Read Book High Momentum Quarks In The Nucleon Pdf For Free

Modified Momentum Distribution of Quarks in a Two-nucleon System **The Charm of Strange Quarks The Spin Structure of the Proton Studies of Quark Momentum in the Proton by Use of the SIDIS Process Fundamental Particles** *Lattice QCD Calculation of the Momentum Fraction Carried by Quarks in the Nucleon, and the Roper Puzzle* **An Introduction to Quarks and Partons Quark Model in Momentum Space and Higher Symmetries** What is the World Made Of? *Quarks: Frontiers In Elementary Particle Physics* **Quark Orbital-angular-momentum Distribution in the Nucleon** *Modification of K0s and Lambda(AntiLambda) Transverse Momentum Spectra in Pb-Pb Collisions at ?sNN = 2.76 TeV with ALICE* **Quarks and Hadronic Structure Weak Interactions of Leptons and Quarks Basic Concepts in Physics Elementary Particle Physics** Leptons and Quarks Non-photonic Electron at High Transverse Momentum in Au+Au Collisions and Bottom Quark Production in P+p Collisions at Sqrt(sNN) *Quark-Parton and the Low Transverse Momentum Hadron-hadron Interaction* **Search for Dark Matter in Events with Heavy Quarks and Missing Transverse Momentum in Pp Collisions with the ATLAS Detector The Wizard of Quarks** The Momentum Distribution of Heavy Quarks Leptons And Quarks (Special Edition Commemorating The Discovery Of The Higgs Boson) **Quark Contributions to Nucleon Momentum and Spin from Domain Wall Fermion Calculations** *Quarks, Baryons and Chiral Symmetry* **Quarks, Leptons and The Big Bang Determination of Intrinsic Transverse Momentum of Quarks** *Quarks, Nuclei And Stars: Memorial Volume Dedicated For Gerald E Brown The Higgs Boson Produced With Top Quarks in Fully Hadronic Signatures* **Quarks, Leptons & Gauge Fields Searches for Supersymmetric Particles in Final States with Multiple Top and Bottom Quarks with the Atlas Detector** Elementary Particles *Leptons and Quarks* **Quarks and Nuclei** Why the Proton Spin is Not Due to Quarks **Mesons and Quarks Transverse Momentum Physics in Ha and Aa Interactions at High Energy Quarks and Leptones Short-Distance Phenomena in Nuclear Physics** Measurement of the Top Quark Mass in the Dilepton Final State Using the Matrix Element Method

The book explains in a precise and complete manner how elementary particle physics has evolved over the past 50 years. The historical development of the ideas that have shaped our thinking about the ultimate constituents of matter is traced out. The author has been associated with some of the originators of elementary particle theory and has made significant contributions to the field. Here, he gives a first-person description of some of the main developments leading to our present view of the universe. This article reports on a search for dark matter pair production in association with bottom or top quarks in 20.3 fb-1 of pp collisions collected at ?s = 8 TeV by the ATLAS detector at the LHC. Events with large missing transverse momentum are selected when produced in association with high-momentum jets of which one or more are identified as jets containing b-quarks. Final states with top quarks are selected by requiring a high jet multiplicity and in some cases a single lepton. The data are found to be consistent with the Standard Model expectations and limits are set on the mass scale of effective field theories that describe scalar and tensor interactions between dark matter and Standard Model particles. Limits on the dark-matter-nucleon cross-section for spin-independent and spin-dependent interactions are also provided. These limits are particularly strong for low-mass dark matter. Using a simplified model, constraints are set on the mass of dark matter and of a colored mediator suitable to explain a possible signal of annihilating dark matter. The work presented in this PhD dissertation is the first search at CMS for Higgs bosons produced in association with top quarks (ttH)

in a final state consisting of only jets. The results presented in this book uncover a new class of ttH events that will help us elucidate our understanding of the Yukawa sector interactions between the Higgs boson and the top quark. Despite this being the most common decay signature for ttH, a large contamination of SM backgrounds makes it the most challenging for extracting a signal from data. The PhD thesis presents many sophisticated tools and techniques that were developed in order to overcome these challenges. These tools pave the way for future analyses to investigate other standard model and beyond-standard model physics. This thesis offers an excellent, comprehensive introduction to the physics of the quark–gluon plasma. It clearly explains the connection between theory and experiment, making the topic accessible to non-specialists in this field. The experimental work, which contributes significantly to our understanding of the quark–gluon plasma, is described in great detail. The results described in the final chapters of the thesis provide interesting new ideas about the connection between proton-proton and Pb-Pb collisions. Simone Schuchmann received the 'ALICE Thesis Award 2016' for this excellent work. Recent EMC data on the spin-dependent proton structure function suggest that very little of the proton spin is due to the helicity of the quarks inside it. We argue that, at leading order in the 1/N/sub c/ expansion, none of the proton spin would be carried by quarks in the chiral limit where m/sub q/ = 0. This model-independent result is based on a physical picture of the nucleon as a soliton solution of the effective chiral Lagrangian of large-N/sub c/ QCD. The Skyrme model is then used to estimate quark contribution to the proton spin when chiral symmetry and flavor SU(3) are broken: this contribution turns out to be small, as suggested by the EMC. Next, we discuss the other possible contributions to the proton helicity in the infinite-momentum frame--polarized gluons (.delta. G), and orbital angular momentum (L/sub z/). We argue on general grounds and by explicit example the .delta. G = 0 and that if the parameters of the chiral Lagrangian are adjusted so that gluons carry /approximately/50% of the proton momentum, most of the orbital angular momentum L/sub z/ is carried by quarks. We mention several experiments to test the EMC results and their interpretation. 43 refs., 3 figs. Ch. 1. Ingredients of the standard model. 1.1. Strong interaction - QCD. 1.2. Electroweak theory. 1.3. CKM mass matrix -- ch. 2. Symmetries and wave functions. 2.1. Why is symmetry important? 2.2. Symmetry current. 2.3. SU(2). 2.4. SU(3). 2.5. Multi-particle states. 2.6. Product-states. 2.7. Quark model wave functions -- ch. 3. Chiral symmetry. 3.1. Lorentz group and chiral fermions. 3.2. Chiral group. 3.3. Spontaneous breaking of chiral symmetry -- ch. 4. The sigma model. 4.1. Linear sigma model. 4.2. Non-linear sigma model. 4.3. Fermion field -- ch. 5. Chiral bag model. 5.1. The MIT bag model. 5.2. The little bag model. 5.3. The Skyrme model. 5.4. The chiral bag model. 5.5. Chiral casimir effects. 5.6. The edgehog solution -- ch. 6. Nucleon properties. 6.1. Semiclassical method. 6.2. Isospin rotation of the hedgehog solution. 6.3. Axial properties. 6.4. Non-rigid quantization of the skyrmion. 6.5. Electromagnetic properties. 6.6. Chiral bag with vector mesons -- ch. 7. Large-Nc baryons. 7.1. Introduction. 7.2. General counting rules. 7.3. Counting rules for solitons. 7.4. Large-Nc algebra for baryons. 7.5. Finite Nc. 7.6. Other representations and gA -- ch. 8. Excited baryons. 8.1. Systematics in baryon masses. 8.2. Quarks in a deformed oscillator potential. 8.3. Electromagnetic transitions. This PhD thesis documents two of the highest-profile searches for supersymmetry performed at the ATLAS experiment using up to 80/fb of proton-proton collision data at a center-of-mass energy of 13 TeV delivered by the Large Hadron Collider (LHC) during its Run 2 (2015-2018). The signals of interest feature a high multiplicity of jets originating from the hadronisation of b-quarks and large missing transverse momentum, which constitutes one of the most promising final state signatures for discovery of new phenomena at the LHC. The first search is focused on the strong production of a pair of gluinos, with each gluino decaying into a neutralino and a top-antitop-quark pair or a bottom-antibottom-quark pair. The second search targets the pair production of higgsinos, with each higgsino decaying into a gravitino and a Higgs boson, which in turn is required to decay into a bottom-antibottom-quark pair. Both searches employ state-of-the-art experimental techniques and analysis strategies at the LHC, resulting in some of the most restrictive bounds available to date on the masses of the gluino,neutralino, and higgsino in the context of the models explored. One of the activities of the Ettore Majorana Centre for ,Scientific Culture is the

international advanced study courses on scientific topics which are of particular relevance today. The Centre is located in Erice, a mountain town in the province of Trapani in Sicily. At present over seventy Schools of the Centre are active, holding annual or biennial courses, so that about forty courses are organized each year. To date some twenty thou sand participants have attended the courses of the various Schools of the Centre. The International Physics Workshop Series has been established to make the contents of the Workshops o'f great topical interest available to those who were unable to attend them. The courses are conducted on an advanced, post-doctoral level. This volume - the proceedings of the session on "Quarks and Hadronic Structure" - is the first of the Series. In September 1975, thirty-three physicists from twenty-one laboratories in nine countries met in Erice to attend the Workshop. The countries represented were: Austria, France, Germany, India, Italy, Poland, Switzerland, the United Kingdom, and the United States of America. The purpose of this Workshop was to bring to gether a group of theorists working on various aspects of the quark structure of hadrons to discuss and critically evaluate the present situation. Professor Morpurgo was given the direction of the Workshop. I would like to take this opportunity to thank him most warmly for having accepted this responsibility and for the success of the Work shop. Quarks, Leptons and The Big Bang is a clear, readable and self-contained introduction to particle physics and related areas of cosmology. It bridges the gap between non-technical popular accounts and textbooks for advanced students. The book concentrates on presenting the subject from the modern perspective of quarks, leptons and the forces between them. This book will be of interest to students, teachers and general science readers interested in fundamental ideas of modern physics. "This monograph "Mesons and Quarks" includes a wide range of topics in the frontier areas of research in the overlapping field of nuclear and particle physics. It discusses various aspects of Quantum Chromodynamics (QCD) at different regimes of energy and density."--BOOK JACKET. This highly readable book uncovers the mysteries of the physics of elementary particles for a broad audience. From the familiar notions of atoms and molecules to the complex ideas of the grand unification of all the basic forces, this book allows the interested lay public to appreciate the fascinating building blocks of matter that make up our universe. Beginning with a description of the quantum nature of atoms and particles, readers are introduced to the elementary constituents of atomic nuclei: quarks. The book goes on to consider all of the important ideas in particle physics: quantum electrodynamics and quantum chromodynamics, the theory of strong interactions, the gauge theories of the weak and electromagnetic interactions, as well as the problem of mass generation. To conclude the book, the ideas of grand unification are described, and finally, some applications to astrophysics are discussed. Your guide to this exciting world is an author who, together with the originator of the idea of quarks, Murray Gell-Mann, has played an important role in the development of the theory of quantum chromodynamics and the concept of grand unification. Contents: Electrons and Atomic NucleiQuantum Properties of Atoms and ParticlesThe Knives of DemocritusQuarks Inside Atomic NucleiQuantum ElectrodynamicsQuantum ChromodynamicsMesons, Baryons and QuarksElectroweak InteractionsGrand Unification Readership: General readers with an interest in physics. Keywords:Elementary Particles;Quarks;Atoms;Nuclei;Particle Interactions;Particle Symmetries;Quantum ChromodynamicsKey Features:Provides a good introduction to particle physics for the lay publicContains all the essential ideas on the topics in an accessible and compact volume In recent years, the study of weak interaction and its relationship with the other fundamnetal interactions of nature has progressed rapidly. Weak interactions of leptons and quarks provides an up-to-date account of this continuing research. The Introduction discusses early models and historical developments in the understanding of the weak force. The authors then give a clear presentation of the modern theoretical basis of weak interactions, going on to discuss recent advances in the field. These include development of the eletroweak gauge theory, and the discovery of neutral currents and of a host of new particles. There is also a chapter devoted entirely to neutrino astrophysics. Its straightforward style and its emphasis on experimental results will make this book an excellent source for students (problem sets are included at the end of each chapter) and experimentalists in the field. Physicists whose speciality

lies outside the study of elementary particle physics will also find it useful. Thousands of readers who were delighted by the adventures and science content of Alice in Quantumland are in for another treat. This time physicist Robert Gilmore takes us on a journey with Dorothy, following the yellow building block road through the land of the Wizard of Quarks. Using characters and situations based on the Wizard of Oz story, we learn along the way about the fascinating world of particle physics. Classes of particles, from quarks to leptons are shown in an atomic garden, where atoms and molecules are produced. See how Dorothy, The Tin Geek, and the Cowardly Lion experience the bizarre world of subatomic particles. A new form of matter with de-confined quarks and gluons, named the "Quark Gluon Plasma" (QGP), is predicted by Lattice Qutantum Chromodynamics to exist at high temperatures and/or high baryon density regions in the QCD phase diagram. Experimental evidence indicates that the QCD matter created in high energy Au+Au collisions at the Relativistic Heavy Ion Collider (RHIC) in Brookhaven National Lab is a strongly-coupled Quark-Gluon Plasma. One of the central goals of heavy ion physics is to understand the QGP through quantitative comparisons between theoretical calculations and experimental measurements. Heavy flavor quarks are believed to be a unique probe for this task, because they are dominantly produced in the initial hard scatterings, where the production rate can be well calculated by perturbative-QCD(pQCD). When heavy favor quarks traverse the QGP medium, they bear the imprints of the medium via their interactions with the medium. Dynamical models have been developed to calculate the interactions between heavy quarks and the QGP medium to quantitatively extract the medium properties. This dissertation presents a series of experimental studies with the electrons produced in the semi-leptonic decays of heavy flavor quarks in Au+Au and p+p collisions, which serve as the proxies for heavy flavor quarks. These electrons are referred to as non-photonic electrons (NPE), to be differentiated from the main background of photonic electrons. The production of NPE at high pT is found to be highly suppressed in central and semi-central Au+Au collisions, compared to binary-collision scaled production in p+p collisions. The azimuthal anisotropy of NPE is found to be finite at high pT, and the azimuthal correlation between high pT NPE and low pT hadrons exhibits a broadening in the away-side, both of which strengthen the evidence for a strong coupling between heavy flavor quarks and the QGP medium. In addition, the bottom quark production cross-section in p+p collisions is obtained based on the measured spectrum of NPE and the ratio of bottom/charm decay electrons. Each summer, the Theoretical Physics Division of the Canadian Association of Physicists organizes a summer institute of two weeks duration on a current topic in theoretical physics. This volume contains the lectures from the Pacific Summer Institute held at Pearson College on Vancouver Island, B. C. (Canada) from August 23 to September 3, 1982. The Institute was titled "Progress in Nuclear Dynamics: Short-Distance Behavior in the Nucleus". The primary source of funds for the Institute came from NATO through its Advanced Study Institute programme. Significant finan cial support is also gratefully acknowledged from TRIUMF, Simon Fraser University, Natural Sciences and Engineering Research Council of Canada, and Atomic Energy of Canada Ltd. The topic of the school was the role of the substructure of hadrons--quarks and gluons--in nuclear physics. This includes not only the effects which may be observed in specific nuclear states, such as form factors at large momentum transfer, or the presence of hidden color components in the ground states of few nucleon systems, but also effects which may be observed in the nuclear matter contin uum: the phase transition from normal nuclear matter to a plasma of quarks and gluons. The current status of the long distance phenom enology of the nucleus--the interacting boson approximation and the role of n's and ~'s in nuclear structure, is also reviewed. This is perhaps the most up-to-date book on Modern Elementary Particle Physics. The main content is an introduction to Yang-Mills fields, and the Standard Model of Particle Physics. A concise introduction to quarks is provided, with a discussion of the representations of SU(3).The Standard Model is presented in detail, including such topics as the Kobayashi-Maskawa matrix, chiral symmetry breaking, and the ?-vacuum. Theoretical topics of a more general nature include path integrals, topological solitons, renormalization group, effective potentials, the axial anomaly, and lattice gauge theory.This second edition, which has been expanded, incorporates the following new subjects:

Wilson's renormalization scheme, and its relation to perturbative renormalization; pitfalls in quantizing gauge fields, such as the Gribov ambiguity; the lattice as a consistent regularization; Monte Carlo methods of solution; and the issues, folklores, and scenarios of quark confinement. More than a quarter of the book comprise of new materials.This book may be used as a text for a one-semester course on advanced quantum field theory, or reference book for particle physicists. An explanation for non-scientists of the research and discoveries of 20thcentury physicists, such as quantum theory, relativity theory, electrons and hadrons. A primer on the evolution of particle physics and the search for the fundamental building blocks of matter, this book presents the full current body of understanding of particle physics in a way that is accessible to readers with some basic principles of physics. This concise book tells the fascinating story of how 20th century physicists revealed layer upon layer of structure within the atom to reach the basic particles of matter, and culminates in descriptions of current theories which form the Standard Model and the discovery of the top quark. It contains many illustrations and photographs, including the famous "Particle Chart", and integrates the stories of the individual scientists throughout. The book is a collaboration among eminent physicists at LBL, CERN and high school teachers to develop a novel book for teaching particle physics to students. It can thus be used as a supplement for courses in advanced high school and physics courses. The book “Leptons and Quarks” was first published in the early 1980s, when the program of the experimental search for the intermediate bosons W and Z and Higgs boson H was formulated. The aim and scope of the present extended edition of the book, written after the experimental discovery of the Higgs boson in 2012, is to reflect the various stages of this 30+ years search. Along with the text of the first edition of “Leptons and Quarks” it contains extracts from a number of books published by World Scientific and an article from “On the concepts of vacuum and mass and the search for higgs” available from www.worldscientific.com/worldscinet/mpla or from arxiv.org/abs/1212.1031.The book is unique in communicating the Electroweak Theory at a basic level and in connecting the concept of Lorenz invariant mass with the concept of the Extended Standard Model, which includes gravitons as the carriers of gravitational interaction. Contents:Constituents of the Atomic Nucleus (B Povh)Quarks, Chiral Symmetry and Dynamics of Nuclear Constituents (W Weise)The Chiral Quark Bag: Properties and Spectroscopy of Baryons and the Nuclear Force (F Myhrer)Building the Nucleus from Quarks: the Cloudy Bag Model and the Quark Description of the Nucleon- Nucleon Wave Function (G A Miller)Deep Inelastic Lepton- Nucleus Scattering (H J Pirner)Baryon-baryon Interaction from Quark Model Viewpoint (M Oka & K Yazaki)From Phenomenological to Macroscopic Description of NN Annihilation (A M Green & J A Niskanen) Readership: Nuclear physicists.
Keywords:Quarks;Nuclei;Chiral Symmetry;Dynamics;Baryons We report contributions to the nucleon spin and momentum from light quarks calculated using dynamical domain wall fermions with pion masses down to 300 MeV and fine lattice spacing a=0.084 fm. Albeit without disconnected diagrams, we observe that spin and orbital angular momenta of both u and d quarks are opposite, almost canceling in the case of the d quark, which agrees with previous calculations using a mixed quark action. We also present the full momentum dependence of n=2 generalized form factors showing little variation with the pion mass. It is believed that the matter and radiation in the Universe were formed some fifteen billion years ago after a huge bang, called Big Bang. A fireball was created in this big bang. Now challenge is that how the fireball changed to the Universe we live in today. As laws of physics are improving day by day, we are becoming able to look further back in time, and to get knowledge about the evolution of this Universe. It is believed that matter and antimatter created in the big-bang were in equal amounts and also it is said that most of the antimatter was annihilated on matter during the formation of the Universe. This antimatter annihilation started when most of the matter we see in the Universe today was already in the form of hadrons made of quarks. But before this hadronized Universe, it had passed through a phase of quarks and gluons in free states. Physics of Quark Gluon Plasma QGP is the field in which physicists are trying to recreate this phase, and to study it in the laboratory. This book is the second edition of an excellent undergraduate-level overview of classical and modern physics, intended for students of physics and related subjects, and also perfectly

suited for the education of physics teachers. The twelve-chapter book begins with Newton's laws of motion and subsequently covers topics such as thermodynamics and statistical physics, electrodynamics, special and general relativity, quantum mechanics and cosmology , the standard model and quantum chromodynamics. The writing is lucid, and the theoretical discussions are easy to follow for anyone comfortable with standard mathematics. An important addition in this second edition is a set of exercises and problems, distributed throughout the book. Some of the problems aim to complement the text, others to provide readers with additional useful tools for tackling new or more advanced topics. Furthermore, new topics have been added in several chapters; for example, the discovery of extra-solar planets from the wobble of their mother stars, a discussion of the Landauer principle relating information erasure to an increase of entropy, quantum logic, first order quantum corrections to the ideal gas equation of state due to the Fermi-Dirac and Bose-Einstein statistics. Both gravitational lensing and the time-correction in geo-positioning satellites are explained as theoretical applications of special and general relativity. The discovery of gravitational waves, one of the most important achievements of physical sciences, is presented as well. Professional scientists, teachers, and researchers will also want to have this book on their bookshelves, as it provides an excellent refresher on a wide range of topics and serves as an ideal starting point for expanding one's knowledge of new or unfamiliar fields. Readers of this book will not only learn much about physics, they will also learn to love it. This book comprises an introduction to the theory of the weak interaction of elementary particles. The author outlines the current situation in weak interaction theory and discusses the prospects for the coming decade. The reader is familiarized with simple theoretical techniques for the calculation of decay rates, interaction cross-sections and angular and spin correlations. The main pacemakers of scienti?c research are curiosity, ingenuity, and a pinch of persistence. Equipped with these characteristics a young researcher will be s- cessful in pushing scienti?c discoveries. And there is still a lot to discover and to understand. In the course of understanding the origin and structure of matter it is now known that all matter is made up of six types of quarks. Each of these carry a different mass. But neither are the particular mass values understood nor is it known why elementary particles carry mass at all. One could perhaps accept some small generic mass value for every quark, but nature has decided differently. Two quarks are extremely light, three more have a somewhat typical mass value, but one quark is extremely massive. It is the top quark, the heaviest quark and even the heaviest elementary particle that we know, carrying a mass as large as the mass of three iron nuclei. Even though there exists no explanation of why different particle types carry certain masses, the internal consistency of the currently best theory—the standard model of particle physics—yields a relation between the masses of the top quark, the so-called W boson, and the yet unobserved Higgs particle. Therefore, when one assumes validity of the model, it is even possible to take precise measurements of the top quark mass to predict the mass of the Higgs (and potentially other yet unobserved) particles. This book grew-how could it be otherwise?-out of a series oflectures which the author held at the University of Heidelberg. The purpose ofthese lectures was to give an introduction to the phenomenology of elementary particles for students both of theoretical and experimental orientation. With the present book the author has set himself the same aim. The reader is assumed to be familiar with ordinary nonrelativistic quantum mechanics as presented, e.g., in the following books: Quantum Mechanics, by L.1. Schiff (McGraw-Hill, New York, 1955); Quantum Mechanics, Vol. I, by K. Gottfried (W.A. Benjamin, Reading, Ma., 1966). The setup of the present book is as follows. In the first part we present some basic general principles and concepts which are used in elementary particle physics. The reader is supposed to learn here the "language" of particle physics. An introductory chapter deals with special relativity, of such funda mental importance for particle physics, which most ofthe time is high energy, i.e., highly relativistic physics. Further chapters of this first part deal with the Dirac equation, with the theory of quantized fields, and with the general definitions of the scattering and transition matrices and the cross-sections. This self-contained text describes breakthroughs in our understanding of the structure and interactions of elementary particles. It provides students of theoretical or experimental physics with the background material to grasp the

significance of these developments. The three dimensional structure of protons and neutrons has been a subject of great interest since the early 1990s when advancements in theory produced the Generalized Parton Distribution (GPD) framework for understanding spatial disturbutions, and Transverse Momentum Dependent Parton Distribution Functions (TMD PDFs) for understanding quark momentum. In this thesis, I present two analyses of the SIDIS process which can be related to TMDs. I have used CLAS data from the E1-F run period, which recorded over 1 billion events of 5.498 GeV electrons colliding with a liquid hydrogen (LH_2) target. First, I discuss analysis of the SIDIS cross section (fully differential in 5 variables) for both charged pions over a wide kinematic range. This analysis observes a non-zero $\cos(\ph\ i_h)$ and $\cos(2\phi_h)$ modulations, and is useful for phenomenological extractions of the Boer-Mulders and Cahn effect terms. I then present results for t\ he beam spin asymmetry (BSA), which is only sensitive to terms containing twist-three distribution functions. The analysis, performed for K^+ mesons, observes a non-zero BSA and therefore implies that twist-three effects are not negligably small in the kinematics used for the study. Unlike the large magnitude of the Sivers asymmetries observed at HERMES for K^+ mesons, the BSA reported here is of the same magnitude as the lighter π^+ meson. One of the main challenges in nuclear and particle physics in the last 20 years has been to understand how the proton"s spin is built up from its quark and gluon constituents. Quark models generally predict that about 60% of the proton"s spin should be carried by the spin of the quarks inside, whereas high energy scattering experiments have shown that the quark spin contribution is small OCo only about 30%. This result has been the underlying motivation for about 1000 theoretical papers and a global program of dedicated spin experiments at BNL, CERN, DESY and Jefferson Laboratory to map the individual quark and gluon angular momentum contributions to the proton"s spin, which are now yielding exciting results. This book gives an overview of the present status of the field: what is new in the data and what can be expected in the next few years. The emphasis is on the main physical ideas and the interpretation of spin data. The interface between QCD spin physics and the famous axial U(1) problem of QCD (eta and etaprime meson physics) is also highlighted. Sample Chapter(s). Chapter 1: Introduction (159 KB). Contents: Spin Experiments and Data; Dispersion Relations and Spin Sum Rules; g 1 Spin Sum Rules; Fixed Poles; The Axial Anomaly, Gluon topology and g (0) A; Chiral Symmetry and Axial U(1) Dynamics; QCD Inspired Models of the Proton Spin Problem; The Spin-Flavour Structure of the Proton; QCD Fits to g 1 Data; Polarized Quark Distributions; Polarized Glue o g(x, Q 2); Transversity; Deeply Virtual Compton Scattering and Exclusive Processes; Polarized Photon Structure Functions; Conclusions and Open Questions: How Does the Proton Spin?. Readership: Academics, as well as physicists working on particle and nuclear physics at the interface of theory and experiment. It is suggested that the observed universality of the transverse momentum squared distribution for the meson resonances eta, rho, .omega., f and K* in soft hadron-hadron interactions arises because they are dominantly produced as a result of quark-antiquark fusion (recombination). The universal value of the slope parameter is then interpreted as due to the intrinsic transverse momentum (k/sub T/) of the quarks which yields the values /sub q/ = 0.36 +- 0.01 GeV/c and k/sub T/2 /sub q/ = 0.16 +- 0.01 (GeV/c)2. This memorial volume is dedicated to physicist Gerald E Brown (1926–2013) or 'Gerry' as he was known to his many students, postdocs, colleagues and friends. As written by one of the contributors to this book, "Gerry was an inspiring father figure for generations of theoretical nuclear physicists and a great human being". This book covers a wide range of topics in nuclear physics, including nuclear structure, two- and three-body nuclear forces, strangeness nuclear physics, chiral symmetry, hadrons in dense medium, hidden local symmetry, heavy quark symmetry, cosmic neutrinos, nuclear double-beta decay, neutron stars, gravitational waves, renormalization group methods, exotic nuclei, electron ion collider (EIC), and much more. Most of the authors are Gerry's former students and collaborators. We hope readers will find this book very interesting not only for its physics content but also for the window it gives into Gerry's personal legacy and humanity. This book has vivid recollections of Gerry at Stony Brook, Princeton and Copenhagen, together with his humor and his very special intuitive way of thinking. This book comprises an introduction to the theory of the

weak interaction of elementary particles. The author outlines the current situation in weak interaction theory and discusses the prospects for the coming decade. The reader is familiarized with simple theoretical techniques for the calculation of decay rates, interaction cross-sections and angular and spin correlations.