

Phenomenology 2019 Symposium



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Understanding recent collider excesses in light of light Higgs bosons

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Although the discovered scalar with a mass of 125 GeV appears to have the properties of the Standard Model Higgs, it remains a possibility that it belongs to an enlarged scalar sector containing other Higgs bosons waiting to be discovered. Motivated by the recent CMS and ATLAS diphoton excesses near 95 GeV, we consider a Type-I two-Higgs-doublet model in regions of high fermiophobia allowing for an enhancement in the $\gamma\gamma$ rate for scalars lighter than the Standard Model Higgs. We fix one CP-even neutral scalar to be SM-like with a mass of 125 GeV and consider separately the other CP-even neutral scalar or the CP-odd neutral pseudoscalar as the source of the observed signal excess. In both instances, we explore the parameter space and identify regions surviving experimental and theoretical constraints. We also consider the strength of the electroweak phase transition within the model and find regions where the transition is strongly first order, allowing for electroweak baryogenesis to explain the observed baryon asymmetry.

Summary

Authors: JOHNSON, Evan (Ohio State University); FOX, Patrick James (Fermi National Accelerator Lab. (US)); NO REDONDO, Jose Miguel (University of Sussex (GB))

Presenter: JOHNSON, Evan (Ohio State University)

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