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2-photon decay rate of the Scalar boson in the Inert Doublet Model

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Loop induced 2-photon decay of the Standard Model (SM)-like scalar boson, being sensitive to the existence of new charged particles, may provide insight into the scalar sector of extensions of the SM as well as some constraints on the parameter space thereof. Motivated by experimental hints on the possibility of deviating from the SM predictions of the 2-photon decay rate of the SM-like scalar boson, the analysis of this rate in the framework of the Inert Doublet Model is presented. For the SM-like scalar boson mass equal 125 GeV, and taking into account the following constraints: vacuum stability, existence of the Inert vacuum, perturbative unitarity, electroweak precision tests and the LEP bounds, the regions in the parameter space where the diphoton decay rate is enhanced were found. The resulting regions are confronted with the allowed values of the Dark Matter (DM) mass. Constraints on the mass of the charged scalar, the DM and scalar couplings are presented.

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