

On the robustness of the indirect determination of the width of the detected Higgs boson

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Experimental collaborations at the LHC provide indirect measurements of the total width of the discovered Higgs boson, assuming that on-shell coupling modifiers remain unchanged in the off-shell regime. However, new physics effects from realistic models with extended scalar sectors could invalidate this assumption and challenge the robustness of the indirect total width measurement. We investigate specific cases where an additional scalar appears as a resonance or at loop level in the $gg \rightarrow ZZ$ channel, including interference effects with the SM Higgs. Our results indicate that the phenomenological impact of such new physics effects on the total width measurement is generally small, except in certain parameter regions which can nonetheless be constrained from beyond the Standard Model analyses searching for extra scalars.

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