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New books on physics and related sciences

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Gusev A I ***Nanocrystalline Materials: Preparation Techniques and Properties*** (Ekaterinburg: UrO RAN Publ., 1998) 200 pp. Bibliography: 592 refs.

This is the first monograph to provide a systematic presentation of the state of knowledge about nanocrystalline materials. The book summarizes experimental information on how the nanocrystalline state affects the microstructure of metals, alloys, and solid-phase compounds and their mechanical, thermophysical, optical, and magnetic properties. It discusses the basic methods for preparing isolated nanoparticles, highly dispersed powders, and compact nanocrystalline materials; provides an in-depth analysis of dimensional effects in isolated nanoparticles and compact nanocrystal materials, and discusses the beneficial effect of interfaces on the structure formation and properties of compact nanomaterials. An analysis of models for explaining the structure and anomalous properties of the substances in a nanocrystalline state is also provided. The book is aimed at specialists and undergraduate and post-graduate students of solid-state physics, physical chemistry, solid-state chemistry, and materials science. (Institute of Solid State Chemistry, RAS Ural Branch regular mail address: 620219 Ekaterinburg, GSP-145, ul. Pervomaĭskaya, 91)

Collected Papers on Current Problems of Quantum Theory in Commemoration of N A Sveshnikov and F A Lunev (Eds Prof. V I Savrin and O A Khrustalev) (NIIYaF MGU preprint No. 98-23/524) (Moscow: NIIYaF MGU Publ., 1998) 256 pp.

Shocked by the untimely death of Nikita Alekseevich Sveshnikov and Fedor Aleksandrovich Lunev, their friends and colleagues compiled this collection to commemorate these two scientists and teachers. Along with Sveshnikov and Lunev's several latest works, left to coauthors to be prepared for publication, the volume also includes original studies on related subjects, whose authors took this sad opportunity to express their deep reverence for the two scientists. Some of the contributed papers will be reprinted in a memorial issue of *Theoretical and Mathematical Physics*.

Bogolyubov A N, Kravtsov V V ***Problems of Mathematical Physics*** (Moscow: Moscow State University Publ., 1998) 350 pp. Bibliography: 9 refs. Special-purpose Federal Program for book publishing.

Based on the authors' 20-odd-year teaching experience at the Physics Department of Moscow State University, this text examines the basic methods of solving boundary and initial boundary value problems for second-order linear partial differential equations, including the separation of variables, the integral Fourier transform, the reflection and wave propagation methods, and more. Introductory theoretical information for using these methods is provided, and comprehensive examples of solving some concrete problems and exercise problems with answers for independent solution are included. The book is a natural supplement to the *Lectures on Mathematical Physics* by A G Sveshnikov, A N Bogolyubov, and V V Kravtsov, and its content is fully in line with the lecture course on the methods of mathematical physics at the MSU Physics Department. Aimed primarily at students of physical disciplines, the textbook will also be useful for students of engineering as well for anyone involved in mathematical physics and applied mathematics. (MSU Publ. regular mail address: 103009 Moscow, B Nikitskaya ul. 5/7)

F L Shapiro: The Man and the Scientist A Book of Reminiscences (Compiled by L B Pikel'ner and A V Strelkov) (Dubna: OIYaI Publ., 1998) 220 pp.

This collection of memoirs is devoted to the life and work of Fedor L'vovich Shapiro (1915 – 1973) — experimenter, doctor of sciences (Phys.&Math.), professor, and corresponding member of the USSR Academy of Sciences. Along with his relatives, contributors include his close friends, disciples, and colleagues, particularly those from OIYaI Neutrino Laboratory where F L Shapiro spent the last 15 years of his career. (OIYaI Publ. division regular mail address: 141980 Dubna, Moscow region, ul. Joliot-Curie 6)

Infinity in Mathematics: Philosophical and Historical Aspects (Ed. by A G Barabashev) (Moscow: Yanus-K, 1997) 400 pp. Russian Science and Humanities Foundation project 97-03-16041.

Bringing together materials from the September 1995 and September 1996 All-Russian conferences on the problem of infinity in mathematics, this book attempts to convey the conference atmosphere and to show how new ideas and a deeper understanding of the problem emerged in the course of discussions. To this aim, the discussion of each report, tape-recorded and then edited by both the lecturer and other participants, is published along with the text of the report itself. The five chapters of the volume cover ancient Chinese and Greek views of infinity and describe certain approaches which the mathematicians of the middle ages and modern times employed when dealing with infinity. Two approaches to infinity notation in mathematics received special emphasis: treating infinity as completeness, a symbol or a set of symbols suitable for formal manipulations, and the finitization of infinity, when only its finite defining remainder is considered. Coverage also includes original metaphysical concepts involving novel approaches to infinity, and a critical review of what such figures as B de Fontenelle, I Kant, P L Chebyshev,

Uspekhi Fizicheskikh Nauk **170** (1) 111 – 112 (2000)
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G Cantor, P A Florenskiĭ, L Brower, and D Hilbert thought of infinity. The relation between the concept of infinity, the understanding of the structure of the Universe, and the problem of God is discussed in a separate chapter. (Yanus-K Publ. phone number: (7-095) 252 1431)

Astrophysics and the Physics of the Microworld. Proceedings of the Baikal School on Fundamental Physics (Eds V A Naumov, Yu V Parfenov, and S I Sinegovskiĭ) (Irkutsk: Irkutsk University Publ., 1998) 292 pp.

This book contains the lectures, reports, and original papers introduced by the members of the Baĭkal School on Fundamental Physics: "Astrophysics and the Physics of the Microworld" (Irkutsk, 11 – 17 October 1998). The school was supported by the special-purpose federal program "State Support for the Integration of Higher Education and Basic Science for 1997 – 2000" (project K 0403), the Russian Foundation for Basic Research (grant 98-02-26130), and the administration of the Irkutsk region. The organizers were Irkutsk State University, the RAS (Siberian Branch) Institute of Solar and Earth Physics, and Irkutsk University's Research Institute of Applied Physics and Physics Department. Much credit for the organization and implementation of the event also goes to the staff of the Irkutsk branch of the RAS (Siberian Branch) Institute of Laser Physics. Featured topics include the origin of primary cosmic rays and their spectrum and composition over a wide energy range; the physics of atmospheric and solar neutrinos; gamma-ray astronomy, and some aspects of solar physics and high-energy particle physics. As a supplement, the transparencies of all the conference papers will be published in 20 copies. The book is intended for young researchers of cosmic ray physics, solar physics, neutrino astrophysics, and adjacent areas of particle physics, and will be a valuable reference for all those with an interest in these fields. (Irkutsk State University Publ. regular mail address: 664003 Irkutsk, Bul'var Gagarina, 36)

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