Books on physics and astronomy to be published by "Mir" in 1990

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The publishing plan includes the most timely books on the fundamental problems in physics and astronomy, particularly those that have a direct application to scientific-technological progress. Appropriate attention is also being devoted to books of pedagogical and general educational nature addressed either to a wide circle of readers, or to readers with education in physics but on problems lying beyond their narrow specialization.

During the last 10–15 years ever greater importance in fundamental physics research is being acquired by the theory of fractals which at first arose as a purely mathematics discipline. The monograph by the Norwegian author J. Feder entitled *Fractals* is devoted to the investigation of the properties of fractals and a description in the language of fractals of phenomena of various natures. The material is presented in 14 chapters. Chapter 1 gives a brief presentation of the idea of fractal description of nature; Ch. 2 gives an idea of fractals and fractal dimensionalities using concrete examples. Chapter 3 investigates the theoretical, computational and experimental data on fractal dimensions of clusters that arise in the course of diffusion-limited growth, electro-deposition, aggregation of proteins and colloid particles. Chapter 4 gives an outline of evaluating the instability of the interphase of two viscous fluids, flowing through a porous medium; Chapters 5 and 6 are devoted to a development (using the example of condensation on a Cantor set) of concepts concerning a multifractal spectrum and of a sequence of mass indices. Percolation problems are examined in Ch. 7. In Chs. 8 and 9 results of Hurst's papers on determining the regularities in the variation of annual water budgets of the river Nile, examples of R/S analysis are discussed, computer modeling of Brownian motions is introduced; Ch. 10 gives an illustration of the concepts of self-similarity and self-affinity of fractals using the examples of the game strategy of a careful and a reckless roulette player; Ch. 11 contains empirical material on the statistics of height of sea waves, its fractal analysis and computer modeling. Chapter 12 examines, using different examples, the relationship between the perimeter and the area of fractals; Chs. 13 and 14 are devoted to fractal surfaces and their construction using computers, and extensive compilation is given of empirical material on the fractal structure of various surfaces (from topography of different localities, and structure of soil to structure of molecular monolayers). The book is intended for scientists, graduate and undergraduate students who wish to become familiar with the theory of fractals and its application in describing various phenomena.

The book *Statistische Mechanik für das Nichtgleichgewicht* by G. Röpke of East Germany presents the foundations of the theory of radom processes, the classical and quantum statistical mechanics of irreversible processes, the theory of the Boltzmann equation, and different approaches to a description of the linear reaction of systems to different perturbations. The book is distinguished by being highly informative, by the simplicity and elegance of its treatment of complicated problems, and by a close connection with physical applications. It can serve as a textbook. The material is presented in five chapters: random processes; equations for irreversible processes and the method of the projection operator; kinetic theory; theory of linear reactions; results and prospects. It is intended for students—physicists, chemists, mathematicians, and also for scientists wishing to acquaint themselves with modern statistical physics.

The monograph by the American scientist J. Keiser *Statistical Thermodynamics of Nonequilibrium Processes* is devoted to a presentation of the present state of thermodynamics. It presents both general results of statistical theory, and also applications to specific cases in hydrodynamics, chemical thermodynamics and electrochemistry, and also to non-steady-state processes in chemical systems. Considerable attention is devoted to the description of results of real experiments. The material is presented in 10 chapters. Chapter 1 is an introduction to the theory of statistical ensembles and the theory of stochastic processes. Chapter 2 examines the foundations of the theories of Onsager and Boltzmann; Ch. 3 is devoted to the theory of fluctuations in a Boltzmann gas and the theory of chemically reacting systems in an equilibrium state. Chapter 4 presents the foundations of nonequilibrium statistical thermodynamics; Ch. 5 is devoted to a thermodynamic description of chemical and electrochemical processes, and also to mechanisms of ion transport (through biological membranes). Chapter 6 provides a hydrodynamic description both of dynamic and fluctuational processes (in chemically reacting systems with diffusion); Ch. 7 examines nonequilibrium steady-state situations. The analysis (solution of steady-state equations, investigation of stability and fluctuations, behavior in critical points) is carried out using the example of chemically reacting systems, semiconductors etc.; Ch. 8 is also devoted to an analysis of nonequilibrium steady-state situations, but this time on the basis of the thermodynamics of nonequilibrium processes. Chapter 9 presents an analysis of the hierarchy of abbreviated descriptions in the statistical theory of nonequilibrium processes. The last chapter is devoted to a description of the modern theory of nonstationary processes in systems with complex behavior. It is intended for specialists in physics, biophysics, chemistry, and also for undergraduate and graduate students.

The book of the well-known French scientists J.-C. Toledano and P. Toledano *The Landau Theory of Phase Transitions. Application to Structural, Incommensurate, Magnetic and Liquid Crystal Systems* contains a presentation of the achievements of the theory of phase transitions in substances

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including the very latest results on the theory of incommensurate phases and the theory of liquid crystals. Because of the breadth of the material being treated the authors succeeded in bringing together theoretical approaches to what might appear to be different problems, and to bring out the common features of these problems. The rigor and the mathematical completeness of the material are combined with a clarity of presentation, and this gives the possibility of using the book as a modern textbook. The material is presented in eight chapters. The book begins with "An intuitive approach to the basic ideas of the Landau theory" (Ch. 1), this is followed by a presentation of the Landau theory on the basis of group theory (Ch. 2). Chapter 3 examines the structural transitions between periodic phases, and Ch. 4 examines transitions of the I order. Then follows a presentation of the Landau theory of incommensurate phases (Ch. 5), of magnetic transitions (Ch. 6), and of liquid crystals (Ch. 7). The last chapter, Ch. 8, presents some of the newest results (for example, the influence of defects on phase transitions) and discusses the question of the foundations of Landau theory. The book is intended for students and scientists interested in the theory of phase transitions.

The study of chaos in dynamical systems is attracting much attention from research workers. The book *Chaotic Vibrations* by F. Moon from the USA is written simply with a large number of examples in the form of mechanical models or elementary radiotechnical circuits. The book is not overloaded by even the simplest mathematical calculations. At the same time it contains a description of the majority of the principal concepts utilized in investigations of chaos. The book could serve as a textbook. The brief table of contents is: principal concepts and domains of application; how does chaos manifest itself (the phase plane, spectra, mappings, flows); the methods of investigations of chaos illustrated by many examples; physical experiments in systems involving chaos (dynamics of solid state, magnetic levitation, elasticity of a medium, nonlinear chains, hydrodynamics); experimental manifestations of chaos, criteria for the appearance of chaos (a perturbed pendulum, surface waves in a liquid cylinder, homoclinical trajectories, Lyapunov indices), fractal properties of chaos, etc. The appendix provides twelve examples of a numerical analysis of the most popular and simple models, and also four "chaos" games. The book is intended for specialists in the field of applied sciences: graduate and undergraduate students, teachers, physicists, mathematicians, and chemists.

The book of the American physicist G. Kane *Modern Elementary Particle Physics* presents the modern theory of strong, weak and electromagnetic interactions. The book is distinguished by a felicitous choice of material, the logic of its presentation, the orientation toward future experiments in high energy physics, by the presence of interesting and original problems, by recommendations concerning a deeper study of the material presented, and also by remarks of a historical, pedagogical or technical nature. It can serve as a textbook. The material is presented in 29 chapters arranged in three parts and six appendices., The first part examines the Standard Model, the second gives a deeper presentation of a number of sections of the Standard Model, and the third is devoted to three of the possible extensions of the Standard Model. The appendices present the principles of the theory of angular momentum, information from group theory, relations of relativistic kinematics and formulas for cross sections with an indication of the range of their applicability. It is intended for undergraduate and graduate students, and also for specialists working in the field of elementary particle physics and quantum field theory.

A proof that the neutrino mass differs from zero will have important consequences for elementary particle physics and cosmological physics. Much attention is devoted to this problem both by physicists and by astrophysicists and astronomers. In the book by the USA authors F. Bohm and P. Vogel *Physics of Massive Neutrinos* information is presented on neutrino physics obtained as a result of research in the fields of nuclear physics, elementary particle physics, astrophysics and cosmology. It examines the formalism of the Majorana and Dirac neutrinos, theoretical models of the neutrino, neutrino interactions, experiments on the search for neutrino mass from the beta-decay spectrum of tritium and on neutrino mixing, and the role of neutrinos in cosmology. It is intended for scientists, and graduate and undergraduate students.

The book by the well-known English theoretical physicist S. Hawking *A Brief History of Time from the Big Bang to Black Holes* presents new ideas (including those of the author) in the theory of gravitation and cosmology. The book begins with a presentation of the history of the origin of scientific concepts of the structure of the Universe and concludes with an examination of the problem of the arrow of time and of the creation of a unified theory. In an appendix brief portraits are given of Galileo, Newton and Einstein with an emphasis on their human qualities and traits of character, and also a dictionary of the physical terms and concepts of modern physics encountered in the book. The book is written without formulas, it is the product of a geometric (devoid of formulas) and conceptual (philosophical) way of thinking. It is intended for undergraduate and graduate students in physics, philosophers, and physics specialists.

Solid state and condensed state physics continues to occupy leading positions in applications to scientific-technological progress. The book of the East German authors F. Bechstedt and R. Enderlein *Semiconductor Surfaces and Interfaces. Their Atomic and Electronic Structures* is devoted to the present state of knowledge in the field of physics of clean surfaces and interfaces. The material is presented in four chapters. The first chapter gives a clear and detailed examination of the problems of symmetry of atomic structure and restructuring of a surface, the nature of chemical bonding, the methods of preparing and investigating a surface; Ch. 2 contains a description of self-consistent calculations of one-electron surface states by the pseudopotential method, and a detailed examination of the different modifications of the strong coupling method for finding surface levels and calculations of total energy. The properties of specific surfaces are examined in Ch. 3, which gives a quite complete presentation of the subject, and also examines the atomic and electronic structure of all the types of surfaces that have been investigated, and analyzes the advantages and disadvantages of different competing models. The fourth chapter examines the boundaries dividing semiconductors from metals, and semiconductors from insulators. Particular attention is paid to the role of surface electron states in the forbidden band in different theoretical models. The book can serve as a textbook. It is intended for graduate

and undergraduate students interested in the physics of semiconductor surfaces, and also for scientists engaged in investigating surfaces and interfaces in semiconductor microelectron devices.

The book by the American author A. Zangwill *Physics of Surfaces* picks out from the extensive and frequently contradictory information on the nature of surface phenomena the principal, most characteristic phenomena common to surfaces of metals, semiconductors and dielectrics. The material is presented in two parts (sixteen chapters). In the first part consisting of seven chapters general physical properties are examined of atomically clean surfaces of metals and semiconductors, the thermodynamical characteristics, the composition of the surface phase, the fundamentals of surface crystallography, the energy spectra of the surface, the phase transitions on the surface, elementary excited states on the surface of a crystal, and optical properties. In the second part of the book (Chapters 8–16) questions are presented concerning the interaction of surfaces of a solid body with its gaseous surroundings, the mechanism of physical adsorption, chemoadsorption, change in the structure of the surface accompanying adsorption and the structure of adsorption complexes, phase transitions in adsorption layers, the influence of adsorption on the energy spectrum of surfaces, energy exchange in a system of adsorbate-solid body, classification of catalytic reactions on the surfaces of metals and semiconductors, the growth of epitaxial films and the influence on this process of the orientation of the substrate and its deformation. Essentially, the book deals will all the basic aspects of the physics of the surface of a solid. Each chapter of the book is accompanied by a short list of review papers on the corresponding problems. At the end of the book there is given an extensive bibliography (approximately 600 references) and a well-constructed subject index. The book is intended for undergraduate and graduate students, scientists, teachers, and technologists in the field of solid state electronics, and also for biophysicists and chemists engaged in studying interphase phenomena.

The book by well-known research workers from the USA, France and Sweden *Microemulsions: Structure and Dynamics* edited by S. Friberg and P. Bothorel is devoted to the study of microemulsions in a state which in many respects is like a critical state. The book examines the thermodynamics of microemulsions, their phase diagrams, their critical behavior, different experimental methods of studying them in connection with the investigation of special structural features of microemulsions, phenomena associated with ultra-low surface tension of such systems, in particular, in connection with using microemulsions in petroleum production. The material is presented in eight articles: phase diagrams and the hypothesis of pseudophases; phase diagrams and critical behavior of quaternary microemulsion systems; nonaqueous microemulsions; nonionic materials; molecular diffusion in microemulsions; the dynamics of microemulsions; low surface tension in microemulsion systems; production of petroleum and microemulsions. The book is intended for specialists in the field of molecular physics and physical chemistry of solutions who are studying phase transitions and critical phenomena, who are engaged in the investigation of supramolecular structures in solutions of amphiphilic molecules, and also for graduate and undergraduate students.

Nuclear magnetic resonance has found the widest application in physics, chemistry, biophysics, medicine and its applications continue to become more extensive. In the book by Swiss scientists R. Ernst, G. Bodenhausen, and A. Wokaun *Principles of* NMR *in One and Two Dimensions* an exhaustive presentation is given of the theory, experimental methods and different applications of pulsed NMR spectroscopy. The main attention is directed to the principles of one- and two-dimensional pulsed NMR spectroscopy. A detailed discussion is given of the theory of pulsed experiments and of methods of calculation, and advantages and disadvantages of different variants of designing experiments are compared and evaluated. The topics under discussion are illustrated by numerous examples, concrete systems, and problems. The book can be characterized as an encyclopedia of modern pulsed NMR spectroscopy. It is also very important that it is written by scientists who have made a definite contribution to the development of two-dimensional NMR spectroscopy. The material is presented in ten chapters. The first chapter gives a brief historical note on the development of NMR. The second chapter "Dynamics of spin systems" presents in detail calculational methods, in particular, on the basis of the density matrix. The third chapter is devoted to the method of the average Hamiltonian and its application to the calculation of pulsed experiments. The next chapter gives a detailed discussion of one-dimensional Fourier spectroscopy. The fifth chapter is devoted to multi-quantum transitions. Chapters 6–9 discuss two-dimensional Fourier spectroscopy. Different variants, and techniques which enable one to sort things out in the complex picture of spin-spin interactions chemical shifts, chemical exchange, etc., are discussed in detail. Many examples of practical application of these methods are given. The book concludes with a presentation of the principles of NMR subsurface imaging, which utilizes many ideas of two-dimensional Fourier spectroscopy. The book will be very useful and of great interest to a wide circle of readers: physicists, chemists, biophysicists, physicians and others. Those who have been working for a long time in the field of NMR will gladly adopt this book as a reference book. For those who are only intending to make use of the modern methods of NMR in their own work, and also for undergraduate and graduate students the book can serve as a textbook. This book will arouse the interest of specialists in adjoining fields, for example those who are developing coherent optical spectroscopy, physicists who are interested in new physical methods, their possibilities and ability to provide information.

Acoustic waves have occupied a firm position in modern scientific-technological progress. The monograph by the well-known American scientist S. Kino *Acoustic Waves. Devices, Imaging, and Analog Signal Processing* reflects the modern level of scientific investigations in the field of acoustoelectronics, acousto-optics, physics and technology of nondestructive testing, ultrasound tomography, acoustic microscopy, etc. The book also presents the foundations of acoustics. In its breadth of treatment of material the book has no equal. It can serve as a textbook. The material is presented in four chapters and ten appendices. The first chapter is devoted to problems of propagation of sound waves in nonpiezoelectric and piezoelectric materials, the theory of different piezoelectric transducers; here also is introduced the mathematical apparatus of the linear theory of elasticity.

The second chapter presents the theory of propagation of waves in finite media and in wave guides, and of surface waves, and also examines problems of the theory of transducers based on surface acoustic waves, and also of perturbation theory, normal modes, and the taking of anisotropy of the medium into account. The third chapter is devoted to the diffraction of acoustic waves, excited by different sources (plane, focusing) and using them in the technique of imaging. Problems are discussed of utilizing short pulses in medical systems and in systems of nondescructive testing, a discussion is given of electronic focusing applied to multielement transducers, and of systems of acoustic tomography and holography. The fourth chapter examines different devices and methods of analog acoustic signal processing. The appendices give rigorous derivations and explicit formulation of a number of the tenets of the theory, and acousto-optic effects in anisotropic crystals are examined in detail. The book is intended for undergraduate and graduate students, scientists, engineers and technologists.

Progress in scientific research is indissolubly associated with improvement in scientific instruments and equipment. The book by the East German author K. Kleinknecht *Detectoren für Teilchenstrahlung* describes modern experimental equipment utilized in high energy physics, nuclear physics, medicine, geology, and space research. Detectors are examined and systematized in accordance with their functional purpose. Much attention is devoted to the practical use of detectors, and this advantageously distinguishes this book from the available literature. The general principles of the operation of detectors are presented clearly and briefly. The book can serve as a textbook. A large number of experimental data quoted in the book provides the possibility of utilizing it as a reference handbook. The material is presented in eight sections. Section I presents the general principles of recording information and fields of application of different detectors, and the basic processes of the interaction of radiation with matter are examined. In conclusion the main characteristics of the different detectors are listed. Section II is devoted to measurements of ionization primarily in gases. Section III presents methods of measuring coordinates. Section IV contains a detailed description of the characteristics of the main elements of devices, primarily scintillation counters, utilized for temporal measurements. Section V examines the question of identifying particles. Section VI is devoted to the measurement of energy of particles. In measurement of the momentum of charged particles, to which Section VII is devoted, the deflection of particles by magnetic fields is traditionally utilized. In the concluding section of the book a description is given of the so-called central (vertex) detectors, and also different examples are provided of utilizing individual detectors in complete recording systems, including the detector of hadron processes, the neutrino detector at the supersynchrotron in CERN, the detector at the antiproton collider, etc. The book is intended for undergraduate and graduate students specializing in the field of particle detection, and for scientists and engineers engaged in problems of recording particles.

At the present time lasers have found daily use in very varied fields of science and technology. Scientific investigations in the field of lasers and their applications continue to be intensively pursued. The book by the Dutch author W. J. Witteman *The CO_2 Laser* is devoted to gas-discharge CO_2 lasers that have found widespread application in science and technology. It examines in detail the main problems of the physics of CO_2 lasers working both in the continuous and in the pulsed regimes, and also problems of molecular physics, gas kinetics, processes of excitation and relaxation, etc., associated with the operation of CO_2 lasers. The book gives a large number of numerical values of physical constants. Moreover, exact spectroscopic data on the CO_2 isotopes are provided. The book is intended for scientists, engineers and specialists working in or interested in the physics and applications of CO_2 lasers, and also for graduate and undergraduate students.

The book by prominent Japanese specialists *Fundamentals of Semiconductor Lasers* edited by H. Takuma is devoted to problems of the physics, technology and applications of semiconductor lasers. The main attention is devoted to the theoretical and experimental study of fluctuation processes, the methods of suppressing them, the improvement of dynamic characteristics, the study of structures of quantum dimensions, the influence of external optical feedback, optical bistability, etc. The material is presented in twelve chapters. Chapter 1 examines the theoretical foundations of the physics of semiconductor lasers; Ch. 2 is devoted to frequency noise in them and the methods of its suppression. Chapter 3 discusses problems associated with frequency modulation, and introduces the concept of negative feedback in frequency; Chapter 4 is devoted to the analysis of the phenomenon of intermode jumping. The fifth chapter analyzes the consequences of external optical feedback, while the sixth chapter examines single-mode semiconductor lasers; Ch. 7 is devoted to the theoretical bases of the physics of lasers with effects of quantum dimensions. Chapter 8 gives a detailed description of optical superlattices, and analyzes the dependence of radiation on their parameters, and also the special features of lasing in lasers with effects of quantum dimensions. Chapter 9 examines optical bistability and also the practical utilization of optoelectronic logical schemes based on bistable elements. Chapter 10 is devoted to the mechanism and the methods of exciting very short pulses. Chapter 11 discusses problems associated with the development, the technology of preparation and exploitation of integrated optics circuits. The subject of Ch. 12 is the history of production and the prospects of further development of semiconductor lasers both from the point of view of utilizing them outside the field of optics communication, and from the point of view of technological problems that have to be solved for an even wider dissemination of such lasers and of using them for construction of optical computers. The book is intended for engineers and scientists involved in the development and application of semiconductor lasers, and also for graduate and undergraduate students.

Three books from the publication plan can serve as textbooks.

The monograph by O. Svelto *Principles of Lasers* is a significantly extended and revised edition of the book by the same title translated and published by Mir, M., 1984; compared to the 1984 edition the volume of the book has grown by a factor of 1.5. It discusses the physical principles of the action of different types of lasers (among them, for example, x-ray lasers). Each chapter is provided with problems. The

book can serve as a textbook. It is intended for undergraduate and graduate students, teachers, engineers and scientists using lasers in their research.

The book by A. Bohm *Quantum Mechanics: Foundations and Applications* is a felicitous combination of rigor in presenting the mathematical foundations of quantum mechanics with a detailed and deep discussion of the physical aspects of the theory, including questions of measurement theory and discussion of key experiments. In many cases a comparison is given of the results of quantum mechanical calculations with experimental data. The book also presents in detail a number of problems to which insufficient attention was devoted in earlier books (quantum description of physics of resonances, the decay of metastable objects, etc.). The book is intended for undergraduate and graduate students studying quantum mechanics, teachers and also scientists requiring a modern balanced and useful handbook on quantum mechanics.

The book by two authors from the USA H. Gould and J. Tobochnik *An Introduction to Computer Simulation Methods. Applications to Physical Systems, Parts 1 and 2* is intended to teach the reader the simulation of physics experiments on the computer. The first part of the book devotes its main attention to numerical simulation of deterministic systems. All the chapters of the second part are associated with statistical physics and quantum mechanics. Each chapter contains a brief discussion of the necessary concepts, which are then followed by texts of programs, problems and test questions. In the main presentation the True Basic language is utilized, while in the appendix the programs are given in Pascal and Fortran 77. The material is presented in 18 chapters. Chapter 1 examines the application of computers in physics and gives characteristics of a number of programming languages. Here also are given instructions on working with the book and methodological recommendations are presented; Ch. 2 acquaints the reader with Euler's method of numerical solution of ordinary differential equations. In Chs. 3–5 a study is made of the fall of bodies near the earth's surface, the motion of planets, oscillatory motion. Chapter 6 examines the dynamical many-particle systems. Here the principal elements of the method of molecular dynamics are described, numerical simulation of liquids and gases is carried out, and simple transport phenomena are studied; Ch. 7 acquaints the reader with nonlinear dynamical systems. The randomization of dynamical trajectories is examined and the complex nature of the behavior of dynamical systems is demonstrated by simple examples; Ch. 8 is devoted to wave processes, while Ch. 9 is devoted to electrostatics and magneto statics. Chapter 10 introduces the principal elements of the Monte-Carlo method using the example of calculating definite integrals; Ch. 11 is devoted to the random walk. Chapters 12 and 13 examine fields of physics which are almost not reflected in the existing courses on general physics; Ch. 12 acquaints the reader with percolation problems, simple models of phase transitions, the method of the renormalization group, Ch. 13 deals with fractals, simplest synergetic phenomena and cell automata. Chapter 14 examines the problem of approach to the equilibrium state. A discussion is given of the concepts of order and chaos, entropy, reversibility in time, microscopic and macroscopic description of a system. In Ch. 15 the microcanonical ensemble is modeled, and the Boltzmann distribution and the Ising model in one- and two-dimensional formulations are examined; Ch. 16 is devoted to simulating a canonical ensemble. In Chapter 17 quantum systems are studied. The solution of the nonstationary Schrödinger equation with different kinds of potentials (primarily one-dimensional problems) are examined by the Monte Carlo method and by other methods. The final chapter is devoted to an examination of analogies in physics. The book is intended for students of physics and engineering higher educational institutions, graduate students, instructors in physics and young specialists.

In the field of astronomy the publication plan includes four books. The book by the scientist from the USA, L. Spitzer, *Dynamical Evolution of Globular Clusters* outlines the present-day knowledge concerning globular clusters obtained on the basis of the fruitful synthesis of astrophysics and stellar dynamics. The book is not overloaded with mathematics, is rich in physical ideas, and is provided with a good bibliography. The object of the book is to help the reader to come to the leading edge of stellar dynamics and to undertake independent investigations. It can serve as a textbook. Material is presented in seven chapters. Chapter 1 contains observational data on globular clusters of galaxies. A brief presentation is given of the mutual gravitational effect of stars and their own nuclear evolution. Chapter 2 examines in detail the process of close and distant stellar approaches and its influence on the distribution function of stellar velocities. Chapters 3 and 4 examine the analytical and numerical methods of solving evolutionary equations. The results of calculations are illustrated by numerous graphs; Ch. 5 is devoted to the description of different effects of the galactic gravitational field, which lead to the destruction of clusters; Ch. 6 is devoted to the special cases of close interaction of binary stellar systems with single and multiple stars. In the concluding chapter the critical stage in the life of a stellar cluster is examined—the collapse of its nucleus, and also the possible splitting of the nucleus which has picturesquely been called "life after death." The book is intended for astrophysicists, graduate and undergraduate students, and also for thoughtful amateur astronomers.

The book by the Canadian author G. Walker *Astronomical Observation. An Optical Perspective* is devoted to problems of practical astronomy. Modern observational methods operating in all ranges of the electromagnetic spectrum and used for observations both from the earth's surface, and also from spacecraft, the principles of operation, special features and limitations on their use are discussed. The presentation is given from a unified point of view. The book can serve as an instructional (reference) aid. The material is presented in eight chapters. The first chapter discusses problems associated with photometry and spectroscopy of objects. The second chapter is devoted to limitations on the result of observation due to the quantum nature of radiation, sky shine, presence of interstellar dust, inhomogeneity of the atmosphere, etc. In the third chapter the principal attention is devoted to present day earth-based and space telescopes. Chapter 4 gives a clear and easily accessible presentation of the question of the effect of the atmosphere on the quality of imaging. The fifth chapter devotes particular attention to telescope efficiency in connection with the spectral and spatial resolution; Ch. 6 is devoted to the means of increasing spatial resolution. The last two chapters examine single- and multichannel light detectors. The book is intend-

ed for undergraduate and graduate students, and also for professional astronomers, and constructors of astronomical equipment.

The book by an author from the USA, D. Fisher, *The Birth of the Earth* is devoted to an exposition of present-day concepts of the origin of the earth. It begins with a description of the surrounding space, of the processes occurring in it and of star formation; the author then leads the reader to a description of the models of formation of the near-solar preplanetary disk, the formation within it of planets and other small bodies, and also to questions associated with the origin of the earth and its early evolution, and gives data on space geochemistry, which provide information on the characteristic times of the individual stages of planetary formation. The book can be regarded as an initial introduction to the subject. It is intended for undergraduate and graduate students, and also for pupils of the upper grades of secondary schools who are interested in problems of planetary cosmology.

The current issue of the collection of articles "Physics Abroad: 1990. Issue A. Research" (in Russian) contains popular science articles of well-known foreign scientists published in "Physics Today" and "La Recherche." The articles present newest achievements and timely problems of physical science. The presentation is distinguished by being highly informational and rigorous. The book is intended for readers who have an education in physical science, and also for students of the physics faculties and higher educational institutions.

Translated by G. M. Volkoff