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### New books on physics and related sciences

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Bogoliubov N N Collected Works in 12 volumes. (Classics of Science Series, composed and edited by A D Sukhanov) *Quantum Theory*: (in 4 vols) Vol. 12. *Theory of Elementary Particles* (Eds V A Matveev, A D Sukhanov) (Moscow: Nauka, 2009) 784 pp. ISBN 978-5-02-035718-1. RFBR Project 07-01-070337d.

This is the first attempt at publishing the complete collected body of research work of N N Bogoliubov, a classic of mathematics and the natural sciences. It comprises twelve volumes. Its uniqueness stems from the fact that the included papers have never before been published all together. Volume 12 includes lectures on "The theory of symmetry of elementary particles", the monograph Colored Quarks, and papers formulating the idea of a new quantum number-color of quarks-and developing elements of a theory of composite hadron models. Furthermore, this volume contains a series of materials on quantum theory not included in the preceding volumes, a complete bibliography of N N Bogoliubov's works, and a concluding review which demonstrates his key role in building modern theoretical and mathematical physics as an integrated selfsufficient science. The volume is intended for students, postgraduates, researchers, and teachers who specialize in mathematical physics, quantum field theory, the theory of elementary particles, and the history of physics. (Akademizdattsentr Nauka RAN: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-71-51; fax (7-495) 420-22-20; e-mail: secret@naukaran.ru; URL: http://www.naukaran.ru/)

## Fortov V E Extreme States of Matter (Moscow: Fizmatlit, 2009) 304 pp. ISBN 978-5-9221-1104-1.

The book is devoted to the physical properties of matter at extremely high pressures and temperatures achievable under laboratory conditions by the cumulation of kinetic or electromagnetic energy. It also deals with extreme processes in space, which are powered by gravitational energy and thermonuclear energy released. The book is based on lectures delivered by the author at the Moscow Institute of Physics and Technology and on reviews and invited talks at science conferences and symposia. It is intended for a broad community of research workers, postgraduates, and students of natural-science departments, and was recommended by the Association of Educational Methods (UMO in Russ. abbr.) on classical university education of the Russian Federation in applied mathematics and physics as a textbook for students of higher education establishments majoring in 'Applied mathematics and physics' discipline. ('Fiziko-matematicheskaya literatura' Publishing Company MAIK Nauka/Interperiodika: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: http:// www.fml.ru/)

### Izyumov Yu A, Kurmaev E Z High-Temperature Superconductors Based on FeAs Compounds (Moscow–Izhevsk: RKhD, 2009) 312 pp. ISBN 978-5-93972-747-1.

The authors analyze the physical properties and electron models of a new class of high-temperature superconductors in iron-based

Uspekhi Fizicheskikh Nauk **179** (9) 1031–1032 (2009) DOI: 10.3367/UFNr.0179.200909m.l031 Translated by V I Kisin layered compounds. Despite greatly varied chemical compositions and differences in crystal structure, they all possess similar physical properties due to electron charge carriers in the FeAs layers and to their interaction with fluctuations of magnetic order. The exceptional interest they have attracted stems from the promise of their practical applications. The monograph gives a complete picture of the formation of their physical properties on the basis of theoretical models and electronic structure. It is intended for a wide range of readers: physicists studying the electronic properties of FeAs compounds; chemistry practitioners who synthesize these compounds, and specialists in theoretical physics who perform calculations of the electronic structure of solids. It will be useful not only to researchers working in the field of superconductivity and magnetism but also to undergraduates, postgraduates, and anyone wishing to familiarize themselves with this area of physical materials science. (Scientific Publishing Center 'Regular and Chaotic Dynamics': 426034 Izhevsk, ul. Universitetskaya 1, Udmurt State University, tel. (7-3412) 50-02-95, (7-495) 332-48-92; e-mail: subsc-ribe@rcd.ru; URL: http://shop.rcd.ru/)

Fifty Years of Space Research (Based on materials of the International Forum "Cosmic space: science and problems of the XXI century, October 2007" dedicated to the fifty-year anniversary of the launching of Earth's first artificial satellite) (Compiled by A V Zakharov, L M Zelenyi, O V Zakutnaya; Ed. A V Zakharov) (Moscow: Fizmatlit, 2009) 280 pp. ISBN 5-9221-1086-0.

This collection of articles is devoted to the most important results of the first fifty years of fundamental space research which started after Earth's first artificial satellite was launched in 1957. The collection brings together articles based on selected talks delivered at the ceremonial and plenary sessions of the International Forum "Cosmic space: science and problems of the XXI century" (Moscow, 1-5 October 2007), and some original publications. The authors discuss the main achievements and unsolved problems in studying the terrestrial magnetosphere, interplanetary space, the Sun, the Moon, the Solar System planets closest to Earth, the astrophysics and physics of cosmic rays, as well as the results of a number of fundamental physical and medical and biological experiments conducted at orbital stations. This is intended for a wide range of scientists, postgraduates, and undergraduates specializing in space physics. ('Fiziko-matematicheskaya literatura' Publishing Company MAIK Nauka/Interperiodika: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: http://www.fml.ru/)

# **Gurbatov S N, Rudenko O V (Eds)** *Acoustics Through Problems* 2nd ed., revised and extended (Moscow: Fizmatlit, 2009) 336 pp. ISBN 978-5-9221-1020-4.

This is a systematically organized collection of problems covering the main subfields of classical and modern acoustics. In the framework of each section, the material is arranged in ascending degree of complexity. Many problems are accompanied with comment notes and the most difficult ones, with expanded solutions, so that it is possible to use this problems book for personal study. The book reflects the experience accumulated when teaching general and special courses of acoustics at Moscow and Nizhny Novgorod State Universities. It was recommended by the Ministry of General and Professional Education of the Russian Federation for use as part of the teaching process by students of physics specialties in the higher education establishments. ('Fiziko-matematicheskaya literatura' Publishing Company MAIK Nauka/Interperiodika: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: http:// www.fml.ru/)

## Lebedev A I *Physics of Semiconductor Devices* (Moscow: Fizmatlit, 2008) 488 pp. ISBN 5-9221-0995-6.

The book deals with the physical principles of the functioning of the more important classes of modern semiconductor devices: diodes, bipolar and field-effect transistors, thyristors, microwave devices with negative differential resistance (Gunn diodes, avalanche-floating and injection-floating diodes), chargecoupled devices, and optoelectronic devices (photodetectors, light diodes, injection lasers, etc.). Derivation is given of the basic theoretical relations for calculating the characteristics of these devices. Much attention is paid to specific features of modern high-speed devices of the submicron- and nanometersized ranges, including those incorporating heterojunctions, quantum wells, and quantum dots. In addition, the book discusses the fundamentals of planar technology; it describes technological problems that arose recently, and points to promising approaches to solving them. The book is intended for senior year students, postgraduates, and researchers working in semiconductor physics and is recommended by the Association of Educational Methods (UMO in Russ. abbr.) on classical university education of the Russian Federation as a textbook for students of higher educational establishments majoring in the specialties 010701-Physics, 010704-Physics of Condensed State of Matter, and 010803-Microelectronics and Semiconductor Devices. ('Fiziko-matematicheskaya literatura' Publishing Company MAIK Nauka/Interperiodika: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: http:// www.fml.ru/)

### Surdin V G, Kuimov K V, Kurt V G, Terebizh V Yu, Rudnitskii G M *Sky and Telescope* (Astronomy and Astrophysics Series, book 1, Ed. V G Surdin) (Moscow: Fizmatlit, 2008) 424 pp. ISBN 5-9221-0844-7.

The first volume in Astronomy and Astrophysics Series presents a review of the current status of sciences studying the Universe and is devoted to the fundamental concepts used in all fields of astronomy and astrophysics: measurements of coordinates and time, observation techniques in various spectral ranges, astronomical terminology, and the nomenclature of celestial objects. The material is mostly intended for students of junior courses in the natural sciences at universities and specialists in related fields of science. The book would be of special interest for amateur astronomers. ('Fiziko-matematicheskaya literatura' Publishing Company MAIK Nauka/Interperiodika: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: http:// www.fml.ru/)

### Surdin V G, Berezhnoi A A, Busarev V V, Ksanfomaliti L V, Kholshevnikov K V *Solar System* (Astronomy and Astrophysics Series, book 2, Ed. V G Surdin) (Moscow: Fizmatlit, 2008) 400 p. ISBN 5-9221-0989-5.

The second volume in Astronomy and Astrophysics Series presents a review of the current status of the study of planets and smaller bodies of the Solar System. The main results discussed were obtained in terrestrial and planetary astronomy. The volume presents current data on planets and their satellites, comets, asteroids, and meteorites. The material is mostly intended for students of junior courses in the natural sciences at universities and specialists in related fields of science. The book would be of special interest for amateur astronomers. ('Fizikomatematicheskaya literatura' Publishing Company MAIK Nauka/Interperiodika: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: http:// www.fml.ru/)

Potapov A A, Gil'mutdinov A Kh, Ushakov P A Fractal Elements and Radio Systems: Physics Aspects (Library of the journal Nelineinyi Mir (Nonlinear World): Research Series 'Fractals, Chaos, Probability'; Ed. A A Potapov) (Moscow: Radiotekhnika, 2009) 200 pp. ISBN 978-5-88070-228-2.

The book presents in a systematic way the results of theoretical and experimental studies that the authors obtained using the theory of fractals, fractional dimensions, and fractional operators, taking into account the scaling effects of real signals and physical fields. The fractional derivative in the equations is interpreted as reflecting a specific property of the process—its memory or its non-Markovian nature (hereditarity). One of the intentions of the book is to briefly outline the history and logic of progress in pioneering research along these lines at the V A Kotel'nikov Institute of Radioengineering and Electronics of the Russian Academy of Sciences in Moscow and the A N Tupolev Kazan' Aviation Institute (Kazan' State Technical University) in Kazan'. Proposed for the first time are new and promising versions of element designs with fractal dimension 'fractal impedances' - capable of functioning in various devices of fractal electronics. The book gives a classification, methods of analysis, and method of synthesis of the modern element base of fractal radioelectronics-resistive-capacitive elements with distributed parameters (RC-DPC) and also discusses areas of their application. A radically new approach is investigated to synthesizing fractal impedances using multilayer RC-DPCs and the method of generalized finite distributed parameter elements and genetic algorithms of optimization. The most recent methods are discussed of processing ultraweak signals and lowcontrast images based on textures and fractals, taking into account scaling effects. The main stages of designing are outlined, as well the principles of designing the first fractal nonparametric detector of radar signals; these principles can be extended to other systems of a similar class. Possible approaches to building adaptive fractal detectors are presented. Physical implementation of operators of fractional integro-differentiation of complex order is analyzed for the first time in the literature in this country; this implies that the *complex* (not only negative) fractal dimension D is possible. There can be no doubt that the results presented in this monograph will assist in the active enhancement of the research potential of students, postgraduates, researchers, and specialists. In light of the projected readership and the selection of topics, this monograph has no analogs in world literature and is 'a first' in this field of science. It is justifiable to hope that the new generation of specialists will scale the heights of the 'fractal' view of the world and thereby produce ever stronger success in science and industry in Russia at this stage of the technological race involving many countries. The book is intended for scientists and engineers keen on new ideas and methods in contemporary fields of radio physics and radioelectronics, as well as for postgraduates and undergraduates majoring in the relevant areas. (Izd. Radiotekhnika: 107031 Moscow, ul. Kuznetskii most 20/6; tel./fax (7-495) 621-48-37, 625-92-41; e-mail: info@radiotec.ru; URL: http://www.radiotec.ru/)

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