Physics Of Low Dimensional Semiconductors Solutions Manual

Electron-Electron Correlation Effects in Low-Dimensional Conductors and Superconductors
Physics of Low Dimensional Systems
Semiconductor Physics
A Compendium of Solid State Theory
Devices Based on Low-Dimensional Semiconductor Structures
Physics of Low Dimensional Systems
The Physics of Low-dimensional Semiconductors
Hot Electrons in Semiconductors
Properties of Interacting Low-Dimensional Systems
Low-Dimensional Semiconductor Structures
Fabrication, Properties and Applications of Low-Dimensional Semiconductors
Optical Spectroscopy of Low Dimensional Semiconductors
Low Dimensional Semiconductor Structures
Effective Electron Mass in Low-Dimensional Semiconductors

Semiconductor Quantum Optoelectronics
Low-Dimensional Semiconductor Structures
Excitons in Low-Dimensional Semiconductors
Physics of Low-Dimensional Semiconductor Structures
Perspectives in Quantum Hall Effects
Low-dimensional Semiconductors
Growth and Optical Properties of Wide-Gap II–VI Low-Dimensional Semiconductors
Compound Semiconductor Device Physics
Growth and Optical Properties of Wide-Gap II-VI Low-Dimensional Semiconductors
Quantum Theory of the Optical and Electronic Properties of Semiconductors
Modern Semiconductor Quantum Physics
Low-dimensional Semiconductors
The Physics Of Low Dimensional Materials
Semiconductor Quantum Optics
Physics of Semiconductor Devices
Optical Properties of Low-dimensional Materials
Low-dimensional Semiconductors
Spin Physics in Semiconductors
Low-Dimensional Systems
Low-Dimensional Structures in Semiconductors

Electronic Properties of Multilayers and Low-Dimensional Semiconductor Structures
Physics of Semiconductors and Nanostructures
Physics and Properties of Narrow Gap Semiconductors
Advanced Electronic Technologies and Systems Based on Low-Dimensional Quantum Devices
Low-Dimensional and Nanostructured Materials and Devices
Modern Semiconductor Physics and Device Applications

HUANG CHASE

Electron-Electron Correlation Effects in Low-Dimensional Conductors and Superconductors Springer Science & Business Media
Narrow gap semiconductors are the most important materials for the preparation of advanced modern infrared systems. They often operate at the extremes of the rules of semiconductor science. This book offers clear descriptions of crystal growth and the fundamental structure and properties of these unique materials. Topics covered include band structure, optical and transport properties, and lattice vibrations and spectra. A thorough treatment of the properties of low-dimensional systems and their relation to infrared applications is

provided.

Physics of Low Dimensional Systems

Springer

Oaxaca, Mexico, was the place chosen by a large international group of scientists to meet and discuss on the recent advances on the understanding of the physical prop- ties of low dimensional systems; one of the most active fields of research in condensed matter in the last years. The International Symposium on the Physics of Low Dim- sions took place in January 16-20, 2000. The group of scientists converging into the historical city of Oaxaca, in the state of the same name, had come from Argentina, Chile, Venezuela, several places in Mexico, Canada, U. S. A. , England, France, Italy, Germany, Russia, and Switzerland. The presentations at the workshop provided sta- of-art reviews of many of the most important problems, currently under study. Equally important to all the participants in the workshop was the fact that we had come to honor a friend, Hans Christoph Siegmann, on his sixty-fifth birthday. This Festschrift recognizes the intellectual leadership of Professor Siegmann in the field and as a sincere homage to his qualities as an exceptional friend, college and mentor. Those who have had the privilege to work closely with Hans Christoph have been deeply impressed by his remarkable analytic mind as well as by his out of range kindness and generosity. Hans Christoph has contributed to the understanding of the difficult and very important problem of

the magnetic properties of finite systems: surfaces, thin films, heterostructures.

Semiconductor Physics Springer Science & Business Media

This book provides one of the most rigorous treatments of compound semiconductor device physics yet published. A complete understanding of modern devices requires a working knowledge of low-dimensional physics, the use of statistical methods, and the use of one-, two-, and three-dimensional analytical and numerical analysis techniques. With its systematic and detailed**discussion of these topics, this book is ideal for both the researcher and the student. Although the emphasis of this text is on compound semiconductor devices, many of the principles discussed will also be useful to those interested in silicon devices. Each chapter ends with exercises that have been designed to reinforce concepts, to complement arguments or derivations, and to emphasize the nature of approximations by critically evaluating realistic conditions. One of the most rigorous treatments of compound semiconductor device physics yet published**Essential reading for a complete understanding of modern devices**Includes chapter-ending exercises to facilitate understanding

A Compendium of Solid State Theory Springer Science & Business Media

This book is a comprehensive text on the physics of semiconductors and nanostructures for a large spectrum of students at the final undergraduate level

studying physics, material science and electronics engineering. It offers introductory and advanced courses on solid state and semiconductor physics on one hand and the physics of low dimensional semiconductor structures on the other in a single text book. Key Features Presents basic concepts of quantum theory, solid state physics, semiconductors, and quantum nanostructures such as quantum well, quantum wire, quantum dot and superlattice In depth description of semiconductor heterojunctions, lattice strain and modulation doping technique Covers transport in nanostructures under an electric and magnetic field with the topics: quantized conductance, Coulomb blockade, and integer and fractional quantum Hall effect Presents the optical processes in nanostructures under a magnetic field Includes illustrative problems with hints for solutions in each chapter Physics of Semiconductors and Nanostructures will be helpful to students initiating PhD work in the field of semiconductor nanostructures and devices. It follows a unique tutorial approach meeting the requirements of students who find learning the concepts difficult and want to study from a physical perspective.

Devices Based on Low-Dimensional Semiconductor Structures Springer Science & Business Media

The author develops the effective-mass theory of excitons in low-dimensional semiconductors and describes numerical methods for calculating the optical absorption including Coulomb

interaction, geometry, and external fields. The theory is applied to Fano resonances in low-dimensional semiconductors and the Zener breakdown in superlattices. Comparing theoretical results with experiments, the book is essentially self-contained; it is a hands-on approach with detailed derivations, worked examples, illustrative figures, and computer programs. The book is clearly structured and will be valuable as an advanced-level self-study or course book for graduate students, lecturers, and researchers.

Physics of Low Dimensional Systems

World Scientific

The purpose of this collective book is to present a non-exhaustive survey of sp-related phenomena in semiconductors with a focus on recent research. In some sense it may be regarded as an updated version of theOpticalOrientation book, which was entirely devoted to spin physics in bulk semiconductors. During the 24 years that have elapsed, we have witnessed, on the one hand, an extraordinary development in the wonderful semiconductor physics in two dim- sions with the accompanying revolutionary applications. On the other hand, during the last maybe 15 years there was a strong revival in the interest in spin phen- ena, in particular in low-dimensional semiconductor structures. While in the 1970s and 1980s the entire world population of researchers in the ?eld never exceeded 20 persons, now it can be counted by the hundreds and the number of publications by the

thousands. This explosive growth is stimulated, to a large extent, by the hopes that the electron and/or nuclear spins in a semiconductor will help to accomplish the dream of factorizing large numbers by quantum computing and eventually to develop a new spin-based electronics, or “spintronics”. Whether any of this will happen or not, still remains to be seen. Anyway, these ideas have resulted in a large body of interesting and exciting research, which is a good thing by itself. The ?eld of spin physics in semiconductors is extremely rich and interesting with many spectacular effects in optics and transport.

The Physics of Low-dimensional Semiconductors Academic Press Low-Dimensional Semiconductor Structures provides a seamless, atoms-to-devices introduction to the latest quantum heterostructures. It covers their fabrication, their electronic, optical and transport properties, their role in exploring physical phenomena, and their utilization in devices. The authors begin with a detailed description of the epitaxial growth of semiconductors. They then deal with the physical behaviour of electrons and phonons in low-dimensional structures. A discussion of localization effects and quantum transport phenomena is followed by coverage of the optical properties of quantum wells. They then go on to discuss non-linear optics in quantum heterostructures. The final chapters deal with semiconductor lasers, mesoscopic devices, and high-speed heterostructure

devices. The book contains many exercises and comprehensive references. It is suitable as a textbook for graduate-level courses in electrical engineering and applied physics. It will also be of interest to engineers involved in the development of semiconductor devices.

Hot Electrons in Semiconductors

Springer Science & Business Media

The emerging field of semiconductor quantum optics combines semiconductor physics and quantum optics, with the aim of developing quantum devices with unprecedented performance. In this book researchers and graduate students alike will reach a new level of understanding to begin conducting state-of-the-art investigations. The book combines theoretical methods from quantum optics and solid-state physics to give a consistent microscopic description of light-matter- and many-body-interaction effects in low-dimensional semiconductor nanostructures. It develops the systematic theory needed to treat semiconductor quantum-optical effects, such as strong light-matter coupling, light-matter entanglement, squeezing, as well as quantum-optical semiconductor spectroscopy. Detailed derivations of key equations help readers learn the techniques and nearly 300 exercises help test their understanding of the materials covered. The book is accompanied by a website hosted by the authors, containing further discussions on topical issues, latest trends and publications on the field. The

link can be found at www.cambridge.org/9780521875097.

Properties of Interacting Low-Dimensional Systems Springer Science & Business Media

The purpose of this book is two fold. First to explain the properties of low dimensional solids such as electronic, vibrational and magnetic structure in terms of simple models. These are used to account for the properties of three dimensional materials providing an elementary introduction to the physics of low dimensional materials. The second objective is to discuss the properties of newer low dimensional materials not made of carbon. These are now the subject of research and describe various phenomena in them such magnetism and superconductivity. Contents: Computational Material ScienceElectronic PropertiesVibrational PropertiesCarbon NanotubesOther Kinds of NanotubesGrapheneOther Low Dimensional MaterialsMagnetism in Low Dimensional MaterialsSuperconductivity in Low Dimensional Materials Readership: Researchers and students in the field of low dimensional materials. Keywords: Graphene;2 Dimensional Materials;Carbon Nanotubes and Tubes of Other Materials;Magnetism in Low Dimensional Materials;Superconductivity in Low Dimensional MaterialsReview: Key Features: This book deals with not only conductivity but a range of other phenomena such as low dimensional magnetism and superconductivity and some very new low dimensional materials such silicene

Low-Dimensional Semiconductor Structures John Wiley & Sons
This book contains contributions on some of the most important and current topics on the physics of low dimensional systems. The main emphasis is on the magnetic properties of surfaces, thin films, and atomic clusters. State-of-the-art techniques are discussed in detail. Techniques for the production and measurement of nanostructures are discussed, and pioneering contributions on the effect on health of these particles are presented. Important studies on semiconductor nanostructures are addressed as well as aerosol systems.
Fabrication, Properties and Applications of Low-Dimensional Semiconductors Springer
This textbook provides a theoretical background for contemporary trends in solid-state theory and semiconductor device physics. It discusses advanced methods of quantum mechanics and field theory and is therefore primarily intended for graduate students in theoretical and experimental physics who have already studied electrodynamics, statistical physics, and quantum mechanics. It also relates solid-state physics fundamentals to semiconductor device applications and includes auxiliary results from mathematics and quantum mechanics, making the book useful also for graduate students in electrical engineering and material science. Key Features: Explores concepts common in textbooks on semiconductors, in addition to topics not included in similar books currently

available on the market, such as the topology of Hilbert space in crystals Contains the latest research and developments in the field Written in an accessible yet rigorous manner
Optical Spectroscopy of Low Dimensional Semiconductors World Scientific
This volume contains the Proceedings of the NATO Advanced Research Workshop on "Growth and Optical Properties of Wide Gap II-VI Low Dimensional Semiconductors", held from 2 - 6 August 1988 in Regensburg, Federal Republic of Germany, under the auspices of the NATO International Scientific Exchange Programme. Semiconducting compounds formed by combining an element from column II of the periodic table with an element from column VI (so called II-VI Semiconductors) have long promised many optoelectronic devices operating in the visible region of the spectrum. However, these materials have encountered numerous problems including: large number of defects and difficulties in obtaining p- and n-type doping. Advances in new methods of material preparation may hold the key to unlocking the unfulfilled promises. During the workshop a full session was taken up covering the prospects for wide-gap II-VI Semiconductor devices, particularly light emitting ones. The growth of bulk materials was reviewed with the view of considering II-VI substrates for the novel epitaxial techniques such as MOCVD, MBE, ALE, MOMBE and ALE-MBE. The controlled introduction of impurities during non-equilibrium growth to provide control of

the doping type and conductivity was emphasized.

Low Dimensional Semiconductor Structures CRC Press

Advances in the physics and chemistry of low-dimensional systems have been really magnificent in the last few decades. Hundreds of quasi-one-dimensional and quasi-two-dimensional systems have been synthesized and studied. The most popular representatives of quasi-one-dimensional materials are polyacethylenes CH [1] and conducting donor-acceptor molecular crystals TIF z TCNQ. Examples of quasi-two-dimensional systems are high temperature su perconductors (HTSC) based on copper oxides LA2CU04, YBa2Cu306+y and organic superconductors based on BEDT -TIP molecules. The properties of such one- and two-dimensional materials are not yet fully understood. On the one hand, the equations of motion of one-dimensional sys tems are rather simple, which facilitates rigorous solutions of model problems. On the other hand, manifestations of various interactions in one-dimensional systems are rather peculiar. This refers, in particular, to electron--electron and electron-phonon interactions. Even within the limit of a weak coupling con stant electron--electron correlations produce an energy gap in the spectrum of one-dimensional metals implying a Mott transition from metal to semiconductor state. In all these cases perturbation theory is inapplicable. Which is one of the main

difficulties on the way towards a comprehensive theory of quasi-one-dimensional systems. - This meeting held at the Institute for Theoretical Physics in Kiev May 15-18 1990 was devoted to related problems. The papers selected for this volume are grouped into three sections.

Effective Electron Mass in Low-Dimensional Semiconductors Cambridge University Press

Presenting the latest advances in artificial structures, this volume discusses in-depth the structure and electron transport mechanisms of quantum wells, superlattices, quantum wires, and quantum dots. It will serve as an invaluable reference and review for researchers and graduate students in solid-state physics, materials science, and electrical and electronic engineering.

Semiconductor Quantum Optoelectronics Cambridge University Press

It is now routine to design and prepare semiconductor multilayers one atomic layer at a time, with independent control over the doping and composition approaching atomic-scale resolution in each layer. In turn, these multilayers can be patterned with features that are as small as only a few atomic layers in lateral extent. These resulting structures not only have led to new generations of electronic and optoelectronic devices offering superior performance, but also have opened up many new areas of exciting solid state and quantum physics. This book collates the whole of

semiconductor science and technology relating to semiconductor multilayers since 1970, and points the way towards the ultimate of materials engineering - the design and preparation of solids atom by atom. Materials, technology, physics, and device issues are covered in detail, making this work ideal for physicists, electronic engineers, and materials scientists alike.

Low-Dimensional Semiconductor Structures World Scientific

Low-Dimensional Semiconductor Structures offers a seamless, atoms-to-devices introduction to the latest quantum heterostructures. It covers their fabrication; electronic, optical, and transport properties; role in exploring new physical phenomena; and utilization in devices. The authors describe the epitaxial growth of semiconductors and the physical behavior of electrons and phonons in low-dimensional structures. They then go on to discuss nonlinear optics in quantum heterostructures. The final chapters deal with semiconductor lasers, mesoscopic devices, and high-speed heterostructure devices. The book contains many exercises and comprehensive references.

Excitons in Low-Dimensional Semiconductors Springer Science & Business Media

Under certain conditions electrons in a semiconductor become much hotter than the surrounding crystal lattice. When this happens, Ohm's Law breaks down: current no longer increases linearly with voltage and may even decrease. Hot electrons have long been

a challenging problem in condensed matter physics and remain important in semiconductor research. Recent advances in technology have led to semiconductors with submicron dimensions, where electrons can be confined to two (quantum well), one (quantum wire), or zero (quantum dot) dimensions. In these devices small voltages heat electrons rapidly, inducing complex nonlinear behavior; the study of hot electrons is central to their further development. This book is the only comprehensive and up-to-date coverage of hot electrons. Intended for both established researchers and graduate students, it gives a complete account of the historical development of the subject, together with current research and future trends, and covers the physics of hot electrons in bulk and low-dimensional device technology. The contributions are from leading scientists in the field and are grouped broadly into five categories: introduction and overview; hot electron-phonon interactions and ultra-fast phenomena in bulk and two-dimensional structures; hot electrons in quantum wires and dots; hot electron tunneling and transport in superlattices; and novel devices based on hot electron transport.

Physics of Low-Dimensional Semiconductor Structures Springer Science & Business Media

This book surveys recent theoretical and experimental studies of optical properties of low-dimensional materials. As an extended version of Optical Properties of Low-Dimensional Materials

(Volume 1, published in 1995 by World Scientific), Volume 2 covers a wide range of interesting low-dimensional materials including both inorganic and organic systems, such as disordered polymers, deformable molecular crystals, dilute magnetic semiconductors, SiGe/Si short-period superlattices, GaAs quantum wires, semiconductor microcavities, and photonic crystals. There are excellent review articles by promising researchers in each field. All the materials introduced in this book yield new optical phenomena originating from their mesoscopic and low-dimensional electronic characters and electron-lattice couplings, which offer a new research field of materials science as well as condensed-matter and optical physics.

Volumes 1 and 2 are interrelated but can be read independently. They are pitched at the level of graduate students and are useful to both students and scientists.

Perspectives in Quantum Hall Effects Springer Science & Business Media

Designed to sit alongside more conventional established condensed matter physics textbooks, this compact volume offers a concise presentation of the principles of solid state theory, ideal for advanced students and researchers requiring an overview or a quick refresher on a specific topic. The book starts from the one-electron theory of solid state physics, moving through electron-electron interaction and many-body approximation schemes, to lattice oscillations and their interactions with

electrons. Subsequent chapters discuss transport theory and optical properties, phase transitions and some properties of low-dimensional semiconductors. Throughout the text, mathematical proofs are often only sketched, and the final chapter of the book reviews some of the key concepts and formulae used in theoretical physics. Aimed primarily at graduate and advanced undergraduate students taking courses on condensed matter theory, the book serves as a study guide to reinforce concepts learned through conventional solid state texts. Researchers and lecturers will also find it a useful resource as a concise set of notes on fundamental topics.

Low-dimensional Semiconductors

Springer Science & Business Media

This volume contains a sequence of reviews presented at the NATO Advanced Study Institute on 'Low Dimensional Structures in Semiconductors ... from Basic Physics to Applications.' This was part of the International School of Materials Science and 1990 at the Ettore Majorana Centre in Sicily. Technology held in July Only a few years ago, Low Dimensional Structures was an esoteric concept, but now it is apparent they are likely to playa major role in the next generation of electronic devices. The theme of the School acknowledged this rapidly developing maturity.' The contributions to the volume consider not only the essential physics, but take a wider view of the topic, starting from material growth and processing, then prog ressing right through to applications with

some discussion of the likely use of low dimensional devices in systems. The papers are arranged into four sections, the first of which deals with basic con cepts of semiconductor and low dimensional systems. The second section is on growth and fabrication, reviewing MBE and MOVPE methods and discussing the achievements and limitations of techniques to reduce structures into the realms of one and zero dimensions. The third section covers the crucial issue of interfaces while the final section deals with devices and device physics.

Series)