

## New books on physics and related sciences

**Bazelyan É M, Raizer Yu P** *The Spark Discharge* Textbook (Moscow: MFTI Publ., 1997) 320 pp. Bibliography: 159 refs. RFBR project 96-02-30042.

This textbook examines current theories about the spark breakdown in extended gaseous (air) gaps and looks in detail at the physics of the streamer and leader processes and at the experimental techniques for their study. The authors discuss the available experimental data and typical experimentation errors; analyze the reliability of measurements; present simplified theoretical models for the ionization wave, the streamer, and a complex leader system containing a streamer zone, a channel, and a charge housing, and cover setting of a problem relevant to numerical simulation. Coverage also includes the electric strength of extended air gaps subject to high-voltage pulses of technological application with various time parameters. The book will be of interest to undergraduate and post-graduate students and researchers specialized in physics and also interested in power engineering, various areas of electrical and radio engineering, and in aerospace technologies. (MFTI Publ.: tel. (095) 408-7681)

**Bureeva L A, Lisitsa V S** *The Perturbed Atom* (Moscow: IzdAT, 1997) 464 pp. Bibliography: 361 refs. RFBR project 96-02-30088.

This volume explores the dynamics of atoms and ions under the action of disturbances of various kinds, such as electrostatic and magnetostatic fields, the laser and Planck radiation, collisions, stochastic (Markovian) perturbations, etc. Special attention is given to the semiclassical treatment of highly excited (Rydberg) atomic states and to quantum-mechanical problems amenable to an exact solution. The book will be a valuable resource for a wide range of readers interested in the fundamental and applied problems of modern atomic physics, such as the quantum mechanics of the atom, quantum optics, collisional–radiative processes, atomic kinetics, nonlinear laser spectroscopy, and plasma and gas diagnostics. [Atomic Engineering Publishing (IsdAT) MAS ‘Chernobyl-Atom’: tel. (095) 947-4100]

**Ginzburg V L** *About Science, Myself, and Others* (Moscow: Fizmatlit, 1997) 272 pp. Bibliography: 514 refs. RFBR project 97-02-30042.

Complimentary to Ginzburg’s well-known book *About Physics and Astrophysics* which run through three editions, here is a collection of his papers, some previously unpublished or hardly accessible. Along with physics and the history of the development of cosmic-ray astrophysics and radio astronomy, the volume also includes Ginzburg’s recollections;

essays about the lives, careers, and impact of prominent scientists; views on the development of society as a whole, and spacious autobiographical material. (Fizmatlit: tel. (095) 955-0330)

**Zakharov A F** *Gravitational Lenses and Microlenses* (Moscow: Yanus-K, 1997) 328 pp. Bibliography: 524 refs. RFBR project 96-02-30057.

An introduction to gravitational lenses, currently a rapidly growing area within the field of astrophysics, this volume describes the history of the subject, provides a necessary mathematical background, and presents the simplest models now in use. The author briefly summarizes the existing observational data on macrolenses (multiple images), giant arcs, and small arcs, and discusses in considerable detail microlensing theory for stars both within our Galaxy and in nearby galaxies. The book also includes the observational data obtained by the MACHO group, outlines other microlensing observation programs (in particular, EROS and JGLE), and illustrates possible interpretations of the data. For professional astrophysicists and undergraduate and post-graduate students in physics and astronomy.

**Pontecorvo B** *Selected Works* In 2 volumes. Volume 1: *Scientific Papers* 416 pp. Volume 2: *Memoirs* 352 pp. (Ed.-in-chief S M Bilen’kii) (Moscow: Fizmatlit, 1997) RFBR project 95-02-24005.

B M Pontecorvo (1913–1993) — a disciple and colleague of E Fermi and an honorary member of the Italian Accademia degli Lincei — spent most of his life in Russia. His vast legacy includes scientific papers, essays on the history of physics, popular science articles, and memoirs. The book contains the complete bibliography of Pontecorvo’s works and also features recollections of him and his role in physics, which more than 30 of his friends, themselves prominent scientists, wrote especially for this volume. (Fizmatlit: tel. (095) 955-0330)

**Smirnov B M, Yatsenko F S** *Dimers* (Novosibirsk: Nauka. Siberian Publishing House of the RAS, 1997) 148 pp. Bibliography: 329 refs. RFBR project 96-02-30065.

This book presents a systematized compilation of spectroscopic data for the dimers ( $A_2$  diatomic molecules) of most chemical elements, for which such parameters as electronic, vibrational, and rotational constants, ionization and dissociation potentials, etc. are provided. The molecular ions of a number of dimers are also covered. The book is intended for researchers, engineers, and students engaged in molecular spectroscopy, plasma physics and chemistry, quantum electronics, gas dynamics, analytical chemistry, astrophysics, and semiconductor technology. (The postal mail address of the Siberian Publishing House ‘Nauka’ reads as follows: 630099, Novosibirsk, ul. Sovetskaya, 18)

**Physics of Nuclear Explosion** (Ed.-in-chief V M Loborev) In 2 volumes. Volume 1: *The Development of an Explosion* 528 pp. Bibliography: 456 refs. Volume 2: *The Impact of an Explosion* 256 pp. Bibliography: 167 refs. (Moscow: Fizmatlit, 1997) RFBR project 96-02-30054.

This monograph, collectively written by the TsFTI MO RF (Central Physics and Technics Institute of the RF Ministry of Defence) researchers, summarizes the R&D work conducted by TsFTI jointly with RAS institutes and the Russian Federation Ministry of the Nuclear Power Industry. The first volume is a systematic presentation of the physical and mathematical models of the processes operating when a nuclear explosion develops. The three chapters of this volume cover explosions near the earth's surface, at high altitudes, and near the air–water interface. The second volume is a logical sequel to the first and presents a systematic account of major physical processes that take place when the damaging factors of a nuclear explosion interact with an obstacle. In the same volume, basic mathematical models developed in the study of such interaction processes are discussed. For undergraduate and post-graduate students and specialists in atomic physics, radio-physics, mechanics, solid-state physics, plasma physics, and in the history of science. (Fizmatlit: tel. (095) 955-0330)

**Gubanov V S** *The Generalized Method of Least Squares. Theory and Applications to Astrometry* (Saint-Petersburg: Nauka, 1997) 318 pp. Bibliography: 82 refs. RFBR project 97-02-30069.

This book is a comprehensive treatment of the method of least squares and its modern generalizations (mean quadratic collocation and Kalman's filtration techniques). It examines the major parametric and stochastic models for measurement data from astrometry and space geodesy, and presents for these models specific algorithms of optimal parameter estimation using a convenient matrix form. Special attention is given to global data equalization, i.e. the collateral processing of a wide variety of measurement data provided by the astro-geodetic network. The text illustrates applications of the generalized method to superlong-base radio-interferometer observations, to the analysis of the rotational motion of the Earth, etc. and also discusses possible further employments. For researchers and engineers in various natural science disciplines, for whom the processing and interpretation of measured data and positional observations is a part of their professional activities. The book can also be used as a textbook for undergraduate and post-graduate students in astrometry, celestial mechanics, geodesy, and geophysics. (The postal mail address of the Nauka Publishing House in St.-Petersburg reads as follows: 199034 Saint-Petersburg, Mendelevskaya lin. 1)

**Shmelev A B** *Foundations of the Markov Theory of Nonlinear Random Field Processing* (Moscow: MFTI Publ., 1998) 208 pp. Bibliography: 230 refs. RFBR project 97-02-30067.

Using the generalization of the Markov approach to the nonlinear estimation of random processes, this book examines the foundations of the theory of nonlinear random-field

processing as applied to the problems one faces in large-aperture and multipositional information and measuring systems (signal reception optimization and the separation of useful information). The major emphasis is on the synthesis and analysis of algorithms for the spacetime estimation of signal phase fluctuations observed in a mixture with Gaussian noise. Coverage also includes the spacetime quasi-coherent reception of phase-distorted modulated signals and the relationship between the plausibility ratio and the a posteriori characteristics of random signals. Some aspects of the time processing of signals observed against the background of pulsed non-Gaussian noise are also discussed. For researchers and engineers engaged in radar, communications, information processing and related areas. (MFTI Publ.: tel. (095) 408-7681)

**Yulii Borisovich Khariton. A Century-Long Journey.** Collection of Memoirs (Compiled and edited by V I Gol'danskiĭ, A Yu Semenov, M B Chernenko, and Yu N Smirnov) (Moscow: Éditorial URSS, 1999) 512 pp. RFBR project 98-02-30001.

The colleagues, disciples, relatives, and friends of Yu B Khariton (1904–1996) publish their memories of him in this collection, which also contains Khariton's biography and his scientific and popular science publications and lectures. (Éditorial URSS: tel./fax (095) 135-4423, tel. (095) 135-4246, e-mail: urss@urss.isa.ac.ru)

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