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New books on physics and related sciences

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Alferov Zh I ***Physics and Life*** (St.-Petersburg: Nauka, 2000) 255 pp. ISBN 5-02-024926-2.

The bulk portion of this book is a collection of Academician Zhores Ivanovich Alferov's pioneering papers on the physics and device applications of semiconductor heterostructures — a rapidly growing field currently at the heart of information technologies, known to have benefited much from the author's work. Alferov's review papers included in the book trace the history of the tremendous growth in the field, present major results, and discuss future prospects. The memoirs and social and political articles of the prominent scientist, well known for his multifaceted public activities, will undoubtedly appeal to a wide circle of readers. A list of Zh I Alferov's major scientific publications is included at the end of the book. (St.-Petersburg RAS Nauka Publ. regular mail address: 199034 St.-Petersburg, Mendeleevskaya lin. 1)

Mesyats G A ***Ectons in a Vacuum Discharge: Breakdown, Spark, arc*** (Moscow: Nauka, 2000) 424 pp. Bibliography: 468 refs. ISBN 5-02-002507-0.

For the first time here is a monograph in which the physics of all the three stages of a vacuum discharge — the breakdown, spark, and arc — are presented within a unified framework. There are two fundamental mechanisms behind each of these stages. Firstly there are microscopic explosions at the surface of the cathode and explosive electron emission occurring as separate electron bunches (ectons, in the author's terminology). Secondly, the plasma produced by these microexplosions interacts with the cathode surface; this gives rise to further microexplosions thus leading to a self-maintained discharge regime. Microscopic explosions are usually due to Joule heating arising from the large current densities in the cathode's microscopic volumes. The book is intended for electric discharge physicists, electrical engineers designing vacuum equipment and for students in electrophysics, electrical power engineering, high voltage technologies, and high current electronics. (Nauka Publ. regular mail address: 117864 GSP-7, Moscow V-485, Profsoyuznaya ul. 90)

Dudkin V I, Pakhomov L N ***Fundamentals of Quantum Electronics*** Textbook (St.-Petersburg: SPbGTU Publ., 1999) 307 pp. Bibliography: 10 refs.

This book examines the physical principles, methods, and underlying phenomena of quantum radiophysics and puts special emphasis on quantum electronics devices and applications, for which operating principles and descriptions are presented. The text provides the characteristics of caesium, rubidium, and hydrogen quantum frequency standards as well as those of quantum magnetometers, paramagnetic amplifiers, and various laser types. Intended for undergraduate and post-graduate students in quantum radiophysics, physical electronics, and optoelectronics, the book will also interest a much wider range of professionals. Recommended by the Russian Federation State Committee on Higher Education as a textbook for students in 'Physical Electronics' and 'Radiophysics and Electronics' disciplines. (St.-Petersburg State Technical University Publ. regular mail address: 195251 St. Petersburg, ul. Politekhnicheskaya 29)

Mikhaĭlov V N, Evtikhin V A, Lyublinskiĭ I E, Vertkov A V, Chumanov A N ***Lithium in the Thermonuclear and Space Power Engineering of the Twenty-First Century*** (Moscow: Énergoatomizdat, 1999) 528 pp. Bibliography: 552 refs. ISBN 5-283- 03634-0.

The book examines the current status of the database on lithium properties and its compatibility with structural materials. It advocates the use of vanadium alloys and capillary porous systems in thermonuclear power reactors and discusses the concept of a closed-cycle lithium thermonuclear reactor with a liquid-metal divertor. It also analyzes the design principles of a spacecraft nuclear power system using the outside lithium-heat-pipe conversion concept. In the light of the growing interest, both in Russia and abroad, in the authors' ideas an English translation of the text is added, if partially, in order to reach a wider audience. The book is intended for scientists, engineers, and those engaged in the development of nuclear power technologies and of new-generation thermonuclear reactors, and may also be useful for under- and post-graduate students in relevant disciplines. (Énergoatomizdat Publ. regular mail address: 113114 Moscow, M-114, Shlyuzovaya nab. 10)

Kamenyarzh Ya A ***Limiting Analysis of Plastic Bodies and Structures*** (Moscow: Fizmatlit, 1997) 512 pp. Bibliography: 186 refs. ISBN 5-02-015162-9. RFBR project 95-01-02836.

This book offers a detailed account of the current status of limiting analysis. Topics discussed include the basic concepts and ideas of mechanics; formulation of problems in mechanics; mathematical formalism; analytical and numerical methods and their application in the mechanics of plastic bodies and structures, and examples of practical solutions. Mathematical apparatus useful for solving problems in mechanics and in other areas of applied mathematics is also provided. For specialists, post-graduate students, and undergraduate students dealing with applied mathematics, mechanics, and engineering. (RAS Physics and Mathematics Publishing regular mail address: 117071 Moscow V-71, Leninskiĭ prospect 15)

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Translated by E G Strel'chenko

Physics of the Atomic Nucleus and Elementary Particles. Proceedings of the 33rd Winter School (St.-Petersburg: PIYaF RAN Publ., 1999) 372 pp. ISBN 5-86763-022-6.

On February 8 – 12, 1999, the 33rd PIYaF Winter School on the Physics of the Atomic Nucleus and Elementary Particles and the 5th Petersburg School on Theoretical Physics were held in Gatchina at the St. Petersburg Institute of Nuclear Physics (PIYaF). The schools were held to commemorate Igor' Andreevich Kondurov, chairman of the Organizing Committee of the 1st – 32nd PIYaF Winter School sessions, and Alekseĭ Andreevich Ansel'm, PIYaF Winter School's scientific adviser and also the founder of the Petersburg school of theoretical physics. Based on the proceedings of the schools, this book covers a wide variety of theoretical and experimental problems in the modern physics of the atomic nucleus and elementary particles as well as examining problems in astrophysics. The four opening papers by Ansel'm, the first two philosophical and the other two scientific in nature, reflect the early and late periods in the author's creative genius. Lectures by Drukarev, Ryskin, and Sadovnikova present a new approach to the problem of pion condensation in nuclear matter. In other theoretical lectures on the physics of the nucleus, a new concept of nuclear forces is advanced and the proton radioactivity of nuclei is discussed. A number of papers deal with the experimental aspects of the field discussing, in particular, the prospects for measuring the neutrino magnetic moment and the T-odd correlations in ternary fission. Astrophysical neutrino problems and purely theoretical aspects of high-energy physics are also discussed, and a number of papers on muon physics conclude the collection. (RAS StPINP Publ. regular mail address: 188350 Gatchina, Leningrad region, Orlova Roshcha)

Surdin V G ***Star Birth*** 2nd enlarged edition (Moscow: Éditorial URSS, 1999) 232 pp. Bibliography: 216 refs. RFBR project 98-02-30048.

This book has evolved from a lecture course on star formation for fourth- and fifth-year students specialized in astronomy at the MSU Physics Department. It provides a concise account of the historical development of theories about the origin of stars and discusses the composition and dynamics of the interstellar medium, with special emphasis on the globules and giant molecular clouds within which stars form. Coverage also includes the basic physical processes whereby stars and small star systems like double and multiple stars, associations, and open and globular star clusters, come to life. The book is intended for students but will also be of interest to professionals in various disciplines of physics and astronomy. (Éditorial URSS Publ. contact information: tel./fax (7-095) 135-44 23, tel. (7-095) 135-4246; e-mail: urss@urss.isa.ac.ru)

Singer M, Berg P ***Genes & Genomes*** in 2 volumes (Translated from the English by T S Il'ina and Yu M Romanova; ed. by N K Yankovskiĭ) (Moscow: Mir, 1998) 373 pp. Bibliography: 394 refs. ISBN 5-03-002849-8. RFBR project 98-04-62107.

This is a Russian translation of the 1991 English edition (Mill Valley, Ca.: University Science Books) of a university molecular biology textbook written by two USA National Academy of Sciences members (one of them, P B, a Nobel Prize Winner in biology). The first volume addresses the structure and functioning of biological molecules participating in the work of the genetic apparatus; gene replication and expression processes, and a wide range of problems concerned with recombinant DNA technology (ferment systems, vector – host systems, manipulations on recombinant DNA). The second volume spans the structure and expression of eucaryotic genes, molecular structure of eucaryotic genomes, and genome rearrangements involving various mobile elements, proceeding as preprogrammed or randomly. Intended for researchers, teachers, and students in molecular biology, the monograph will also be of interest to biophysicists (Mir Publ. regular mail address: 129820, GSP, Moscow, I-110, 1st Rizhskiĭ per. 2)

Belov G A ***Mathematical Foundations of the Dynamics of Nonlinear Discrete Electron Systems*** Lecture Texts (Cheboksary: Chuvash University Publ., 1999) 324 pp. Bibliography: 23 refs. ISBN 5-7677-0352-3. RFBR project 98-01-03282.

State-of-the-art coverage spans such topics as mapping theory, local nonlinear analysis, normal forms of systems of differential equations, and the fundamentals of bifurcation theory. The selection of material for this synopsis was oriented at research work and masters-, post-graduate-, and doctoral-level dissertation projects at the Chuvash State University's Industrial Electronics Department. The book is based on lectures given by the author to the Department's teachers and post-graduate and doctoral students. For masters and post-graduate and doctoral students in electronic technology, automation, and computer engineering. (Chuvash University Publishing regular mail address: 428015 Cheboksary, Moskovskiĭ prosp. 15)

Commemorating G A Askar'yan (Compiled by G M Batanov, B M Bolotovskiĭ, S S Grigoryan, I S Kossyĭ, I V Sokolov) (Moscow: Fizmatlit, 2000) 384 pp. ISBN 5-9221-0042-4. RFBR project 99-02-30007.

Selected for this book — and stereotyped after their original publications — are about a third of the works of Gurgen Ashotovich Askar'yan (1928 – 1997), viewed by himself as his most special ones both in terms of the joy and frustration they gave him. For this reason, these papers are favored over the remaining his heritage. The book features a bibliographic paper by B M Bolotovskiĭ as well as fragments of G A Askar'yan's reminiscences of his encounters with V I Veksler, E K Zavoĭskiĭ, M L Levin, M A Leontovich, and D V Skobel'tsyn. The last part of the book contains excerpts from G A Askar'yan's diaries, some of them in poetic form. A list of G A Askar'yan's works, comprising 234 items, is also given. The book will be of interest for specialists in various areas of physics. (Fiziko-Matematicheskaya Literatura & MAIK Nauka/Interperiodika Publishing regular mail address: 117864 Moscow V-485, Profsoyuznaya ul. 90)

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