N_R^α $\alpha = 1, 2)$

Z_2 Φ_i $i = 1, 2)$ Z_2

$S^\pm$ Z_2 η^0 Z_2

H $H^\pm$ h

$$M_{ij}^\nu = \sum_{\alpha=1}^{2} \left(\frac{1}{16\pi^2}\right)^3 \frac{(y_{\ell_i} h_i^\alpha)(y_{\ell_j} h_j^\alpha)(\kappa \tan\beta)^2 v^2}{M_{N_R^\alpha}} I_2(m_{H^\pm}, m_{S^\pm}, m_{N_R^\alpha}, m_\eta),$$

$m_{H^\pm}, m_{S^\pm}, m_{N_R^\alpha}$ m_η

$H^\pm$ $S^\pm$ N_R^α η^0 h_i^α κv $\overline{N}_R^\alpha e_R^i S^+$

$H^+ S^- \eta^0$ $\tan\beta = \langle\Phi_2^0\rangle / \langle\Phi_1^0\rangle$

$$I_2(x, y, z, w) = \frac{-4z^2}{z^2 - w^2} \int_0^\infty u du \left\{\frac{B_1(-u; x, y) - B_1(-u; 0, y)}{x^2}\right\}^2 \left(\frac{z^2}{u + z^2} - \frac{w^2}{u + w^2}\right)$$

B_1

h_i^α $m_{N_R^\alpha}$

$h_e^{1,2}$ $\mathcal{O}(1)$ $m_{N_R}^{1,2} \sim \mathcal{O}(1)$

h_i^α $h_e^{1,2}(\simeq \mathcal{O}(1)) \gg h_\mu^{1,2} \gg h_\tau^{1,2}$

$H^\pm$