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Solid State Properties - Mildred Dresselhaus
2018-01-17

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.

Solid State Physics - Philip Hofmann 2015-05-19

A must-have textbook for any undergraduate studying solid state physics. This successful brief course in solid state physics is now in its second edition. The clear and concise introduction not only describes all the basic phenomena and concepts, but also such advanced issues as magnetism and superconductivity. Each section starts with a gentle introduction, covering basic principles, progressing to a more advanced level in order to present a comprehensive overview of the subject. The book is providing qualitative discussions that help undergraduates understand concepts even if they can't follow all the mathematical detail. The revised edition has been carefully updated to present an up-to-date account of the essential topics and recent

developments in this exciting field of physics. The coverage now includes ground-breaking materials with high relevance for applications in communication and energy, like graphene and topological insulators, as well as transparent conductors. The text assumes only basic mathematical knowledge on the part of the reader and includes more than 100 discussion questions and some 70 problems, with solutions free to lecturers from the Wiley-VCH website. The author's webpage provides Online Notes on x-ray scattering, elastic constants, the quantum Hall effect, tight binding model, atomic magnetism, and topological insulators. This new edition includes the following updates and new features: * Expanded coverage of mechanical properties of solids, including an improved discussion of the yield stress * Crystal structure, mechanical properties, and band structure of graphene * The coverage of electronic properties of metals is expanded by a section on the quantum hall effect including exercises. New topics include the tight-binding model and an expanded discussion on Bloch waves. * With respect to semiconductors, the discussion of solar cells has been extended and improved. * Revised coverage of magnetism, with additional material on atomic magnetism * More extensive treatment of finite solids and nanostructures, now including topological insulators * Recommendations for further reading have been updated and increased. * New exercises on Hall mobility, light penetrating metals, band structure

Introduction to Solid State Physics - Charles Kittel 1971

Introductory Solid State Physics, 2nd Edition - H. P. Myers 2003-07-13

Assuming an elementary knowledge of quantum and statistical physics, this book provides a guide to principal physical properties of condensed matter, as well as the underlying theory necessary for an understanding of their origins.

Advanced Solid State Physics - Philip Phillips 2019-03-08

Solid state physics continues to be the most rapidly growing subdiscipline in physics. As a result, entering graduate students wishing to pursue research in this field face the daunting task of not only mastering the old topics but also gaining competence in the problems of current interest, such as the fractional quantum Hall effect, strongly correlated electron systems, and quantum phase transitions. This book is written to serve the needs of such students. I have attempted in this book to present some of the standard topics in a way that makes it possible to move smoothly to current material. Hence, all the interesting topics are not presented at the end of the book. For example, immediately after the first 50 pages, Anderson's analysis of local magnetic moments is presented as an application of Hartree-Fock theory; this affords a discussion of the relationship with the Kondo model and how scaling ideas can be used to uncloak low-energy physics. As the key problems of current interest in solid state involve some aspects of electron-electron interactions or disorder or both, I have focused on the archetypal problems in which such physics is central. However, only those problems in which there is a consensus view are discussed extensively. In addition, I have placed the emphasis on physics rather than on techniques. Consequently, I focus on a clear presentation of the phenomenology along with a pedagogical derivation of the relevant equations. A key goal of the detailed derivations is to make it possible for the students who have read this book to immediately comprehend research papers on related topics. A key omission in this book is magnetism beyond the Stoner criterion and local magnetic moments. This omission has arisen primarily because the topic is adequately treated in the book by Assa Auerbach.

Energy Research Abstracts - 1983

The Potential Distribution Theorem and Models of Molecular Solutions - Tom L. Beck 2006-08-31

An understanding of statistical thermodynamic molecular theory is fundamental to the appreciation of molecular solutions. This complex subject has been simplified by the authors with down-to-earth presentations of molecular theory. Using the potential distribution theorem (PDT) as the basis, the text provides a discussion of practical theories in conjunction with simulation results. The authors discuss the field in a concise and simple manner, illustrating the text with useful models of solution thermodynamics and numerous exercises. Modern quasi-chemical theories that permit statistical thermodynamic properties to be studied on the basis of electronic structure calculations are given extended development, as is the testing of those theoretical results with ab initio molecular dynamics simulations. The book is intended for students taking up research problems of molecular science in chemistry, chemical engineering, biochemistry, pharmaceutical chemistry, nanotechnology and biotechnology.

The Oxford Solid State Basics - Steven H. Simon 2013-06-20

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.

Magnetism in Condensed Matter - Stephen Blundell 2001-10-05

An understanding of the quantum mechanical nature of magnetism has led to the development of new magnetic materials which are used as permanent magnets, sensors, and information storage. Behind these practical applications lie a range of fundamental ideas, including symmetry breaking, order parameters, excitations, frustration, and reduced dimensionality. This superb new textbook presents a logical account of these ideas, starting from basic concepts in electromagnetism and quantum mechanics. It outlines the origin of magnetic moments in atoms and how these moments can be affected by their local environment inside a crystal. The different types of interactions which can be present between magnetic moments are described. The final chapters of the book are

devoted to the magnetic properties of metals, and to the complex behaviour which can occur when competing magnetic interactions are present and/or the system has a reduced dimensionality. Throughout the text, the theoretical principles are applied to real systems. There is substantial discussion of experimental techniques and current research topics. The book is copiously illustrated and contains detailed appendices which cover the fundamental principles.

Solid-State Physics for Electronics - Andre Moliton 2013-03-01

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.

Problems In Solid State Physics With Solutions - Han Fuxiang 2011-10-31

This book provides a practical approach to consolidate one's acquired knowledge or to learn new concepts in solid state physics through solving problems. It contains 300 problems on various subjects of solid state physics. The problems in this book can be used as homework assignments in an introductory or advanced course on solid state physics for undergraduate or graduate students. It can also serve as a desirable reference book to solve typical problems and grasp mathematical techniques in solid state physics. In practice, it is more fascinating and rewarding to learn a new idea or technique through solving challenging problems rather than through reading only. In this aspect, this book is not a plain collection of problems

but it presents a large number of problem-solving ideas and procedures, some of which are valuable to practitioners in condensed matter physics.

Fundamentals of Solid State Electronics - Chih-Tang Sah 1991-10-30

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*.

Proceedings of the ... International Symposium on Molten Salts - 1987

Introduction to Solid State Physics - Charles Kittel 1962

ERDA Energy Research Abstracts - 1983

Solid State Physics - Giuseppe Grosso 2013-10-17

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

Understanding Solid State Physics - Jacques Cazaux 2016-03-23

The correlation between the microscopic composition of solids and their macroscopic (electrical, optical, thermal) properties is the goal of solid state physics. This book is the deeply revised version of the French book *Initiation physique du solide: exercices commentés avec rappels de cours*, written more than 20 years ago. It has five sections

Introductory Solid State Physics - H.P. Meyers 2014-04-21

Assuming an elementary knowledge of quantum and statistical physics, this book provides a guide to principal physical properties of condensed matter, as well as the underlying theory necessary for an understanding of their

origins.

Metal—Ammonia Solutions - Yong Zhou 2013-10-22

Metal-Ammonia Solutions contains the proceedings of an International Conference on the Nature of Metal-Ammonia Solutions Colloque Weyl II held at Cornell University in Ithaca, New York, on June 15-19, 1969. The papers explore the nature of metal-ammonia solutions and cover topics ranging from the dilemma of metal-ammonia models to the magnetic properties of metal-ammonia solutions, the reactions of such solutions, and solid metal-ammonia compounds. This monograph is comprised of 39 chapters and begins with an overview of models for the concentration dependence of the properties of dilute metal-ammonia solutions. The discussion then turns to a continuous dielectric model for the solvated dielectron in dielectric media; elementary electronic excitations in insulating liquids; and magnetic properties of metal-ammonia solutions. The chapters that follow focus on the kinetics of the reaction between sodium and ethanol in liquid ammonia; electrons trapped in solids; metal-nonmetal transition and phase separation; and optical spectra of alkali metal-ammonia solutions. This text will be a valuable resource for chemists and chemistry students.

Introductory Solid State Physics - H.P. Myers 1997-04-26

Assuming an elementary knowledge of quantum and statistical physics, this book provides a comprehensive guide to principal physical properties of condensed matter, as well as the underlying theory necessary for a proper understanding of their origins. The subject matter covers the principal features of condensed matter physics, but with particular accent on the properties of metal alloys. Relevance to technical applications is recognized.

Condensed Matter Physics - Michael P. Marder 2010-11-17

Now updated—the leading single-volume introduction to solid state and soft condensed matter physics This Second Edition of the unified treatment of condensed matter physics keeps the best of the first, providing a basic foundation in the subject while addressing many recent discoveries. Comprehensive and

authoritative, it consolidates the critical advances of the past fifty years, bringing together an exciting collection of new and classic topics, dozens of new figures, and new experimental data. This updated edition offers a thorough treatment of such basic topics as band theory, transport theory, and semiconductor physics, as well as more modern areas such as quasicrystals, dynamics of phase separation, granular materials, quantum dots, Berry phases, the quantum Hall effect, and Luttinger liquids. In addition to careful study of electron dynamics, electronics, and superconductivity, there is much material drawn from soft matter physics, including liquid crystals, polymers, and fluid dynamics. Provides frequent comparison of theory and experiment, both when they agree and when problems are still unsolved. Incorporates many new images from experiments. Provides end-of-chapter problems including computational exercises. Includes more than fifty data tables and a detailed forty-page index. Offers a solutions manual for instructors. Featuring 370 figures and more than 1,000 recent and historically significant references, this volume serves as a valuable resource for graduate and undergraduate students in physics, physics professionals, engineers, applied mathematicians, materials scientists, and researchers in other fields who want to learn about the quantum and atomic underpinnings of materials science from a modern point of view.

Solid State Physics - J. S. Blakemore 1985-12-12
Updated to reflect recent work in the field, this book emphasizes crystalline solids, going from the crystal lattice to the ideas of reciprocal space and Brillouin zones, and develops these ideas for lattice vibrations, for the theory of metals, and for semiconductors. The theme of lattice periodicity and its varied consequences runs through eighty percent of the book. Other sections deal with major aspects of solid state physics controlled by other phenomena: superconductivity, dielectric and magnetic properties, and magnetic resonance.

Solid State Physics - 1978-10-27
Solid State Physics
CONCEPTS OF SOLID STATE PHYSICS MADE EASY - Abdul Hannan 2022-05-12
This textbook mainly focuses on structural, thermal, electronic, dielectric, magnetic and

superconducting behaviors of materials in their solid states. This book was motivated to present those core topics of Solid State Physics in the easy way. The text has a range from basics to advanced and experimental topics in Solid State Physics. We have tried to write the text as easy as it is to comprehend with easy-to-understand figures and derivation. Majority of the subject matters of this book were originated from lecture notes of Solid State Physics courses delivered to undergraduate and postgraduate students by the first author at Shahjalal University of Science and Technology (SUST), Sylhet, Bangladesh. It will serve two main goals. The first goal is to provide the beginners, both major and non-major physics students, a solid foundation in Solid State Physics through the supplied imaginative figures in most of the topics. The second goal is to enhance understanding of the advanced and applied topics through our rigorous presentation of the text and mathematical derivations in the book.

Solid State Physics - Henry Ehrenreich
2001-09-12

Solid state physics is the branch of physics that is primarily devoted to the study of matter in its solid phase, especially at the atomic level. This prestigious serial presents timely and state-of-the-art reviews pertaining to all aspects of solid state physics.

Solid State Physics - László Mihály 2009-02-24
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.

The Physics of Solar Energy Conversion - Juan Bisquert 2020-06-09

Research on advanced energy conversion devices such as solar cells has intensified in the last two decades. A broad landscape of candidate materials and devices were discovered and systematically studied for effective solar energy conversion and utilization. New concepts have emerged forming a rather powerful picture embracing the mechanisms and limitation to efficiencies of different types of devices. The Physics of Solar Energy Conversion introduces the main physico-chemical principles that govern the operation of energy devices for energy conversion and storage, with a detailed view of the principles of solar energy conversion using advanced materials. Key Features include: Highlights recent rapid advances with the discovery of perovskite solar cells and their development. Analyzes the properties of organic solar cells, lithium ion batteries, light emitting diodes and the semiconductor materials for hydrogen production by water splitting. Embraces concepts from nanostructured and highly disordered materials to lead halide perovskite solar cells Takes a broad perspective and comprehensively addresses the fundamentals so that the reader can apply these and assess future developments and technologies in the field. Introduces basic techniques and methods for understanding the materials and interfaces that compose operative energy devices such as solar cells and solar fuel converters.

Solid State Theory - Walter A. Harrison 2012-04-30

DIVThorough, modern study of solid state physics; solid types and symmetry, electron states, electronic properties and cooperative phenomena. /div

Solid State Physics - Neil W. Ashcroft 1976

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

Quantum Wells, Wires and Dots - Paul Harrison 2016-06-13

Quantum Wells, Wires and Dots provides all the essential information, both theoretical and computational, to develop an understanding of the electronic, optical and transport properties of these semiconductor nanostructures. The book will lead the reader through comprehensive explanations and mathematical derivations to the point where they can design semiconductor nanostructures with the required electronic and optical properties for exploitation in these technologies. This fully revised and updated 4th edition features new sections that incorporate modern techniques and extensive new material including: Properties of non-parabolic energy bands Matrix solutions of the Poisson and Schrödinger equations Critical thickness of strained materials Carrier scattering by interface roughness, alloy disorder and impurities Density matrix transport modelling Thermal modelling Written by well-known authors in the field of semiconductor nanostructures and quantum optoelectronics, this user-friendly guide is presented in a lucid style with easy to follow steps, illustrative examples and questions and computational problems in each chapter to help the reader build solid foundations of understanding to a level where they can initiate their own theoretical investigations. Suitable for postgraduate students of semiconductor and condensed matter physics, the book is essential to all those researching in academic and industrial laboratories worldwide. Instructors can contact the authors directly (p.harrison@shu.ac.uk / a.valavanis@leeds.ac.uk) for Solutions to the problems.

Simulations for Solid State Physics

Paperback Without CD-ROM - Robert H. Silsbee 1997-06-28

Interactive resource centering around fourteen high quality computer simulations covering essential topics in solid state physics. Copyright © Libri GmbH. All rights reserved.

Electronic Structure - Richard M. Martin

2004-04-08

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.

Solid State Physics - Gerald Burns 2016-05-18

The objective of Solid State Physics is to introduce college seniors and first-year graduate students in physics, electrical engineering, materials science, chemistry, and related areas to this diverse and fascinating field. I have attempted to present this complex subject matter in a coherent, integrated manner, emphasizing fundamental scientific ideas to give the student a strong understanding and "feel" for the physics and the orders of magnitude involved. The subject is varied, covering many important, sophisticated, and practical areas, which, at first, may appear unrelated but which are actually built on the same foundation: the bonding between atoms, the periodic translational symmetry, and the resulting electron energy levels. The text is comprehensive enough so that the basics of broad areas of present research are covered, yet flexible enough so that courses of varying lengths can be satisfied. The exercises at the end of each chapter serve to reinforce and extend the text.

Problems in Solid State Physics with Solutions - Fuxiang Han 2012

This book provides a practical approach to

consolidate one's acquired knowledge or to learn new concepts in solid state physics through solving problems. It contains 300 problems on various subjects of solid state physics. The problems in this book can be used as homework assignments in an introductory or advanced course on solid state physics for undergraduate or graduate students. It can also serve as a desirable reference book to solve typical problems and grasp mathematical techniques in solid state physics. In practice, it is regarded fascinating and rewarding to learn a new idea or technique through solving a real challenging problem than through reading only. In this aspect, this book is not a plain collection of problems but it presents a large number of problem-solving ideas and procedures, some of which are valuable to practitioners in condensed matter physics.

The Physics of Solids - John Boyd Ketterson 2016

This text offers a broad coverage of the physical properties of solids at fundamental level. The quantum-mechanical origins that lead to a wide range of observed properties are discussed. The book also includes a modern treatment of unusual physical states.

Dispositions and Causal Powers - Bruno Gnessounou 2016-05-23

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.

Relaxation Processes in Micromagnetics - Harry Suhl 2007-06-21

Electrons in solids behave like microscopic bar

magnets, and in certain solids these align to produce macroscopic magnetizations. This book deals with the dynamics of this magnetization field. It addresses questions of microscopic mechanism only to the extent that residual interactions of the magnetic moments with other degrees of freedom of the host solid affect the dynamics, particularly the dissipative aspects. Several of these damping mechanisms are evaluated here for their effect on the equations of the magnetization dynamics. This dynamics is intrinsically nonlinear. This is important in the applications, particularly magnetic recording, which involves very large motion of the magnetization, well beyond the validity of linearized (small motion) approximations or limited extensions thereof. Therefore nonlinear solution methods are emphasized, but with only minimal use of numerical simulation. The book should be useful to practitioners of magnetic recording, and to physicists studying magnetic phenomena.

Introductory Solid State Physics, Second Edition - H.P. Meyers 1997-04-26

Assuming an elementary knowledge of quantum and statistical physics, this book provides a comprehensive guide to principal physical properties of condensed matter, as well as the underlying theory necessary for a proper understanding of their origins. The subject matter covers the principal features of

condensed matter physics, but with particular accent on the properties of metal alloys. Relevance to technical applications is recognized.

Proceedings of the Joint International Symposium on Molten Salts - Gleb Mamantov 1987

Fundamentals of Condensed Matter and Crystalline Physics - David L. Sidebottom 2012-07-05

This undergraduate textbook merges traditional solid state physics with contemporary condensed matter physics, providing an up-to-date introduction to the major concepts that form the foundations of condensed materials. The main foundational principles are emphasized, providing students with the knowledge beginners in the field should understand. The book is structured in four parts and allows students to appreciate how the concepts in this broad area build upon each other to produce a cohesive whole as they work through the chapters. Illustrations work closely with the text to convey concepts and ideas visually, enhancing student understanding of difficult material, and end-of-chapter exercises varying in difficulty allow students to put into practice the theory they have covered in each chapter and reinforce new concepts.