

Anomalous Dimensions via on-shell Methods: Operator Mixing and Leading Mass Effects

Thursday 13 June 2024 10:30 (10 minutes)

We elaborate on the application of on-shell and unitarity-based methods for evaluating renormalization group coefficients, and generalize this framework to account for the mixing of operators with different dimensions and leading mass effects. We derive a master formula for anomalous dimensions stemming from the general structure of operator mixings, up to two-loop order, and show how the Higgs low-energy theorem can be exploited to include leading mass effects. A few applications on the renormalization properties of popular effective field theories showcase the strength of the proposed approach, which drastically reduces the complexity of standard loop calculations. Our results provide a powerful tool to interpret experimental measurements of low-energy observables, such as flavor violating processes or electric and magnetic dipole moments, as induced by new physics emerging above the electroweak scale.

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Session Classification: Session