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Prospects for doubly charged scalar at the future colliders

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Summary

We studied various possibilities of doubly charged scalar frameworks in the light of low energy constraints, i.e., muon ($g-2$) and lepton flavor violation etc. First, we have calculated the contribution of doubly charged scalar to these low energy processes assuming some model independent couplings. The minimal BSM scenario involving doubly charged scalar is Higgs Triplet Model. We examined HTM with type-II seesaw mechanism, not restricted by custodial symmetry. We discussed the relationship between vacuum expectation value of the triplet v_Δ and $H^{\pm\pm}$ couplings with leptons, taking into account constraints on v_Δ coming from low energy studies connected with the ρ -parameter, muon $g-2$, lepton flavor violation (LFV) processes and neutrino oscillations (normal and inverse mass scenarios). $H^{\pm\pm}$ pair production and four-lepton final state at proton-proton LHC and e^+e^- collider within both the frameworks are analyzed and compared. Another popular model containing doubly charged scalar is Left-Right symmetry model. We study the prospects of doubly charged scalar in minimal Left-Right symmetric model at the future colliders hadrons and leptons.

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