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Standard Model EFT and Extended Scalar Sectors

One of the simplest extensions of the Standard Model is the inclusion of an additional scalar multiplet, and we consider scalars in the $SU(2)$L singlet, triplet, and quartet representations. We examine models with heavy neutral scalars, $mH \sim 1$—2 TeV, and the matching of the UV complete theories to the low energy effective field theory. We demonstrate the agreement of the kinematic distributions obtained in the singlet models for the gluon fusion of a Higgs pair with the predictions of the effective field theory. The restrictions on the extended scalar sectors due to unitarity and precision electroweak measurements are summarized and lead to highly restricted regions of viable parameter space for the triplet and quartet models.

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