

Higgs interference effect at the one-loop level in the 1-Higgs-Singlet extension of the Standard Model

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A detailed study of Higgs interference effects at the one-loop level in the 1-Higgs-Singlet extension of the Standard Model (1HSM) is presented for the WW and $t\bar{t}$ decay modes with fully leptonic WW decay. We explore interference effects for benchmark points with a heavy Higgs mass that significantly exceeds $2m_t$. In the WW channel, the Higgs signal and the interfering continuum background are loop induced. In the $t\bar{t}$ channel, which features a tree-level background, we also calculate the interference with the one-loop background, which, due to the appearance of the absorptive part, is found to dominate the normalization and shape of differential Higgs distributions and should therefore be considered in experimental analyses. The commonly used geometric average K-factor approximation is not appropriate. We calculate with massive top and bottom quarks. Our 1HSM and SM implementation in Sherpa+OpenLoops is publicly available and can be used as parton-level integrator or event generator.

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