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Scalar Singlets in Particle Physics & Cosmology

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We study the phenomenology of the Standard Model (SM) Higgs sector extended by two singlet scalars. The model has two CP-even scalars $h_{\{1,2\}}$ where one of them corresponds to the observed 125 GeV scalar resonance; in addition to a scalar singlet that can be stable and plays the role of a dark matter candidate. We discuss the effect of the extra scalars on the Higgs triple couplings and show that it can receive up to 150% correction at one-loop, which leads enhanced production at the future International Linear Collider. Finally, we discuss a special case where the two CP-even scalars are degenerate around the 125 GeV mass value, and we show that the triple Higgs coupling can play an important role to distinguish this scenario from other popular extensions of the SM.

Primary author: Dr AHRICHE, Amine (Jijel U.)

Co-authors: Prof. ARHRIB, Abdessalam (Tanger U.); Prof. NASRI, Salah (UAE U.)

Presenter: Dr AHRICHE, Amine (Jijel U.)

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