Low Dimensional Science

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Low-Dimensional Electronic Properties of Molybdenum Bronzes and Oxides - C. Schlenker 2012-12-06
The history of low dimensional conductors goes back to the prediction, more than forty years ago, by Peierls, of the instability of a one dimensional metallic chain, leading to what is known now as the charge density wave state. At the same time, Frohlich suggested that an "ideal" conductivity could be associated to the sliding of this charge density wave. Since then, several classes of compounds, including layered transition metal dichalcogenides, quasi one-dimensional organic conduc tors and transition metal tri- and tretrachalcogenides have been extensively studied. The molybdenum bronzes or oxides have been discovered or rediscovered as low dimensional conductors in this last decade. A considerable amount of work has now been performed on this subject and it was time to collect some review papers in a single book. Although this book is focused on the molybdenum bronzes and oxides, it has a far more general interest in the field of low dimensional conductors, since several of the molybdenum compounds provide, from our point of view, model systems. This is the case for the quasi one-dimensional blue bronze, especially due to the availability of good quality large single crystals. This book is intended for scientists belonging to the fields of solid state physics and chemistry as well as materials science. It should especially be useful to many graduate students involved in low dimensional oxides. It has been written by recognized specialists of low dimensional systems.

Physics of Low-dimensional Systems - Stig Lundqvist 1989-01-01

Low-Dimensional Cooperative Phenomena - H. Keller 2012-11-01
Theoretical and experimental work on solids with low-dimensi onal cooperative phenomena has been rather explosively expanded in the last few years, and it seems to be quite fashionable to con tribute to this field, especially to the problem of one-dimensional metals. On the whole, one could divide the huge amount of recent investigations into two parts although there is much overlap bet ween these regimes, namely investigations on magnetic exchange interactions constrained to mainly one or two dimensions and, secondly, work done on Id metallic solids or linear chain compounds with Id delocalized electrons. There is, of course, overlap from one extreme case to the other with these solids and in some rare cases both phenomena are studied on one and the same crystal. In fact, however, most of the scientific groups in this area could be associated roughly with one of these categories and,in addition, a separation between theoreticians and experimentalists in each of these groups leads to a further splitting of interests although many theories about these solids have been tested by experimenta lists. Nevertheless, more cooperation and understanding between scientists working on low-dimensional cooperative phenomena should appreciably stimulate further development. With a better inderdis ciplinary understanding, new ideas could possibly help chemists in synthesizing tailor-cut solids. This would in return give experi mentalists new phenomena to examine and finally would stimulate new theoretical work.

Progress in Nanoscale and Low-Dimensional Materials and Devices - Hilmi Ünlü 2022-10-18
This book describes most recent progress in the properties, synthesis, characterization, modelling, and applications of nanomaterials and nanodevices. It begins with the review of the modelling of the structural, electronic and optical properties of low dimensional and nanoscale semiconductors, methodology of synthesis, and characterization of quantum dots and nanowires, with special attention towards Dirac materials, whose electrical conduction and sensing properties far exceed those of silicon-based materials, making them strong competitors. The contributed reviews presented in this book touch on broader issues associated with the environment, as well as energy production and storage, while highlighting important achievements in materials pertinent to the fields of biology and medicine, exhibiting an outstanding confluence of basic physical science with vital human endeavor. The subjects treated in this book are attractive to the broader readership of graduate and advanced undergraduate students in physics, chemistry, biology, and medicine, as well as in electrical, chemical, biological, and mechanical engineering. Seasoned researchers and experts from the semiconductor/device industry also greatly benefit from the book’s treatment of cutting-edge application studies.

Low Dimensional Structures and Devices - Science and Engineering Research Council 1988

Low-Dimensional Systems: Theory, Preparation, and Some Applications - Luis M. Liz-Marzán 2012-12-06
This volume contains papers presented at the NATO Advanced Research Workshop (ARW) Dynamic Interactions in Quantum Dot Systems held at Hotel Atrium in Puszczykowo, near Poznan, Poland, May 16-19,2002. The term low-dimensional systems, which is used in the title of this volume, refers to those systems which contain at least one dimension that is intermediate between those characteristic ofatoms/molecules and those ofthe bulk material. Depending on how many dimensions lay within this range, we generally speak of quantum wells, quantum wires, and quantum dots. As such an intermediate state, some properties of low-dimensional systems are very different to those of their molecular and bulk counterparts. These properties generally include optical, electronic, and magnetic properties, and all these are partially covered in this book. The main goal of the workshop was to discuss the actual state of the art in the broad area ofnanotechnology. The initial focus was on the innovative synthesis of nanomaterials and their properties such as: quantum size effects, superparamagnetism, or field emission. These topics lead us into the various field based interactions including plasmon- magnetic spin- and exciton coupling. The newer, more sophisticated methods for characterization of nanomaterials were discussed, as well as the methods for possible industrial applications. In general, chemists and physicists, as well as experts on both theory and experiments on nanosized regime structures were brought together, to discuss the general phenomena underlying their fields ofinterest from different points ofview.

The Physics Of Low Dimensional Materials - Owens Frank J 2017-08-23
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 Magnetism - A.N. Vasiliev 2019-07-16

Low-dimensional magnetism physics involves the search for new magnetic compounds and improving their characteristics to meet the needs of innovative technologies. A comprehensive overview of key materials, their formulation data and characteristics are detailed by the author. Key selling features: Explores dominant mechanisms of magnetic interaction to determine the parameters of exchange interactions in new magnetic materials. Describes how magnetism and superconductivity not only compete, but also "help" each other. Details characteristics of key materials in the magnetic subsystem. Results of several internationally renowned research groups are included and cited. Suitable for a wide range of readers in physics, materials science, and chemistry interested in the problems of the structure of matter.

Nanoelectronics - Vijay Kumar Arora 2018-10-08

Brings the Band Structure of Carbon-Based Devices into the Limelight A shift to carbon is positioning biology as a process of synthesis in mainstream engineering. Silicon is quickly being replaced with carbon-based electronics, devices are being reduced down to nanometer scale, and further potential applications are being considered. While traditionally, engineers are trained by way of physics, chemistry, and mathematics, Nanoelectronics: Quantum Engineering of Low-Dimensional Nanoensembles establishes biology as an essential basic science for engineers to explore. Unifies Science and Engineering: from Quantum Physics to Nanoengineering Drawing heavily on published papers by the author, this research-driven text offers a complete review of nanoelectronic transport starting from quantum waves, to ohmic and ballistic conduction, and saturation-limited extreme nonequilibrium conditions. In addition, it highlights a new paradigm using non-equilibrium Arora’s Distribution Function (NEADF) and establishes this function as the starting point (from band theory to equilibrium to extreme nonequilibrium carrier statistics). The author focuses on nano-electronic device design and development, including carbon-based devices, and provides you with a vantage point for the global outlook on the future of nanoelectronics devices and ULSI. Encompassing ten chapters, this illuminating text: Converts the electric-field response of drift velocity into current–voltage relationships that are driven by the presence of critical voltage and saturation current arising from the unidirectional drift of carriers Applies the effect of these scaled-down dimensions to nano-MOSFET (metal–oxide–semiconductor field-effect transistor) Considers specialized applications that can be tried through a number of suggested projects that are all feasible with MATLAB® codes Nanoelectronics: Quantum Engineering of Low-Dimensional Nanoensembles contains the latest research in nanoelectronics, identifies problems and other factors to consider when it comes to nanolayer design and application, and ponders future trends. Print Versions of this book also include access to the ebook version.

Optical Properties of Narrow-Gap Low-Dimensional Structures - Clivia M. Sotomayor Torres 1987-06-30

This volume contains the Proceedings of the NATO Advanced Research Workshop on "Optical Properties of Narrow-Gap Low-Dimensional Structures", held from July 29th to August 1st, 1986, in St. Andrews, Scotland, under the auspices of the NATO International Scientific Exchange Program. The workshop was not limited to optical properties of narrow-gap semiconductor structures (Part III). Sessions on, for example, the growth methods and characterization of III-V, II-VI, and IV-VI materials, discussed in Part II, were an integral part of the workshop. Considering the small masses of the carriers in narrow-gap low dimensional structures (LOS), in Part I the enhanced band mixing and magnetic field effects are explored in the context of the envelope function approximation. Optical nonlinearities and energy relaxation phenomena applied to the well-known systems of HgCdTe and GaAs/GaAlAs, respectively, are reviewed with comments on their extension to narrow gap LOS. The relevance of optical observations in quantum transport studies is illustrated in Part IV. A review of devices based on epitaxial narrow-gap materials defines a frame of reference for future ones based on two-dimensional narrow-gap semiconductors; in addition, an analysis of the physics of quantum well lasers provides a guide to relevant parameters for narrow-gap laser devices for the infrared (Part V). The roles and potentials of special techniques are explored in Part VI, with emphasis on hydrostatic pressure techniques, since this has a pronounced effect in small-mass, narrow-gap, non-parabolic structures.

Optical Properties of Low Dimensional Silicon Structures - B. Bensahel 2012-12-06

The workshop on "Optical Properties of Low Dimensional Silicon sL Structures" was held in Meylan, France on March, I yd, 1993. The workshop took place inside the facilities of France Telecom- CNET. Around 45 leading scientists working on this rapidly moving field were in attendance. Principal support was provided by the Advanced Research Workshop Program of the North Atlantic Treaty Organisation (NATO). French Delegation a l'Armement and CNET gave also a small financial grant, the organisational part being undertaken by the SEE and CNET. There is currently intense research activity worldwide devoted to the optical properties of low dimensional silicon structures. This follow the recent discovery of efficient visible photoluminescence (PL) from highly porous silicon. This workshop was intended to bring together all the leading European scientists and laboratories in order to reveal the state of the art and to open new research fields on this subject. A large number of invited talks took place (12) together with regular contribution (20). The speakers were asked to leave nearly 1/3 of the time to the discussion with the audience, and that promoted both formal and informal discussions between the participants.

Aspects topologiques de la physique en basse dimension. Topological aspects of low dimensional systems - A. Comtet 2000-01-20

Session LXIX. 7 - 31 July 1998

Electron Spin Resonance and Related Phenomena in Low-Dimensional Structures - Marco Fanciulli 2009-08-24

Here is a discussion of the state of the art of spin resonance in low dimensional structures, such as two-dimensional electron systems, quantum wires, and quantum dots. Leading scientists report on recent advances and discuss open issues and perspectives.

Physica E. - 2001

Low-Dimensional Applications of Quantum Field Theory - L. Baulieu 2013-12-01

The Cargese Summer School "Low Dimensional Applications of Quantum Field Theory" was held in July 1995. The School was dedicated to the memory of Claude Itzykson. This session focused on the recent progress in quantum field theory in two dimen sions with a particular emphasis on integrable models and applications of quantum field theory to condensed matter physics. A large fraction of the school was also devoted to a detailed review of the exciting developments in four dimensional super symmetric Yang-Mills theory. The diversity of the topics presented constitute, in our opinion, one of the most attractive features of these proceedings. Some contributions constitute a very thor ough introduction to their subject matter and should be helpful to advanced students in the field while others present entirely new research, not previously published, and should be of considerable interest to the specialist. There were in depth introductory lectures on the application of conformal field theory techniques to disordered systems, on the quantum Hall effect, on quantum in tegrable systems, on the thermodynamic Bethe Ansatz and on the new developments in supersymmetric gauges theories. The computation of the three point function of the Liouville model using conformal bootstrap methods was presented in detail.

Organic and Inorganic Low-Dimensional Crystalline Materials - Pierre Delhaes 2013-12-01

The research of unitary concepts in solid state and molecular chemistry is of current interest for both chemist and physicist communities. It is clear that due to their relative simplicity, low dimensional materials have attracted most of the attention. Thus, many non-trivial problems were solved in chain systems, giving some insight into the behavior of real systems which would otherwise be untractable. The NATO Advanced Research Workshop on "Organic and Inorganic Low-Dimensional Crystalline Materials" was organized to review the most striking electronic properties exhibited by organic and inorganic sytems whose space dimensionality ranges from zero (Od) to one (1d), and to discuss related scientific and technological potentials. The initial objectives of this Workshop were, respectively: i) To research unitary concepts in solid state physics, in particular for one dimensional compounds, ii) To reinforce, through a close coupling between theory and experiment, the interplay between organic and inorganic chemistry, on the one hand, and solid state physics on the other, iii) To get a salient understanding of new low-dimensional materials showing "exotic" physical properties, in conjunction with structural features.

Isotope Low-Dimensional Structures - Vladimir G. Plekhanov 2012-05-08

This Briefs volume describes the properties and structure of elementary excitations in isotope low-dimensional structures. Without assuming prior knowledge of quantum physics, the present book provides the basic knowledge needed to understand the recent developments in the sub-disciplines of nanoscience isotopetronics, novel device concepts and materials for nanotechnology. It is the first and comprehensive interdisciplinary account of the newly developed scientific discipline isotopetronics.

Low-Dimensional Molecular Metals - Naoki Toyota 2007-04-21
This monograph assimilates new research in the field of low-dimensional metals. It provides a detailed overview of the current status of research on quasi-one- and two-dimensional molecular metals, describing normal-state properties, magnetic field effects, superconductivity, and the phenomena of interacting p and d electrons. It includes a number of findings likely to become standard material in future textbooks on solid-state physics.
Low-Dimensional Topology and Quantum Field Theory - Hugh Osborn 2013-11-11
The motivations, goals and general culture of theoretical physics and mathematics are different. Most practitioners of either discipline have no necessity for most of the time to keep abreast of the latest developments in the other. However on occasion newly developed mathematical concepts become relevant in theoretical physics and the less rigorous theoretical physics framework may prove valuable in understanding and suggesting new theorems and approaches in pure mathematics. Such interdis ciplinary successes invariably cause much rejoicing, as over a prodigal son returned. In recent years the framework provided by quantum field theory and functional in tegrals, developed over half a century in theoretical physics, have proved a fertile soil for developments in low dimensional topology and especially knot theory. Given this background it was particularly pleasing that NATO was able to generously sup port an Advanced Research Workshop to be held in Cambridge, England from 6th to 12th September 1992 with the title Low Dimensional Topology and Quantum Field Theory. Although independently organised this overlapped as far as some speak ers were concerned with a longer term programme with the same title organised by Professor M Green, Professor E Corrigan and Dr R Lickorish. The contents of this proceedings of the workshop demonstrate the breadth of topics now of interest on the interface between theoretical physics and mathematics as well as the sophistication of the mathematical tools required in current theoretical physics.
High-Dimensional Data Analysis with Low-Dimensional Models - John Wright 2022-01-13
Connects fundamental mathematical theory with real-world problems, through efficient and scalable optimization algorithms.
Physics and Chemistry of Low-Dimensional Inorganic Conductors - C. Schlenker 2012-12-06
The field of low-dimensional conductors has been very active for more than twenty years. It has grown continuously and both the inorganic and organic materials have remark able properties, such as charge and spin density waves and superconductivity. The discovery of superconductivity at high temperature in copper-based quasi two-dimensional conducting oxides nearly ten years ago has further enlarged the field and stimulated new research on inorganic conductors. It was obviously impossible to cover such a broad field in a ten day Institute and it seemed pertinent to concentrate on inorganic conductors, excluding the high Tc superconducting oxides. In this context, it was highly desirable to include both physics and chemistry in the same Institute in order to tighten or in some cases to establish links between physicists and chemists. This Advanced Study Institute is the continuation of a series of similar ones which have taken place every few years since 1974. 73 participants coming from 13 countries have taken part in this School at the beautiful site of the Centre de Physique des Houches in the Mont-Blanc mountain range. The scientific programme included more than forty lectures and seminars, two poster sessions and ten short talks. Several discussion sessions were organized for the evenings, one on New Materials, one on New Topics and one on the special problem of the Fermi and Luttinger liquids. The scientific activity was kept high from the beginning to the end of the Institute.
Intelligence of Low Dimensional Topology 2006 - J. Scott Carter 2007
This volume gathers the contributions from the international conference ?Intelligence of Low Dimensional Topology 2006,? which took place in Hiroshima in 2006. The aim of this volume is to promote research in low dimensional topology with the focus on knot theory and related topics. The papers include comprehensive reviews and some latest results.
Dynamical Properties in Nanostructured and Low-Dimensional Materials - Michael G. Cottam 2015
Annotation The last few years have seen dramatic advances in the growth, fabrication and characterization of low-dimensional materials and nanostructures. In particular, the dynamical properties of these materials are of fundamental interest for the devices that involve high-frequency operation and/or switching.
Electron Spectroscopies Applied to Low-dimensional Structures - H.P. Hughes 2001-11-30
The effect of reduced dimensionality, inherent at the crystallographic level, on the electronic properties of low dimensional materials can be dramatic, leading to structural and electronic instabilities—including supercond- tivity at high temperatures, charge density waves, and localisation—which continue to attract widespread interest. The layered transition metal dichalcogenides have engaged attention for many years, partly arising from the charge density wave effects which some show and the controlled way in which their properties can be modified by intercalation, while the development of epitaxial growth techniques has opened up promising areas based on dichalcogenide heterostructures and quantum wells. The discovery of high-temperature superconducting oxides, and the realisation that polymeric materials too can be exploited in a controlled way for various opto-electronic applications, have further sti- lated interest in the effects of structural dimensionality. It seems timely therefore to draw together some strands of recent research involving a range of disparate materials which share some common char- teristics of low dimensionality. This resulting volume is aimed at researchers with specialist interests in the particular materials discussed but who may also wish to examine the related phenomena observed in different systems, and at a more general solid state audience with broad interests in electronic properties and low dimensional phenomena. Space limitations have required us to be selective as regards particular materials, though we have managed to include those as dissimilar as polymeric semiconductors, superconducting oxides, bronzes and layered chalcogenides.
Optical Properties of Low-dimensional Materials - Tetsuo Ogawa 1998
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.
Low-Dimensional Conductors and Superconductors - D. Jerome 2013-09-18
Research activities in low dimensional conductors have shown a rapid growth since 1972 and have led to the discovery of new and remarkable phy sical properties unique to both molecular and inorganic conductors exhibi ting one-dimensional transport behaviour. This NATO Institute was a conti nuation of aseries of NATO Advanced Study Institutes of Worshops which took place at regular intervals till 1979. This is the first time, however, that charge density wave transport and electronic properties of low dimen sional organic conductors are treated on an equal footing. The program of the Institute was framed by tutorial lectures in the theories and experiments of low dimensional conductors. The bulk of the course covered two series of low-dimensional mate rials with their respective properties. 1) The I-D inorganic conductors exhibiting the phenomena of sliding charge density waves, narrow band noise, memory effects, etc ..• 2) Low-dimensional crystallized organic conductors giving rise to various possibilities of ground states, spin-Peierls, spin density wave, Peierls, superconductivity and magnetic-field induced spin density wave, etc ... Since it has been established from the beginning that this Institute was to be devoted essentially to the Physics of Low Dimensional Conductors, only one main course summarized the progress in chemistry and material preparation.
Physics of Low Dimensional Systems - J.L. Morán-López 2007-05-08
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.

Strongly Correlated Fermions and Bosons in Low-Dimensional Disordered Systems - Igor V. Lerner 2012-12-06

The physics of strongly correlated fermions and bosons in a disordered envi ronment and confined geometries is at the focus of intense experimental and theoretical research efforts. Advances in material technology and in low temper ature techniques during the last few years led to the discoveries of new physical of atomic gases and a possible metal phenomena including Bose condensation insulator transition in two-dimensional high mobility electron structures. Situ ations were the electronic system is so dominated by interactions that the old concepts of a Fermi liquid do not necessarily make a good starting point are now routinely achieved. This is particularly true in the theory of low dimensional systems such as carbon nanotubes, or in two dimensional electron gases in high mobility devices where the electrons can form a variety of new structures. In many of these sys tems disorder is an unavoidable complication and lead to a host of rich physical phenomena. This has pushed the forefront of fundamental research in condensed matter towards the edge where the interplay between many-body correlations and quantum interference enhanced by disorder has become the key to the understand ing of novel phenomena.

Low-dimensional Structures in Semiconductors - A.R. Peaker 1991

Low-dimensional Semiconductors - M. J. Kelly 1995-11-23

This text is a first attempt to pull together the whole of semiconductor science and technology since 1970 in so far as semiconductor multilayers are concerned. Material, technology, physics and device issues are described with approximately equal emphasis, and form a single coherant point of view. The subject matter is the concern of over half of today's active semiconductor scientists and technologists, the remainder working on bulk semiconductors and devices. It is now routine to design and the prepare semiconductor multilayers at a time, with independent control over the dropping and composition in each layer. In turn these multilayers can be patterned with features that as a small as a few atomic layers in lateral extent. The resulting structures open up many new ares of exciting solid state and quantum physics. They have also led to whole new generations of electronic and optoelectronic devices whose superior performance relates back to the multilayer structures. The principles established in the field have several decades to go, advancing towards the ultimate of materials engineering, the design and preparation of solids atom by atom. The book should appeal equally to physicists, electronic engineers and materials scientists.

Physics Of Low Dimensional Materials - Frank J. Owens 2017

"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."--Publisher's website.

Emerging Applications of Low Dimensional Magnets - Ram K. Gupta 2022-11-22

Low-dimensional magnetic materials find their wide applications in many areas, including spintronics, memory devices, catalysis, biomedical, sensors, electromagnetic shielding, aerospace, and energy. This book provides a comprehensive discussion on magnetic nanomaterials for emerging applications. Fundamentals along with applications of low-dimensional magnetic materials in spintronics, catalysis, memory, biomedicals, toxic waste removal, aerospace, telecommunications, batteries, supercapacitors, flexible electronics, and many more are covered in detail to provide a full spectrum of their advanced applications. This book offers fresh aspects of nanomagnetic materials and innovative directions to scientists, researchers, and students. It will be of particular interest to materials scientists, engineers, physicists, chemists, and researchers in electronic and spintronic industries, and is suitable as a textbook for undergraduate and graduate studies.

Strong Interactions in Low Dimensions - D. Baeriswyl 2007-09-29

This book provides an attempt to convey the colorful facets of condensed matter systems with reduced dimensionality. Some of the specific features predicted for interacting one-dimensional electron systems, such as charge- and spin-density waves, have been observed in many quasi-one-dimensional materials. The two-dimensional world is even richer: besides d-wave superconductivity and the Quantum Hall Effect - perhaps the most spectacular phases explored during the last two decades - many collective charge and spin states have captured the interest of researchers, such as charge stripes or spontaneously generated circulating currents. Recent years have witnessed important progress in material preparation, measurement techniques and theoretical methods. Today larger and better samples, higher flux for neutron beams, advanced light sources, better resolution in electron spectroscopy, new computational algorithms, and the development of field-theoretical approaches allow an in-depth analysis of the complex many-body behaviour of low-dimensional materials. The epoch when simple mean-field arguments were sufficient for describing the gross features observed experimentally is definitely over. The Editors' aim is to thoroughly explain a number of selected topics: the application of dynamical probes, such as neutron scattering, optical absorption and photoemission, as well as transport studies, both electrical and thermal. Some of the more theoretical chapters are directly relevant for experiments, such as optical spectroscopy, transport in one-dimensional models, and the phenomenology of charge inhomogeneities in layered materials, while others discuss more general topics and methods, for example the concept of a Luttinger liquid and bosonization, or duality transformations, both promising tools for treating strongly interacting many-body systems.

Correlation Effects in Low-Dimensional Electron Systems - Ayao Okiji 2012-12-06

Correlation Effects in Low-Dimensional Electron Systems describes recent developments in theoretical condensed-matter physics, emphasizing exact solutions in one dimension including conformal-field theoretical approaches, the application of quantum groups, and numerical diagonalization techniques. Various key properties are presented for two-dimensional, highly correlated electron systems.

Low-Dimensional and Nanostructured Materials and Devices - Hilmi Ünlü 2015-12-01

This book focuses on the fundamental phenomena at nanoscale. It covers synthesis, properties, characterization and computer modelling of nanomaterials, nanotechnologies, bionanotechnology, involving nanodevices. Further topics are imaging, measuring, modeling and manipulating of low dimensional matter at nanoscale. The topics covered in the book are of vital importance in a wide range of modern and emerging technologies employed or to be employed in most industries, communication, healthcare, energy, conservation , biology, medical science, food, environment, and education, and consequently have great impact on our society.

Physics of Low-dimensional Systems - Stig Lundqvist 1989

Field Theories for Low-Dimensional Condensed Matter Systems - Guiseppe Morandi 2013-03-14

This book is especially addressed to young researchers in theoretical physics with a basic background in Field Theory and Condensed Matter Physics. The topics were chosen so as to offer the largest possible overlap between the two expertises, selecting a few key problems in Condensed Matter Theory which have been recently revisited within a field-theoretic approach. The presentation of the material is aimed not only at providing the reader with an overview of this exciting frontier area of modern theoretical physics, but also at elucidating most of the tools needed for a technical comprehen sion of the many papers appearing in current issues of physics journals and, hopefully, to enable the reader to tackle research problems in this area of physics. This makes the material a live creature: while not pretending it to be exhaustive, it is tutorial enough to be useful to young researchers as a starting point in anyone of the topics covered in the book.

Rich Quasiparticle Properties of Low Dimensional Systems - Dr Cheng-Hsueh Yang 2021

This book discusses the essential properties of carbon nanotubes and 2D graphene systems. The book focuses on the fundamental excitation properties of a large range of graphene-related materials, presenting a new theoretical framework that couples electronic properties and e-e Coulomb interactions together in

order to thoroughly explore Coulomb excitations and decay rates in carbon-nanotube-related systems.
Low-dimensional Semiconductors - Michael Joseph Kelly 1995

Molecular Low Dimensional and Nanostructured Materials for Advanced Applications - A. Graja 2012-12-06
A presentation and discussion of the most recent advances in the field by the world's leading experts. Topics dealt with include new organic metals with quasi-two-dimensional structure, new organic superconductors, conducting and magnetic hybrid organic-inorganic materials, and highly conducting organic composites. Also reported are very interesting, significant results on optically controllable gratings in liquid crystals and polymers, organic electroluminescent materials, functionalised polymers and photonics, and nonlinear optics. Some new, fascinating fullerene derivatives and organic and metallic clusters are also presented. The chemical design of logic gates and molecular logic machines and the analysis of the roles of defects in clusters are attracting great interest. The properties of semiconducting quantum wires, electronic transport through magnetic molecular nanostructure and electronic transport properties of nanostructures containing both ferromagnetic and superconductors are also presented and discussed.