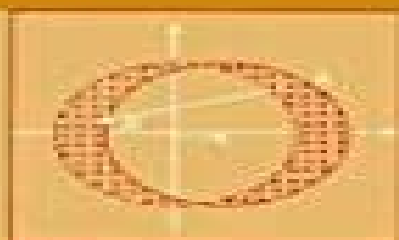


Harald Ibach · Hans Lüth

Solid-State Physics

An Introduction to Theory and Experiment



Springer-Verlag

Solid State Physics An Introduction To Theory And Experiment

Attilio Rigamonti, Pietro Carretta



Solid State Physics An Introduction To Theory And Experiment:

Solid-State Physics Harald Ibach, Hans Lüth, 2012-12-06 In recent decades solid state physics has seen many dramatic new developments and has become one of the largest independent branches of physics. It has simultaneously expanded into many new areas playing a vital role in fields that were once the domain of the engineering and chemical sciences. A consequence of this explosive development is that no single university lecturer can today be expected to have a detailed knowledge of all aspects of this vast subject. Likewise, it is impossible to conceive of a course that could offer students a comprehensive understanding of the entire discipline and its many applications. In view of this situation, it is particularly valuable to have a textbook that gives a concise account of the essential elements of the physics of solids. In this book, the fundamental aspects of solid state physics are presented according to the scheme: Chemical bonding, structure, lattice dynamics, and electronic properties. We believe that this sequence is the optimum choice for tutorial purposes. It enables the more difficult concepts to be introduced at a point where a basic understanding of fundamental ideas has already been achieved through the study of simple models and examples. In addition to this carefully structured exposition of classical solid state theory based on the periodic solid and the one electron approximation, the book also includes comprehensive descriptions of the most active areas in modern research: Magnetism, superconductivity, and semiconductor physics. **Solid-state Physics**

, 1991 *Solid-State Physics* Harald Ibach, Hans Lüth, 1993-09-02 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 Harald Ibach, Hans Lüth, 2013-04-18 Our German textbook *Festkörperphysik* has meanwhile appeared in its 6th edition, extensively revised and extended in comparison to the latest 2nd English edition. Presently, the book has been translated into Japanese, Korean, and Polish and is used as a standard text in many universities around the world. It is therefore high time to carefully revise the English text and bring it up to par with the latest 6th German edition. The sections on High Temperature Superconductors as well as Panel XVI on Shubnikov-de Haas Oscillations and Quantum Hall Effect are completely revised according to the present deeper understanding of the phenomena. This 3rd English edition has furthermore been expanded by several chapters to meet the educational requirements for recent fields of research. We let ourselves be guided by the idea that modern teaching of solid state physics emphasizes aspects of material science and its applications, in particular in solid state electronics. Accordingly, deviations from the ideal periodic solid have gained more

weight in the text we now consider phase diagrams of alloys some basics of defect physics and amorphous solids Because of the importance of strained layer systems in device physics inclusion of the fundamentals of crystal elasticity theory seems again necessary so a new chapter is devoted to this topic Solid-State Physics Harald Ibach,Hans Lüth,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 Solid-state Physics Harald Ibach,Hans Luth,1991

Solid-State Physics H. Ibach,Harald Ibach,Hans Lüth,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 Panel 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 Jilich The revision of the problems was done with the help of Dr W **The Art of Cryogenics** Guglielmo Ventura,Lara Risegari,2010-07-07 Cryogenics is the study of low temperature interactions temperatures well below those existing in the natural universe The book covers a large spectrum of experimental cases including basic vacuum techniques indispensable in cryogenics Guidance in solving experimental problems and numerous numerical examples are given as are examples of the applications of cryogenics in such areas as underground detectors and space applications Updated tables of low temperature data on materials are also presented and the book is supplemented with a rich bibliography Researchers graduate and above in the fields of physics engineering and chemistry with an interest in the technology and applications of low temperature measurements will find this book invaluable Experiments described in technical detail Description of newest cryogenic apparatus Applications in multidisciplinary areas Data on cryogenic properties of new materials Current reference review *Fundamentals of Solid*

State Engineering Manijeh Razeghi, 2018-08-21 Provides a multidisciplinary introduction to quantum mechanics solid state physics advanced devices and fabrication Covers wide range of topics in the same style and in the same notation Most up to date developments in semiconductor physics and nano engineering Mathematical derivations are carried through in detail with emphasis on clarity Timely application areas such as biophotonics bioelectronics

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

Molecular Electronics: An Introduction To Theory And Experiment (2nd Edition) Elke Scheer, Juan Carlos Cuevas, 2017-05-19 Molecular Electronics is self contained and unified in its presentation It can be used as a textbook on nanoelectronics by graduate students and advanced undergraduates studying physics and chemistry In addition included in this new edition are previously unpublished material that will help researchers gain a deeper understanding into the basic concepts involved in the field of molecular electronics

Molecular Electronics: An Introduction To Theory And Experiment Elke Scheer, Juan Carlos Cuevas, 2010-06-23 This book provides a comprehensive overview of the rapidly developing field of molecular electronics It focuses on our present understanding of the electrical conduction in single molecule circuits and provides a thorough introduction to the experimental techniques and theoretical concepts It will also constitute as the first textbook like introduction to both the experiment and theory of electronic transport through single atoms and molecules In this sense this publication will prove invaluable to both researchers and students interested in the field of nanoelectronics and nanoscience in general Molecular Electronics is self contained and unified in its presentation It may be used as a textbook on nanoelectronics by graduate students and advanced undergraduates studying physics and chemistry In addition included are previously unpublished material that will help researchers gain a deeper understanding into the basic concepts involved in the field of molecular electronics

Solid State Physics Adrianus J. Dekker, 1957 Solid-state physics : an introduction to principles of materials science ; with 100 problems Harald Ibach, Hans Lüth, 2004-01-01

Electronic Structure Richard M. Martin, 2004-04-08 An important graduate textbook in condensed matter physics by highly regarded physicist

Structure of Matter Attilio Rigamonti, Pietro Carretta, 2015-06-13 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, 1978-10-27 Solid State Physics **Non-Reciprocal Materials and Systems** Prabhakar Bandaru, 2024-01-22 Non Reciprocal Materials and Systems An Engineering Approach to the Control of Light Sound and Heat discusses the related concept of bound states which help confine sound and electromagnetic waves and can also lead to the control of thermal energy The requirements for the formation of such bound states their relationship to physical and topological characteristics of materials and the possible application to new devices is considered The book takes a unique approach to energy transfer in and between materials systems considering dimensional effects supersonic transonic and subsonic wave motion as well as the coupling of waves This book is suitable for researchers in materials science condensed matter physics electrical mechanical and structural engineering and technologists aiming for better control of non electronic physical phenomena Provides information on how to use specific features in new and artificial materials for the control of sound light and heat Explores dimensional considerations such as surface material phenomena that can be decoupled from bulk materials or the inside of a material Discusses new device concepts and related technologies such as energy sources isolators and diodes involving energy confinement

Solid-State Physics James Deane Patterson, Bernard C. Bailey, 2007 Learning solid state physics involves a certain degree of maturity since it involves tying together diverse concepts from many areas of physics The objective is to understand in a basic way how solid materials behave To do this one needs both a good physical and mathematical background One definition of solid state physics is that it is the study of the physical e g the electrical dielectric magnetic elastic and thermal properties of solids in terms of basic physical laws In one sense solid state physics is more like chemistry than some other branches of physics because it focuses on common properties of large classes of materials It is typical that solid state physics emphasizes how physics properties link to electronic structure We have retained the term solid state physics even though condensed matter physics is more commonly used Condensed matter physics includes liquids and non crystalline solids such as glass which we shall not discuss in detail Modern solid state physics came of age in the late thirties and forties and had its most extensive expansion with the development of the transistor integrated circuits and microelectronics Most of microelectronics however is limited to the properties of inhomogeneously doped semiconductors Solid state physics includes many other areas of course among the largest of these

are ferromagnetic materials and superconductors Just a little less than half of all working physicists are in condensed matter A course in solid state physics typically begins with three broad areas 1 How and why atoms bind together to form solids 2 Lattice vibrations and phonons and 3 Electrons in solids One would then typically apply the above to 4 Interactions especially of electrons with phonons 5 Metals the Fermi surface and alloys 6 Semiconductors 7 Magnetism 8 Superconductivity 9 Dielectrics and ferroelectrics 10 Optical properties 11 Defects and 12 Certain other modern topics such as layered materials quantum Hall effect mesoscopics nanophysics and soft condensed matter In this book we will consider all of these

Whitaker's Books in Print ,1998

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