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Nonstandard Higgs decays in the E6 inspired SUSY models

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We study the decays of the SM-like Higgs state within the E_6 inspired supersymmetric (SUSY) model based on the SM gauge group together with an extra $U(1)_N$ gauge symmetry under which right–handed neutrinos have zero charge. To ensure anomaly cancellation and gauge coupling unification the low energy matter content of this SUSY model involves three 27 representations of E_6 and a pair of $SU(2)$ doublets from additional 27 and $\overline{27}$. In addition, we impose a $\tilde{Z}_2^H$ symmetry to forbid tree–level flavor–changing transitions and the most dangerous baryon and lepton number violating operators. This model contain at least two states which are absolutely stable and can contribute to the dark matter density. One of them is the lightest SUSY particle (LSP) which is expected to be lighter than 1 eV forming hot dark matter in the Universe. The presence of another stable neutral state which is the lightest ordinary neutralino can account for all or some of the observed cold dark matter density. In this SUSY model the next–to–lightest SUSY particle (NLSP) also tend to be light. We argue that the NLSP with GeV scale mass can result in the substantial branching ratio of the nonstandard decays of the SM–like Higgs boson into NLSPs.

Summary

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