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Unitarized EFT for a strongly interacting BSM Electroweak Sector coupled with $t\bar{t}$

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We use the nonlinear electroweak chiral Lagrangian (EChL) and the mathematical properties of the S-matrix (encoded into unitarization methods) for sampling the collider phenomenology of a (hypothetical) strongly interacting electroweak symmetry breaking sector (EWSBS) coupled with $t\bar{t}$ states. The EChL Lagrangian is used as an intermediate energy approximation ($E \sim 500$ GeV), where the Equivalence Theorem is valid but the EFT does not violate unitarity.

Of highest interest is the EWSBS and the description of the scattering processes between longitudinally polarized gauge bosons and the Higgs-like particle discovered at the LHC. Because $t\bar{t}$ channel is more accessible at the LHC, we couple such processes with $t\bar{t}$. Hence, we use the $A[W_L, Z_L, h \rightarrow W_L, Z_L, h]$ scattering amplitudes computed at NLO, and consider a weak (perturbative) coupling with $t\bar{t}$ states, in order to compute the $A[W_L, Z_L, h \rightarrow t\bar{t}]$ scattering amplitudes.

Unitarization procedures are used to extend the validity range of the EFT up to the first resonance, where the EFT perturbative expansion breaks down. We develop a modified version of several unitarization procedures in order to simplify the computation by considering that coupling with $t\bar{t}$ states is perturbative..

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