

# Outline of the book

This book provides:

- A pedagogical introduction to the perturbative and non-perturbative aspects of Quantum Chromodynamics (QCD), which is expected to be accessible by pre-Ph.D. students who want to learn this field.
- A status of the modern developments in the field.
- An update of the different results presented in the older though successful review [2] and book [3], taking into account the developments of the field within these past 10 years.
- An extension and improvements of the presentation used in these previous review and book, where the QSSR results are compared with those from other non-perturbative approaches.

The book is divided into ten parts:

- In the first part, one starts from a general introduction to particle physics and historical survey on the developments of strong interactions prior to QCD. Then, we discuss the main ideas and basic tools of the field.
- In the second part, we present the gauge theory aspect of QCD.
- In the third part, we discuss in details the most popular techniques of dimensional regularization and renormalization and discuss some of its applications both in QCD and QED.
- In the fourth part, we present different QCD hard deep inelastic processes at hadron colliders, and discuss different unpolarized and polarized structure functions.
- In the fifth part, we present the QCD hard processes in  $e^+e^-$  processes and discuss jets, fragmentation functions and totally inclusive processes.
- In the sixth part we summarize QCD tests and  $\alpha_s$  measurements.
- In the seventh part, we discuss power corrections and mainly the theoretical basis and technologies of the Shifman–Vainshtein–Zakharov operating product expansion (OPE).
- In the eighth part, we present a compilation of different QCD two-point functions obtained from perturbative calculations and the SVZ-expansion. These expressions are basic ingredients for various phenomenological applications.
- In the ninth part, we present different aspects of modern non-perturbative approaches to QCD.
- In the tenth part, we present extensive phenomenological aspects of QCD spectral sum rules.
- The Appendices collect different useful conventions and formulae for QCD practitioners.
- The Contents, References and Index are useful for a quick guide for readers of the book.

