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More on spectral sum rules

QSSR have wider applications and can also be applied to theories other than QCD as it is based on first principles of analyticity and duality.

58.1 Some other applications in QCD

Some other applications of QSSR have been already reviewed in details in the book [3], which we list below:

- Baryons at large N_c.
- String tension from Wilson loops.
- Relation between lattice correlators and chiral symmetry breaking in the continuum limit.
- Two-dimensional QCD.

58.2 Electroweak models with dynamic symmetry breaking

QSSR has been also extended in order to give dynamic constraints on fermions and W, Z bosons assumed to be bound states of preons (haplons) where the structures may manifest at the TeV scale. The analysis has been done by assuming that at that scale, one can have a strong interaction theory of preons that is closely analogous to QCD describing the electroweak interactions, with the exception that one has to be careful on the chirality of the theories:

- In [868] and [869],[1] (reviewed in [870]), QSSR (Laplace and FESR) have been used in order to test the consistency of the compositeness assumption for the W and Z bosons and its spin zero partners, in the haplon model proposed by Fritzsch and Mandelbaum [871],[2] leading to a duality constraint between the boson masses and couplings with the continuum threshold (compositeness scale).
- In [873], QSSR has been used for an alternative derivation of the Dashen formula and some constraints among the Goldstone parameters with the condensate in supersymmetric QCD.
- In [874], analogous constraints have been derived between the 'composite' fermions and the vacuum structure of the (non)-supersymmetric theory, where it is found that for supersymmetric theories, there are unlikely to be composite fermions below the TeV scale.

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[1] Some phenomenological implications of the scenario are also discussed in this paper.
[2] However, the obtained constraints are more general and can be applied to some other classes of composite models discussed in [872].