

The BLSSM explanation to the excess at around 95 GeV at the LHC

The search for a light Higgs state performed by the CMS collaboration in the di-photon decay channel with integrated luminosity 35.9 fb^{-1} and center of mass energy $\sqrt{s} = 13 \text{ TeV}$ showed an excess of events of around 2σ for a mass hypothesis of around 95 GeV, which was later investigated by the ATLAS collaboration showing an excess of around 1.7σ at 95 GeV with integrated luminosity 140 fb^{-1} and $\sqrt{s} = 13 \text{ TeV}$. Primarily motivated by the CMS search, we probed the feasibility of a scenario with a light singlet scalar Higgs state in the 94–98 GeV range along with 125 GeV SM-like Higgs boson in the context of the B-L Supersymmetric Standard Model (BLSSM) in the light of the experimental results obtained by the CMS collaboration. In this work with the help of a Monte Carlo (MC) signal-background analysis, we found a reasonable compatibility of our BLSSM scenario with experimental data. Finally, we also drew a conclusion on the discovery potential of such a light Higgs state in the di-photon decay channel at the present and future LHC runs.

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