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Two Higgs doublet models with a new U(1) gauge symmetry

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In this talk, we discuss two Higgs doublet models in which a new U(1) gauge symmetry is introduced. We investigate if these models are allowed by current phenomenological data without introducing a scalar field except for two Higgs doublet ones. We find they are excluded by constraints from scalar boson decays associated with new gauge boson Z'. Then a dark vector-like fermion is introduced to modify branching ratio of Z' and we searched for allowed parameter region taking all the phenomenological constraints into account. Finally we show allowed region that can avoid all the constraints.

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