

Solid State And Semiconductor Physics By John Philip Mckelvey

Introduction to Solid State Physics
 Plenary Lectures of the Divisions "Semiconductor Physics", "Low Temperature Physics", "Metal Physics" of the German Physical Society, Münster, March 17-21, 1975
 Semiconductor Physics
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 Modern Semiconductor Quantum Physics
 An Introduction Including Nanophysics and Applications
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 Conductors, Semiconductors, Superconductors
 Modern Semiconductor Physics and Device Applications
 Solid State and Semiconductor Physics
 Advances in Research and Applications: Semiconductor Heterostructures and Nanostructures
 Advances in Solid State Physics
 Solid State and Semiconductor Physics
 Principles and Modern Applications
 Introduction to Solid State Physics
 The Oxford Solid State Basics
 Physics and Materials Properties
 Fundamentals of Solid State Engineering
 Survey of Semiconductor Physics
 An Introduction
 Aspects of Solid-State and Semiconductor Physics Research in France and Germany
 Physics of Semiconductor Devices
 Solid State Physics
 Introduction to Applied Solid State Physics
 Solid State and Semiconductor Physics
 Introduction to the Theory
 Physics of Semiconductor Devices
 Solid State Physics
 Solid State Theory
 Semiconductor Device Physics and Design
 Semiconductor Physics
 Solid-State Physics
 Solid State Physics
 Aspects of Solid-state and Semiconductor Physics Research in Europe
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 Solid State Electronic Devices
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 Fundamentals of Semiconductors

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Introduction to Solid State Physics World Scientific
 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.

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 Springer

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 Springer Science & Business Media
Semiconductor Physics Anchor Academic Publishing
 Solid state physics is a fascinating sub-genre of condensed matter physics - though some graduate students consider it a very boring and tedious subject area in Physics and others even call it a "squalid state". Topics covered in this book are built on standard solid state physics references available in most online libraries or in other books on solid state physics. The complexity of high speed semiconductor physics and related devices arose from condensed solid state matter. The content covered in this book gives a deep coverage on some topics or sections that may be covered only superficially in other literature. Therefore, these

topics are likely to differ a great deal from what is deemed important elsewhere in other books or available literature. There are many extremely good books on solid-state physics and condensed matter physics but very few of these books are restricted to high speed semiconductor physics though. Chapter one covers the general semiconductor qualities that make high speed semiconductor devices effect and includes the theory of crystals, diffusion and its mechanisms, while chapter two covers solid state materials, material processing for high speed semiconductor devices and an introduction to quantum theory for materials in relation to density of states of the radiation for a black body and its radiation properties. Chapter three discuss high speed semiconductor energy band theory, energy bands in general solid semiconductor materials, the Debye model, the Einstein model the Debye model and semiconductor transport carriers in 3D semiconductors while chapter four discuss effect of external force on current flow based on the concept of holes valence band, and lattice scattering in high speed devices. Chapter five briefly describes solid state thermoelectric fundamentals, thermoelectric material and thermoelectric theory of solids in lattice and phonons while chapter six scattering in high field effect in semiconductors in inter-valley electron scattering and the associated Fermi Dirac statistics and Maxwell-Boltzmann approximation on their carrier concentration variation with energy in extrinsic doping chapter seven covers p-n junction diodes, varactor diode, pin diode Schottky diode and their transient response of diode in multi-valley semiconductors. Chapter eight discusses high speed metal semiconductor field effect transistors.

Solid State Physics Wiley

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.

Elsevier

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 character--while at the same 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.

Modern Semiconductor Quantum Physics John Wiley & Sons

Since the publication of the first edition over 50 years ago, Introduction to Solid State Physics has been the standard solid state physics text for physics students. The author's goal from the beginning has been to write a book that is accessible to undergraduates and consistently teachable. The emphasis in the book has always been on physics rather than formal mathematics. With each new edition, the author has attempted to add important new developments in the field without sacrificing the book's accessibility and teachability. * A very important chapter on nanophysics has been written by an active worker in the field. This field is the liveliest addition to solid state

science during the past ten years * The text uses the simplifications made possible by the wide availability of computer technology. Searches using keywords on a search engine (such as Google) easily generate many fresh and useful references
An Introduction Including Nanophysics and Applications Academic Press

This book is designed to help readers gain a basic understanding of semiconductor devices and the physical operating principles behind them. This two-fold approach 1) provides the user with a sound understanding of existing devices, and 2) helps them develop the basic tools with which they can later learn about applications and the latest devices. The piece provides one of the most comprehensive treatments of all the important semiconductor devices, and reflects the most current trends in the technology and theoretical understanding of the devices.
FEATURES/BENEFITS *NEW--Thoroughly updated to reflect the most current trends in the technology and theoretical understanding of devices. *NEW--Expanded description of silicon Czochralski growth, wafer production, and vapor phase epitaxy (Ch. 1). *NEW--Clearer discussion of chemical bonding, energy band formation and hole transport (Chs. 2, 3 and 4). *NEW--Consolidated coverage of p-n junction diodes and its applications (Ch. 5). *NEW--Greatly expanded/updated discussion of device fabrication processes (Ch. 5 and appendices). *NEW--Earlier discussion of MOS devices (Ch. complementary MOS field effect transistors (MOSFETs) in integrated circuits today. *NEW--Major revision of chapter on Field Effect Transistors (Ch. 6)--Both in the underlying theory as well as discussion of a variety of short channel, high field and hot carrier effects in scaled, ultra-small MOSFETs. Includes extensive discussions of the current-voltage and capacitance-voltage characteristics of these devices--and the information that can be gleaned from such measurements. *NEW--Updated chapter on Bipolar Junction Transistors (BJTs) (Ch. 7)--To reflect current technology. Describes higher-order effects (including the Kirk effect and Webster effect); discusses the Gummel-Poon model (which is more elaborate and physically more accurate than the Ebers-Moll model); and updates the fabrication aspects of BJTs. *NEW--Consolidated coverage of optoelectronic devices in a single chapter (Ch. 8)--Brings the discussion of semiconductor lasers into the same chapter as LEDs and detectors *Reflects the growing importance of optoelectronics. *NEW--Updated coverage of integrated circuits (Ch. concerted shift to CMOS applications, such as logic and memory integrated circuits. *NEW--A section on the insulated gate bipolar transistor (Ch. 11)--A device that is gradually supplanting the semiconductor-controlled rectifier. *NEW--Real data--Wherever feasible, replaces idealized current-voltage and capacitance-voltage plots with real data.

Solid State Physics Springer Science & Business Media

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. $\int \int$ 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.

Introduction to Semiconductor Physics Cambridge University Press

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.

Conductors, Semiconductors, Superconductors Springer Science & Business Media

The aim of this book is a discussion, at the introductory level, of some applications of solid state physics. The book evolved from notes written for a course offered three times in the Department of Physics of the University of California at Berkeley. The objects of the course were (a) to broaden the knowledge of graduate students in physics, especially those in solid state physics; (b) to provide a useful course covering the physics of a variety of solid state devices for students in several areas of physics; (c) to indicate some areas of research in applied solid state physics. To achieve these ends, this book is designed to be a survey of the physics of a number of solid state devices. As the italics indicate, the key words in this description are physics and survey. Physics is a key word because the book stresses the basic qualitative physics of the applications, in enough depth to explain the essentials of how a device works but not deeply enough to allow the reader to design one. The question emphasized is how the solid state physics of the application results in the basic useful property of the device. An example is how the physics of the tunnel diode results in a negative dynamic resistance. Specific circuit applications of devices are mentioned, but not emphasized, since expositions are available in the electrical engineering textbooks given as references.

Modern Semiconductor Physics and Device Applications Springer Science & Business Media

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 and Semiconductor Physics 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 physics 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 demanding training ground for a future physicist or electrical engineer giving 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 semiconductor is given. It was decided to omit the usual

description of the material properties of certain semiconductors and instead to include the "in-between" equations in mathematical derivations which I hope will make life simpler for a non-theoretical physicist. In view of the many thousands of papers which appear every year in the field of semiconductor physics and which are distributed among more than 30 journals, it would have been impossible for a single person to write a comprehensive book unless there had not been some excellent review articles on special topics published in the series "Solid State Physics", "Festkörper-Probleme! Advances in Solid State Physics", "Semiconductors and Semimetals". and "Progress in Semiconductors", and I have leaned heavily on such review articles

Advances in Research and Applications: Semiconductor Heterostructures and Nanostructures Prentice Hall

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.

Advances in Solid State Physics CRC Press

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.

Solid State and Semiconductor Physics Springer Science & Business Media

Excellent bridge between general solid-state physics textbook and research articles packed with providing detailed explanations of the electronic, vibrational, transport, and optical properties of semiconductors "The most striking feature of the book is its modern outlook ... provides a wonderful foundation. The most wonderful feature is its efficient style of exposition ... an excellent book." Physics Today "Presents the theoretical derivations carefully and in detail and gives thorough discussions of the experimental results it presents. This makes it an excellent

textbook both for learners and for more experienced researchers wishing to check facts. I have enjoyed reading it and strongly recommend it as a text for anyone working with semiconductors ... I know of no better text ... I am sure most semiconductor physicists will find this book useful and I recommend it to them." Contemporary Physics Offers much new material: an extensive appendix about the important and by now well-established, deep center known as the DX center, additional problems and the solutions to over fifty of the problems at the end of the various chapters.

Principles and Modern Applications Firewall Media

Semiconductor Device Physics and Design teaches readers how to approach device design from the point of view of someone who wants to improve devices and can see the opportunity and challenges. It begins with coverage of basic physics concepts, including the physics behind polar heterostructures and strained heterostructures. The book then details the important devices ranging from p-n diodes to bipolar and field effect devices. By relating device design to device performance and then relating device needs to system use the student can see how device design works in the real world.

Introduction to Solid State Physics CRC Press

Describes activities in France at CNET and CNRS, and in Germany at the Max Planck Institute in Stuttgart, research facilities in the Wurzburg/Regensburg/Munich area, in Berlin and in the eastern part of Germany, including Jena.

The Oxford Solid State Basics Springer Science & Business Media

Any book that covers a large variety of subjects and is written by one author lacks by necessity the depth provided by an expert in his or her own field of specialization. This book is no exception. It has been written with the encouragement of my students and colleagues, who felt that an extensive card file I had accumulated over the years of teaching solid state and semiconductor physics would be helpful to more than just a few of us. This file, updated from time to time, contained lecture notes and other entries that were useful in my research and permitted me to give to my students a broader spectrum of information than is available in typical textbooks. When assembling this material into a book, I divided the topics into material dealing with the homogeneous semiconductor, the subject of the previously published Volume 1, and the inhomogeneous semiconductor, the subject of this Volume 2. In order to keep the book to a manageable size, sections of tutorial character which can be used as text for a graduate level class had to be interwoven with others written in shorter, reference style. The pointers at the right-hand page header will assist in distinguishing the more difficult reference parts of the book (with the pointer to the right) from the more easy-to-read basic educational sections (with the pointer tending to the left).

Physics and Materials Properties World Scientific Publishing

Company

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 Oxford University Press

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

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