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Functional matching of a heavy scalar singlet onto the type-I seesaw and the Higgs potential

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Starting from a conformal model for the type-one seesaw, we use functional matching to integrate out a heavy scalar singlet completely at the one-loop level. Before integration, the vacuum expectation value of the heavy scalar singlet generates a mass for the heavy right-handed neutrinos and modifies the Higgs potential. The one-loop level matching results in meaningful modifications to the potential and heavy right-handed masses that are different from those discussed in literature [1, 2]. Lastly, we will discuss the possible connection to "neutrino option"conformal models that generate the Higgs potential from heavy neutrino loop effects [3].
[1] M. Jiang, N. Craig, Y.-Y. Li, and D. Sutherland, Complete One-Loop Matching for a Singlet Scalar in the Standard Model EFT, J. High Energ. Phys. 2019, 31 (2019). [2] D. Zhang and S. Zhou, Complete One-Loop Matching of the Type-I Seesaw Model onto the Standard Model Effective Field Theory, J. High Energ. Phys. 2021, 163 (2021). [3] I. Brivio and M. Trott, Examining the Neutrino Option, J. High Energ. Phys. 2019, 107 (2019).

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