This book provides a pedagogical introduction to the perturbative and non-perturbative aspects of quantum chromodynamics (QCD).

Introducing the basic theory and recent advances in QCD, it also reviews the historical development of the subject up to the present day, covering pre-QCD ideas of strong interactions such as the quark and parton models, the notion of colours, current algebra and the *S*-matrix approach. The author then discusses tools of quantum field theory, the symmetry and quantization of gauge theory, techniques of dimensional regularization and renormalization, QED high-precision tests, deep inelastic scattering and hard processes in hadron collisions, hadron jets, and inclusive processes in e + e− annihilations. Other topics include power corrections and the technologies of the Shifman–Vainshtein–Zakharov (SVZ) operator product expansion, renormalizations and phenomena beyond the SVZ expansion. The final parts of the book are devoted to modern non-perturbative approaches to QCD, such as lattice and effective theories, and the phenomenological aspects of QCD spectral sum rules.

The book will be a valuable reference for graduate students and researchers in high-energy particle and nuclear physics, both theoretical and experimental.

This title, first published in 2005, has been reissued as an Open Access publication on Cambridge Core.

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QCD AS A THEORY OF HADRONS

From Partons to Confinement

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