

## New books on physics and related sciences

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**Thorn K S** *Black Holes and Time Warps: Einstein's Outrageous Legacy* (New York: W W Norton & Co., 1994) [Translated into Russian under the general editorship of Prof. V B Braginsky (Moscow: Izd. Fiziko-Matematicheskoi Literaturny, 2007) 616 pp. ISBN 9875-94052-144-4].

This monograph is intended as a popular-science presentation of the latest achievements in astrophysics and gravitation which are closely related to the fundamental predictions of Albert Einstein. In this book, the reader will find a great deal of interesting information on the contribution of scientists of many countries to both this area of science and to a number of related areas. This book was translated from English into French, German, Japanese, Chinese, Polish, Greek, and now Russian. In fact some of its chapters were published earlier in Russian in the magazine *Priroda* (Nature). Professor Kip S Thorn (California Institute of Technology) is at the front of fundamental research in relativistic astrophysics and gravitation, quantum measurements, and the theory of gravitational antennas. The intended audience for this book is a broad range of readers, including pupils of senior high school grades. (Physical and Mathematical Literature Publ.: 123182 Moscow, ul. Shchukinskaya 12, korp. 1; e-mail: fizmatlit@narod.ru; URL: <http://fizmatlit.narod.ru/>)

**Khriplovich I B** *Theoretical Kaleidoscope* (Moscow–Izhevsk: RKhD, Institute for Computer Research, 2007) 116 pp. ISBN 978-5-93972-509-5.

The book is mostly based on lectures on additional chapters of theoretical physics that the author read for a number of years to students at Novosibirsk State University. It will be useful and accessible to students and master degree seekers at physics departments of universities, and will be of interest to mature physicists. (Scientific Publications Center 'Regular and Chaotic Dynamics': 426034 Izhevsk, ul. Universitetskaya 1, Udmurt State University; tel. (7-3412) 50-02-95; e-mail: [subscribe@rcd.ru](mailto:subscribe@rcd.ru); URL: <http://shop.rcd.ru/>)

**Brandt N B, Kul'bachinsky V A** *Quasiparticles in Condensed Matter Physics* (Moscow: Fizmatlit, 2007) 632 pp. ISBN 5-9221-0813-3.

The general concept of quasiparticles in condensed matter physics is treated in a unified framework, which makes it possible to evaluate the excitations of ensembles of strongly interacting particles by a weakly nonideal gas of elementary excitations, and its various applications. In addition to classical quasiparticles — phonons, excitons, plasmons, etc. — the authors consider less-known new-generation

quasiparticles — holons, spinons, vortexons, fractional-statistics quasiparticles, fractional- and variable-charge quasiparticles, as well as hybrid and compound quasiparticles. The book was designed for undergraduate students, postgraduates, lecturers in physics disciplines, researchers, and specialists in condensed matter physics. (Fizmatlit Publ.: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21, fax (7-495) 334-76-20; e-mail: [fizmat@maik.ru](mailto:fizmat@maik.ru); URL: <http://www.fml.ru/>)

**Loskutov A Yu, Mikhailov A S** *Fundamentals of the Theory of Complex Systems* (Moscow–Izhevsk: RKhD, Institute for Computer Research, 2007) 612 pp. ISBN 5-93972-558-9.

The theory of cooperative behavior of strongly nonequilibrium physical, chemical, biological, and other nonlinear systems is presented in a systematic manner. The properties of autowaves and dissipative structures in active media and the phenomenon of deterministic chaos are investigated in detail. Much attention is paid to a description of fractal sets, mappings, and spatial and temporal dynamics. Methods for analog processing of information using distributed active media and neuronlike networks are discussed. The book is well-illustrated, and gives numerous clarifying examples. This 2nd edition (1st edition — *Introduction to Synergetics*, 1990) includes new sections dealing with the nature of chaos, fractal geometry, controlling nonlinear chaotic systems and chaos suppression, coupled map lattices, analysis of temporal series, and some other areas in current nonlinear dynamics. Correspondingly, the new edition was given a new title that better represents the contents of the book. The book is intended for undergraduates and postgraduate students, teachers, and specialists in the physics of nonlinear systems, biological and chemical physics, physical informatics, and all those interested in the current understanding of problems of dynamic chaos. The book is recommended by the Ministry of Education Department (UMO) on Classical University Education of the Russian Federation as a textbook for students of higher educational establishments majoring in the specialties 010701.65 (Physics) and 010710.65 (Physics of Open Nonlinear Systems). (Scientific Publications Center 'Regular and Chaotic Dynamics': 426034 Izhevsk, ul. Universitetskaya 1, Udmurt State University; tel. (7-3412) 50-02-95; e-mail: [subscribe@rcd.ru](mailto:subscribe@rcd.ru); URL: <http://shop.rcd.ru/>)

**Astronomy: XXIth Century** (Composed and edited by V G Surdin) (Fryazino: Izd. Vek 2, 2007) 608 pp. ISBN 978-5-85099-175-3.

The book deals with current problems of astronomy: from the study of the Moon and planets to the search for gravitational waves, dark matter, and dark energy. Scientists of the P K Shternberg State Institute of Astronomy, Moscow State University (Baturin V A, Gindilis L M, Efremov Yu N, Zasov A V, Mironova I V, Popov S B, Prokhorov M E,

Rodionova Zh F, Rudenko V N, Sazhin M V, Samus' N N, Surdin V G, Khovanskaya O S, Cherepashchuk A M, Chernin A D, and Shevchenko V V tell the reader about major events that took place in astronomy at the threshold of the new millennium and what the unsolved mysteries are that scientists are working on now. This symbolic historical borderline — the beginning of the new millennium — was marked by several outstanding discoveries about our Universe. It would be no exaggeration therefore to call the last ten or so years the Great Decade of Astronomy, perhaps the beginning of its 'golden century'. The Appendix offers extensive reference material on the current status as of June 2007. The book is intended for pupils of higher grades of schools, undergraduates, and teachers, as well as anyone interested in the problems of current natural sciences. (Vek 2 Publ.: 141195 Fryazino-5, Moskovskaya obl., P.O. Box 107; tel. (7-496) 565-25-14; e-mail: mail@vek2.ru; URL: http://www.vek2.ru)

**Olemskoi A I, Kharchenko D O** *Self-Organization of Self-Similar Stochastic Systems* (Moscow – Izhevsk: RKhD, Institute for Computer Research, 2007) 296 pp. ISBN 978-5-93972-609-2.

The book is devoted to the effect of fluctuating external environment on the processes of generation of statistically coherent states in nonlinear dynamic systems for which progress in the methods of statistical analysis provides a qualitative expansion of the possibility of analyzing real phenomena and of forecasting them. The book studies processes of self-organization of self-similar systems that are governed by the principles of phase transitions caused by the influence of fluctuations of external parameters that characterize the external medium. Qualitative restructuring of a system's dynamics is studied under conditions favoring generalized diffusion processes. Methods of description and analysis of anomalous transfer processes are given. Statistical approaches are developed for the representation of nonequilibrium transitions in self-similar systems exposed to correlated action from the side of random sources. The book gives self-consistent models of avalanche formation in the self-organized criticality process. The problems in question are being solved analytically and by numerical simulation. The intended audience of this volume includes undergraduate students, postgraduates, and researchers interested in various aspects of anomalous diffusion, statistical dynamics, nonequilibrium phase transitions, and self-organized criticality. (Scientific Publications Center 'Regular and Chaotic Dynamics': 426034 Izhevsk, ul. Universitetskaya 1, Udmurt State University; tel. (7-3412) 50-02-95; e-mail: subscribe@rcd.ru; URL: http://shop.rcd.ru/)

**Andryushin E A** *The Strength of Nanotechnologies: Science & Business* (Moscow: 'Uspekhi fiziki' Fund, 2007) 160 pp. ISBN 978-5-85099-176-0.

The now popular concept of nanotechnologies is typically associated with a bright kaleidoscope of discoveries marvelled at in newspapers and on TV. In fact, the attractive book jacket does cover content that is no less interesting. The author shows why nanotechnologies never fail to attract big money, tells why progress in nanotechnologies is evolving into one of the whales on which our life rests, and treats the

subject both from its science side and from the business end — and science does turn into business in the nanofield. (Vek 2 Publ.: 141195 Fryazino-5, Moskovskaya obl., P.O. Box 107; tel. (7-496) 565-25-14; e-mail: mail@vek2.ru; URL: http://www.vek2.ru)

**Surdin V G** *Astrology and Science* ("Science today" Series) (Afterword by V L Ginzburg) (Fryazino: Izd. Vek 2, 2007) 96 pp. ISBN 978-5-85099-173-9.

Is there a link between astrology and science? Some maintain that astrology is science, others are adamant that astrology is nothing but guesswork married to stargazing. The book tells the reader what the attitude of scientists toward astrology is, how they test astrological predictions, and who, of the great astronomers, was also an astrologer — and to what degree. (Vek 2 Publ.: 141195 Fryazino-5, Moskovskaya obl., P.O. Box 107; tel. (7-496) 565-25-14; e-mail: mail@vek2.ru; URL: http://www.vek2.ru)

**Gorobets B S** *A Trio in the Atomic Project. The Leipunskys: Top Secret Physicists* (Ed. I O Leipunsky; foreword by Yu N Ranyuk) (Moscow: Izd. LKI, 2008) 312 pp. ISBN 978-5-382-00333-7.

This is the story of the lives and creative contributions of three Soviet nuclear physicists from a single family: two brothers, Aleksandr Il'ich Leipunsky and Ovsei Il'ich Leipunsky, and their sister Dora Il'inichna Leipunskaya. All three made huge contributions to the Soviet Atomic Project. Their names are on the first secret list of persons to be given USSR orders for the successful test of the Soviet atomic bomb in 1949. A I Leipunsky, Full Member of the Ukrainian Academy of Sciences, headed the largest physics institutes of the USSR — the Ukrainian Physical-Technical Institute in Khar'kov, the Institute of Physics in Kiev, and the Physico-Energy Institute in Obninsk. His team of physicists was the first in the USSR and second in the world to cause the atomic nucleus to undergo fission, he suggested and implemented the concept of the fast neutron reactor (the breeder) and the first heat-exchanger liquid-metal loop, and he was science supervisor of the project of power nuclear reactors for the Navy and for space vehicles. Professor O I Leipunsky (Institute of Chemical Physics) was the founder of the method of diamond synthesis that is used everywhere now. He was one of the creators of the scientific and methodical foundations of radiometry and dosimetry of penetrating radiation, co-authored (together with Ya B Zel'dovich) the theory of internal ballistics of powder jet projectiles ("Katyushas"), and developed today's types of solid rocket fuel. Professor D I Leipunskaya was head of a laboratory at the super-top-secret NII-9 where she worked on the plutonium technology and dosimeters and later, at the All-Union Research Institute of Nuclear Geochemistry and Geophysics, developed the method of quantitative neutron-activation analysis for geological prospecting. The book also describes widely known scientists of the Stalin era: L D Landau, N N Semenov, F Houtermans, L S Polak, and others. For people interested in 20th century science and, in particular, the Soviet Atomic Project. (LKI Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9; tel./fax (7-495) 135-42-16; e-mail: urss@urss.ru; URL: http://urss.ru/)

*I.M. Lifshits — A Scientist and A Man* (Exec. Ed. V V Rudnitsky) (Khar'kov: NNTs KhFTI, 2006) 717 pp.

These collected papers celebrate the memory of the outstanding physics theoretician, Full Member of the USSR Academy of Sciences Il'ya Mihailovich Lifshits. The organization of this book is highly nontraditional. On the one hand, it describes in sufficient detail the professional side of life of Il'ya Mihailovich. At the same time, details provided by personal recollections and biographical materials wonderfully reconstruct the whole atmosphere of that epoch. The review of scientific achievement with a bibliography is followed by a selection of Il'ya Mihailovich's papers. Several of his most important original publications take up nearly half of the volume (about 300 pages). These are followed by a comment that was compiled to reflect the evolution of Lifshits's ideas over a quarter of a century after his death. Then we find a number of original papers written by several first-class physicists and mathematicians specially for this volume. The concluding part of the book consists of memoirs of his wife, his disciples, and his colleagues. L P Gor'kov, having read the book, had this to say: "This collection is a brilliantly warm, candid and truthful book that should make an interesting read for people of different ages and, I believe, different professions. I belong to the generation of scientists who witnessed the beginning of something resembling, so to speak, a 'change of guard'. The older generation was at the peak of their creative talent. The 'changing' consisted mostly in a huge influx of youngsters. The post-war decades were the time of rapid progress in science, when new ideas and new fields of research and of course new names emerged in physics. The atmosphere of openness and frank discussion of ideas — that is my mental image of those years. Il'ya Mihailovich (IM), 'Il'mekh' as people referred to him (some face-to-face, some behind his back) was a brilliant example of that attitude. His striving to 'crystallize' a problem and reach maximum clarity before ideas are put on paper was unique even for those years. The reader shall notice this trait, which is so rare nowadays, pointed out in the published reminiscences of his students and assistants. I hasten to remark that I myself never worked with IM — it somehow never happened. However, in those years one was supposed to know who does what, and so I was aware of many results obtained by IM and his school through the 'grapevine', sometimes before the paper was sent for publication. For example: I learned of IM's ideas about superfluidity in quantum crystals because I was present at a discussion of a possible experiment between IM and A I Shal'nikov. There is no need to repeat that IM was the founder and head of the Kharkov school that had done so much work in the theory of metals. The reader can see for himself that the contribution of this school is not reducible to the sum of theoretical papers. More than one generation of experimenters grew out of this area of research. Our current understanding of metal physics is to a large extent the achievement of IM and his school; not a single of the latest experiments measuring quantum oscillations in new systems can avoid resorting to the Lifshits–Kosevich formula! As for IM's work on biopolymers, I knew of it only in most general terms. Now, the least, the reader can do it to appreciate the impressive scale of the field created by IM — he can read the excellent commented review and reminiscences of his closest disciples on IM's Moscow period. Concluding these brief remarks on this note, I wish to repeat once more that I very

much liked the festschrift volume devoted to the memory of Il'ya Mikhailovich Lifshits. I rather think many people, especially scientists of all generations from the 1950s to 1980s, will find it interesting." (National Research Center 'Kharkov Physical-Technical Institute': 61108 Kharkov, ul. Akademicheskaya 1; tel. + 38 (057) 335-35-30, fax: + 38 (057) 335-16-88; URL: <http://www.kipt.kharkov.ua/>)

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