

# An Effective Field Theory approach using top quark polarisation and spin correlations in $t\bar{t}$ production at the LHC

Andre Zimmermann-Santos,\* Afiq Anuar, Alexander Grohsjean,  
Christian Schwanenberger.

Deutsches Elektronen-Synchrotron, DESY Hamburg

\* andre.zimmermann@desy.de

The Effective Field Theory (EFT) approach provides a systematic and model-independent way to search for new physics. It assumes new heavier particles exist outside the energy reach of the LHC. Nonetheless, their effects can be parametrized by new effective interactions constructed with Standard Model (SM) fields. Hence, new couplings can be identified and measured via small deviations from SM predictions.

In this study, we aim to use particular sets of observables related to the top quark polarisation and spin correlation in top quark pair events with two leptons in the final state. Each of those sets are sensitive exclusively to a sub-set of EFT couplings. This provides a natural way of uncorrelating EFT effects, allowing limits on their strength to be drawn with unprecedented precision. We investigate various EFT scenarios using the *dim6top* and *SMEFTatNLO* models. Subsequently, we also verify necessary translations between different EFT formalism. Our findings pave the way for the EFT interpretation using full CMS Run 2 data.