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New books on physics and related sciences

Feĭnberg E L ***Radio Wave Propagation Along the Earth's Surface*** 2nd ed. (Moscow: Nauka – Fizmatlit, 1999) 496 pp. Bibliography: 160 refs. RFBR project 98-02-30002.

This monograph examines the basic aspects of the theory of the propagation of surface waves (for which the effect of the ionosphere is insignificant) with particular emphasis put on the physics pattern of the phenomena coming to pass at the electromagnetically rough and inhomogeneous Earth's real surface. Special attention is given to the Earth's troposphere and how its stratification, inhomogeneity, and turbulence affect wave propagation. The present publication follows the text of the previous edition (1961) practically without revision. For researchers, post-graduate and undergraduate students in radiophysics and radio engineering as well as for practical engineers in applied acoustics, seismology and other fields. [Fizmatlit contact phone number: (7-095) 955-0330]

Kizel' V A ***Practical Molecular Spectroscopy. University Textbook*** (Moscow: MFTI Publ., 1998) 276 pp. Bibliography: 155 refs. RFBR project 96-03-46016.

Aimed primarily at experimentalists, this is a comprehensive summary of modern molecular spectroscopy, examining both its classical background and the capabilities and achievements of new methods such as the laser, optogalvanic, and photoelectron multiphoton nonlinear techniques. The book looks in detail at the spectroscopy of complex dye-type molecules. Coverage also includes such practically interesting topics as excitation mechanisms, statistical and configuration distributions, intramolecular energy redistribution, and laser excitation specifics. Throughout the text, the main focus is on practical aspects; in theoretical terms, the structure and spectra of molecules are presented at the minimum level necessary for an understanding of the physical processes. In the same vein, while computation methods are only briefly outlined, much attention is given to their scope and accuracy. The text outlines the capabilities of experiment, examines its results and the orders of magnitude of the quantities measured. The spectroscopy of intermolecular interactions, and the formation of eximers, clathrates, quasi-molecules, and collisional complexes are also discussed. For undergraduate students, post-graduate students, and researchers. [MFTI Publ. contact information: 141700 Dolgoprudnyĭ, Moscow region, Institutskiĭ per. 9; tel. (7-095) 408-7681]

Abramov I I ***Modeling Physical Processes in the Elements of Silicon Integrated Microcircuits*** (Minsk: BGU Publ., 1999) 189 pp. Bibliography: 254 refs.

This monograph describes the multidimensional modeling methodology for physical processes in the elements and components of silicon-based superlarge and ultralarge integrated circuits (SLIC and ULIC). In particular, it presents continuous models of diffusion – drift approximation accounting for the effects of heavy doping, self-heating, and the ambient temperature on processes in circuit structures, and shows how to translate these models to discrete physico-topological models of circuit elements and components. The capabilities of the methodology are illustrated with multi-dimensional example models of physical processes in typical SLIC and ULIC active structures, including nonlinear regimes for which no rigorous theory is yet available. Having appeal to specialists in microelectronics and the physics of semiconductor devices, the book will also interest researchers and engineers engaged in SLIC and ULIC design automation as well as undergraduate and post-graduate university students. (BGU Publ. regular mail address: Belarus, 220050 Minsk, pr. F Skoriny 4)

Chalykh A E, Gerasimov V K, Mikhaĭlov Yu M ***Phase Diagrams for Polymer Systems*** (Moscow: Yanus-K, 1998) 216 pp. Bibliography: 206 refs. RFBR project 97-03-46036.

A summary of experimental research conducted in 1989 – 1997, this handbook presents phase diagrams for binary and ternary polymer systems exhibiting such diverse phase equilibrium types as amorphous segregation, crystal – crystal and liquid – crystal equilibria, and combinations of amorphous and crystal – crystal types. The systems covered are the polymer-solvent, oligomer, plasticizer, monomer, and polymer. For researchers, engineers, and undergraduate and post-graduate students in polymer physical chemistry and polymer materials science. [Yanus-K Publ. contact phone number: (7-095) 132- 4865]

Aksenov V P, Banakh V A, Valuev V V, Zuev V E, Morozov V V, Smalikho I N, Tsvyk R Sh ***High-Power Laser Beams in a Randomly Inhomogeneous Atmosphere*** (Ed. V A Banakh) (Novosibirsk: SO RAN Publ., 1998) 341 pp. Bibliography: 292 refs. RFBR grant 97-02-30086.

This monograph summarizes the theoretical and experimental results concerning the propagation of high-power IR laser beams in the atmosphere. It provides information on atmospheric turbulence, describes methods and instrumentation for measuring radiation and beam parameters relevant to the bench testing of gas discharge lasers, presents results on the induced Mandel'shtam – Brillouin scattering in a confined gaseous volume, and discusses the thermal self-action of a laser beam entering the formation system or passing the atmospheric portion of its path. It also analyzes the spatial coherence and intensity fluctuations of partially coherent laser beams experiencing thermal self-action in a turbulent atmosphere. Finally, it presents results on laser beam propagation in the troposphere and higher layers of the stratosphere. For specialists concerned with electromagnetic wave propagation through the atmosphere and random media, as well as for the designers and users of laser systems.

Uspekhi Fizicheskikh Nauk **169** (12) 1399 – 1400 (1999)
Translated by E G Strel'chenko

[IOA SO RAN Spektr Publ. contact information: 634055 Tomsk, pr. Akademicheskiĭ 1, tel. (7-3822) 25-8172]

Demidov E E *Quantum Groups* (Moscow: Faktorial, 1998) 128 pp. Bibliography: 143 refs.

This book provides an introduction to the theory of quantum groups. Richly illustrated with examples, it introduces the central objects of the theory, examines their properties, and discusses the concept of quantization. Coverage also includes axiomatic approaches to the theory of quantum groups, quantum analogues of classical concepts, and noncommutative differential calculus. (Faktorial Publ. regular mail address: 117449 Moscow, POB 331)

Topological Methods in the Theory of Hamiltonian Systems (Eds A V Bolsinov, A T Fomenko, A I Shafarevich) (Moscow: Faktorial, 1998) 320 pp.

This collection of papers covers a rapidly growing field which evolved at the interface between topology, the theory of differential equations and dynamic systems, symplectic geometry, classical and quantum mechanics, the spectral theory of partial derivative operators, and mathematical physics. For researchers as well as post-graduate and undergraduate students in mathematics, mathematical and theoretical physics, and in classical and quantum physics. (Faktorial Publ. regular mail address: 117449 Moscow, POB 331)

Shafranova M G *Joint Institute for Nuclear Research* Information biographic handbook (Dubna: OIYaI, 1998) 222 pp. OIYaI project 97-157.

This is a comprehensive profile of the international physical science center in Dubna. In addition to a brief history of the foundation of the Institute, the book surveys the Institute's laboratories, describes its major achievements and discoveries, contains concise biographies of over 500 JINR researchers, reviews the literature on the Institute, and presents other useful information. Its content will be of interest to physicists, students, and science historians as well as the general reader.

Natural Science Writings of Petr Alekseevich Kropotkin (Nauka series 'Nauchnoe nasledstvo') (Compiled by V A Markin, A V Biryukov, R K Balandin) (Moscow: Nauka, 1998) 270 pp.

This new contribution to the *Nauchnoe Nasledstvo* (Scientific Legacy) series contains previously unpublished natural science works of the Russian scientist of encyclopedic erudition, including chapters from his monograph *Studies on the Ice Age*; articles and other materials on geology, geography, biology, and the philosophy of nature; and letters to prominent scientists and scholars in Russia and abroad. For specialists in Earth sciences, philosophers, and historians as well as for a wide circle of readers interested in the personality of P A Kropotkin.

Compiled by *E V Zakharova*