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Higgs-like particle decays into γZ and $\gamma\gamma$: Fingerprints of some non-supersymmetric models.

Recently, ATLAS and CMS experiments at the LHC put on light the relevant results in the measurement precision of the Higgs and BSM. In such a report, where the resonance direct search was made in the γZ channel, a mass adjustment distribution for the reconstructed Z boson and photon was established. Thus, simultaneously with the signal-from-background separation, the number of events has been perfectly described, and an excess signal approximately twice that expected by the Standard Model (SM) has been noticed, which is equivalent to a significance of 2.2 standard deviations. In this study, we examine how any possible new physics models can explain this excess, such as the CP-conserving Two-Higgs doublet model (2HDMs), the Inert doublet model (IDM), and the Higgs triplet model (HTM). While considering the available theoretical and most recent experimental constraints, the phenomenological implications of existing extensions beyond the SM are discussed, and prospects for precision studies of these processes are described. We have found that the excess could be explained in the BSM frameworks studied, depending on the charged and double-charged Higgs boson masses.

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