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Renormalons of the QCD spectral function in the large-beta$_0$ limit and R(s)

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Rernormalons of perturbation theory are the singularities of the series that appear once the Borel transform - which consists, in essence, in an inverse Laplace transform - is applied. These singularities can lead to badly behaved series, and are particularly important in QCD at relatively low energies, where the coupling is not so small (due to asymptotic freedom) but the perturbative QCD treatment can still be applied. In the present case, we are interested in studying renormalons of the QCD perturbative series and its implications to R(s), the celebrated observable defined as the ratio between the cross section for the electroproduction of hadrons and that of muons. Here, we focus on the renormalons of the QCD spectral function, which is the imaginary part of the correlator divided by pi, and is the ingredient for the perturbative prediction of R(s). (1) We exploit results in the so-called large-beta$_0$ limit, where the series is known to all orders in the strong coupling. Our aim is to investigate the recently observed tension between perturbative QCD and BES-III experimental data, which could have implications for the data-driven approach to the hadronic vacuum polarization contribution to the muon anomalous magnetic moment, known and denoted simply as g-2. (2)

Palavras-chave: Renormalons; Large-beta$_0$; Spectral function.

Agência de fomento: Sem auxílio

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