

Modern status of heavy quark sum rules in QCD *

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Abstract

We briefly report the modern status of heavy quark sum rules (HQSR) based on stability criteria by emphasizing the recent progresses for determining the QCD parameters (α_s , $m_{c,b}$ and gluon condensates) where their correlations have been taken into account.

Keywords: QCD spectral sum rules, QCD coupling α_s , Hadron and Quark masses, QCD condensates.

1. Introduction

QCD spectral sum rules (QSSR) à la SVZ [1, 2] have been applied since 41 years ¹ to study successfully the hadron properties (masses, couplings and widths) and to extract some fundamental QCD parameters (α_s , quark masses, quark and gluon condensates,...).

In this mini-review, we concentrate on the determinations of the previous QCD parameters from heavy quark sum rules and shortly comment on the uses of these sum rules for extracting the masses and couplings of the molecules and tetraquark states.

We emphasize that the analysis of the correlations of the previous QCD parameters leads to a noticeable improvement of their determinations and gives an understanding of the apparent discrepancy between some earlier estimates.

References

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¹References to original works, reviews and books prior 2004 can be found in the books and reviews [3–5]