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Resonant Double Higgs Production in the Singlet Extended Standard Model at the LHC

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The simplest extension of the Standard Model is the singlet extended Standard Model. This model adds a gauge singlet scalar, S , which has interactions with the Standard Model Higgs doublet. For a sufficiently heavy new scalar and in the absence of a Z_2 symmetry $S \rightarrow -S$, this model can lead to resonant double Higgs production, which leads to a significant increase in production rates over the predictions of the Standard Model. Many Standard Model extensions include singlets, so this extension is fairly generic. We determine benchmarks by maximizing the double Higgs production rate at the LHC in the singlet extended Standard Model. Within current experimental constraints, the branching ratio of the new scalar into two Standard Model-like Higgs bosons can be upwards of 0.76 and the double Higgs rate can be increased upwards of 30 times the Standard Model prediction for certain values of the new scalar mass.

Summary

This is a presentation of resonant double Higgs production benchmarks for the singlet extended Standard Model.

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