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Singlet-doublet mixing in NMSSM and approximate scale symmetries

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LHC Run I discovered the Higgs boson and revealed that it has properties almost
predicted by the SM, like spin, parity and couplings to the other SM particles.
If there exists additional light bosons having the same quantum numbers with the Higgs boson, they will mix with it through the off-diagonal mass terms.
This mixings modify the couplings of the Higgs boson and also generate couplings of the new bosons to the SM particles.
In this talk, we take the Next-to-Mininal Supersymmetric Standard Model as an example and discuss that approximate scale symmetries are useful to suppress the singlet-doublet mixing which prevents the Higgs boson mass achieving 125 GeV if the singlet-like boson is heavier than the Higgs boson and is tightly constrained from the LEP Higgs boson search if the singlet-like boson is lighter than the Higgs boson.

Summary

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