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3.4.1 Radiative Muon Capture; 3.5 Near Threshold Pion Electroproduction; 3.6 Neutral Current Interactions; 3.6.1 Elastic Neutrino Scattering; 3.6.2 Parity Violation in Elastic Electron Scattering; 4 Deep-Inelastic Lepton Scattering; 4.1 Parton Model; 4.2 Scaling Violations; 4.3 Neutrino Deep-Inelastic Scattering; 4.4 Sum Rules; 4.4.1 Gross-Llewellyn-Smith Sum Rule; 4.4.2 Adler Sum Rule; 4.4.3 Momentum Sum Rule; 4.4.4 Gottfried Sum Rule; 4.5 Experimental Results for Unpolarized Targets; 4.6 Spin Dependent Structure Functions; 4.6.1 Spin Structure Function g_1 ; 4.6.2 Bjorken Sum Rule; 4.6.3 Ellis-Jaffe Sum Rule; 4.6.4 Transverse Spin Structure Function g_2 ; 4.7 Qualitative Understanding of Parton Distributions; 4.7.1 Counting Rules; 4.7.2 Small- x Behaviour; 4.7.3 Formal Parton Model; 4.8 Off-Forward Parton Distributions; 5 Elements of QCD; 5.1 Basic Lagrangian; 5.2 Feynman Rules; 5.2.1 Gauge Invariance; 5.2.2 Free Propagators and Interactions; 5.3 Renormalization; 5.3.1 Renormalization Scale; 5.3.2 Renormalization of the Gauge Coupling Constant; 5.4 Renormalization Group; 5.4.1 Running Coupling; 5.4.2 Asymptotic Freedom; 5.5 Deep Inelastic Scattering: Operator Product Expansion; 5.6 Deep Inelastic Scattering within QCD; 5.6.1 Connection to Moments of the Structure Functions; 5.6.2 Flavour Structure; 5.6.3 Non-singlet Case; 5.6.4 Singlet Case; 6 Aspects of Non-Perturbative QCD; 6.1 Symmetries, Currents and Anomalies; 6.1.1 Baryon and Flavour Currents; 6.1.2 Massless Quarks: Chiral Symmetry; 6.1.3 Spontaneous Breaking of Chiral Symmetry; 6.1.4 Dynamical Symmetry Breaking and Fermion Mass Generation; 6.1.5 A Schematic Model: Nambu and Jona-Lasinio; 6.1.6 The Axial Anomaly; 6.1.7 Scale Invariance and the Trace Anomaly

Sommario/riassunto

As the only stable baryon, the nucleon is of crucial importance in particle physics. Since the nucleon is a building block for all atomic nuclei, there is a need to analyse its structure in order to fully understand the essential properties of all atomic nuclei. After more than forty years of research on the nucleon, both the experimental and theoretical situations have matured to a point where a synthesis of the results becomes indispensable. Here, A.W. Thomas and W. Weise present a unique report on the extensive empirical studies, theoretical foundations and the different models of th
