

New books on physics and related sciences

DOI: 10.3367/UFNe.0181.201102o.0232

Sarycheva L I *Introduction to the Physics of Microcosm: The Physics of Nuclei and Particles* (Moscow: LIBROKOM Publishing House, 2009) 224 pp. ISBN 978-5-397-00972-0. The book received First Prize in the contest for the best educational and methodological books marking the 100th anniversary of the birthday of S N Vernov.

This book is based on the lecture course presented by the author to 3rd-year students of the Astronomy Division of the MGU Department of Physics. The book lists the main characteristics of fundamental and elementary particles and processes occurring under various types of interactions between them. A description is given of modern experimental techniques and methods of data analysis used in accelerators and in cosmic-ray physics, as well as in experiments studying the structure of hadrons and atomic nuclei. Various characteristics of elementary particles and nuclei are presented and related nuclear models are discussed. The role of elementary particle physics and the nuclear physics is outlined in the context of processes occurring in the Universe and some astrophysical phenomena are touched on. The book is intended for students in physics as their first systematic introduction into the particle and nuclear physics. These lectures can also be useful to teachers and postgraduates of physics departments of universities. (Knizhnyi dom LIBROKOM: 117312 Moscow, prosp. 60-letiya Oktyabrya 9; tel./fax (7-499) 135-44-23; e-mail: orders@URSS.ru; URL: <http://www.urss.ru/>)

Kovtyukh A S (Ed.) *Laboratory Manual in Space Science* 2nd ed., revised and enlarged (Moscow: University Book Publ., 2006) 189 pp. ISBN 978-5-90304-006-0. The book received Second Prize in the contest for the best educational and methodological books marking the 100th anniversary of the birthday of S N Vernov.

This textbook is the first practical work manual for space physics in this country. It is based on the experimental data of the MSU RINP (NIIYaF MGU in *Russ. abbr.*) Earth satellite Universitetskii-Tatiyana, which was placed into orbit on 20 January 2005 on the eve of the 250th anniversary of the founding of Moscow State University, and on the data gathered by other satellites, as well. The tasks in the tutorial follows the course of general physics and can be used for special courses in plasma physics, astrophysics, and geophysics. They can also be used fully or in part for noncompulsory learning by pupils of senior classes in high schools. The work has been carried out as a part of the National Priority Project ‘Education’ (Izdatel’skii dom Universitetskaya Kniga: Mos-

cow 125009, ul. B. Nikitskaya, d. 5/7, office 214; tel. (7-495) 629-92-18, +7 8-901-541-29-27; e-mail: unkniga@mail.ru, ssnosov@mail.ru; URL: <http://www.ubook.ru>)

Il’ina N P, Silaev A A, Silaev A A (Jr.), Amineva T P, Kuznetsova T P *Leptons of Cosmic Radiation: Laboratory Manual in Cosmic Ray Physics and Modern Methods of Physics Research; Special Laboratory Manual in Modern Methods of Physics Research* Textbook (Moscow: University Book Publ., 2008) 107 pp. ISBN 978-5-91304-070-1. The book received Third Prize in the contest for the best educational and methodological books marking the 100th anniversary of the birthday of S N Vernov.

This textbook presents a description of a cycle of laboratory works for mastering practical skills in cosmic-ray physics and special topics of nuclear physics. The main feature of this cycle is that each task is performed on the same experimental setup. The source of radiation is cosmic radiation. There is a theoretical introduction, a description of experimental methods, information on the equipment required for each task and on methods of measurement and treatment of results, including a specialized software for data processing. The laboratory works in the book were selected for studying the properties of cosmic radiation and its interaction with the environment. They introduce the student to methods of radiation recording and specific radiation detectors. The book is intended for students of the MSU Department of Physics and students attending the advanced retraining department. (Izdatel’skii dom Universitetskaya Kniga: Moscow 125009, ul. B. Nikitskaya, d. 5/7, office 214; tel. (7-495) 629-92-18, +7 8-901-541-29-27; e-mail: unkniga@mail.ru, ssnosov@mail.ru; URL: <http://www.ubook.ru>)

Akishin A I *Space Materials Science* Methodology and Tutorial (Moscow: MSU RINP, 2007) 209 pp. The book was entered in the contest for the best educational and methodological books marking the 100th anniversary of the birthday of S N Vernov.

The author describes the initiation period of the new research field — space materials science — at the MSU RINP (NIIYaF MGU in *Russ. abbr.*) in 1962–1991. The exceptional role that Academician S N Vernov together with Professors S S Vasil’ev and I B Teplov played in the progress of this science is described. Imitation methods, using particle accelerators at the NIIYaF MGU and elsewhere, of the influence of various factors of space environment on materials and elements of space vehicles are presented, including the effects of corpuscular radiation. The radiation strength of optical glass is discussed, including the mechanism of electric breakdown of radiationally charged glasses and other dielectric materials. The process of energy cumulation in the discharge channel is described. Effects produced by radiation

and electric discharges on the performance of photoelectric convertors of solar panels of artificial satellites in the process of their irradiation in a vacuum by electrons and protons in the energy range 0.03–10 MeV were investigated. Imitation methods are discussed, as is the nature of radiation-caused single malfunctions of integrated circuits bombarded by cosmic ray nuclei. Data are given on the imitation of effects exerted by cosmic dust particles moving with velocities $\sim 0.1\text{--}20\text{ km s}^{-1}$, by fluxes of oxygen atoms at energies of 5–20 eV, and by products of the surrounding outer atmosphere of space vehicles on space-used materials. The textbook gives an extensive list of research publications on space materials science. The book is intended for students and postgraduates of the Division of Nuclear Physics at MSU Department of Physics and MIEM. (NIIYaF MGU: 119991 GSP-1, Moscow, Leninskie gory, d. 1, str. 2; tel. (7-495) 939-18-18; fax (7-495) 939-08-96; e-mail: info@sinp.msu.ru; URL: <http://www.sinp.msu.ru>)

Novikov L S, Voronina E N *Prospects of the Application of Nanomaterials in Space Technologies* Textbook (Moscow: University Book Publ., 2008) 188 pp. ISBN 978-5-90304-090-9. The book was entered in the contest for the best educational and methodological books marking the 100th anniversary of the birthday of S N Vernov.

This textbook presents the physical foundation of nanotechnologies, describes the most important types of nanomaterials, and the methods of their manufacturing and analysis, discusses the operating conditions for materials in a cosmic environment and the ensuing demand for space technology materials, demonstrates possible advantages of using nanomaterials replacing traditional materials for space applications, and provides information on existing programs and the prospects of the introduction of nanomaterials into space industries and on the current developments in this field. The book is intended for students and postgraduates of universities and as a textbook for advanced retraining of personnel in new promising fields of science and technology. (Izdatel'skii dom Universitetskaya Kniga: Moscow 125009, ul. B. Nikitskaya, d. 5/7, office 214; tel. (7-495) 629-92-18, +7 8-901-541-29-27; e-mail: unkniga@mail.ru, ssnosov@mail.ru; URL: <http://www.ubook.ru>)

Popov A M, Tikhonova O V *Lectures on Atomic Physics* (Moscow: MSU Department of Physics, 2007) 356 pp. ISBN 978-5-8279-0075-7. The book was entered in the contest for the best educational and methodological books marking the 100th anniversary of the birthday of S N Vernov.

This textbook was written on the basis of lectures delivered by the author over two decades to third-year students of the MSU Department of Physics. It meets the requirements of the modern course of atomic physics. The textbook outlines the history of evolution of quantum concepts in the first quarter of the 20th century, and presents the basics of the mathematical formalism of quantum theory (Schrödinger's coordinate representation). Using this formalism, it studies the structure of single- and many-electron atoms, the simplest molecular systems, and the problem of interaction between quantum systems and an external electromagnetic field. The material is divided into sixteen lectures, each one offering at the end a number of problems to be solved at home. The book is intended for university students majoring in physics. (MSU

Department of Physics: 119991 GSP-1, Moscow, Leninskie gory, d. 1, str. 2)

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