

SMEFT vs UV-completion - BSM-effects in the Tails of Distributions

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As the progress to reach higher and higher centre-of-mass energies seems to take longer and longer, the need to make the most out of the data available to us has increased. One approach to studying Beyond the Standard Model (BSM) effects without being able to produce new particles on-shell is with the framework of *Effective Field Theories* (EFTs). These models use Lagrangians with operators of dimensionality higher than dimension four to parametrise new physics order by order in inverse powers of some energy scale associated with the new 'heavy' physics. The coupling coefficients multiplying these operators, often referred to as *Wilson Coefficients* may in principle be measured. Once redundancies related to e.g symmetries have been accounted for with the help of a so called *basis*, such Wilson Coefficients may uniquely parametrise the new physics up to higher order corrections.

This in principle establishes an opportunity to measure the Wilson Coefficients in the Standard Model as an Effective Field Theory (SMEFT) once and for all and then simply compare theoretically computed Wilson Coefficients to the experimentally measured once to rule out points in parameter space for various BSM models. The problem of whether or not a given order in the expansion of higher-dimensionality operators accurately reproduces the results of a UV-complete BSM-model remains a subject to be studied. For modern day colliders, discrepancies between an EFT at a given order and a full UV-model would most likely be detectable in the high-energy tails in distributions of observables.

In my talk, I will discuss some relevant background on EFTs as well as my work on studying how well the SMEFT with appropriately set Wilson Coefficients reproduces the distributions of observables compared to a full UV-extension of the Standard Model. I will discuss how I move from Lagrangians, both EFT and UV model Lagrangians, to histograms of observables using various types of pre-existing computer software and I will also display some example histograms. Finally, I will conclude with an outlook on how I plan on proceeding moving forward, e.g with performing different types of statistical tests.