Contribution ID: **37** Type: **not specified**

Methods for on-shell matching

Wednesday 12 June 2024 16:00 (10 minutes)

Effective field theories (EFTs) have become an essential tool in the search of new physics beyond the Standard Model. The calculation of the Wilson coefficients of the EFT for specific new physics models is usually performed by matching off-shell one-light-particle irreducible Green functions, which requires an off-shell basis of effective operators. This so-called Green's basis includes some operators that are redundant and can be written in terms of a minimal, physical basis when computing on-shell observables. This reduction is traditionally achieved by applying field redefinitions and equations of motion (EOMs). However, the absence of a systematic way of identifying the optimal field redefinition, coupled with the limitation that EOMs are only valid up to linear order in the perturbative expansion, calls for the search of a more systematic approach to the reduction of the Green's basis.

Our proposed method consists on performing a tree-level on-shell matching between the Green's and the physical bases. This matching requires a delicate cancellation between non-local contributions in both theories that we sidestep by evaluating the amplitudes with randomly generated physical momenta. Here, we present the application of this procedure to the dimension-eight Green's basis reduction of a toy model consisting on a real scalar field with $\mathbb{Z}_2$ symmetry. Furthermore, we derive the reduction of a large set of operators in the SMEFT as well as some examples of renormalization group equations.

Authors: Ms VILCHES BRAVO, Fuensanta (Universidad de Granada); LÓPEZ MIRAS, JAVIER; SANTIAGO, Jose (Universidad de Granada (ES)); CHALA, Mikael (Universidad de Granada)

Presenter: LÓPEZ MIRAS, JAVIER

Session Classification: Session