Contribution ID: **267** Type: **not specified**

Constraining the real scalar singlet extension of the SM

The real scalar singlet extension of the Standard Model (SM) represents one of the simplest and most theoretically motivated scenarios beyond the SM, with potential implications for electroweak baryogenesis and vacuum stability. In this work, we present an up-to-date study of the model parameter space under current and projected constraints. We systematically combine indirect probes (precision Higgs measurements, trilinear coupling deviations), direct searches for heavy scalar resonances, and theoretical requirements including a strong first-order EWPT and ultraviolet vacuum stability. Our findings demonstrate that, while current data already constrain substantial regions of parameter space, future facilities, notably the High-Luminosity LHC (HL-LHC) will significantly enhance sensitivity, testing the majority of the viable parameter space. This benchmark model thus provides a valuable reference for probing electroweak symmetry breaking and early universe dynamics.

Authors: LITIM, Daniel (University of Sussex); Prof. MALTONI, Fabio (Universite Catholique de Louvain (UCL) (BE) and Università di Bologna); HILLER, Gudrun (Technische Universitaet Dortmund (DE)); Mr XIA, Guotao; RAMSEY-MUSOLF, Michael (U. Massachusetts Amherst); BOSSE, Moritz; TENTORI, Simone (UCLouvain)