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How to achieve precise prediction from a fixed-order perturbative QCD calculation ?

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We suggest a novel single-scale setting approach under the principal of maximum conformality (PMC) for eliminating the conventional renormalization scheme-and-scale ambiguities following the idea of intrinsic conformality. It has been shown that the intrinsic conformality ensures the scale-invariance at each order, and vice versa. We call this newly suggested single-scale method as the PMC_{∞}-s approach, in which an overall effective strong coupling constant, and hence an overall effective scale, is achieved by using all the known type of RG-involved non-conformal terms. Its resultant conformal series is scale-invariant and satisfies all the RG requirements. We also demonstrate that it is equivalent to the previously suggested PMC single-scale setting approach (PMCs), which further indicates that all the correctly RG-involved single-scale setting approaches are in fast the same. Finally, by using the Higgs decays to two gluons up to five-loop level as an explicit example, we show how the PMC_{∞}-s works. The method is applicable to any perturbatively calculable physical quantities.

Summary

Primary authors: YAN, Jiang (重庆大学); WU, Zhi-Fei (重庆大学); SHEN, Jian-Ming (湖南大学); WU, Xing-Gang (重庆大学)

Presenter: YAN, Jiang (重庆大学)

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