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Elements of Nuclear Physics Elements of Nuclear Physics Instructor's Guide to Elements of Nuclear Physics Energy Levels of Light Nuclei A Fundamentals of Nuclear Physics Redirecting Science: Niels Bohr, Philanthropy, and the Rise of Nuclear Physics Modern Nuclear Chemistry Introductory Nuclear Physics Key Nuclear Reaction Experiments Introduction to Atomic and Nuclear Physics Grants and Awards for the Fiscal Year Ended ... Nuclear Science Abstracts Computational Nuclear Physics 1 Linear Operators for Quantum Mechanics Basic Physics Of Radiotracers Fundamentals in Nuclear Physics Inner-Shell and X-Ray Physics of Atoms and Solids Sustainable Energy, SI Edition Advances in Nuclear Physics Coherence in Atomic Collision Physics Sustainable Energy, 2nd Growth Points in Nuclear Physics Atomic and Nuclear Physics Problems and Solutions on Atomic, Nuclear and Particle Physics Integrated Circuit Design for Radiation Environments Advances in Atomic and Molecular Physics Catalog of Copyright Entries. Third Series Nuclear Physics Research in Progress Nuclear and Particle Physics Introduction to Nuclear Engineering Elements of Nuclear Physics Nuclear and Radiochemistry, 2 Volume Set Changing Landscapes of Nuclear Physics Models of the Atomic Nucleus Atomic Physics 4 Electronic and Atomic Collisions Physics of Strong Fields Atomic Inner-Shell Physics The Atomic Nucleus

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Suitable for advanced undergraduates and graduate students, this compact treatment examines linear space, functionals, and operators; diagonalizing operators; operator algebras; and equations of motion. 1969 edition. INTRODUCTORY NUCLEAR PHYSICS Nuclear physics between 1921 and 1947 shaped more than any other science thepolitical landscape of our century and the public opinion on physical research. Using quantitative scientometric methods, a new branch in the history of science, the author focuses on the developments of nuclear physics in these formative years paying special attention to theimpact of German emigrants on the evolution of the field as a cognitive and social unity. The book is based on a thorough analysis of various citation analyses thus producing results that should be more replicable and more objective. The scientometric techniques should complement the more qualitative approach usually applied in historical writing. This makes the text an interesting study also for the historian in general. Readers explore present and future energy needs as well as options for continued use of fossil fuels and alternative energy sources with Dunlap’s SUSTAINABLE ENERGY, 2nd Edition. Individual chapters thoroughly investigate each energy approach as the book covers both current energy production and future strategies. The author assumes reader familiarity with the basic concepts of freshman-level physics and chemistry. The text emphasizes the complexity of energy issues and the need for a multidisciplinary approach to solving energy problems. Quantitative end-of-chapter problems emphasize analyzing information, correlating data from various sources, and interpreting graphical data and interpolate values. Readers see real problems in producing and using energy as they realize that while exact calculations are important, a broad-based analysis is often most appropriate. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version. ATOMIC PHYSICS 4 extends the series of books containing the invited papers presented at each "International Conference on Atomic Physics." FICAP, the fourth conference of this type since its foun dation in 1968, was held at the University of Heidelberg. The goal of these conferences, to cover the field of atomic physics with all its different branches, to review the present status of research, to revive the fundamental basis of atomic physics and to emphasize future developments of this field as well as its applications was met by more than thirty invited speakers, leaders in the field of atomic physics. Their talks were supplemented by more than two hundred contributed papers contained in the FICAP Book of Abstracts. This volume begins with papers given in honour and memory of E. U. Condon, to whom this conference was dedicated. It continues with articles on fundamental interactions in atoms and Quantum electrodynamics, on the fast progressing field of high energy heavy ion collisions and Quasi-molecules, on electronic and atomic collisions and the structure of electronic and ~-mesic atoms. The volume closes with contributions concerning the application of la sers in atomic physics, a new field of vastly increasing importance to fundamental experiments as well as applications. We feel that this book contains a very stimulating account of the present main streams of research in atomic physics and its possible future di rections. For undergraduate physics students or for nuclear engineers. The NATO Advanced Study Institute on Physios of St~ong Fields was held at Maratea/Italy from 1-14 June, 1986. The school was devoted to the advances, theoretical and experimental, in physics of strong fields made during the past five years. The topic of the first week was almost exclusively quantum electrodynamics, with dis cussions of symmetry breaking in the ground state, of the physics of strong fields in heavy ion collisions and of precision tests of perturba tive quantum electrodynamics. The famous positron lines found at GSI (Darmstadt)

and the related question "new particle versus vacuum decay" - (yes or no or both) - constituted the center of experimental advances. This was followed in the second week by the presentation of a broad range of other areas where strong fields occur, reaching from nuclear physics over quantum chromodynamics to gravitation theory and astrophysics. We were fortunate to be able to calIon a body of lecturers who not only made considerable personal contributions to this research but who are also noted for their lecturing skills. Their enthusiasm and dedication for their work was readily transmitted to the students resulting in a very suc cessful school. SUSTAINABLE ENERGY focuses directly on energy related issues and includes a thorough treatment of all potentially viable energy sources. In most cases, individual chapters are devoted to each alternative energy approach. Although author Richard Dunlap covers past and current energy production methods, the text deals largely with future alternative energy strategies and follows the guidelines of ABET, the major engineering accreditation body. The book approaches these topics on a rigorous level -- familiarity with the basic concepts of freshman Physics and Chemistry is needed. The book contains enough material for a typical one semester course. The end-of-chapter problems are predominantly quantitative in nature. However, most are not straight forward calculations based on substituting values from the chapter in to the appropriate formula. The problems are designed to require the students to analyze information, to make use of material from previous chapters, to correlate data from various sources (not only from the textbook itself but from library, internet or other sources) and in many cases to estimate quantities based on interpretation of graphical data, interpolation of values and sometime just plain common sense. While maintaining a quantitative approach to the study of energy in our society, the text and accompanying problems show that this is a complex and very interdisciplinary topic. This approach is intended to provide students with an appreciation for the real problems that are encountered in the understanding of how we produce and use energy, and the realization that, while exact calculations are important and necessary, a broadly based analysis is often most appropriate. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version. The three articles of the present volume clearly exhibit a wide scope of articles, which is the aim of this series. The article by Kahana and Baltz lies in the main flow of the large stream of work currently in progress with heavy-ion accelerators. A related article by Terry Fortune on "Multinuclear Transfer Reactions with Heavy Ions" is scheduled to appear in the next volume. The article by Whitehead, Watt, Cole, and Morrison pertains to the nuclear-shell model for which a number of articles have appeared in our series. Our very first volume had an article on how SU(3) techniques can, with great elegance, enable one to cope with the sizable number of states within a configuration. But the actual nuclear force is not exactly that yielded by the elegant techniques, and so interest continued in dealing with the large number of states by brute force. Then the Glasgow school of Whitehead et al. discovered that mathematical techniques existed for coping more simply with the lowest eigenvalues of large matrices. The present ar ticle aims generally to make accessible to nuclear physicists the methods developed at Glasgow. The final article by Baer, Crowe, and Truol on radiative pion capture describes a new field of importance because of the advent of the meson factories. More and more pions and muons will become standard tools in nuclear physics. The physics of atomic inner shells has undergone significant advances in recent years. Fast computers and new experimental tools, notably syn chrotron-radiation sources and heavy-ion accelerators, have greatly enhan ced the scope of problems that are accessible. The level of research activity is growing substantially; added incentives are provided by the importance of inner-shell processes in such diverse areas as plasma studies, astrophysics, laser technology, biology, medicine, and materials science. The main reason for all this exciting activity in atomic inner-shell physics, to be sure, lies in the significance of the fundamental problems that are coming within grasp. The large energies of many inner-shell processes cause relativistic and quantum-electrodynamic effects to become strong. Unique opportunities exist for delicate tests of such phenomena as the screening of the electron self-energy and the limits of validity of the present form of the frequency-dependent Breit interaction, to name but two. The many-body problem, which pervades virtually all of physics, presents somewhat less intractable aspects in the atomic inner-shell regime: correlations are relatively weak so that they can be treated perturbatively, and the basic potential is simple and known! The dynamics of inner-shell processes are characterized by exceedingly short lifetimes and high transition rates that strain perturbation theory to its limits and obliterate the traditional separation of excitation and deexcitation. These factors are only now being explored, as are interference phenomena between the various channels. Written by established experts in the field, this book features in-depth discussions of proven scientific principles, current trends, and applications of nuclear chemistry to the sciences and engineering. • Provides up-to-date coverage of the latest research and examines the theoretical and practical aspects of nuclear and radiochemistry • Presents the basic physical principles of nuclear and radiochemistry in a succinct fashion, requiring no basic knowledge of quantum mechanics • Adds discussion of math tools and simulations to demonstrate various phenomena, new chapters on Nuclear Medicine, Nuclear Forensics and Particle Physics, and updates to all other chapters • Includes additional in-chapter sample problems with solutions to help students • Reviews of 1st edition: "... an authoritative, comprehensive but succinct, state-of-the-art textbook ...." (The Chemical Educator) and "...an excellent resource for libraries and laboratories supporting programs requiring familiarity with nuclear processes ..." (CHOICE) After the death of Dr. Littlefield it was decided that I should undertake the revision ofthe whole of Atomic and Nuclear Physics: an Introduction for the third edition, and it was soon apparent that major changes were necessary. I am confident that these changes would have had Dr. Littlefield's approval. The prime consideration for the present edition has been to modernize at a minimum cost. As much as possible of the second edition has therefore been retained, but where changes have been made they have been fairly drastic. Thus the chapters on fine structure, wave mechanics, the vector model of the atom, Pauli's principle and the Zeeman effect have been completely restructured. The chapters on nuclear models, cosmic rays, fusion systems and fundamental particles have been brought up to date while a new chapter on charm and the latest ideas on quarks has been included. It is hoped that the presentation of the last named will give readers a feeling that physics research can be full of adventure and surprises. A wide range of atomic and solid state phenomena is studied today by means of x-ray excitation or inner-shell ionization, as this volume strikingly illustrates. The strong link between these two fields of investigation is partly the result of the extensive developments within each and also largely due to the broad variety of theoretical and experimental techniques now available. All im portant recent advances are to be found highlighted here; most are substantially reviewed. Two dominant research threads are evident in, the chapters of this book. While clearly distinguishable, they are inescapably en twined. One is concerned with x-ray processes as probes for the study of solid-state effects, the other with the measurement and interpretation of inner-shell and bremsstrahlung processes in iso lated systems. In the first, a given material is made the target in an x-ray tube; in the second, free atoms form the target while a solid material can be used when the effect of the solid environ ment on the excitation processes is negligible. Thus, although inner-shell ionization is predominantly concerned with atoms and x-ray processes with the solid state, there are large regions of overlap which have arisen when a given research technique has de veloped from studies in both areas. To bring out these features we have arranged the chapters in the order: atomic, solid-state, chemical. This textbook on nuclear physics will be of value to all undergraduates studying nuclear physics, as well as to first-year graduates. to Atomic and Nuclear Physics Aerial view of the National Accelerator Laboratory, Batavia, Illinois. (Photograph courtesy of NAL.) Introduction to Atomic and Nuclear Physics HENRY SEMAT Professor Emeritus The City College of the City University of New York JOHN R. ALBRIGHT The Florida State University FIFTH EDITION LONDON NEW YORK CHAPMAN AN D HALL First edition 1939 Fifth edition, first published in the U.S.A. by Holt, Rinehart and Winston, Inc. Fifth edition first published in Great Britain 1973 by Chapman and Hall Ltd 11 New Fetter Lane, London EC4P 4EE Reprinted as a paperback 1978 Reprinted 1979, 1983, 1985 Fletcher & Son Ltd, Norwich ISBN-13: 978-0-412-15670-0 e-ISBN-13: 978-1-4615-9701-8 DOl: 10.1007/978-1-4615-9701-8 This book, part of the seven-volume series Major American Universities PhD Qualifying Questions and Solutions contains detailed

solutions to 483 questions/problems on atomic, molecular, nuclear and particle physics, as well as experimental methodology. The problems are of a standard appropriate to advanced undergraduate and graduate syllabi, and blend together two objectives — understanding of physical principles and practical application. The volume is an invaluable supplement to textbooks. Advances in Atomic and Molecular Physics A practical guide to the effects of radiation on semiconductor components of electronic systems, and techniques for the designing, laying out, and testing of hardened integrated circuits This book teaches the fundamentals of radiation environments and their effects on electronic components, as well as how to design, lay out, and test cost-effective hardened semiconductor chips not only for today's space systems but for commercial terrestrial applications as well. It provides a historical perspective, the fundamental science of radiation, and the basics of semiconductors, as well as radiation-induced failure mechanisms in semiconductor chips. Integrated Circuits Design for Radiation Environments starts by introducing readers to semiconductors and radiation environments (including space, atmospheric, and terrestrial environments) followed by circuit design and layout. The book introduces radiation effects phenomena including single-event effects, total ionizing dose damage and displacement damage) and shows how technological solutions can address both phenomena. Describes the fundamentals of radiation environments and their effects on electronic components Teaches readers how to design, lay out and test cost-effective hardened semiconductor chips for space systems and commercial terrestrial applications Covers natural and man-made radiation environments, space systems and commercial terrestrial applications Provides up-to-date coverage of state-of-the-art of radiation hardening technology in one concise volume Includes questions and answers for the reader to test their knowledge Integrated Circuits Design for Radiation Environments will appeal to researchers and product developers in the semiconductor, space, and defense industries, as well as electronic engineers in the medical field. The book is also helpful for system, layout, process, device, reliability, applications, ESD, latchup and circuit design semiconductor engineers, along with anyone involved in micro-electronics used in harsh environments. Covers all the phenomenological and experimental data on nuclear physics and demonstrates the latest experimental developments that can be obtained. Introduces modern theories of fundamental processes, in particular the electroweak standard model, without using the sophisticated underlying quantum field theoretical tools. Incorporates all major present applications of nuclear physics at a level that is both understandable by a majority of physicists and scientists of many other fields, and usefull as a first introduction for students who intend to pursue in the domain. Growth Points in Nuclear Physics, Volume 2 covers the progress in the fields of nuclear structure and nuclear reactions. This book is composed of three chapters. The first chapter is devoted to nuclear forces and potentials, in particular the optical model potential that enables the elastic scattering of many particles by nuclei to be calculated in a very simple manner. This chapter also deals with the three-body forces and the spin dependence of the nuclear potential. The second chapter describes higher order processes involving two or more stages, specifically their intrinsic interest and the effect they can have on the total cross-section. The third chapter examines heavy ion reactions, one of the most prominent growth areas of contemporary nuclear physics. Heavy ion reactions are particularly sensitive to some features of nuclear structure, and thus constitute a powerful tool in nuclear structure research. This book will prove useful to nuclear physicists. The text is designed for junior and senior level Nuclear Engineering students. The third edition of this highly respected text offers the most current and complete introduction to nuclear engineering available. Introduction to Nuclear Engineering has been thoroughly updated with new information on French, Russian, and Japanese nuclear reactors. All units have been revised to reflect current standards. In addition to the numerous end-of-chapter problems, computer exercises have been added. A variety of standard problems in theoretical nuclear-structure physics is addressed by the well-documented computer codes presented in this book. Most of these codes were available up to now only through personal contact. The subject matter ranges from microscopic models (the shell, Skyrme-Hartree-Fock, and cranked Nilsson models) through collective excitations (RPA, IBA, and geometric model) to the relativistic impulse approximation, three-body calculations, variational Monte Carlo methods, and electron scattering. The 5 1/4'' high-density floppy disk that comes with the book contains the FORTRAN codes of the problems that are tackled in each of the ten chapters. In the text, the precise theoretical foundations and motivations of each model or method are discussed together with the numerical methods employed. Instructions for the use of each code, and how to adapt them to local compilers and/or operating systems if necessary, are included. The third edition of this classic in the field is completely updated and revised with approximately 30% new content so as to include the latest developments. The handbook and ready reference comprehensively covers nuclear and radiochemistry in a well-structured and readily accessible manner, dealing with the theory and fundamentals in the first half, followed by chapters devoted to such specific topics as nuclear energy and reactors, radiotracers, and radionuclides in the life sciences. The result is a valuable resource for both newcomers as well as established scientists in the field. In this book the author charts the developments in nuclear physics since its inception around a century ago by reviewing the key experiments that helped drive and shape our understanding of the field, especially in the context of the wider developments in physics in the early 20th century. In addition to providing a path through the field and the crucial events it looks at how these experiments not only answered key questions at the time but presented new challenges to the contemporary perception of the nuclear and sub-atomic worlds and how they helped develop our present understanding of nuclear physics. Very intuitive and physically precise visualization software for nuclear models Database of all nuclei and isotopes included All nuclear parameters are adjustable in a wide range Comprehensive and introductory book on nuclear models Platform invariant software (Windows, Unix, Mac) An accessible introduction to nuclear and particle physics with equal coverage of both topics, this text covers all the standard topics in particle and nuclear physics thoroughly and provides a few extras, including chapters on experimental methods; applications of nuclear physics including fission, fusion and biomedical applications; and unsolved problems for the future. It includes basic concepts and theory combined with current and future applications. An excellent resource for physics and astronomy undergraduates in higher-level courses, this text also serves well as a general reference for graduate studies. The opportunity to present the physics of radioactive processes in some detail apart from topics such as instrumentation which conventionally compete with it for spacer is most welcome. The material is intended to give a fairly complete introduction to radiation physics to those who which to have more than a descriptive understanding of the subject. Although it is possible to work one's way through much of the subject matter without having any previous physics background, some prior acquaintance with modern physics is desirable. A familiarity with calculus and differential equations is also assumed. Volume I begins with a brief description of classical physics, it's extension to special relativity and quantum mechanics, and an introduction to basic atomic and nuclear concepts. A thorough discussion of atomic structure follows with emphasis on the theory of the multielectron atom, characteristic X-rays, and the Auger effect. Volume II treats the subjects of nuclear structure, nuclear decay processes, the interaction of radiation with matter, and the mathematics of radioactive decay. How and why do complex scientific disciplines such as physics change emphasis from one sub-discipline to another? Do such transitions stem entirely from developments within the discipline itself or also from external factors? This book addresses these questions by examining the transition from atomic to nuclear physics, theoretically and experimentally, at Niels Bohr's Institute for Theoretical Physics in Copenhagen in the 1930s. On the basis of extensive archival research, Finn Aaserud shows that the "Copenhagen spirit," the playful research atmosphere under Bohr's fatherly guidance that permeated the Institute, thrived because of extra-scientific circumstances that Bohr exploited to the fullest, such as the need to help Jewish physicists out of Hitler's Germany and the changing funding policies of private foundations, notably those of the Rockefeller Foundation which made it opportune to introduce research in experimental biology at the Institute. "A clear, carefully developed and substantially convincing argument... Aaserud gives a detailed and impressively documented account of the direction of Bohr's scientific interests... Aaserud is... to be congratulated for his original, clear — indeed, didactic — work of scholarship and enlightenment." — Paul Forman, Physics Today "A professional historian's study of the happenings at the Niels Bohr Institute in the decisive years 1930 to 1940... In particular, the... support of the Institute by Danish and other foundations, mainly the Rockefeller Foundation, are treated in great detail, revealing many interesting aspects of these relationships... The detailed accounts... of Bohr's negotiations are a testimony to Bohr's uncanny ability to get

what he wanted from the various foundations... Aaserud's book is an invaluable source of information [showing] that Bohr was not only an inspiring physicist and philosopher but also a cunning negotiator who knew how to make use of his great reputation for the benefit of science." — Victor F. Weisskopf, Science "Aaserud elucidates Bohr's skills not only as mentor and guiding hand behind the 'Copenhagen spirit,' but also as financial negotiator." — Neil Wasserman, Isis, A Journal of the History of Science Society "This book teaches us that running such [a truly elite] institution required entrepreneurial skills as well as scientific genius. Bohr had an abundance of both." — Jeremy Bernstein, Nature "Redirecting Science is the history of Bohr's institute during the 1930s when it experienced a drastic change in its research priorities, from a laissez-faire mode of work and lack of clearly defined research programme to a concerted research effort in nuclear physics and experimental biology... Aaserud gives a highly interesting account of the interaction between physics and biology... Aaserud's carefully documented work is an excellent example of how institutional history may transcend social and institutional limitations and integrate also conceptual history of science." — Helge Kragh, Centaurus "By showing that a new research programme at one of the most important scientific institutes in the world was triggered, and pushed forward, by social and financial considerations, this book delivers yet another blow to the tired old idea that scientific knowledge is driven by its own internal, inexorable logic. It also throws valuable light on Bohr's activities and strategies as a fundraiser and institution builder." — John Krige, The British Journal for the History of Science During the last two decades the experimental investigation of atomic coherence phenomena has made rapid progress. Detailed studies have been performed of angular correlations, spin polarization effects, angular momen tum transfer, and the alignment parameters which characterize the charge cloud of excited atoms. The enormous growth in the number of these investigations was made possible through substantial development and application of new experimental technology, the development of sophisti cated theoretical models and numerical methods, and a fine interplay between theory and experiment. This interplay has resulted in a deeper understanding of the physical mechanisms of atomic collision processes. It is the purpose of the chapters in this book to provide introductions for nonspecialists to the various fields of this area as well as to present new experimental and theoretical results and ideas. The interest in spin-dependent interactions in electron-atom scattering has a long history; it dates back to the early investigations of Mott in 1929. While the more traditional measurements in this field were concerned with the determination of spin polarization and asymmetries, the range of investi gations has been expanded enormously during the last few years and now includes many observables sensitive to one or more of the various spin dependent interactions. The understanding of these effects requires a theoretical description of the orientation and alignment parameters of the target atoms, of the forma tion of resonances, of the influence of electron-exchange processes, and of the relativistic interactions inside the atom and between projectile and target.