, hydrodynamics, radio physics, elasticity theory, electrodynamics, diffraction theory, accelerator theory, etc. (MISiS Publishing House: Leninskii prospect 4, 119991 Moscow; +7 (495) 638-44-28; e-mail: kniga-misis@mail.ru)

Compiled by *E V Zakharova*
(e-mail: zaharova@ufn.ru)