

Harald Ibach Hans Lüth

Solid-State Physics

An Introduction to Theory and Experiment



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Solid State Physics An Introduction To Theory And Experiment

Harald Ibach, Hans Lüth



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, 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 Part 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, 1991 **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** H. Ibach, Hans-Lüth, 1995 [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

Solid-state physics : an introduction to principles of materials science ; with 100 problems Harald Ibach, Hans Lüth, 2004-01-01 [Whitaker's Books in Print](#) , 1998 **Renormalization Group Theory** Ulrich Köbler, Andreas

Hoser,2010-04-29 Spin wave theory of magnetism and BCS theory of superconductivity are typical theories of the time before renormalization group RG theory The two theories consider atomistic interactions only and ignore the energy degrees of freedom of the continuous infinite solid Since the pioneering work of Kenneth G Wilson Nobel Prize of physics in 1982 we know that the continuous solid is characterized by a particular symmetry invariance with respect to transformations of the length scale Associated with this symmetry are particular field particles with characteristic excitation spectra In diamagnetic solids these are the well known Debye bosons This book reviews experimental work on solid state physics of the last five decades and shows in a phenomenological way that the dynamics of ordered magnets and conventional superconductors is controlled by the field particles of the infinite solid and not by magnons and Cooper pairs respectively In the case of ordered magnets the relevant field particles are called GSW bosons after Goldstone Salam and Weinberg and in the case of superconductors the relevant field particles are called SC bosons One can imagine these bosons as magnetic density waves or charge density waves respectively Crossover from atomistic exchange interactions to the excitations of the infinite solid occurs because the GSW bosons have generally lower excitation energies than the atomistic magnons According to the principle of relevance the dynamics is governed by the excitations with the lowest energy The non relevant atomistic interactions with higher energy are practically unimportant for the dynamics *The Best Books for Academic Libraries: Science, technology, and agriculture* ,2002 **Introduction to Chemical Physics** Thomas Ruggles Pynchon,1873

General Catalog Georgia Institute of Technology,1986 *Solid State Theory* Ulrich Rössler,2009-08-29 Solid State Theory An Introduction is a textbook for graduate students of physics and material sciences Whilst covering the traditional topics of older textbooks it also takes up new developments in theoretical concepts and materials that are connected with such breakthroughs as the quantum Hall effects the high Tc superconductors and the low dimensional systems realized in solids Thus besides providing the fundamental concepts to describe the physics of the electrons and ions comprising the solid including their interactions the book casts a bridge to the experimental facts and gives the reader an excellent insight into current research fields A compilation of problems makes the book especially valuable to both students and teachers

Nuclear Science Abstracts ,1974 NSA is a comprehensive collection of international nuclear science and technology literature for the period 1948 through 1976 pre dating the prestigious INIS database which began in 1970 NSA existed as a printed product Volumes 1 33 initially created by DOE s predecessor the U S Atomic Energy Commission AEC NSA includes citations to scientific and technical reports from the AEC the U S Energy Research and Development Administration and its contractors plus other agencies and international organizations universities and industrial and research organizations References to books conference proceedings papers patents dissertations engineering drawings and journal articles from worldwide sources are also included Abstracts and full text are provided if available [Introduction to Chemical Physics](#) ,1874 *International Books in Print*, 1995 Barbara Hopkinson,[Anonymus AC01401231],1995 **Experimental Studies**

Of Boson Fields In Solids Ulrich Kobler, Andreas Hoser, 2018-09-14 This book provides a new understanding of the large amount of experimental results gained in solid state physics during the last seven decades For more than 160 different materials data analyses shown in terms of atomistic models Hamiltonians have not provided a quantitatively satisfactory description of either excitation spectra or dynamic properties Instead the experimental evidences have elaborated that field theories are necessary However most experimentalists are not familiar with field theories and realistic field theories of magnetism are absent The book illustrates in an empirical way the elements of future field theories of solid state physics with special emphasis on magnetic materials In contrast to the many available textbooks on quantum field theories that emphasize more on algorithmic formalities rather than referring to the experimental facts the approach in this book is pragmatic instead of abstract theoretic This methodical concept considerably facilitates experimentalists to get acquainted with the basic ideas of field theories even if a ready field theory is not provided by this experimental study

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