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Matching Higgs triplets to HEFT: non-decoupling and polar coordinates

We consider real Higgs triplet extension to Standard Model and match it to a non-linear effective field theory, the Higgs Effective Field Theory(HEFT). For the decoupling and non-decoupling regimes different power counting methods are adopted, the effective Lagrangians at leading order are derived. Their effects in physical observables are plotted. Later we present the parametrization of the Higgs doublet in polar coordinates, and get effective Lagrangian at next-to-leading order. New parametrization method allow us to derive all orders as it overcomes the kinematic mixing between Nambu-Goldstone bosons and new heavy particles. We also use it to the complex Higgs triplet in Type-II seesaw model.

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