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Alien operators for PDF evolution

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Understanding the scale dependence of parton distribution functions is vital for precision physics at hadron colliders. The well-known DGLAP evolution equation relates this scale dependence to the QCD splitting functions, which can be calculated perturbatively in terms of the anomalous dimensions of leading-twist gauge-invariant operators. The computation of the latter in general requires one to take into account contributions of gauge-variant (or alien) operators. In this talk, we discuss the systematic study of these alien operators at arbitrary spin. Specifically, using generalized BRST symmetry relations, we derive the one-loop couplings and Feynman rules of the aliens necessary to perform the operator renormalization up to four loops in QCD. This provides an important step towards the determination of the four-loop splitting functions which will be of significant phenomenological importance at future colliders.

Secondary track

T10 - Quantum Field and String Theory

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