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External-leg corrections as an origin of large logarithms

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Obtaining precise theoretical predictions for both production and decay processes of heavy new particles is of great importance to constrain the allowed parameter space of BSM models and to properly assess the sensitivity for discoveries and for discriminating between different possible BSM scenarios.
In this context, it is well known that large logarithmic corrections can appear in the presence of widely separated mass scales. In this talk, I will point out the existence of possible large, Sudakov-like, logarithms in external-leg corrections of heavy scalars. In constrast with usual Sudakov logarithms, these can furthermore potentially be enhanced by large trilinear couplings. I will show that such large logarithms are associated with infrared singularities and examine several techniques to address these. In addition to a discussion at one loop, I will also present the derivation of the two-loop corrections containing this type of large logarithms, pointing out in this context the importance of adopting an on-shell renormalisation scheme. I will illustrate these calculations and results for a simple scalar toy model as well as for several decay processes involving heavy scalars in the Minimal Supersymmetric Standard Model (MSSM) and the singlet-extended Two-Higgs-Doublet Model (N2HDM).

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