Solid State And Semiconductor Physics By John Philip Mckelvey

An Introduction
Plenary Lectures of the Divisions "Semiconductor Physics", "Low Temperature Physics", "Metal Physics" of the German Physical Society, Münster, March 17-21, 1975
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LAMBERT AMY

An Introduction Tata McGraw-Hill Education
This compact undergraduate textbook provides a concise yet thorough introduction to the fundamentals of solid-state physics, while also briefly discussing the historical context surrounding key scholars in the field. The vivid explanations and unique didactic approach adopted in the book aim to generate interest in these subjects while also serving as a motivating primer and supporting companion for studying more detailed and advanced textbooks in solid-state physics. The book is also suitable as a quick refresher for students preparing for examinations. The third edition features many extensions, including an up-to-date discussion of topological materials, a rapidly developing area at the forefront of solid-state physics. Primarily concentrating on the electric and magnetic properties of materials, the book will benefit undergraduate students in the fields of physics, materials science, and electrical engineering.
Plenary Lectures of the Divisions "Semiconductor Physics", "Low Temperature Physics", "Metal Physics" of the German Physical Society, Münster, March 17-21, 1975 Prentice Hall
The first edition of "Semiconductor Physics" was published in 1973 by Springer-Verlag Wien-New York as a paperback in the Springer Study Edition. In 1977, a Russian translation by Professor Yu. K. Pozhela and coworkers at Vilnius/USSR was published by Izdatelstvo "MIR", Mo scow. Since then new ideas have been developed in the field of semi conductors such as electron hole droplets, dangling bond saturation in amorphous silicon by hydrogen, or the determination of the fine struc ture constant from surface quantization in inversion layers. New tech niques such as molecular beam epitaxy which has made the realization of the Esaki superlattice possible, deep level transient spectroscopy, and refined a. c. Hall techniques have evolved. Now that the Viennese edition is about to go out of print, Springer-Verlag, Berlin-Heidelberg-New York is giving me the opportunity to include these new subjects in a monograph to appear in the Solid-State Sciences series. Again it has been the intention to cover the field of semiconductor physics comprehensively, although some chapters such as diffusion of hot carriers and their galvanomagnetic phenomena, as well as super conducting degenerate semiconductors and the appendices, had to go for commercial reasons. The emphasis is more on physics than on device as pects.
Solid State Theory CRC Press
While the standard solid state topics are covered, the basic ones often have more detailed derivations than is customary (with an empasis 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.
Festkörper Probleme Springer Science & Business Media
Physics of Semiconductor Devices covers both basic classic topics such as energy band theory and the gradual-channel model of the MOSFET as well as advanced concepts and devices such as MOSFET short-channel effects, low-dimensional devices and single-electron transistors. Concepts are introduced to the reader in a simple way, often using comparisons to everyday-life experiences such as simple fluid mechanics. They are then explained in depth and mathematical developments are fully described. Physics of Semiconductor Devices contains a list of problems that can be used as homework assignments or can be solved in class to exemplify the theory. Many of these problems make use of Matlab and are aimed at illustrating theoretical concepts in a graphical manner.
Solid State Physics Courier Corporation
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.
An Introduction Including Nanophysics and Applications Anchor Academic Publishing
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.
The Oxford Solid State Basics Springer Science & Business Media
Solid State Physics, Volume 51 continues the serial's tradition of excellence by focusing on the optical and electronic properties and applications of semiconductors. All of the topics in this volume are at the cutting-edge of research in the semiconductor field and will be of great interest to the scientific community.
John Wiley & Sons
Modern Semiconductor Quantum Physics has the following constituents: (1) energy band theory: pseudopotential method (empirical and ab initio); density functional theory; quasi-particles; LCAO method; k.p method; spin-orbit splitting; effect mass and Luttinger parameters; strain effects and deformation potentials; temperature effects. (2) Optical properties: absorption and exciton effect; modulation spectroscopy; photo luminescence and photo luminescence excitation; Raman scattering and polaritons; photoionization. (3) Defects and Impurities: effective mass theory and shallow impurity states; deep state cluster method, super cell method, Green's function method; carrier recombination kinetics; trapping transient measurements; electron spin resonance; electron lattice interaction and lattice relaxation effects; multi-phonon nonradiative recombination; negative U center, DX center and EL2 Defects. (4) Semiconductor surfaces: two dimensional periodicity and surface reconstruction; surface electronic states; photo-electron spectroscopy; LEED, STM and other experimental methods. (5) Low-dimensional structures: Heterojunctions, quantum wells; superlattices, quantum-confined Stark effect and Wannier-Stark ladder effects; resonant tunneling, quantum Hall effect, quantum wires and quantum dots.This book can be used as an advanced textbook on semiconductor physics for graduate students in physics and electrical engineering departments. It is also useful as a research reference for solid state scientists and semiconductor device engineers.
Solid State and Semiconductor Physics Springer Science & Business Media
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 Solid State Engineering Springer Science & Business Media

The explosion of the science of mesoscopic structures is having a great impact on physics and electrical engineering because of the possible applications of these structures in microelectronic and optoelectronic devices of the future. This volume of Solid State Physics consists of two comprehensive and authoritative articles that discuss most of the physical problems that have so far been identified as being of importance in semiconductor nanostructures. Much of the volume is tutorial in characture--while at the same time time presenting current and vital theoretical and experimental results and a copious reference list--so it will be essential reading to all those taking a part in the research and development of this emerging technology.

Physics of Semiconductors and Nanostructures Springer Science & Business Media

Festkorperprobleme X: Advances in Solid State Physics is a compilation of papers and lectures on semiconductor physics, low temperature physics, thermodynamics, and metal physics of the German Physical Society, Freudenstadt, on April 6-11, 1970. This volume is a collection of 13 papers in English and German on the abovementioned subjects. The book describes some characteristics of the different families of narrow bandgap semiconductors; the result arising from the interaction between free carriers and acoustic waves in solids; and the advances made in the field of modulation spectroscopy. The text further discusses the relations between the state of the photoemitted electrons and the absorption process in the solid. In Chapter 8, applications to various problems in semiconductor physics are dealt with. The Empirical Pseudopotential Method and the theory of phonon dispersion curves from a pseudopotential point of view are also considered. Further examined is the Ginzburg-Landau theory of superconductivity in relation to the probability distribution of the electric field strength of laser light that has a form completely analogous to that of the pair wave function of the theory. The implications of the thermodynamics of point defects in imperfect crystals and the association of foreign ions and vacancies due to their Coulomb interaction, resulting in complexes, are investigated. This book is of interest to electrical engineers, research engineers, professors, and students in theoretical or experimental physics.

Introduction to Semiconductor Physics Springer Science & Business Media

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

Physics of Semiconductor Devices Springer Science & Business Media

This book has been designed primarily as a text book for a three-semester, three· hour per week senior or graduate course in semiconductor physics for students In electrical engineering and physics, It may be supplemented by a solid state phy .. ics course. Prerequisites are courses in electrodynamics and -for some of the chapters -basic quantum mechanics. Emphasis has been laid on physical rather than technological aspects. Semiconductor physics is in fact an excellent and d ... · manding training ground for a future physicist or electrical engineer givina him an opportunity to practice a large variety of physical laws he was introduced to in the more fundamental courses. A detailed treatment of the transport and optical properties of semiconducton is given. It was decided to omit the usual description of the material propertkl of certain semiconductors and instead to include the "in· between" equations In mathematical derivations which I hope will make life simpler for a non·theorell· ciano In view of the many thousands of papers which appear every y ... ar in th ... field of semiconductor physics and which are distributed amona more than 30 journals, it would have been impossible for a single person to writ ... comprehen· sive book unless there had not been some excellent review art ides on speCial top ics published in the series "Solid State Physics", "FestkOrper·Probleme! Ad· vances in Solid State Physics", "Semiconductors and Semimetals". and "Proareu in Semiconductors", and I have leaned heavily on such review articles

Advances in Solid State Physics Academic Press

This book covers the physics of semiconductors on an introductory level, assuming that the reader already has some knowledge of condensed matter physics. Crystal structure, band structure, carrier transport, phonons, scattering processes and optical properties are presented for typical semiconductors such as silicon, but III–V and II–VI compounds are also included. In view of the increasing importance of wide-gap semiconductors, the electronic and optical properties of these materials are dealt with too.

Fundamentals of Semiconductors Elsevier

Solid State Electronic Devices is intended for undergraduate electrical engineering students or for practicing engineers and scientists interested in updating their understanding of modern electronics ¿ One of the most widely used introductory books on semiconductor materials, physics, devices and technology, Solid State Electronic Devices aims to: 1) develop basic semiconductor physics concepts, so students can better understand current and future devices; and 2) provide a sound understanding of current semiconductor devices and technology, so that their applications to electronic and optoelectronic circuits and systems can be appreciated. Students are brought to a level of understanding that will enable them to read much of the current literature on new devices and applications. ¿¿ Teaching and Learning Experience This program will provide a better teaching and learning experience-for you and your students. It will help: Provide a Sound Understanding of Current Semiconductor Devices: With this background, students will be able to see how their applications to electronic and optoelectronic circuits and systems are meaningful. Incorporate the Basics of Semiconductor Materials and Conduction Processes in Solids: Most of the commonly used semiconductor terms and concepts are introduced and related to a broad range of devices. Develop Basic Semiconductor Physics Concepts: With this background, students will be better able to understand current and future devices.

Principles and Modern Applications Cambridge University Press

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 Physics Springer Science & Business Media

Semiconductorelectronicsiscommonplaceineveryhousehold.Semiconductor deviceshavealsoenabledeconomicallyreasonable?ber-basedopticalcom- nication, optical storage and high-frequency ampli?cation and have recently revolutionizedphotography,displaytechnologyandlighting.Alongwiththese tremendous technological developments, semiconductors have changed the way we work, communicate, entertain and think. The technological progress of semiconductor materials and devices is evolving continuously with a large worldwide e?ort in human and monetary capital. For students, semicond- tors o?er a rich, diverse and exciting ?eld with a great tradition and a bright future. This book introduces students to semiconductor physics and semicond- tor devices. It brings them to the point where they can specialize and enter supervisedlaboratoryresearch.Itisbasedonthetwosemestersemiconductor physics course taught at Universit¨ at Leipzig in its Master of Science physics curriculum. Since the book can be followed with little or no pre-existing knowledge in solid-state physics and quantum mechanics, it is also suitable for undergraduate students. For the interested reader some additional topics are included in the book that can be covered in subsequent, more speci- ized courses. The material is selected to provide a balance between aspects of solid-state and semiconductor physics, the concepts of various semiconductor devices and modern applications in electronics and photonics.

Survey of Semiconductor Physics Academic Press

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

Physics of Semiconductor Devices Springer Science & Business Media

Solid State Physics opens with the adiabatic approximation to the many-body problem of a system of ions and valence electrons. After chapters on lattice symmetry, structure and dynamics, it then proceeds with four chapters devoted to the single-electron theory of the solid state. Semiconductors and dielectrics are covered in depth and chapters on magnetism and superconductivity follow. The book concludes with a chapter on solid surfaces. Every section is followed by solved problems, some of them illustrating areas of current interest in solid state physics, to give the student a practical working knowledge of the subject, and the text is illustrated by many supplementary examples.

Solid State Physics World Scientific

The Third Edition of the standard textbook and reference in the field of semiconductor devices This classic book has set the standard for advanced study and reference in the semiconductor device field. Now completely updated and reorganized to reflect the tremendous advances in device concepts and performance, this Third Edition remains the most detailed and exhaustive single source of information on the most important semiconductor devices. It gives readers immediate access to detailed descriptions of the underlying physics and performance characteristics of all major bipolar, field-effect, microwave, photonic, and sensor devices. Designed for graduate textbook adoptions and reference needs, this new edition includes: A complete update of the latest developments New devices such as three-dimensional MOSFETs, MODFETs, resonant-tunneling diodes, semiconductor sensors, quantum-cascade lasers, single-electron transistors, real-space transfer devices, and more Materials completely reorganized Problem sets at the end of each chapter All figures reproduced at the highest quality Physics of Semiconductor Devices, Third Edition offers engineers, research scientists, faculty, and students a practical basis for understanding the most important devices in use today and for evaluating future device performance and limitations. A Solutions Manual is available from the editorial department.

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