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ALEXIS ARELLANO

Superconductivity, Superfluids and Condensates Cambridge University Press

This book gives an introduction to the optical properties of solids, including many new topics that have not been previously covered in other solid state texts at this level. The fundamental principles of absorption, reflection, luminescence and light scattering are discussed for a wide range of materials, including crystalline insulators and semiconductors, glasses, metals, and molecular materials. Classical and quantum models are used where appropriate along with recent experimental data. Examples include semiconductor quantum wells, organic semiconductors, vibronic solid state lasers, and nonlinear optics

The Lattice Boltzmann Method OUP Oxford

The superb book describes the modern theory of the magnetic properties of solids. Starting from fundamental principles, this copiously illustrated volume outlines the theory of magnetic behaviour, describes experimental techniques, and discusses current research topics. The book is intended for final year undergraduate students and graduate students in the physical sciences.

Soft Condensed Matter World Scientific

Providing a broad review of many techniques and their application to condensed matter systems, this book begins with a review of thermodynamics and statistical mechanics, before moving onto real and imaginary time path integrals and the link between Euclidean quantum mechanics and statistical mechanics. A detailed study of the Ising, gauge-Ising and XY models is included. The renormalization group is developed and applied to critical

phenomena, Fermi liquid theory and the renormalization of field theories. Next, the book explores bosonization and its applications to one-dimensional fermionic systems and the correlation functions of homogeneous and random-bond Ising models. It concludes with Bohm-Pines and Chern-Simons theories applied to the quantum Hall effect. Introducing the reader to a variety of techniques, it opens up vast areas of condensed matter theory for both graduate students and researchers in theoretical, statistical and condensed matter physics.

Advances In The Chemistry And Physics Of Materials: Overview Of Selected Topics Oxford University Press, USA

A balanced mechanics-materials approach and coverage of the latest developments in biomaterials and electronic materials, the new edition of this popular text is the most thorough and modern book available for upper-level undergraduate courses on the mechanical behavior of materials. To ensure that the student gains a thorough understanding the authors present the fundamental mechanisms that operate at micro- and nano-meter level across a wide-range of materials, in a way that is mathematically simple and requires no extensive knowledge of materials. This integrated approach provides a conceptual presentation that shows how the microstructure of a material controls its mechanical behavior, and this is reinforced through extensive use of micrographs and illustrations. New worked examples and exercises help the student test their understanding. Further resources for this title, including lecture slides of select illustrations and solutions for exercises, are available online at www.cambridge.org/97800521866758.

Fundamentals of Soft Matter Science Cambridge University Press

This text includes coverage of important topics that are not commonly featured in other textbooks on condensed matter physics; these include surfaces, the quantum Hall effect and

superfluidity. The author avoids complex formalism, such as Green's functions, which can obscure the underlying physics, and instead emphasizes fundamental physical reasoning. This text is intended for classroom use, so it features plenty of references and extensive problems for solution based on the author's many years of teaching in the Physics Department at the University of Michigan. This textbook is ideal for physics graduates as well as students in chemistry and engineering; it can equally serve as a reference for research students in condensed matter physics. Engineering students in particular, will find the treatment of the fundamentals of semiconductor devices and the optics of solids of particular interest.

Coarse-Grained Modeling of Biomolecules Oxford University Press on Demand

This book presents a selection of advanced lectures from leading researchers, providing recent theoretical results on strongly coupled quantum field theories. It also analyzes their use for describing new quantum states, which are physically realizable in condensed matter, cold-atomic systems, as well as artificial materials. It particularly focuses on the engineering of these states in quantum devices and novel materials useful for quantum information processing. The book offers graduate students and young researchers in the field of modern condensed matter theory an updated review of the most relevant theoretical methods used in strongly coupled field theory and string theory. It also provides the tools for understanding their relevance in describing the emergence of new quantum states in a variety of physical settings. Specifically, this proceedings book summarizes new and previously unrelated developments in modern condensed matter physics, in particular: the interface of condensed matter theory and quantum information theory; the interface of condensed matter physics and the mathematics

emerging from the classification of the topological phases of matter, such as topological insulators and topological superconductors; and the simulation of condensed matter systems with cold atoms in optical lattices.

Feynman Diagram Techniques in Condensed Matter Physics CRC Press

In each generation, scientists must redefine their fields: abstracting, simplifying and distilling the previous standard topics to make room for new advances and methods. Sethna's book takes this step for statistical mechanics - a field rooted in physics and chemistry whose ideas and methods are now central to information theory, complexity, and modern biology. Aimed at advanced undergraduates and early graduate students in all of these fields, Sethna limits his main presentation to the topics that future mathematicians and biologists, as well as physicists and chemists, will find fascinating and central to their work. The amazing breadth of the field is reflected in the author's large supply of carefully crafted exercises, each an introduction to a whole field of study: everything from chaos through information theory to life at the end of the universe.

Soft Matter Physics Cambridge University Press

This undergraduate textbook merges traditional solid state physics with contemporary condensed matter physics, providing an up-to-date introduction to the major concepts that form the foundations of condensed materials. The main foundational principles are emphasized, providing students with the knowledge beginners in the field should understand. The book is structured in four parts and allows students to appreciate how the concepts in this broad area build upon each other to produce a cohesive whole as they work through the chapters. Illustrations work closely with the text to convey concepts and ideas visually, enhancing student understanding of difficult material, and end-of-chapter exercises varying in difficulty allow students to put into practice the theory they have covered in each chapter and reinforce new concepts.

Supersymmetry Clarendon Press

"The chapters in this book survey the progress in simulating biomolecular dynamics.... The images conjured up by this work are not yet universally loved, but are beginning to bring new insights into the study of biological structure and function. The future will decide whether this scientific movement can bring

forth its Picasso or Modigliani." -from the Foreword by Peter G. Wolynes, Bullard-Welch Foundation Professor of Science, Rice University This book highlights the state-of-art in coarse-grained modeling of biomolecules, covering both fundamentals as well as various cutting edge applications. Coarse-graining of biomolecules is an area of rapid advances, with numerous new force fields having appeared recently and significant progress made in developing a systematic theory of coarse-graining. The contents start with first fundamental principles based on physics, then survey specific state-of-art coarse-grained force fields of proteins and nucleic acids, and provide examples of exciting biological problems that are at large scale, and hence, only amenable to coarse-grained modeling. Introduces coarse-grained models of proteins and nucleic acids. Showcases applications such as genome packaging in nuclei and understanding ribosome dynamics Gives the physical foundations of coarse-graining Demonstrates use of models for large-scale assemblies in modern studies Garegin A. Papoian is the first Monroe Martin Associate Professor with appointments in the Department of Chemistry and Biochemistry and the Institute for Physical Science and Technology at the University of Maryland.

Basic Concepts for Simple and Complex Liquids Cambridge University Press

This revised edition continues to provide the most approachable introduction to the structure, characteristics, and everyday applications of soft matter. It begins with a substantially revised overview of the underlying physics and chemistry common to soft materials. Subsequent chapters comprehensively address the different classes of soft materials, from liquid crystals to surfactants, polymers, colloids, and biomaterials, with vivid, full-color illustrations throughout. There are new worked examples throughout, new problems, some deeper mathematical treatment, and new sections on key topics such as diffusion, active matter, liquid crystal defects, surfactant phases and more. • Introduces the science of soft materials, experimental methods used in their study, and wide-ranging applications in everyday life. • Provides brand new worked examples throughout, in addition to expanded chapter problem sets and an updated glossary. • Includes expanded mathematical content and substantially revised introductory chapters. This book will provide a comprehensive introductory resource to both undergraduate and graduate

students discovering soft materials for the first time and is aimed at students with an introductory college background in physics, chemistry or materials science.

Quantum Field Theory and Condensed Matter Springer Nature

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.

Microrheology Oxford University Press

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.

Band Theory and Electronic Properties of Solids OUP Oxford

An introduction to the area of condensed matter in a nutshell. This textbook covers the standard topics, including crystal structures, energy bands, phonons, optical properties, ferroelectricity, superconductivity, and magnetism.

Fundamentals and Applications of Magnetic Materials Cambridge University Press

The advent of X-ray diffraction in the early twentieth century transformed crystallography from an area of scientific inquiry largely limited to physics, mineralogy, and mathematics, to a highly interdisciplinary field which now includes nearly all life and physical sciences as well as materials science and engineering. This book is a collection of works showcasing some of the most recent developments in the field of crystallography.

Green's Functions and Condensed Matter Cambridge University Press

This text offers an introduction to the properties and behaviour of

soft matter. It begins with a treatment of the underlying principles, then discusses how the properties of certain substances and systems are treated within this framework.

Optical Properties of Solids World Scientific

Students and researchers looking for a comprehensive textbook on magnetism, magnetic materials and related applications will find in this book an excellent explanation of the field. Chapters progress logically from the physics of magnetism, to magnetic phenomena in materials, to size and dimensionality effects, to applications. Beginning with a description of magnetic phenomena and measurements on a macroscopic scale, the book then presents discussions of intrinsic and phenomenological concepts of magnetism such as electronic magnetic moments and classical, quantum, and band theories of magnetic behavior. It then covers ordered magnetic materials (emphasizing their structure-sensitive properties) and magnetic phenomena, including magnetic anisotropy, magnetostriction, and magnetic domain structures and dynamics. What follows is a comprehensive description of imaging methods to resolve magnetic microstructures (domains) along with an introduction to micromagnetic modeling. The book then explores in detail size (small particles) and dimensionality (surface and interfaces) effects — the underpinnings of nanoscience and nanotechnology that are brought into sharp focus by magnetism. The hallmark of modern science is its interdisciplinarity, and the second half of the

book offers interdisciplinary discussions of information technology, magnetoelectronics and the future of biomedicine via recent developments in magnetism. Modern materials with tailored properties require careful synthetic and characterization strategies. The book also includes relevant details of the chemical synthesis of small particles and the physical deposition of ultra thin films. In addition, the book presents details of state-of-the-art characterization methods and summaries of representative families of materials, including tables of properties. CGS equivalents (to SI) are included.

Magnetism in Condensed Matter Cambridge University Press

Presenting a unified approach, this book focusses on the concepts and theoretical methods that are necessary for an understanding of the physics and chemistry of the fluid state. The authors do not attempt to cover the whole field in an encyclopedic manner. Instead, important ideas are presented in a concise and rigorous style, and illustrated with examples from both simple molecular liquids and more complex soft condensed matter systems such as polymers, colloids, and liquid crystals.

Introduction to the Theory of Ferromagnetism Courier Corporation

This book describes how the arrangement and movement of atoms in a solid are related to the forces between atoms, and how they affect the behaviour and properties of materials. The book is intended for final year undergraduate students and graduate

students in physics and materials science.

Liquid Crystals OUP Oxford

Publisher Description

Magnetism in Condensed Matter Princeton University Press

This book is an introduction to the theory, practice, and implementation of the Lattice Boltzmann (LB) method, a powerful computational fluid dynamics method that is steadily gaining attention due to its simplicity, scalability, extensibility, and simple handling of complex geometries. The book contains chapters on the method's background, fundamental theory, advanced extensions, and implementation. To aid beginners, the most essential paragraphs in each chapter are highlighted, and the introductory chapters on various LB topics are front-loaded with special "in a nutshell" sections that condense the chapter's most important practical results. Together, these sections can be used to quickly get up and running with the method. Exercises are integrated throughout the text, and frequently asked questions about the method are dealt with in a special section at the beginning. In the book itself and through its web page, readers can find example codes showing how the LB method can be implemented efficiently on a variety of hardware platforms, including multi-core processors, clusters, and graphics processing units. Students and scientists learning and using the LB method will appreciate the wealth of clearly presented and structured information in this volume.