MSSM

[FFS] Chargino – Lepton – Higgs

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

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

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

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

[FFS] Chargino – Neutralino – Higgs

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

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

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

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

[FFS] Chargino – Quark – Higgs

$$\underset{265}{C}\left(\tilde{\chi}_{c1}^{-}, \bar{d}_{g2}, \tilde{u}_{g3}^{s3}\right) = \frac{ie\mathrm{CKM}_{g3,g2}^{*}}{M_W s_W}\begin{bmatrix} \frac{m_{d_{g2}} U_{c1,2}^{*} U_{s3,1}^{\tilde{u}_{g3}*}}{\sqrt{2}c_\beta} \\ -\frac{1}{2s_\beta}\left(2M_W s_\beta V_{c1,1} U_{s3,1}^{\tilde{u}_{g3}*} - \sqrt{2} m_{u_{g3}} V_{c1,2} U_{s3,2}^{\tilde{u}_{g3}*}\right) \end{bmatrix}$$

$$\underset{266}{C}\left(\tilde{\chi}_{c1}^{+}, \bar{u}_{g2}, \tilde{d}_{g3}^{s3}\right) = \frac{ie\mathrm{CKM}_{g2,g3}}{M_W s_W}\begin{bmatrix} \frac{m_{u_{g2}} U_{s3,1}^{\tilde{d}_{g3}*} V_{c1,2}^{*}}{\sqrt{2}s_\beta} \\ -\frac{1}{2c_\beta}\left(2c_\beta M_W U_{c1,1} U_{s3,1}^{\tilde{d}_{g3}*} - \sqrt{2} m_{d_{g3}} U_{c1,2} U_{s3,2}^{\tilde{d}_{g3}*}\right) \end{bmatrix}$$

$$\underset{269}{C}\left(d_{g1}, \tilde{\chi}_{c2}^{+}, \tilde{u}_{g3}^{s3,\dagger}\right) = \frac{ie\mathrm{CKM}_{g3,g1}}{M_W s_W}\begin{bmatrix} -\frac{1}{2s_\beta}\left(2M_W s_\beta U_{s3,1}^{\tilde{u}_{g3}} V_{c2,1}^{*} - \sqrt{2} m_{u_{g3}} U_{s3,2}^{\tilde{u}_{g3}} V_{c2,2}^{*}\right) \\ \frac{m_{d_{g1}} U_{c2,2} U_{s3,1}^{\tilde{u}_{g3}}}{\sqrt{2}c_\beta} \end{bmatrix}$$

$$\underset{270}{C}\left(u_{g1}, \tilde{\chi}_{c2}^{-}, \tilde{d}_{g3}^{s3,\dagger}\right) = \frac{ie\mathrm{CKM}_{g1,g3}^{*}}{M_W s_W}\begin{bmatrix} -\frac{1}{2c_\beta}\left(2c_\beta M_W U_{c2,1}^{*} U_{s3,1}^{\tilde{d}_{g3}} - \sqrt{2} m_{d_{g3}} U_{c2,2}^{*} U_{s3,2}^{\tilde{d}_{g3}}\right) \\ \frac{m_{u_{g1}} V_{c2,2} U_{s3,1}^{\tilde{d}_{g3}}}{\sqrt{2}s_\beta} \end{bmatrix}$$

[FFS] Lepton – Neutralino – Higgs

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

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

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

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

[FFS] Neutralino – Quark – Higgs

$$\underset{259}{C}\left(\tilde{\chi}^0_{n1}, \bar{u}_{g2}, \tilde{u}^{s3}_{g3}\right) = \frac{ie\delta_{g2,g3}}{3\sqrt{2}c_W M_W s_W s_\beta} \begin{bmatrix} 4M_W s_W s_\beta U^{\tilde{u}_{g2}*}_{s3,2} Z^*_{n1,1} - 3c_W m_{u_{g2}} U^{\tilde{u}_{g2}*}_{s3,1} Z^*_{n1,4} \\ \hline -M_W s_\beta \left(s_W Z_{n1,1} + 3c_W Z_{n1,2}\right) U^{\tilde{u}_{g2}*}_{s3,1} - 3c_W m_{u_{g2}} Z_{n1,4} U^{\tilde{u}_{g2}*}_{s3,2} \end{bmatrix}$$

$$\underset{260}{C}\left(\tilde{\chi}^0_{n1}, \bar{d}_{g2}, \tilde{d}^{s3}_{g3}\right) = \frac{ie\delta_{g2,g3}}{3\sqrt{2}c_W c_\beta M_W s_W} \begin{bmatrix} -2c_\beta M_W s_W U^{\tilde{d}_{g2}*}_{s3,2} Z^*_{n1,1} - 3c_W m_{d_{g2}} U^{\tilde{d}_{g2}*}_{s3,1} Z^*_{n1,3} \\ \hline -c_\beta M_W \left(s_W Z_{n1,1} - 3c_W Z_{n1,2}\right) U^{\tilde{d}_{g2}*}_{s3,1} - 3c_W m_{d_{g2}} Z_{n1,3} U^{\tilde{d}_{g2}*}_{s3,2} \end{bmatrix}$$

$$\underset{263}{C}\left(u_{g1}, \tilde{\chi}^0_{n2}, \tilde{u}^{s3,\dagger}_{g3}\right) = -\frac{ie\delta_{g1,g3}}{3\sqrt{2}c_W M_W s_W s_\beta} \begin{bmatrix} M_W s_W s_\beta U^{\tilde{u}_{g1}}_{s3,1} Z^*_{n2,1} + 3c_W \left(M_W s_\beta U^{\tilde{u}_{g1}}_{s3,1} Z^*_{n2,2} + m_{u_{g1}} U^{\tilde{u}_{g1}}_{s3,2} Z^*_{n2,4}\right) \\ \hline 3c_W m_{u_{g1}} Z_{n2,4} U^{\tilde{u}_{g1}}_{s3,1} - 4M_W s_W s_\beta Z_{n2,1} U^{\tilde{u}_{g1}}_{s3,2} \end{bmatrix}$$

$$\underset{264}{C}\left(d_{g1}, \tilde{\chi}^0_{n2}, \tilde{d}^{s3,\dagger}_{g3}\right) = -\frac{ie\delta_{g1,g3}}{3\sqrt{2}c_W c_\beta M_W s_W} \begin{bmatrix} c_\beta M_W s_W U^{\tilde{d}_{g1}}_{s3,1} Z^*_{n2,1} - 3c_W \left(c_\beta M_W U^{\tilde{d}_{g1}}_{s3,1} Z^*_{n2,2} - m_{d_{g1}} U^{\tilde{d}_{g1}}_{s3,2} Z^*_{n2,3}\right) \\ \hline 3c_W m_{d_{g1}} Z_{n2,3} U^{\tilde{d}_{g1}}_{s3,1} + 2c_\beta M_W s_W Z_{n2,1} U^{\tilde{d}_{g1}}_{s3,2} \end{bmatrix}$$

[FFS] 2 Charginos – Higgs

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

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

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

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

[FFS] 2 Leptons – Higgs

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

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

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

$$\underset{197}{C}\left(e_{g1},\bar{e}_{g2},A^{0}\right)=\frac{e\delta_{g1,g2}m_{e_{g1}}t_{\beta}}{2M_{W}s_{W}}\left[\begin{array}{c}1\\\hline-1\end{array}\right]$$

$$\underset{200}{C}\left(\nu_{g1},\bar{e}_{g2},G^{-}\right)=-\frac{ie\delta_{g1,g2}m_{e_{g2}}}{\sqrt{2}M_{W}s_{W}}\left[\begin{array}{c}1\\\hline0\end{array}\right]$$

$$\underset{201}{C}\left(e_{g1},\bar{\nu}_{g2},G^{+}\right)=-\frac{ie\delta_{g1,g2}m_{e_{g1}}}{\sqrt{2}M_{W}s_{W}}\left[\begin{array}{c}0\\\hline1\end{array}\right]$$

$$\underset{204}{C}\left(\nu_{g1},\bar{e}_{g2},H^{-}\right)=\frac{ie\delta_{g1,g2}m_{e_{g2}}t_{\beta}}{\sqrt{2}M_{W}s_{W}}\left[\begin{array}{c}1\\\hline0\end{array}\right]$$

$$\underset{205}{C}\left(e_{g1},\bar{\nu}_{g2},H^{+}\right)=\frac{ie\delta_{g1,g2}m_{e_{g1}}t_{\beta}}{\sqrt{2}M_{W}s_{W}}\left[\begin{array}{c}0\\\hline1\end{array}\right]$$

[FFS] 2 Neutralinos – Higgs

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

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

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

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

[FFS] 2 Quarks – Higgs

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

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

$$\underset{185}{C}\left(u_{g1}, \overline{u}_{g2}, G^0\right) = \frac{e\delta_{g1,g2} m_{u_{g1}}}{2M_W s_W}\begin{bmatrix}1\\\hline -1\end{bmatrix}$$

$$\underset{186}{C}\left(d_{g1}, \overline{d}_{g2}, G^0\right) = \frac{e\delta_{g1,g2} m_{d_{g1}}}{2M_W s_W}\begin{bmatrix}-1\\\hline 1\end{bmatrix}$$

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

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

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

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

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

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

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

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

[FFV] Chargino – Neutralino – Gauge Boson

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

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

[FFV] 2 Charginos – Gauge Boson

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

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

[FFV] 2 Leptons – Gauge Boson

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

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

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

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

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

[FFV] 2 Neutralinos – Gauge Boson

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

[FFV] 2 Quarks – Gauge Boson

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

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

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

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

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

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

[SSS] 3 Higgs

$$C_{43}\left(h^0,h^0,h^0\right) = \left[-\frac{3ie c_{2\alpha} M_W s_{\alpha+\beta}}{2 s_W c_W^2} \right]$$

$$C_{44}\left(h^0,h^0,H^0\right) = \left[\frac{ie M_W}{2 s_W c_W^2} \left(c_{2\alpha} c_{\alpha+\beta} - 2 s_{2\alpha} s_{\alpha+\beta}\right) \right]$$

$$C_{45}\left(h^0,H^0,H^0\right) = \left[\frac{ie M_W}{2 s_W c_W^2} \left(2 c_{\alpha+\beta} s_{2\alpha} + c_{2\alpha} s_{\alpha+\beta}\right) \right]$$

$$C_{46}\left(H^0,H^0,H^0\right) = \left[-\frac{3ie c_{2\alpha} c_{\alpha+\beta} M_W}{2 s_W c_W^2} \right]$$

$$C_{47}\left(h^0,A^0,A^0\right) = \left[-\frac{ie c_{2\beta} M_W s_{\alpha+\beta}}{2 s_W c_W^2} \right]$$

$$C_{48}\left(h^0,A^0,G^0\right) = \left[-\frac{ie M_W s_{2\beta} s_{\alpha+\beta}}{2 s_W c_W^2} \right]$$

$$C_{49}\left(h^0,G^0,G^0\right) = \left[\frac{ie c_{2\beta} M_W s_{\alpha+\beta}}{2 s_W c_W^2} \right]$$

$$C_{50}\left(H^0,A^0,A^0\right) = \left[\frac{ie c_{2\beta} c_{\alpha+\beta} M_W}{2 s_W c_W^2} \right]$$

$$C_{51}\left(H^0,A^0,G^0\right) = \left[\frac{ie c_{\alpha+\beta} M_W s_{2\beta}}{2 s_W c_W^2} \right]$$

$$C_{52}\left(H^0,G^0,G^0\right) = \left[-\frac{ie c_{2\beta} c_{\alpha+\beta} M_W}{2 s_W c_W^2} \right]$$

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

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

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

$$C_{56}\left(h^0,G^-,G^+\right) = \left[\frac{ie c_{2\beta} M_W s_{\alpha+\beta}}{2 s_W c_W^2} \right]$$

$$\underset{57}{C}\left(H^0, H^-, H^+\right) = \left[\frac{\mathrm{i}eM_{\mathrm{W}}}{s_{\mathrm{W}}} \left(\frac{c_{2\beta} c_{\alpha+\beta}}{2c_{\mathrm{W}}^2} - c_{\beta-\alpha} \right) \right]$$

$$\underset{58}{C}\left(H^0, H^-, G^+\right) = \left[\frac{\mathrm{i}eM_{\mathrm{W}}}{2s_{\mathrm{W}}} \left(\frac{c_{\alpha+\beta} s_{2\beta}}{c_{\mathrm{W}}^2} - s_{\beta-\alpha} \right) \right]$$

$$\underset{59}{C}\left(H^0, G^-, H^+\right) = \left[\frac{\mathrm{i}eM_{\mathrm{W}}}{2s_{\mathrm{W}}} \left(\frac{c_{\alpha+\beta} s_{2\beta}}{c_{\mathrm{W}}^2} - s_{\beta-\alpha} \right) \right]$$

$$\underset{60}{C}\left(H^0, G^-, G^+\right) = \left[-\frac{\mathrm{i}ec_{2\beta} c_{\alpha+\beta} M_{\mathrm{W}}}{2s_{\mathrm{W}} c_{\mathrm{W}}^2} \right]$$

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

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

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

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

$$\underset{214}{C}\left(A^0, \tilde{u}_{\mathrm{g2}}^{\mathrm{s2}}, \tilde{u}_{\mathrm{g3}}^{\mathrm{s3},\dagger}\right) = \left[-\frac{e\delta_{\mathrm{g2,g3}} m_{u_{\mathrm{g2}}}}{2M_{\mathrm{W}} s_{\mathrm{W}} t_\beta} \left(\left(\mu t_\beta + A_{\mathrm{g2,g2}}^{u*} \right) U_{\mathrm{s2,2}}^{\tilde{u}_{\mathrm{g2}}*} U_{\mathrm{s3,1}}^{\tilde{u}_{\mathrm{g2}}} - \left(t_\beta \mu^* + A_{\mathrm{g2,g2}}^{u} \right) U_{\mathrm{s2,1}}^{\tilde{u}_{\mathrm{g2}}*} U_{\mathrm{s3,2}}^{\tilde{u}_{\mathrm{g2}}} \right) \right]$$

$$\underset{215}{C}\left(G^0, \tilde{u}_{\mathrm{g2}}^{\mathrm{s2}}, \tilde{u}_{\mathrm{g3}}^{\mathrm{s3},\dagger}\right) = \left[\frac{e\delta_{\mathrm{g2,g3}} m_{u_{\mathrm{g2}}}}{2M_{\mathrm{W}} s_{\mathrm{W}} t_\beta} \left(\left(\mu - t_\beta A_{\mathrm{g2,g2}}^{u*} \right) U_{\mathrm{s2,2}}^{\tilde{u}_{\mathrm{g2}}*} U_{\mathrm{s3,1}}^{\tilde{u}_{\mathrm{g2}}} - \left(\mu^* - t_\beta A_{\mathrm{g2,g2}}^{u} \right) U_{\mathrm{s2,1}}^{\tilde{u}_{\mathrm{g2}}*} U_{\mathrm{s3,2}}^{\tilde{u}_{\mathrm{g2}}} \right) \right]$$

$$\underset{216}{C}\left(A^0, \tilde{d}_{\mathrm{g2}}^{\mathrm{s2}}, \tilde{d}_{\mathrm{g3}}^{\mathrm{s3},\dagger}\right) = \left[-\frac{e\delta_{\mathrm{g2,g3}} m_{d_{\mathrm{g2}}}}{2M_{\mathrm{W}} s_{\mathrm{W}}} \left(\left(\mu + t_\beta A_{\mathrm{g2,g2}}^{d*} \right) U_{\mathrm{s2,2}}^{\tilde{d}_{\mathrm{g2}}*} U_{\mathrm{s3,1}}^{\tilde{d}_{\mathrm{g2}}} - \left(\mu^* + t_\beta A_{\mathrm{g2,g2}}^{d} \right) U_{\mathrm{s2,1}}^{\tilde{d}_{\mathrm{g2}}*} U_{\mathrm{s3,2}}^{\tilde{d}_{\mathrm{g2}}} \right) \right]$$

$$\underset{217}{C}\left(G^0, \tilde{d}_{\mathrm{g2}}^{\mathrm{s2}}, \tilde{d}_{\mathrm{g3}}^{\mathrm{s3},\dagger}\right) = \left[-\frac{e\delta_{\mathrm{g2,g3}} m_{d_{\mathrm{g2}}}}{2M_{\mathrm{W}} s_{\mathrm{W}}} \left(\left(\mu t_\beta - A_{\mathrm{g2,g2}}^{d*} \right) U_{\mathrm{s2,2}}^{\tilde{d}_{\mathrm{g2}}*} U_{\mathrm{s3,1}}^{\tilde{d}_{\mathrm{g2}}} - \left(t_\beta \mu^* - A_{\mathrm{g2,g2}}^{d} \right) U_{\mathrm{s2,1}}^{\tilde{d}_{\mathrm{g2}}*} U_{\mathrm{s3,2}}^{\tilde{d}_{\mathrm{g2}}} \right) \right]$$

$$\underset{218}{C}\left(h^0, \tilde{\nu}_{\mathrm{g2}}, \tilde{\nu}_{\mathrm{g3}}^\dagger\right) = \left[\frac{\mathrm{i}e\delta_{\mathrm{g2,g3}} M_{\mathrm{Z}} s_{\alpha+\beta}}{2c_{\mathrm{W}} s_{\mathrm{W}}} \right]$$

$$\underset{219}{C}\left(H^0, \tilde{\nu}_{\mathrm{g2}}, \tilde{\nu}_{\mathrm{g3}}^\dagger\right) = \left[-\frac{\mathrm{i}e\delta_{\mathrm{g2,g3}} c_{\alpha+\beta} M_{\mathrm{Z}}}{2c_{\mathrm{W}} s_{\mathrm{W}}} \right]$$

$$\underset{220}{C}\left(h^0,\tilde{e}^{s2}_{g2},\tilde{e}^{s3,\dagger}_{g3}\right) = \left[\frac{ie\delta_{g2,g3}}{2c_W c_\beta M_W s_W}\begin{pmatrix} U^{\tilde{e}_{g2}*}_{s2,1}\left(\left(2c_W s_\alpha m^2_{e_{g2}} - c_\beta M_W M_Z s_{\alpha+\beta}\left(1-2s^2_W\right)\right)U^{\tilde{e}_{g2}}_{s3,1} + c_W m_{e_{g2}}\left(c_\alpha\mu^* + s_\alpha A^e_{g2,g2}\right)U^{\tilde{e}_{g2}}_{s3,2}\right) + \\ U^{\tilde{e}_{g2}*}_{s2,2}\left(c_W m_{e_{g2}}\left(\mu c_\alpha + s_\alpha A^{e*}_{g2,g2}\right)U^{\tilde{e}_{g2}}_{s3,1} + 2c_W s_\alpha m^2_{e_{g2}}U^{\tilde{e}_{g2}}_{s3,2} - 2c_\beta M_W M_Z s_{\alpha+\beta}s^2_W U^{\tilde{e}_{g2}}_{s3,2}\right)\end{pmatrix}\right]$$

$$\underset{221}{C}\left(H^0,\tilde{e}^{s2}_{g2},\tilde{e}^{s3,\dagger}_{g3}\right) = \left[-\frac{ie\delta_{g2,g3}}{2c_W c_\beta M_W s_W}\begin{pmatrix} U^{\tilde{e}_{g2}*}_{s2,1}\left(\left(2c_W c_\alpha m^2_{e_{g2}} - c_{\alpha+\beta}c_\beta M_W M_Z\left(1-2s^2_W\right)\right)U^{\tilde{e}_{g2}}_{s3,1} - c_W m_{e_{g2}}\left(s_\alpha\mu^* - c_\alpha A^e_{g2,g2}\right)U^{\tilde{e}_{g2}}_{s3,2}\right) - \\ U^{\tilde{e}_{g2}*}_{s2,2}\left(c_W m_{e_{g2}}\left(\mu s_\alpha - c_\alpha A^{e*}_{g2,g2}\right)U^{\tilde{e}_{g2}}_{s3,1} - 2c_W c_\alpha m^2_{e_{g2}}U^{\tilde{e}_{g2}}_{s3,2} + 2c_{\alpha+\beta}c_\beta M_W M_Z s^2_W U^{\tilde{e}_{g2}}_{s3,2}\right)\end{pmatrix}\right]$$

$$\underset{222}{C}\left(h^0,\tilde{u}^{s2}_{g2},\tilde{u}^{s3,\dagger}_{g3}\right) = \left[-\frac{ie\delta_{g2,g3}}{6c_W M_W s_W s_\beta}\begin{pmatrix} U^{\tilde{u}_{g2}*}_{s2,1}\left(\left(6c_W c_\alpha m^2_{u_{g2}} - M_W M_Z s_{\alpha+\beta}s_\beta\left(3-4s^2_W\right)\right)U^{\tilde{u}_{g2}}_{s3,1} + 3c_W m_{u_{g2}}\left(s_\alpha\mu^* + c_\alpha A^u_{g2,g2}\right)U^{\tilde{u}_{g2}}_{s3,2}\right) + \\ U^{\tilde{u}_{g2}*}_{s2,2}\left(3c_W m_{u_{g2}}\left(\mu s_\alpha + c_\alpha A^{u*}_{g2,g2}\right)U^{\tilde{u}_{g2}}_{s3,1} + 6c_W c_\alpha m^2_{u_{g2}}U^{\tilde{u}_{g2}}_{s3,2} - 4M_W M_Z s_{\alpha+\beta}s_\beta s^2_W U^{\tilde{u}_{g2}}_{s3,2}\right)\end{pmatrix}\right]$$

$$\underset{223}{C}\left(H^0,\tilde{u}^{s2}_{g2},\tilde{u}^{s3,\dagger}_{g3}\right) = \left[-\frac{ie\delta_{g2,g3}}{6c_W M_W s_W s_\beta}\begin{pmatrix} U^{\tilde{u}_{g2}*}_{s2,1}\left(\left(6c_W s_\alpha m^2_{u_{g2}} + c_{\alpha+\beta}M_W M_Z s_\beta\left(3-4s^2_W\right)\right)U^{\tilde{u}_{g2}}_{s3,1} - 3c_W m_{u_{g2}}\left(c_\alpha\mu^* - s_\alpha A^u_{g2,g2}\right)U^{\tilde{u}_{g2}}_{s3,2}\right) - \\ U^{\tilde{u}_{g2}*}_{s2,2}\left(3c_W m_{u_{g2}}\left(\mu c_\alpha - s_\alpha A^{u*}_{g2,g2}\right)U^{\tilde{u}_{g2}}_{s3,1} - 6c_W s_\alpha m^2_{u_{g2}}U^{\tilde{u}_{g2}}_{s3,2} - 4c_{\alpha+\beta}M_W M_Z s_\beta s^2_W U^{\tilde{u}_{g2}}_{s3,2}\right)\end{pmatrix}\right]$$

$$\underset{224}{C}\left(h^0,\tilde{d}^{s2}_{g2},\tilde{d}^{s3,\dagger}_{g3}\right) = \left[\frac{ie\delta_{g2,g3}}{6c_W c_\beta M_W s_W}\begin{pmatrix} U^{\tilde{d}_{g2}*}_{s2,1}\left(\left(6c_W s_\alpha m^2_{d_{g2}} - c_\beta M_W M_Z s_{\alpha+\beta}\left(3-2s^2_W\right)\right)U^{\tilde{d}_{g2}}_{s3,1} + 3c_W m_{d_{g2}}\left(c_\alpha\mu^* + s_\alpha A^d_{g2,g2}\right)U^{\tilde{d}_{g2}}_{s3,2}\right) + \\ U^{\tilde{d}_{g2}*}_{s2,2}\left(3c_W m_{d_{g2}}\left(\mu c_\alpha + s_\alpha A^{d*}_{g2,g2}\right)U^{\tilde{d}_{g2}}_{s3,1} + 6c_W s_\alpha m^2_{d_{g2}}U^{\tilde{d}_{g2}}_{s3,2} - 2c_\beta M_W M_Z s_{\alpha+\beta}s^2_W U^{\tilde{d}_{g2}}_{s3,2}\right)\end{pmatrix}\right]$$

$$\underset{225}{C}\left(H^0,\tilde{d}^{s2}_{g2},\tilde{d}^{s3,\dagger}_{g3}\right) = \left[-\frac{ie\delta_{g2,g3}}{6c_W c_\beta M_W s_W}\begin{pmatrix} U^{\tilde{d}_{g2}*}_{s2,1}\left(\left(6c_W c_\alpha m^2_{d_{g2}} - c_{\alpha+\beta}c_\beta M_W M_Z\left(3-2s^2_W\right)\right)U^{\tilde{d}_{g2}}_{s3,1} - 3c_W m_{d_{g2}}\left(s_\alpha\mu^* - c_\alpha A^d_{g2,g2}\right)U^{\tilde{d}_{g2}}_{s3,2}\right) - \\ U^{\tilde{d}_{g2}*}_{s2,2}\left(3c_W m_{d_{g2}}\left(\mu s_\alpha - c_\alpha A^{d*}_{g2,g2}\right)U^{\tilde{d}_{g2}}_{s3,1} - 6c_W c_\alpha m^2_{d_{g2}}U^{\tilde{d}_{g2}}_{s3,2} + 2c_{\alpha+\beta}c_\beta M_W M_Z s^2_W U^{\tilde{d}_{g2}}_{s3,2}\right)\end{pmatrix}\right]$$

$$\underset{226}{C}\left(H^+,\tilde{d}^{s2}_{g2},\tilde{u}^{s3,\dagger}_{g3}\right) = \left[\frac{ieCKM_{g3,g2}}{\sqrt{2}M_W s_W t_\beta}\begin{pmatrix} m_{d_{g2}}U^{\tilde{d}_{g2}*}_{s2,2}\left(t_\beta\left(\mu + t_\beta A^{d*}_{g2,g2}\right)U^{\tilde{u}_{g3}}_{s3,1} + m_{u_{g3}}\left(1+t^2_\beta\right)U^{\tilde{u}_{g3}}_{s3,2}\right) + \\ U^{\tilde{d}_{g2}*}_{s2,1}\left(\left(m^2_{u_{g3}} + t_\beta\left(t_\beta m^2_{d_{g2}} - s_{2\beta}M^2_W\right)\right)U^{\tilde{u}_{g3}}_{s3,1} + m_{u_{g3}}\left(t_\beta\mu^* + A^u_{g3,g3}\right)U^{\tilde{u}_{g3}}_{s3,2}\right)\end{pmatrix}\right]$$

$$\underset{227}{C}\left(H^-,\tilde{u}^{s2}_{g2},\tilde{d}^{s3,\dagger}_{g3}\right) = \left[\frac{ieCKM^*_{g2,g3}}{\sqrt{2}M_W s_W t_\beta}\begin{pmatrix} m_{u_{g2}}U^{\tilde{u}_{g2}*}_{s2,2}\left(\left(\mu t_\beta + A^{u*}_{g2,g2}\right)U^{\tilde{d}_{g3}}_{s3,1} + m_{d_{g3}}\left(1+t^2_\beta\right)U^{\tilde{d}_{g3}}_{s3,2}\right) + \\ U^{\tilde{u}_{g2}*}_{s2,1}\left(\left(m^2_{u_{g2}} + t_\beta\left(t_\beta m^2_{d_{g3}} - s_{2\beta}M^2_W\right)\right)U^{\tilde{d}_{g3}}_{s3,1} + m_{d_{g3}}t_\beta\left(\mu^* + t_\beta A^d_{g3,g3}\right)U^{\tilde{d}_{g3}}_{s3,2}\right)\end{pmatrix}\right]$$

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

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

$$\underset{230}{C}\left(G^+, \tilde{d}^{s2}_{g2}, \tilde{u}^{s3,\dagger}_{g3}\right) = \left[\frac{ie\mathrm{CKM}_{g3,g2}}{\sqrt{2}M_W s_W t_\beta} \left(m_{d_{g2}} t_\beta \left(\mu t_\beta - A^{d*}_{g2,g2} \right) U^{\tilde{d}_{g2}*}_{s2,2} U^{\tilde{u}_{g3}}_{s3,1} - U^{\tilde{d}_{g2}*}_{s2,1} \left(t_\beta \left(m^2_{d_{g2}} - m^2_{u_{g3}} - c_{2\beta} M^2_W \right) U^{\tilde{u}_{g3}}_{s3,1} + m_{u_{g3}} \left(\mu^* - t_\beta A^u_{g3,g3} \right) U^{\tilde{u}_{g3}}_{s3,2} \right) \right) \right]$$

$$\underset{231}{C}\left(G^-, \tilde{u}^{s2}_{g2}, \tilde{d}^{s3,\dagger}_{g3}\right) = \left[-\frac{ie\mathrm{CKM}^*_{g2,g3}}{\sqrt{2}M_W s_W t_\beta} \left(m_{u_{g2}} \left(\mu - t_\beta A^{u*}_{g2,g2} \right) U^{\tilde{u}_{g2}*}_{s2,2} U^{\tilde{d}_{g3}}_{s3,1} + t_\beta U^{\tilde{u}_{g2}*}_{s2,1} \left(\left(m^2_{d_{g3}} - m^2_{u_{g2}} - c_{2\beta} M^2_W \right) U^{\tilde{d}_{g3}}_{s3,1} - m_{d_{g3}} \left(t_\beta \mu^* - A^d_{g3,g3} \right) U^{\tilde{d}_{g3}}_{s3,2} \right) \right) \right]$$

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

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

[SSV] 2 Higgs – Gauge Boson

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

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

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

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

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

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

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

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

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

$$C_{68}\left(H^-, H^+, Z\right) = \left[\frac{ie}{2c_W s_W}\left(c_W^2 - s_W^2\right) \right]$$

$$C_{69}\left(h^0, H^-, W^+\right) = \left[-\frac{iec_{\beta-\alpha}}{2s_W} \right]$$

$$C_{70}\left(h^0, G^-, W^+\right) = \left[-\frac{ies_{\beta-\alpha}}{2s_W} \right]$$

$$C_{71}\left(H^0, H^-, W^+\right) = \left[\frac{ies_{\beta-\alpha}}{2s_W} \right]$$

$$C_{72}\left(H^0, G^-, W^+\right) = \left[-\frac{iec_{\beta-\alpha}}{2s_W} \right]$$

$$C_{73}\left(h^0, H^+, W^-\right) = \left[\frac{iec_{\beta-\alpha}}{2s_W} \right]$$

$$C_{74}\left(h^0, G^+, W^-\right) = \left[\frac{ies_{\beta-\alpha}}{2s_W} \right]$$

$$C_{75}\left(H^0, H^+, W^-\right) = \left[-\frac{ies_{\beta-\alpha}}{2s_W} \right]$$

$$C_{76}\left(H^0, G^+, W^-\right) = \left[\frac{iec_{\beta-\alpha}}{2s_W} \right]$$

$$C_{77}\left(A^0, H^-, W^+\right) = \left[\frac{e}{2s_W} \right]$$

$$C_{78}\left(A^0, H^+, W^-\right) = \left[\frac{e}{2s_W} \right]$$

$$C_{234}\left(\tilde{\nu}_{g1}, \tilde{\nu}_{g2}^{\dagger}, Z\right) = \left[-\frac{ie\delta_{g1,g2}}{2c_W s_W} \right]$$

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

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

$$C_{237}\left(\tilde{u}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, \gamma\right) = \left[-\frac{2}{3}ie\delta_{g1,g2}\delta_{s1,s2} \right]$$

$$\underset{238}{C}\left(\tilde{u}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, Z\right) = \left[-\frac{ie\delta_{g1,g2}}{6c_W s_W}\left(\left(3-4s_W^2\right)U_{s1,1}^{\tilde{u}_{g1}*}U_{s2,1}^{\tilde{u}_{g1}} - 4s_W^2 U_{s1,2}^{\tilde{u}_{g1}*}U_{s2,2}^{\tilde{u}_{g1}}\right)\right]$$

$$\underset{239}{C}\left(\tilde{d}_{g1}^{s1}, \tilde{d}_{g2}^{s2,\dagger}, \gamma\right) = \left[\frac{1}{3}ie\delta_{g1,g2}\delta_{s1,s2}\right]$$

$$\underset{240}{C}\left(\tilde{d}_{g1}^{s1}, \tilde{d}_{g2}^{s2,\dagger}, Z\right) = \left[\frac{ie\delta_{g1,g2}}{6c_W s_W}\left(\left(3-2s_W^2\right)U_{s1,1}^{\tilde{d}_{g1}*}U_{s2,1}^{\tilde{d}_{g1}} - 2s_W^2 U_{s1,2}^{\tilde{d}_{g1}*}U_{s2,2}^{\tilde{d}_{g1}}\right)\right]$$

$$\underset{241}{C}\left(\tilde{u}_{g1}^{s1}, \tilde{d}_{g2}^{s2,\dagger}, W^-\right) = \left[-\frac{ie\mathrm{CKM}_{g1,g2}^{*}U_{s1,1}^{\tilde{u}_{g1}*}U_{s2,1}^{\tilde{d}_{g2}}}{\sqrt{2}s_W}\right]$$

$$\underset{242}{C}\left(\tilde{d}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, W^+\right) = \left[-\frac{ie\mathrm{CKM}_{g2,g1}U_{s1,1}^{\tilde{d}_{g1}*}U_{s2,1}^{\tilde{u}_{g2}}}{\sqrt{2}s_W}\right]$$

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

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

[SUU] Higgs – 2 Ghosts

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[SVV] Higgs – 2 Gauge Bosons

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

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

$$\underset{7}{C}\left(G^-, Z, W^+\right) = \left[\ -\frac{\mathrm{i}eM_W s_W}{c_W}\ \right]$$

$$\underset{8}{C}\left(G^+, Z, W^-\right) = \left[\ -\frac{\mathrm{i}eM_W s_W}{c_W}\ \right]$$

$$\underset{79}{C}\left(h^0, Z, Z\right) = \left[\ \frac{\mathrm{i}eM_W s_{\beta-\alpha}}{s_W c_W^2}\ \right]$$

$$\underset{80}{C}\left(H^0, Z, Z\right) = \left[\ \frac{\mathrm{i}ec_{\beta-\alpha} M_W}{s_W c_W^2}\ \right]$$

$$\underset{81}{C}\left(h^0, W^-, W^+\right) = \left[\begin{array}{c} \frac{\mathrm{i}eM_W s_{\beta-\alpha}}{s_W} \end{array}\right]$$

$$\underset{82}{C}\left(H^0, W^-, W^+\right) = \left[\begin{array}{c} \frac{\mathrm{i}ec_{\beta-\alpha}M_W}{s_W} \end{array}\right]$$

[UUV] 2 Ghosts – Gauge Boson

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

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

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

$$\underset{22}{C}\left(\overline{u}_+, u_+, Z\right) = \frac{\mathrm{i}ec_W}{s_W}\left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$\underset{23}{C}\left(\overline{u}_-, u_\gamma, W^-\right) = \mathrm{i}e\left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$\underset{24}{C}\left(\overline{u}_+, u_\gamma, W^+\right) = -\mathrm{i}e\left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$\underset{25}{C}\left(\overline{u}_\gamma, u_+, W^-\right) = -\mathrm{i}e\left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$C_{26}\left(\overline{u}_\gamma, u_-, W^+\right) = \mathrm{i}e \left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$C_{27}\left(\overline{u}_-, u_Z, W^-\right) = \frac{\mathrm{i}ec_\mathrm{W}}{s_\mathrm{W}} \left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$C_{28}\left(\overline{u}_+, u_Z, W^+\right) = -\frac{\mathrm{i}ec_\mathrm{W}}{s_\mathrm{W}} \left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$C_{29}\left(\overline{u}_Z, u_+, W^-\right) = -\frac{\mathrm{i}ec_\mathrm{W}}{s_\mathrm{W}} \left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

$$C_{30}\left(\overline{u}_Z, u_-, W^+\right) = \frac{\mathrm{i}ec_\mathrm{W}}{s_\mathrm{W}} \left[\begin{array}{c} 1 \\ \hline 0 \end{array}\right]$$

[VVV] 3 Gauge Bosons

$$C_{9}\left(\gamma, W^+, W^-\right) = \left[\begin{array}{c} -\mathrm{i}e \end{array}\right]$$

$$C_{10}\left(Z, W^+, W^-\right) = \left[\begin{array}{c} -\frac{\mathrm{i}ec_\mathrm{W}}{s_\mathrm{W}} \end{array}\right]$$

[SSSS] 4 Higgs

$$C_{89}\left(h^0, h^0, h^0, h^0\right) = \left[\begin{array}{c} -\frac{3\mathrm{i}e^2c_{2\alpha}^2}{4c_\mathrm{W}^2 s_\mathrm{W}^2} \end{array}\right]$$

$$C_{90}\left(h^0, h^0, h^0, H^0\right) = \left[\begin{array}{c} -\frac{3\mathrm{i}e^2c_{2\alpha}s_{2\alpha}}{4c_\mathrm{W}^2 s_\mathrm{W}^2} \end{array}\right]$$

$$C_{91}\left(h^0,h^0,H^0,H^0\right) = \left[\ \frac{ie^2}{4c_W^2 s_W^2}\left(1-3s_{2\alpha}^2\right)\ \right]$$

$$C_{92}\left(h^0,H^0,H^0,H^0\right) = \left[\ \frac{3ie^2 c_{2\alpha}s_{2\alpha}}{4c_W^2 s_W^2}\ \right]$$

$$C_{93}\left(H^0,H^0,H^0,H^0\right) = \left[\ -\frac{3ie^2 c_{2\alpha}^2}{4c_W^2 s_W^2}\ \right]$$

$$C_{94}\left(h^0,h^0,A^0,A^0\right) = \left[\ -\frac{ie^2 c_{2\alpha}c_{2\beta}}{4c_W^2 s_W^2}\ \right]$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$C\left(G^0, G^0, H^-, G^+\right) = \left[\frac{\mathrm{i}e^2 c_{2\beta} s_{2\beta}}{4 c_W^2 s_W^2} \right]$$

$$C\left(G^0, G^0, G^-, H^+\right) = \left[\frac{\mathrm{i}e^2 c_{2\beta} s_{2\beta}}{4 c_W^2 s_W^2} \right]$$

$$C\left(G^0, G^0, G^-, G^+\right) = \left[-\frac{\mathrm{i}e^2 c_{2\beta}^2}{4 c_W^2 s_W^2} \right]$$

$$C\left(H^-, H^-, H^+, H^+\right) = \left[-\frac{\mathrm{i}e^2 c_{2\beta}^2}{2 c_W^2 s_W^2} \right]$$

$$C\left(H^-, H^-, H^+, G^+\right) = \left[-\frac{\mathrm{i}e^2 c_{2\beta} s_{2\beta}}{2 c_W^2 s_W^2} \right]$$

$$C\left(H^-, H^-, G^+, G^+\right) = \left[-\frac{\mathrm{i}e^2 s_{2\beta}^2}{2 c_W^2 s_W^2} \right]$$

$$C\left(H^-, G^-, H^+, H^+\right) = \left[-\frac{\mathrm{i}e^2 c_{2\beta} s_{2\beta}}{2 c_W^2 s_W^2} \right]$$

$$C\left(H^-, G^-, H^+, G^+\right) = \left[\frac{\mathrm{i}e^2}{4 c_W^2 s_W^2} \left(c_{2\beta}^2 - s_{2\beta}^2 \right) \right]$$

$$C\left(H^-, G^-, G^+, G^+\right) = \left[\frac{\mathrm{i}e^2 c_{2\beta} s_{2\beta}}{2c_W^2 s_W^2} \right]$$

$$C\left(G^-, G^-, H^+, H^+\right) = \left[-\frac{\mathrm{i}e^2 s_{2\beta}^2}{2c_W^2 s_W^2} \right]$$

$$C\left(G^-, G^-, H^+, G^+\right) = \left[\frac{\mathrm{i}e^2 c_{2\beta} s_{2\beta}}{2c_W^2 s_W^2} \right]$$

$$C\left(G^-, G^-, G^+, G^+\right) = \left[-\frac{\mathrm{i}e^2 c_{2\beta}^2}{2c_W^2 s_W^2} \right]$$

$$C\left(h^0, h^0, \tilde{\nu}_{g3}, \tilde{\nu}_{g4}^\dagger\right) = \left[\frac{\mathrm{i}e^2 \delta_{g3,g4} c_{2\alpha}}{4c_W^2 s_W^2} \right]$$

$$C\left(h^0, h^0, \tilde{e}_{g3}^{s3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[-\frac{\mathrm{i}e^2 \delta_{g3,g4}}{4c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\left(c_{2\alpha} c_\beta^2 M_W^2 \left(1 - 2s_W^2\right) + 2c_W^2 m_{e_{g4}}^2 s_\alpha^2 \right) U_{s3,1}^{\tilde{e}_{g4}*} U_{s4,1}^{\tilde{e}_{g4}} + 2\left(c_{2\alpha} c_\beta^2 M_W^2 s_W^2 + c_W^2 m_{e_{g4}}^2 s_\alpha^2 \right) U_{s3,2}^{\tilde{e}_{g4}*} U_{s4,2}^{\tilde{e}_{g4}} \right) \right]$$

$$C\left(h^0, h^0, \tilde{u}_{g3}^{s3}, \tilde{u}_{g4}^{s4,\dagger}\right) = \left[-\frac{\mathrm{i}e^2 \delta_{g3,g4}}{12c_W^2 M_W^2 s_W^2 s_\beta^2} \left(\left(6c_W^2 c_\alpha^2 m_{u_{g4}}^2 - c_{2\alpha} M_W^2 \left(3 - 4s_W^2\right) s_\beta^2 \right) U_{s3,1}^{\tilde{u}_{g4}*} U_{s4,1}^{\tilde{u}_{g4}} + 2\left(3c_W^2 c_\alpha^2 m_{u_{g4}}^2 - 2c_{2\alpha} M_W^2 s_W^2 s_\beta^2 \right) U_{s3,2}^{\tilde{u}_{g4}*} U_{s4,2}^{\tilde{u}_{g4}} \right) \right]$$

$$C\left(h^0, h^0, \tilde{d}_{g3}^{s3}, \tilde{d}_{g4}^{s4,\dagger}\right) = \left[-\frac{\mathrm{i}e^2 \delta_{g3,g4}}{12c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\left(c_{2\alpha} c_\beta^2 M_W^2 \left(3 - 2s_W^2\right) + 6c_W^2 m_{d_{g4}}^2 s_\alpha^2 \right) U_{s3,1}^{\tilde{d}_{g4}*} U_{s4,1}^{\tilde{d}_{g4}} + 2\left(c_{2\alpha} c_\beta^2 M_W^2 s_W^2 + 3c_W^2 m_{d_{g4}}^2 s_\alpha^2 \right) U_{s3,2}^{\tilde{d}_{g4}*} U_{s4,2}^{\tilde{d}_{g4}} \right) \right]$$

$$C\left(H^0, H^0, \tilde{\nu}_{g3}, \tilde{\nu}_{g4}^\dagger\right) = \left[-\frac{\mathrm{i}e^2 \delta_{g3,g4} c_{2\alpha}}{4c_W^2 s_W^2} \right]$$

$$C\left(H^0, H^0, \tilde{e}_{g3}^{s3}, \tilde{e}_{g4}^{s4,\dagger}\right) = \left[-\frac{\mathrm{i}e^2 \delta_{g3,g4}}{4c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\left(2c_W^2 c_\alpha^2 m_{e_{g4}}^2 - c_{2\alpha} c_\beta^2 M_W^2 \left(1 - 2s_W^2\right) \right) U_{s3,1}^{\tilde{e}_{g4}*} U_{s4,1}^{\tilde{e}_{g4}} + 2\left(c_W^2 c_\alpha^2 m_{e_{g4}}^2 - c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) U_{s3,2}^{\tilde{e}_{g4}*} U_{s4,2}^{\tilde{e}_{g4}} \right) \right]$$

$$C\left(H^0, H^0, \tilde{u}_{g3}^{s3}, \tilde{u}_{g4}^{s4,\dagger}\right) = \left[-\frac{\mathrm{i}e^2 \delta_{g3,g4}}{12c_W^2 M_W^2 s_W^2 s_\beta^2} \left(\left(6c_W^2 m_{u_{g4}}^2 s_\alpha^2 + c_{2\alpha} M_W^2 \left(3 - 4s_W^2\right) s_\beta^2 \right) U_{s3,1}^{\tilde{u}_{g4}*} U_{s4,1}^{\tilde{u}_{g4}} + 2\left(3c_W^2 m_{u_{g4}}^2 s_\alpha^2 + 2c_{2\alpha} M_W^2 s_W^2 s_\beta^2 \right) U_{s3,2}^{\tilde{u}_{g4}*} U_{s4,2}^{\tilde{u}_{g4}} \right) \right]$$

$$C\left(H^0, H^0, \tilde{d}_{g3}^{s3}, \tilde{d}_{g4}^{s4,\dagger}\right) = \left[-\frac{\mathrm{i}e^2 \delta_{g3,g4}}{12c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\left(6c_W^2 c_\alpha^2 m_{d_{g4}}^2 - c_{2\alpha} c_\beta^2 M_W^2 \left(3 - 2s_W^2\right) \right) U_{s3,1}^{\tilde{d}_{g4}*} U_{s4,1}^{\tilde{d}_{g4}} + 2\left(3c_W^2 c_\alpha^2 m_{d_{g4}}^2 - c_{2\alpha} c_\beta^2 M_W^2 s_W^2 \right) U_{s3,2}^{\tilde{d}_{g4}*} U_{s4,2}^{\tilde{d}_{g4}} \right) \right]$$

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

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

$$C\left(A^0, A^0, \tilde{u}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2\delta_{g3,g4}}{12c_W^2 M_W^2 s_W^2 t_\beta^2}\left(\left(6c_W^2 m^2_{u_{g4}}-c_{2\beta}M_W^2\left(3-4s_W^2\right)t_\beta^2\right)U^{\tilde{u}_{g4}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1}+2\left(3c_W^2 m^2_{u_{g4}}-2c_{2\beta}M_W^2 s_W^2 t_\beta^2\right)U^{\tilde{u}_{g4}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\right)\right]$$

$$C\left(A^0, A^0, \tilde{d}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2\delta_{g3,g4}}{12c_W^2 M_W^2 s_W^2}\left(\left(c_{2\beta}M_W^2\left(3-2s_W^2\right)+6c_W^2 m^2_{d_{g4}}t_\beta^2\right)U^{\tilde{d}_{g4}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1}+2\left(c_{2\beta}M_W^2 s_W^2+3c_W^2 m^2_{d_{g4}}t_\beta^2\right)U^{\tilde{d}_{g4}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\right)\right]$$

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

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

$$C\left(G^0, G^0, \tilde{u}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2\delta_{g3,g4}}{12c_W^2 M_W^2 s_W^2}\left(\left(6c_W^2 m^2_{u_{g4}}+c_{2\beta}M_W^2\left(3-4s_W^2\right)\right)U^{\tilde{u}_{g4}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1}+2\left(3c_W^2 m^2_{u_{g4}}+2c_{2\beta}M_W^2 s_W^2\right)U^{\tilde{u}_{g4}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\right)\right]$$

$$C\left(G^0, G^0, \tilde{d}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2\delta_{g3,g4}}{12c_W^2 M_W^2 s_W^2}\left(\left(6c_W^2 m^2_{d_{g4}}-c_{2\beta}M_W^2\left(3-2s_W^2\right)\right)U^{\tilde{d}_{g4}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1}+2\left(3c_W^2 m^2_{d_{g4}}-c_{2\beta}M_W^2 s_W^2\right)U^{\tilde{d}_{g4}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\right)\right]$$

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

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

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

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

$$C\left(h^0, H^0, \tilde{u}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2\delta_{g3,g4}s_{2\alpha}}{12c_W^2 M_W^2 s_W^2 s_\beta^2}\left(\left(3c_W^2 m^2_{u_{g4}}-M_W^2\left(3-4s_W^2\right)s_\beta^2\right)U^{\tilde{u}_{g4}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1}+\left(3c_W^2 m^2_{u_{g4}}-4M_W^2 s_W^2 s_\beta^2\right)U^{\tilde{u}_{g4}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\right)\right]$$

$$C\left(h^0, H^0, \tilde{d}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2\delta_{g3,g4}s_{2\alpha}}{12c_W^2 c_\beta^2 M_W^2 s_W^2}\left(\left(3c_W^2 m^2_{d_{g4}}-c_\beta^2 M_W^2\left(3-2s_W^2\right)\right)U^{\tilde{d}_{g4}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1}+\left(3c_W^2 m^2_{d_{g4}}-2c_\beta^2 M_W^2 s_W^2\right)U^{\tilde{d}_{g4}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\right)\right]$$

$$C\left(A^0, G^0, \tilde{u}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2\delta_{g3,g4}s_{2\beta}}{12c_W^2 M_W^2 s_W^2 s_\beta^2}\left(\left(3c_W^2 m^2_{u_{g4}} - M_W^2\left(3-4s_W^2\right)s_\beta^2\right)U^{\tilde{u}_{g4}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1} + \left(3c_W^2 m^2_{u_{g4}} - 4M_W^2 s_W^2 s_\beta^2\right)U^{\tilde{u}_{g4}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\right)\right]$$

$$C\left(A^0, G^0, \tilde{d}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2\delta_{g3,g4}s_{2\beta}}{12c_W^2 c_\beta^2 M_W^2 s_W^2}\left(\left(3c_W^2 m^2_{d_{g4}} - c_\beta^2 M_W^2\left(3-2s_W^2\right)\right)U^{\tilde{d}_{g4}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1} + \left(3c_W^2 m^2_{d_{g4}} - 2c_\beta^2 M_W^2 s_W^2\right)U^{\tilde{d}_{g4}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\right)\right]$$

$$C\left(h^0, H^-, \tilde{u}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2 CKM^*_{g3,g4}}{2\sqrt{2}s_{2\beta}M_W^2 s_W^2 s_\beta^2}\left(s_{2\beta}\left(c_\alpha c_\beta m^2_{u_{g3}} - s_\beta\left(c_{\alpha+\beta}s_\beta M_W^2 + s_\alpha m^2_{d_{g4}}t_\beta^2\right)\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1} + 2m_{d_{g4}}m_{u_{g3}}s_{\beta-\alpha}s_\beta^2 U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\right)\right]$$

$$C\left(h^0, H^+, \tilde{d}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2 CKM_{g4,g3}}{2\sqrt{2}s_{2\beta}M_W^2 s_W^2 s_\beta^2}\left(s_{2\beta}\left(c_\alpha c_\beta m^2_{u_{g4}} - s_\beta\left(c_{\alpha+\beta}s_\beta M_W^2 + s_\alpha m^2_{d_{g3}}t_\beta^2\right)\right)U^{\tilde{d}_{g3}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1} + 2m_{d_{g3}}m_{u_{g4}}s_{\beta-\alpha}s_\beta^2 U^{\tilde{d}_{g3}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\right)\right]$$

$$C\left(h^0, G^-, \tilde{u}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2 CKM^*_{g3,g4}}{2\sqrt{2}c_\beta s_{2\beta}s_\beta M_W^2 s_W^2}\left(s_{2\beta}\left(s_\alpha s_\beta m^2_{d_{g4}} + c_\alpha c_\beta m^2_{u_{g3}} - c_\beta s_{\alpha+\beta}s_\beta M_W^2\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1} - 2c_\beta c_{\beta-\alpha}m_{d_{g4}}m_{u_{g3}}s_\beta U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\right)\right]$$

$$C\left(h^0, G^+, \tilde{d}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2 CKM_{g4,g3}}{2\sqrt{2}c_\beta s_{2\beta}s_\beta M_W^2 s_W^2}\left(s_{2\beta}\left(s_\alpha s_\beta m^2_{d_{g3}} + c_\alpha c_\beta m^2_{u_{g4}} - c_\beta s_{\alpha+\beta}s_\beta M_W^2\right)U^{\tilde{d}_{g3}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1} - 2c_\beta c_{\beta-\alpha}m_{d_{g3}}m_{u_{g4}}s_\beta U^{\tilde{d}_{g3}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\right)\right]$$

$$C\left(A^0, H^-, \tilde{u}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{e^2 CKM^*_{g3,g4}U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1}}{2\sqrt{2}s_W^2}\left(\frac{m^2_{u_{g3}}}{M_W^2 t_\beta^2} - \frac{m^2_{d_{g4}}t_\beta^2}{M_W^2} - c_{2\beta}\right)\right]$$

$$C\left(A^0, H^+, \tilde{d}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[\frac{e^2 CKM_{g4,g3}U^{\tilde{d}_{g3}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1}}{2\sqrt{2}s_W^2}\left(\frac{m^2_{u_{g4}}}{M_W^2 t_\beta^2} - \frac{m^2_{d_{g3}}t_\beta^2}{M_W^2} - c_{2\beta}\right)\right]$$

$$C\left(A^0, G^-, \tilde{u}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{e^2 CKM^*_{g3,g4}}{2\sqrt{2}s_{2\beta}t_\beta M_W^2 s_W^2}\left(s_{2\beta}\left(m^2_{u_{g3}} + t_\beta\left(t_\beta m^2_{d_{g4}} - s_{2\beta}M_W^2\right)\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1} + 2m_{d_{g4}}m_{u_{g3}}t_\beta U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\right)\right]$$

$$C\left(A^0, G^+, \tilde{d}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[\frac{e^2 CKM_{g4,g3}}{2\sqrt{2}s_{2\beta}t_\beta M_W^2 s_W^2}\left(s_{2\beta}\left(m^2_{u_{g4}} + t_\beta\left(t_\beta m^2_{d_{g3}} - s_{2\beta}M_W^2\right)\right)U^{\tilde{d}_{g3}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1} + 2m_{d_{g3}}m_{u_{g4}}t_\beta U^{\tilde{d}_{g3}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\right)\right]$$

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

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

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

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

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

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

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

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

$$C\left(H^0, H^-, \tilde{u}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2 \mathrm{CKM}^*_{g3,g4}}{2\sqrt{2} s_{2\beta} M_W^2 s_W^2 s_\beta^2} \left(s_{2\beta} \left(c_\beta s_\alpha m^2_{u_{g3}} - s_\beta \left(s_{\alpha+\beta} s_\beta M_W^2 - c_\alpha m^2_{d_{g4}} t_\beta^2 \right) \right) U^{\tilde{u}_{g3}*}_{s3,1} U^{\tilde{d}_{g4}}_{s4,1} + 2 c_{\beta-\alpha} m_{d_{g4}} m_{u_{g3}} s_\beta^2 U^{\tilde{u}_{g3}*}_{s3,2} U^{\tilde{d}_{g4}}_{s4,2} \right) \right]$$

$$C\left(H^0, H^+, \tilde{d}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2 \mathrm{CKM}_{g4,g3}}{2\sqrt{2} s_{2\beta} M_W^2 s_W^2 s_\beta^2} \left(s_{2\beta} \left(c_\beta s_\alpha m^2_{u_{g4}} - s_\beta \left(s_{\alpha+\beta} s_\beta M_W^2 - c_\alpha m^2_{d_{g3}} t_\beta^2 \right) \right) U^{\tilde{d}_{g3}*}_{s3,1} U^{\tilde{u}_{g4}}_{s4,1} + 2 c_{\beta-\alpha} m_{d_{g3}} m_{u_{g4}} s_\beta^2 U^{\tilde{d}_{g3}*}_{s3,2} U^{\tilde{u}_{g4}}_{s4,2} \right) \right]$$

$$C\left(H^0, G^-, \tilde{u}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2 \mathrm{CKM}^*_{g3,g4}}{2\sqrt{2} c_\beta s_{2\beta} s_\beta M_W^2 s_W^2} \left(s_{2\beta} \left(c_\alpha s_\beta m^2_{d_{g4}} - c_\beta s_\alpha m^2_{u_{g3}} - c_{\alpha+\beta} c_\beta s_\beta M_W^2 \right) U^{\tilde{u}_{g3}*}_{s3,1} U^{\tilde{d}_{g4}}_{s4,1} - 2 c_\beta m_{d_{g4}} m_{u_{g3}} s_\beta s_{\beta-\alpha} U^{\tilde{u}_{g3}*}_{s3,2} U^{\tilde{d}_{g4}}_{s4,2} \right) \right]$$

$$C\left(H^0, G^+, \tilde{d}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2 \mathrm{CKM}_{g4,g3}}{2\sqrt{2} c_\beta s_{2\beta} s_\beta M_W^2 s_W^2} \left(s_{2\beta} \left(c_\alpha s_\beta m^2_{d_{g3}} - c_\beta s_\alpha m^2_{u_{g4}} - c_{\alpha+\beta} c_\beta s_\beta M_W^2 \right) U^{\tilde{d}_{g3}*}_{s3,1} U^{\tilde{u}_{g4}}_{s4,1} - 2 c_\beta m_{d_{g3}} m_{u_{g4}} s_\beta s_{\beta-\alpha} U^{\tilde{d}_{g3}*}_{s3,2} U^{\tilde{u}_{g4}}_{s4,2} \right) \right]$$

$$C\left(G^0, H^-, \tilde{u}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{e^2 \mathrm{CKM}^*_{g3,g4}}{2\sqrt{2} s_{2\beta} t_\beta M_W^2 s_W^2} \left(s_{2\beta} \left(m^2_{u_{g3}} + t_\beta \left(t_\beta m^2_{d_{g4}} - s_{2\beta} M_W^2 \right) \right) U^{\tilde{u}_{g3}*}_{s3,1} U^{\tilde{d}_{g4}}_{s4,1} - 2 m_{d_{g4}} m_{u_{g3}} t_\beta U^{\tilde{u}_{g3}*}_{s3,2} U^{\tilde{d}_{g4}}_{s4,2} \right) \right]$$

$$C\left(G^0, H^+, \tilde{d}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[\frac{e^2 \mathrm{CKM}_{g4,g3}}{2\sqrt{2} s_{2\beta} t_\beta M_W^2 s_W^2} \left(s_{2\beta} \left(m^2_{u_{g4}} + t_\beta \left(t_\beta m^2_{d_{g3}} - s_{2\beta} M_W^2 \right) \right) U^{\tilde{d}_{g3}*}_{s3,1} U^{\tilde{u}_{g4}}_{s4,1} - 2 m_{d_{g3}} m_{u_{g4}} t_\beta U^{\tilde{d}_{g3}*}_{s3,2} U^{\tilde{u}_{g4}}_{s4,2} \right) \right]$$

$$\underset{324}{C}\left(G^0, G^-, \tilde{u}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[\frac{e^2 \mathrm{CKM}^*_{g3,g4} U^{\tilde{u}_{g3}*}_{s3,1} U^{\tilde{d}_{g4}}_{s4,1}}{2\sqrt{2} M_W^2 s_W^2} \left(m^2_{d_{g4}} - m^2_{u_{g3}} - c_{2\beta} M_W^2 \right) \right]$$

$$\underset{325}{C}\left(G^0, G^+, \tilde{d}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{e^2 \mathrm{CKM}_{g4,g3} U^{\tilde{d}_{g3}*}_{s3,1} U^{\tilde{u}_{g4}}_{s4,1}}{2\sqrt{2} M_W^2 s_W^2} \left(m^2_{d_{g3}} - m^2_{u_{g4}} - c_{2\beta} M_W^2 \right) \right]$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$C\left(H^-, H^+, \tilde{u}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2}{12c_W^2 M_W^2 s_W^2 t_\beta^2}\left(\begin{array}{l} t_\beta^2\left(\delta_{g3,g4}c_{2\beta}\left(1 + 2c_W^2\right)M_W^2 + 6\left(\sum_{gn=1}^{3}\mathrm{CKM}_{g4,gn}\mathrm{CKM}^*_{g3,gn}m_{d_{gn}}^2\right)c_W^2 t_\beta^2\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1} + \\ 2\delta_{g3,g4}\left(3c_W^2 m_{u_{g3}}^2 - 2c_{2\beta}M_W^2 s_W^2 t_\beta^2\right)U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\end{array}\right)\right]$$

$$C\left(H^-, G^+, \tilde{u}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2}{12t_\beta c_W^2 M_W^2 s_W^2}\left(\begin{array}{l} t_\beta\left(6\left(\sum_{gn=1}^{3}\mathrm{CKM}_{g4,gn}\mathrm{CKM}^*_{g3,gn}m_{d_{gn}}^2\right)t_\beta c_W^2 - \delta_{g3,g4}s_{2\beta}\left(1 + 2c_W^2\right)M_W^2\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1} - \\ 2\delta_{g3,g4}\left(3c_W^2 m_{u_{g3}}^2 - 2s_{2\beta}t_\beta M_W^2 s_W^2\right)U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\end{array}\right)\right]$$

$$C\left(G^-, H^+, \tilde{u}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[\frac{ie^2}{12t_\beta c_W^2 M_W^2 s_W^2}\left(\begin{array}{l} t_\beta\left(6\left(\sum_{gn=1}^{3}\mathrm{CKM}_{g4,gn}\mathrm{CKM}^*_{g3,gn}m_{d_{gn}}^2\right)t_\beta c_W^2 - \delta_{g3,g4}s_{2\beta}\left(1 + 2c_W^2\right)M_W^2\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1} - \\ 2\delta_{g3,g4}\left(3c_W^2 m_{u_{g3}}^2 - 2s_{2\beta}t_\beta M_W^2 s_W^2\right)U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}\end{array}\right)\right]$$

$$C\left(H^-, H^+, \tilde{d}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2}{12c_W^2 M_W^2 s_W^2 t_\beta^2}\left(\begin{array}{l} \left(6\left(\sum_{gn=1}^{3}\mathrm{CKM}_{gn,g3}\mathrm{CKM}^*_{gn,g4}m_{u_{gn}}^2\right)c_W^2 + \delta_{g3,g4}c_{2\beta}\left(1 - 4c_W^2\right)M_W^2 t_\beta^2\right)U^{\tilde{d}_{g3}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1} + \\ 2\delta_{g3,g4}t_\beta^2\left(c_{2\beta}M_W^2 s_W^2 + 3c_W^2 m_{d_{g3}}^2 t_\beta^2\right)U^{\tilde{d}_{g3}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\end{array}\right)\right]$$

$$C\left(H^-, G^+, \tilde{d}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2}{12t_\beta c_W^2 M_W^2 s_W^2}\left(\begin{array}{l} \left(6\left(\sum_{gn=1}^{3}\mathrm{CKM}_{gn,g3}\mathrm{CKM}^*_{gn,g4}m_{u_{gn}}^2\right)c_W^2 + \delta_{g3,g4}s_{2\beta}t_\beta\left(1 - 4c_W^2\right)M_W^2\right)U^{\tilde{d}_{g3}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1} - \\ 2\delta_{g3,g4}t_\beta\left(3t_\beta c_W^2 m_{d_{g3}}^2 - s_{2\beta}M_W^2 s_W^2\right)U^{\tilde{d}_{g3}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\end{array}\right)\right]$$

$$C\left(G^-, H^+, \tilde{d}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2}{12t_\beta c_W^2 M_W^2 s_W^2}\left(\begin{array}{l} \left(6\left(\sum_{gn=1}^{3}\mathrm{CKM}_{gn,g3}\mathrm{CKM}^*_{gn,g4}m_{u_{gn}}^2\right)c_W^2 + \delta_{g3,g4}s_{2\beta}t_\beta\left(1 - 4c_W^2\right)M_W^2\right)U^{\tilde{d}_{g3}*}_{s3,1}U^{\tilde{d}_{g4}}_{s4,1} - \\ 2\delta_{g3,g4}t_\beta\left(3t_\beta c_W^2 m_{d_{g3}}^2 - s_{2\beta}M_W^2 s_W^2\right)U^{\tilde{d}_{g3}*}_{s3,2}U^{\tilde{d}_{g4}}_{s4,2}\end{array}\right)\right]$$

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

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

$$
\underset{348}{C}\left(G^-, G^+, \tilde{u}^{s3}_{g3}, \tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{i e^2}{12 c_W^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(6\left(\sum_{gn=1}^{3} CKM_{g4,gn} CKM^*_{g3,gn} m_{d_{gn}}^2\right) c_W^2 - \delta_{g3,g4} c_{2\beta}\left(1 + 2 c_W^2\right) M_W^2\right) U^{\tilde{u}_{g3}*}_{s3,1} U^{\tilde{u}_{g4}}_{s4,1} + \\ 2\delta_{g3,g4}\left(3 c_W^2 m_{u_{g3}}^2 + 2 c_{2\beta} M_W^2 s_W^2\right) U^{\tilde{u}_{g3}*}_{s3,2} U^{\tilde{u}_{g4}}_{s4,2} \end{array} \right) \right]
$$

$$
\underset{349}{C}\left(G^-, G^+, \tilde{d}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[-\frac{i e^2}{12 c_W^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(6\left(\sum_{gn=1}^{3} CKM_{gn,g3} CKM^*_{gn,g4} m_{u_{gn}}^2\right) c_W^2 - \delta_{g3,g4} c_{2\beta}\left(1 - 4 c_W^2\right) M_W^2\right) U^{\tilde{d}_{g3}*}_{s3,1} U^{\tilde{d}_{g4}}_{s4,1} + \\ 2\delta_{g3,g4}\left(3 c_W^2 m_{d_{g3}}^2 - c_{2\beta} M_W^2 s_W^2\right) U^{\tilde{d}_{g3}*}_{s3,2} U^{\tilde{d}_{g4}}_{s4,2} \end{array} \right) \right]
$$

$$
\underset{372}{C}\left(\tilde{d}^{s1}_{g1}, \tilde{d}^{s2,\dagger}_{g2}, \tilde{d}^{s3}_{g3}, \tilde{d}^{s4,\dagger}_{g4}\right) = \left[\begin{array}{l} -\left(\begin{array}{l} \frac{i e^2}{36 c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(\begin{array}{l} \left(1 + 8 c_W^2\right) c_\beta^2 M_W^2 U^{\tilde{d}_{g2}}_{s2,1} U^{\tilde{d}_{g2}*}_{s3,1} U^{\tilde{d}_{g1}}_{s4,1} + \\ 2 U^{\tilde{d}_{g2}*}_{s3,2}\left(c_\beta^2 M_W^2 s_W^2 U^{\tilde{d}_{g2}}_{s2,2} U^{\tilde{d}_{g1}}_{s4,1} + 9 m_{d_{g1}} m_{d_{g2}} c_W^2 U^{\tilde{d}_{g2}}_{s2,1} U^{\tilde{d}_{g1}}_{s4,2}\right) \end{array} \right) U^{\tilde{d}_{g1}*}_{s1,1} + \\ 2\left(\begin{array}{l} 2 c_\beta^2 M_W^2 s_W^2 U^{\tilde{d}_{g2}}_{s2,2} U^{\tilde{d}_{g2}*}_{s3,2} U^{\tilde{d}_{g1}}_{s4,2} + \\ U^{\tilde{d}_{g2}*}_{s3,1}\left(9 m_{d_{g1}} m_{d_{g2}} c_W^2 U^{\tilde{d}_{g2}}_{s2,2} U^{\tilde{d}_{g1}}_{s4,1} + c_\beta^2 M_W^2 s_W^2 U^{\tilde{d}_{g2}}_{s2,1} U^{\tilde{d}_{g1}}_{s4,2}\right) \end{array} \right) U^{\tilde{d}_{g1}*}_{s1,2} \end{array} \right) + \\ i g_s^2 \left(T^x_{c2,c3} T^x_{c4,c1}\right)\left(U^{\tilde{d}_{g2}}_{s2,1} U^{\tilde{d}_{g2}*}_{s3,1} - U^{\tilde{d}_{g2}}_{s2,2} U^{\tilde{d}_{g2}*}_{s3,2}\right)\left(U^{\tilde{d}_{g1}*}_{s1,1} U^{\tilde{d}_{g1}}_{s4,1} - U^{\tilde{d}_{g1}*}_{s1,2} U^{\tilde{d}_{g1}}_{s4,2}\right) \end{array} \right) \delta_{g1,g4}\delta_{g2,g3} - \\ \left(\begin{array}{l} \frac{i e^2}{36 c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(\begin{array}{l} \left(1 + 8 c_W^2\right) c_\beta^2 M_W^2 U^{\tilde{d}_{g1}}_{s2,1} U^{\tilde{d}_{g3}*}_{s3,1} U^{\tilde{d}_{g3}}_{s4,1} + \\ 2 U^{\tilde{d}_{g3}*}_{s3,2}\left(9 m_{d_{g1}} m_{d_{g3}} c_W^2 U^{\tilde{d}_{g1}}_{s2,2} U^{\tilde{d}_{g3}}_{s4,1} + c_\beta^2 M_W^2 s_W^2 U^{\tilde{d}_{g1}}_{s2,1} U^{\tilde{d}_{g3}}_{s4,2}\right) \end{array} \right) U^{\tilde{d}_{g1}*}_{s1,1} + \\ 2\left(\begin{array}{l} 2 c_\beta^2 M_W^2 s_W^2 U^{\tilde{d}_{g1}}_{s2,2} U^{\tilde{d}_{g3}*}_{s3,2} U^{\tilde{d}_{g3}}_{s4,2} + \\ U^{\tilde{d}_{g3}*}_{s3,1}\left(c_\beta^2 M_W^2 s_W^2 U^{\tilde{d}_{g1}}_{s2,2} U^{\tilde{d}_{g3}}_{s4,1} + 9 m_{d_{g1}} m_{d_{g3}} c_W^2 U^{\tilde{d}_{g1}}_{s2,1} U^{\tilde{d}_{g3}}_{s4,2}\right) \end{array} \right) U^{\tilde{d}_{g1}*}_{s1,2} \end{array} \right) + \\ i g_s^2 \left(T^x_{c2,c1} T^x_{c4,c3}\right)\left(U^{\tilde{d}_{g1}*}_{s1,1} U^{\tilde{d}_{g1}}_{s2,1} - U^{\tilde{d}_{g1}*}_{s1,2} U^{\tilde{d}_{g1}}_{s2,2}\right)\left(U^{\tilde{d}_{g3}*}_{s3,1} U^{\tilde{d}_{g3}}_{s4,1} - U^{\tilde{d}_{g3}*}_{s3,2} U^{\tilde{d}_{g3}}_{s4,2}\right) \end{array} \right) \delta_{g1,g2}\delta_{g3,g4} \end{array} \right]
$$

$$
\underset{373}{C}\left(\tilde{d}^{s1}_{g1}, \tilde{d}^{s2,\dagger}_{g2}, \tilde{e}^{s3}_{g3}, \tilde{e}^{s4,\dagger}_{g4}\right) = \left[-\frac{i e^2 \delta_{g1,g2}\delta_{g3,g4}}{12 c_W^2 c_\beta^2 M_W^2 s_W^2} \left(\begin{array}{l} \left(\begin{array}{l} c_\beta^2 M_W^2\left(3 c_W^2 - s_W^2\right) U^{\tilde{d}_{g1}*}_{s1,1} U^{\tilde{d}_{g1}}_{s2,1} U^{\tilde{e}_{g3}}_{s4,1} - \\ 2 U^{\tilde{d}_{g1}*}_{s1,2}\left(c_\beta^2 M_W^2 s_W^2 U^{\tilde{d}_{g1}}_{s2,2} U^{\tilde{e}_{g3}}_{s4,1} - 3 m_{d_{g1}} m_{e_{g3}} c_W^2 U^{\tilde{d}_{g1}}_{s2,1} U^{\tilde{e}_{g3}}_{s4,2}\right) \end{array} \right) U^{\tilde{e}_{g3}*}_{s3,1} + \\ 2 U^{\tilde{e}_{g3}*}_{s3,2}\left(2 c_\beta^2 M_W^2 s_W^2 U^{\tilde{d}_{g1}*}_{s1,2} U^{\tilde{d}_{g1}}_{s2,2} U^{\tilde{e}_{g3}}_{s4,2} + U^{\tilde{d}_{g1}*}_{s1,1}\left(3 m_{d_{g1}} m_{e_{g3}} c_W^2 U^{\tilde{d}_{g1}}_{s2,2} U^{\tilde{e}_{g3}}_{s4,1} + c_\beta^2 M_W^2 s_W^2 U^{\tilde{d}_{g1}}_{s2,1} U^{\tilde{e}_{g3}}_{s4,2}\right)\right) \end{array} \right) \right]
$$

$$\underset{374}{C}\left(\tilde{d}^{s1}_{g1},\tilde{d}^{s2,\dagger}_{g2},\tilde{\nu}_{g3},\tilde{\nu}^{\dagger}_{g4}\right) = \left[\frac{ie^2\delta_{g1,g2}\delta_{g3,g4}}{12c_W^2 s_W^2}\left(\left(1+2c_W^2\right)U^{\tilde{d}_{g1}*}_{s1,1}U^{\tilde{d}_{g1}}_{s2,1}+2s_W^2 U^{\tilde{d}_{g1}*}_{s1,2}U^{\tilde{d}_{g1}}_{s2,2}\right)\right]$$

$$\underset{375}{C}\left(\tilde{d}^{s1}_{g1},\tilde{d}^{s2,\dagger}_{g2},\tilde{u}^{s3}_{g3},\tilde{u}^{s4,\dagger}_{g4}\right) = \left[\begin{array}{l}\left(\begin{array}{l}\frac{ie^2}{36c_W^2 s_W^2}\left(\begin{array}{l}4s_W^2\left(U^{\tilde{d}_{g1}*}_{s1,1}U^{\tilde{d}_{g1}}_{s2,1}+2U^{\tilde{d}_{g1}*}_{s1,2}U^{\tilde{d}_{g1}}_{s2,2}\right)U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g3}}_{s4,2}+\\ \left(\left(9c_W^2-s_W^2\right)U^{\tilde{d}_{g1}*}_{s1,1}U^{\tilde{d}_{g1}}_{s2,1}-2s_W^2 U^{\tilde{d}_{g1}*}_{s1,2}U^{\tilde{d}_{g1}}_{s2,2}\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g3}}_{s4,1}\end{array}\right)-\\ ig_s^2\left(T^x_{c2,c1}T^x_{c4,c3}\right)\left(U^{\tilde{d}_{g1}*}_{s1,1}U^{\tilde{d}_{g1}}_{s2,1}-U^{\tilde{d}_{g1}*}_{s1,2}U^{\tilde{d}_{g1}}_{s2,2}\right)\left(U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g3}}_{s4,1}-U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g3}}_{s4,2}\right)\end{array}\right)\delta_{g1,g2}\delta_{g3,g4}-\\ \frac{ie^2 CKM_{g4,g1}CKM^*_{g3,g2}}{2c_\beta^2 M_W^2 s_W^2 s_\beta^2}\left(\begin{array}{l}m_{u_{g3}}m_{u_{g4}}c_\beta^2 U^{\tilde{d}_{g1}*}_{s1,1}U^{\tilde{d}_{g2}}_{s2,1}U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g4}}_{s4,2}+\\ s_\beta^2\left(c_\beta^2 M_W^2 U^{\tilde{d}_{g1}*}_{s1,1}U^{\tilde{d}_{g2}}_{s2,1}+m_{d_{g1}}m_{d_{g2}}U^{\tilde{d}_{g1}*}_{s1,2}U^{\tilde{d}_{g2}}_{s2,2}\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g4}}_{s4,1}\end{array}\right)\end{array}\right]$$

$$\underset{376}{C}\left(\tilde{d}^{s1}_{g1},\tilde{e}^{s2,\dagger}_{g2},\tilde{\nu}_{g3},\tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2 CKM_{g4,g1}\delta_{g2,g3}U^{\tilde{u}_{g4}}_{s4,1}}{2c_\beta^2 M_W^2 s_W^2}\left(c_\beta^2 M_W^2 U^{\tilde{d}_{g1}*}_{s1,1}U^{\tilde{e}_{g2}}_{s2,1}+m_{d_{g1}}m_{e_{g2}}U^{\tilde{d}_{g1}*}_{s1,2}U^{\tilde{e}_{g2}}_{s2,2}\right)\right]$$

$$\underset{377}{C}\left(\tilde{e}^{s1}_{g1},\tilde{d}^{s2,\dagger}_{g2},\tilde{u}^{s3}_{g3},\tilde{\nu}^{\dagger}_{g4}\right) = \left[-\frac{ie^2\delta_{g1,g4}CKM^*_{g3,g2}U^{\tilde{u}_{g3}*}_{s3,1}}{2c_\beta^2 M_W^2 s_W^2}\left(c_\beta^2 M_W^2 U^{\tilde{e}_{g1}*}_{s1,1}U^{\tilde{d}_{g2}}_{s2,1}+m_{d_{g2}}m_{e_{g1}}U^{\tilde{e}_{g1}*}_{s1,2}U^{\tilde{d}_{g2}}_{s2,2}\right)\right]$$

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

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

$$\underset{380}{C}\left(\tilde{e}^{s1}_{g1},\tilde{e}^{s2,\dagger}_{g2},\tilde{u}^{s3}_{g3},\tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2\delta_{g1,g2}\delta_{g3,g4}}{12c_W^2 s_W^2}\left(\begin{array}{l}2s_W^2 U^{\tilde{e}_{g1}*}_{s1,2}U^{\tilde{e}_{g1}}_{s2,2}\left(U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g3}}_{s4,1}-4U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g3}}_{s4,2}\right)-\\ U^{\tilde{e}_{g1}*}_{s1,1}U^{\tilde{e}_{g1}}_{s2,1}\left(\left(1+2c_W^2\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g3}}_{s4,1}-4s_W^2 U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g3}}_{s4,2}\right)\end{array}\right)\right]$$

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

$$\underset{382}{C}\left(\tilde{\nu}_{g1},\tilde{\nu}^{\dagger}_{g2},\tilde{u}^{s3}_{g3},\tilde{u}^{s4,\dagger}_{g4}\right) = \left[-\frac{ie^2\delta_{g1,g2}\delta_{g3,g4}}{12c_W^2 s_W^2}\left(\left(3c_W^2-s_W^2\right)U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g3}}_{s4,1}+4s_W^2 U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g3}}_{s4,2}\right)\right]$$

$$\underset{383}{C}\left(\tilde{u}^{s1}_{g1},\tilde{u}^{s2,\dagger}_{g2},\tilde{u}^{s3}_{g3},\tilde{u}^{s4,\dagger}_{g4}\right) = \left[\begin{array}{l} -\left(\begin{array}{l} \frac{ie^2}{36c_W^2 M_W^2 s_W^2 s_\beta^2}\left(\begin{array}{l}\left(\begin{array}{l}\left(1+8c_W^2\right)M_W^2 s_\beta^2 U^{\tilde{u}_{g2}}_{s2,1}U^{\tilde{u}_{g2}*}_{s3,1}U^{\tilde{u}_{g1}}_{s4,1}- \\ 2U^{\tilde{u}_{g2}*}_{s3,2}\left(2M_W^2 s_W^2 s_\beta^2 U^{\tilde{u}_{g2}}_{s2,2}U^{\tilde{u}_{g1}}_{s4,1}-9m_{u_{g1}}m_{u_{g2}}c_W^2 U^{\tilde{u}_{g2}}_{s2,1}U^{\tilde{u}_{g1}}_{s4,2}\right)\end{array}\right)U^{\tilde{u}_{g1}*}_{s1,1}+ \\ 2\left(\begin{array}{l}8M_W^2 s_W^2 s_\beta^2 U^{\tilde{u}_{g2}}_{s2,2}U^{\tilde{u}_{g2}*}_{s3,2}U^{\tilde{u}_{g1}}_{s4,2}+ \\ U^{\tilde{u}_{g2}*}_{s3,1}\left(9m_{u_{g1}}m_{u_{g2}}c_W^2 U^{\tilde{u}_{g2}}_{s2,2}U^{\tilde{u}_{g1}}_{s4,1}-2M_W^2 s_W^2 s_\beta^2 U^{\tilde{u}_{g2}}_{s2,1}U^{\tilde{u}_{g1}}_{s4,2}\right)\end{array}\right)U^{\tilde{u}_{g1}*}_{s1,2}\end{array}\right)+ \\ ig_s^2\left(T^x_{c2,c3}T^x_{c4,c1}\right)\left(U^{\tilde{u}_{g2}}_{s2,1}U^{\tilde{u}_{g2}*}_{s3,1}-U^{\tilde{u}_{g2}}_{s2,2}U^{\tilde{u}_{g2}*}_{s3,2}\right)\left(U^{\tilde{u}_{g1}*}_{s1,1}U^{\tilde{u}_{g1}}_{s4,1}-U^{\tilde{u}_{g1}*}_{s1,2}U^{\tilde{u}_{g1}}_{s4,2}\right)\end{array}\right)\delta_{g1,g4}\delta_{g2,g3}- \\ \left(\begin{array}{l} \frac{ie^2}{36c_W^2 M_W^2 s_W^2 s_\beta^2}\left(\begin{array}{l}\left(\begin{array}{l}\left(1+8c_W^2\right)M_W^2 s_\beta^2 U^{\tilde{u}_{g1}}_{s2,1}U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g3}}_{s4,1}+ \\ 2U^{\tilde{u}_{g3}*}_{s3,2}\left(9m_{u_{g1}}m_{u_{g3}}c_W^2 U^{\tilde{u}_{g1}}_{s2,2}U^{\tilde{u}_{g3}}_{s4,1}-2M_W^2 s_W^2 s_\beta^2 U^{\tilde{u}_{g1}}_{s2,1}U^{\tilde{u}_{g3}}_{s4,2}\right)\end{array}\right)U^{\tilde{u}_{g1}*}_{s1,1}+ \\ 2\left(\begin{array}{l}8M_W^2 s_W^2 s_\beta^2 U^{\tilde{u}_{g1}}_{s2,2}U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g3}}_{s4,2}- \\ U^{\tilde{u}_{g3}*}_{s3,1}\left(2M_W^2 s_W^2 s_\beta^2 U^{\tilde{u}_{g1}}_{s2,2}U^{\tilde{u}_{g3}}_{s4,1}-9m_{u_{g1}}m_{u_{g3}}c_W^2 U^{\tilde{u}_{g1}}_{s2,1}U^{\tilde{u}_{g3}}_{s4,2}\right)\end{array}\right)U^{\tilde{u}_{g1}*}_{s1,2}\end{array}\right)+ \\ ig_s^2\left(T^x_{c2,c1}T^x_{c4,c3}\right)\left(U^{\tilde{u}_{g1}*}_{s1,1}U^{\tilde{u}_{g1}}_{s2,1}-U^{\tilde{u}_{g1}*}_{s1,2}U^{\tilde{u}_{g1}}_{s2,2}\right)\left(U^{\tilde{u}_{g3}*}_{s3,1}U^{\tilde{u}_{g3}}_{s4,1}-U^{\tilde{u}_{g3}*}_{s3,2}U^{\tilde{u}_{g3}}_{s4,2}\right)\end{array}\right)\delta_{g1,g2}\delta_{g3,g4}\end{array}\right]$$

[SSVV] 2 Higgs – 2 Gauge Bosons

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

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

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

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

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

$$C_{36}\left(G^-, G^+, \gamma, Z\right) = \left[\frac{\mathrm{i}e^2}{c_W s_W}\left(c_W^2 - s_W^2\right) \right]$$

$$C_{37}\left(G^-, G^+, Z, Z\right) = \left[\frac{\mathrm{i}e^2}{2c_W^2 s_W^2}\left(c_W^2 - s_W^2\right)^2 \right]$$

$$C_{38}\left(G^-, G^+, W^-, W^+\right) = \left[\frac{\mathrm{i}e^2}{2s_W^2} \right]$$

$$C_{149}\left(h^0, H^-, \gamma, W^+\right) = \left[\frac{\mathrm{i}e^2 c_{\beta-\alpha}}{2s_W} \right]$$

$$C_{150}\left(h^0, H^-, Z, W^+\right) = \left[-\frac{\mathrm{i}e^2 c_{\beta-\alpha}}{2c_W} \right]$$

$$C_{151}\left(h^0, G^-, \gamma, W^+\right) = \left[\frac{\mathrm{i}e^2 s_{\beta-\alpha}}{2s_W} \right]$$

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

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

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

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

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

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

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

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

$$C\left(H^0, H^-, Z, W^+\right) = \left[\frac{\mathrm{i}e^2 s_{\beta-\alpha}}{2c_W} \right]$$

$$C\left(H^0, G^-, \gamma, W^+\right) = \left[\frac{\mathrm{i}e^2 c_{\beta-\alpha}}{2s_W} \right]$$

$$C\left(H^0, G^-, Z, W^+\right) = \left[-\frac{\mathrm{i}e^2 c_{\beta-\alpha}}{2c_W} \right]$$

$$C\left(H^0, H^+, \gamma, W^-\right) = \left[-\frac{\mathrm{i}e^2 s_{\beta-\alpha}}{2s_W} \right]$$

$$C\left(H^0, H^+, Z, W^-\right) = \left[\frac{\mathrm{i}e^2 s_{\beta-\alpha}}{2c_W} \right]$$

$$C\left(H^0, G^+, \gamma, W^-\right) = \left[\frac{\mathrm{i}e^2 c_{\beta-\alpha}}{2s_W} \right]$$

$$C\left(H^0, G^+, Z, W^-\right) = \left[-\frac{\mathrm{i}e^2 c_{\beta-\alpha}}{2c_W} \right]$$

$$C\left(A^0, A^0, Z, Z\right) = \left[\frac{\mathrm{i}e^2}{2c_W^2 s_W^2} \right]$$

$$C\left(A^0, A^0, W^-, W^+\right) = \left[\frac{\mathrm{i}e^2}{2s_W^2} \right]$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$C_{354}\left(\tilde{u}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, \gamma, \gamma\right) = \left[\ \frac{8}{9}ie^2\delta_{g1,g2}\delta_{s1,s2}\ \right]$$

$$C_{355}\left(\tilde{u}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, \gamma, Z\right) = \left[\ \frac{2ie^2\delta_{g1,g2}}{9c_W s_W}\left(\left(3 - 4s_W^2\right)U_{s1,1}^{\tilde{u}_{g1}*}U_{s2,1}^{\tilde{u}_{g1}} - 4s_W^2 U_{s1,2}^{\tilde{u}_{g1}*}U_{s2,2}^{\tilde{u}_{g1}}\right)\ \right]$$

$$C_{356}\left(\tilde{u}_{g1}^{s1}, \tilde{u}_{g2}^{s2,\dagger}, Z, Z\right) = \left[\ \frac{ie^2\delta_{g1,g2}}{18c_W^2 s_W^2}\left(\left(3 - 4s_W^2\right)^2 U_{s1,1}^{\tilde{u}_{g1}*}U_{s2,1}^{\tilde{u}_{g1}} + 16s_W^4 U_{s1,2}^{\tilde{u}_{g1}*}U_{s2,2}^{\tilde{u}_{g1}}\right)\ \right]$$

$$C\left(\tilde{d}^{s1}_{g1}, \tilde{d}^{s2,\dagger}_{g2}, \gamma, \gamma\right) = \left[\frac{2}{9} i e^2 \delta_{g1,g2} \delta_{s1,s2} \right]$$

$$C\left(\tilde{d}^{s1}_{g1}, \tilde{d}^{s2,\dagger}_{g2}, \gamma, Z\right) = \left[\frac{i e^2 \delta_{g1,g2}}{9 c_W s_W} \left(\left(3 - 2 s_W^2\right) U^{\tilde{d}_{g1}*}_{s1,1} U^{\tilde{d}_{g1}}_{s2,1} - 2 s_W^2 U^{\tilde{d}_{g1}*}_{s1,2} U^{\tilde{d}_{g1}}_{s2,2} \right) \right]$$

$$C\left(\tilde{d}^{s1}_{g1}, \tilde{d}^{s2,\dagger}_{g2}, Z, Z\right) = \left[\frac{i e^2 \delta_{g1,g2}}{18 c_W^2 s_W^2} \left(\left(3 - 2 s_W^2\right)^2 U^{\tilde{d}_{g1}*}_{s1,1} U^{\tilde{d}_{g1}}_{s2,1} + 4 s_W^4 U^{\tilde{d}_{g1}*}_{s1,2} U^{\tilde{d}_{g1}}_{s2,2} \right) \right]$$

$$C\left(\tilde{u}^{s1}_{g1}, \tilde{d}^{s2,\dagger}_{g2}, \gamma, W^-\right) = \left[\frac{i e^2 \mathrm{CKM}^*_{g1,g2} U^{\tilde{u}_{g1}*}_{s1,1} U^{\tilde{d}_{g2}}_{s2,1}}{3\sqrt{2} s_W} \right]$$

$$C\left(\tilde{d}^{s1}_{g1}, \tilde{u}^{s2,\dagger}_{g2}, \gamma, W^+\right) = \left[\frac{i e^2 \mathrm{CKM}_{g2,g1} U^{\tilde{d}_{g1}*}_{s1,1} U^{\tilde{u}_{g2}}_{s2,1}}{3\sqrt{2} s_W} \right]$$

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

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

$$C\left(\tilde{u}^{s1}_{g1}, \tilde{d}^{s2,\dagger}_{g2}, Z, W^-\right) = \left[-\frac{i e^2 \mathrm{CKM}^*_{g1,g2} U^{\tilde{u}_{g1}*}_{s1,1} U^{\tilde{d}_{g2}}_{s2,1}}{3\sqrt{2} c_W} \right]$$

$$C\left(\tilde{d}^{s1}_{g1}, \tilde{u}^{s2,\dagger}_{g2}, Z, W^+\right) = \left[-\frac{i e^2 \mathrm{CKM}_{g2,g1} U^{\tilde{d}_{g1}*}_{s1,1} U^{\tilde{u}_{g2}}_{s2,1}}{3\sqrt{2} c_W} \right]$$

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

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

$$C\left(\tilde{\nu}_{g1}, \tilde{\nu}^{\dagger}_{g2}, W^-, W^+\right) = \left[\frac{i e^2 \delta_{g1,g2}}{2 s_W^2} \right]$$

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

$$\underset{370}{C}\left(\tilde{u}^{s1}_{g1}, \tilde{u}^{s2,\dagger}_{g2}, W^-, W^+\right) = \left[\frac{ie^2 \delta_{g1,g2} U^{\tilde{u}_{g1}*}_{s1,1} U^{\tilde{u}_{g1}}_{s2,1}}{2 s_W^2}\right]$$

$$\underset{371}{C}\left(\tilde{d}^{s1}_{g1}, \tilde{d}^{s2,\dagger}_{g2}, W^-, W^+\right) = \left[\frac{ie^2 \delta_{g1,g2} U^{\tilde{d}_{g1}*}_{s1,1} U^{\tilde{d}_{g1}}_{s2,1}}{2 s_W^2}\right]$$

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

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

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

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