TẠP CHÍ KHOA HỌC
Khoa học Tự nhiên và Công nghệ

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(30): 97- 103

INVESTIGATION OF HIGGS BOSON DECAY IN THE MINIMAL FLIPPED 3-3-1 MODEL

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Abstract: *This paper reported an investigation in which minimal flipped* $SU(3)_C \otimes SU(3)_L \otimes U(1)_X$ *(MF331) model was used. It suggested the way the phenomenological and theoretical aspects of the known flipped 3-3-1 model could be revised. MF331 not only has a modified first generation in the lepton component that is different from the remaining generations, but also lacks the new Higgs doublet. This makes it possible for the physical Higgs bosons to couple in flavor-changing ways at the tree level. It may support large branching ratios for lepton flavor-violating decay of SM-like Higgs bosons like* $h \to \mu\tau$.

Keywords: *Standard model, minimal flipped 3-3-1 model, Higgs boson decay, anomalies.*

I. INTRODUCTION

The Standard Model (SM) is an imperfect theory. Only roughly 5% of the universe's mass-energy density is explained. About 25% of the dark matter and 70% of the dark energy are yet unknown. Beside that the SM also needs to be expanded in order to address a number of well-known issues, including matter-antimatter asymmetry, dark matter, cosmic inflation, the question of neutrino masses and neutrino oscillations which have been experimentally verified, the reason for the existence of only three fermion families, strong CP conservation, and electric charge quantization.

The discovery of the Higgs boson by experiments at the Large Hadron Collider in July 2012 (LHC) [1-5] with a mass of approximately 125.09 GeV reaffirms the remarkable success of the SM) at low energies below several hundred GeV while also presenting an additional opportunity for direct searches of new physics beyond the SM. The manifestation of the new physics may take the form of Higgs boson properties that differ from those expected by the SM. Unusual interactions of the recently discovered 125 GeV Higgs-like resonance, such as flavor-violating Higgs couplings to leptons and quarks, express one of those features. These interactions could induce non-zero lepton flavor-violating (LFV) Higgs boson decays such as $h \to l_i l_j$ with $i \neq j$. The most stringent limits on the branching ratios of LFV decays of the SM-like Higgs boson is $Br(h \to \mu\tau, e\tau) \ll O(10^{-3})$, from the CMS Collaboration using data received at a center-of-mass energy of 13 TeV. Different mechanisms can produce the flavor-violating processes that are predicted by the Higgs boson that is similar to SM in the physics beyond SM, which might be near to the sensitivity of future accelerators. Based on the extension of the $SU(2)_L \otimes U(1)_Y$ gauge symmetry of the SM to the $SU(3)_L \otimes U(1)_X$, there is a class of models called 3-3-1 models which inherit new LFV sources. The 3-3-1 model is also effective at resolve other pressing physics problems, including those involving the number of fermion generation, neutrino mass and mixing [6 - 12], dark matter, dark energy [13], strong CP problem [14], matter-antimatter asymmetry [15] and electric charge quantization [16]. For resolving recent experimental findings at the LHC, improved versions of simplification have been proposed. The difference in each version is determined through the content of the scalar and fermion. The minimal flipped (MF331) model is an improvement of the flipped model (F331)[11], which contains a minimum scalar multiplets contents [36]. A delightful F331 proposal has been made[18], the first lepton family transforms differently than the remaining lepton families s and three quark families , in order to cancel the $[SU(3)_L]^3$ anomaly [19–22]. Queries about quark flavors [23–30] are consequently converted to queries about lepton flavors [24] by this inversion of quark and lepton configurations in comparison to the normal setup. Given that gauge principles govern both the lepton flavor-violating processes and the dark matter observables, the model is incredibly predictive. On the other side, the $[\text{gravity}]^2 U(1)_X$ anomaly disappears, validating the model all the way up to the Planck scale, in which quantum gravity starts to play a role [32, 33]. The flipped 3-3-1 model, which has been examined in [18, 31], has a scalar sector with some Higgs doublets that each include three triplets and one sextet, leading to dangerous lepton flavors violating Higgs decays [31, 32]. The MF331 is proposed as a solution to this issue because it only has two scalar triplets, one for 3-3-1 symmetry breaking and the other for electroweak symmetry breaking in the standard model. The model does not contain no new Higgs doublet. The model's scalar sector can now be calculated and predicted.

Despite the fact that the constraint on the SM-like Higgs boson at the LHC was investigated in [35], the implications for collider searches of precision physics bound on the SM-like Higgs bosons with flavor-violating couplings were not taken into account. In addition to lacking the new Higgs doublet, model MF331 also has a modified first generation in the lepton component that is distinct from the remaining generations. Therefore, it permits flavor--changing couplings of the physical Higgs bosons at the tree level. Large branching ratios for lepton flavor-violating decay of SM-like Higgs bosons like $h \to \mu\tau$ may be supported by it.

The remaining portions of this work are structured as follows. In Sec.II, we briefly review the flipped 3-3-1 model with minimal scalar content. Sec.III investigates the contributions of flavor violating Higgs couplings to SM-charged lepton at the tree lever into precision flavor observables, such as $h \to \mu\tau$. Finally, we summarize our results and conclude this work in Sec. IV.

II. A SUMMARY OF THE MF331 MODEL

Renato M. Fonseca and Martin Hirsch were the ones who first bring up the F331mode [18]. The extended $SU(3)_C \otimes SU(2)_L \otimes U(1)_X$ gauge group serves as the model's framework. The electric charge and hypercharge are additionally suitably expressed in the 3-3-1 symmetry as

$$Q = T_3 + \sqrt{3}T_8 + X, \qquad Y = \frac{1}{\sqrt{3}}T_8 + X \qquad (1)$$

where T_i, $i = 1,2,3,...,8$, and X are the $SU(3)_L$ and $U(1)_X$ generators, accordingly. To make the exotic fermion spectrum phenomenologically feasible, the coefficient of T_8 is fixed [18, 31]. The most important finding is that a sextet's $[SU(3)_L]^3$ anomaly is seven times greater than a triplet's $A(6) = 7A(3)$ [18, 31]. In contrast to the typical 3-3-1 approach this results in a flipped fermion content and family number solution, such that:

$$\psi_{1L} \equiv \begin{pmatrix} \xi^+ & \frac{1}{\sqrt{2}}\xi^0 & \frac{1}{\sqrt{2}}\nu_1 \\ \frac{1}{\sqrt{2}}\xi^0 & \xi^- & \frac{1}{\sqrt{2}}e_1 \\ \frac{1}{\sqrt{2}}\nu_1 & \frac{1}{\sqrt{2}}e_1 & E_1 \end{pmatrix} \sim (1, 6, -1/3) \qquad (2)$$

$$\psi_{\alpha L} \equiv \begin{pmatrix} \nu_{\alpha L} \\ e_{\alpha L} \\ E_{\alpha L} \end{pmatrix} \sim (1,3,-2/3) \quad (3)$$

$$Q_{aL} \equiv \begin{pmatrix} d_{aL} \\ -u_{aL} \\ U_{aL} \end{pmatrix} \sim (3,3^*,1/3), \quad (4)$$

$$e_{aR} \sim (,1,,-1), \quad E_{aR} \sim (1,1,-1) \quad (5)$$

$$u_{aR} \sim (3,1,2/3), \quad d_{aR} \sim (3,1,-1/3), \\ U_{aR} \sim (3,1,2/3) \quad (6)$$

where $a = 1,2,3$ and $\alpha = 2,3$ are family indices. The 3-3-1-1 groups are defined, correspondingly, for the quantum numbers in parentheses. The gravitational gauge anomaly is absent from the inverted fermion content. Three triplets and one sextet in the complex Higgs sector of the F331 model have the potential to trigger dangerous LFV in the Higgs decay. Thus, the MF331 model [36] was introduced, in which the fermion content is identical to that of the F331 model but the Higgs component is reduced to two scalar triplets,

$$\rho = \begin{pmatrix} \rho_1^+ \\ \rho_2^0 \\ \rho_3^0 \end{pmatrix} \sim (1,3,1/3), \quad (7)$$

$$\chi = \begin{pmatrix} \chi_1^+ \\ \chi_2^0 \\ \chi_3^0 \end{pmatrix} \sim (1,3,1/3), \quad (8)$$

where their vacuum expectation values (VEVs) take a specific form:

$$\langle \rho \rangle = \frac{1}{\sqrt{2}} \begin{pmatrix} 0 \\ v \\ \omega' \end{pmatrix}, \ \langle \chi \rangle = \frac{1}{\sqrt{2}} \begin{pmatrix} 0 \\ v' \\ \omega \end{pmatrix} \quad (9)$$

Due to ω, the 3-3-1 symmetry can be reduced to the standard model. Due to v, the gauge symmetry of the standard model is reduced to $SU(3)_C \otimes \mathrm{U}(1)_Q$. The VEVs must satisfy the conditions $v', \omega' \ll v, \omega$ in order to maintain compatibility with the SM and small neutrino masses.

The total Lagrangian consists of

$$\mathrm{L} = \mathrm{L}_{kinetic} + \mathrm{L}_{Yukawa} - V \quad (10)$$

Kinetic terms and gauge interactions are found in the first part.

$$\mathrm{L}_{kinetic} = \sum_F \bar{F} i \gamma^\mu D_\mu F + \sum_S (D^\mu S)^\dagger (D_\mu S) \\ -\frac{1}{4}(G_{i\mu\nu} G_i^{\mu\nu} + A_{i\mu\nu} A_i^{\mu\nu} + B_{\mu\nu} B^{\mu\nu}), \quad (11)$$

where F and S are multiplets of fermions and scalars, respectively. The forms of the covariant derivative and the field strength tensors are

$$D_\mu = \partial_\mu + i g_s t_i G_{i\mu} + i g T_i A_{i\mu} + i g_X X B_\mu, \\ G_{i\mu\nu} = \partial_\mu G_{i\nu} - \partial_\nu G_{i\mu} - g_s f_{ijk} G_{j\mu} G_{k\nu}, \\ A_{i\mu\nu} = \partial_\mu A_{i\nu} - \partial_\nu A_{i\mu} - g f_{ijk} A_{j\mu} A_{k\nu}, \\ B_{\mu\nu} = \partial_\mu B_\nu - \partial_\nu B_\mu, \quad (12)$$

Here $(t_i, T_i, X), (g_s, g, g_X), (G_i, A_i, B,)$ denote the generators, gauge coupling-constants, and gauge bosons of the 3-3-1-1 groups, respectively. And f_{ijk} is the structure constant of $SU(3)$ group.

The Yukawa interactions are given, up to six dimensions, is obtained in [28]. Light fermions gain mass through non-standard interactions characterized by dimension-six operators as the number of Higgs multiplets decreases, as compared to $\ll$ heavy quarks and leptons, whose masses are dictated by usual four-dimensional operators.

The scalar potential takes the form,

$$V = \mu_1^2 \rho^\dagger \rho + \mu_2^2 \chi^\dagger \chi + \lambda_1 (\eta^\dagger \eta)^2 + \lambda_2 (\chi^\dagger \chi)^2 \\ + \lambda_3 (\rho^\dagger \rho)(\chi^\dagger \chi) + \lambda_4 (\rho^\dagger \chi)(\chi^\dagger \rho) \\ + \left[\mu_3^2 (\rho^\dagger \chi) + \bar{\lambda}_5 (\chi^\dagger \rho)^2 + \bar{\lambda}_6 (\rho^\dagger \rho) + H.c \right], \quad (13)$$

While λ and $\mu_{1,2}$ are the B - L conservation, $\bar{\lambda}$ and $\bar{\mu}_3$ violate B - L, leading to $\bar{\lambda} \ll \lambda, \bar{\mu}_3 \ll \mu_{1,2}$. The MF331 model contains the SM- like Higgs boson and two new Higgs fields H_1, H' after spontaneous symmetry breaking. The masses of these physical states at limit $v', \omega' \ll v \ll \omega$ will take the following form:

$$m_H^2 \simeq \frac{\left(4\lambda_1\lambda_2-\lambda_3^2\right)v^2}{2\lambda_\partial},\ m_{H_1}^2 \simeq 2\lambda_2\omega^2,\ m_{H'}^2 \simeq \frac{\lambda_4}{2}\left(v^2+\omega^2\right),\ (14)$$

and the Higgs triplets, ρ, χ, are given via the following physical states:

$$\rho=\begin{pmatrix} G_{\mathrm{W}}^{+} \\ \frac{1}{\sqrt{2}}(v+H+iG_Z) \\ \frac{1}{\sqrt{2}}\omega'+H') \end{pmatrix},\ \chi=\begin{pmatrix} G_X^{+} \\ \frac{1}{\sqrt{2}}(v'+H+G_Y^0) \\ \frac{1}{\sqrt{2}}(\omega+H_\partial+iG_{Z'}) \end{pmatrix},\ (15)$$

where $G_{\mathrm{W},X,Y,Z,Z'}$ are the Goldstone bosons.

Let's cover the main ideas pertaining to the gauge bosons sector in order to wrap up this section. The MF331 model has matching masses for all gauge bosons with the exception of the SM gauge bosons Z, W, including non-Hermitian gauge bosons $X^{\pm}, Y^{0,0*}$, as well as one new neutral gauge boson Z', all of which have matching masses.

$$\begin{aligned} m_Z^2 &\simeq \frac{g^2v^2}{4c_{\mathrm{W}}^2},\ m_{Z'}^2 \simeq \frac{g^2[c_{2\mathrm{W}}^2v^2+4c_{2\mathrm{W}}^4\omega^2]}{4c_{\mathrm{W}}^2(3-3s_{\mathrm{W}}^2)},\\ m_{\mathrm{W}}^2 &\simeq \frac{g^2v^2}{4},\ m_X^2 \simeq \frac{g^2\omega^2}{4},\\ m_{\mathrm{W}}^2 &\simeq \frac{g^2v^2}{4},\ m_Y^2 \simeq \frac{g^2(v^2+\omega^2)}{4}. \qquad (16)\end{aligned}$$

The Weinberg angle is given by $s_{\mathrm{W}}=\frac{\sqrt{3}t_X}{\sqrt{3+t_X^2}}$ with $t_X=\frac{g_X}{g}$, where $s_{\mathrm{W}}=\sin\theta_{\mathrm{W}}$ $c_{\mathrm{W}}=\cos\theta_{\mathrm{W}}$ and θ_{W} is the Weinberg angle.

III. HIGGS LEPTON FLAVOR VIOLATING DECAY

We now investigate a non-zero rate for lepton flavor-violating decay mode of the SM- like Higgs boson. The Yukawa interactions relevant to the SM-charged leptons under consideration are given by

$$\begin{aligned}\mathrm{L}_Y \supset\ & h_{\alpha b}^e\bar{\psi}_{\alpha L}\rho e_{bR}+s_{\alpha b}^e\bar{\psi}_{\alpha L}\chi e_{bR}+\frac{h_{1b}^e}{\Lambda}\bar{\psi}_{1L}\rho\chi e_{bR}\\ &+\frac{s_{1b}^e}{\Lambda}\bar{\psi}_{1L}\chi\chi e_{bR}+\frac{s'^e_{1b}}{\Lambda}\bar{\psi}_{1L}\rho\rho e_{bR}+H.c \qquad (17)\end{aligned}$$

From Eq.(17), we obtain the Lagrangian terms describing interactions of two charged leptons with the neutral components of scalar fields as follows

$$\begin{aligned}\mathrm{L}_Y \supset \mathrm{L}_{Higgs}^{Leptons} &= h_{\alpha b}^e\bar{e}_{\alpha L}\rho_2^0e_{bR}^0+s_{\alpha b}^e\bar{e}_{\alpha L}\chi_2^0e_{bR}^0\\ &+\frac{h_{1b}^e}{\Lambda\sqrt{2}}\bar{e}_{1L}\left(\left\langle\chi_3^0\right\rangle\rho_2^0+\chi_3^0\left\langle\rho_2^0\right\rangle\right)e_{bR} \qquad (18)\\ &+\frac{s_{1b}^e\sqrt{2}}{\Lambda}\bar{e}_{1L}\left\langle\chi_2^0\right\rangle\chi_3^0e_{bR}+\frac{s'^e_{1b}\sqrt{2}}{\Lambda}\bar{e}_{1L}\left\langle\rho_3^0\right\rangle\rho_2^0e_{bR}+H.c.\end{aligned}$$

In the basis of physical neutral scalar, H, H_1, the interaction terms given in Eq.(17) are rewritten as

$$\begin{aligned}\mathrm{L}_{Higgs}^{Leptons} &= -\left\{\bar{e}_{aL}\left(M^l\right)_{ab}e_{bR}\frac{\cos\zeta}{v}+\bar{e}_{aL}\left(\Gamma'^e_H\right)_{ab}e_{bR}+\bar{e}_{1L}\left(\Gamma'^e_H\right)_{1b}e_{bR}\right\}H\\ &-\left\{\bar{e}_{aL}\left(M^l\right)_{ab}e_{bR}\frac{\sin\zeta}{v}+\bar{e}_{aL}\left(\Gamma'^e_{H_1}\right)_{ab}e_{bR}+\bar{e}_{1L}\left(\Gamma'^e_{H_1}\right)_{1b}e_{bR}\right\}H_1\\ &+H.c. \qquad (18)\end{aligned}$$

where

$$\cos\zeta=\frac{2\lambda_2\omega}{\sqrt{(\lambda_3v)^2+(2\lambda_2\omega^2)}},$$

$$\sin\zeta=\frac{2\lambda_3\omega}{\sqrt{(\lambda_3v)^2+(2\lambda_2\omega^2)}}, \qquad (20)$$

and

$$M_D^l=\begin{pmatrix} -\frac{h_{1b}^e}{2\sqrt{2}\Lambda}(v'\omega'+v\omega) & -\frac{s_{1b}^e}{\sqrt{2}\Lambda}(\omega v') & -\frac{s'^e_{1b}}{\sqrt{2}\Lambda}(\omega'v) \\ -\frac{h_{2b}^e}{\sqrt{2}}v & -\frac{s_{2b}^e}{\sqrt{2}\Lambda}(v') & -\frac{s'^e_{2b}}{\sqrt{2}\Lambda}(v) \\ -\frac{h_{3b}^e}{\sqrt{2}}v & -\frac{s_{3b}^e}{\sqrt{2}\Lambda}(v') & -\frac{s'^e_{3b}}{\sqrt{2}\Lambda}(v) \end{pmatrix} \quad (21)$$

is a mixing mass of the charged leptons, and $(\Gamma'^e_H)_{\alpha\beta}, (\Gamma'^e_{H_1})_{\alpha\beta}$ are defined as

$$\left(\Gamma'^e_H\right)_{ab}=\left(\frac{s_{ab}^e}{\sqrt{2}\Lambda}(v')+\frac{s'^e_{1b}}{\sqrt{2}\Lambda}(\omega'v)\right)\frac{\cos\zeta}{v}, \qquad (22)$$

$$\begin{aligned}\left(\Gamma'^e_H\right)_{ab} &= -m_{1b}^e\frac{\cos\zeta}{v}+\frac{s_{1b}^e}{\sqrt{2}\Lambda}(v')\sin\zeta-\frac{s_{'1b}^e}{\sqrt{2}\Lambda}(\omega')\cos\zeta\\ &+\left(m_{1b}^e+\frac{s_{ab}^e}{\sqrt{2}\Lambda}(\omega v')+\frac{s'^e_{1b}}{\sqrt{2}\Lambda}(\omega'v)\right)\left(\frac{\omega\cos\zeta-v\sin\zeta}{\omega v+\omega'v'}\right), \qquad (23)\end{aligned}$$

$$\left(\Gamma'^e_{H_1}\right)_{ab}=\left(\frac{s_{ab}^e}{\sqrt{2}\Lambda}(v')+\frac{s'^e_{1b}}{\sqrt{2}\Lambda}(\omega'v)\right)\frac{\sin\zeta}{v}, \quad (24)$$

$$\begin{aligned}\left(\Gamma'^e_{H_1}\right)_{ab} &= -m_{1b}^e\frac{\cos\zeta}{v}-\frac{s_{1b}^e}{\sqrt{2}\Lambda}(v')\cos\zeta-\frac{s_{1b}^e}{\sqrt{2}\Lambda}(\omega')\sin\zeta\\ &+\left(m_{1b}^e-\frac{s_{ab}^e}{\sqrt{2}\Lambda}(\omega v')-\frac{s'^e_{1b}}{\sqrt{2}\Lambda}(\omega'v)\right)\left(\frac{\omega\sin\zeta-v\cos\zeta}{\omega v+\omega'v'}\right), \qquad (25)\end{aligned}$$

We assume that $e'_{L,R} = (e', \mu', \tau')^T_{L,R}$ are the physical states of the charged leptons and they relate to the flavor states by: $e_{L,R} = (e, \mu, \tau) V_L e'_{L,R}$. In the $e'_{L,R}$ basis, we rewrite the interactions given Eq.(18) as follows:

$$\begin{aligned}
\mathcal{L}^{Leptons}_{Higgs} &= -\bar{e}'_L M^l_D e'_R H \frac{\cos\zeta}{v} \\
&-\bar{e}'_L M^l_D e'_R H_1 \frac{\sin\zeta}{v} \bar{e}_L \\
&+\bar{e}'_{\beta L} \left(V^\dagger_L\right)_{\alpha\beta} \left(\Gamma'^e_H\right)_{\alpha b} \left(V_R\right)_{b\gamma} e'_{\gamma R} H \\
&+\bar{e}'_{\beta L} \left(V^\dagger_L\right)_{1\beta} \left(\Gamma'^e_H\right)_{1b} \left(V_R\right)_{b\gamma} e'_{\gamma R} H \qquad (26) \\
&+\bar{e}'_{\beta L} \left(V^\dagger_L\right)_{\alpha\beta} \left(\Gamma'^e_{H_1}\right)_{\alpha b} \left(V_R\right)_{b\gamma} e'_{\gamma R} H_1 \\
&+\bar{e}'_{\beta L} \left(V^\dagger_L\right)_{1\beta} \left(\Gamma'^e_{H_1}\right)_{1b} \left(V_R\right)_{b\gamma} e'_{\gamma R} H_1 + H.c
\end{aligned}$$

where $M^l_D = Diag(m_e, m_\mu, m_\tau)$.

The first and second lines of Eq.(26) contain flavor-conserving interactions, while the last four lines contain lepton flavor-changing interactions of neutral scalars, H,H1, respectively. These lepton flavor-violating interactions can be represented as

$$\begin{aligned}
\mathcal{L}^{FCNC}_{Higgs-Leptons} &= -\bar{e}'_{\beta L} \left(\Gamma^e_H\right)_{\beta\gamma} e'_{\gamma R} H \\
&-\bar{e}'_{\beta L} \left(\Gamma^e_{H_1}\right)_{\beta\gamma} e'_{\gamma R} H_1 \qquad (27)
\end{aligned}$$

where $\left(\Gamma^e_H\right)_{\beta\gamma}, \left(\Gamma^e_{H_1}\right)_{\beta\gamma}$ are determined by:

$$\begin{aligned}
\left(\Gamma^e_H\right)_{\beta\gamma} &= \left(V^\dagger_L\right)_{\beta\alpha} \left(\Gamma'^e_H\right)_{\alpha b} \left(V_R\right)_{b\gamma} + \left(V^\dagger_L\right)_{\beta 1} \left(\Gamma'^e_H\right)_{1b} \left(V_R\right)_{b\gamma} \\
\left(\Gamma^e_{H_1}\right)_{\beta\gamma} &= \left(V^\dagger_L\right)_{\beta\alpha} \left(\Gamma'^e_{H_1}\right)_{\alpha b} \left(V_R\right)_{b\gamma} + \left(V^\dagger_L\right)_{\beta 1} \left(\Gamma'^e_{H_1}\right)_{1b} \left(V_R\right) \qquad (28)
\end{aligned}$$

The interactions given in Eq.(27) describe the decay processes of the neutral Higgs bosons which violate lepton number, such as $H \to e'_i e'_j$ for $i \neq j$. The branching for these decay processes are.

$$Br(h \to e_i e_j) = \frac{m_H}{8\pi\Gamma_H}\left(\left|\left(\Gamma^e_H\right)_{ij}\right|^2 + \left|\left(\Gamma^e_H\right)_{ji}\right|^2\right), \quad (29)$$

where $\Gamma_H \simeq 4.02$ MeV is the total decay width of the SM-like Higgs boson.

IV. CONCLUSION

We investigate the non-standard interactions of the SM-like Higgs boson in the minimal flipped 3-3-1 model, which allows for significant impacts in FCNC processes. We examine the effects of the flavor physics in the model both from the lepton sectors and via non-renormalizable Yukawa interactions. In particular, it produces lepton flavor-violating couplings at the tree level because of the couplings of the leptons to both Higgs triplets. So that the lepton flavor-violation processes such as $h \to \mu\tau$ are perfectly possible. The non-renormalizable Yukawa coupling, the mixing angle, and the new physical scale are all affect how the decay branches.

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KHẢO SÁT QUÁ TRÌNH RÃ HIGGS BOSON TRONG MÔ HÌNH 331 ĐẢO TỐI THIỂU

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Tóm tắt: *Trong bài báo, chúng tôi tiến hành thảo luận về mô hình 331 đảo tối thiểu (MF331) cũng như cách mô hình này cải thiện các khía cạnh lý thuyết và hiện tượng luận dựa trên mô hình 3-3-1 đảo đã biết. Mô hình MF331 có thế hệ thứ nhất trong phần lepton biến đổi khác với hai thế hệ lepton còn lại và không chứa lưỡng tuyến Higgs mới. Cách sắp xếp này dẫn đến việc xuất hiện sự thay đổi số vị lepton gắn với các boson Higgs vật lý ở phần lepton ngay tại mức cây. Do đó có thể làm tăng các tỷ lệ rã nhánh cho quá trình phân rã vi phạm số vị lepton của boson Higgs tựa SM như* $h \to \mu\tau$.

Keywords: *mô hình chuẩn, mô hình MF331, rã Higgs boson, dị thường.*

Ngày nhận bài: 15/02/2023. Ngày nhận đăng: 19/03/2023
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