

New books on physics and related sciences

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Rubakov V A *Classical Gauge Fields: Theories with Fermions. Noncommutative Theories* 3rd ed. (Moscow: LIBROKOM, 2009) 240 pp. ISBN 978-5-397-00715-3.

The book is based on a lecture course given to the 3rd- and 4th-year undergraduate students at the Physics Department of Moscow State University, specializing in theoretical physics. Part I of the book treats various effects due to the interaction between fermions and topological objects arising in theories of scalar and gauge fields — solitons, instantons, and sphalerons. Part II deals with less traditional material on classical field theories in noncommutative spaces and on solitons in such theories. The book contains an Appendix which briefly discusses instantons as saddle points of the Euclidean functional integral in quantum field theory and some related aspects. This material can be learned in parallel with studying quantum mechanics and then quantum field theory, and will therefore be of interest and value to researchers, postgraduates, and senior-year university students. (Publishing House ‘LIBROKOM’: 117312 Moscow, prosp. 60-letiya Oktyabrya 9; tel/fax (7-499) 135-44-23; e-mail: orders@URSS.ru; URL: <http://www.urss.ru/>)

Borovik-Romanov A S *Lectures on Low-Temperature Magnetism: Magnetic Symmetry of Antiferromagnets* (Moscow: Tsifrovichok, 2010) 56 pp.

For a number of years Andrei Stanislavovich Borovik-Romanov gave students a lecture course ‘Low-temperature magnetism’ which included the fundamentals of solid-state physics, the properties of ferromagnets and diamagnetic materials, and the physics of magnetically ordered materials. Maximum attention was paid to antiferromagnets. That was the time when antiferromagnets were vigorously studied in many laboratories around the world, and Andrei Stanislavovich’s papers greatly influenced progress in this field of magnetism. His discoveries of weak ferromagnetism and the piezomagnetic effect became widely known. Borovik-Romanov’s collaboration with I E Dzyaloshinskii, who developed a thermodynamic theory of antiferromagnetism, made it possible to explain the unusual observed effects. The theoretical and experimental studies of antiferromagnetic resonance carried out by A S Borovik-Romanov opened a new chapter in spin dynamics. These lectures were given in written form to summarize the many years of the exciting massive research program and were delivered at a Physics Summer School in Prague in 1966. Booklet was first printed in 1976 at Novosibirsk State University. This concise book became a desktop feature for several generations of research-

ers working in magnetism. On the occasion of the 90th anniversary of A S Borovik-Romanov’s birthday, the P L Kapitza Institute for Physical Problems of the Russian Academy of Sciences (RAS) offers readers a reprint of the lectures on low-temperature magnetism, having completely reproduced the contents of the first printing. (P L Kapitza Institute for Physical Problems, RAS: 119334 Moscow, ul. Kosygina 2; tel. (7-499) 137-32-48; fax (7-495) 651-21-25; e-mail: office@kapitza.ras.ru; URL: <http://www.kapitza.ras.ru/>)

Abrikosov A A *Fundamentals of the Theory of Metals* 2nd ed. (Ed. L A Falkovsky) (Moscow: FIZMATLIT, 2009) 600 pp. 155 ills. Bibl. 358 refs. ISBN 978-5-9221-1097-6.

The author presents the modern theory of normal and superconducting metals without resorting to complex mathematical methods. In addition to a description of classical properties, the book devotes serious space to currently pressing problems: quantum interference effects, localization of electrons by random potential, nonlinear phenomena, the interrelation between superconductivity and magnetism, etc. The reader needs to be acquainted with quantum mechanics and statistics. The book is intended for students and postgraduates of physics specializations of universities, as well as for researchers in solid-state physics. It includes 155 figures and 358 bibliographic references. Reviewed by: Chair of Solid State Physics of the Moscow Institute of Physics and Technology, chaired by Academician Yu A Osip’yan, and Academician Yu M Kagan. (‘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/>)

Timofeev A V *Resonance Phenomena in Plasma Oscillations* 2nd ed. (Moscow: FIZMATLIT, 2009) 296 pp. ISBN 978-5-9221-1043-3.

This monograph treats the resonance interaction between collective degrees of freedom (self-consistent oscillations) and individual ones (motion of individual particles). In the case of nonmagnetized plasma this means the Cherenkov resonance interaction (Vavilov–Cherenkov resonance), and in the case of plasma in a magnetic field, the cyclotron interaction. Coinciding values of flow velocity and phase velocity of oscillations in nonuniform plasma flow result in the phenomenon of hydrodynamic resonance. If the plasma is nonuniform, the resonance interaction due to constant phase of oscillations on the trajectory of the particle (phase resonance) may result in sharp local growth of the wave vector of oscillations (spatial resonance). At the same time, spatial resonances may also arise when there are no phase resonances. Alfvén resonance, also treated in this mono-

graph, is such a resonance. The book will serve as a useful reference source for physics researchers and senior-year students of physics departments of universities. ('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/>)

Verkhodanov O V, Pariisky Yu N *Radio Galaxies and Cosmology* (Moscow: FIZMATLIT, 2009) 304 pp. ISBN 978-5-9221-1135-5.

This book is devoted to the study of powerful radio galaxies in various ranges of wavelengths. Maximum attention is paid to observational data and their interpretation. The history of radio galaxy research is outlined and the future of radio galaxy investigation is discussed. The properties of these galaxies are described, as are the current physical models explaining their activities and the differences between them. Results are given of many years of studying radio galaxies in the framework of the Big Trio program on the RATAN-600 radio telescope, 6-m optical BTA telescope of the RAS Special Astrophysical Observatory, and on the VLA HP radio interferometer (USA). A detailed analysis is given of tests which make it possible to compare models of the Universe with the observational data for radio galaxies. The book discusses problems encountered in the analysis of data of microwave background radiation in the presence of noise determined by the distribution of radio galaxies. The book is designed for postgraduates, astrophysicists, astronomy students, physicists, and all readers interested in modern astrophysics and cosmology. ('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/>)

Compiled by *E V Zakharova*
(e-mail: zaharova@ufn.ru)