FVMSSM

$$\underset{267}{C}\left(\tilde{\chi}_{c1}^{-}, \bar{e}_{g2}, \tilde{\nu}_{g3}\right) = \frac{ie\delta_{g2,g3}}{s_W}\begin{bmatrix} \dfrac{m_{e_{g3}}U_{c1,2}^{*}}{\sqrt{2}c_\beta M_W} \\ \\ -V_{c1,1} \end{bmatrix}$$

$$\underset{268}{C}\left(\tilde{\chi}_{c1}^{+}, \bar{\nu}_{g2}, \tilde{e}_{g3}^{s3}\right) = \frac{ie\delta_{g2,g3}}{2s_W}\left(\frac{\sqrt{2}m_{e_{g2}}U_{c1,2}U_{s3,2}^{\tilde{e}_{g2}*}}{c_\beta M_W} - 2U_{c1,1}U_{s3,1}^{\tilde{e}_{g2}*}\right)\begin{bmatrix} 0 \\ \hline 1 \end{bmatrix}$$

$$\underset{271}{C}\left(e_{g1}, \tilde{\chi}_{c2}^{+}, \tilde{\nu}_{g3}^{\dagger}\right) = \frac{ie\delta_{g1,g3}}{s_W}\begin{bmatrix} -V_{c2,1}^{*} \\ \\ \dfrac{m_{e_{g3}}U_{c2,2}}{\sqrt{2}c_\beta M_W} \end{bmatrix}$$

$$\underset{272}{C}\left(\nu_{g1}, \tilde{\chi}_{c2}^{-}, \tilde{e}_{g3}^{s3,\dagger}\right) = \frac{ie\delta_{g1,g3}}{2s_W}\left(\frac{\sqrt{2}m_{e_{g1}}U_{c2,2}^{*}U_{s3,2}^{\tilde{e}_{g1}}}{c_\beta M_W} - 2U_{c2,1}^{*}U_{s3,1}^{\tilde{e}_{g1}}\right)\begin{bmatrix} 1 \\ \hline 0 \end{bmatrix}$$

$$\underset{253}{C}\left(\tilde{\chi}_{n1}^{0}, \tilde{\chi}_{c2}^{+}, H^{-}\right) = -\frac{ie}{s_W}\begin{bmatrix} c_\beta\left(\dfrac{V_{c2,2}^{*}}{\sqrt{2}}\left(\dfrac{s_W Z_{n1,1}^{*}}{c_W} + Z_{n1,2}^{*}\right) + V_{c2,1}^{*}Z_{n1,4}^{*}\right) \\ \hline -s_\beta\left(\dfrac{U_{c2,2}}{\sqrt{2}}\left(\dfrac{s_W Z_{n1,1}}{c_W} + Z_{n1,2}\right) - U_{c2,1}Z_{n1,3}\right) \end{bmatrix}$$

$$\underset{254}{C}\left(\tilde{\chi}_{n1}^{0}, \tilde{\chi}_{c2}^{+}, G^{-}\right) = -\frac{ie}{s_W}\begin{bmatrix} s_\beta\left(\dfrac{V_{c2,2}^{*}}{\sqrt{2}}\left(\dfrac{s_W Z_{n1,1}^{*}}{c_W} + Z_{n1,2}^{*}\right) + V_{c2,1}^{*}Z_{n1,4}^{*}\right) \\ \hline c_\beta\left(\dfrac{U_{c2,2}}{\sqrt{2}}\left(\dfrac{s_W Z_{n1,1}}{c_W} + Z_{n1,2}\right) - U_{c2,1}Z_{n1,3}\right) \end{bmatrix}$$

$$\underset{255}{C}\left(\tilde{\chi}_{c1}^{-}, \tilde{\chi}_{n2}^{0}, H^{+}\right) = -\frac{ie}{s_W}\begin{bmatrix} -s_\beta\left(\dfrac{U_{c1,2}^{*}}{\sqrt{2}}\left(\dfrac{s_W Z_{n2,1}^{*}}{c_W} + Z_{n2,2}^{*}\right) - U_{c1,1}^{*}Z_{n2,3}^{*}\right) \\ \hline c_\beta\left(\dfrac{V_{c1,2}}{\sqrt{2}}\left(\dfrac{s_W Z_{n2,1}}{c_W} + Z_{n2,2}\right) + V_{c1,1}Z_{n2,4}\right) \end{bmatrix}$$

$$\underset{256}{C}\left(\tilde{\chi}^-_{c1}, \tilde{\chi}^0_{n2}, G^+\right) = -\frac{ie}{s_W}\left[\begin{array}{c} c_\beta\left(\dfrac{U^*_{c1,2}}{\sqrt{2}}\left(\dfrac{s_W Z^*_{n2,1}}{c_W} + Z^*_{n2,2}\right) - U^*_{c1,1} Z^*_{n2,3}\right) \\[2ex] s_\beta\left(\dfrac{V_{c1,2}}{\sqrt{2}}\left(\dfrac{s_W Z_{n2,1}}{c_W} + Z_{n2,2}\right) + V_{c1,1} Z_{n2,4}\right) \end{array}\right]$$

[FFS] **Chargino – Quark – Squark**

$$\underset{265}{C}\left(\tilde{\chi}^-_{c1}, \bar{d}_{g2}, \tilde{u}_{a3}\right) = \frac{ie}{M_W s_W}\left[\begin{array}{c} \dfrac{m_{d_{g2}} U^*_{c1,2}}{\sqrt{2}c_\beta}\left(\displaystyle\sum_{j1=1}^{3} \mathrm{CKM}^*_{j1,g2} R^{\tilde{u}*}_{a3,j1}\right) \\[3ex] -\dfrac{1}{2s_\beta}\left(\displaystyle\sum_{j1=1}^{3} \mathrm{CKM}^*_{j1,g2}\left(2M_W s_\beta V_{c1,1} R^{\tilde{u}*}_{a3,j1} - \sqrt{2}m_{u_{j1}} V_{c1,2} R^{\tilde{u}*}_{a3,3+j1}\right)\right) \end{array}\right]$$

$$\underset{266}{C}\left(\tilde{\chi}^+_{c1}, \bar{u}_{g2}, \tilde{d}_{a3}\right) = \frac{ie}{M_W s_W}\left[\begin{array}{c} \dfrac{m_{u_{g2}} V^*_{c1,2}}{\sqrt{2}s_\beta}\left(\displaystyle\sum_{j2=1}^{3} \mathrm{CKM}_{g2,j2} R^{\tilde{d}*}_{a3,j2}\right) \\[3ex] -\dfrac{1}{2c_\beta}\left(\displaystyle\sum_{j2=1}^{3} \mathrm{CKM}_{g2,j2}\left(2c_\beta M_W U_{c1,1} R^{\tilde{d}*}_{a3,j2} - \sqrt{2}m_{d_{j2}} U_{c1,2} R^{\tilde{d}*}_{a3,3+j2}\right)\right) \end{array}\right]$$

$$\underset{269}{C}\left(d_{g1}, \tilde{\chi}^+_{c2}, \tilde{u}^\dagger_{a3}\right) = \frac{ie}{M_W s_W}\left[\begin{array}{c} -\dfrac{1}{2s_\beta}\left(\displaystyle\sum_{j1=1}^{3} \mathrm{CKM}_{j1,g1}\left(2M_W s_\beta R^{\tilde{u}}_{a3,j1} V^*_{c2,1} - \sqrt{2}m_{u_{j1}} R^{\tilde{u}}_{a3,3+j1} V^*_{c2,2}\right)\right) \\[3ex] \dfrac{m_{d_{g1}} U_{c2,2}}{\sqrt{2}c_\beta}\left(\displaystyle\sum_{j1=1}^{3} \mathrm{CKM}_{j1,g1} R^{\tilde{u}}_{a3,j1}\right) \end{array}\right]$$

$$\underset{270}{C}\left(u_{g1}, \tilde{\chi}^-_{c2}, \tilde{d}^\dagger_{a3}\right) = \frac{ie}{M_W s_W}\left[\begin{array}{c} -\dfrac{1}{2c_\beta}\left(\displaystyle\sum_{j2=1}^{3} \mathrm{CKM}^*_{g1,j2}\left(2c_\beta M_W R^{\tilde{d}}_{a3,j2} U^*_{c2,1} - \sqrt{2}m_{d_{j2}} R^{\tilde{d}}_{a3,3+j2} U^*_{c2,2}\right)\right) \\[3ex] \dfrac{m_{u_{g1}} V_{c2,2}}{\sqrt{2}s_\beta}\left(\displaystyle\sum_{j2=1}^{3} \mathrm{CKM}^*_{g1,j2} R^{\tilde{d}}_{a3,j2}\right) \end{array}\right]$$

[FFS] **Gluino – Quark – Squark**

$$\underset{392}{C}\left(\tilde{g}, \bar{u}_{g2}, \tilde{u}_{a3}\right) = \sqrt{2}ig_s T^{g1}_{c2,c3}\left[\begin{array}{c} \oplus^*_{Gl} R^{\tilde{u}*}_{a3,3+g2} \\[2ex] -\oplus_{Gl} R^{\tilde{u}*}_{a3,g2} \end{array}\right]$$

$$\underset{393}{C}\left(\tilde{g}, \overline{d}_{g2}, \tilde{d}_{a3}\right) = \sqrt{2}ig_s T^{g1}_{c2,c3}\begin{bmatrix} e^*_{Gl}R^{\tilde{d}*}_{a3,3+g2} \\ \hline -e_{Gl}R^{\tilde{d}*}_{a3,g2} \end{bmatrix}$$

$$\underset{394}{C}\left(\tilde{g}, u_{g2}, \tilde{u}^{\dagger}_{a3}\right) = \sqrt{2}ig_s T^{g1}_{c3,c2}\begin{bmatrix} -e^*_{Gl}R^{\tilde{u}}_{a3,g2} \\ \hline e_{Gl}R^{\tilde{u}}_{a3,3+g2} \end{bmatrix}$$

$$\underset{395}{C}\left(\tilde{g}, d_{g2}, \tilde{d}^{\dagger}_{a3}\right) = \sqrt{2}ig_s T^{g1}_{c3,c2}\begin{bmatrix} -e^*_{Gl}R^{\tilde{d}}_{a3,g2} \\ \hline e_{Gl}R^{\tilde{d}}_{a3,3+g2} \end{bmatrix}$$

[FFS] **Lepton – Neutralino – Slepton**

$$\underset{257}{C}\left(\tilde{\chi}^0_{n1}, \overline{\nu}_{g2}, \tilde{\nu}_{g3}\right) = \frac{ie\delta_{g2,g3}}{\sqrt{2}c_W s_W}\left(s_W Z_{n1,1} - c_W Z_{n1,2}\right)\begin{bmatrix} 0 \\ \hline 1 \end{bmatrix}$$

$$\underset{258}{C}\left(\tilde{\chi}^0_{n1}, \overline{e}_{g2}, \tilde{e}^{s3}_{g3}\right) = \frac{ie\delta_{g2,g3}}{\sqrt{2}c_W c_\beta M_W s_W}\begin{bmatrix} -2c_\beta M_W s_W U^{\tilde{e}_{g2}*}_{s3,2}Z^*_{n1,1} - c_W m_{e_{g2}}U^{\tilde{e}_{g2}*}_{s3,1}Z^*_{n1,3} \\ \hline c_\beta M_W\left(s_W Z_{n1,1} + c_W Z_{n1,2}\right)U^{\tilde{e}_{g2}*}_{s3,1} - c_W m_{e_{g2}}Z_{n1,3}U^{\tilde{e}_{g2}*}_{s3,2} \end{bmatrix}$$

$$\underset{261}{C}\left(\nu_{g1}, \tilde{\chi}^0_{n2}, \tilde{\nu}^{\dagger}_{g3}\right) = \frac{ie\delta_{g1,g3}}{\sqrt{2}c_W s_W}\left(s_W Z^*_{n2,1} - c_W Z^*_{n2,2}\right)\begin{bmatrix} 1 \\ \hline 0 \end{bmatrix}$$

$$\underset{262}{C}\left(e_{g1}, \tilde{\chi}^0_{n2}, \tilde{e}^{s3,\dagger}_{g3}\right) = \frac{ie\delta_{g1,g3}}{\sqrt{2}c_W c_\beta M_W s_W}\begin{bmatrix} c_\beta M_W s_W U^{\tilde{e}_{g1}}_{s3,1}Z^*_{n2,1} + c_W\left(c_\beta M_W U^{\tilde{e}_{g1}}_{s3,1}Z^*_{n2,2} - m_{e_{g1}}U^{\tilde{e}_{g1}}_{s3,2}Z^*_{n2,3}\right) \\ \hline -c_W m_{e_{g1}}Z_{n2,3}U^{\tilde{e}_{g1}}_{s3,1} - 2c_\beta M_W s_W Z_{n2,1}U^{\tilde{e}_{g1}}_{s3,2} \end{bmatrix}$$

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$$\underset{259}{C}\left(\tilde{\chi}^0_{n1}, \overline{u}_{g2}, \tilde{u}_{a3}\right) = \frac{\mathrm{i}e}{3\sqrt{2}c_W M_W s_W s_\beta}\left[\frac{4M_W s_W s_\beta R^{\tilde{u}*}_{a3,3+g2}Z^*_{n1,1} - 3c_W m_{u_{g2}}R^{\tilde{u}*}_{a3,g2}Z^*_{n1,4}}{-M_W s_\beta\left(s_W Z_{n1,1}+3c_W Z_{n1,2}\right)R^{\tilde{u}*}_{a3,g2} - 3c_W m_{u_{g2}}Z_{n1,4}R^{\tilde{u}*}_{a3,3+g2}}\right]$$

$$\underset{260}{C}\left(\tilde{\chi}^0_{n1}, \overline{d}_{g2}, \tilde{d}_{a3}\right) = \frac{\mathrm{i}e}{3\sqrt{2}c_W c_\beta M_W s_W}\left[\frac{-2c_\beta M_W s_W R^{\tilde{d}*}_{a3,3+g2}Z^*_{n1,1} - 3c_W m_{d_{g2}}R^{\tilde{d}*}_{a3,g2}Z^*_{n1,3}}{-c_\beta M_W\left(s_W Z_{n1,1}-3c_W Z_{n1,2}\right)R^{\tilde{d}*}_{a3,g2} - 3c_W m_{d_{g2}}Z_{n1,3}R^{\tilde{d}*}_{a3,3+g2}}\right]$$

$$\underset{263}{C}\left(u_{g1}, \tilde{\chi}^0_{n2}, \tilde{u}^\dagger_{a3}\right) = -\frac{\mathrm{i}e}{3\sqrt{2}c_W M_W s_W s_\beta}\left[\frac{M_W s_W s_\beta R^{\tilde{u}}_{a3,g1}Z^*_{n2,1} + 3c_W\left(M_W s_\beta R^{\tilde{u}}_{a3,g1}Z^*_{n2,2} + m_{u_{g1}}R^{\tilde{u}}_{a3,3+g1}Z^*_{n2,4}\right)}{3c_W m_{u_{g1}}Z_{n2,4}R^{\tilde{u}}_{a3,g1} - 4M_W s_W s_\beta Z_{n2,1}R^{\tilde{u}}_{a3,3+g1}}\right]$$

$$\underset{264}{C}\left(d_{g1}, \tilde{\chi}^0_{n2}, \tilde{d}^\dagger_{a3}\right) = -\frac{\mathrm{i}e}{3\sqrt{2}c_W c_\beta M_W s_W}\left[\frac{c_\beta M_W s_W R^{\tilde{d}}_{a3,g1}Z^*_{n2,1} - 3c_W\left(c_\beta M_W R^{\tilde{d}}_{a3,g1}Z^*_{n2,2} - m_{d_{g1}}R^{\tilde{d}}_{a3,3+g1}Z^*_{n2,3}\right)}{3c_W m_{d_{g1}}Z_{n2,3}R^{\tilde{d}}_{a3,g1} + 2c_\beta M_W s_W Z_{n2,1}R^{\tilde{d}}_{a3,3+g1}}\right]$$

$$\underset{249}{C}\left(\tilde{\chi}^-_{c1}, \tilde{\chi}^+_{c2}, h^0\right) = \frac{\mathrm{i}e}{\sqrt{2}s_W}\left[\frac{s_\alpha U^*_{c1,2}V^*_{c2,1} - c_\alpha U^*_{c1,1}V^*_{c2,2}}{s_\alpha U_{c2,2}V_{c1,1} - c_\alpha U_{c2,1}V_{c1,2}}\right]$$

$$\underset{250}{C}\left(\tilde{\chi}^-_{c1}, \tilde{\chi}^+_{c2}, H^0\right) = -\frac{\mathrm{i}e}{\sqrt{2}s_W}\left[\frac{c_\alpha U^*_{c1,2}V^*_{c2,1} + s_\alpha U^*_{c1,1}V^*_{c2,2}}{c_\alpha U_{c2,2}V_{c1,1} + s_\alpha U_{c2,1}V_{c1,2}}\right]$$

$$\underset{251}{C}\left(\tilde{\chi}^-_{c1}, \tilde{\chi}^+_{c2}, A^0\right) = \frac{e}{\sqrt{2}s_W}\left[\frac{-s_\beta U^*_{c1,2}V^*_{c2,1} - c_\beta U^*_{c1,1}V^*_{c2,2}}{s_\beta U_{c2,2}V_{c1,1} + c_\beta U_{c2,1}V_{c1,2}}\right]$$

$$\mathop{C}_{252}\left(\tilde{\chi}_{c1}^-, \tilde{\chi}_{c2}^+, G^0\right) = \frac{e}{\sqrt{2}s_W}\begin{bmatrix} c_\beta U_{c1,2}^* V_{c2,1}^* - s_\beta U_{c1,1}^* V_{c2,2}^* \\ \hline -c_\beta U_{c2,2} V_{c1,1} + s_\beta U_{c2,1} V_{c1,2} \end{bmatrix}$$

[FFS] **2 Leptons – Higgs**

$$\mathop{C}_{181}\left(e_{g1}, \bar{e}_{g2}, h^0\right) = \frac{ie\delta_{g1,g2}m_{e_{g1}}s_\alpha}{2c_\beta M_W s_W}\begin{bmatrix} 1 \\ \hline 1 \end{bmatrix}$$

$$\mathop{C}_{184}\left(e_{g1}, \bar{e}_{g2}, G^0\right) = \frac{e\delta_{g1,g2}m_{e_{g1}}}{2M_W s_W}\begin{bmatrix} -1 \\ \hline 1 \end{bmatrix}$$

$$\mathop{C}_{194}\left(e_{g1}, \bar{e}_{g2}, H^0\right) = -\frac{ie\delta_{g1,g2}c_\alpha m_{e_{g1}}}{2c_\beta M_W s_W}\begin{bmatrix} 1 \\ \hline 1 \end{bmatrix}$$

$$\mathop{C}_{197}\left(e_{g1}, \bar{e}_{g2}, A^0\right) = \frac{e\delta_{g1,g2}m_{e_{g1}}t_\beta}{2M_W s_W}\begin{bmatrix} 1 \\ \hline -1 \end{bmatrix}$$

$$\mathop{C}_{200}\left(\nu_{g1}, \bar{e}_{g2}, G^-\right) = -\frac{ie\delta_{g1,g2}m_{e_{g2}}}{\sqrt{2}M_W s_W}\begin{bmatrix} 1 \\ \hline 0 \end{bmatrix}$$

$$\mathop{C}_{201}\left(e_{g1}, \bar{\nu}_{g2}, G^+\right) = -\frac{ie\delta_{g1,g2}m_{e_{g1}}}{\sqrt{2}M_W s_W}\begin{bmatrix} 0 \\ \hline 1 \end{bmatrix}$$

$$\mathop{C}_{204}\left(\nu_{g1}, \bar{e}_{g2}, H^-\right) = \frac{ie\delta_{g1,g2}m_{e_{g2}}t_\beta}{\sqrt{2}M_W s_W}\begin{bmatrix} 1 \\ \hline 0 \end{bmatrix}$$

$$\underset{205}{C}\left(e_{\mathrm{g1}}, \overline{\nu}_{\mathrm{g2}}, H^+\right) = \frac{ie\delta_{\mathrm{g1,g2}} m_{e_{\mathrm{g1}}} t_\beta}{\sqrt{2} M_W s_W} \begin{bmatrix} 0 \\ \hline 1 \end{bmatrix}$$

[FFS] **2 Neutralinos – Higgs**

$$\underset{245}{C}\left(\tilde{\chi}^0_{\mathrm{n1}}, \tilde{\chi}^0_{\mathrm{n2}}, h^0\right) = \frac{ie}{2c_W s_W} \begin{bmatrix} \begin{array}{l} -\left(s_\alpha Z^*_{\mathrm{n1,3}} + c_\alpha Z^*_{\mathrm{n1,4}}\right)\left(s_W Z^*_{\mathrm{n2,1}} - c_W Z^*_{\mathrm{n2,2}}\right) - \\ s_\alpha\left(s_W Z^*_{\mathrm{n1,1}} - c_W Z^*_{\mathrm{n1,2}}\right) Z^*_{\mathrm{n2,3}} - \\ c_\alpha\left(s_W Z^*_{\mathrm{n1,1}} - c_W Z^*_{\mathrm{n1,2}}\right) Z^*_{\mathrm{n2,4}} \end{array} \\ \hline \begin{array}{l} -\left(s_\alpha Z_{\mathrm{n1,3}} + c_\alpha Z_{\mathrm{n1,4}}\right)\left(s_W Z_{\mathrm{n2,1}} - c_W Z_{\mathrm{n2,2}}\right) - \\ \left(s_W s_\alpha Z_{\mathrm{n1,1}} - c_W s_\alpha Z_{\mathrm{n1,2}}\right) Z_{\mathrm{n2,3}} - \\ \left(c_\alpha s_W Z_{\mathrm{n1,1}} - c_W c_\alpha Z_{\mathrm{n1,2}}\right) Z_{\mathrm{n2,4}} \end{array} \end{bmatrix}$$

$$\underset{246}{C}\left(\tilde{\chi}^0_{\mathrm{n1}}, \tilde{\chi}^0_{\mathrm{n2}}, H^0\right) = \frac{ie}{2c_W s_W} \begin{bmatrix} \begin{array}{l} \left(c_\alpha Z^*_{\mathrm{n1,3}} - s_\alpha Z^*_{\mathrm{n1,4}}\right)\left(s_W Z^*_{\mathrm{n2,1}} - c_W Z^*_{\mathrm{n2,2}}\right) + \\ c_\alpha\left(s_W Z^*_{\mathrm{n1,1}} - c_W Z^*_{\mathrm{n1,2}}\right) Z^*_{\mathrm{n2,3}} - \\ \left(s_W s_\alpha Z^*_{\mathrm{n1,1}} - c_W s_\alpha Z^*_{\mathrm{n1,2}}\right) Z^*_{\mathrm{n2,4}} \end{array} \\ \hline \begin{array}{l} \left(c_\alpha Z_{\mathrm{n1,3}} - s_\alpha Z_{\mathrm{n1,4}}\right)\left(s_W Z_{\mathrm{n2,1}} - c_W Z_{\mathrm{n2,2}}\right) + \\ c_\alpha\left(s_W Z_{\mathrm{n1,1}} - c_W Z_{\mathrm{n1,2}}\right) Z_{\mathrm{n2,3}} - \\ \left(s_W s_\alpha Z_{\mathrm{n1,1}} - c_W s_\alpha Z_{\mathrm{n1,2}}\right) Z_{\mathrm{n2,4}} \end{array} \end{bmatrix}$$

$$\underset{247}{C}\left(\tilde{\chi}^0_{\mathrm{n1}}, \tilde{\chi}^0_{\mathrm{n2}}, A^0\right) = \frac{e}{2c_W s_W} \begin{bmatrix} \begin{array}{l} \left(s_\beta Z^*_{\mathrm{n1,3}} - c_\beta Z^*_{\mathrm{n1,4}}\right)\left(s_W Z^*_{\mathrm{n2,1}} - c_W Z^*_{\mathrm{n2,2}}\right) + \\ s_\beta\left(s_W Z^*_{\mathrm{n1,1}} - c_W Z^*_{\mathrm{n1,2}}\right) Z^*_{\mathrm{n2,3}} - \\ \left(c_\beta s_W Z^*_{\mathrm{n1,1}} - c_W c_\beta Z^*_{\mathrm{n1,2}}\right) Z^*_{\mathrm{n2,4}} \end{array} \\ \hline \begin{array}{l} -\left(s_\beta Z_{\mathrm{n1,3}} - c_\beta Z_{\mathrm{n1,4}}\right)\left(s_W Z_{\mathrm{n2,1}} - c_W Z_{\mathrm{n2,2}}\right) - \\ s_\beta\left(s_W Z_{\mathrm{n1,1}} - c_W Z_{\mathrm{n1,2}}\right) Z_{\mathrm{n2,3}} + \\ \left(c_\beta s_W Z_{\mathrm{n1,1}} - c_W c_\beta Z_{\mathrm{n1,2}}\right) Z_{\mathrm{n2,4}} \end{array} \end{bmatrix}$$

$$\underset{248}{C}\left(\tilde{\chi}^0_{n1}, \tilde{\chi}^0_{n2}, G^0\right) = \frac{e}{2c_W s_W} \left[\frac{\begin{array}{l} -\left(c_\beta Z^*_{n1,3} + s_\beta Z^*_{n1,4}\right)\left(s_W Z^*_{n2,1} - c_W Z^*_{n2,2}\right) - \\ c_\beta \left(s_W Z^*_{n1,1} - c_W Z^*_{n1,2}\right) Z^*_{n2,3} - \\ s_\beta \left(s_W Z^*_{n1,1} - c_W Z^*_{n1,2}\right) Z^*_{n2,4} \end{array}}{\begin{array}{l} \left(c_\beta Z_{n1,3} + s_\beta Z_{n1,4}\right)\left(s_W Z_{n2,1} - c_W Z_{n2,2}\right) + \\ c_\beta \left(s_W Z_{n1,1} - c_W Z_{n1,2}\right) Z_{n2,3} + \\ s_\beta \left(s_W Z_{n1,1} - c_W Z_{n1,2}\right) Z_{n2,4} \end{array}} \right]$$

[FFS] **2 Quarks – Higgs**

$$\underset{182}{C}\left(u_{g1}, \bar{u}_{g2}, h^0\right) = -\frac{ie\delta_{g1,g2} c_\alpha m_{u_{g1}}}{2 M_W s_W s_\beta} \left[\frac{1}{1} \right]$$

$$\underset{183}{C}\left(d_{g1}, \bar{d}_{g2}, h^0\right) = \frac{ie\delta_{g1,g2} m_{d_{g1}} s_\alpha}{2 c_\beta M_W s_W} \left[\frac{1}{1} \right]$$

$$\underset{185}{C}\left(u_{g1}, \bar{u}_{g2}, G^0\right) = \frac{e\delta_{g1,g2} m_{u_{g1}}}{2 M_W s_W} \left[\frac{1}{-1} \right]$$

$$\underset{186}{C}\left(d_{g1}, \bar{d}_{g2}, G^0\right) = \frac{e\delta_{g1,g2} m_{d_{g1}}}{2 M_W s_W} \left[\frac{-1}{1} \right]$$

$$\underset{195}{C}\left(u_{g1}, \bar{u}_{g2}, H^0\right) = -\frac{ie\delta_{g1,g2} m_{u_{g1}} s_\alpha}{2 M_W s_W s_\beta} \left[\frac{1}{1} \right]$$

$$\underset{196}{C}\left(d_{g1}, \bar{d}_{g2}, H^0\right) = -\frac{ie\delta_{g1,g2} c_\alpha m_{d_{g1}}}{2 c_\beta M_W s_W} \left[\frac{1}{1} \right]$$

$$\underset{198}{C}\left(u_{g1}, \bar{u}_{g2}, A^0\right) = \frac{e\delta_{g1,g2}m_{u_{g1}}}{2M_W s_W t_\beta} \begin{bmatrix} 1 \\ \hline -1 \end{bmatrix}$$

$$\underset{199}{C}\left(d_{g1}, \bar{d}_{g2}, A^0\right) = \frac{e\delta_{g1,g2}m_{d_{g1}}t_\beta}{2M_W s_W} \begin{bmatrix} 1 \\ \hline -1 \end{bmatrix}$$

$$\underset{206}{C}\left(u_{g1}, \bar{d}_{g2}, G^-\right) = \frac{ie\text{CKM}^*_{g1,g2}}{\sqrt{2}M_W s_W} \begin{bmatrix} -m_{d_{g2}} \\ \hline m_{u_{g1}} \end{bmatrix}$$

$$\underset{207}{C}\left(d_{g1}, \bar{u}_{g2}, G^+\right) = \frac{ie\text{CKM}_{g2,g1}}{\sqrt{2}M_W s_W} \begin{bmatrix} m_{u_{g2}} \\ \hline -m_{d_{g1}} \end{bmatrix}$$

$$\underset{210}{C}\left(u_{g1}, \bar{d}_{g2}, H^-\right) = \frac{ie\text{CKM}^*_{g1,g2}}{\sqrt{2}M_W s_W} \begin{bmatrix} m_{d_{g2}}t_\beta \\ \hline \dfrac{m_{u_{g1}}}{t_\beta} \end{bmatrix}$$

$$\underset{211}{C}\left(d_{g1}, \bar{u}_{g2}, H^+\right) = \frac{ie\text{CKM}_{g2,g1}}{\sqrt{2}M_W s_W} \begin{bmatrix} \dfrac{m_{u_{g2}}}{t_\beta} \\ \hline m_{d_{g1}}t_\beta \end{bmatrix}$$

[FFV] **Chargino – Neutralino – Gauge Boson**

$$\underset{274}{C}\left(\tilde{\chi}^0_{n1}, \tilde{\chi}^+_{c2}, W^-\right) = \frac{ie}{s_W} \begin{bmatrix} -\dfrac{Z_{n1,4}V^*_{c2,2}}{\sqrt{2}} + Z_{n1,2}V^*_{c2,1} \\ \hline \dfrac{U_{c2,2}Z^*_{n1,3}}{\sqrt{2}} + U_{c2,1}Z^*_{n1,2} \end{bmatrix}$$

$$\underset{275}{C}\left(\tilde{\chi}^-_{c1}, \tilde{\chi}^0_{n2}, W^+\right) = \frac{ie}{s_W} \begin{bmatrix} -\dfrac{V_{c1,2}Z^*_{n2,4}}{\sqrt{2}} + V_{c1,1}Z^*_{n2,2} \\ \hline \dfrac{Z_{n2,3}U^*_{c1,2}}{\sqrt{2}} + Z_{n2,2}U^*_{c1,1} \end{bmatrix}$$

$$\underset{276}{C}\left(\tilde{\chi}^{+}_{c1}, \tilde{\chi}^{-}_{c2}, \gamma\right) = ie \begin{bmatrix} 1 \\ \overline{} \\ 1 \end{bmatrix}$$

$$\underset{277}{C}\left(\tilde{\chi}^{+}_{c1}, \tilde{\chi}^{-}_{c2}, Z\right) = -\frac{ie}{c_W s_W} \begin{bmatrix} -\left(\frac{1}{2} U_{c1,2} U^*_{c2,2}\right) + s_W^2 - U_{c1,1} U^*_{c2,1} \\ \rule{0pt}{1.2em} \\ -\left(\frac{1}{2} V_{c2,2} V^*_{c1,2}\right) + s_W^2 - V_{c2,1} V^*_{c1,1} \end{bmatrix}$$

[FFV] **2 Gluinos – Gluon**

$$\underset{389}{C}\left(\tilde{g}, \tilde{g}, g\right) = -g_s f^{g1,g2,g3} \begin{bmatrix} 1 \\ \overline{} \\ 1 \end{bmatrix}$$

[FFV] **2 Leptons – Gauge Boson**

$$\underset{187}{C}\left(\bar{e}_{g1}, e_{g2}, \gamma\right) = ie\delta_{g1,g2} \begin{bmatrix} 1 \\ \overline{} \\ 1 \end{bmatrix}$$

$$\underset{190}{C}\left(\bar{\nu}_{g1}, \nu_{g2}, Z\right) = -\frac{ie\delta_{g1,g2}}{2c_W s_W} \begin{bmatrix} 1 \\ \overline{} \\ 0 \end{bmatrix}$$

$$\underset{191}{C}\left(\bar{e}_{g1}, e_{g2}, Z\right) = -\frac{ie\delta_{g1,g2}}{c_W} \begin{bmatrix} -\frac{1}{s_W}\left(\frac{1}{2} - s_W^2\right) \\ \rule{0pt}{1.2em} \\ s_W \end{bmatrix}$$

$$\underset{202}{C}\left(\bar{e}_{g1}, \nu_{g2}, W^-\right) = -\frac{ie\delta_{g1,g2}}{\sqrt{2}s_W} \begin{bmatrix} 1 \\ \overline{} \\ 0 \end{bmatrix}$$

$$\underset{203}{C}\left(\overline{\nu}_{g1}, e_{g2}, W^+\right) = -\frac{ie\delta_{g1,g2}}{\sqrt{2}s_W}\begin{bmatrix} 1 \\ \hline 0 \end{bmatrix}$$

[FFV] **2 Neutralinos – Gauge Boson**

$$\underset{273}{C}\left(\tilde{\chi}^0_{n1}, \tilde{\chi}^0_{n2}, Z\right) = \frac{ie}{2c_W s_W}\begin{bmatrix} -Z_{n1,3}Z^*_{n2,3} + Z_{n1,4}Z^*_{n2,4} \\ \hline Z_{n2,3}Z^*_{n1,3} - Z_{n2,4}Z^*_{n1,4} \end{bmatrix}$$

[FFV] **2 Quarks – Gauge Boson**

$$\underset{188}{C}\left(\overline{u}_{g1}, u_{g2}, \gamma\right) = -\frac{2}{3}ie\delta_{g1,g2}\begin{bmatrix} 1 \\ \hline 1 \end{bmatrix}$$

$$\underset{189}{C}\left(\overline{d}_{g1}, d_{g2}, \gamma\right) = \frac{1}{3}ie\delta_{g1,g2}\begin{bmatrix} 1 \\ \hline 1 \end{bmatrix}$$

$$\underset{192}{C}\left(\overline{u}_{g1}, u_{g2}, Z\right) = \frac{ie\delta_{g1,g2}}{c_W}\begin{bmatrix} -\frac{1}{6s_W}\left(3 - 4s_W^2\right) \\ \hline \frac{2s_W}{3} \end{bmatrix}$$

$$\underset{193}{C}\left(\overline{d}_{g1}, d_{g2}, Z\right) = -\frac{ie\delta_{g1,g2}}{c_W}\begin{bmatrix} -\frac{1}{6s_W}\left(3 - 2s_W^2\right) \\ \hline \frac{s_W}{3} \end{bmatrix}$$

$$\underset{208}{C}\left(\overline{d}_{g1}, u_{g2}, W^-\right) = -\frac{ie\,\text{CKM}^*_{g2,g1}}{\sqrt{2}s_W}\begin{bmatrix} 1 \\ \hline 0 \end{bmatrix}$$

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$$\underset{209}{C}\left(\overline{u}_{g1}, d_{g2}, W^+\right) = -\frac{ie\mathrm{CKM}_{g1,g2}}{\sqrt{2}s_W}\begin{bmatrix} 1 \\ \hline 0 \end{bmatrix}$$

[FFV] **2 Quarks – Gluon**

$$\underset{387}{C}\left(\overline{u}_{g1}, u_{g2}, g\right) = -ig_s\delta_{g1,g2}T^{g3}_{c1,c2}\begin{bmatrix} 1 \\ \hline 1 \end{bmatrix}$$

$$\underset{388}{C}\left(\overline{d}_{g1}, d_{g2}, g\right) = -ig_s\delta_{g1,g2}T^{g3}_{c1,c2}\begin{bmatrix} 1 \\ \hline 1 \end{bmatrix}$$

[SSS] **3 Higgs**

$$\underset{43}{C}\left(h^0, h^0, h^0\right) = \begin{bmatrix} -\dfrac{3iec_{2\alpha}M_Ws_{\alpha+\beta}}{2s_Wc_W^2} \end{bmatrix}$$

$$\underset{44}{C}\left(h^0, h^0, H^0\right) = \begin{bmatrix} \dfrac{ieM_W}{2s_Wc_W^2}\left(c_{2\alpha}c_{\alpha+\beta} - 2s_{2\alpha}s_{\alpha+\beta}\right) \end{bmatrix}$$

$$\underset{45}{C}\left(h^0, H^0, H^0\right) = \begin{bmatrix} \dfrac{ieM_W}{2s_Wc_W^2}\left(2c_{\alpha+\beta}s_{2\alpha} + c_{2\alpha}s_{\alpha+\beta}\right) \end{bmatrix}$$

$$\underset{46}{C}\left(H^0, H^0, H^0\right) = \begin{bmatrix} -\dfrac{3iec_{2\alpha}c_{\alpha+\beta}M_W}{2s_Wc_W^2} \end{bmatrix}$$

$$\underset{47}{C}\left(h^0, A^0, A^0\right) = \begin{bmatrix} -\dfrac{iec_{2\beta}M_Ws_{\alpha+\beta}}{2s_Wc_W^2} \end{bmatrix}$$

$$\underset{48}{C}\left(h^0, A^0, G^0\right) = \begin{bmatrix} -\dfrac{ieM_Ws_{2\beta}s_{\alpha+\beta}}{2s_Wc_W^2} \end{bmatrix}$$

$$\underset{49}{C}\left(h^0, G^0, G^0\right) = \begin{bmatrix} \dfrac{iec_{2\beta}M_Ws_{\alpha+\beta}}{2s_Wc_W^2} \end{bmatrix}$$

$$\underset{50}{C}\left(H^0, A^0, A^0\right) = \left[\ \frac{iec_{2\beta}c_{\alpha+\beta}M_W}{2s_Wc_W^2}\ \right]$$

$$\underset{51}{C}\left(H^0, A^0, G^0\right) = \left[\ \frac{iec_{\alpha+\beta}M_Ws_{2\beta}}{2s_Wc_W^2}\ \right]$$

$$\underset{52}{C}\left(H^0, G^0, G^0\right) = \left[\ -\frac{iec_{2\beta}c_{\alpha+\beta}M_W}{2s_Wc_W^2}\ \right]$$

$$\underset{53}{C}\left(h^0, H^-, H^+\right) = \left[\ -\frac{ieM_W}{s_W}\left(\frac{c_{2\beta}s_{\alpha+\beta}}{2c_W^2} + s_{\beta-\alpha}\right)\ \right]$$

$$\underset{54}{C}\left(h^0, H^-, G^+\right) = \left[\ -\frac{ieM_W}{2s_W}\left(\frac{s_{2\beta}s_{\alpha+\beta}}{c_W^2} - c_{\beta-\alpha}\right)\ \right]$$

$$\underset{55}{C}\left(h^0, G^-, H^+\right) = \left[\ -\frac{ieM_W}{2s_W}\left(\frac{s_{2\beta}s_{\alpha+\beta}}{c_W^2} - c_{\beta-\alpha}\right)\ \right]$$

$$\underset{56}{C}\left(h^0, G^-, G^+\right) = \left[\ \frac{iec_{2\beta}M_Ws_{\alpha+\beta}}{2s_Wc_W^2}\ \right]$$

$$\underset{57}{C}\left(H^0, H^-, H^+\right) = \left[\ \frac{ieM_W}{s_W}\left(\frac{c_{2\beta}c_{\alpha+\beta}}{2c_W^2} - c_{\beta-\alpha}\right)\ \right]$$

$$\underset{58}{C}\left(H^0, H^-, G^+\right) = \left[\ \frac{ieM_W}{2s_W}\left(\frac{c_{\alpha+\beta}s_{2\beta}}{c_W^2} - s_{\beta-\alpha}\right)\ \right]$$

$$\underset{59}{C}\left(H^0, G^-, H^+\right) = \left[\ \frac{ieM_W}{2s_W}\left(\frac{c_{\alpha+\beta}s_{2\beta}}{c_W^2} - s_{\beta-\alpha}\right)\ \right]$$

$$\underset{60}{C}\left(H^0, G^-, G^+\right) = \left[\ -\frac{iec_{2\beta}c_{\alpha+\beta}M_W}{2s_Wc_W^2}\ \right]$$

$$\underset{61}{C}\left(A^0, H^-, G^+\right) = \left[\ -\frac{eM_W}{2s_W}\ \right]$$

$$\underset{62}{C}\left(A^0, G^-, H^+\right) = \left[\ \frac{eM_W}{2s_W}\ \right]$$

$$\underset{212}{C}\left(A^0, \tilde{e}_{g2}^{s2}, \tilde{e}_{g3}^{s3,\dagger}\right) = \left[\; -\frac{e\delta_{g2,g3}m_{e_{g2}}}{2M_W s_W}\left(\left(\mu + t_\beta A_{g2,g2}^{e*}\right)U_{s2,2}^{\tilde{e}_{g2}*}U_{s3,1}^{\tilde{e}_{g2}} - \left(\mu^* + t_\beta A_{g2,g2}^e\right)U_{s2,1}^{\tilde{e}_{g2}*}U_{s3,2}^{\tilde{e}_{g2}}\right)\;\right]$$

$$\underset{213}{C}\left(G^0, \tilde{e}_{g2}^{s2}, \tilde{e}_{g3}^{s3,\dagger}\right) = \left[\; -\frac{e\delta_{g2,g3}m_{e_{g2}}}{2M_W s_W}\left(\left(\mu t_\beta - A_{g2,g2}^{e*}\right)U_{s2,2}^{\tilde{e}_{g2}*}U_{s3,1}^{\tilde{e}_{g2}} - \left(t_\beta\mu^* - A_{g2,g2}^e\right)U_{s2,1}^{\tilde{e}_{g2}*}U_{s3,2}^{\tilde{e}_{g2}}\right)\;\right]$$

$$\underset{218}{C}\left(h^0, \tilde{\nu}_{g2}, \tilde{\nu}_{g3}^{\dagger}\right) = \left[\; \frac{ie\delta_{g2,g3}M_Z s_{\alpha+\beta}}{2c_W s_W}\;\right]$$

$$\underset{219}{C}\left(H^0, \tilde{\nu}_{g2}, \tilde{\nu}_{g3}^{\dagger}\right) = \left[\; -\frac{ie\delta_{g2,g3}c_{\alpha+\beta}M_Z}{2c_W s_W}\;\right]$$

$$\underset{220}{C}\left(h^0, \tilde{e}_{g2}^{s2}, \tilde{e}_{g3}^{s3,\dagger}\right) = \left[\; \frac{ie(\boxed{1})\delta_{g2,g3}}{2c_W c_\beta M_W s_W}\;\right]$$

$$\boxed{1} = U_{s2,1}^{\tilde{e}_{g2}*}\left(\left(2c_W s_\alpha m_{e_{g2}}^2 - c_\beta M_W M_Z s_{\alpha+\beta}\left(1 - 2s_W^2\right)\right)U_{s3,1}^{\tilde{e}_{g2}} + c_W m_{e_{g2}}\left(c_\alpha\mu^* + s_\alpha A_{g2,g2}^e\right)U_{s3,2}^{\tilde{e}_{g2}}\right) +$$
$$U_{s2,2}^{\tilde{e}_{g2}*}\left(c_W m_{e_{g2}}\left(\mu c_\alpha + s_\alpha A_{g2,g2}^{e*}\right)U_{s3,1}^{\tilde{e}_{g2}} + 2c_W s_\alpha m_{e_{g2}}^2 U_{s3,2}^{\tilde{e}_{g2}} - 2c_\beta M_W M_Z s_{\alpha+\beta}s_W^2 U_{s3,2}^{\tilde{e}_{g2}}\right)$$

$$\underset{221}{C}\left(H^0, \tilde{e}_{g2}^{s2}, \tilde{e}_{g3}^{s3,\dagger}\right) = \left[\; \frac{ie(\boxed{1})\delta_{g2,g3}}{2c_W c_\beta M_W s_W}\;\right]$$

$$\boxed{1} = U_{s2,2}^{\tilde{e}_{g2}*}\left(c_W m_{e_{g2}}\left(\mu s_\alpha - c_\alpha A_{g2,g2}^{e*}\right)U_{s3,1}^{\tilde{e}_{g2}} - 2c_W c_\alpha m_{e_{g2}}^2 U_{s3,2}^{\tilde{e}_{g2}} + 2c_{\alpha+\beta}c_\beta M_W M_Z s_W^2 U_{s3,2}^{\tilde{e}_{g2}}\right) -$$
$$U_{s2,1}^{\tilde{e}_{g2}*}\left(\left(2c_W c_\alpha m_{e_{g2}}^2 - c_{\alpha+\beta}c_\beta M_W M_Z\left(1 - 2s_W^2\right)\right)U_{s3,1}^{\tilde{e}_{g2}} - c_W m_{e_{g2}}\left(s_\alpha\mu^* - c_\alpha A_{g2,g2}^e\right)U_{s3,2}^{\tilde{e}_{g2}}\right)$$

$$\underset{228}{C}\left(H^+, \tilde{e}_{g2}^{s2}, \tilde{\nu}_{g3}^{\dagger}\right) = \left[\; \frac{ie\delta_{g2,g3}}{\sqrt{2}M_W s_W}\left(\left(t_\beta m_{e_{g3}}^2 - s_{2\beta}M_W^2\right)U_{s2,1}^{\tilde{e}_{g3}*} + m_{e_{g3}}\left(\mu + t_\beta A_{g3,g3}^{e*}\right)U_{s2,2}^{\tilde{e}_{g3}*}\right)\;\right]$$

$$\underset{229}{C}\left(H^-, \tilde{\nu}_{g2}, \tilde{e}_{g3}^{s3,\dagger}\right) = \left[\; \frac{ie\delta_{g2,g3}}{\sqrt{2}M_W s_W}\left(\left(t_\beta m_{e_{g2}}^2 - s_{2\beta}M_W^2\right)U_{s3,1}^{\tilde{e}_{g2}} + m_{e_{g2}}\left(\mu^* + t_\beta A_{g2,g2}^e\right)U_{s3,2}^{\tilde{e}_{g2}}\right)\;\right]$$

$$\underset{232}{C}\left(G^+, \tilde{e}_{g2}^{s2}, \tilde{\nu}_{g3}^{\dagger}\right) = \left[\; -\frac{ie\delta_{g2,g3}}{\sqrt{2}M_W s_W}\left(\left(m_{e_{g3}}^2 - c_{2\beta}M_W^2\right)U_{s2,1}^{\tilde{e}_{g3}*} - m_{e_{g3}}\left(\mu t_\beta - A_{g3,g3}^{e*}\right)U_{s2,2}^{\tilde{e}_{g3}*}\right)\;\right]$$

$$\underset{233}{C}\left(G^-, \tilde{\nu}_{g2}, \tilde{e}_{g3}^{s3,\dagger}\right) = \left[\; -\frac{ie\delta_{g2,g3}}{\sqrt{2}M_W s_W}\left(\left(m_{e_{g2}}^2 - c_{2\beta}M_W^2\right)U_{s3,1}^{\tilde{e}_{g2}} - m_{e_{g2}}\left(t_\beta\mu^* - A_{g2,g2}^e\right)U_{s3,2}^{\tilde{e}_{g2}}\right)\;\right]$$

$$\underset{214}{C}\left(A^0, \tilde{u}_{a2}, \tilde{u}_{a3}^\dagger\right) = \left[\; -\frac{e}{2M_W s_W t_\beta}\left(\sum_{j1,j2=1}^{3}\left(\left(\mu\delta_{j1,j2}m_{u_{j1}}t_\beta + m_{u_{j2}}A_{j2,j1}^{u*}\right)R_{a2,3+j1}^{\tilde{u}*}R_{a3,j2}^{\tilde{u}} - \left(\delta_{j1,j2}m_{u_{j1}}t_\beta\mu^* + m_{u_{j1}}A_{j1,j2}^{u}\right)R_{a2,j1}^{\tilde{u}*}R_{a3,3+j2}^{\tilde{u}}\right)\right)\;\right]$$

$$\underset{215}{C}\left(G^0, \tilde{u}_{a2}, \tilde{u}_{a3}^\dagger\right) = \left[\; \frac{e}{2M_W s_W t_\beta}\left(\sum_{j1,j2=1}^{3}\left(\left(\mu\delta_{j1,j2}m_{u_{j1}} - m_{u_{j2}}t_\beta A_{j2,j1}^{u*}\right)R_{a2,3+j1}^{\tilde{u}*}R_{a3,j2}^{\tilde{u}} - \left(\delta_{j1,j2}m_{u_{j1}}\mu^* - m_{u_{j1}}t_\beta A_{j1,j2}^{u}\right)R_{a2,j1}^{\tilde{u}*}R_{a3,3+j2}^{\tilde{u}}\right)\right)\;\right]$$

$$\underset{216}{C}\left(A^0, \tilde{d}_{a2}, \tilde{d}_{a3}^\dagger\right) = \left[\; -\frac{e}{2M_W s_W}\left(\sum_{j1,j2=1}^{3}\left(\left(\mu\delta_{j1,j2}m_{d_{j1}} + m_{d_{j2}}t_\beta A_{j2,j1}^{d*}\right)R_{a2,3+j1}^{\tilde{d}*}R_{a3,j2}^{\tilde{d}} - \left(\delta_{j1,j2}m_{d_{j1}}\mu^* + m_{d_{j1}}t_\beta A_{j1,j2}^{d}\right)R_{a2,j1}^{\tilde{d}*}R_{a3,3+j2}^{\tilde{d}}\right)\right)\;\right]$$

$$\underset{217}{C}\left(G^0, \tilde{d}_{a2}, \tilde{d}_{a3}^\dagger\right) = \left[\; -\frac{e}{2M_W s_W}\left(\sum_{j1,j2=1}^{3}\left(\left(\mu\delta_{j1,j2}m_{d_{j1}}t_\beta - m_{d_{j2}}A_{j2,j1}^{d*}\right)R_{a2,3+j1}^{\tilde{d}*}R_{a3,j2}^{\tilde{d}} - \left(\delta_{j1,j2}m_{d_{j1}}t_\beta\mu^* - m_{d_{j1}}A_{j1,j2}^{d}\right)R_{a2,j1}^{\tilde{d}*}R_{a3,3+j2}^{\tilde{d}}\right)\right)\;\right]$$

$$\underset{222}{C}\left(h^0, \tilde{u}_{a2}, \tilde{u}_{a3}^\dagger\right) = \left[\; -\frac{ie}{6c_W M_W s_W s_\beta}\left(\sum_{j1,j2=1}^{3}\boxed{1}\right)\;\right]$$

$$\boxed{1} = \begin{pmatrix} 3c_W\left(\delta_{j1,j2}m_{u_{j1}}s_\alpha\mu^* + c_\alpha m_{u_{j1}}A_{j1,j2}^{u}\right)R_{a3,3+j2}^{\tilde{u}} + \\ \delta_{j1,j2}R_{a3,j2}^{\tilde{u}}\left(6c_W c_\alpha m_{u_{j1}}^2 - M_W M_Z s_{\alpha+\beta}s_\beta\left(3 - 4s_W^2\right)\right) \end{pmatrix}R_{a2,j1}^{\tilde{u}*} + \\ \begin{pmatrix} 6\delta_{j1,j2}c_W c_\alpha m_{u_{j1}}^2 R_{a3,3+j2}^{\tilde{u}} - 4\delta_{j1,j2}M_W M_Z s_{\alpha+\beta}s_\beta R_{a3,3+j2}^{\tilde{u}}s_W^2 + \\ 3c_W\left(\mu\delta_{j1,j2}m_{u_{j1}}s_\alpha + c_\alpha m_{u_{j2}}A_{j2,j1}^{u*}\right)R_{a3,j2}^{\tilde{u}} \end{pmatrix}R_{a2,3+j1}^{\tilde{u}*}$$

$$\underset{223}{C}\left(H^0, \tilde{u}_{a2}, \tilde{u}_{a3}^\dagger\right) = \left[\; -\frac{ie}{6c_W M_W s_W s_\beta}\left(\sum_{j1,j2=1}^{3}\boxed{1}\right)\;\right]$$

$$\boxed{1} = -\begin{pmatrix} 3c_W\left(\delta_{j1,j2}c_\alpha m_{u_{j1}}\mu^* - m_{u_{j1}}s_\alpha A_{j1,j2}^{u}\right)R_{a3,3+j2}^{\tilde{u}} - \\ \delta_{j1,j2}R_{a3,j2}^{\tilde{u}}\left(6c_W s_\alpha m_{u_{j1}}^2 + c_{\alpha+\beta}M_W M_Z s_\beta\left(3 - 4s_W^2\right)\right) \end{pmatrix}R_{a2,j1}^{\tilde{u}*} + \\ \begin{pmatrix} 6\delta_{j1,j2}c_W s_\alpha m_{u_{j1}}^2 R_{a3,3+j2}^{\tilde{u}} + 4\delta_{j1,j2}c_{\alpha+\beta}M_W M_Z s_\beta s_W^2 R_{a3,3+j2}^{\tilde{u}} - \\ 3c_W\left(\mu\delta_{j1,j2}c_\alpha m_{u_{j1}} - m_{u_{j2}}s_\alpha A_{j2,j1}^{u*}\right)R_{a3,j2}^{\tilde{u}} \end{pmatrix}R_{a2,3+j1}^{\tilde{u}*}$$

$$\underset{224}{C}\left(h^0, \tilde{d}_{a2}, \tilde{d}_{a3}^\dagger\right) = \left[\; \frac{ie}{6c_W c_\beta M_W s_W}\left(\sum_{j1,j2=1}^{3}\boxed{1}\right)\;\right]$$

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$$
1 = \begin{pmatrix} 3c_{\mathrm{W}}\left(\delta_{\mathrm{j1,j2}}c_\alpha m_{d_{\mathrm{j1}}}\mu^* + m_{d_{\mathrm{j1}}}s_\alpha A^d_{\mathrm{j1,j2}}\right)R^{\tilde{d}}_{\mathrm{a3,3+j2}} + \\ \delta_{\mathrm{j1,j2}}R^{\tilde{d}}_{\mathrm{a3,j2}}\left(6c_{\mathrm{W}}s_\alpha m^2_{d_{\mathrm{j1}}} - c_\beta M_{\mathrm{W}}M_{\mathrm{Z}}s_{\alpha+\beta}\left(3 - 2s^2_{\mathrm{W}}\right)\right) \end{pmatrix}R^{\tilde{d}*}_{\mathrm{a2,j1}} + \\ \begin{pmatrix} 6\delta_{\mathrm{j1,j2}}c_{\mathrm{W}}s_\alpha m^2_{d_{\mathrm{j1}}}R^{\tilde{d}}_{\mathrm{a3,3+j2}} - 2\delta_{\mathrm{j1,j2}}c_\beta M_{\mathrm{W}}M_{\mathrm{Z}}s_{\alpha+\beta}R^{\tilde{d}}_{\mathrm{a3,3+j2}}s^2_{\mathrm{W}} + \\ 3c_{\mathrm{W}}\left(\mu\delta_{\mathrm{j1,j2}}c_\alpha m_{d_{\mathrm{j1}}} + m_{d_{\mathrm{j2}}}s_\alpha A^{d*}_{\mathrm{j2,j1}}\right)R^{\tilde{d}}_{\mathrm{a3,j2}} \end{pmatrix}R^{\tilde{d}*}_{\mathrm{a2,3+j1}}
$$

$$
\underset{225}{C}\left(H^0, \tilde{d}_{\mathrm{a2}}, \tilde{d}^\dagger_{\mathrm{a3}}\right) = \left[-\frac{ie}{6c_{\mathrm{W}}c_\beta M_{\mathrm{W}}s_{\mathrm{W}}}\left(\sum_{\mathrm{j1,j2}=1}^{3} 1\right) \right]
$$

$$
1 = \begin{pmatrix} 6\delta_{\mathrm{j1,j2}}c_{\mathrm{W}}c_\alpha m^2_{d_{\mathrm{j1}}}R^{\tilde{d}}_{\mathrm{a3,3+j2}} - 2\delta_{\mathrm{j1,j2}}c_{\alpha+\beta}c_\beta M_{\mathrm{W}}M_{\mathrm{Z}}R^{\tilde{d}}_{\mathrm{a3,3+j2}}s^2_{\mathrm{W}} - \\ 3c_{\mathrm{W}}\left(\mu\delta_{\mathrm{j1,j2}}m_{d_{\mathrm{j1}}}s_\alpha - c_\alpha m_{d_{\mathrm{j2}}}A^{d*}_{\mathrm{j2,j1}}\right)R^{\tilde{d}}_{\mathrm{a3,j2}} \end{pmatrix}R^{\tilde{d}*}_{\mathrm{a2,3+j1}} + \\ \begin{pmatrix} \delta_{\mathrm{j1,j2}}R^{\tilde{d}}_{\mathrm{a3,j2}}\left(6c_{\mathrm{W}}c_\alpha m^2_{d_{\mathrm{j1}}} - c_{\alpha+\beta}c_\beta M_{\mathrm{W}}M_{\mathrm{Z}}\left(3 - 2s^2_{\mathrm{W}}\right)\right) - \\ 3c_{\mathrm{W}}\left(\delta_{\mathrm{j1,j2}}m_{d_{\mathrm{j1}}}s_\alpha\mu^* - c_\alpha m_{d_{\mathrm{j1}}}A^d_{\mathrm{j1,j2}}\right)R^{\tilde{d}}_{\mathrm{a3,3+j2}} \end{pmatrix}R^{\tilde{d}*}_{\mathrm{a2,j1}}
$$

$$
\underset{226}{C}\left(H^+, \tilde{d}_{\mathrm{a2}}, \tilde{u}^\dagger_{\mathrm{a3}}\right) = \left[-\frac{ie}{\sqrt{2}M_{\mathrm{W}}s_{\mathrm{W}}t_\beta}\left(\sum_{\mathrm{j1,j2}=1}^{3} 1\right) \right]
$$

$$
1 = -R^{\tilde{d}*}_{\mathrm{a2,j2}}\left(\mathrm{CKM}_{\mathrm{j1,j2}}\left(m^2_{u_{\mathrm{j1}}} + t_\beta\left(t_\beta m^2_{d_{\mathrm{j2}}} - s_{2\beta}M^2_{\mathrm{W}}\right)\right)R^{\tilde{u}}_{\mathrm{a3,j1}} + \left(\sum_{\mathrm{gn}=1}^{3}\mathrm{CKM}_{\mathrm{gn,j2}}m_{u_{\mathrm{gn}}}A^u_{\mathrm{gn,j1}} + \mathrm{CKM}_{\mathrm{j1,j2}}m_{u_{\mathrm{j1}}}t_\beta\mu^*\right)R^{\tilde{u}}_{\mathrm{a3,3+j1}}\right) - \\ R^{\tilde{d}*}_{\mathrm{a2,3+j2}}\left(t_\beta\left(\mu\mathrm{CKM}_{\mathrm{j1,j2}}m_{d_{\mathrm{j2}}} + \left(\sum_{\mathrm{gn}=1}^{3}\mathrm{CKM}_{\mathrm{j1,gn}}m_{d_{\mathrm{gn}}}A^{d*}_{\mathrm{gn,j2}}\right)t_\beta\right)R^{\tilde{u}}_{\mathrm{a3,j1}} + \mathrm{CKM}_{\mathrm{j1,j2}}m_{d_{\mathrm{j2}}}m_{u_{\mathrm{j1}}}R^{\tilde{u}}_{\mathrm{a3,3+j1}}\left(t^2_\beta + 1\right)\right)
$$

$$
\underset{227}{C}\left(H^-, \tilde{u}_{\mathrm{a2}}, \tilde{d}^\dagger_{\mathrm{a3}}\right) = \left[-\frac{ie}{\sqrt{2}M_{\mathrm{W}}s_{\mathrm{W}}t_\beta}\left(\sum_{\mathrm{j1,j2}=1}^{3} 1\right) \right]
$$

$$
1 = -R^{\tilde{u}*}_{\mathrm{a2,j1}}\left(\mathrm{CKM}^*_{\mathrm{j1,j2}}\left(m^2_{u_{\mathrm{j1}}} + t_\beta\left(t_\beta m^2_{d_{\mathrm{j2}}} - s_{2\beta}M^2_{\mathrm{W}}\right)\right)R^{\tilde{d}}_{\mathrm{a3,j2}} + t_\beta\left(\left(\sum_{\mathrm{gn}=1}^{3}m_{d_{\mathrm{gn}}}\mathrm{CKM}^*_{\mathrm{j1,gn}}A^d_{\mathrm{gn,j2}}\right)t_\beta + m_{d_{\mathrm{j2}}}\mu^*\mathrm{CKM}^*_{\mathrm{j1,j2}}\right)R^{\tilde{d}}_{\mathrm{a3,3+j2}}\right) - \\ R^{\tilde{u}*}_{\mathrm{a2,3+j1}}\left(\left(\sum_{\mathrm{gn}=1}^{3}m_{u_{\mathrm{gn}}}\mathrm{CKM}^*_{\mathrm{gn,j2}}A^{u*}_{\mathrm{gn,j1}} + \mu m_{u_{\mathrm{j1}}}t_\beta\mathrm{CKM}^*_{\mathrm{j1,j2}}\right)R^{\tilde{d}}_{\mathrm{a3,j2}} + m_{d_{\mathrm{j2}}}m_{u_{\mathrm{j1}}}\mathrm{CKM}^*_{\mathrm{j1,j2}}R^{\tilde{d}}_{\mathrm{a3,3+j2}}\left(t^2_\beta + 1\right)\right)
$$

$$\underset{230}{C}\left(G^+, \tilde{d}_{a2}, \tilde{u}_{a3}^\dagger\right) = \left[\begin{array}{c} \dfrac{ie}{\sqrt{2}M_W s_W t_\beta} \sum\limits_{j1,j2=1}^{3} \left(\begin{array}{c} t_\beta\left(-\left(\sum\limits_{gn=1}^{3} \text{CKM}_{j1,gn} m_{d_{gn}} A^{d*}_{gn,j2}\right) + \mu \text{CKM}_{j1,j2} m_{d_{j2}} t_\beta\right) R^{\tilde{d}*}_{a2,3+j2} R^{\tilde{u}}_{a3,j1} - \\[2ex] \left(\begin{array}{c} \text{CKM}_{j1,j2} t_\beta\left(m^2_{d_{j2}} - m^2_{u_{j1}} - c_{2\beta} M^2_W\right) R^{\tilde{u}}_{a3,j1} - \\[1ex] \left(\left(\sum\limits_{gn=1}^{3} \text{CKM}_{gn,j2} m_{u_{gn}} A^{u}_{gn,j1}\right) t_\beta - \text{CKM}_{j1,j2} m_{u_{j1}} \mu^*\right) R^{\tilde{u}}_{a3,3+j1} \end{array}\right) R^{\tilde{d}*}_{a2,j2} \end{array}\right) \end{array}\right]$$

$$\underset{231}{C}\left(G^-, \tilde{u}_{a2}, \tilde{d}_{a3}^\dagger\right) = \left[\begin{array}{c} \dfrac{ie}{\sqrt{2}M_W s_W t_\beta} \sum\limits_{j1,j2=1}^{3} \left(\begin{array}{c} \left(\left(\sum\limits_{gn=1}^{3} m_{u_{gn}} \text{CKM}^*_{gn,j2} A^{u*}_{gn,j1}\right) t_\beta - \mu m_{u_{j1}} \text{CKM}^*_{j1,j2}\right) R^{\tilde{u}*}_{a2,3+j1} R^{\tilde{d}}_{a3,j2} - \\[2ex] \left(\begin{array}{c} \text{CKM}^*_{j1,j2}\left(m^2_{d_{j2}} - m^2_{u_{j1}} - c_{2\beta} M^2_W\right) R^{\tilde{d}}_{a3,j2} + \\[1ex] \left(\sum\limits_{gn=1}^{3} m_{d_{gn}} \text{CKM}^*_{j1,gn} A^{d}_{gn,j2} - m_{d_{j2}} t_\beta \mu^* \text{CKM}^*_{j1,j2}\right) R^{\tilde{d}}_{a3,3+j2} \end{array}\right) t_\beta R^{\tilde{u}*}_{a2,j1} \end{array}\right) \end{array}\right]$$

[SSV] **2 Higgs – Gauge Boson**

$$\underset{1}{C}\left(G^-, G^+, \gamma\right) = \left[\ ie\ \right]$$

$$\underset{2}{C}\left(G^-, G^+, Z\right) = \left[\ \dfrac{ie}{2c_W s_W}\left(c^2_W - s^2_W\right)\ \right]$$

$$\underset{3}{C}\left(G^0, G^-, W^+\right) = \left[\ \dfrac{e}{2s_W}\ \right]$$

$$\underset{4}{C}\left(G^0, G^+, W^-\right) = \left[\ \dfrac{e}{2s_W}\ \right]$$

$$\underset{63}{C}\left(h^0, A^0, Z\right) = \left[\ \dfrac{ec_{\beta-\alpha}}{2c_W s_W}\ \right]$$

$$\underset{64}{C}\left(h^0, G^0, Z\right) = \left[\ \dfrac{es_{\beta-\alpha}}{2c_W s_W}\ \right]$$

$$\underset{65}{C}\left(H^0, A^0, Z\right) = \left[\ -\dfrac{es_{\beta-\alpha}}{2c_W s_W}\ \right]$$

$$\underset{66}{C}\left(H^0, G^0, Z\right) = \left[\ \dfrac{ec_{\beta-\alpha}}{2c_W s_W}\ \right]$$

$$\underset{67}{C}\left(H^-, H^+, \gamma\right) = \left[\; ie \;\right]$$

$$\underset{68}{C}\left(H^-, H^+, Z\right) = \left[\; \frac{ie}{2c_{\mathrm{W}}s_{\mathrm{W}}}\left(c_{\mathrm{W}}^2 - s_{\mathrm{W}}^2\right) \;\right]$$

$$\underset{69}{C}\left(h^0, H^-, W^+\right) = \left[\; -\frac{iec_{\beta-\alpha}}{2s_{\mathrm{W}}} \;\right]$$

$$\underset{70}{C}\left(h^0, G^-, W^+\right) = \left[\; -\frac{ies_{\beta-\alpha}}{2s_{\mathrm{W}}} \;\right]$$

$$\underset{71}{C}\left(H^0, H^-, W^+\right) = \left[\; \frac{ies_{\beta-\alpha}}{2s_{\mathrm{W}}} \;\right]$$

$$\underset{72}{C}\left(H^0, G^-, W^+\right) = \left[\; -\frac{iec_{\beta-\alpha}}{2s_{\mathrm{W}}} \;\right]$$

$$\underset{73}{C}\left(h^0, H^+, W^-\right) = \left[\; \frac{iec_{\beta-\alpha}}{2s_{\mathrm{W}}} \;\right]$$

$$\underset{74}{C}\left(h^0, G^+, W^-\right) = \left[\; \frac{ies_{\beta-\alpha}}{2s_{\mathrm{W}}} \;\right]$$

$$\underset{75}{C}\left(H^0, H^+, W^-\right) = \left[\; -\frac{ies_{\beta-\alpha}}{2s_{\mathrm{W}}} \;\right]$$

$$\underset{76}{C}\left(H^0, G^+, W^-\right) = \left[\; \frac{iec_{\beta-\alpha}}{2s_{\mathrm{W}}} \;\right]$$

$$\underset{77}{C}\left(A^0, H^-, W^+\right) = \left[\; \frac{e}{2s_{\mathrm{W}}} \;\right]$$

$$\underset{78}{C}\left(A^0, H^+, W^-\right) = \left[\; \frac{e}{2s_{\mathrm{W}}} \;\right]$$

[SSV] **2 Sleptons – Gauge Boson**

$$\underset{234}{C}\left(\tilde{\nu}_{g1}, \tilde{\nu}_{g2}^\dagger, Z\right) = \left[\; -\frac{ie\delta_{g1,g2}}{2c_{\mathrm{W}}s_{\mathrm{W}}} \;\right]$$

18 $\underset{235}{C}\left(\tilde{e}_{g1}^{s1}, \tilde{e}_{g2}^{s2,\dagger}, \gamma\right) = \left[\; ie\delta_{g1,g2}\delta_{s1,s2} \;\right]$

$$\underset{236}{C}\left(\tilde{e}^{s1}_{g1}, \tilde{e}^{s2,\dagger}_{g2}, Z\right) = \left[\ \frac{ie\delta_{g1,g2}}{2c_W s_W}\left(\left(1 - 2s_W^2\right)U^{\tilde{e}_{g1}*}_{s1,1}U^{\tilde{e}_{g1}}_{s2,1} - 2s_W^2 U^{\tilde{e}_{g1}*}_{s1,2}U^{\tilde{e}_{g1}}_{s2,2}\right)\ \right]$$

$$\underset{243}{C}\left(\tilde{\nu}_{g1}, \tilde{e}^{s2,\dagger}_{g2}, W^-\right) = \left[\ -\frac{ie\delta_{g1,g2}U^{\tilde{e}_{g1}}_{s2,1}}{\sqrt{2}s_W}\ \right]$$

$$\underset{244}{C}\left(\tilde{e}^{s1}_{g1}, \tilde{\nu}^{\dagger}_{g2}, W^+\right) = \left[\ -\frac{ie\delta_{g1,g2}U^{\tilde{e}_{g2}*}_{s1,1}}{\sqrt{2}s_W}\ \right]$$

[SSV] **2 Squarks – Gauge Boson**

$$\underset{237}{C}\left(\tilde{u}_{a1}, \tilde{u}^{\dagger}_{a2}, \gamma\right) = \left[\ -\frac{2}{3}ie\delta_{a1,a2}\ \right]$$

$$\underset{238}{C}\left(\tilde{u}_{a1}, \tilde{u}^{\dagger}_{a2}, Z\right) = \left[\ -\frac{ie}{6c_W s_W}\left(\sum_{j2=1}^{3}\left(R^{\tilde{u}*}_{a1,j2}R^{\tilde{u}}_{a2,j2}\left(3 - 4s_W^2\right) - 4R^{\tilde{u}*}_{a1,3+j2}R^{\tilde{u}}_{a2,3+j2}s_W^2\right)\right)\ \right]$$

$$\underset{239}{C}\left(\tilde{d}_{a1}, \tilde{d}^{\dagger}_{a2}, \gamma\right) = \left[\ \frac{1}{3}ie\delta_{a1,a2}\ \right]$$

$$\underset{240}{C}\left(\tilde{d}_{a1}, \tilde{d}^{\dagger}_{a2}, Z\right) = \left[\ \frac{ie}{6c_W s_W}\left(\sum_{j2=1}^{3}\left(R^{\tilde{d}*}_{a1,j2}R^{\tilde{d}}_{a2,j2}\left(3 - 2s_W^2\right) - 2R^{\tilde{d}*}_{a1,3+j2}R^{\tilde{d}}_{a2,3+j2}s_W^2\right)\right)\ \right]$$

$$\underset{241}{C}\left(\tilde{u}_{a1}, \tilde{d}^{\dagger}_{a2}, W^-\right) = \left[\ -\frac{ie}{\sqrt{2}s_W}\left(\sum_{j1=1}^{3}\left(\sum_{j2=1}^{3}CKM^*_{j1,j2}R^{\tilde{d}}_{a2,j2}\right)R^{\tilde{u}*}_{a1,j1}\right)\ \right]$$

$$\underset{242}{C}\left(\tilde{d}_{a1}, \tilde{u}^{\dagger}_{a2}, W^+\right) = \left[\ -\frac{ie}{\sqrt{2}s_W}\left(\sum_{j2=1}^{3}\left(\sum_{j1=1}^{3}CKM_{j1,j2}R^{\tilde{u}}_{a2,j1}\right)R^{\tilde{d}*}_{a1,j2}\right)\ \right]$$

[SSV] **2 Squarks – Gluon**

$$\underset{390}{C}\left(\tilde{u}_{a1}, \tilde{u}^{\dagger}_{a2}, g\right) = \left[\ -ig_s\delta_{a1,a2}T^{g3}_{c2,c1}\ \right]$$

$$\underset{391}{C}\left(\tilde{d}_{a1}, \tilde{d}^{\dagger}_{a2}, g\right) = \left[\ -ig_s\delta_{a1,a2}T^{g3}_{c2,c1}\ \right]$$

$$\underset{11}{C}\left(G^0, u_-, \bar{u}_-\right) = \left[\; -\frac{e\xi_W M_W}{2s_W}\; \right]$$

$$\underset{12}{C}\left(G^0, u_+, \bar{u}_+\right) = \left[\; \frac{e\xi_W M_W}{2s_W}\; \right]$$

$$\underset{13}{C}\left(G^-, u_\gamma, \bar{u}_-\right) = \left[\; -ie\xi_W M_W\; \right]$$

$$\underset{14}{C}\left(G^+, u_\gamma, \bar{u}_+\right) = \left[\; -ie\xi_W M_W\; \right]$$

$$\underset{15}{C}\left(G^-, u_Z, \bar{u}_-\right) = \left[\; -\frac{ie\xi_W M_W}{2c_W s_W}\left(c_W^2 - s_W^2\right)\; \right]$$

$$\underset{16}{C}\left(G^+, u_Z, \bar{u}_+\right) = \left[\; -\frac{ie\xi_W M_W}{2c_W s_W}\left(c_W^2 - s_W^2\right)\; \right]$$

$$\underset{17}{C}\left(G^-, u_+, \bar{u}_Z\right) = \left[\; \frac{ie\xi_Z M_W}{2c_W s_W}\; \right]$$

$$\underset{18}{C}\left(G^+, u_-, \bar{u}_Z\right) = \left[\; \frac{ie\xi_Z M_W}{2c_W s_W}\; \right]$$

$$\underset{83}{C}\left(h^0, u_Z, \bar{u}_Z\right) = \left[\; -\frac{ie\xi_Z M_W s_{\beta-\alpha}}{2s_W c_W^2}\; \right]$$

$$\underset{84}{C}\left(H^0, u_Z, \bar{u}_Z\right) = \left[\; -\frac{ie\xi_Z c_{\beta-\alpha} M_W}{2s_W c_W^2}\; \right]$$

$$\underset{85}{C}\left(h^0, u_-, \bar{u}_-\right) = \left[\; -\frac{ie\xi_W M_W s_{\beta-\alpha}}{2s_W}\; \right]$$

$$\underset{86}{C}\left(H^0, u_-, \bar{u}_-\right) = \left[\; -\frac{ie\xi_W c_{\beta-\alpha} M_W}{2s_W}\; \right]$$

$$\underset{87}{C}\left(h^0, u_+, \bar{u}_+\right) = \left[\; -\frac{ie\xi_W M_W s_{\beta-\alpha}}{2s_W}\; \right]$$

$$\underset{88}{C}\left(H^0, u_+, \bar{u}_+\right) = \left[\; -\frac{ie\xi_W c_{\beta-\alpha} M_W}{2s_W}\; \right]$$

$$\underset{5}{C}\left(G^{-},\gamma,W^{+}\right) = \left[\; ieM_{\mathrm{W}} \;\right]$$

$$\underset{6}{C}\left(G^{+},\gamma,W^{-}\right) = \left[\; ieM_{\mathrm{W}} \;\right]$$

$$\underset{7}{C}\left(G^{-},Z,W^{+}\right) = \left[\; -\frac{ieM_{\mathrm{W}}s_{\mathrm{W}}}{c_{\mathrm{W}}} \;\right]$$

$$\underset{8}{C}\left(G^{+},Z,W^{-}\right) = \left[\; -\frac{ieM_{\mathrm{W}}s_{\mathrm{W}}}{c_{\mathrm{W}}} \;\right]$$

$$\underset{79}{C}\left(h^{0},Z,Z\right) = \left[\; \frac{ieM_{\mathrm{W}}s_{\beta-\alpha}}{s_{\mathrm{W}}c_{\mathrm{W}}^{2}} \;\right]$$

$$\underset{80}{C}\left(H^{0},Z,Z\right) = \left[\; \frac{iec_{\beta-\alpha}M_{\mathrm{W}}}{s_{\mathrm{W}}c_{\mathrm{W}}^{2}} \;\right]$$

$$\underset{81}{C}\left(h^{0},W^{-},W^{+}\right) = \left[\; \frac{ieM_{\mathrm{W}}s_{\beta-\alpha}}{s_{\mathrm{W}}} \;\right]$$

$$\underset{82}{C}\left(H^{0},W^{-},W^{+}\right) = \left[\; \frac{iec_{\beta-\alpha}M_{\mathrm{W}}}{s_{\mathrm{W}}} \;\right]$$

[UUV] **2 Ghosts – Gauge Boson**

$$\underset{19}{C}\left(\overline{u}_{-},u_{-},\gamma\right) = -ie \left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$\underset{20}{C}\left(\overline{u}_{+},u_{+},\gamma\right) = ie \left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$\underset{21}{C}\left(\overline{u}_{-},u_{-},Z\right) = -\frac{iec_{\mathrm{W}}}{s_{\mathrm{W}}} \left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$C_{22}(\overline{u}_+, u_+, Z) = \frac{iec_W}{s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{23}(\overline{u}_-, u_\gamma, W^-) = ie \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{24}(\overline{u}_+, u_\gamma, W^+) = -ie \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{25}(\overline{u}_\gamma, u_+, W^-) = -ie \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{26}(\overline{u}_\gamma, u_-, W^+) = ie \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{27}(\overline{u}_-, u_Z, W^-) = \frac{iec_W}{s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{28}(\overline{u}_+, u_Z, W^+) = -\frac{iec_W}{s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{29}(\overline{u}_Z, u_+, W^-) = -\frac{iec_W}{s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

$$C_{30}(\overline{u}_Z, u_-, W^+) = \frac{iec_W}{s_W} \begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

2 Ghosts – Gluon

$$\underset{386}{C}\left(\overline{u}_g, u_g, g\right) = g_s f^{g1,g2,g3} \begin{bmatrix} 1 \\ \hline 0 \end{bmatrix}$$

[VVV] **3 Gauge Bosons**

$$\underset{9}{C}\left(\gamma, W^+, W^-\right) = \begin{bmatrix} -ie \end{bmatrix}$$

$$\underset{10}{C}\left(Z, W^+, W^-\right) = \begin{bmatrix} -\dfrac{iec_W}{s_W} \end{bmatrix}$$

[VVV] **3 Gluons**

$$\underset{385}{C}(g, g, g) = \begin{bmatrix} g_s f^{g1,g2,g3} \end{bmatrix}$$

[SSSS] **4 Higgs**

$$\underset{89}{C}\left(h^0, h^0, h^0, h^0\right) = \begin{bmatrix} -\dfrac{3ie^2 c_{2\alpha}^2}{4c_W^2 s_W^2} \end{bmatrix}$$

$$\underset{90}{C}\left(h^0, h^0, h^0, H^0\right) = \begin{bmatrix} -\dfrac{3ie^2 c_{2\alpha} s_{2\alpha}}{4c_W^2 s_W^2} \end{bmatrix}$$

$$\underset{91}{C}\left(h^0, h^0, H^0, H^0\right) = \begin{bmatrix} \dfrac{ie^2}{4c_W^2 s_W^2}\left(1 - 3s_{2\alpha}^2\right) \end{bmatrix}$$

$$\underset{92}{C}\left(h^0, H^0, H^0, H^0\right) = \begin{bmatrix} \dfrac{3ie^2 c_{2\alpha} s_{2\alpha}}{4c_W^2 s_W^2} \end{bmatrix}$$

$$\underset{93}{C}\left(H^0, H^0, H^0, H^0\right) = \begin{bmatrix} -\dfrac{3ie^2 c_{2\alpha}^2}{4c_W^2 s_W^2} \end{bmatrix}$$

$$\underset{94}{C}\left(h^0, h^0, A^0, A^0\right) = \begin{bmatrix} -\dfrac{ie^2 c_{2\alpha} c_{2\beta}}{4c_W^2 s_W^2} \end{bmatrix}$$

$$\underset{95}{C}\left(h^0, h^0, A^0, G^0\right) = \left[\ -\frac{ie^2 c_{2\alpha} s_{2\beta}}{4 c_W^2 s_W^2}\ \right]$$

$$\underset{96}{C}\left(h^0, h^0, G^0, G^0\right) = \left[\ \frac{ie^2 c_{2\alpha} c_{2\beta}}{4 c_W^2 s_W^2}\ \right]$$

$$\underset{97}{C}\left(h^0, H^0, A^0, A^0\right) = \left[\ -\frac{ie^2 c_{2\beta} s_{2\alpha}}{4 c_W^2 s_W^2}\ \right]$$

$$\underset{98}{C}\left(h^0, H^0, A^0, G^0\right) = \left[\ -\frac{ie^2 s_{2\alpha} s_{2\beta}}{4 c_W^2 s_W^2}\ \right]$$

$$\underset{99}{C}\left(h^0, H^0, G^0, G^0\right) = \left[\ \frac{ie^2 c_{2\beta} s_{2\alpha}}{4 c_W^2 s_W^2}\ \right]$$

$$\underset{100}{C}\left(H^0, H^0, A^0, A^0\right) = \left[\ \frac{ie^2 c_{2\alpha} c_{2\beta}}{4 c_W^2 s_W^2}\ \right]$$

$$\underset{101}{C}\left(H^0, H^0, A^0, G^0\right) = \left[\ \frac{ie^2 c_{2\alpha} s_{2\beta}}{4 c_W^2 s_W^2}\ \right]$$

$$\underset{102}{C}\left(H^0, H^0, G^0, G^0\right) = \left[\ -\frac{ie^2 c_{2\alpha} c_{2\beta}}{4 c_W^2 s_W^2}\ \right]$$

$$\underset{103}{C}\left(h^0, h^0, H^-, H^+\right) = \left[\ -\frac{ie^2}{4 s_W^2}\left(1 + \frac{c_{2\alpha} c_{2\beta} s_W^2}{c_W^2} - s_{2\alpha} s_{2\beta}\right)\ \right]$$

$$\underset{104}{C}\left(h^0, h^0, H^-, G^+\right) = \left[\ -\frac{ie^2}{4 s_W^2}\left(\frac{c_{2\alpha} s_{2\beta} s_W^2}{c_W^2} + c_{2\beta} s_{2\alpha}\right)\ \right]$$

$$\underset{105}{C}\left(h^0, h^0, G^-, H^+\right) = \left[\ -\frac{ie^2}{4 s_W^2}\left(\frac{c_{2\alpha} s_{2\beta} s_W^2}{c_W^2} + c_{2\beta} s_{2\alpha}\right)\ \right]$$

$$\underset{106}{C}\left(h^0, h^0, G^-, G^+\right) = \left[\ -\frac{ie^2}{4 s_W^2}\left(1 - \frac{c_{2\alpha} c_{2\beta} s_W^2}{c_W^2} + s_{2\alpha} s_{2\beta}\right)\ \right]$$

$$\underset{107}{C}\left(h^0, H^0, H^-, H^+\right) = \left[\ -\frac{ie^2}{4 s_W^2}\left(\frac{c_{2\beta} s_{2\alpha} s_W^2}{c_W^2} + c_{2\alpha} s_{2\beta}\right)\ \right]$$

$$\underset{108}{C}\left(h^0, H^0, H^-, G^+\right) = \left[\ -\frac{ie^2}{4 s_W^2}\left(\frac{s_{2\alpha} s_{2\beta} s_W^2}{c_W^2} - c_{2\alpha} c_{2\beta}\right)\ \right]$$

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$$\underset{109}{C}\left(h^0, H^0, G^-, H^+\right) = \left[-\frac{ie^2}{4s_W^2}\left(\frac{s_{2\alpha}s_{2\beta}s_W^2}{c_W^2} - c_{2\alpha}c_{2\beta}\right) \right]$$

$$\underset{110}{C}\left(h^0, H^0, G^-, G^+\right) = \left[\frac{ie^2}{4s_W^2}\left(\frac{c_{2\beta}s_{2\alpha}s_W^2}{c_W^2} + c_{2\alpha}s_{2\beta}\right) \right]$$

$$\underset{111}{C}\left(H^0, H^0, H^-, H^+\right) = \left[-\frac{ie^2}{4s_W^2}\left(1 - \frac{c_{2\alpha}c_{2\beta}s_W^2}{c_W^2} + s_{2\alpha}s_{2\beta}\right) \right]$$

$$\underset{112}{C}\left(H^0, H^0, H^-, G^+\right) = \left[\frac{ie^2}{4s_W^2}\left(\frac{c_{2\alpha}s_{2\beta}s_W^2}{c_W^2} + c_{2\beta}s_{2\alpha}\right) \right]$$

$$\underset{113}{C}\left(H^0, H^0, G^-, H^+\right) = \left[\frac{ie^2}{4s_W^2}\left(\frac{c_{2\alpha}s_{2\beta}s_W^2}{c_W^2} + c_{2\beta}s_{2\alpha}\right) \right]$$

$$\underset{114}{C}\left(H^0, H^0, G^-, G^+\right) = \left[-\frac{ie^2}{4s_W^2}\left(1 + \frac{c_{2\alpha}c_{2\beta}s_W^2}{c_W^2} - s_{2\alpha}s_{2\beta}\right) \right]$$

$$\underset{115}{C}\left(h^0, A^0, H^-, G^+\right) = \left[-\frac{e^2 s_{\beta-\alpha}}{4s_W^2} \right]$$

$$\underset{116}{C}\left(h^0, A^0, G^-, H^+\right) = \left[\frac{e^2 s_{\beta-\alpha}}{4s_W^2} \right]$$

$$\underset{117}{C}\left(h^0, G^0, H^-, G^+\right) = \left[\frac{e^2 c_{\beta-\alpha}}{4s_W^2} \right]$$

$$\underset{118}{C}\left(h^0, G^0, G^-, H^+\right) = \left[-\frac{e^2 c_{\beta-\alpha}}{4s_W^2} \right]$$

$$\underset{119}{C}\left(H^0, A^0, H^-, G^+\right) = \left[-\frac{e^2 c_{\beta-\alpha}}{4s_W^2} \right]$$

$$\underset{120}{C}\left(H^0, A^0, G^-, H^+\right) = \left[\frac{e^2 c_{\beta-\alpha}}{4s_W^2} \right]$$

$$\underset{121}{C}\left(H^0, G^0, H^-, G^+\right) = \left[-\frac{e^2 s_{\beta-\alpha}}{4s_W^2} \right]$$

$$\underset{122}{C}\left(H^0, G^0, G^-, H^+\right) = \left[\frac{e^2 s_{\beta-\alpha}}{4s_W^2} \right]$$

$$\underset{123}{C}\left(A^0,A^0,A^0,A^0\right)=\left[-\frac{3ie^2c_{2\beta}^2}{4c_W^2s_W^2}\right]$$

$$\underset{124}{C}\left(A^0,A^0,A^0,G^0\right)=\left[-\frac{3ie^2c_{2\beta}s_{2\beta}}{4c_W^2s_W^2}\right]$$

$$\underset{125}{C}\left(A^0,A^0,G^0,G^0\right)=\left[\frac{ie^2}{4c_W^2s_W^2}\left(1-3s_{2\beta}^2\right)\right]$$

$$\underset{126}{C}\left(A^0,G^0,G^0,G^0\right)=\left[\frac{3ie^2c_{2\beta}s_{2\beta}}{4c_W^2s_W^2}\right]$$

$$\underset{127}{C}\left(G^0,G^0,G^0,G^0\right)=\left[-\frac{3ie^2c_{2\beta}^2}{4c_W^2s_W^2}\right]$$

$$\underset{128}{C}\left(A^0,A^0,H^-,H^+\right)=\left[-\frac{ie^2c_{2\beta}^2}{4c_W^2s_W^2}\right]$$

$$\underset{129}{C}\left(A^0,A^0,H^-,G^+\right)=\left[-\frac{ie^2c_{2\beta}s_{2\beta}}{4c_W^2s_W^2}\right]$$

$$\underset{130}{C}\left(A^0,A^0,G^-,H^+\right)=\left[-\frac{ie^2c_{2\beta}s_{2\beta}}{4c_W^2s_W^2}\right]$$

$$\underset{131}{C}\left(A^0,A^0,G^-,G^+\right)=\left[-\frac{ie^2}{4s_W^2}\left(1-\frac{c_{2\beta}^2s_W^2}{c_W^2}+s_{2\beta}^2\right)\right]$$

$$\underset{132}{C}\left(A^0,G^0,H^-,H^+\right)=\left[-\frac{ie^2c_{2\beta}s_{2\beta}}{4c_W^2s_W^2}\right]$$

$$\underset{133}{C}\left(A^0,G^0,H^-,G^+\right)=\left[-\frac{ie^2}{4s_W^2}\left(\frac{s_W^2s_{2\beta}^2}{c_W^2}-c_{2\beta}^2\right)\right]$$

$$\underset{134}{C}\left(A^0,G^0,G^-,H^+\right)=\left[-\frac{ie^2}{4s_W^2}\left(\frac{s_W^2s_{2\beta}^2}{c_W^2}-c_{2\beta}^2\right)\right]$$

$$\underset{135}{C}\left(A^0,G^0,G^-,G^+\right)=\left[\frac{ie^2c_{2\beta}s_{2\beta}}{4c_W^2s_W^2}\right]$$

$$C_{136}\left(G^0, G^0, H^-, H^+\right) = \left[-\frac{ie^2}{4s_W^2}\left(1 - \frac{c_{2\beta}^2 s_W^2}{c_W^2} + s_{2\beta}^2\right) \right]$$

$$C_{137}\left(G^0, G^0, H^-, G^+\right) = \left[\frac{ie^2 c_{2\beta} s_{2\beta}}{4c_W^2 s_W^2} \right]$$

$$C_{138}\left(G^0, G^0, G^-, H^+\right) = \left[\frac{ie^2 c_{2\beta} s_{2\beta}}{4c_W^2 s_W^2} \right]$$

$$C_{139}\left(G^0, G^0, G^-, G^+\right) = \left[-\frac{ie^2 c_{2\beta}^2}{4c_W^2 s_W^2} \right]$$

$$C_{140}\left(H^-, H^-, H^+, H^+\right) = \left[-\frac{ie^2 c_{2\beta}^2}{2c_W^2 s_W^2} \right]$$

$$C_{141}\left(H^-, H^-, H^+, G^+\right) = \left[-\frac{ie^2 c_{2\beta} s_{2\beta}}{2c_W^2 s_W^2} \right]$$

$$C_{142}\left(H^-, H^-, G^+, G^+\right) = \left[-\frac{ie^2 s_{2\beta}^2}{2c_W^2 s_W^2} \right]$$

$$C_{143}\left(H^-, G^-, H^+, H^+\right) = \left[-\frac{ie^2 c_{2\beta} s_{2\beta}}{2c_W^2 s_W^2} \right]$$

$$C_{144}\left(H^-, G^-, H^+, G^+\right) = \left[\frac{ie^2}{4c_W^2 s_W^2}\left(c_{2\beta}^2 - s_{2\beta}^2\right) \right]$$

$$C_{145}\left(H^-, G^-, G^+, G^+\right) = \left[\frac{ie^2 c_{2\beta} s_{2\beta}}{2c_W^2 s_W^2} \right]$$

$$C_{146}\left(G^-, G^-, H^+, H^+\right) = \left[-\frac{ie^2 s_{2\beta}^2}{2c_W^2 s_W^2} \right]$$

$$C_{147}\left(G^-, G^-, H^+, G^+\right) = \left[\frac{ie^2 c_{2\beta} s_{2\beta}}{2c_W^2 s_W^2} \right]$$

$$C_{148}\left(G^-, G^-, G^+, G^+\right) = \left[-\frac{ie^2 c_{2\beta}^2}{2c_W^2 s_W^2} \right]$$

$$\underset{378}{C}\left(\tilde{e}_{g1}^{s1}, \tilde{e}_{g2}^{s2,\dagger}, \tilde{e}_{g3}^{s3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[-\frac{ie^2}{4c_W^2 c_\beta^2 M_W^2 s_W^2}\left(\left(\boxed{2}\right)U_{s1,1}^{\tilde{e}_{g1}*} + 2\left(\boxed{1}\right)U_{s1,2}^{\tilde{e}_{g1}*}\right) \right]$$

$$\boxed{2} = \begin{aligned} &\delta_{g1,g4}\delta_{g2,g3}c_\beta^2 M_W^2 U_{s2,1}^{\tilde{e}_{g2}} U_{s3,1}^{\tilde{e}_{g2}*} U_{s4,1}^{\tilde{e}_{g1}} - 2\delta_{g1,g4}\delta_{g2,g3}U_{s3,2}^{\tilde{e}_{g2}*}\left(c_\beta^2 M_W^2 s_W U_{s2,2}^{\tilde{e}_{g2}} U_{s4,1}^{\tilde{e}_{g1}} - m_{e_{g1}} m_{e_{g2}} c_W^2 U_{s2,1}^{\tilde{e}_{g2}} U_{s4,2}^{\tilde{e}_{g1}}\right) + \\ &\delta_{g1,g2}\delta_{g3,g4}\left(c_\beta^2 M_W^2 U_{s2,1}^{\tilde{e}_{g1}} U_{s3,1}^{\tilde{e}_{g3}*} U_{s4,1}^{\tilde{e}_{g3}} + 2U_{s3,2}^{\tilde{e}_{g3}*}\left(m_{e_{g1}} m_{e_{g3}} c_W^2 U_{s2,2}^{\tilde{e}_{g1}} U_{s4,1}^{\tilde{e}_{g3}} - c_\beta^2 M_W^2 s_W U_{s2,1}^{\tilde{e}_{g1}} U_{s4,2}^{\tilde{e}_{g3}}\right)\right) \end{aligned}$$

$$\boxed{1} = \begin{aligned} &2\delta_{g1,g4}\delta_{g2,g3}c_\beta^2 M_W^2 s_W U_{s2,2}^{\tilde{e}_{g2}} U_{s3,2}^{\tilde{e}_{g2}*} U_{s4,2}^{\tilde{e}_{g1}} + \delta_{g1,g4}\delta_{g2,g3}U_{s3,1}^{\tilde{e}_{g2}*}\left(m_{e_{g1}} m_{e_{g2}} c_W^2 U_{s2,2}^{\tilde{e}_{g2}} U_{s4,1}^{\tilde{e}_{g1}} - c_\beta^2 M_W^2 s_W U_{s2,1}^{\tilde{e}_{g2}} U_{s4,2}^{\tilde{e}_{g1}}\right) + \\ &\delta_{g1,g2}\delta_{g3,g4}\left(2c_\beta^2 M_W^2 s_W U_{s2,2}^{\tilde{e}_{g1}} U_{s3,2}^{\tilde{e}_{g3}*} U_{s4,2}^{\tilde{e}_{g3}} - U_{s3,1}^{\tilde{e}_{g3}*}\left(c_\beta^2 M_W^2 s_W U_{s2,2}^{\tilde{e}_{g1}} U_{s4,1}^{\tilde{e}_{g3}} - m_{e_{g1}} m_{e_{g3}} c_W^2 U_{s2,1}^{\tilde{e}_{g1}} U_{s4,2}^{\tilde{e}_{g3}}\right)\right) \end{aligned}$$

$$\underset{379}{C}\left(\tilde{e}_{g1}^{s1}, \tilde{e}_{g2}^{s2,\dagger}, \tilde{\nu}_{g3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\frac{ie^2}{4s_W^2}\left(\begin{aligned} &\frac{\delta_{g1,g2}\delta_{g3,g4}}{c_W^2}\left(\left(c_W^2 - s_W^2\right)U_{s1,1}^{\tilde{e}_{g1}*} U_{s2,1}^{\tilde{e}_{g1}} + 2s_W^2 U_{s1,2}^{\tilde{e}_{g1}*} U_{s2,2}^{\tilde{e}_{g1}}\right) - \\ &\frac{2\delta_{g1,g4}\delta_{g2,g3}}{c_\beta^2 M_W^2}\left(c_\beta^2 M_W^2 U_{s1,1}^{\tilde{e}_{g1}*} U_{s2,1}^{\tilde{e}_{g2}} + m_{e_{g1}} m_{e_{g2}} U_{s1,2}^{\tilde{e}_{g1}*} U_{s2,2}^{\tilde{e}_{g2}}\right) \end{aligned} \right) \right]$$

$$\underset{381}{C}\left(\tilde{\nu}_{g1}, \tilde{\nu}_{g2}^{\dagger}, \tilde{\nu}_{g3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[-\frac{ie^2}{4c_W^2 s_W^2}\left(\delta_{g1,g4}\delta_{g2,g3} + \delta_{g1,g2}\delta_{g3,g4}\right) \right]$$

$$\underset{372}{C}\left(\tilde{d}_{a1}, \tilde{d}_{a2}^{\dagger}, \tilde{d}_{a3}, \tilde{d}_{a4}^{\dagger}\right) = \left[\sum_{j1,j2,j3,j4=1}^{3} \boxed{3} \right]$$

$$\boxed{3} = \begin{aligned} &-\delta_{j1,j2}\delta_{j3,j4}\left(\frac{ie^2\left(\boxed{1}\right)}{36c_W^2 c_\beta^2 M_W^2 s_W^2} + i\left(T_{c2,c1}^x T_{c4,c3}^x\right)g_s^2\left(R_{a1,j1}^{\tilde{d}*} R_{a2,j2}^{\tilde{d}} - R_{a1,3+j1}^{\tilde{d}*} R_{a2,3+j2}^{\tilde{d}}\right)\left(R_{a3,j3}^{\tilde{d}*} R_{a4,j4}^{\tilde{d}} - R_{a3,3+j3}^{\tilde{d}*} R_{a4,3+j4}^{\tilde{d}}\right)\right) - \\ &\delta_{j1,j4}\delta_{j2,j3}\left(\frac{ie^2\left(\boxed{2}\right)}{36c_W^2 c_\beta^2 M_W^2 s_W^2} + i\left(T_{c2,c3}^x T_{c4,c1}^x\right)g_s^2\left(R_{a2,j2}^{\tilde{d}} R_{a3,j3}^{\tilde{d}*} - R_{a2,3+j2}^{\tilde{d}} R_{a3,3+j3}^{\tilde{d}*}\right)\left(R_{a1,j1}^{\tilde{d}} R_{a4,j4}^{\tilde{d}*} - R_{a1,3+j1}^{\tilde{d}} R_{a4,3+j4}^{\tilde{d}*}\right)\right) \end{aligned}$$

$$\boxed{2} = \begin{aligned} &R_{a1,j1}^{\tilde{d}*}\left(\left(8c_W^2 + 1\right)c_\beta^2 M_W^2 R_{a2,j2}^{\tilde{d}} R_{a3,j3}^{\tilde{d}*} R_{a4,j4}^{\tilde{d}} + 2R_{a3,3+j3}^{\tilde{d}*}\left(9m_{d_{j1}} m_{d_{j2}} c_W^2 R_{a2,j2}^{\tilde{d}} R_{a4,3+j4}^{\tilde{d}} + c_\beta^2 M_W^2 R_{a2,3+j2}^{\tilde{d}} R_{a4,j4}^{\tilde{d}} s_W^2\right)\right) + \\ &2R_{a1,3+j1}^{\tilde{d}*}\left(2c_\beta^2 M_W^2 R_{a2,3+j2}^{\tilde{d}} R_{a3,3+j3}^{\tilde{d}*} R_{a4,3+j4}^{\tilde{d}} s_W^2 + R_{a3,j3}^{\tilde{d}*}\left(9m_{d_{j1}} m_{d_{j2}} c_W^2 R_{a2,3+j2}^{\tilde{d}} R_{a4,j4}^{\tilde{d}} + c_\beta^2 M_W^2 R_{a2,j2}^{\tilde{d}} R_{a4,3+j4}^{\tilde{d}} s_W^2\right)\right) \end{aligned}$$

$$\boxed{1} = \begin{aligned} &2R_{a1,3+j1}^{\tilde{d}*}\left(2c_\beta^2 M_W^2 R_{a2,3+j2}^{\tilde{d}} R_{a3,3+j3}^{\tilde{d}*} R_{a4,3+j4}^{\tilde{d}} s_W^2 + R_{a3,j3}^{\tilde{d}*}\left(9m_{d_{j1}} m_{d_{j3}} c_W^2 R_{a2,j2}^{\tilde{d}} R_{a4,3+j4}^{\tilde{d}} + c_\beta^2 M_W^2 R_{a2,3+j2}^{\tilde{d}} R_{a4,j4}^{\tilde{d}} s_W^2\right)\right) + \\ &R_{a1,j1}^{\tilde{d}*}\left(\left(8c_W^2 + 1\right)c_\beta^2 M_W^2 R_{a2,j2}^{\tilde{d}} R_{a3,j3}^{\tilde{d}*} R_{a4,j4}^{\tilde{d}} + 2R_{a3,3+j3}^{\tilde{d}*}\left(9m_{d_{j1}} m_{d_{j3}} c_W^2 R_{a2,3+j2}^{\tilde{d}} R_{a4,j4}^{\tilde{d}} + c_\beta^2 M_W^2 R_{a2,j2}^{\tilde{d}} R_{a4,3+j4}^{\tilde{d}} s_W^2\right)\right) \end{aligned}$$

$$\underset{375}{C}\left(\tilde{d}_{a1}, \tilde{d}^\dagger_{a2}, \tilde{u}_{a3}, \tilde{u}^\dagger_{a4}\right) = \left[\sum_{j1,j2,j3,j4=1}^{3} \frac{ie^2 CKM_{j4,j1} CKM^*_{j3,j2}}{2c_\beta^2 M_W^2 s_W^2 s_\beta^2} \begin{pmatrix} (\boxed{1})\delta_{j1,j2}\delta_{j3,j4} - \\ m_{u_{j3}} m_{u_{j4}} c_\beta^2 R^{\tilde{d}*}_{a1,j1} R^{\tilde{d}}_{a2,j2} R^{\tilde{u}*}_{a3,3+j3} R^{\tilde{u}}_{a4,3+j4} + \\ \left(c_\beta^2 M_W^2 R^{\tilde{d}*}_{a1,j1} R^{\tilde{d}}_{a2,j2} + m_{d_{j1}} m_{d_{j2}} R^{\tilde{d}*}_{a1,3+j1} R^{\tilde{d}}_{a2,3+j2}\right) R^{\tilde{u}*}_{a3,j3} R^{\tilde{u}}_{a4,j4} s_\beta^2 \end{pmatrix} \right]$$

$$\boxed{1} = \frac{ie^2}{36 c_W^2 s_W^2} \begin{pmatrix} -i \left(T^x_{c2,c1} T^x_{c4,c3}\right) g_s^2 \left(R^{\tilde{d}*}_{a1,j1} R^{\tilde{d}}_{a2,j2} - R^{\tilde{d}*}_{a1,3+j1} R^{\tilde{d}}_{a2,3+j2}\right) \left(R^{\tilde{u}*}_{a3,j3} R^{\tilde{u}}_{a4,j4} - R^{\tilde{u}*}_{a3,3+j3} R^{\tilde{u}}_{a4,3+j4}\right) + \\ 4 \left(R^{\tilde{d}*}_{a1,j1} R^{\tilde{d}}_{a2,j2} + 2R^{\tilde{d}*}_{a1,3+j1} R^{\tilde{d}}_{a2,3+j2}\right) R^{\tilde{u}*}_{a3,3+j3} R^{\tilde{u}}_{a4,3+j4} s_W^2 + \\ R^{\tilde{u}*}_{a3,j3} R^{\tilde{u}}_{a4,j4} \left(R^{\tilde{d}*}_{a1,j1} R^{\tilde{d}}_{a2,j2}\left(9c_W^2 - s_W^2\right) - 2R^{\tilde{d}*}_{a1,3+j1} R^{\tilde{d}}_{a2,3+j2} s_W^2\right) \end{pmatrix}$$

$$\underset{383}{C}\left(\tilde{u}_{a1}, \tilde{u}^\dagger_{a2}, \tilde{u}_{a3}, \tilde{u}^\dagger_{a4}\right) = \left[\sum_{j1,j2,j3,j4=1}^{3} \boxed{3} \right]$$

$$\boxed{3} = \begin{matrix} -\delta_{j1,j2}\delta_{j3,j4}\left(\dfrac{ie^2(\boxed{1})}{36 c_W^2 M_W^2 s_W^2 s_\beta^2} + i\left(T^x_{c2,c1} T^x_{c4,c3}\right) g_s^2 \left(R^{\tilde{u}*}_{a1,j1} R^{\tilde{u}}_{a2,j2} - R^{\tilde{u}*}_{a1,3+j1} R^{\tilde{u}}_{a2,3+j2}\right)\left(R^{\tilde{u}*}_{a3,j3} R^{\tilde{u}}_{a4,j4} - R^{\tilde{u}*}_{a3,3+j3} R^{\tilde{u}}_{a4,3+j4}\right)\right) - \\ \delta_{j1,j4}\delta_{j2,j3}\left(\dfrac{ie^2(\boxed{2})}{36 c_W^2 M_W^2 s_W^2 s_\beta^2} + i\left(T^x_{c2,c3} T^x_{c4,c1}\right) g_s^2 \left(R^{\tilde{u}}_{a2,j2} R^{\tilde{u}*}_{a3,j3} - R^{\tilde{u}}_{a2,3+j2} R^{\tilde{u}*}_{a3,3+j3}\right)\left(R^{\tilde{u}*}_{a1,j1} R^{\tilde{u}}_{a4,j4} - R^{\tilde{u}*}_{a1,3+j1} R^{\tilde{u}}_{a4,3+j4}\right)\right) \end{matrix}$$

$$\boxed{2} = \begin{matrix} R^{\tilde{u}*}_{a1,j1}\left(\left(8c_W^2 + 1\right) M_W^2 R^{\tilde{u}}_{a2,j2} R^{\tilde{u}*}_{a3,j3} R^{\tilde{u}}_{a4,j4} s_\beta^2 + 2R^{\tilde{u}*}_{a3,3+j3}\left(9m_{u_{j1}} m_{u_{j2}} c_W^2 R^{\tilde{u}}_{a2,j2} R^{\tilde{u}}_{a4,3+j4} - 2M_W^2 R^{\tilde{u}}_{a2,3+j2} R^{\tilde{u}}_{a4,3+j4} s_W^2 s_\beta^2\right)\right) + \\ 2R^{\tilde{u}*}_{a1,3+j1}\left(8M_W^2 R^{\tilde{u}}_{a2,3+j2} R^{\tilde{u}*}_{a3,3+j3} R^{\tilde{u}}_{a4,3+j4} s_W^2 s_\beta^2 + R^{\tilde{u}*}_{a3,j3}\left(9m_{u_{j1}} m_{u_{j2}} c_W^2 R^{\tilde{u}}_{a2,3+j2} R^{\tilde{u}}_{a4,j4} - 2M_W^2 R^{\tilde{u}}_{a2,j2} R^{\tilde{u}}_{a4,3+j4} s_W^2 s_\beta^2\right)\right) \end{matrix}$$

$$\boxed{1} = \begin{matrix} 2R^{\tilde{u}*}_{a1,3+j1}\left(8M_W^2 R^{\tilde{u}}_{a2,3+j2} R^{\tilde{u}*}_{a3,3+j3} R^{\tilde{u}}_{a4,3+j4} s_W^2 s_\beta^2 + R^{\tilde{u}*}_{a3,j3}\left(9m_{u_{j1}} m_{u_{j3}} c_W^2 R^{\tilde{u}}_{a2,j2} R^{\tilde{u}}_{a4,3+j4} - 2M_W^2 R^{\tilde{u}}_{a2,3+j2} R^{\tilde{u}}_{a4,j4} s_W^2 s_\beta^2\right)\right) + \\ R^{\tilde{u}*}_{a1,j1}\left(\left(8c_W^2 + 1\right) M_W^2 R^{\tilde{u}}_{a2,j2} R^{\tilde{u}*}_{a3,j3} R^{\tilde{u}}_{a4,j4} s_\beta^2 + 2R^{\tilde{u}*}_{a3,3+j3}\left(9m_{u_{j1}} m_{u_{j3}} c_W^2 R^{\tilde{u}}_{a2,3+j2} R^{\tilde{u}}_{a4,j4} - 2M_W^2 R^{\tilde{u}}_{a2,j2} R^{\tilde{u}}_{a4,3+j4} s_W^2 s_\beta^2\right)\right) \end{matrix}$$

[SSSS] **2 Higgs – 2 Sleptons**

$$\underset{278}{C}\left(h^0, h^0, \tilde{\nu}_{g3}, \tilde{\nu}^\dagger_{g4}\right) = \left[\frac{ie^2 \delta_{g3,g4} c_{2\alpha}}{4 c_W^2 s_W^2} \right]$$

$$\underset{279}{C}\left(h^0, h^0, \tilde{e}^{s3}_{g3}, \tilde{e}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2 \delta_{g3,g4}}{4 c_W^2 c_\beta^2 M_W^2 s_W^2} \begin{pmatrix} \left(c_{2\alpha} c_\beta^2 M_W^2\left(1 - 2s_W^2\right) + 2c_W^2 m^2_{e_{g4}} s_\alpha^2\right) U^{\tilde{e}_{g4}*}_{s3,1} U^{\tilde{e}_{g4}}_{s4,1} + \\ 2\left(c_{2\alpha} c_\beta^2 M_W^2 s_W^2 + c_W^2 m^2_{e_{g4}} s_\alpha^2\right) U^{\tilde{e}_{g4}*}_{s3,2} U^{\tilde{e}_{g4}}_{s4,2} \end{pmatrix} \right]$$

$$\underset{282}{C}\left(H^0, H^0, \tilde{\nu}_{g3}, \tilde{\nu}^\dagger_{g4}\right) = \left[-\frac{ie^2 \delta_{g3,g4} c_{2\alpha}}{4 c_W^2 s_W^2} \right]$$

$$
\underset{283}{C}\left(H^0, H^0, \tilde{e}^{s3}_{g3}, \tilde{e}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2 \delta_{g3,g4}}{4c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(2c_W^2 c_\alpha^2 m_{e_{g4}}^2 - c_{2\alpha} c_\beta^2 M_W^2 \left(1 - 2s_W^2\right)\right) U^{\tilde{e}_{g4}*}_{s3,1} U^{\tilde{e}_{g4}}_{s4,1} + \\ 2\left(c_W^2 c_\alpha^2 m_{e_{g4}}^2 - c_{2\alpha} c_\beta^2 M_W^2 s_W^2\right) U^{\tilde{e}_{g4}*}_{s3,2} U^{\tilde{e}_{g4}}_{s4,2} \end{array} \right) \right]
$$

$$
\underset{286}{C}\left(A^0, A^0, \tilde{\nu}_{g3}, \tilde{\nu}^{\dagger}_{g4}\right) = \left[\frac{ie^2 \delta_{g3,g4} c_{2\beta}}{4c_W^2 s_W^2} \right]
$$

$$
\underset{287}{C}\left(A^0, A^0, \tilde{e}^{s3}_{g3}, \tilde{e}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2 \delta_{g3,g4}}{4c_W^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(c_{2\beta} M_W^2 \left(1 - 2s_W^2\right) + 2c_W^2 m_{e_{g4}}^2 t_\beta^2\right) U^{\tilde{e}_{g4}*}_{s3,1} U^{\tilde{e}_{g4}}_{s4,1} + \\ 2\left(c_{2\beta} M_W^2 s_W^2 + c_W^2 m_{e_{g4}}^2 t_\beta^2\right) U^{\tilde{e}_{g4}*}_{s3,2} U^{\tilde{e}_{g4}}_{s4,2} \end{array} \right) \right]
$$

$$
\underset{290}{C}\left(G^0, G^0, \tilde{\nu}_{g3}, \tilde{\nu}^{\dagger}_{g4}\right) = \left[-\frac{ie^2 \delta_{g3,g4} c_{2\beta}}{4c_W^2 s_W^2} \right]
$$

$$
\underset{291}{C}\left(G^0, G^0, \tilde{e}^{s3}_{g3}, \tilde{e}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2 \delta_{g3,g4}}{4c_W^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(2c_W^2 m_{e_{g4}}^2 - c_{2\beta} M_W^2 \left(1 - 2s_W^2\right)\right) U^{\tilde{e}_{g4}*}_{s3,1} U^{\tilde{e}_{g4}}_{s4,1} + \\ 2\left(c_W^2 m_{e_{g4}}^2 - c_{2\beta} M_W^2 s_W^2\right) U^{\tilde{e}_{g4}*}_{s3,2} U^{\tilde{e}_{g4}}_{s4,2} \end{array} \right) \right]
$$

$$
\underset{294}{C}\left(h^0, H^0, \tilde{\nu}_{g3}, \tilde{\nu}^{\dagger}_{g4}\right) = \left[\frac{ie^2 \delta_{g3,g4} s_{2\alpha}}{4c_W^2 s_W^2} \right]
$$

$$
\underset{295}{C}\left(h^0, H^0, \tilde{e}^{s3}_{g3}, \tilde{e}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2 \delta_{g3,g4} s_{2\alpha}}{4c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(c_W^2 m_{e_{g4}}^2 - c_\beta^2 M_W^2 \left(1 - 2s_W^2\right)\right) U^{\tilde{e}_{g4}*}_{s3,1} U^{\tilde{e}_{g4}}_{s4,1} + \\ \left(c_W^2 m_{e_{g4}}^2 - 2c_\beta^2 M_W^2 s_W^2\right) U^{\tilde{e}_{g4}*}_{s3,2} U^{\tilde{e}_{g4}}_{s4,2} \end{array} \right) \right]
$$

$$
\underset{296}{C}\left(A^0, G^0, \tilde{\nu}_{g3}, \tilde{\nu}^{\dagger}_{g4}\right) = \left[\frac{ie^2 \delta_{g3,g4} s_{2\beta}}{4c_W^2 s_W^2} \right]
$$

$$
\underset{297}{C}\left(A^0, G^0, \tilde{e}^{s3}_{g3}, \tilde{e}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2 \delta_{g3,g4} s_{2\beta}}{4c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(c_W^2 m_{e_{g4}}^2 - c_\beta^2 M_W^2 \left(1 - 2s_W^2\right)\right) U^{\tilde{e}_{g4}*}_{s3,1} U^{\tilde{e}_{g4}}_{s4,1} + \\ \left(c_W^2 m_{e_{g4}}^2 - 2c_\beta^2 M_W^2 s_W^2\right) U^{\tilde{e}_{g4}*}_{s3,2} U^{\tilde{e}_{g4}}_{s4,2} \end{array} \right) \right]
$$

$$
\underset{310}{C}\left(h^0, H^-, \tilde{\nu}_{g3}, \tilde{e}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2 \delta_{g3,g4} U^{\tilde{e}_{g3}}_{s4,1}}{2\sqrt{2} s_W^2} \left(\frac{s_\alpha t_\beta m_{e_{g3}}^2}{c_\beta M_W^2} + c_{\alpha+\beta} \right) \right]
$$

$$
\underset{311}{C}\left(h^0, H^+, \tilde{e}^{s3}_{g3}, \tilde{\nu}^{\dagger}_{g4}\right) = \left[-\frac{ie^2 \delta_{g3,g4} U^{\tilde{e}_{g4}*}_{s3,1}}{2\sqrt{2} s_W^2} \left(\frac{s_\alpha t_\beta m_{e_{g4}}^2}{c_\beta M_W^2} + c_{\alpha+\beta} \right) \right]
$$

$$\underset{312}{C}\left(h^0, G^-, \tilde{\nu}_{g3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[\frac{ie^2\delta_{g3,g4}U_{s4,1}^{\tilde{e}_{g3}}}{2\sqrt{2}s_W^2}\left(\frac{s_\alpha m_{e_{g3}}^2}{c_\beta M_W^2} - s_{\alpha+\beta}\right) \right]$$

$$\underset{313}{C}\left(h^0, G^+, \tilde{e}_{g3}^{s3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\frac{ie^2\delta_{g3,g4}U_{s3,1}^{\tilde{e}_{g4}*}}{2\sqrt{2}s_W^2}\left(\frac{s_\alpha m_{e_{g4}}^2}{c_\beta M_W^2} - s_{\alpha+\beta}\right) \right]$$

$$\underset{314}{C}\left(A^0, H^-, \tilde{\nu}_{g3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[\frac{e^2\delta_{g3,g4}U_{s4,1}^{\tilde{e}_{g3}}}{2\sqrt{2}s_W^2}\left(\frac{m_{e_{g3}}^2 t_\beta^2}{M_W^2} + c_{2\beta}\right) \right]$$

$$\underset{315}{C}\left(A^0, H^+, \tilde{e}_{g3}^{s3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[-\frac{e^2\delta_{g3,g4}U_{s3,1}^{\tilde{e}_{g4}*}}{2\sqrt{2}s_W^2}\left(\frac{m_{e_{g4}}^2 t_\beta^2}{M_W^2} + c_{2\beta}\right) \right]$$

$$\underset{316}{C}\left(A^0, G^-, \tilde{\nu}_{g3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[-\frac{e^2\delta_{g3,g4}U_{s4,1}^{\tilde{e}_{g3}}}{2\sqrt{2}s_W^2}\left(\frac{t_\beta m_{e_{g3}}^2}{M_W^2} - s_{2\beta}\right) \right]$$

$$\underset{317}{C}\left(A^0, G^+, \tilde{e}_{g3}^{s3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\frac{e^2\delta_{g3,g4}U_{s3,1}^{\tilde{e}_{g4}*}}{2\sqrt{2}s_W^2}\left(\frac{t_\beta m_{e_{g4}}^2}{M_W^2} - s_{2\beta}\right) \right]$$

$$\underset{326}{C}\left(H^0, H^-, \tilde{\nu}_{g3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[\frac{ie^2\delta_{g3,g4}U_{s4,1}^{\tilde{e}_{g3}}}{2\sqrt{2}s_W^2}\left(\frac{c_\alpha t_\beta m_{e_{g3}}^2}{c_\beta M_W^2} - s_{\alpha+\beta}\right) \right]$$

$$\underset{327}{C}\left(H^0, H^+, \tilde{e}_{g3}^{s3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\frac{ie^2\delta_{g3,g4}U_{s3,1}^{\tilde{e}_{g4}*}}{2\sqrt{2}s_W^2}\left(\frac{c_\alpha t_\beta m_{e_{g4}}^2}{c_\beta M_W^2} - s_{\alpha+\beta}\right) \right]$$

$$\underset{328}{C}\left(H^0, G^-, \tilde{\nu}_{g3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[-\frac{ie^2\delta_{g3,g4}U_{s4,1}^{\tilde{e}_{g3}}}{2\sqrt{2}s_W^2}\left(\frac{c_\alpha m_{e_{g3}}^2}{c_\beta M_W^2} - c_{\alpha+\beta}\right) \right]$$

$$\underset{329}{C}\left(H^0, G^+, \tilde{e}_{g3}^{s3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[-\frac{ie^2\delta_{g3,g4}U_{s3,1}^{\tilde{e}_{g4}*}}{2\sqrt{2}s_W^2}\left(\frac{c_\alpha m_{e_{g4}}^2}{c_\beta M_W^2} - c_{\alpha+\beta}\right) \right]$$

$$\underset{330}{C}\left(G^0, H^-, \tilde{\nu}_{g3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[-\frac{e^2\delta_{g3,g4}U_{s4,1}^{\tilde{e}_{g3}}}{2\sqrt{2}s_W^2}\left(\frac{t_\beta m_{e_{g3}}^2}{M_W^2} - s_{2\beta}\right) \right]$$

$$\underset{331}{C}\left(G^0, H^+, \tilde{e}_{g3}^{s3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\frac{e^2\delta_{g3,g4}U_{s3,1}^{\tilde{e}_{g4}*}}{2\sqrt{2}s_W^2}\left(\frac{t_\beta m_{e_{g4}}^2}{M_W^2} - s_{2\beta}\right) \right]$$

$$\underset{332}{C}\left(G^0, G^-, \tilde{\nu}_{g3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[\ \frac{e^2 \delta_{g3,g4} U_{s4,1}^{\tilde{e}_{g3}}}{2\sqrt{2}s_W^2}\left(\frac{m_{e_{g3}}^2}{M_W^2} - c_{2\beta}\right)\ \right]$$

$$\underset{333}{C}\left(G^0, G^+, \tilde{e}_{g3}^{s3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\ -\frac{e^2 \delta_{g3,g4} U_{s3,1}^{\tilde{e}_{g4}*}}{2\sqrt{2}s_W^2}\left(\frac{m_{e_{g4}}^2}{M_W^2} - c_{2\beta}\right)\ \right]$$

$$\underset{334}{C}\left(H^-, H^+, \tilde{\nu}_{g3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\ -\frac{ie^2 \delta_{g3,g4}}{2s_W^2}\left(\frac{m_{e_{g3}}^2 t_\beta^2}{M_W^2} + \left(\frac{1}{2}c_{2\beta}\right)\left(2 - \frac{1}{c_W^2}\right)\right)\ \right]$$

$$\underset{335}{C}\left(H^-, G^+, \tilde{\nu}_{g3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\ \frac{ie^2 \delta_{g3,g4}}{2s_W^2}\left(\frac{t_\beta m_{e_{g3}}^2}{M_W^2} - \left(\frac{1}{2}s_{2\beta}\right)\left(2 - \frac{1}{c_W^2}\right)\right)\ \right]$$

$$\underset{336}{C}\left(G^-, H^+, \tilde{\nu}_{g3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\ \frac{ie^2 \delta_{g3,g4}}{2s_W^2}\left(\frac{t_\beta m_{e_{g3}}^2}{M_W^2} - \left(\frac{1}{2}s_{2\beta}\right)\left(2 - \frac{1}{c_W^2}\right)\right)\ \right]$$

$$\underset{337}{C}\left(H^-, H^+, \tilde{e}_{g3}^{s3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[\ \frac{ie^2 \delta_{g3,g4}}{4c_W^2 M_W^2 s_W^2}\left(c_{2\beta}M_W^2 U_{s3,1}^{\tilde{e}_{g3}*} U_{s4,1}^{\tilde{e}_{g3}} - 2\left(c_{2\beta}M_W^2 s_W^2 + c_W^2 m_{e_{g3}}^2 t_\beta^2\right)U_{s3,2}^{\tilde{e}_{g3}*} U_{s4,2}^{\tilde{e}_{g3}}\right)\ \right]$$

$$\underset{338}{C}\left(H^-, G^+, \tilde{e}_{g3}^{s3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[\ \frac{ie^2 \delta_{g3,g4}}{2s_W^2}\left(s_{2\beta}\left(1 - \frac{1}{c_W^2}\left(\frac{1}{2} - s_W^2\right)\right)U_{s3,1}^{\tilde{e}_{g3}*} U_{s4,1}^{\tilde{e}_{g3}} + \left(\frac{t_\beta m_{e_{g3}}^2}{M_W^2} - \frac{s_{2\beta}s_W^2}{c_W^2}\right)U_{s3,2}^{\tilde{e}_{g3}*} U_{s4,2}^{\tilde{e}_{g3}}\right)\ \right]$$

$$\underset{339}{C}\left(G^-, H^+, \tilde{e}_{g3}^{s3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[\ \frac{ie^2 \delta_{g3,g4}}{2s_W^2}\left(s_{2\beta}\left(1 - \frac{1}{c_W^2}\left(\frac{1}{2} - s_W^2\right)\right)U_{s3,1}^{\tilde{e}_{g3}*} U_{s4,1}^{\tilde{e}_{g3}} + \left(\frac{t_\beta m_{e_{g3}}^2}{M_W^2} - \frac{s_{2\beta}s_W^2}{c_W^2}\right)U_{s3,2}^{\tilde{e}_{g3}*} U_{s4,2}^{\tilde{e}_{g3}}\right)\ \right]$$

$$\underset{346}{C}\left(G^-, G^+, \tilde{\nu}_{g3}, \tilde{\nu}_{g4}^{\dagger}\right) = \left[\ -\frac{ie^2 \delta_{g3,g4}}{4c_W^2 M_W^2 s_W^2}\left(2c_W^2 m_{e_{g3}}^2 + c_{2\beta}\left(1 - 2c_W^2\right)M_W^2\right)\ \right]$$

$$\underset{347}{C}\left(G^-, G^+, \tilde{e}_{g3}^{s3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[\ -\frac{ie^2 \delta_{g3,g4}}{2s_W^2}\left(c_{2\beta}\left(1 - \frac{1}{c_W^2}\left(\frac{1}{2} - s_W^2\right)\right)U_{s3,1}^{\tilde{e}_{g3}*} U_{s4,1}^{\tilde{e}_{g3}} + \left(\frac{m_{e_{g3}}^2}{M_W^2} - \frac{c_{2\beta}s_W^2}{c_W^2}\right)U_{s3,2}^{\tilde{e}_{g3}*} U_{s4,2}^{\tilde{e}_{g3}}\right)\ \right]$$

[SSSS] **2 Higgs – 2 Squarks**

$$\underset{280}{C}\left(h^0, h^0, \tilde{u}_{a3}, \tilde{u}_{a4}^{\dagger}\right) = \left[\ -\frac{ie^2}{12c_W^2 M_W^2 s_W^2 s_\beta^2}\left(\sum_{j1=1}^{3}\ \begin{array}{l} 2R_{a3,3+j1}^{\tilde{u}*} R_{a4,3+j1}^{\tilde{u}}\left(3c_W^2 c_\alpha^2 m_{u_{j1}}^2 - 2c_{2\alpha}M_W^2 s_W^2 s_\beta^2\right) + \\ R_{a3,j1}^{\tilde{u}*} R_{a4,j1}^{\tilde{u}}\left(6c_W^2 c_\alpha^2 m_{u_{j1}}^2 - c_{2\alpha}M_W^2\left(3 - 4s_W^2\right)s_\beta^2\right) \end{array}\right)\ \right]$$

$$\underset{281}{C}\left(h^0, h^0, \tilde{d}_{\text{a3}}, \tilde{d}_{\text{a4}}^\dagger\right) = \left[-\frac{ie^2}{12c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\sum_{j1=1}^{3} \begin{array}{l} R_{\text{a3,j1}}^{\tilde{d}*} R_{\text{a4,j1}}^{\tilde{d}} \left(c_{2\alpha} c_\beta^2 M_W^2 \left(3 - 2s_W^2\right) + 6c_W^2 m_{d_{j1}}^2 s_\alpha^2 \right) + \\ 2R_{\text{a3,3+j1}}^{\tilde{d}*} R_{\text{a4,3+j1}}^{\tilde{d}} \left(c_{2\alpha} c_\beta^2 M_W^2 s_W^2 + 3c_W^2 m_{d_{j1}}^2 s_\alpha^2 \right) \end{array} \right) \right]$$

$$\underset{284}{C}\left(H^0, H^0, \tilde{u}_{\text{a3}}, \tilde{u}_{\text{a4}}^\dagger\right) = \left[-\frac{ie^2}{12c_W^2 M_W^2 s_W^2 s_\beta^2} \left(\sum_{j1=1}^{3} \begin{array}{l} R_{\text{a3,j1}}^{\tilde{u}*} R_{\text{a4,j1}}^{\tilde{u}} \left(6c_W^2 m_{u_{j1}}^2 s_\alpha^2 + c_{2\alpha} M_W^2 \left(3 - 4s_W^2\right) s_\beta^2 \right) + \\ 2R_{\text{a3,3+j1}}^{\tilde{u}*} R_{\text{a4,3+j1}}^{\tilde{u}} \left(3c_W^2 m_{u_{j1}}^2 s_\alpha^2 + 2c_{2\alpha} M_W^2 s_W^2 s_\beta^2 \right) \end{array} \right) \right]$$

$$\underset{285}{C}\left(H^0, H^0, \tilde{d}_{\text{a3}}, \tilde{d}_{\text{a4}}^\dagger\right) = \left[-\frac{ie^2}{12c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\sum_{j1=1}^{3} \begin{array}{l} 2R_{\text{a3,3+j1}}^{\tilde{d}*} R_{\text{a4,3+j1}}^{\tilde{d}} \left(3c_W^2 c_\alpha^2 m_{d_{j1}}^2 - c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) + \\ R_{\text{a3,j1}}^{\tilde{d}*} R_{\text{a4,j1}}^{\tilde{d}} \left(6c_W^2 c_\alpha^2 m_{d_{j1}}^2 - c_{2\alpha} c_\beta^2 M_W^2 \left(3 - 2s_W^2\right) \right) \end{array} \right) \right]$$

$$\underset{288}{C}\left(A^0, A^0, \tilde{u}_{\text{a3}}, \tilde{u}_{\text{a4}}^\dagger\right) = \left[-\frac{ie^2}{12c_W^2 M_W^2 s_W^2 t_\beta^2} \left(\sum_{j1=1}^{3} \begin{array}{l} 2R_{\text{a3,3+j1}}^{\tilde{u}*} R_{\text{a4,3+j1}}^{\tilde{u}} \left(3c_W^2 m_{u_{j1}}^2 - 2c_{2\beta} M_W^2 s_W^2 t_\beta^2 \right) + \\ R_{\text{a3,j1}}^{\tilde{u}*} R_{\text{a4,j1}}^{\tilde{u}} \left(6c_W^2 m_{u_{j1}}^2 - c_{2\beta} M_W^2 \left(3 - 4s_W^2\right) t_\beta^2 \right) \end{array} \right) \right]$$

$$\underset{289}{C}\left(A^0, A^0, \tilde{d}_{\text{a3}}, \tilde{d}_{\text{a4}}^\dagger\right) = \left[-\frac{ie^2}{12c_W^2 M_W^2 s_W^2} \left(\sum_{j1=1}^{3} \begin{array}{l} 2R_{\text{a3,3+j1}}^{\tilde{d}*} R_{\text{a4,3+j1}}^{\tilde{d}} \left(c_{2\beta} M_W^2 s_W^2 + 3c_W^2 m_{d_{j1}}^2 t_\beta^2 \right) + \\ R_{\text{a3,j1}}^{\tilde{d}*} R_{\text{a4,j1}}^{\tilde{d}} \left(c_{2\beta} M_W^2 \left(3 - 2s_W^2\right) + 6c_W^2 m_{d_{j1}}^2 t_\beta^2 \right) \end{array} \right) \right]$$

$$\underset{292}{C}\left(G^0, G^0, \tilde{u}_{\text{a3}}, \tilde{u}_{\text{a4}}^\dagger\right) = \left[-\frac{ie^2}{12c_W^2 M_W^2 s_W^2} \left(\sum_{j1=1}^{3} \begin{array}{l} R_{\text{a3,j1}}^{\tilde{u}*} R_{\text{a4,j1}}^{\tilde{u}} \left(6c_W^2 m_{u_{j1}}^2 + c_{2\beta} M_W^2 \left(3 - 4s_W^2\right) \right) + \\ 2R_{\text{a3,3+j1}}^{\tilde{u}*} R_{\text{a4,3+j1}}^{\tilde{u}} \left(3c_W^2 m_{u_{j1}}^2 + 2c_{2\beta} M_W^2 s_W^2 \right) \end{array} \right) \right]$$

$$\underset{293}{C}\left(G^0, G^0, \tilde{d}_{\text{a3}}, \tilde{d}_{\text{a4}}^\dagger\right) = \left[-\frac{ie^2}{12c_W^2 M_W^2 s_W^2} \left(\sum_{j1=1}^{3} \begin{array}{l} 2R_{\text{a3,3+j1}}^{\tilde{d}*} R_{\text{a4,3+j1}}^{\tilde{d}} \left(3c_W^2 m_{d_{j1}}^2 - c_{2\beta} M_W^2 s_W^2 \right) + \\ R_{\text{a3,j1}}^{\tilde{d}*} R_{\text{a4,j1}}^{\tilde{d}} \left(6c_W^2 m_{d_{j1}}^2 - c_{2\beta} M_W^2 \left(3 - 2s_W^2\right) \right) \end{array} \right) \right]$$

$$\underset{298}{C}\left(h^0, H^0, \tilde{u}_{\text{a3}}, \tilde{u}_{\text{a4}}^\dagger\right) = \left[-\frac{ie^2 s_{2\alpha}}{12c_W^2 M_W^2 s_W^2 s_\beta^2} \left(\sum_{j1=1}^{3} \begin{array}{l} R_{\text{a3,3+j1}}^{\tilde{u}*} R_{\text{a4,3+j1}}^{\tilde{u}} \left(3c_W^2 m_{u_{j1}}^2 - 4M_W^2 s_W^2 s_\beta^2 \right) + \\ R_{\text{a3,j1}}^{\tilde{u}*} R_{\text{a4,j1}}^{\tilde{u}} \left(3c_W^2 m_{u_{j1}}^2 - M_W^2 \left(3 - 4s_W^2\right) s_\beta^2 \right) \end{array} \right) \right]$$

$$\underset{299}{C}\left(h^0, H^0, \tilde{d}_{\text{a3}}, \tilde{d}_{\text{a4}}^\dagger\right) = \left[\frac{ie^2 s_{2\alpha}}{12c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\sum_{j1=1}^{3} \begin{array}{l} R_{\text{a3,3+j1}}^{\tilde{d}*} R_{\text{a4,3+j1}}^{\tilde{d}} \left(3c_W^2 m_{d_{j1}}^2 - 2c_\beta^2 M_W^2 s_W^2 \right) + \\ R_{\text{a3,j1}}^{\tilde{d}*} R_{\text{a4,j1}}^{\tilde{d}} \left(3c_W^2 m_{d_{j1}}^2 - c_\beta^2 M_W^2 \left(3 - 2s_W^2\right) \right) \end{array} \right) \right]$$

$$\underset{300}{C}\left(A^0, G^0, \tilde{u}_{\text{a3}}, \tilde{u}_{\text{a4}}^\dagger\right) = \left[-\frac{ie^2 s_{2\beta}}{12c_W^2 M_W^2 s_W^2 s_\beta^2} \left(\sum_{j1=1}^{3} \begin{array}{l} R_{\text{a3,3+j1}}^{\tilde{u}*} R_{\text{a4,3+j1}}^{\tilde{u}} \left(3c_W^2 m_{u_{j1}}^2 - 4M_W^2 s_W^2 s_\beta^2 \right) + \\ R_{\text{a3,j1}}^{\tilde{u}*} R_{\text{a4,j1}}^{\tilde{u}} \left(3c_W^2 m_{u_{j1}}^2 - M_W^2 \left(3 - 4s_W^2\right) s_\beta^2 \right) \end{array} \right) \right]$$

$$\underset{301}{C}\left(A^0, G^0, \tilde{d}_{a3}, \tilde{d}^\dagger_{a4}\right) = \left[\frac{ie^2 s_{2\beta}}{12 c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\sum_{j1=1}^{3} \begin{array}{l} R^{\tilde{d}*}_{a3,3+j1} R^{\tilde{d}}_{a4,3+j1} \left(3 c_W^2 m_{d_{j1}}^2 - 2 c_\beta^2 M_W^2 s_W^2\right) + \\ R^{\tilde{d}*}_{a3,j1} R^{\tilde{d}}_{a4,j1} \left(3 c_W^2 m_{d_{j1}}^2 - c_\beta^2 M_W^2 \left(3 - 2 s_W^2\right)\right) \end{array} \right) \right]$$

$$\underset{302}{C}\left(h^0, H^-, \tilde{u}_{a3}, \tilde{d}^\dagger_{a4}\right) = \left[\frac{ie^2}{2\sqrt{2} s_{2\beta} M_W^2 s_W^2 s_\beta} \left(\sum_{j1,j2=1}^{3} \begin{pmatrix} 2 m_{d_{j2}} m_{u_{j1}} s_{\beta-\alpha} R^{\tilde{u}*}_{a3,3+j1} R^{\tilde{d}}_{a4,3+j2} s_\beta^2 + \\ s_{2\beta} R^{\tilde{u}*}_{a3,j1} R^{\tilde{d}}_{a4,j2} \left(c_\alpha c_\beta m_{u_{j1}}^2 - s_\beta \left(c_{\alpha+\beta} s_\beta M_W^2 + s_\alpha m_{d_{j2}}^2 t_\beta \right)\right) \end{pmatrix} CKM^*_{j1,j2} \right) \right]$$

$$\underset{303}{C}\left(h^0, H^+, \tilde{d}_{a3}, \tilde{u}^\dagger_{a4}\right) = \left[\frac{ie^2}{2\sqrt{2} s_{2\beta} M_W^2 s_W^2 s_\beta} \left(\sum_{j1,j2=1}^{3} \begin{pmatrix} 2 m_{d_{j2}} m_{u_{j1}} s_{\beta-\alpha} R^{\tilde{d}*}_{a3,3+j2} R^{\tilde{u}}_{a4,3+j1} s_\beta^2 + \\ s_{2\beta} R^{\tilde{d}*}_{a3,j2} R^{\tilde{u}}_{a4,j1} \left(c_\alpha c_\beta m_{u_{j1}}^2 - s_\beta \left(c_{\alpha+\beta} s_\beta M_W^2 + s_\alpha m_{d_{j2}}^2 t_\beta \right)\right) \end{pmatrix} CKM_{j1,j2} \right) \right]$$

$$\underset{304}{C}\left(h^0, G^-, \tilde{u}_{a3}, \tilde{d}^\dagger_{a4}\right) = \left[-\frac{ie^2}{2\sqrt{2} c_\beta s_{2\beta} s_\beta M_W^2 s_W^2} \left(\sum_{j1,j2=1}^{3} \begin{pmatrix} 2 c_\beta c_{\beta-\alpha} m_{d_{j2}} m_{u_{j1}} s_\beta R^{\tilde{u}*}_{a3,3+j1} R^{\tilde{d}}_{a4,3+j2} - \\ s_{2\beta} \left(s_\alpha s_\beta m_{d_{j2}}^2 + c_\alpha c_\beta m_{u_{j1}}^2 - c_\beta s_{\alpha+\beta} s_\beta M_W^2 \right) R^{\tilde{u}*}_{a3,j1} R^{\tilde{d}}_{a4,j2} \end{pmatrix} CKM^*_{j1,j2} \right) \right]$$

$$\underset{305}{C}\left(h^0, G^+, \tilde{d}_{a3}, \tilde{u}^\dagger_{a4}\right) = \left[-\frac{ie^2}{2\sqrt{2} c_\beta s_{2\beta} s_\beta M_W^2 s_W^2} \left(\sum_{j1,j2=1}^{3} \begin{pmatrix} 2 c_\beta c_{\beta-\alpha} m_{d_{j2}} m_{u_{j1}} s_\beta R^{\tilde{d}*}_{a3,3+j2} R^{\tilde{u}}_{a4,3+j1} - \\ s_{2\beta} \left(s_\alpha s_\beta m_{d_{j2}}^2 + c_\alpha c_\beta m_{u_{j1}}^2 - c_\beta s_{\alpha+\beta} s_\beta M_W^2 \right) R^{\tilde{d}*}_{a3,j2} R^{\tilde{u}}_{a4,j1} \end{pmatrix} CKM_{j1,j2} \right) \right]$$

$$\underset{306}{C}\left(A^0, H^-, \tilde{u}_{a3}, \tilde{d}^\dagger_{a4}\right) = \left[-\frac{e^2}{2\sqrt{2} s_W^2} \left(\sum_{j1=1}^{3} \left(\sum_{j2=1}^{3} \left(\frac{m_{u_{j1}}^2}{M_W^2 t_\beta^2} - \frac{m_{d_{j2}}^2 t_\beta^2}{M_W^2} - c_{2\beta} \right) CKM^*_{j1,j2} R^{\tilde{d}}_{a4,j2} \right) R^{\tilde{u}*}_{a3,j1} \right) \right]$$

$$\underset{307}{C}\left(A^0, H^+, \tilde{d}_{a3}, \tilde{u}^\dagger_{a4}\right) = \left[\frac{e^2}{2\sqrt{2} s_W^2} \left(\sum_{j2=1}^{3} \left(\sum_{j1=1}^{3} CKM_{j1,j2} \left(\frac{m_{u_{j1}}^2}{M_W^2 t_\beta^2} - \frac{m_{d_{j2}}^2 t_\beta^2}{M_W^2} - c_{2\beta} \right) R^{\tilde{u}}_{a4,j1} \right) R^{\tilde{d}*}_{a3,j2} \right) \right]$$

$$\underset{308}{C}\left(A^0, G^-, \tilde{u}_{a3}, \tilde{d}^\dagger_{a4}\right) = \left[-\frac{e^2}{2\sqrt{2} s_{2\beta} t_\beta M_W^2 s_W^2} \left(\sum_{j1,j2=1}^{3} \begin{pmatrix} 2 m_{d_{j2}} m_{u_{j1}} t_\beta R^{\tilde{u}*}_{a3,3+j1} R^{\tilde{d}}_{a4,3+j2} + \\ s_{2\beta} \left(m_{u_{j1}}^2 + t_\beta \left(t_\beta m_{d_{j2}}^2 - s_{2\beta} M_W^2 \right)\right) R^{\tilde{u}*}_{a3,j1} R^{\tilde{d}}_{a4,j2} \end{pmatrix} CKM^*_{j1,j2} \right) \right]$$

$$\underset{309}{C}\left(A^0, G^+, \tilde{d}_{a3}, \tilde{u}^\dagger_{a4}\right) = \left[\frac{e^2}{2\sqrt{2} s_{2\beta} t_\beta M_W^2 s_W^2} \left(\sum_{j1,j2=1}^{3} \begin{pmatrix} 2 m_{d_{j2}} m_{u_{j1}} t_\beta R^{\tilde{d}*}_{a3,3+j2} R^{\tilde{u}}_{a4,3+j1} + \\ s_{2\beta} \left(m_{u_{j1}}^2 + t_\beta \left(t_\beta m_{d_{j2}}^2 - s_{2\beta} M_W^2 \right)\right) R^{\tilde{d}*}_{a3,j2} R^{\tilde{u}}_{a4,j1} \end{pmatrix} CKM_{j1,j2} \right) \right]$$

$$\underset{318}{C}\left(H^0, H^-, \tilde{u}_{a3}, \tilde{d}^\dagger_{a4}\right) = \left[\frac{ie^2}{2\sqrt{2} s_{2\beta} M_W^2 s_W^2 s_\beta} \left(\sum_{j1,j2=1}^{3} \begin{pmatrix} 2 c_{\beta-\alpha} m_{d_{j2}} m_{u_{j1}} R^{\tilde{u}*}_{a3,3+j1} R^{\tilde{d}}_{a4,3+j2} s_\beta^2 + \\ s_{2\beta} R^{\tilde{u}*}_{a3,j1} R^{\tilde{d}}_{a4,j2} \left(c_\beta s_\alpha m_{u_{j1}}^2 - s_\beta \left(s_{\alpha+\beta} s_\beta M_W^2 - c_\alpha m_{d_{j2}}^2 t_\beta \right)\right) \end{pmatrix} CKM^*_{j1,j2} \right) \right]$$

$$\underset{319}{C}\left(H^0, H^+, \tilde{d}_{a3}, \tilde{u}^\dagger_{a4}\right) = \left[\frac{ie^2}{2\sqrt{2} s_{2\beta} M_W^2 s_W^2 s_\beta} \left(\sum_{j1,j2=1}^{3} \begin{pmatrix} 2 c_{\beta-\alpha} m_{d_{j2}} m_{u_{j1}} R^{\tilde{d}*}_{a3,3+j2} R^{\tilde{u}}_{a4,3+j1} s_\beta^2 + \\ s_{2\beta} R^{\tilde{d}*}_{a3,j2} R^{\tilde{u}}_{a4,j1} \left(c_\beta s_\alpha m_{u_{j1}}^2 - s_\beta \left(s_{\alpha+\beta} s_\beta M_W^2 - c_\alpha m_{d_{j2}}^2 t_\beta \right)\right) \end{pmatrix} CKM_{j1,j2} \right) \right]$$

$$\underset{320}{C}\left(H^0, G^-, \tilde{u}_{a3}, \tilde{d}_{a4}^\dagger\right) = \left[-\frac{ie^2}{2\sqrt{2}c_\beta s_{2\beta}s_\beta M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{pmatrix} s_{2\beta}\left(c_\alpha s_\beta m_{d_{j2}}^2 - c_\beta s_\alpha m_{u_{j1}}^2 - c_{\alpha+\beta}c_\beta s_\beta M_W^2\right) R_{a3,j1}^{\tilde{u}*}R_{a4,j2}^{\tilde{d}} - \\ 2c_\beta m_{d_{j2}}m_{u_{j1}}s_\beta s_{\beta-\alpha}R_{a3,3+j1}^{\tilde{u}*}R_{a4,3+j2}^{\tilde{d}} \end{pmatrix} \text{CKM}_{j1,j2}^*\right)\right]$$

$$\underset{321}{C}\left(H^0, G^+, \tilde{d}_{a3}, \tilde{u}_{a4}^\dagger\right) = \left[-\frac{ie^2}{2\sqrt{2}c_\beta s_{2\beta}s_\beta M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{pmatrix} s_{2\beta}\left(c_\alpha s_\beta m_{d_{j2}}^2 - c_\beta s_\alpha m_{u_{j1}}^2 - c_{\alpha+\beta}c_\beta s_\beta M_W^2\right) R_{a3,j2}^{\tilde{d}*}R_{a4,j1}^{\tilde{u}} - \\ 2c_\beta m_{d_{j2}}m_{u_{j1}}s_\beta s_{\beta-\alpha}R_{a3,3+j2}^{\tilde{d}*}R_{a4,3+j1}^{\tilde{u}} \end{pmatrix} \text{CKM}_{j1,j2}\right)\right]$$

$$\underset{322}{C}\left(G^0, H^-, \tilde{u}_{a3}, \tilde{d}_{a4}^\dagger\right) = \left[\frac{e^2}{2\sqrt{2}s_{2\beta}t_\beta M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{pmatrix} 2m_{d_{j2}}m_{u_{j1}}t_\beta R_{a3,3+j1}^{\tilde{u}*}R_{a4,3+j2}^{\tilde{d}} - \\ s_{2\beta}\left(m_{u_{j1}}^2 + t_\beta\left(t_\beta m_{d_{j2}}^2 - s_{2\beta}M_W^2\right)\right)R_{a3,j1}^{\tilde{u}*}R_{a4,j2}^{\tilde{d}} \end{pmatrix} \text{CKM}_{j1,j2}^*\right)\right]$$

$$\underset{323}{C}\left(G^0, H^+, \tilde{d}_{a3}, \tilde{u}_{a4}^\dagger\right) = \left[-\frac{e^2}{2\sqrt{2}s_{2\beta}t_\beta M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{pmatrix} 2m_{d_{j2}}m_{u_{j1}}t_\beta R_{a3,3+j2}^{\tilde{d}*}R_{a4,3+j1}^{\tilde{u}} - \\ s_{2\beta}\left(m_{u_{j1}}^2 + t_\beta\left(t_\beta m_{d_{j2}}^2 - s_{2\beta}M_W^2\right)\right)R_{a3,j2}^{\tilde{d}*}R_{a4,j1}^{\tilde{u}} \end{pmatrix} \text{CKM}_{j1,j2}\right)\right]$$

$$\underset{324}{C}\left(G^0, G^-, \tilde{u}_{a3}, \tilde{d}_{a4}^\dagger\right) = \left[\frac{e^2}{2\sqrt{2}M_W^2 s_W^2}\left(\sum_{j1=1}^{3}\left(\sum_{j2=1}^{3}\text{CKM}_{j1,j2}^*\left(m_{d_{j2}}^2 - m_{u_{j1}}^2 - c_{2\beta}M_W^2\right)R_{a4,j2}^{\tilde{d}}\right)R_{a3,j1}^{\tilde{u}*}\right)\right]$$

$$\underset{325}{C}\left(G^0, G^+, \tilde{d}_{a3}, \tilde{u}_{a4}^\dagger\right) = \left[-\frac{e^2}{2\sqrt{2}M_W^2 s_W^2}\left(\sum_{j2=1}^{3}\left(\sum_{j1=1}^{3}\text{CKM}_{j1,j2}\left(m_{d_{j2}}^2 - m_{u_{j1}}^2 - c_{2\beta}M_W^2\right)R_{a4,j1}^{\tilde{u}}\right)R_{a3,j2}^{\tilde{d}*}\right)\right]$$

$$\underset{340}{C}\left(H^-, H^+, \tilde{u}_{a3}, \tilde{u}_{a4}^\dagger\right) = \left[-\frac{ie^2}{12c_W^2 M_W^2 s_W^2 t_\beta^2}\left(\sum_{j1,j2=1}^{3}\begin{matrix} R_{a3,j1}^{\tilde{u}*}R_{a4,j2}^{\tilde{u}}t_\beta^2\left(\delta_{j1,j2}c_{2\beta}\left(1+2c_W^2\right)M_W^2 + 6\left(\sum_{gn=1}^{3}\text{CKM}_{j2,gn}\text{CKM}_{j1,gn}^*m_{d_{gn}}^2\right)c_W^2 t_\beta^2\right) + \\ 2\delta_{j1,j2}R_{a3,3+j1}^{\tilde{u}*}R_{a4,3+j2}^{\tilde{u}}\left(3c_W^2 m_{u_{j1}}^2 - 2c_{2\beta}M_W^2 s_W^2 t_\beta^2\right) \end{matrix}\right)\right]$$

$$\underset{341}{C}\left(H^-, G^+, \tilde{u}_{a3}, \tilde{u}_{a4}^\dagger\right) = \left[\frac{ie^2}{12t_\beta c_W^2 M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{matrix} t_\beta\left(6\left(\sum_{gn=1}^{3}\text{CKM}_{j2,gn}\text{CKM}_{j1,gn}^*m_{d_{gn}}^2\right)t_\beta c_W^2 - \delta_{j1,j2}s_{2\beta}\left(1+2c_W^2\right)M_W^2\right)R_{a3,j1}^{\tilde{u}*}R_{a4,j2}^{\tilde{u}} - \\ 2\delta_{j1,j2}R_{a3,3+j1}^{\tilde{u}*}R_{a4,3+j2}^{\tilde{u}}\left(3c_W^2 m_{u_{j1}}^2 - 2s_{2\beta}t_\beta M_W^2 s_W^2\right) \end{matrix}\right)\right]$$

$$\underset{342}{C}\left(G^-, H^+, \tilde{u}_{a3}, \tilde{u}_{a4}^\dagger\right) = \left[\frac{ie^2}{12t_\beta c_W^2 M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{matrix} t_\beta\left(6\left(\sum_{gn=1}^{3}\text{CKM}_{j2,gn}\text{CKM}_{j1,gn}^*m_{d_{gn}}^2\right)t_\beta c_W^2 - \delta_{j1,j2}s_{2\beta}\left(1+2c_W^2\right)M_W^2\right)R_{a3,j1}^{\tilde{u}*}R_{a4,j2}^{\tilde{u}} - \\ 2\delta_{j1,j2}R_{a3,3+j1}^{\tilde{u}*}R_{a4,3+j2}^{\tilde{u}}\left(3c_W^2 m_{u_{j1}}^2 - 2s_{2\beta}t_\beta M_W^2 s_W^2\right) \end{matrix}\right)\right]$$

$$\underset{343}{C}\left(H^-, H^+, \tilde{d}_{a3}, \tilde{d}_{a4}^\dagger\right) = \left[-\frac{ie^2}{12c_W^2 M_W^2 s_W^2 t_\beta^2}\left(\sum_{j1,j2=1}^{3}\begin{matrix} 2\delta_{j1,j2}R_{a3,3+j1}^{\tilde{d}*}R_{a4,3+j2}^{\tilde{d}}t_\beta^2\left(c_{2\beta}M_W^2 s_W^2 + 3c_W^2 m_{d_{j1}}^2 t_\beta^2\right) + \\ R_{a3,j1}^{\tilde{d}*}R_{a4,j2}^{\tilde{d}}\left(6\left(\sum_{gn=1}^{3}\text{CKM}_{gn,j1}\text{CKM}_{gn,j2}^*m_{u_{gn}}^2\right)c_W^2 + \delta_{j1,j2}c_{2\beta}\left(1-4c_W^2\right)M_W^2 t_\beta^2\right) \end{matrix}\right)\right]$$

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$$\underset{344}{C}\left(H^-,G^+,\tilde{d}_{a3},\tilde{d}_{a4}^\dagger\right) = \left[\quad \frac{ie^2}{12 t_\beta c_W^2 M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{array}{l}2\delta_{j1,j2}t_\beta R^{\tilde{d}*}_{a3,3+j1}R^{\tilde{d}}_{a4,3+j2}\left(3t_\beta c_W^2 m_{d_{j1}}^2 - s_{2\beta}M_W^2 s_W^2\right) - \\ \left(6\left(\sum_{gn=1}^{3}CKM_{gn,j1}CKM^*_{gn,j2}m_{u_{gn}}^2\right)c_W^2 + \delta_{j1,j2}s_{2\beta}t_\beta\left(1-4c_W^2\right)M_W^2\right)R^{\tilde{d}*}_{a3,j1}R^{\tilde{d}}_{a4,j2}\end{array}\right)\quad\right]$$

$$\underset{345}{C}\left(G^-,H^+,\tilde{d}_{a3},\tilde{d}_{a4}^\dagger\right) = \left[\quad \frac{ie^2}{12 t_\beta c_W^2 M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{array}{l}2\delta_{j1,j2}t_\beta R^{\tilde{d}*}_{a3,3+j1}R^{\tilde{d}}_{a4,3+j2}\left(3t_\beta c_W^2 m_{d_{j1}}^2 - s_{2\beta}M_W^2 s_W^2\right) - \\ \left(6\left(\sum_{gn=1}^{3}CKM_{gn,j1}CKM^*_{gn,j2}m_{u_{gn}}^2\right)c_W^2 + \delta_{j1,j2}s_{2\beta}t_\beta\left(1-4c_W^2\right)M_W^2\right)R^{\tilde{d}*}_{a3,j1}R^{\tilde{d}}_{a4,j2}\end{array}\right)\quad\right]$$

$$\underset{348}{C}\left(G^-,G^+,\tilde{u}_{a3},\tilde{u}_{a4}^\dagger\right) = \left[\quad -\frac{ie^2}{12 c_W^2 M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{array}{l}\left(6\left(\sum_{gn=1}^{3}CKM_{j2,gn}CKM^*_{j1,gn}m_{d_{gn}}^2\right)c_W^2 - \delta_{j1,j2}c_{2\beta}\left(1+2c_W^2\right)M_W^2\right)R^{\tilde{u}*}_{a3,j1}R^{\tilde{u}}_{a4,j2} + \\ 2\delta_{j1,j2}R^{\tilde{u}*}_{a3,3+j1}R^{\tilde{u}}_{a4,3+j2}\left(3c_W^2 m_{u_{j1}}^2 + 2c_{2\beta}M_W^2 s_W^2\right)\end{array}\right)\quad\right]$$

$$\underset{349}{C}\left(G^-,G^+,\tilde{d}_{a3},\tilde{d}_{a4}^\dagger\right) = \left[\quad -\frac{ie^2}{12 c_W^2 M_W^2 s_W^2}\left(\sum_{j1,j2=1}^{3}\begin{array}{l}\left(6\left(\sum_{gn=1}^{3}CKM_{gn,j1}CKM^*_{gn,j2}m_{u_{gn}}^2\right)c_W^2 - \delta_{j1,j2}c_{2\beta}\left(1-4c_W^2\right)M_W^2\right)R^{\tilde{d}*}_{a3,j1}R^{\tilde{d}}_{a4,j2} + \\ 2\delta_{j1,j2}R^{\tilde{d}*}_{a3,3+j1}R^{\tilde{d}}_{a4,3+j2}\left(3c_W^2 m_{d_{j1}}^2 - c_{2\beta}M_W^2 s_W^2\right)\end{array}\right)\quad\right]$$

[SSSS] 2 Sleptons – 2 Squarks

$$\underset{373}{C}\left(\tilde{d}_{a1},\tilde{d}_{a2}^\dagger,\tilde{e}_{g3}^{s3},\tilde{e}_{g4}^{s4,\dagger}\right) = \left[\quad -\frac{ie^2\delta_{g3,g4}}{12 c_W^2 c_\beta^2 M_W^2 s_W^2}\left(\sum_{j2=1}^{3}\boxed{1}\right)\quad\right]$$

$$\boxed{1} = \begin{array}{l}U^{\tilde{e}_{g3}*}_{s3,1}\left(c_\beta^2 M_W^2 R^{\tilde{d}*}_{a1,j2}R^{\tilde{d}}_{a2,j2}\left(3c_W^2 - s_W^2\right)U^{\tilde{e}_{g3}}_{s4,1} - 2R^{\tilde{d}*}_{a1,3+j2}\left(c_\beta^2 M_W^2 R^{\tilde{d}}_{a2,3+j2}s_W^2 U^{\tilde{e}_{g3}}_{s4,1} - 3m_{d_{j2}}m_{e_{g3}}c_W^2 R^{\tilde{d}}_{a2,j2}U^{\tilde{e}_{g3}}_{s4,2}\right)\right) + \\ 2U^{\tilde{e}_{g3}*}_{s3,2}\left(2c_\beta^2 M_W^2 R^{\tilde{d}*}_{a1,3+j2}R^{\tilde{d}}_{a2,3+j2}s_W^2 U^{\tilde{e}_{g3}}_{s4,2} + R^{\tilde{d}*}_{a1,j2}\left(3m_{d_{j2}}m_{e_{g3}}c_W^2 R^{\tilde{d}}_{a2,3+j2}U^{\tilde{e}_{g3}}_{s4,1} + c_\beta^2 M_W^2 R^{\tilde{d}}_{a2,j2}s_W^2 U^{\tilde{e}_{g3}}_{s4,2}\right)\right)\end{array}$$

$$\underset{374}{C}\left(\tilde{d}_{a1},\tilde{d}_{a2}^\dagger,\tilde{\nu}_{g3},\tilde{\nu}_{g4}^\dagger\right) = \left[\quad \frac{ie^2\delta_{g3,g4}}{12 c_W^2 s_W^2}\left(\sum_{j2=1}^{3}\left(\left(1+2c_W^2\right)R^{\tilde{d}*}_{a1,j2}R^{\tilde{d}}_{a2,j2} + 2R^{\tilde{d}*}_{a1,3+j2}R^{\tilde{d}}_{a2,3+j2}s_W^2\right)\right)\quad\right]$$

$$\underset{376}{C}\left(\tilde{d}_{a1},\tilde{e}_{g2}^{s2,\dagger},\tilde{\nu}_{g3},\tilde{u}_{a4}^\dagger\right) = \left[\quad -\frac{ie^2\delta_{g2,g3}}{2 c_\beta^2 M_W^2 s_W^2}\left(\sum_{j1=1}^{3}\left(\sum_{j4=1}^{3}CKM_{j4,j1}R^{\tilde{u}}_{a4,j4}\right)\left(c_\beta^2 M_W^2 R^{\tilde{d}*}_{a1,j1}U^{\tilde{e}_{g2}}_{s2,1} + m_{d_{j1}}m_{e_{g2}}R^{\tilde{d}*}_{a1,3+j1}U^{\tilde{e}_{g2}}_{s2,2}\right)\right)\quad\right]$$

$$\underset{377}{C}\left(\tilde{e}_{g1}^{s1},\tilde{d}_{a2}^\dagger,\tilde{u}_{a3},\tilde{\nu}_{g4}^\dagger\right) = \left[\quad -\frac{ie^2\delta_{g1,g4}}{2 c_\beta^2 M_W^2 s_W^2}\left(\sum_{j2=1}^{3}\left(\sum_{j3=1}^{3}CKM^*_{j3,j2}R^{\tilde{u}*}_{a3,j3}\right)\left(c_\beta^2 M_W^2 R^{\tilde{d}}_{a2,j2}U^{\tilde{e}_{g1}*}_{s1,1} + m_{d_{j2}}m_{e_{g1}}R^{\tilde{d}}_{a2,3+j2}U^{\tilde{e}_{g1}*}_{s1,2}\right)\right)\quad\right]$$

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$$\underset{380}{C}\left(\tilde{e}^{s1}_{g1}, \tilde{e}^{s2,\dagger}_{g2}, \tilde{u}_{a3}, \tilde{u}^{\dagger}_{a4}\right) = \left[\; \frac{ie^2\delta_{g1,g2}}{12c_W^2 s_W^2}\left(\sum_{j4=1}^{3}\; \begin{array}{l}\left(\left(1+2c_W^2\right)R^{\tilde{u}*}_{a3,j4}R^{\tilde{u}}_{a4,j4} - 4R^{\tilde{u}*}_{a3,3+j4}R^{\tilde{u}}_{a4,3+j4}s_W^2\right)U^{\tilde{e}_{g1}*}_{s1,1}U^{\tilde{e}_{g1}}_{s2,1} - \\ 2\left(R^{\tilde{u}*}_{a3,j4}R^{\tilde{u}}_{a4,j4} - 4R^{\tilde{u}*}_{a3,3+j4}R^{\tilde{u}}_{a4,3+j4}\right)s_W^2 U^{\tilde{e}_{g1}*}_{s1,2}U^{\tilde{e}_{g1}}_{s2,2}\end{array}\right)\;\right]$$

$$\underset{382}{C}\left(\tilde{v}_{g1}, \tilde{v}^{\dagger}_{g2}, \tilde{u}_{a3}, \tilde{u}^{\dagger}_{a4}\right) = \left[\; -\frac{ie^2\delta_{g1,g2}}{12c_W^2 s_W^2}\left(\sum_{j4=1}^{3}\left(R^{\tilde{u}*}_{a3,j4}R^{\tilde{u}}_{a4,j4}\left(3c_W^2 - s_W^2\right) + 4R^{\tilde{u}*}_{a3,3+j4}R^{\tilde{u}}_{a4,3+j4}s_W^2\right)\right)\;\right]$$

[SSVV] **2 Higgs – 2 Gauge Bosons**

$$\underset{31}{C}\left(h^0, h^0, Z, Z\right) = \left[\; \frac{ie^2}{2c_W^2 s_W^2}\;\right]$$

$$\underset{32}{C}\left(h^0, h^0, W^-, W^+\right) = \left[\; \frac{ie^2}{2s_W^2}\;\right]$$

$$\underset{33}{C}\left(G^0, G^0, Z, Z\right) = \left[\; \frac{ie^2}{2c_W^2 s_W^2}\;\right]$$

$$\underset{34}{C}\left(G^0, G^0, W^-, W^+\right) = \left[\; \frac{ie^2}{2s_W^2}\;\right]$$

$$\underset{35}{C}\left(G^-, G^+, \gamma, \gamma\right) = \left[\; 2ie^2\;\right]$$

$$\underset{36}{C}\left(G^-, G^+, \gamma, Z\right) = \left[\; \frac{ie^2}{c_W s_W}\left(c_W^2 - s_W^2\right)\;\right]$$

$$\underset{37}{C}\left(G^-, G^+, Z, Z\right) = \left[\; \frac{ie^2}{2c_W^2 s_W^2}\left(c_W^2 - s_W^2\right)^2\;\right]$$

$$\underset{38}{C}\left(G^-, G^+, W^-, W^+\right) = \left[\; \frac{ie^2}{2s_W^2}\;\right]$$

$$\underset{149}{C}\left(h^0, H^-, \gamma, W^+\right) = \left[\; \frac{ie^2 c_{\beta-\alpha}}{2s_W}\;\right]$$

$$\underset{150}{C}\left(h^0, H^-, Z, W^+\right) = \left[\; -\frac{ie^2 c_{\beta-\alpha}}{2c_W}\;\right]$$

$$\underset{151}{C}\left(h^0, G^-, \gamma, W^+\right) = \left[\; \frac{ie^2 s_{\beta-\alpha}}{2s_W}\;\right]$$

$$C_{152}\left(h^0, G^-, Z, W^+\right) = \left[-\frac{ie^2 s_{\beta-\alpha}}{2c_W} \right]$$

$$C_{153}\left(h^0, H^+, \gamma, W^-\right) = \left[\frac{ie^2 c_{\beta-\alpha}}{2s_W} \right]$$

$$C_{154}\left(h^0, H^+, Z, W^-\right) = \left[-\frac{ie^2 c_{\beta-\alpha}}{2c_W} \right]$$

$$C_{155}\left(h^0, G^+, \gamma, W^-\right) = \left[\frac{ie^2 s_{\beta-\alpha}}{2s_W} \right]$$

$$C_{156}\left(h^0, G^+, Z, W^-\right) = \left[-\frac{ie^2 s_{\beta-\alpha}}{2c_W} \right]$$

$$C_{157}\left(H^0, H^0, Z, Z\right) = \left[\frac{ie^2}{2c_W^2 s_W^2} \right]$$

$$C_{158}\left(H^0, H^0, W^-, W^+\right) = \left[\frac{ie^2}{2s_W^2} \right]$$

$$C_{159}\left(H^0, H^-, \gamma, W^+\right) = \left[-\frac{ie^2 s_{\beta-\alpha}}{2s_W} \right]$$

$$C_{160}\left(H^0, H^-, Z, W^+\right) = \left[\frac{ie^2 s_{\beta-\alpha}}{2c_W} \right]$$

$$C_{161}\left(H^0, G^-, \gamma, W^+\right) = \left[\frac{ie^2 c_{\beta-\alpha}}{2s_W} \right]$$

$$C_{162}\left(H^0, G^-, Z, W^+\right) = \left[-\frac{ie^2 c_{\beta-\alpha}}{2c_W} \right]$$

$$C_{163}\left(H^0, H^+, \gamma, W^-\right) = \left[-\frac{ie^2 s_{\beta-\alpha}}{2s_W} \right]$$

$$C_{164}\left(H^0, H^+, Z, W^-\right) = \left[\frac{ie^2 s_{\beta-\alpha}}{2c_W} \right]$$

$$C_{165}\left(H^0, G^+, \gamma, W^-\right) = \left[\frac{ie^2 c_{\beta-\alpha}}{2s_W} \right]$$

$$\underset{166}{C}\left(H^0, G^+, Z, W^-\right) = \left[\; -\frac{ie^2 c_{\beta-\alpha}}{2c_W} \;\right]$$

$$\underset{167}{C}\left(A^0, A^0, Z, Z\right) = \left[\; \frac{ie^2}{2c_W^2 s_W^2} \;\right]$$

$$\underset{168}{C}\left(A^0, A^0, W^-, W^+\right) = \left[\; \frac{ie^2}{2s_W^2} \;\right]$$

$$\underset{169}{C}\left(A^0, H^-, \gamma, W^+\right) = \left[\; -\frac{e^2}{2s_W} \;\right]$$

$$\underset{170}{C}\left(A^0, H^-, Z, W^+\right) = \left[\; \frac{e^2}{2c_W} \;\right]$$

$$\underset{171}{C}\left(A^0, H^+, \gamma, W^-\right) = \left[\; \frac{e^2}{2s_W} \;\right]$$

$$\underset{172}{C}\left(A^0, H^+, Z, W^-\right) = \left[\; -\frac{e^2}{2c_W} \;\right]$$

$$\underset{173}{C}\left(G^0, G^-, \gamma, W^+\right) = \left[\; -\frac{e^2}{2s_W} \;\right]$$

$$\underset{174}{C}\left(G^0, G^-, Z, W^+\right) = \left[\; \frac{e^2}{2c_W} \;\right]$$

$$\underset{175}{C}\left(G^0, G^+, \gamma, W^-\right) = \left[\; \frac{e^2}{2s_W} \;\right]$$

$$\underset{176}{C}\left(G^0, G^+, Z, W^-\right) = \left[\; -\frac{e^2}{2c_W} \;\right]$$

$$\underset{177}{C}\left(H^-, H^+, \gamma, \gamma\right) = \left[\; 2ie^2 \;\right]$$

$$\underset{178}{C}\left(H^-, H^+, \gamma, Z\right) = \left[\; \frac{ie^2}{c_W s_W}\left(c_W^2 - s_W^2\right) \;\right]$$

$$\underset{179}{C}\left(H^-, H^+, Z, Z\right) = \left[\; \frac{ie^2}{2c_W^2 s_W^2}\left(c_W^2 - s_W^2\right)^2 \;\right]$$

$$\underset{180}{C}\left(H^-, H^+, W^-, W^+\right) = \left[\; \frac{ie^2}{2s_W^2} \;\right]$$

$$\underset{398}{C}\left(\tilde{u}_{a1}, \tilde{u}_{a2}^{\dagger}, g, \gamma\right) = \left[\ \frac{4}{3}ieg_s\delta_{a1,a2}T_{c2,c1}^{g3}\ \right]$$

$$\underset{399}{C}\left(\tilde{d}_{a1}, \tilde{d}_{a2}^{\dagger}, g, \gamma\right) = \left[\ -\frac{2}{3}ieg_s\delta_{a1,a2}T_{c2,c1}^{g3}\ \right]$$

$$\underset{400}{C}\left(\tilde{u}_{a1}, \tilde{u}_{a2}^{\dagger}, g, Z\right) = \left[\ \frac{2ieg_sT_{c2,c1}^{g3}}{c_Ws_W}\left(\sum_{j2=1}^{3}\left(\frac{1}{2}R_{a1,j2}^{\tilde{u}*}R_{a2,j2}^{\tilde{u}} - \frac{2}{3}\delta_{a1,a2}\delta_{j2,1}s_W^2\right)\right)\ \right]$$

$$\underset{401}{C}\left(\tilde{d}_{a1}, \tilde{d}_{a2}^{\dagger}, g, Z\right) = \left[\ -\frac{2ieg_sT_{c2,c1}^{g3}}{c_Ws_W}\left(\sum_{j2=1}^{3}\left(\frac{1}{2}R_{a1,j2}^{\tilde{d}*}R_{a2,j2}^{\tilde{d}} - \frac{1}{3}\delta_{a1,a2}\delta_{j2,1}s_W^2\right)\right)\ \right]$$

$$\underset{402}{C}\left(\tilde{u}_{a1}, \tilde{d}_{a2}^{\dagger}, g, W^-\right) = \left[\ \frac{\sqrt{2}ieg_sT_{c2,c1}^{g3}}{s_W}\left(\sum_{j1=1}^{3}\left(\sum_{j2=1}^{3}\text{CKM}_{j1,j2}^{*}R_{a2,j2}^{\tilde{d}}\right)R_{a1,j1}^{\tilde{u}*}\right)\ \right]$$

$$\underset{403}{C}\left(\tilde{d}_{a1}, \tilde{u}_{a2}^{\dagger}, g, W^+\right) = \left[\ \frac{\sqrt{2}ieg_sT_{c2,c1}^{g3}}{s_W}\left(\sum_{j2=1}^{3}\left(\sum_{j1=1}^{3}\text{CKM}_{j1,j2}R_{a2,j1}^{\tilde{u}}\right)R_{a1,j2}^{\tilde{d}*}\right)\ \right]$$

$$\underset{350}{C}\left(\tilde{\nu}_{g1}, \tilde{\nu}_{g2}^{\dagger}, Z, Z\right) = \left[\ \frac{ie^2\delta_{g1,g2}}{2c_W^2s_W^2}\ \right]$$

$$\underset{351}{C}\left(\tilde{e}_{g1}^{s1}, \tilde{e}_{g2}^{s2,\dagger}, \gamma, \gamma\right) = \left[\ 2ie^2\delta_{g1,g2}\delta_{s1,s2}\ \right]$$

$$\underset{352}{C}\left(\tilde{e}_{g1}^{s1}, \tilde{e}_{g2}^{s2,\dagger}, \gamma, Z\right) = \left[\ \frac{ie^2\delta_{g1,g2}}{c_Ws_W}\left(\left(1 - 2s_W^2\right)U_{s1,1}^{\tilde{e}_{g1}*}U_{s2,1}^{\tilde{e}_{g1}} - 2s_W^2U_{s1,2}^{\tilde{e}_{g1}*}U_{s2,2}^{\tilde{e}_{g1}}\right)\ \right]$$

$$\underset{353}{C}\left(\tilde{e}_{g1}^{s1}, \tilde{e}_{g2}^{s2,\dagger}, Z, Z\right) = \left[\ \frac{ie^2\delta_{g1,g2}}{2c_W^2s_W^2}\left(\left(1 - 2s_W^2\right)^2U_{s1,1}^{\tilde{e}_{g1}*}U_{s2,1}^{\tilde{e}_{g1}} + 4s_W^4U_{s1,2}^{\tilde{e}_{g1}*}U_{s2,2}^{\tilde{e}_{g1}}\right)\ \right]$$

$$\underset{362}{C}\left(\tilde{\nu}_{g1}, \tilde{e}_{g2}^{s2,\dagger}, \gamma, W^-\right) = \left[\ -\frac{ie^2\delta_{g1,g2}U_{s2,1}^{\tilde{e}_{g1}}}{\sqrt{2}s_W}\ \right]$$

$$\underset{363}{C}\left(\tilde{e}^{s1}_{g1}, \tilde{v}^{\dagger}_{g2}, \gamma, W^{+}\right) = \left[-\frac{ie^2 \delta_{g1,g2} U^{\tilde{e}_{g2}*}_{s1,1}}{\sqrt{2}s_W} \right]$$

$$\underset{366}{C}\left(\tilde{v}_{g1}, \tilde{e}^{s2,\dagger}_{g2}, Z, W^{-}\right) = \left[\frac{ie^2 \delta_{g1,g2} U^{\tilde{e}_{g1}}_{s2,1}}{\sqrt{2}c_W} \right]$$

$$\underset{367}{C}\left(\tilde{e}^{s1}_{g1}, \tilde{v}^{\dagger}_{g2}, Z, W^{+}\right) = \left[\frac{ie^2 \delta_{g1,g2} U^{\tilde{e}_{g2}*}_{s1,1}}{\sqrt{2}c_W} \right]$$

$$\underset{368}{C}\left(\tilde{v}_{g1}, \tilde{v}^{\dagger}_{g2}, W^{-}, W^{+}\right) = \left[\frac{ie^2 \delta_{g1,g2}}{2s^2_W} \right]$$

$$\underset{369}{C}\left(\tilde{e}^{s1}_{g1}, \tilde{e}^{s2,\dagger}_{g2}, W^{-}, W^{+}\right) = \left[\frac{ie^2 \delta_{g1,g2} U^{\tilde{e}_{g1}*}_{s1,1} U^{\tilde{e}_{g1}}_{s2,1}}{2s^2_W} \right]$$

$\boxed{\text{[SSVV]} \ \textbf{2 Squarks – 2 Gauge Bosons}}$

$$\underset{354}{C}\left(\tilde{u}_{a1}, \tilde{u}^{\dagger}_{a2}, \gamma, \gamma\right) = \left[\frac{8}{9}ie^2 \delta_{a1,a2} \right]$$

$$\underset{355}{C}\left(\tilde{u}_{a1}, \tilde{u}^{\dagger}_{a2}, \gamma, Z\right) = \left[\frac{2ie^2}{9c_W s_W} \left(\sum_{j2=1}^{3} \left(R^{\tilde{u}*}_{a1,j2} R^{\tilde{u}}_{a2,j2} \left(3 - 4s^2_W\right) - 4R^{\tilde{u}*}_{a1,3+j2} R^{\tilde{u}}_{a2,3+j2} s^2_W \right) \right) \right]$$

$$\underset{356}{C}\left(\tilde{u}_{a1}, \tilde{u}^{\dagger}_{a2}, Z, Z\right) = \left[\frac{ie^2}{18c^2_W s^2_W} \left(\sum_{j2=1}^{3} \left(R^{\tilde{u}*}_{a1,j2} R^{\tilde{u}}_{a2,j2} \left(3 - 4s^2_W\right)^2 + 16R^{\tilde{u}*}_{a1,3+j2} R^{\tilde{u}}_{a2,3+j2} s^4_W \right) \right) \right]$$

$$\underset{357}{C}\left(\tilde{d}_{a1}, \tilde{d}^{\dagger}_{a2}, \gamma, \gamma\right) = \left[\frac{2}{9}ie^2 \delta_{a1,a2} \right]$$

$$\underset{358}{C}\left(\tilde{d}_{a1}, \tilde{d}^{\dagger}_{a2}, \gamma, Z\right) = \left[\frac{ie^2}{9c_W s_W} \left(\sum_{j2=1}^{3} \left(R^{\tilde{d}*}_{a1,j2} R^{\tilde{d}}_{a2,j2} \left(3 - 2s^2_W\right) - 2R^{\tilde{d}*}_{a1,3+j2} R^{\tilde{d}}_{a2,3+j2} s^2_W \right) \right) \right]$$

$$\underset{359}{C}\left(\tilde{d}_{a1}, \tilde{d}^{\dagger}_{a2}, Z, Z\right) = \left[\frac{ie^2}{18c^2_W s^2_W} \left(\sum_{j2=1}^{3} \left(R^{\tilde{d}*}_{a1,j2} R^{\tilde{d}}_{a2,j2} \left(3 - 2s^2_W\right)^2 + 4R^{\tilde{d}*}_{a1,3+j2} R^{\tilde{d}}_{a2,3+j2} s^4_W \right) \right) \right]$$

$$\underset{360}{C}\left(\tilde{u}_{a1}, \tilde{d}^{\dagger}_{a2}, \gamma, W^{-}\right) = \left[\frac{ie^2}{3\sqrt{2}s_W} \left(\sum_{j1=1}^{3} \left(\sum_{j2=1}^{3} CKM^{*}_{j1,j2} R^{\tilde{d}}_{a2,j2} \right) R^{\tilde{u}*}_{a1,j1} \right) \right]$$

$$\underset{361}{C}\left(\tilde{d}_{a1}, \tilde{u}_{a2}^{\dagger}, \gamma, W^{+}\right) = \left[\frac{ie^2}{3\sqrt{2}s_W} \left(\sum_{j2=1}^{3} \left(\sum_{j1=1}^{3} CKM_{j1,j2} R_{a2,j1}^{\tilde{u}} \right) R_{a1,j2}^{\tilde{d}*} \right) \right]$$

$$\underset{364}{C}\left(\tilde{u}_{a1}, \tilde{d}_{a2}^{\dagger}, Z, W^{-}\right) = \left[-\frac{ie^2}{3\sqrt{2}c_W} \left(\sum_{j1=1}^{3} \left(\sum_{j2=1}^{3} CKM_{j1,j2}^{*} R_{a2,j2}^{\tilde{d}} \right) R_{a1,j1}^{\tilde{u}*} \right) \right]$$

$$\underset{365}{C}\left(\tilde{d}_{a1}, \tilde{u}_{a2}^{\dagger}, Z, W^{+}\right) = \left[-\frac{ie^2}{3\sqrt{2}c_W} \left(\sum_{j2=1}^{3} \left(\sum_{j1=1}^{3} CKM_{j1,j2} R_{a2,j1}^{\tilde{u}} \right) R_{a1,j2}^{\tilde{d}*} \right) \right]$$

$$\underset{370}{C}\left(\tilde{u}_{a1}, \tilde{u}_{a2}^{\dagger}, W^{-}, W^{+}\right) = \left[\frac{ie^2}{2s_W^2} \left(\sum_{j2=1}^{3} R_{a1,j2}^{\tilde{u}*} R_{a2,j2}^{\tilde{u}} \right) \right]$$

$$\underset{371}{C}\left(\tilde{d}_{a1}, \tilde{d}_{a2}^{\dagger}, W^{-}, W^{+}\right) = \left[\frac{ie^2}{2s_W^2} \left(\sum_{j2=1}^{3} R_{a1,j2}^{\tilde{d}*} R_{a2,j2}^{\tilde{d}} \right) \right]$$

[SSVV] **2 Squarks – 2 Gluons**

$$\underset{396}{C}\left(\tilde{u}_{a1}, \tilde{u}_{a2}^{\dagger}, g, g\right) = \left[ig_s^2 \delta_{a1,a2} \left((T^{g3}T^{g4})_{c2,c1} + (T^{g4}T^{g3})_{c2,c1} \right) \right]$$

$$\underset{397}{C}\left(\tilde{d}_{a1}, \tilde{d}_{a2}^{\dagger}, g, g\right) = \left[ig_s^2 \delta_{a1,a2} \left((T^{g3}T^{g4})_{c2,c1} + (T^{g4}T^{g3})_{c2,c1} \right) \right]$$

[VVVV] **4 Gauge Bosons**

$$\underset{39}{C}\left(\gamma, \gamma, W^{-}, W^{+}\right) = ie^2 \begin{bmatrix} -2 \\ \hline 1 \\ \hline 1 \end{bmatrix}$$

$$\underset{40}{C}\left(\gamma, Z, W^{-}, W^{+}\right) = \frac{ie^2 c_W}{s_W} \begin{bmatrix} -2 \\ \hline 1 \\ \hline 1 \end{bmatrix}$$

$$\underset{41}{C}\left(Z, Z, W^-, W^+\right) = \frac{ie^2 c_W^2}{s_W^2} \begin{bmatrix} \dfrac{-2}{1} \\ \dfrac{1}{} \\ 1 \end{bmatrix}$$

$$\underset{42}{C}\left(W^-, W^-, W^+, W^+\right) = \frac{ie^2}{s_W^2} \begin{bmatrix} \dfrac{2}{-1} \\ \dfrac{-1}{} \\ -1 \end{bmatrix}$$

[VVVV] **4 Gluons**

$$\underset{384}{C}(g, g, g, g) = -ig_s^2 \begin{bmatrix} f^{g1,g3,x} f^{x,g2,g4} - f^{g1,g4,x} f^{x,g3,g2} \\ \hline f^{g1,g2,x} f^{x,g3,g4} + f^{g1,g4,x} f^{x,g3,g2} \\ \hline -\left(f^{g1,g2,x} f^{x,g3,g4}\right) - f^{g1,g3,x} f^{x,g2,g4} \end{bmatrix}$$