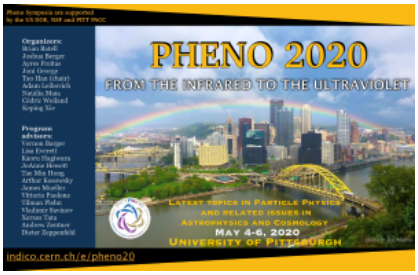

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Beyond the Standard Model Effective Field Theory: The Singlet Extended Standard Model

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One of the assumptions of simplified models is that there are a few new particles and interactions accessible at the LHC and all other new particles are heavy and decoupled. Effective field theory (EFT) methods provide a consistent method to test this assumption. Simplified models can be augmented with higher order operators involving the new particles accessible at the LHC. Any UV
completion of the simplified model will be able to match onto these beyond the Standard Model EFTs (BSM-EFT). In this paper we study the simplest simplified model: the Standard Model extended by a real gauge singlet scalar. In addition to the usual renormalizable interactions, we include dimension-5 interactions of the singlet scalar with Standard Model particles. As we will show, even when the cutoff scale is 3 TeV, these new effective interactions can drastically change
the interpretation of Higgs precision measurements and scalar searches. In addition, we discuss how power counting in a BSM-EFT depends strongly on the processes and parameter space under consideration. Finally, we propose a χ^2 method to consistently combine the limits from new particle searches with measurements of the Standard Model. Unlike imposing a hard cut off on heavy resonance rates, our method allows fluctuations in individual channels that are consistent with global fits.

Summary

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