

# Solid State Physics An Introduction To Principles Of Materials Science Advanced Texts In Physics Paperback

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*Introduction to Solid State Devices* - Lemuel Ibbotson  
1996-11-29

In this book the author provides a readily accessible, uncomplicated account of how some semiconductor devices work and why they are designed as they are. Assuming only the most rudimentary understanding of electronic circuits, it is truly introductory, illustrating the general principles underlying the whole range of devices and systems. Self assessment tests are liberally distributed throughout to allow the reader to gauge their understanding of the material as they work through, and exercises are given at the end of each chapter with full solutions provided for all. The author's easy-to-read style results in a text that will prove invaluable to all requiring an insight into the

theory of semiconductors that will be essential for more advanced studies.

**Physical Chemistry of Solids** - H. F. Franzen 1994  
This book is about the underlying principles of symmetry, thermodynamics and electronic structure that pertain to crystalline solids. After years of teaching graduate students in the areas covered, the author has a good idea of what major notions of group theory and thermodynamics are useful to students of solid state chemistry, and of what fundamental concepts are necessary for a clear understanding. Thus the book deals with lattice symmetry, space groups, reciprocal space, Landau theory, X-ray diffraction, heterogeneous equilibria and simple band theory, in a rigorous and thorough treatment.

**Understanding Solid State Physics** - Sharon Ann Holgate  
2009-12-16

Enables students to easily grasp basic solid state physics principles Keeping the mathematics to a minimum yet losing none of the required rigor, Understanding Solid State Physics clearly explains basic physics principles to provide a firm grounding in the subject. The author underscores the technological applications of the physics discussed and emphasizes the multidisciplinary nature of scientific research. After introducing students to solid state physics, the text examines the various ways in which atoms bond together to form crystalline and amorphous solids. It also describes the measurement of mechanical properties and the means by which the mechanical properties of solids can be altered or supplemented for particular applications. The author discusses how electromagnetic radiation interacts with the periodic array of atoms that make up a crystal and how solids react to heat on both atomic and macroscopic scales. She then focuses on conductors, insulators, semiconductors, and superconductors, including some basic semiconductor devices. The final chapter addresses the magnetic properties of solids as well as applications of magnets and magnetism. This accessible textbook provides a useful introduction to solid state physics for undergraduates who feel daunted by a highly mathematical approach. By relating the theories and concepts to practical applications, it shows how physics is used in the real world.

**ELEMENTS OF SOLID STATE PHYSICS** - J.P. SRIVASATAVA  
2014-12-11

This revised and updated Fourth Edition of the text builds on the strength of previous edition and gives a

systematic and clear exposition of the fundamental principles of solid state physics. The text covers the topics, such as crystal structures and chemical bonds, semiconductors, dielectrics, magnetic materials, superconductors, and nanomaterials. What distinguishes this text is the clarity and precision with which the author discusses the principles of physics, their relations as well as their applications. With the introduction of new sections and additional information, the fourth edition should prove highly useful for the students. This book is designed for the courses in solid state physics for B.Sc. (Hons.) and M.Sc. students of physics. Besides, the book would also be useful to the students of chemistry, material science, electrical/electronic and allied engineering disciplines. New to the Fourth Edition • Solved examples have been introduced to explain the fundamental principles of physics. • Matrix representation for symmetry operations has been introduced in Chapter 1 to enable the use of Group Theory for treating crystallography. • A section entitled 'Other Contributions to Heat Capacity', has been introduced in Chapter 5. • A statement on 'Kondo effect (minimum)' has been added in Chapter 14. • A section on 'Graphenes' has been introduced in Chapter 16. • The section on 'Carbon Nanotubes', in Chapter 16 has been revised. • A "Lesson on Group Theory", has been added as Appendix.

*Symmetry Principles in Solid State and Molecular Physics*  
- Melvin Lax 2001-01-01

High-level text applies group theory to physics problems, develops methods for solving molecular vibration problems and for determining the form of crystal tensors, develops translational properties of crystals, more. 1974 edition.

*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.

*Solid-state Physics* - Harald Ibach 1993

This introduction to solid-state physics emphasizes both experimental and theoretical aspects of the subject. Three important areas of modern research are treated in particular detail: magnetism, superconductivity, and semiconductor physics. Experimental aspects with examples taken from research areas of current interest are presented in the form of separate panels. This novel format was highly praised by readers of the original German text and, here too, should help the student to relate the theoretical concepts described in the text to important practical applications. Students will benefit significantly from working through the problems related to each chapter. In many cases these lead to areas outside the scope of the main text and are designed to stimulate further reading.

**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.

*Chemical Sensing with Solid State Devices* - Marc J. Madou 2012-12-02

This book is a lucid presentation for chemists, electrical engineers, surface scientists, and solid-state physicists, of the fundamentals underlying the construction of simple and small chemical sensors. The first part of the book is a review of the theoretical background in solid state physics, chemistry and electronics. Semiconductor and solid electrolyte bulk

models are reviewed as well as solid/gas and solid/liquid interface models. Membranes and catalysis theory are also covered expansively. The second part is a discussion of more complete sensor devices, their essential components, and of the important developments in this area over the last fifteen to twenty years. The book provides guidance through the multidisciplinary world of chemical sensors. It should be understandable to students with some training in physics and chemistry and a general knowledge of electronics. Finally, comments on economic considerations in the development of new sensor products and suggestions for future research and development should be of value to company R&D planners. Key Features \* Introduction \* Solid State Background \* Solid/Gas Interfaces \* Solid/Liquid Interfaces \* Catalysis Background \* Membrane Background \* Biosensor Principles \* Principles of Chemfet Operation \* Silicon Based Chemical Sensors \* Thin Film Gas Sensors \* Solid Electrolytes-Devices \* Gas Sensors Based on Semiconductor Powders \* Application of Solid State Chemical Sensors

*Principles of the Theory of Solids* - J. M. Ziman  
1979-11-29

Professor Ziman's classic textbook on the theory of solids was first published in 1964. This paperback edition is a reprint of the second edition, which was substantially revised and enlarged in 1972. The value and popularity of this textbook is well attested by reviewers' opinions and by the existence of several foreign language editions, including German, Italian, Spanish, Japanese, Polish and Russian. The book gives a clear exposition of the elements of the physics of perfect crystalline solids. In discussing the principles, the author aims to give students an

appreciation of the conditions which are necessary for the appearance of the various phenomena. A self-contained mathematical account is given of the simplest model that will demonstrate each principle. A grounding in quantum mechanics and knowledge of elementary facts about solids is assumed. This is therefore a textbook for advanced undergraduates and is also appropriate for graduate courses.

**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.

*Studyguide for Solid-State Physics* - Cram101 Textbook Reviews  
2013-05

Never HIGHLIGHT a Book Again Virtually all testable terms, concepts, persons, places, and events are included. Cram101 Textbook Outlines gives all of the outlines, highlights, notes for your textbook with

optional online practice tests. Only Cram101 Outlines are Textbook Specific. Cram101 is NOT the Textbook. Accompanys: 9780521673761

**Solid-state Physics** - Harald Ibach 1993

This introduction to solid-state physics emphasizes both experimental and theoretical aspects of the subject. Three important areas of modern research are treated in particular detail: magnetism, superconductivity, and semiconductor physics. Experimental aspects with examples taken from research areas of current interest are presented in the form of separate panels. This novel format was highly praised by readers of the original German text and, here too, should help the student to relate the theoretical concepts described in the text to important practical applications. Students will benefit significantly from working through the problems related to each chapter. In many cases these lead into areas outside the scope of the main text and are designed to stimulate further reading.

*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 Many-Body Physics** - Piers Coleman 2015-11-26

A modern, graduate-level introduction to many-body physics in condensed matter, this textbook explains the tools and concepts needed for a research-level

understanding of the correlated behavior of quantum fluids. Starting with an operator-based introduction to the quantum field theory of many-body physics, this textbook presents the Feynman diagram approach, Green's functions and finite-temperature many-body physics before developing the path integral approach to interacting systems. Special chapters are devoted to the concepts of Fermi liquid theory, broken symmetry, conduction in disordered systems, superconductivity and the physics of local-moment metals. A strong emphasis on concepts and numerous exercises make this an invaluable course book for graduate students in condensed matter physics. It will also interest students in nuclear, atomic and particle physics.

*Elementary Solid State Physics* - M. Ali Omar 1975

Principles of Condensed Matter Physics - P. M. Chaikin  
2000-09-28

Now in paperback, this book provides an overview of the physics of condensed matter systems. Assuming a familiarity with the basics of quantum mechanics and statistical mechanics, the book establishes a general framework for describing condensed phases of matter, based on symmetries and conservation laws. It explores the role of spatial dimensionality and microscopic interactions in determining the nature of phase transitions, as well as discussing the structure and properties of materials with different symmetries. Particular attention is given to critical phenomena and renormalization group methods. The properties of liquids, liquid crystals, quasicrystals, crystalline solids, magnetically ordered systems and amorphous solids are investigated in terms of their symmetry, generalised rigidity, hydrodynamics and topological

defect structure. In addition to serving as a course text, this book is an essential reference for students and researchers in physics, applied physics, chemistry, materials science and engineering, who are interested in modern condensed matter physics.

**Solid-state physics : an introduction to principles of materials science ; with 100 problems** - Harald Ibach  
2004-01-01

*Outlines, Notes and Highlights for Solid-State Physics* - Lawrence J. Gitman 2011-06

Never HIGHLIGHT a Book Again! Virtually all of the testable terms, concepts, persons, places, and events from the textbook are included. Cram101 Just the FACTS101 studyguides give all of the outlines, highlights, notes, and quizzes for your textbook with optional online comprehensive practice tests. Only Cram101 is Textbook Specific. Accompany: 9783540938033

SOLID STATE PHYSICS - V K BABBAR 1997

This book presents a comprehensive introduction to Solid State Physics for undergraduate students of pure and applied sciences and engineering disciplines. It acquaints the students with the fundamental properties of solids starting from their properties. The coverage of basic topics is developed in terms of simple physical phenomenon supplemented with theoretical derivations and relevant models which provides strong grasp of the fundamental principles of physics in solids in a concise and self-explanatory manner.

**Solid-State Physics** - Harald Ibach 2009-11-04

This new edition of the well-received introduction to solid-state physics provides a comprehensive overview of the basic theoretical and experimental concepts of

materials science. Experimental aspects and laboratory details are highlighted in separate panels that enrich text and emphasize recent developments. Notably, new material in the third edition includes sections on important new devices, aspects of non-periodic structures of matter, phase transitions, defects, superconductors and nanostructures. Students will benefit significantly from solving the exercises given at the end of each chapter. This book is intended for university students in physics, materials science and electrical engineering. It has been thoroughly updated to maintain its relevance and usefulness to students and professionals.

Understanding Solid State Physics - Sharon Ann Holgate  
2021-04-22

Keeping the mathematics to a minimum yet losing none of the required rigor, *Understanding Solid State Physics*, Second Edition clearly explains basic physics principles to provide a firm grounding in the subject. This new edition has been fully updated throughout, with recent developments and literature in the field, including graphene and the use of quasicrystalline materials, in addition to featuring new journalistic boxes and the reciprocal lattice. The author underscores the technological applications of the physics discussed and emphasizes the multidisciplinary nature of scientific research. After introducing students to solid state physics, the text examines the various ways in which atoms bond together to form crystalline and amorphous solids. It also describes the measurement of mechanical properties and the means by which the mechanical properties of solids can be altered or supplemented for particular applications. The author discusses how electromagnetic radiation interacts with the periodic

array of atoms that make up a crystal and how solids react to heat on both atomic and macroscopic scales. She then focuses on conductors, insulators, semiconductors, and superconductors, including some basic semiconductor devices. The final chapter addresses the magnetic properties of solids as well as applications of magnets and magnetism. This accessible textbook provides a useful introduction to solid state physics for undergraduates who feel daunted by a highly mathematical approach. By relating the theories and concepts to practical applications, it shows how physics is used in the real world. Key features: Fully updated throughout, with new journalistic boxes and recent applications Uses an accessible writing style and format, offering journalistic accounts of interesting research, worked examples, self-test questions, and a helpful glossary of frequently used terms Highlights various technological applications of physics, from locomotive lights to medical scanners to USB flash drives  
Elementary Solid State Physics - M. Ali Omar 1975

*Solid-State Physics* - H. Ibach 2003

This third edition of the introduction to solid-state physics provides an overview of the theoretical and experimental concepts of materials science.

*The Physics of Solids* - Eleftherios N. Economou  
2010-08-04

*Solid State Physics* emphasizes a few fundamental principles and extracts from them a wealth of information. This approach also unifies an enormous and diverse subject which seems to consist of too many disjoint pieces. The book starts with the absolutely minimum of formal tools, emphasizes the basic principles, and employs physical reasoning ("a little

thinking and imagination" to quote R. Feynman) to obtain results. Continuous comparison with experimental data leads naturally to a gradual refinement of the concepts and to more sophisticated methods. After the initial overview with an emphasis on the physical concepts and the derivation of results by dimensional analysis, The Physics of Solids deals with the Jellium Model (JM) and the Linear Combination of Atomic Orbitals (LCAO) approaches to solids and introduces the basic concepts and information regarding metals and semiconductors.

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.

**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 a successful 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** - Joginder Singh Galsin 2019-02-23

Solid State Physics: An Introduction to Theory presents an intermediate quantum approach to the properties of solids. Through this lens, the text explores different properties, such as lattice, electronic, elastic, thermal, dielectric, magnetic, semiconducting, superconducting and optical and transport properties, along with the structure of crystalline solids. The work presents the general theory for most of the properties of crystalline solids, along with the results for one-, two- and three-dimensional solids in particular cases. It also includes a brief description of emerging topics, such as the quantum hall effect and high superconductivity. Building from fundamental principles and requiring only a minimal mathematical background, the book includes illustrative images and solved problems in all chapters to support student understanding. Provides an introduction to recent topics, such as the quantum hall effect, high-superconductivity and nanomaterials Utilizes the Dirac' notation to highlight the physics contained in the mathematics in an appropriate and succinct manner Includes many figures and solved problems throughout all chapters to provide a deeper understanding for students Offers topics of particular interest to engineering students, such as elasticity in solids, dislocations, polymers, point defects and nanomaterials

**Electron Density and Bonding in Crystals** - V.G Tsirelson  
1996-01-01

Electron Density and Bonding in Crystals: Principles, Theory and X-Ray Diffraction Experiments in Solid State Physics and Chemistry provides a comprehensive, unified account of the use of diffraction techniques to determine the distribution of electrons in crystals. The book discusses theoretical and practical techniques, the



application of electron density studies to chemical bonding, and the determination of the physical properties of condensed matter. The book features the authors' own key contributions to the subject as well as a thorough, critical summary of the extensive literature on electron density and bonding. Logically organized, coverage ranges from the theoretical and experimental basis of electron density determination to its impact on investigations of the nature of the chemical bond and its uses in determining electromagnetic and optical properties of crystals. The main text is supplemented by appendices that provide clear, concise guidance on aspects such as systems of units, quantum theory of atomic vibrations, atomic orbitals, and creation and annihilation operators. The result is a valuable compendium of modern knowledge on electron density distributions, making this reference a standard for crystallographers, condensed matter physicists, theoretical chemists, and materials scientists.

*Solid-State Physics* - Harald Ibach 1995

Our German textbook "Festkörperphysik" has become rather popular among German-speaking students, and is currently produced in its 4th edition. Its version in English has already been adopted by many universities in the United States and other countries. This new 2nd edition corresponds to the 4th edition in German. In addition to correcting some typographical errors and making small improvements in the presentation, in the present edition some chapters have been revised or extended. Part V, for example, has been extended to include a description of angle-resolved photoemission and its importance for the study of electronic band structures. Section 10.10 on high-temperature superconductors has completely been rewritten. This

active field of research continues to progress rapidly and many new results have emerged since the publication of the first edition. These results shed new light on much of the fundamental physics. The new version of Sect. 10.10 has been developed in discussions with colleagues who are themselves engaged in superconductivity research. We thank, in particular, Professor C. Calandra from the University of Modena and Dr. R. Wordenweber of the Institute of Thin Film and Ion Technology at the Research Centre Jülich. The revision of the problems was done with the help of Dr. W.

**Symmetry Principles and Magnetic Symmetry in Solid State Physics**, - S. J. Joshua 1991-01-01

Group theory and symmetry are important concepts in solid state physics, but are not widely taught because of the mathematical complexities involved. This book aims to remedy this by using a practical approach which bypasses most of the abstruse detail of formal group theory. The subject is usually developed using abstract entities, but here the author uses concrete examples to aid understanding in his development of the basics of the subject. This makes the book an ideal text for senior undergraduate and graduate students. The book is divided into two parts. Part one introduces the reader to group theoretical techniques and applications via the extensive use of character tables. All topics required for a complete understanding of group theory in the context of solid state physics are covered. The author demonstrates clearly how symmetry arguments can be applied to give detailed insights into the physical properties of crystals. This part ends with a selection of applications which will prove useful to solid state physicists/chemists and materials scientists. Each chapter includes a set of problems with hints and

solutions. Part two is self-contained and deals with applications of group theory to the study of the symmetry properties of strongly magnetic crystals. This is a topic usually omitted from group theory texts at this level. Symmetry Principles and Magnetic Symmetry in Solid State Physics is a comprehensive introduction to the subject. It will be of great use to all students of condensed matter and materials science.

**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.

*Elements of Solid State Physics* - Michael N. Rudden  
1993-05-24

Elements of Solid State Physics Second Edition M. N. Rudden and J. Wilson University of Northumbria at Newcastle, Newcastle upon Tyne, UK This textbook provides a basic introduction to the principles of solid state physics and semiconductor devices and will prove essential for first and second year students of physics,

materials science and electrical/electronic engineering courses. It assumes no prior knowledge of quantum or statistical mechanics and relies on simple models to illustrate the physical principles. However, the opportunity has been taken in this edition to extend the concept of energy bands to a consideration of  $E-k$  curves, and certain new material has been added, notably relating to superconductivity and optoelectronic devices, including lasers, following significant developments in these areas. Elements of Solid State Physics, Second Edition, presents the student with an essentially non-mathematical approach to the subject. Arranged in a logical sequence with many clear illustrations, each chapter has a number of worked examples and discussion points, as well as questions and answers. Readers of this fully revised and updated edition will receive a thorough grounding in the principles of solid state physics and should have sufficient knowledge about modern electronic devices to proceed to more advanced texts in this area. Main Contents: Some Aspects of Modern Physics; Structure of Crystalline Solids; Theories of Conduction and Magnetism; Energy Bands in Solids; Quantum Theory of Conduction; Semiconductor Devices.

**Solid State Physics** - John J. Quinn 2010-05-03

Intended for a two semester advanced undergraduate or graduate course in Solid State Physics, this treatment offers modern coverage of the theory and related experiments, including the group theoretical approach to band structures, Moessbauer recoil free fraction, semi-classical electron theory, magnetoconductivity, electron self-energy and Landau theory of Fermi liquid, and both quantum and fractional quantum Hall effects. Integrated throughout are developments from the newest

semiconductor devices, e.g. space charge layers, quantum wells and superlattices. The first half includes all material usually covered in the introductory course, but in greater depth than most introductory textbooks. The second half includes most of the important developments in solid-state researches of the past half century, addressing e.g. optical and electronic properties such as collective bulk and surface modes and spectral function of a quasiparticle, which is a basic concept for understanding LEED intensities, X ray fine structure spectroscopy and photoemission. So both the fundamental principles and most recent advances in solid state physics are explained in a class-tested tutorial style, with end-of-chapter exercises for review and reinforcement of key concepts and calculations.

Fundamentals of Many-body Physics - Wolfgang Nolting

2009-03-02

The goal of the present course on "Fundamentals of Theoretical Physics" is to be a direct accompaniment to the lower-division study of physics, and it aims at providing the physical tools in the most straightforward and compact form as needed by the students in order to master theoretically more complex topics and problems in advanced studies and in research. The presentation is thus intentionally designed to be sufficiently detailed and self-contained – sometimes, admittedly, at the cost of a certain elegance – to permit individual study without reference to the secondary literature. This volume deals with the quantum theory of many-body systems. Building upon a basic knowledge of quantum mechanics and of statistical physics, modern techniques for the description of interacting many-particle systems are developed and applied to various real problems, mainly from the area of solid-state physics. A thorough

revision should guarantee that the reader can access the relevant research literature without experiencing major problems in terms of the concepts and vocabulary, techniques and deductive methods found there. The world which surrounds us consists of very many particles interacting with one another, and their description requires in principle the solution of a corresponding number of coupled quantum-mechanical equations of motion (Schrödinger equations), which, however, is possible only in exceptional cases in a mathematically strict sense. The concepts of elementary quantum mechanics and quantum statistics are therefore not directly applicable in the form in which we have thus far encountered them. They require an extension and restructuring, which is termed "many-body theory".

INTRODUCTION TO SOLID STATE PHYSICS, Second Edition -

KUMAR, ARUN 2015-10-01

Introduction to Solid State Physics, in its Second Edition, provides a comprehensive introduction to the physical properties of crystalline solids. It explains the structure of crystals, theory of crystal diffraction and the reciprocal lattice. As the book advances, it describes different kinds of imperfections in crystals, bonding in solids, and vibration in one-dimensional monoatomic and diatomic linear lattice. Different theories of specific heat, thermal conductivity of solids and lattice thermal conductivity are thoroughly dealt with. Coverage also includes the free electron theory, band theory of solids and semiconductors. In addition, the book also describes in detail the magnetic properties of solids and superconductivity. Finally, the book includes discussions on lasers, nanotechnology and the basic principles of fibre optics and holography.

Some new topics like cellular method, quantum Hall effect, de Haas van Alphen effect, Pauli paramagnetism and semiconductor laser have been added in the present edition of the book to make it more useful for the students. The book is designed to meet the requirements of undergraduate and postgraduate students of physics for their courses in solid state physics, condensed matter physics and material science. KEY FEATURES • Puts a conceptual emphasis on the subject. • Includes numerous diagrams and figures to clarify the concepts. • Gives step-by-step explanations of theories. • Provides chapter-end exercises to test the knowledge acquired.

**Solid-State Physics** - James Patterson 2010-12-08

While the standard solid state topics are covered, the basic ones often have more detailed derivations than is customary (with an emphasis on crystalline solids). Several recent topics are introduced, as are some subjects normally included only in condensed matter physics. Lattice vibrations, electrons, interactions, and spin effects (mostly in magnetism) are discussed the most comprehensively. Many problems are included whose level is from "fill in the steps" to long and challenging, and the text is equipped with references and several comments about experiments with figures and tables.

**Principles of the Solid State** - H. V. Keer 1993

Uses an integrated, scientists' approach to the

principles regulating the synthesis, structure and physical characteristics of crystalline solids. Mathematical derivations are kept to a minimum. Covers electrical properties of metals and band semiconductors, superionic conductors, ferrites and solid electrolytes. Features end-of-chapter problem sets.

Field Guide to Solid State Physics - Marek S. Wartak 2019

"This Field Guide covers the essential topics of solid state physics, including crystal structures and dynamics, band structures, quantum structures, semiconductors, superconductors, and magnetism. Essential equations and simple diagrams convey the principles that form the core of this field."--

**Principles of Solid State Physics** - Robert M Levy 2012-12-02

Principles of Solid State Physics presents a unified treatment of the basic models used to describe the solid state phenomena. This book is divided into three parts. Part I considers mechanical or geometrical properties that are describable by a lattice of mass points. What happens if the electric charge and magnetic moment are to be associated with the lattice points is explained in Part II. Part III discusses the application of the band theory and imperfections in solids. This publication is recommended for a one-semester senior course in solid state physics for students majoring in physics, chemistry, and electrical engineering.