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KEY=PROBLEM - RODGERS PARKER

The Oxford Solid State Basics

Oxford University Press This is a first undergraduate textbook in Solid State Physics or Condensed Matter Physics. While most textbooks on the subject are extremely dry, this book is written to be much more exciting, inspiring, and entertaining.

Solid State Physics

Cengage Learning This book provides an introduction to the field of solid state physics for undergraduate students in physics, chemistry, engineering, and materials science.

Solid State Physics

John Wiley & Sons The ideal companion in condensed matter physics - now in new and revised edition. Solving homework problems is the single most effective way for students to familiarize themselves with the language and details of solid state physics. Testing problem-solving ability is the best means at the professor's disposal for measuring student progress at critical points in the learning process. This book enables any instructor to supplement end-of-chapter textbook assignments with a large number of challenging and engaging practice problems and discover a host of new ideas for creating exam questions. Designed to be used in tandem with any of the excellent textbooks on this subject, Solid State Physics: Problems and Solutions provides a self-study approach through which advanced undergraduate and first-year graduate students can develop and test their skills while acclimating themselves to the demands of the discipline. Each problem has been chosen for its ability to illustrate key concepts, properties, and systems, knowledge of which is crucial in developing a complete understanding of the subject, including: * Crystals,

diffraction, and reciprocal lattices. * Phonon dispersion and electronic band structure. * Density of states. * Transport, magnetic, and optical properties. * Interacting electron systems. * Magnetism. * Nanoscale Physics.

Structure of Matter

An Introductory Course with Problems and Solutions

Springer This textbook, now in its third edition, provides a formative introduction to the structure of matter that will serve as a sound basis for students proceeding to more complex courses, thus bridging the gap between elementary physics and topics pertaining to research activities. The focus is deliberately limited to key concepts of atoms, molecules and solids, examining the basic structural aspects without paying detailed attention to the related properties. For many topics the aim has been to start from the beginning and to guide the reader to the threshold of advanced research. This edition includes four new chapters dealing with relevant phases of solid matter (magnetic, electric and superconductive) and the related phase transitions. The book is based on a mixture of theory and solved problems that are integrated into the formal presentation of the arguments. Readers will find it invaluable in enabling them to acquire basic knowledge in the wide and wonderful field of condensed matter and to understand how phenomenological properties originate from the microscopic, quantum features of nature.

Solid-State Physics for Electronics

John Wiley & Sons Describing the fundamental physical properties of materials used in electronics, the thorough coverage of this book will facilitate an understanding of the technological processes used in the fabrication of electronic and photonic devices. The book opens with an introduction to the basic applied physics of simple electronic states and energy levels. Silicon and copper, the building blocks for many electronic devices, are used as examples. Next, more advanced theories are developed to better account for the electronic and optical behavior of ordered materials, such as diamond, and disordered materials, such as amorphous silicon. Finally, the principal quasi-particles (phonons, polarons, excitons, plasmons, and polaritons) that are fundamental to explaining phenomena such as component aging (phonons) and optical performance in terms of yield (excitons) or communication speed (polarons) are discussed.

A Concise Handbook of

Mathematics, Physics, and Engineering Sciences

CRC Press A Concise Handbook of Mathematics, Physics, and Engineering Sciences takes a practical approach to the basic notions, formulas, equations, problems, theorems, methods, and laws that most frequently occur in scientific and engineering applications and university education. The authors pay special attention to issues that many engineers and students

Concepts in Solids

Lectures on the Theory of Solids

World Scientific These lecture notes constitute a course on a number of central concepts of solid state physics ? classification of solids, band theory, the developments in one-electron band theory in the presence of perturbation, effective Hamiltonian theory, elementary excitations and the various types of collective elementary excitation (excitons, spin waves and phonons), the Fermi liquid, ferromagnetic spin waves, antiferromagnetic spin waves and the theory of broken symmetry.The book can be used in conjunction with a survey course in solid state physics, or as the basis of a first graduate-level course. It can be read by anyone who has had basic grounding in quantum mechanics.

Solid-State Spectroscopy

An Introduction

Springer Science & Business Media Spectroscopic methods have opened up a new horizon in our knowledge of solid-state materials. Numerous techniques using electromagnetic radiation or charged and neutral particles have been invented and worked out to a high level in order to provide more detailed information on the solids. In this text, new radiation sources like lasers and synchrotrons are discussed. It provides a description of the linear response together with the basic principles and the technical background for various scattering experiments. Fourier transform spectroscopy, pulsed and magnetic NMR techniques, photo-emission, and light and electron scattering are elucidated. Each chapter includes problems. The concept of this textbook is designed for graduate students.

Physics of Condensed Matter

Academic Press Physics of Condensed Matter is designed for a two-semester graduate course on condensed matter physics for students in physics and materials science. While the book offers fundamental ideas and topic areas of condensed

matter physics, it also includes many recent topics of interest on which graduate students may choose to do further research. The text can also be used as a one-semester course for advanced undergraduate majors in physics, materials science, solid state chemistry, and electrical engineering, because it offers a breadth of topics applicable to these majors. The book begins with a clear, coherent picture of simple models of solids and properties and progresses to more advanced properties and topics later in the book. It offers a comprehensive account of the modern topics in condensed matter physics by including introductory accounts of the areas of research in which intense research is underway. The book assumes a working knowledge of quantum mechanics, statistical mechanics, electricity and magnetism and Green's function formalism (for the second-semester curriculum). Covers many advanced topics and recent developments in condensed matter physics which are not included in other texts and are hot areas: Spintronics, Heavy fermions, Metallic nanoclusters, Zno, Graphene and graphene-based electronic, Quantum hall effect, High temperature superdonductivity, Nanotechnology Offers a diverse number of Experimental techniques clearly simplified Features end of chapter problems

Physics Qualifying Examination Problems and Solutions

John Wiley & Sons Designed for use in tandem with the 'Handbook of Physics', this volume is nonetheless self-contained and can be used on its own. The chapters are based on lectures delivered annually by Professor Poole in a course to prepare students for their PhD qualifying examination in the physics department at the University of South Carolina. The book contains 120 selected problems (and answers) that appeared in these examinations, and each one refers to the chapter in the Handbook that discusses the background for it. Professor Farach has kept a record of all the qualifying examinations in the department since 1981. It covers all relevant physics subjects, which are otherwise scattered in different preparation publications or university scripts, including: * Atomic and General Physics * Condensed Matter Physics * Classical Mechanics * Electricity and Magnetism * Elementary Particle Physics * Nuclear Physics * Optics and Light * Quantum Mechanics * Relativity and Astrophysics * Thermo and Statistical Mechanics An excellent self-study approach to prepare physics PhD candidates for their qualifying examinations.

Electronic Structure Basic Theory and Practical Methods

Cambridge University Press The study of the electronic structure of materials is at a momentous stage, with the emergence of computational methods and theoretical approaches. Many properties of materials can now be determined directly from the fundamental equations for the electrons, providing insights into critical problems in

physics, chemistry, and materials science. This book provides a unified exposition of the basic theory and methods of electronic structure, together with instructive examples of practical computational methods and real-world applications. Appropriate for both graduate students and practising scientists, this book describes the approach most widely used today, density functional theory, with emphasis upon understanding the ideas, practical methods and limitations. Many references are provided to original papers, pertinent reviews, and widely available books. Included in each chapter is a short list of the most relevant references and a set of exercises that reveal salient points and challenge the reader.

Modern Perspectives in Inorganic Crystal Chemistry

Springer Science & Business Media The study of crystal structures has had an ever increasing impact on many fields of science such as physics, chemistry, biology, materials science, medicine, pharmacy, metallurgy, mineralogy and geology. Particularly, with the advent of direct methods of structure determination, the data on crystal structures are accumulating at an unbelievable pace and it becomes more and more difficult to oversee this wealth of data. A crude rationalization of the structures of organic compounds and the atom coordinations can be made with the well-known Kekule model, however, no such generally applicable model exists for the structures of inorganiC and particularly intermetallic compounds. There is a need to rationalize the inorganic crystal structures, to find better ways of describing them, of denoting the geometrical relationships between them, of elucidating the electronic factors and of explaining the bonding between the atoms with the aim of not only having a better understanding of the known structures, but also of predicting structural features of new compounds.

The Physics of Information Technology

Cambridge University Press The Physics of Information Technology explores the familiar devices that we use to collect, transform, transmit, and interact with electronic information. Many such devices operate surprisingly close to very many fundamental physical limits. Understanding how such devices work, and how they can (and cannot) be improved, requires deep insight into the character of physical law as well as engineering practice. The book starts with an introduction to units, forces, and the probabilistic foundations of noise and signalling, then progresses through the electromagnetics of wired and wireless communications, and the quantum mechanics of electronic, optical, and magnetic materials, to discussions of mechanisms for computation, storage, sensing, and display. This self-contained volume will help both physical scientists and computer scientists see beyond the conventional division between hardware and software to understand the implications

of physical theory for information manipulation.

Progress in Industrial Mathematics at ECMI 2004

Springer Science & Business Media ECMI has a brand name in Industrial Mathematics and organises successful biannual conferences. This time, the conference on Industrial Mathematics held in Eindhoven in June 2004 Mathematics focused on Aerospace, Electronic Industry, Chemical Technology, Life Sciences, Materials, Geophysics, Financial Mathematics and Water flow. The majority of the invited talks on these topics can be found in these proceedings. Apart from these lectures, a large number of contributed papers and minisymposium papers are included here. They give an interesting (and impressive) overview of the important place mathematics has achieved in solving all kinds of problems met in industry, and commerce in particular.

Selected Topics in Almost Periodicity

Walter de Gruyter GmbH & Co KG Covers uniformly recurrent solutions and c-almost periodic solutions of abstract Volterra integro-differential equations as well as various generalizations of almost periodic functions in Lebesgue spaces with variable coefficients. Treats multi-dimensional almost periodic type functions and their generalizations in adequate detail.

A Guide to Physics Problems

Part 2: Thermodynamics, Statistical Physics, and Quantum Mechanics

Springer Science & Business Media In order to equip hopeful graduate students with the knowledge necessary to pass the qualifying examination, the authors have assembled and solved standard and original problems from major American universities – Boston University, University of Chicago, University of Colorado at Boulder, Columbia, University of Maryland, University of Michigan, Michigan State, Michigan Tech, MIT, Princeton, Rutgers, Stanford, Stony Brook, University of Tennessee at Knoxville, and the University of Wisconsin at Madison – and Moscow Institute of Physics and Technology. A wide range of material is covered and comparisons are made between similar problems of different schools to provide the student with enough information to feel comfortable and confident at the exam. Guide to Physics Problems is published in two volumes: this book, Part 2, covers

Thermodynamics, Statistical Mechanics and Quantum Mechanics; Part 1, covers Mechanics, Relativity and Electrodynamics. Praise for A Guide to Physics Problems: Part 2: Thermodynamics, Statistical Physics, and Quantum Mechanics: "... A Guide to Physics Problems, Part 2 not only serves an important function, but is a pleasure to read. By selecting problems from different universities and even different scientific cultures, the authors have effectively avoided a one-sided approach to physics. All the problems are good, some are very interesting, some positively intriguing, a few are crazy; but all of them stimulate the reader to think about physics, not merely to train you to pass an exam. I personally received considerable pleasure in working the problems, and I would guess that anyone who wants to be a professional physicist would experience similar enjoyment. ... This book will be a great help to students and professors, as well as a source of pleasure and enjoyment." (From Foreword by Max Dresden) "An excellent resource for graduate students in physics and, one expects, also for their teachers." (Daniel Kleppner, Lester Wolfe Professor of Physics Emeritus, MIT) "A nice selection of problems ... Thought-provoking, entertaining, and just plain fun to solve." (Giovanni Vignale, Department of Physics and Astronomy, University of Missouri at Columbia) "Interesting indeed and enjoyable. The problems are ingenious and their solutions very informative. I would certainly recommend it to all graduate students and physicists in general ... Particularly useful for teachers who would like to think about problems to present in their course." (Joel Lebowitz, Rutgers University) "A very thoroughly assembled, interesting set of problems that covers the key areas of physics addressed by Ph.D. qualifying exams. ... Will prove most useful to both faculty and students. Indeed, I plan to use this material as a source of examples and illustrations that will be worked into my lectures." (Douglas Mills, University of California at Irvine)

Computational Methods in Physics

Compendium for Students

Springer This book is intended to help advanced undergraduate, graduate, and postdoctoral students in their daily work by offering them a compendium of numerical methods. The choice of methods pays significant attention to error estimates, stability and convergence issues, as well as optimization of program execution speeds. Numerous examples are given throughout the chapters, followed by comprehensive end-of-chapter problems with a more pronounced physics background, while less stress is given to the explanation of individual algorithms. The readers are encouraged to develop a certain amount of skepticism and scrutiny instead of blindly following readily available commercial tools. The second edition has been enriched by a chapter on inverse problems dealing with the solution of integral equations, inverse Sturm-Liouville problems, as well as retrospective and recovery problems for partial differential equations. The revised text now includes an introduction to sparse matrix methods, the solution of matrix equations, and pseudospectra of matrices; it discusses the sparse Fourier, non-uniform Fourier and discrete wavelet transformations, the basics of non-linear regression and the

Kolmogorov-Smirnov test; it demonstrates the key concepts in solving stiff differential equations and the asymptotics of Sturm-Liouville eigenvalues and eigenfunctions. Among other updates, it also presents the techniques of state-space reconstruction, methods to calculate the matrix exponential, generate random permutations and compute stable derivatives.

Solid State Theory

Courier Corporation Thorough, modern study of solid state physics; solid types and symmetry, electron states, electronic properties and cooperative phenomena.

Path Integrals in Physics

Volume II Quantum Field Theory, Statistical Physics and other Modern Applications

CRC Press The path integral approach has proved extremely useful for the understanding of the most complex problems in quantum field theory, cosmology, and condensed matter physics. Path Integrals in Physics: Volume II, Quantum Field Theory, Statistical Physics and other Modern Applications covers the fundamentals of path integrals, both the Wiener and Feynman types, and their many applications in physics. The book deals with systems that have an infinite number of degrees of freedom. It discusses the general physical background and concepts of the path integral approach used, followed by a detailed presentation of the most typical and important applications as well as problems with either their solutions or hints how to solve them. Each chapter is self-contained and can be considered as an independent textbook. It provides a comprehensive, detailed, and systematic account of the subject suitable for both students and experienced researchers.

Mathematical Problems in Semiconductor Physics

Lectures given at the C.I.M.E. Summer School held in Cetraro,

Italy, June 15-22, 1998

Springer On the the mathematical aspects of the theory of carrier transport in semiconductor devices. The subjects covered include hydrodynamical models for semiconductors based on the maximum entropy principle of extended thermodynamics, mathematical theory of drift-diffusion equations with applications, and the methods of asymptotic analysis.

Band Theory and Electronic Properties of Solids

Oxford University Press Band theory is evident all around us and yet is one of the most stringent tests of quantum mechanics. This textbook, one of the first in the new Oxford Master Series in Physics, attempts to reveal in a quantitative and fairly rigorous fashion how band theory leads to the everyday properties of materials. The book is suitable for final-year undergraduate and first-year graduate students in physics and materials science.

Fundamentals of Condensed Matter Physics

Cambridge University Press Based on an established course and covering all the fundamentals, central areas and contemporary topics of this diverse field, Fundamentals of Condensed Matter Physics is a much-needed textbook for graduate students. Coverage of concepts and techniques ensures that both theoretically and experimentally inclined students gain the strong understanding needed for research and teaching.

Atomic Physics: Precise Measurements and Ultracold Matter

Oxford University Press This book illustrates the frontiers of precise measurements in Atomic Physics. It is written in an introductory style, which makes it useful for advanced undergraduate and graduate students as well as for more experienced researchers who want to remain up-to-date with the most recent advances. The book focuses on experimental investigations, illustrating both milestone experiments and key experimental techniques, and discussing the results and perspectives ofcurrent research activities. Emphasis is put on the investigations of precision physics: from the determination of fundamental constants of Nature to tests of General Relativity and QuantumElectrodynamics, from the realization of ultra-stable atomic clocks to the precise simulation of condensed matter theories with ultracold gases.

The Stationary Semiconductor Device Equations

Springer Science & Business Media In the last two decades semiconductor device simulation has become a research area, which thrives on a cooperation of physicists, electrical engineers and mathe maticians. In this book the static semiconductor device problem is presented and analysed from an applied mathematician's point of view. I shall derive the device equations - as obtained for the first time by Van Roosbroeck in 1950 - from physical principles, present a mathematical analysis, discuss their numerical solu tion by discretisation techniques and report on selected device simulation runs. To me personally the most fascinating aspect of mathematical device analysis is that an interplay of abstract mathematics, perturbation theory, numerical analysis and device physics is prompting the design and development of new technology. I very much hope to convey to the reader the importance of applied mathematics for technological progress. Each chapter of this book is designed to be as selfcontained as possible, however, the mathematical analysis of the device problem requires tools which cannot be presented completely here. Those readers who are not interested in the mathemati cal methodology and rigor can extract the desired information by simply ignoring details and proofs of theorems. Also, at the beginning of each chapter I refer to textbooks which introduce the interested reader to the required mathematical concepts.

Dispositions and Causal Powers

Routledge Dispositions are everywhere. We say that a wall is hard, that water quenches thirst and is transparent, that dogs can swim and oak trees can let their leaves fall, and that acid has the power to corrode metals. All these statements express attributions of dispositions, be they physical, physiological or psychological, yet there is much philosophical debate about how far, if at all, dispositional predicates can have complete meaning or figure in causal explanations. This collection of essays, by leading international researchers, examine the case for realism with respect to dispositions and causal powers in both metaphysics and science. Among the issues debated in this book is whether dispositions can be analyzed in terms of conditionals, whether all dispositions have a so-called categorical basis and, if they do, what is the relation between the disposition and its basis.

Simulations for Solid State Physics Paperback Without CD-ROM

An Interactive Resource for Students and Teachers

Cambridge University Press Interactive resource centering around fourteen high quality computer simulations covering essential topics in solid state physics.

The Specific Heat of Matter at Low Temperatures

World Scientific Recent discoveries of new materials and improvements in calorimetric techniques have given new impetus to the subject of specific heat. Nevertheless, there is a serious lack of literature on the subject. This invaluable book, which goes some way towards remedying that, is concerned mainly with the specific heat of matter at ordinary temperatures. It discusses the principles that underlie the theory of specific heat and considers a number of theoretical models in some detail. The subject matter ranges from traditional materials to those recently discovered — heavy fermion compounds, high temperature superconductors, spin glasses and so on — and includes a large number of figures, tables and references. The book will be particularly useful for advanced undergraduate and postgraduate students as well as academics and researchers. Contents:Basic Concepts and DefinitionsLattice Specific HeatElectronic Specific HeatMagnetic Specific HeatSpecific Heat of Cryogenic LiquidsSpecific-Heat AnomaliesExperimental Techniques Readership: Upper level undergraduates, graduate students, researchers and academics.

Intermediate Statistical Mechanics

World Scientific Publishing Company In this new textbook, a number of unusual applications are discussed in addition to the usual topics covered in a course on Statistical Physics. Examples are: statistical mechanics of powders, Peierls instability, graphene, Bose-Einstein condensates in a trap, Casimir effect and the quantum Hall effect. Superfluidity and super-conductivity (including the physics of high-temperature superconductors) have also been discussed extensively. The emphasis on the treatment of these topics is pedagogic, introducing the basic tenets of statistical mechanics, with extensive and thorough discussion of the postulates, ensembles, and the relevant statistics. Many standard examples illustrate the microcanonical, canonical and grand canonical ensembles, as well as the Bose-Einstein and Fermi-Dirac statistics. A special feature of this text is the detailed presentation of the theory of second-order phase transitions and the renormalization group, emphasizing the role of disorder. Non-equilibrium statistical physics is introduced via the Boltzmann transport equation. Additional topics covered here include metastability, glassy systems, the Langevin equation, Brownian motion, and

the Fokker-Planck equation. Graduate students will find the presentation readily accessible, since the topics have been treated with great deal of care and attention to detail. Request Inspection Copy

Introduction to the Physics and Chemistry of Materials

CRC Press Discusses the Structure and Properties of Materials and How These Materials Are Used in Diverse Applications Building on undergraduate students' backgrounds in mathematics, science, and engineering, Introduction to the Physics and Chemistry of Materials provides the foundation needed for more advanced work in materials science. Ideal for a two-semester course, the text focuses on chemical bonding, crystal structure, mechanical properties, phase transformations, and materials processing for the first semester. The material for the second semester covers thermal, electronic, photonic, optical, and magnetic properties of materials. Requiring no prior experience in modern physics and quantum mechanics, the book introduces quantum concepts and wave mechanics through a simple derivation of the Schrödinger equation, the electron-in-a-box problem, and the wave functions of the hydrogen atom. The author also presents a historical perspective on the development of the materials science field. He discusses the Bose–Einstein, Maxwell–Boltzmann, Planck, and Fermi–Dirac distribution functions, before moving on to the various properties and applications of materials. With detailed derivations of important equations, this applications-oriented text examines the structure and properties of materials, such as heavy metal glasses and superconductors. It also explores recent developments in organics electronics, polymer light-emitting diodes, superconductivity, and more.

Computational Physics

Cambridge University Press This edition has been fully updated with several new sections and chapters. It covers many different areas of physics research and different computational methodologies. Throughout the book the relations between the methods used in different fields of physics are emphasised.

NMR of Quadrupolar Nuclei in Solid Materials

John Wiley & Sons The content of this volume has been added to eMagRes (formerly Encyclopedia of Magnetic Resonance) - the ultimate online resource for NMR and MRI. Over the past 20 years technical developments in superconducting magnet technology and instrumentation have increased the potential of NMR spectroscopy so that it is now possible to study a wide range of solid materials. In addition, one can probe the nuclear environments of many other additional atoms that possess the property of spin. In particular, it is possible to carry out NMR experiments on isotopes

that have nuclear spin greater that 1⁄2 (i.e. quadrupolar nuclei). Since more that two-thirds of all NMR active isotopes are quadrupolar nuclei, applications of NMR spectroscopy with quadrupolar nuclei are increasing rapidly. The purpose of this handbook is to provide under a single cover the fundamental principles, techniques and applications of quadrupolar NMR as it pertains to solid materials. Each chapter has been prepared by an expert who has made significant contributions to out understanding and appreciation of the importance of NMR studies of quadrupolar nuclei in solids. The text is divided into three sections: The first provides the reader with the background necessary to appreciate the challenges in acquiring and interpreting NMR spectra of quadrupolar neclei in solids. The second presents cutting-edge techniques and methodology for employing these techniques to investigate quadrupolar nuclei in solids. The final section explores applications of solid-state NMR studies of solids ranging from investigations of dynamics, characterizations of biological samples, organic and inorganic materials, porous materials, glasses, catalysts, semiconductors and high-temperature superconductors. About EMR Handbooks / eMagRes Handbooks The Encyclopedia of Magnetic Resonance (up to 2012) and eMagRes (from 2013 onward) publish a wide range of online articles on all aspects of magnetic resonance in physics, chemistry, biology and medicine. The existence of this large number of articles, written by experts in various fields, is enabling the publication of a series of EMR Handbooks / eMagRes Handbooks on specific areas of NMR and MRI. The chapters of each of these handbooks will comprise a carefully chosen selection of articles from eMagRes. In consultation with the eMagRes Editorial Board, the EMR Handbooks / eMagRes Handbooks are coherently planned in advance by specially-selected Editors, and new articles are written (together with updates of some already existing articles) to give appropriate complete coverage. The handbooks are intended to be of value and interest to research students, postdoctoral fellows and other researchers learning about the scientific area in question and undertaking relevant experiments, whether in academia or industry. Have the content of this Handbook and the complete content of eMagRes at your fingertips! Visit: www.wileyonlinelibrary.com/ref/eMagRes View other eMagRes publications here

Conquering the Physics GRE

A self-contained guide to the Physics GRE, reviewing all of the topics covered alongside three practice exams with fully worked solutions.

The One-Dimensional Hubbard Model

Cambridge University Press The description of solids at a microscopic level is complex, involving the interaction of a huge number of its constituents, such as ions or electrons. It is impossible to solve the corresponding many-body problems analytically or numerically, although much insight can be gained from the analysis of simplified models. An important example is the Hubbard model, which describes

interacting electrons in narrow energy bands, and which has been applied to problems as diverse as high-Tc superconductivity, band magnetism, and the metal-insulator transition. This book presents a coherent, self-contained account of the exact solution of the Hubbard model in one dimension. The early chapters will be accessible to beginning graduate students with a basic knowledge of quantum mechanics and statistical mechanics. The later chapters address more advanced topics, and are intended as a guide for researchers to some of the more topical results in the field of integrable models.

Equilibrium Statistical Physics

Phases, Phase Transitions, and Topological Phases

Springer Nature This is a textbook which gradually introduces the student to the statistical mechanical study of the different phases of matter and to the phase transitions between them. Throughout, only simple models of both ordinary and soft matter are used but these are studied in full detail. The subject is developed in a pedagogical manner, starting from the basics, going from the simple ideal systems to the interacting systems, and ending with the more modern topics. The textbook provides the student with a complete overview, intentionally at an introductory level, of the theory of phase transitions. All equations and deductions are included.

Frontiers in Surface Science and Interface Science

Gulf Professional Publishing Any notion that surface science is all about semiconductors and coatings is laid to rest by this encyclopedic publication: Bioengineered interfaces in medicine, interstellar dust, DNA computation, conducting polymers, the surfaces of atomic nuclei - all are brought up to date. Frontiers in Surface and Interface Science - a milestone publication deserving a wide readership. It combines a sweeping expert survey of research today with an educated look into the future. It is a future that embraces surface phenomena on scales from the subatomic to the galactic, as well as traditional topics like semiconductor design, catalysis, and surface processing, modeling and characterization. And, great efforts have been made to express sophisticated ideas in an attractive and accessible way. Nanotechnology, surfaces for DNA computation, polymer-based electronics, soft surfaces, interstellar surface chemistry - all feature in this comprehensive collection.

Solid State Physics

Academic Press Solid State Physics is a textbook for students of physics, material science, chemistry, and engineering. It is the state-of-the-art presentation of the theoretical foundations and application of the quantum structure of matter and materials. This second edition provides timely coverage of the most important scientific breakthroughs of the last decade (especially in low-dimensional systems and quantum transport). It helps build readers' understanding of the newest advances in condensed matter physics with rigorous yet clear mathematics. Examples are an integral part of the text, carefully designed to apply the fundamental principles illustrated in the text to currently active topics of research. Basic concepts and recent advances in the field are explained in tutorial style and organized in an intuitive manner. The book is a basic reference work for students, researchers, and lecturers in any area of solid-state physics. Features additional material on nanostructures, giving students and lecturers the most significant features of low-dimensional systems, with focus on carbon allotropes Offers detailed explanation of dissipative and nondissipative transport, and explains the essential aspects in a field, which is commonly overlooked in textbooks Additional material in the classical and quantum Hall effect offers further aspects on magnetotransport, with particular emphasis on the current profiles Gives a broad overview of the band structure of solids, as well as presenting the foundations of the electronic band structure. Also features reported with new and revised material, which leads to the latest research

Solid State Properties

From Bulk to Nano

Springer This book fills a gap between many of the basic solid state physics and materials sciencebooks that are currently available. It is written for a mixed audience of electricalengineering and applied physics students who have some knowledge of elementaryundergraduate quantum mechanics and statistical mechanics. This book, based on asuccessful course taught at MIT, is divided pedagogically into three parts: (I) ElectronicStructure, (II) Transport Properties, and (III) Optical Properties. Each topic is explainedin the context of bulk materials and then extended to low-dimensional materials whereapplicable. Problem sets review the content of each chapter to help students to understandthe material described in each of the chapters more deeply and to prepare them to masterthe next chapters.

Fundamentals of Solid State

Electronics

World Scientific Publishing Company This is perhaps the most comprehensive undergraduate textbook on the fundamental aspects of solid state electronics. It presents basic and state-of-the-art topics on materials physics, device physics, and basic circuit building blocks not covered by existing textbooks on the subject. Each topic is introduced with a historical background and motivations of device invention and circuit evolution. Fundamental physics is rigorously discussed with minimum need of tedious algebra and advanced mathematics. Another special feature is a systematic classification of fundamental mechanisms not found even in advanced texts. It bridges the gap between solid state device physics covered here with what students have learnt in their first two years of study. Used very successfully in a one-semester introductory core course for electrical and other engineering, materials science and physics junior students, the second part of each chapter is also used in an advanced undergraduate course on solid state devices. The inclusion of previously unavailable analyses of the basic transistor digital circuit building blocks and cells makes this an excellent reference for engineers to look up fundamental concepts and data, design formulae, and latest devices such as the GeSi heterostructure bipolar transistors. This book is also available as a set with Fundamentals of Solid-State Electronics — Study Guide and Fundamentals of Solid-State Electronics — Solution Manual.

Spin Waves

Problems and Solutions

Springer Nature This book presents a collection of problems in spin wave excitations with their detailed solutions. Each chapter briefly introduces the important concepts, encouraging the reader to further explore the physics of spin wave excitations and the engineering of spin wave devices by working through the accompanying problem sets. The initial chapters cover the fundamental aspects of magnetization, with its origins in quantum mechanics, followed by chapters on spin wave excitations, such as the magnetostatic approximation, Walker's equation, the spin wave manifold in the three different excitation geometries of forward volume, backward volume and surface waves, and the dispersion of spin waves. The latter chapters focus on the practical aspects of spin waves and spin wave optical devices and use the problem sets to introduce concepts such as variational analysis and coupled mode theory. Finally, for the more advanced reader, the book covers nonlinear interactions and topics such as spin wave quantization, spin torque excitations, and the inverse Doppler effect. The topics range in difficulty from elementary to advanced. All problems are solved in detail and the reader is encouraged to develop an understanding of spin wave excitations and spin wave devices while also strengthening their mathematical, analytical, and numerical programming skills.

The Physics of Solids

Oxford University Press This comprehensive text covers the basic physics of the solid state starting at an elementary level suitable for undergraduates but then advancing, in stages, to a graduate and advanced graduate level. In addition to treating the fundamental elastic, electrical, thermal, magnetic, structural, electronic, transport, optical, mechanical and compositional properties, we also discuss topics like superfluidity and superconductivity along with special topics such as strongly correlated systems, high-temperature superconductors, the quantum Hall effects, and graphene. Particular emphasis is given to so-called first principles calculations utilizing modern density functional theory which for many systems now allow accurate calculations of the electronic, magnetic, and thermal properties.