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New books on physics and related sciences

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Gribov V N ***Gauge Theories and Quark Confinement*** Translated from the Russian (Moscow: Izd-vo FAZIS, 2002) xxxii + 640 pp. ISBN 5-7036-0072-3.

Vladimir Naumovich Gribov (1930 – 1997) was one of the leading theoretical physicists of the XX century, who made outstanding contributions to the physics of elementary particles. Apart from his basic papers on hadron interactions at high energies, the collected book *Gauge Theories and Quark Confinement* includes practically all of Gribov's works on non-Abelian gauge theories, thus showing the road which led him to his theory of quark confinement. The book contains not only published papers and preprints (often not easily available), but also Gribov's manuscripts that are largely unknown to physicists, as well as lectures given in St.-Petersburg, Orsay, and Erice. Well collected together, these works by Gribov acquire a new quality: the book is not just a collection of papers commemorating a talented scientist, but is rather a complete monograph which the author has had no time to design himself. Gribov's approach to the problem of interactions at high energies has not lost its relevance and today his main results are used in a new context in the hadron theory and quantum chromodynamics. The book is thoroughly prepared and excellently printed, and will serve a useful purpose at the hands of research workers. (FAZIS Publ.: 123557 Moscow, Presnenskiĭ val 42-44; tel./fax: (7-095) 253-08-20; e-mail: phasis@aha.ru; URL: http://www.aha.ru/~phasis/)

Kvasnikov I A ***Thermodynamics and Statistical Physics: The Theory of Nonequilibrium Systems*** The three volumes. 2nd ed. Vol. 1 (Moscow: Izd-vo Éditorial URSS, 2002) 240 pp. ISBN 5-354-00077-7; Vol. 2 (Moscow: Izd-vo Éditorial URSS, 2002) 432 pp. ISBN 5-354-00078-5; Vol. 3 (Moscow: Izd-vo Éditorial URSS, 2003) 448 pp.

This new, three-volume edition of the course in thermodynamics and statistical physics, now offered to the reader, presents the revised and enlarged material from two previous books by the same author: *Thermodynamics and Statistical Physics. The Theory of Nonequilibrium Systems* (Moscow: MSU Publ., 1987) 560 pp., and *Thermodynamics and Statistical Physics: The Theory of Nonequilibrium Systems* (Moscow: MSU Publ., 1991) 800 pp. In 1992, the author was the first recipient of the Lomonosov Award "for the development of a unique course and teaching aid on statistical physics and thermodynamics".
The book can be used as a manual for the second part of the course in *Thermodynamics and Statistical Physics*, which the author has taught since 1963 in the MSU Physics Department for the fourth-year students. The first volume provides material on the axiomatics of macroscopic thermodynamics, general theoretical problems, and major applied aspects. The second volume covers the fundamentals of Gibbs' statistical mechanics and applications, the theory of ideal systems, classical nonideal gases, etc. The third volume examines the theory of fluctuations, Brownian motion, random processes, the thermodynamic theory of irreversible processes, and kinetic equations in statistical mechanics. In preparing the second edition, not only have misprints been corrected and some errors in the text and the figures eliminated, but also some formulations which the author considered somewhat chary of words were improved. Also, as is often the case with new editions, several new topics are addressed in this book — topics that did not require expanding the theoretical basis already given (the detailed analysis of spin echo, the thermodynamic treatment of temperature separation of a gas in a vortex tube, etc.). The material in the textbook is grouped into two parts: the main part, basically the content of the lecture course, and the additional part which includes problems and supplementary questions (not beyond the syllabus subject matter) represented as exercises and helps the reader to gain a more detailed understanding of some aspects of statistical mechanics. The text is intended for undergraduate and post-graduate students in physics disciplines and practising specialists with an interest in nonequilibrium statistical mechanics. (Éditorial URSS Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the RAS Institute for Systems Analysis; tel./fax: (7-095) 135-44-23, 135-42-46; e-mail: urss@urss.ru; URL: http://urss.ru/)

Irodov I E ***Physics and Basic Laws of Macrosystems*** Textbook 2nd enlarged ed. (Moscow: Izd-vo Laboratoriya Bazovykh Znaniĭ Publ., 2001) 207 pp. ISBN 5-93208-089-2.

This textbook examines theoretical methods for studying the properties and behavior of macrosystems — that is, systems consisting of a very large number of particles — and includes thermodynamics, molecular-kinetic theory, and statistics (both classic and quantum). Along with a large number of examples throughout the book, review problems are featured at the end of every chapter, which are closely related to and often extend and augment the main material. For undergraduates in physics as well as in engineering and technical disciplines. (Laboratoriya Bazovykh Znaniĭ Publ.: 103473, Moscow, P.O. Box 9; tel.: (7-095) 955-03-98, 955-04-29; e-mail: lbz@aha.ru)

Menskiĭ M B ***Path Groups: Measurements, Fields, Particles*** 2nd ed. (Moscow: Izd-vo Éditorial URSS, 2003) 320 pp.

This book examines the quantum theory of continuous measurements, and the theory of quantum particles in gauge and gravitational fields. While sharing a common mathematical apparatus (path space), these two classes of problems are

Uspekhi Fizicheskikh Nauk **173** (5) 575 – 576 (2003)
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discussed independently of each other. The quantum theory of continuous measurements (monitoring the position of a system, spectral measurements, etc.) is constructed based on the Feynman path integrals, thus incorporating the inverse influence of the measuring apparatus on the quantum system (wave packet reduction) during a continuous measurement. The theory of gauge and gravitational fields with particles moving in them uses the so-called path group, an extension of the translation group concept. In a sense, this 'reduces geometry to algebra', giving the theory of particle motion in external fields a close similarity to free particle theory. The relation between the local and global aspects in the description of particles is discussed, and the kinematics of nonlocal particles (strings, gauge monopoles) is investigated. (Éditorial URSS Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the RAS Institute for Systems Analysis; tel./fax: (7-095) 135-44-23, 135-42-46; e-mail: urss@urss.ru; URL: http://urss.ru/)

Novozhilov V V ***Foundations of the Nonlinear Theory of Elasticity*** 2nd ed. (Moscow: Izd-vo Éditorial URSS, 2003) 208 pp.

In this book, the elasticity theory free of assumptions restricting elongations, shears, and rotation angles is presented, and the stress – strain relation in an isotropic elastic body is examined in general terms. Being a major generalization of the classical theory, nonlinear theory of elasticity is capable of treating problems beyond the reach of its restricted linear counterpart. To maximize the audience, the author has attempted to make derivations as clear and simple as possible, avoiding, in particular, the use of tensor calculus with its complicated symbolism (or more precisely, limiting it to what little is typically used in courses in the classical theory of elasticity). The book is based on the author's lecture course given in the Mathematics and Mechanics Department at Leningrad (nowadays St. Petersburg) State University in 1947. (Éditorial URSS Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the RAS Institute for Systems Analysis; tel./fax: (7-095) 135-44-23, 135-42-46; e-mail: urss@urss.ru; URL: http://urss.ru/)

Benderskiĭ B Ya ***Engineering Thermodynamics and Heat Transfer*** A set of lectures with concise biographies of scientists (Izhevsk: Izd-vo RKhD, 2002) 264 pp. ISBN 5-93972-148-6.

The set of lectures is structured in two parts: the fundamentals of engineering thermodynamics, and the theory of heat transfer. Concise biographies of the scientists who contributed to the field are presented. The book is intended for undergraduate students in power engineering, the aircraft and rocket industries, and related disciplines, and will be useful to post-graduate students and faculty. ('Regular and Chaotic Dynamics' Sci. Publ.: 426034 Izhevsk, ul. Universitetskaya 1; UdSU, RCD; tel.: (7-3412) 50-02-95; fax: (7-3412) 50-02-95; e-mail: subscribe@rcd.ru; URL: http://rcd.ru/)

Postnikov M M ***Galois Theory*** (Moscow: Izd-vo Factorial, 2003) 304. pp ISBN 5-88688-063-1.

This book covers the classical aspects of the Galois theory: field extensions and the Galois group, the insolubility theorem for general algebraic equations of degree higher than four, and the theory of rule-and-compasses geometric constructions. The book is illustrated with a large number of examples and is written in a style that is accessible to first- and second-year students at the universities. (Factorial Publ.: e-mail: factorial@mail.compnet.ru)

Marchenkov S S ***The S-classification of the Functions of Three-Valued Logic*** (Moscow: Izd-vo Fizmatlit, 2001) 80 pp. ISBN 5-9221-0152-8.

S-classification — that based on operations of superposition and of transitions to dual functions for substitutions from the full symmetric group — is the only effective approach to classifying the set of functions of multivalued logic. In this book, the S-classification for the set of functions of three-valued logic is systematically presented. All 48 of the S-closed classes of three-valued logic are described, with a finite superposition basis constructed for each. For all S-closed classes, predicate definitions are given based on a finite number of predicates of a certain standard kind. For research workers and higher education teachers specializing in discrete mathematics. (Fizmatlit Publ.: 117864 Moscow, ul. Profsoyuznaya 90; tel./fax: (7-095) 334-74-21, 334-76-20; e-mail: fmlsale@maik.ru; URL: http:// www.fizmatlit.ru/)

Neuromathematics (Neurocomputers and Their Applications, Book 6. Ed. by A I Galushkin) (Moscow: Izd-vo IPRZhR, 2002) 448 pp. ISBN 5-93108-007-4.

This book examines neuronetted algorithms for solving various mathematical problems. It brings together papers by Russian authors published in the journal *Neĭrokomp'yutery: Razrabotka i Primenenie* (Neurocomputers: Development and Application) (1992 – 2001), in the proceedings of the All-Russia conferences "Neurocomputers and Their Applications" (1992 – 2001), and in collections of international research into neuromathematics. For the bachelor's and master's degree course "Applied Mathematics and Physics", as well as for research workers and undergraduate and post-graduate students dealing with algorithms for supercomputer-aided problem solving. ['Radiotekhnika' (Radio Engineering) Editorial Board Publ.: 103031 Moscow, K-31, ul. Kuznetskiĭ most 20/6; tel./fax: (7-095) 921-48-37, 925-92-41; e-mail: iprzhr@iprzhr.ru; URL: http://webcenter.ru/~iprzhr/]

Rambidi N T, Grebennikov E P, Devyatkov A G, Yakovenchuk D V ***Biomolecular Neural Network Devices*** (Neurocomputers and Their Applications, Book 33. Ed. by A I Galushkin) (Moscow: Izd-vo IPRZhR, 2002) 224 pp. ISBN 5-93108-014-7.

This book discusses the current views on the feasibility of neural network devices based on the principles governing the processing of information by biomolecular and biological objects. The authors' abundant experimental material on bacteriorhodopsin-based neural network devices is presented, and devices on the basis of reacting diffusive media are discussed. The book demonstrates that these devices can be effective tools for solving problems of high computational complexity, such as pattern recognition and image processing, optimization, and control of mobile robots. For researchers and practising engineers involved in the study

and design of neural network devices, and for teachers and undergraduate students in physics disciplines. ['Radiotekhnika' (Radio Engineering) Editorial Board Publ.: 103031 Moscow, K-31, ul. Kuznetskiĭ most 20/6; tel./fax: (7-095) 921-48-37, 925-92-41; e-mail: iprzhr@iprzhr.ru; URL: http://webcenter.ru/~iprzhr/]

Prudnikov A P, Brychkov Yu A, Marichev O I *Integrals and Series* In two volumes. 2nd ed. Vol. 1. *Elementary Functions* Vol. 2. *Special Functions* (Moscow: Izd-vo Fizmatlit, 2003); Vol. 1, 632 pp. ISBN 5-9221-0323-7; Vol. 2, 664 pp. ISBN 5-9221-0324-5.

The first volume (whose first edition was published by Fizmatlit Publ. in 1981) covers indefinite and definite (in particular, multiple) integrals, finite sums, and series and products involving elementary functions. The second volume (first published by Fizmatlit Publ. in 1983) covers indefinite and definite integrals, finite sums, and series with special functions. The two-volume set represents the most comprehensive handbook available in the field and contains results taken from similar publications as well as from journals and scientific literature in general. The book will appeal to a wide range of practising specialists in various areas of knowledge, and is an essential text for undergraduate students. (Fizmatlit Publ.: 117864 Moscow, ul. Profsoyuznaya 90; tel./fax: (7-095) 334-74-21, 334-76-20; e-mail: fmlsale@maik.ru; URL:http://www.fizmatlit.ru/)

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