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Probing mass degeneracies in Supersymmetric Higgs sectors at the LHC SHOAIB MUNIR, ICTP-East African Institute for Fundamental Research, BISWARANJAN DAS, Zewail City of Science and Technology, Egypt, STEFANO MORETTI, University of Southampton, UK, POULOSE POULOSE, IIT Guwahati, India — A large variety of data from the Large Hadron Collider (LHC) points to new physics beyond the Standard Model (SM), with a Higgs sector containing more than one state. In these extended Higgs sectors, it is possible that the mass difference between two (or more) of the Higgs bosons is comparable to the sum of their decay widths, which would result in quantum mechanical interference between their propagators. A particularly interesting possibility is that of two Higgs bosons having masses so close to 125 GeV each that they have hitherto appeared as a single resonance at the LHC, due to insufficient mass resolution in any of the decay channels. We analyzed the interference effects for such Higgs bosons, produced in gluon fusion at the 14 TeV LHC and decaying into a pair of photons, in the theoretical framework of the Next-to-Minimal Supersymmetric Standard Model. We also investigated the alternative scenario, that may arise in this model, of a strong mass-degeneracy between the two additional scalars, much heavier than 125 GeV, decaying into pairs of tau leptons or of the 125 GeV SM-like Higgs states. For all these cases, we have found sizeable interference effects, which invalidates the narrow-width approximation commonly employed to estimate production rates.

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