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Kernreaktionen III / Nuclear Reactions III - D. E. Alburger 2012-12-06

Particles and Nuclei - Bogdan Povh 2013-04-17
The fourth edition includes new developments, in particular a new section on the double beta decay including a discussion of the possibility of a neutrinoless decay and its implications for the standard model.
Finsler Geometry, Relativity and Gauge Theories - G.S. Asanov 2012-12-06
The methods of differential geometry have been so completely merged nowadays with physical concepts that general relativity may well be considered to be a physical theory of the geometrical properties of space-time. The general relativity principles together with the recent development of Finsler geometry as a metric generalization of Riemannian geometry justify the attempt to systematize the basic techniques for extending general relativity on the basis of Finsler geometry. It is this endeavour that forms the subject matter of the present book. Our exposition reveals the remarkable fact that the Finslerian approach is automatically permeated with the idea of the unification of the geometrical space-time picture with gauge field theory - a circumstance that we try our best to elucidate in this book. The book has been written in such a way that the reader acquainted with the methods of tensor calculus and linear algebra at the graduate level can use it as a manual of Finslerian techniques orientable to applications in several fields. The problems attached to the chapters are also intended to serve this purpose. This notwithstanding, whenever we touch upon the Finslerian refinement or generalization of physical concepts, we assume that the reader is acquainted with these concepts at least at the level of the standard textbooks, to which we refer him or her.
Representations of Compact Lie Groups - T. Bröcker 2013-03-14
This introduction to the representation theory of compact Lie groups follows Herman Weyl's original approach. It discusses all aspects of finite-dimensional Lie theory, consistently emphasizing the groups themselves. Thus, the presentation is more geometric and analytic than algebraic. It is a useful reference and a source of explicit computations. Each section contains a range of exercises, and 24 figures help illustrate geometric concepts.
Magnetohydrodynamics and Fluid Dynamics: Action Principles and Conservation Laws - Gary Webb 2018-02-05
This text focuses on conservation laws in magnetohydrodynamics, gasdynamics and hydrodynamics. A grasp of new conservation laws is essential in fusion and space plasmas, as well as in geophysical fluid dynamics; they can be used to test numerical codes, or to reveal new aspects of the underlying physics, e.g., by identifying the time history of the fluid elements as an important key to understanding fluid vorticity or in investigating the stability of steady flows. The ten Galilean Lie point symmetries of the fundamental action discussed in this book give rise to the conservation of energy, momentum, angular momentum and center of mass conservation laws via Noether's first theorem. The advected invariants are related to fluid relabeling symmetries – so-called diffeomorphisms associated with the Lagrangian map – and are obtained by applying the Euler-Poincare approach to Noether's second theorem. The book discusses several variants of helicity including kinetic helicity, cross helicity, magnetic helicity, Ertels' theorem and potential vorticity, the Hollman invariant, and the Godbillon Vey invariant. The book develops the non-canonical Hamiltonian approach to MHD using the non-canonical Poisson bracket, while also refining the multisymplectic approach to ideal MHD and obtaining novel nonlocal conservation laws. It also briefly discusses Anco and Bluman's direct method for deriving conservation laws. A range of examples is used to illustrate topological invariants in MHD and fluid dynamics, including the Hopf invariant, the Calugareanu invariant, the Taylor magnetic helicity reconnection hypothesis for magnetic fields in highly conducting plasmas, and the

magnetic helicity of Alfvén simple waves, MHD topological solitons, and the Parker Archimedean spiral magnetic field. The Lagrangian map is used to obtain a class of solutions for incompressible MHD. The Aharonov-Bohm interpretation of magnetic helicity and cross helicity is discussed. In closing, examples of magnetosonic N-waves are used to illustrate the role of the wave number and group velocity concepts for MHD waves. This self-contained and pedagogical guide to the fundamentals will benefit postgraduate-level newcomers and seasoned researchers alike.
ETO Multicenter Molecular Integrals - C.A. Weatherford 2012-12-06
The First International Conference on ETO Multicenter Molecular Integrals was held August 3-6, 1981, on the Florida A&M university campus in Tallahassee, Florida, USA. Thirty four scientists from eight countries assembled in Tallahassee under the sponsorship of the Institute for Molecular Computations and the Physics Department at Florida A&M. Financial support is gratefully acknowledged from the National Science Foundation, U.S. Army Research Office (Durham), Office of Naval Research, the National Aeronautics and Space Admini stration (NASA), and Florida A&M University. In particular, the editors would like to thank Dr. Joe Majowicz and Dr. David Squire of the U.S. Army, and Dr. Aaron Temkin of NASA for their support and encouragement. We would also like to acknowledge the Atlanta University Resource Center for Science and Engineering for financial support in the pre paration of the manuscript. Also, of course, we sincerely appreciate the participation of the attendees and especially the contributors to this work. As a result of their presentations, the conference was a very intense and fertile forum for the exchange of ideas on a very important and historic problem of quantum chemistry. Finally, we want to thank Ms. Sonja Richardson for the enthusiastic, diligent and competent preparation of a very difficult manuscript. Charles A. Weatherford Herbert W. Jones vii C. A. Weatherford and H. W. Jones (eds.), ETO Multicenter Molecular Inteffrals, vii.
Flux Coordinates and Magnetic Field Structure - William D. D'haeseleer 2012-12-06
Flux Coordinates and Magnetic Field Structure gives a systematic and rigorous presentation of the mathematical framework and principles underlying the description of magnetically confined fusion plasmas. After a brief treatment of vector algebra in curvilinear coordinate systems the book introduces concepts such as flux surfaces, rotational transforms, and magnetic differential equations. The various specific types of coordinate system are dealt with in detail. Researchers and advanced students in plasma physics, electromagnetics, and mathematical physics will greatly benefit from this useful guide and reference book.
Polarization, Alignment, and Orientation in Atomic Collisions - Nils Andersen 2017-08-02
This book covers polarization, alignment, and orientation effects in atomic collisions induced by electron, heavy particle, or photon impact. The first part of the book presents introductory chapters on light and particle polarization, experimental and computational methods, and the density matrix and state multipole formalism. Examples and exercises are included. The second part of the book deals with case studies of electron impact and heavy particle excitation, electron transfer, impact ionization, and autoionization. A separate chapter on photo-induced processes by new-generation light sources has been added. The last chapter discusses related topics and applications. Part III includes examples of charge clouds and introductory summaries of selected seminal papers of tutorial value from the early history of the field (1925 – 1975). The book is a significant update to the previous (first) edition, particularly in experimental and computational methods, the inclusion of key results obtained during the past 15 years, and the extended coverage of photo-induced processes. It is intended as an introductory text for both experimental and theoretical students and researchers. It can be used as a textbook for graduate courses, as a primary source for special

topics and seminar courses, and as a standard reference. The book is accompanied by electronically available copies of the full text of the key papers in Part III, as well as animations of theoretically predicted electron charge clouds and currents for some of the cases discussed in Part II.

Visual Quantum Mechanics - Bernd Thaller 2007-05-08
"Visual Quantum Mechanics" uses the computer-generated animations found on the accompanying material on Springer Extras to introduce, motivate, and illustrate the concepts explained in the book. While there are other books on the market that use Mathematica or Maple to teach quantum mechanics, this book differs in that the text describes the mathematical and physical ideas of quantum mechanics in the conventional manner. There is no special emphasis on computational physics or requirement that the reader know a symbolic computation package. Despite the presentation of rather advanced topics, the book requires only calculus, making complicated results more comprehensible via visualization. The material on Springer Extras provides easy access to more than 300 digital movies, animated illustrations, and interactive pictures. This book along with its extra online materials forms a complete introductory course on spinless particles in one and two dimensions.

Introductory Quantum Mechanics - Paul R. Berman 2017-12-26
This book presents a basic introduction to quantum mechanics. Depending on the choice of topics, it can be used for a one-semester or two-semester course. An attempt has been made to anticipate the conceptual problems students encounter when they first study quantum mechanics. Wherever possible, examples are given to illustrate the underlying physics associated with the mathematical equations of quantum mechanics. To this end, connections are made with corresponding phenomena in classical mechanics and electromagnetism. The problems at the end of each chapter are intended to help students master the course material and to explore more advanced topics. Many calculations exploit the extraordinary capabilities of computer programs such as Mathematica, MatLab, and Maple. Students are urged to use these programs, just as they had been urged to use calculators in the past. The treatment of various topics is rather complete, in that most steps in derivations are included. Several of the chapters go beyond what is traditionally covered in an introductory course. The goal of the presentation is to provide the students with a solid background in quantum mechanics.

Electrodynamics - Masud Chaichian 2016-10-31
This book is devoted to the fundamentals of classical electrodynamics, one of the most beautiful and productive theories in physics. A general survey on the applicability of physical theories shows that only few theories can be compared to electrodynamics. Essentially, all electric and electronic devices used around the world are based on the theory of electromagnetism. It was Maxwell who created, for the first time, a unified description of the electric and magnetic phenomena in his electromagnetic field theory. Remarkably, Maxwell's theory contained in itself also the relativistic invariance of the special relativity, a fact which was discovered only a few decades later. The present book is an outcome of the authors' teaching experience over many years in different countries and for different students studying diverse fields of physics. The book is intended for students at the level of undergraduate and graduate studies in physics, astronomy, engineering, applied mathematics and for researchers working in related subjects. We hope that the reader will not only acquire knowledge, but will also grasp the beauty of theoretical physics. A set of about 130 solved and proposed problems shall help to attain this aim.

Dynamical Systems X - Victor V. Kozlov 2013-03-09
This book contains a mathematical exposition of analogies between classical (Hamiltonian) mechanics, geometrical optics, and hydrodynamics. In addition, it details some interesting applications of the general theory of vortices, such as applications in numerical methods, stability theory, and the theory of exact integration of equations of dynamics.

Optical Tweezers - Philip H. Jones 2015-12-03
A comprehensive guide to the theory, practice and applications of optical tweezers, combining state-of-the-art research with a strong pedagogic approach.

Emergence of the Theory of Lie Groups - Thomas Hawkins 2012-12-06
The great Norwegian mathematician Sophus Lie developed the general theory of transformations in the 1870s, and the first part of the book properly focuses on his work. In the second part the central figure is Wilhelm Killing, who developed structure and classification of semisimple Lie algebras. The third part focuses on the developments of the representation of Lie algebras, in particular the work of Elie Cartan. The book concludes with the work of Hermann Weyl and his contemporaries on the structure and representation of Lie groups which serves to bring together much of the earlier work into a coherent theory while at the same time opening up significant avenues for further work.

Density Functional Theory - Eberhard K.U. Gross 2013-06-29
The first Nato Advanced Studies Institute entirely devoted to density functional theory was held in Portugal in September 1983. The proceedings of this School, publis hed in early 1985, is still used as a standard reference covering the basic development of the theory and applications in atomic, molecular, solid state and nuclear physics. Ho wever, astonishing progress has been achieved in the intervening years: The foundations of the theory have been extended to cover excited states and time dependent problems more fully, density functional theory of classical liquids and superconducting systems has been addressed and extensions to relativistic, that is, field theoretical systems, as well as a more thorough discussion of magnetic field problems have been presented. In addition, new functionals have been devised, for instance under the heading of ge neralised gradient expansions, and the number of applications in the traditional fields has steadily increased, in particular in chemistry. Applications in new fields, as for instance the structure of atomic clusters and the marriage of density functional theory with molecular dynamics and simulated annealing, have provided additional impetus to the field of density functional theory.

Mathematical Reviews - 2004

Fundamental Processes in Atomic Collision Physics - H. Kleinpoppen 2012-12-06
The Proceedings of the Advanced study Institute on Fundamental Processes in Atomic Collision Physics (Santa Flavia, Italy, September 10-21, 1984) are dedicated to the memory of Sir Harrie r-1assey, whose scientific achievements and life are reviewed herein by Sir David Bates. At the first School on the above topic (Maratea, September 1983, Volume 103 in this series), Harrie Massey presented the introductory lectures, summarized the entire lecture program, and presented an outlook on future developments in atomic collision physics. In an after-dinner speech, Massey recalled personal reminiscences and historical events with regard to atomic collision physics, to which he had contributed by initiating pioneering work and by stimulating and surveying this branch of physics over a period of almost six decades. Participants in the Maratea School will always remember Harrie Massey as a charming and wonderful person who was most pleased to discuss with everyone-- students, postdoctorals, and senior scientists--any topic in atomic collision physics. Harrie Massey was a member of the Scientific Advisory Committee of the 1984 Santa Flavia School. Before his death he expressed his interest in attending this second School devoted to the presentation of recent developments and highlights in atomic collision physics. It is the desire of all authors to honor Harrie Massey with their contributions in these Proceedings.

Nuclear Science Abstracts - 1966

Nonlinear MHD Waves and Turbulence - Thierry Passot 2008-01-11
The workshop "Nonhnear MHD Waves and Turbulence" was held at the -servatoire de Nice, December 1-4, 1998 and brought together an international group of experts in plasma physics, fluid dynamics and applied mathematics. The aim of the meeting was to survey the current knowledge on two main topics: (i) propagation of plasma waves (like Alfven, whistler or ion-acoustic waves), their instabilities and the development of a nonlinear dynamics lea ding to solitonic structures, wave collapse or weak turbulence; (ii) turbulence in magnetohydrodynamic flows and its reduced description in the presence of a strong ambient magnetic fleld. As is well known, both aspects play an important role in various geophysical or astrophysical media such as the - gnetospheres of planets, the heliosphere, the solar wind, the solar corona, the interplanetary and interstellar media, etc. This volume, which includes expanded versions of oral contributions pre sented at this meeting, should be of interest for a large community of resear chers in space plasmas and nonlinear sciences. Special effort was made to put the new results into perspective and to provide a detailed literature review. A main motivation was the attempt to relate more closely the theoretical un derstanding of MHD waves and turbulence (both weak and strong) with the most recent observations in space plasmas. Some papers also bring interesting new insights into the evolution of hydrodynamic or magnetohydrodynamic structures, based on systematic asymptotic

methods.
<u>Energy Research Abstracts</u> - 1989

Encyclopaedia of Mathematics - M. Hazewinkel 2013-12-01

Mathematical Software – ICMS 2016 - Gert-Martin Greuel 2016-07-05
This book constitutes the proceedings of the 5th International Conference on Mathematical Software, ICMS 2015, held in Berlin, Germany, in July 2016. The 68 papers included in this volume were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections named: univalent foundations and proof assistants; software for mathematical reasoning and applications; algebraic and toric geometry; algebraic geometry in applications; software of polynomial systems; software for numerically solving polynomial systems; high-precision arithmetic, effective analysis, and special functions; mathematical optimization; interactive operation to scientific artwork and mathematical reasoning; information services for mathematics: software, services, models, and data; semDML: towards a semantic layer of a world digital mathematical library; miscellanea.
<u>Geometric Quantization in Action</u> - N.E. Hurt 2012-12-06
Approach your problems from the right It isn't that they can't see the solution. It end and begin with the answers. Then, is that they can't see the problem. one day, perhaps you will fmd the final question. G. K. Chesterton, The Scandal of Father Brown 'The Point of a Pin'. 'The Hermit Clad in Crane Feathers' in R. Van Gulik's The Chinese Maze Murders. Growing specialization and diversification have brought a host of monographs and textbooks on increasingly specialized topics. However, the 'tree' of knowledge of mathematics and related fields does not grow only by putting forth new branches. It also happens, quite often in fact, that branches which were thought to be completely disparate are suddenly seen to be related. Further, the kind and level of sophistication of mathematics applied in various sciences has changed drastically in recent years: measure theory is used (non-trivially) in regional and theoretical economics; algebraic geo metry interacts with physics; the Minkowsky lemma, coding theory and the structure of water meet one another in packing and covering theory; quantum fields, crystal defects and mathematical progmmming profit from homotopy theory; Lie algebras are relevant to fIltering; and prediction and electrical engineering can use Stein spaces.
Introduction to Classical Integrable Systems - Olivier Babelon 2003-04-17
This book provides a thorough introduction to the theory of classical integrable systems, discussing the various approaches to the subject and explaining their interrelations. The book begins by introducing the central ideas of the theory of integrable systems, based on Lax representations, loop groups and Riemann surfaces. These ideas are then illustrated with detailed studies of model systems. The connection between isomonodromic deformation and integrability is discussed, and integrable field theories are covered in detail. The KP, KdV and Toda hierarchies are explained using the notion of Grassmannian, vertex operators and pseudo-differential operators. A chapter is devoted to the inverse scattering method and three complementary chapters cover the necessary mathematical tools from symplectic geometry, Riemann surfaces and Lie algebras. The book contains many worked examples and is suitable for use as a textbook on graduate courses. It also provides a comprehensive reference for researchers already working in the field.
Group Theory Applied to Chemistry - Arnout Jozef Ceulemans 2013-09-03
Chemists are used to the operational definition of symmetry, which crystallographers introduced long before the advent of quantum mechanics. The ball-and-stick models of molecules naturally exhibit the symmetrical properties of macroscopic objects. However, the practitioner of quantum chemistry and molecular modeling is not concerned with balls and sticks, but with subatomic particles: nuclei and electrons. This textbook introduces the subtle metaphors which relate our macroscopic understanding of symmetry to the molecular world. It gradually explains how bodily rotations and reflections, which leave all inter-particle distances unaltered, affect the study of molecular phenomena that depend only on these internal distances. It helps readers to acquire the skills to make use of the mathematical tools of group theory for whatever chemical problems they are confronted with in the course of their own research.
Geometric Optimal Control - Heinz Schättler 2012-06-26
This book gives a comprehensive treatment of the fundamental necessary and sufficient conditions for optimality for finite-dimensional,

deterministic, optimal control problems. The emphasis is on the geometric aspects of the theory and on illustrating how these methods can be used to solve optimal control problems. It provides tools and techniques that go well beyond standard procedures and can be used to obtain a full understanding of the global structure of solutions for the underlying problem. The text includes a large number and variety of fully worked out examples that range from the classical problem of minimum surfaces of revolution to cancer treatment for novel therapy approaches. All these examples, in one way or the other, illustrate the power of geometric techniques and methods. The versatile text contains material on different levels ranging from the introductory and elementary to the advanced. Parts of the text can be viewed as a comprehensive textbook for both advanced undergraduate and all level graduate courses on optimal control in both mathematics and engineering departments. The text moves smoothly from the more introductory topics to those parts that are in a monograph style were advanced topics are presented. While the presentation is mathematically rigorous, it is carried out in a tutorial style that makes the text accessible to a wide audience of researchers and students from various fields, including the mathematical sciences and engineering. Heinz Schättler is an Associate Professor at Washington University in St. Louis in the Department of Electrical and Systems Engineering, Urszula Ledzewicz is a Distinguished Research Professor at Southern Illinois University Edwardsville in the Department of Mathematics and Statistics.
Physics and Astrophysics of Neutrinos - Masataka Fukugita 2013-12-14
Observations of neutrinos being emitted by the supernova SN1987A, star neutrinos, and atmospheric neutrinos have provided new insights into astronomy, as well as new unresolved phenomena such as the solar neutrino problem, spurring investigative studies among particle physicists and astrophysicists. One of the most important features of this book is its enumeration of a number of basic properties of neutrinos and their relationship to Grand Unified Theories, focusing on the origin of the neutrino's mass and the generation mixing of neutrinos. All the kamiokande results, detector performances, and complete references are included.
<u>Applied Statistical Thermodynamics</u> - Klaus Lucas 2013-11-11
The book guides the reader from the foundations of statisti- cal thermodynamics including the theory of intermolecular forces to modern computer-aided applications in chemical en- gineering and physical chemistry. The approach is new. The foundations of quantum and statistical mechanics are presen- ted in a simple way and their applications to the prediction of fluid phase behavior of real systems are demonstrated. A particular effort is made to introduce the reader to expli- cit formulations of intermolecular interaction models and to show how these models influence the properties of fluid sy- stems. The established methods of statistical mechanics - computer simulation, perturbation theory, and numerical in- tegration - are discussed in a style appropriate for newcom- ers and are extensively applied. Numerous worked examples illustrate how practical calculations should be carried out.
Conceptual Studies of Multistage Depressed Collectors for Gyrotrons - Wu, Chuanren 2019-09-09

Magnetism - Joachim Stöhr 2007-01-19
This text book gives a comprehensive account of magnetism, one of the oldest yet most vibrant fields of physics. It spans the historical development, the physical foundations and the continuing research underlying the subject. The book covers both the classical and quantum mechanical aspects of magnetism and novel experimental techniques. Perhaps uniquely, it discusses spin transport and magnetization dynamics phenomena associated with atomically and spin engineered nano-structures against the backdrop of spintronics and magnetic storage and memory applications. The book is for students, and serves as a reference for scientists in academia and research laboratories.
<u>Disconjugacy</u> - W. A. Coppel 2006-11-15

Quantum Theory and Symmetries - M. B. Paranjape 2021
This volume of the CRM Conference Series is based on a carefully refereed selection of contributions presented at the "11th International Symposium on Quantum Theory and Symmetries", held in Montreal, Canada from July 1-5, 2019. The main objective of the meeting was to share and make accessible new research and recent results in several branches of Theoretical and Mathematical Physics, including Algebraic Methods, Condensed Matter Physics, Cosmology and Gravitation, Integrability, Non-perturbative Quantum Field Theory, Particle Physics,

Quantum Computing and Quantum Information Theory, and String/ADS-CFT. There was also a special session in honour of Decio Levi. The volume is divided into sections corresponding to the sessions held during the symposium, allowing the reader to appreciate both the homogeneity and the diversity of mathematical tools that have been applied in these subject areas. Several of the plenary speakers, who are internationally recognized experts in their fields, have contributed reviews of the main topics to complement the original contributions. .

Advanced Methods of Structural Analysis - Igor A. Karnovsky 2021-03-16
This revised and significantly expanded edition contains a rigorous examination of key concepts, new chapters and discussions within existing chapters, and added reference materials in the appendix, while retaining its classroom-tested approach to helping readers navigate through the deep ideas, vast collection of the fundamental methods of structural analysis. The authors show how to undertake the numerous analytical methods used in structural analysis by focusing on the principal concepts, detailed procedures and results, as well as taking into account the advantages and disadvantages of each method and sphere of their effective application. The end result is a guide to mastering the many intricacies of the range of methods of structural analysis. The book differentiates itself by focusing on extended analysis of beams, plane and spatial trusses, frames, arches, cables and combined structures; extensive application of influence lines for analysis of structures; simple and effective procedures for computation of deflections; introduction to plastic analysis, stability, and free and forced vibration analysis, as well as some special topics. Ten years ago, Professor Igor A. Karnovsky and Olga Lebed crafted a must-read book. Now fully updated, expanded, and titled Advanced Methods of Structural Analysis (Strength, Stability, Vibration), the book is ideal for instructors, civil and structural engineers, as well as researches and graduate and post graduate students with an interest in perfecting structural analysis.

Springer Handbook of Atomic, Molecular, and Optical Physics - Gordon W. F. Drake 2006
Comprises a comprehensive reference source that unifies the entire fields of atomic molecular and optical (AMO) physics, assembling the principal ideas, techniques and results of the field. 92 chapters written by about 120 authors present the principal ideas, techniques and results of the field, together with a guide to the primary research literature (carefully edited to ensure a uniform coverage and style, with extensive cross-references). Along with a summary of key ideas, techniques, and results, many chapters offer diagrams of apparatus, graphs, and tables of data. From atomic spectroscopy to applications in comets, one finds contributions from over 100 authors, all leaders in their respective disciplines. Substantially updated and expanded since the original 1996 edition, it now contains several entirely new chapters covering current areas of great research interest that barely existed in 1996, such as Bose-Einstein condensation, quantum information, and cosmological variations of the fundamental constants. A fully-searchable CD- ROM version of the contents accompanies the handbook.

Fundamentals of Quantum Optics and Quantum Information - Peter Lambropoulos 2007-01-30
This book is an introduction to the two closely related subjects of quantum optics and quantum information. The book gives a simple, self-contained introduction to both subjects, while illustrating the physical principles of quantum information processing using quantum optical systems. To make the book accessible to those with backgrounds other than physics, the authors also include a brief review of quantum mechanics. Furthermore, some aspects of quantum information, for example those pertaining to recent experiments on cavity QED and quantum dots, are described here for the first time in book form.

Symmetries and Group Theory in Particle Physics - Giovanni Costa 2012-02-03
Symmetries, coupled with the mathematical concept of group theory, are an essential conceptual backbone in the formulation of quantum field theories capable of describing the world of elementary particles. This primer is an introduction to and survey of the underlying concepts and structures needed in order to understand and handle these powerful tools. Specifically, in Part I of the book the symmetries and related group theoretical structures of the Minkowskian space-time manifold are analyzed, while Part II examines the internal symmetries and their related unitary groups, where the interactions between fundamental particles are encoded as we know them from the present standard model of particle physics. This book, based on several courses given by the authors, addresses advanced graduate students and non-specialist researchers wishing to enter active research in the field, and having a

working knowledge of classical field theory and relativistic quantum mechanics. Numerous end-of-chapter problems and their solutions will facilitate the use of this book as self-study guide or as course book for topical lectures.

Theory of Nucleus - A. Sitenko 2012-12-06
Modern nuclear physics is a well developed branch of physical science, with wide-ranging applications of its results in engineering and industry. At the same time, the development of a consistent theory of nuclei and nuclear processes presents certain problems. It is well known that the most important aim of nuclear physics is the study of nuclear structure and the explanation of properties on the basis of the interaction between nucleons which constitute nuclei. Difficulties of a modern theory of the nucleus are caused by both an insufficient knowledge of nuclear interactions and the multi particle character of nuclear systems. Experimental data on nuclear interactions do not contradict the hypothesis of the pair character of nuclear forces. However, the absence of rigorous meth ods of calculations of many particle nuclear systems with strong interaction makes it necessary to use macroscopic nuclear models to describe particular nuclear properties. Nuclear models have been developed in different ways, and the models themselves have been modified and complicated. In spite of the visible discrepancy, different models of the nucleus significantly supple ment one another. The development of nuclear models has led to considerable progress in the understanding of atomic nuclei. The current results of theo retical nuclear physics are reported in numerous scientific papers. The most important and relevant experimental and theoretical results can be found in many monographs, the best of which are written by well-known experts in the field.

Conservation Laws in Variational Thermo-Hydrodynamics - S. Sieniutycz 2012-12-06
This study is one of the first attempts to bridge the theoretical models of variational dynamics of perfect fluids and some practical approaches worked out in chemical and mechanical engineering in the field newly called thermo-hydrodynamics. In recent years, applied mathematicians and theoretical physicists have made significant progress in formulating analytical tools to describe fluid dynamics through variational methods. These tools are much loved by theoretists, and rightly so, because they are quite powerful and beautiful theoretical tools. Chemists, physicists and engineers, however, are limited in their ability to use these tools, because presently they are applicable only to "perfect fluids" (i. e. those fluids without viscosity, heat transfer, diffusion and chemical reactions). To be useful, a model must take into account important transport and rate phenomena, which are inherent to real fluid behavior and which cannot be ignored. This monograph serves to provide the beginnings of a means by which to extend the mathematical analyses to include the basic effects of thermo-hydrodynamics. In large part a research report, this study uses variational calculus as a basic theoretical tool, without undo compromise to the integrity of the mathematical analyses, while emphasizing the conservation laws of real fluids in the context of underlying thermodynamics --reversible or irreversible. The approach of this monograph is a new generalizing approach, based on Nother's theorem and variational calculus, which leads to the energy-momentum tensor and the related conservation or balance equations in fluids.

Advanced Quantum Mechanics - Franz Schwabl 2013-03-14
This book covers advanced topics in quantum mechanics, including nonrelativistic multi-particle systems, relativistic wave equations, and relativistic fields. Numerous examples for application help readers gain a thorough understanding of the subject. The presentation of relativistic wave equations and their symmetries, and the fundamentals of quantum field theory lay the foundations for advanced studies in solid-state physics, nuclear, and elementary particle physics. The authors earlier book, Quantum Mechanics, was praised for its unsurpassed clarity.

International Tables for Crystallography, Volume B - Uri Shmueli 2008-08-27
International Tables for Crystallography are no longer available for purchase from Springer. For further information please contact Wiley Inc. (follow the link on the right hand side of this page). Volume B presents accounts of the numerous aspects of reciprocal space in crystallographic research. After an introductory chapter, Part 1 presents the reader with an account of structure-factor formalisms, an extensive treatment of the theory, algorithms and crystallographic applications of Fourier methods, and fundamental as well as advanced treatments of symmetry in reciprocal space. In Part 2, these general accounts are followed by detailed expositions of crystallographic statistics, the theory of direct methods, Patterson techniques, isomorphous replacement and

anomalous scattering, and treatments of the role of electron microscopy and diffraction in crystal structure determination, including applications of direct methods to electron crystallography. Part 3 deals with applications of reciprocal space to molecular geometry and `best'-plane calculations, and contains a treatment of the principles of molecular graphics and modelling and their applications. A convergence-acceleration method of importance in the computation of approximate lattice sums is presented and the part concludes with a discussion of the Ewald method. Part 4 contains treatments of various diffuse-scattering phenomena arising from crystal dynamics, disorder and low dimensionality (liquid crystals), and an exposition of the underlying theories and/or experimental evidence. Polymer crystallography and reciprocal-space images of aperiodic crystals are also treated. Part 5 of the volume contains introductory treatments of the theory of the interaction of radiation with matter (dynamical theory) as applied to X-ray, electron and neutron diffraction techniques. The simplified trigonometric expressions for the structure factors in the 230 three-dimensional space groups, which appeared in Volume I of International Tables for X-ray Crystallography, are now given in Appendix 1.4.3 to Chapter 1.4 of this volume. Volume B is a vital addition to the library of scientists engaged in crystal structure determination, crystallographic computing, crystal physics and other fields of crystallographic research. Graduate students specializing in crystallography will find much material suitable for self-study and a rich source of references to the relevant literature.