# Reconciling the FOPT and CIPT predictions for the tau hadronic spectral function moments

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Parallel Talk | E: QCD and New Physics | Parallels Track E

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## Descrição

The discrepancy between the *fixed-order* (FOPT) and *contour-improved* (CIPT) expansions for tau hadronic spectral function moments has been a subject of intense investigations for more than a decade and constituted a major theoretical uncertainty for strong coupling determinations from hadronic tau decay spectral data. Recently, it has been shown by some of us that a discrepancy between the FOPT and CIPT expansions arises in the presence of IR renormalons in the underlying Adler function perturbation series, and that the CIPT expansion is inconsistent with the standard form of the OPE corrections. The observed CIPT-FOPT discrepancy at the 5-loop level may be due to this property. The discrepancy that is caused by the IR renomalon associated to the gluon condensate OPE correction plays the most important numerical role. We show that the FOPT and CIPT expansions can be reconciled by adopting a renormalon-free scheme for the gluon condensate that is in close analogy to scheme changes from the pole quark mass to short-distance heavy quark masses. This removes the discrepancy between the FOPT and CIPT expansions, improves their convergence and may lead to more precise determinations of the strong coupling. In the talk we review the conceptual background of the original FOPT-CIPT discrepancy related IR renormalons and show how the discrepancy is removed exactly in large-order renormalon models. We demonstrate how well the scheme can be applied in practical phenomenological analyses based on the known loop corrections, where the strength of the gluon condensate renormalon is only known approximately and uncertainties related to scheme-variations for the renormalon-free gluon condensate must be accounted for.

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